GEOPHYSICAL REPORT

VLF EM-16

and

Proton Magnetometer Surveys

ROUS LAKE

FOR: Cannon Mines Ltd.

BY: Phantom Exploration Services Ltd.
Ian Spence
April, 1983

RECEIVED
Sh i 2 - 1993
MINING LANDS SECTION
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MAPS INCLUDED IN THIS REPORT

<table>
<thead>
<tr>
<th>Map Type</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location Map</td>
<td>1&quot; = ½ mile</td>
</tr>
<tr>
<td>VLF EM-16 Profiles</td>
<td>1:2500</td>
</tr>
<tr>
<td>VLF EM-16 Fraser Filtered Data</td>
<td>1:2500</td>
</tr>
<tr>
<td>Proton Magnetometer</td>
<td>1:2500</td>
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</table>
INTRODUCTION

During the Spring of 1983, Cannon Mines Ltd. contracted Phantom Exploration Services Ltd. to establish a grid and conduct geophysical surveys over its Rous Lake claim block in the Hemlo area.

Both VLF EM-16 and Proton Magnetometer surveys were conducted over the grid at a station interval of 25 meters and line spacing of 75 meters. The purpose of these surveys was to delineate any EM conductors on the property and to test the magnetic response of these anomalies.

LOCATION AND ACCESS

The claim group is located directly south of Highway 17 and on Rous Lake. The nearest town would be Marathon, which is approximately 35 kilometers to the west of the block along the highway. Access to the group was provided by bush roads to a camp located on the east shore of Rous Lake.

REGIONAL GEOLOGY

The block of claims lies to the west of the Golden-Giant deposit which is being brought into production by Noranda Exploration. Mapping by T. L. Muir of the O.G.S. shows the area being underlain by a granodiorite of the Heron Bay Pluton. The geophysics, however, suggest that this may not be the case.

LINECUTTING

A total of 36.725 kilometers of line was cut over the property. Pickets were established every 25 meters along the length of the grid lines which were spaced at an interval of 75 meters. The baseline was cut at 090 degrees (East-West) with the grid lines at 000 degrees (North-South).

THEORY OF OPERATION

The Proton Magnetometer

The proton precession magnetometer is so named because it utilizes the precession of spinning protons or nuclei of the hydrogen atom in a sample of hydrocarbon fluid to measure the total magnetic intensity. The spinning protons in a sample of kerosene behave as small, spinning magnetic dipoles. These magnets are temporarily polarized by application of a uniform magnetic field generated by a current in a coil of wire. When the current is removed, the spin of the protons causes them to precess about the
The processing protons then generate a small signal whose frequency is precisely proportional to the total magnetic field intensity and independent of the orientation of the coil (sensor). The proportionality which relates frequency to field intensity is the gyromagnetic ratio of the proton. The precession frequency, typically 2000 Hz is measured as the absolute value of the total magnetic field intensity with an accuracy of 1 gamma in the earth's field of approximately 50,000 gammas.

The total magnetic intensity, as measured by the proton magnetometer is the magnitude of the earth's field vector independent of its direction. The measurement can be expressed as a length (50,000 gammas) of the earth's field vector. A local disturbance, say 10 gammas, would add (or subtract) to the undisturbed field (50,000 gammas) in the usual manner of vector addition. Since the proton magnetometer measures only the magnitude of the resultant vector whose direction is almost parallel to the undisturbed total field vector, that which is measured is very nearly the component of the disturbance vector in the direction of the original undisturbed total field. Thus the change in total field intensity is called the anomaly.

The VLF EM-16 and Radem

The VLF-transmitting stations operating for communications with submarines have a vertical antenna. The antenna current is thus vertical, creating a concentric horizontal magnetic field around them. When these magnetic fields meet conductive bodies in the ground, there will be secondary fields radiating from these bodies. This equipment measures the vertical components of these secondary fields.

The VLF EM-16 is a sensitive receiver covering the frequency band of the VLF-transmitting stations with means of measuring the vertical field components.

The receiver has two inputs, with two receiving coils built into the instrument. One coil has normally vertical axis and the other is horizontal.

The signal from one of the coils (vertical axis) is first minimized by tilting the instrument. The tilt angle is calibrated in percentage. The remaining signal in this coil is finally balanced out by a measured percentage of a signal from another coil, after being shifted by 90°. This coil is normally parallel to the primary field.

Thus, if the secondary signals are small compared to the primary horizontal field, the mechanical tilt angle is an accurate measure of the vertical real-component, and the compensation 90° signal from the horizontal coil is a measure of the quadrature vertical signal.
SURVEY PROCEDURE

EM VLF Survey

The Cutler Maine transmitter station was chosen because of its favourable orientation to the geology of the area.

Readings were taken at 25 meter intervals over the entire grid with both the dip angle and the quadrature being noted at each station.

To take a reading the reference coil ("T") in the lower end of the handle is orientated along the magnetic lines 90° to the station direction. This is achieved by swinging the instrument back and forth until a minimum sound intensity is heard. The quadrature dial is then adjusted until the sound is further minimized. The dip angle is then read from the inclinometer and the quadrature from the dial. The direction is always faced when a reading is taken.

Proton Magnetometer Survey

The Proton Magnetometer data was collected at 25 meter intervals using a Scintrex MP-2 Proton Magnetometer. The field data was then referred to the log of a base station recorder (Scintrex MBS-2) which operated continuously throughout the survey. The purpose of the recorder was to correct for any major fluctuations in the magnetic field as the survey took place. Data was then plotted on a map scale of 1:2500 and contoured at the appropriate interval.

DISCUSSION OF RESULTS

Magnetometer Survey

The magnetometer survey indicates the presence of an almost North-South trend centered around line 7+50 East. This trend contains the highest readings on the property (about 2000 gammas above background) around an island on line 6+75 East/7+00 South. The regional geology and the morphology of the magnetics suggests that this anomaly is due to one of the many North-South striking diabase dykes which cut the area. There is a weak anomaly which parallels the above trend to the East and is likely due to a smaller dyke.

The other prominent magnetic feature on the property is a North-West striking body which is found on the west side of the grid. The magnetitude of the anomaly is about 500 gammas above background and probably represents the most interesting magnetic response. It may be due to a metagabbro or amphibolic unit.
Because of its proximity to the main highway and hydro line on the north and the rail line to the south, there is a problem with culture contamination (steel, garbage, etc.) which influence the readings. The spot highs on the north part of the grid are probably due to this problem.

VLF EM-16

The VLF EM-16 survey results were not very definitive. This is in part due to the instruments inherent problem of responding conductive clays (lake bottoms) and topographic lows such as creeks and swamps. The other problem on the grid is the presence of an electric transmission line along the highway which creates its own anomaly. This effect is evident on the North-West and North-East corners of the grid where the grid lines cross the hydro line.

The lake bottom problem is obvious along the south and east shores of the lake where the instrument is responding to the edge of a flat lying body. Since the conductivities are very low and the anomaly does match the shoreline of the lake, this is an obvious lake bottom conductor. This is unfortunate because of the position of the North-West trending mag high which coincides with this topographic noise and may be masking any VLF response over this trend.

There was no response over the North-South mag trend, probably due to the lack of anything electrically conductive and the angle of the trend to the transmitter.

CONCLUSIONS & RECOMMENDATIONS

The most interesting area of the property is by the southern shore of Rous Lake where two magnetic trends intersect and a number of VLF anomalies are present.

Due to the confusion of the VLF data for the reasons stated in the DISCUSSION OF RESULTS, it is difficult to say just what is causing the anomalies on the grid.

Because of the close proximity of the Golden-Giant deposit, I would hesitate to make a final decision on the property on the basis of this type of geophysical surveys.

I would, therefore, recommend that the ground be mapped geologically and sampling done where warranted in order to further assess the viability of the claim block.

Respectfully submitted.

Ian Spence
Geologist
LIST OF CLAIMS COVERED BY THIS REPORT

645372
657495
657496
657497
657498
657499
657500
657501
657502
657503
657504
657505
MAPS INCLUDED IN THIS REPORT
**Report of Work**

Ministry of Natural Resources

**Type of Survey(s):** Geophysical

**Claim Holder(s):** CANNON MINES LIMITED

**Address:** 10 ADELAIDE ST E STE 200 TORONTO ONT. M5C 1J2

**Survey Company:** PHANTOM EXPLORATION SERVICES

**Prospector’s Licence No.:** T 12 90

**Geophysical:**
- Electromagnetic
- Magnetometer
- Radiometric
- Other

**Geological:**
- Other

**Special Provisions**
- For first survey:
  - Enter 40 days. (This includes line cutting)
- For each additional survey:
  - Enter 20 days (for each)

**Man Days**

**Credits Requested per Each Claim in Columns at right**

**Expenditures (excludes power stripping):**

**Calculation of Expenditure Days Credits**

<table>
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<tr>
<th>Total Expenditures</th>
<th>Total Days Credits</th>
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<tbody>
<tr>
<td>$</td>
<td>15</td>
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**Instructions:**

- Total Days Credits may be apportioned at the claim holder's choice. Enter number of days credits per claim selected in columns at right.

**Certification Verifying Report of Work:**

I hereby certify that I have a personal and intimate knowledge of the facts set forth in the Report of Work annexed hereto, having performed the work or witnessed same during and/or after its completion and the annexed report is true.

**Received:** SEP 1 1983

**Mineral Lands Section:**

**For Office Use Only:**

- Total Days Credits: 12
- Date Recorded: Aug 29/83
- Mining Recorder: Audrey M. Hayed
- Date Approved: 8/6/87
- Branch Director: R. R. Pain

**Airborne Credits:**

**Note:** Special provisions credits do not apply to Airborne Surveys.
Mining Lands Comments

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<th>To: Geophysics</th>
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<td>Comments</td>
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☐ Approved  ☐ Wish to see again with corrections  Date: 26/8/83  Signature: [Signature]

☐ To: Geology - Expenditures

☐ To: Geochemistry

☐ To: Mining Lands Section, Room 6462, Whitney Block. (Tel: 5-1380)
June 5, 1984

Ministry of Natural Resources
Whitney Block, Room 6643
Queens Park
Toronto, Ontario
M7A 1W3

Attention: Mr. Ray Fichette

RE: Your File # 2.5799
Geophysical (Electromagnetic and Magnetic) and
Geological Surveys submitted on Mining Claims
TB 657495 et al in the Rous Lake area.

Dear Sir:

Enclosed are two copies of the Magnetometer
Maps which you requested from Cannon Mines Limited on
May 31, 1984. I apologise for the repeated delays in
getting these maps to you, however I just recently
learned of the problems with the first edition.

I hope that you will find that this will
fulfil your requirements for assessment.

Yours Sincerely:

[Signature]

Ian Spence
Geologist
Phantom Exploration Services Ltd
R.R. #14
736 Alice Avenue
Thunder Bay, Ontario
P7B 5E5

Dear Sirs:

RE: Geophysical (Electromagnetic and Magnetometer) Survey on Mining Claims TB 645372 et al in the Rous Lake Area

Your letter of May 18, 1984 and attachments have been received. We are still awaiting copies of the magnetometer plans (in duplicate). Upon receipt of this material your survey will be assessed.

For further information, please contact Mr. Ray Pichette at (416)965-6918.

Yours sincerely,

S.E. Yundt
Director
Land Management Branch

Whitney Block, Room 6643
Queen's Park
Toronto, Ontario
M7A 1M3
Phone: (416)965-6918

S. Hurst: mc

cc: Mining Recorder
Thunder Bay, Ontario
Phantom Exploration Services Ltd.
RR #14, 736 Alice Ave.
Thunder Bay, Ontario
P7B 5E5

May 18, 1984

Ministry of Natural Resources
Whitney Block, Room 6643
Queens Park
Toronto, Ontario
M7A 1W3

RE: ROUS LAKE REPORT
CLAIM NUMBERS: 6645372, 657495 to 657505
TOTAL OF 12 CLAIMS

Dear Sir:

Enclosed are two amended copies of the EM-16 VLF PROFILES which you requested from Cannon Mines Limited some time ago. I apologise for the delay in getting these maps to you, however I just learned of the discrepancies about two weeks ago.

I trust that you will find these amendments satisfactory.

If there is any further problem with this report, please don’t hesitate to get in touch with me.

Yours Sincerely,

Ian Spence
December 12, 1983

Cannon Mines Ltd
10 Adelaide Street East
Suite 300
Toronto, Ontario
M5C 1J3

Dear Sirs:

RE: Geophysical (Electromagnetic and Magnetometer) survey submitted on Mining Claims TB 645372 et al in the Area of Rous Lake

Enclosed are the plans, in duplicate, for the above-mentioned survey. Please return with:

a) raw data plotted on VLF map
b) duplicate maps
c) statement of qualifications of the author of this report

For further information, please contact Mr. F.W. Matthews at (416)965-1380.

Yours very truly,

E.F. Anderson
Director
Land Management Branch

Whitney Block, Room 6643
Queen's Park
Toronto, Ontario
M7A 1N3
Phone:(416)965-1380

M. Anderson

cc: Mining Recorder
    Thunder Bay, Ontario

Encl.
Mrs. Audrey Hayes  
Mining Recorder  
Ministry of Natural Resources  
P.O. Box 5000  
Thunder Bay, Ontario  
P7C 5G6

Dear Madam:

We have received reports and maps for a Geophysical  
(Electromagnetic and Magnetometer) survey submitted under  
Special Provisions (credit for Performance and Coverage) on  
mining claims TB 645372 et al in the Area of Rous Lake.

This material will be examined and assessed and a statement  
of assessment work credits will be issued.

Yours very truly,

E.F. Anderson  
Director  
Land Management Branch

Whitney Block, Room 6450  
Queen’s Park  
Toronto, Ontario  
M7A 1W3  
Phone: (416) 965-1380

A. Barr:

cc: Cannon Mines Limited  
10 Adelaide Street East  
Suite 200  
Toronto, Ontario  
M5C 1J3
**Ontario Ministry of Natural Resources**

**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(s):** Geophysical

**Township or Area:** Roug Lake

**Claim Holder(s):** CANNOCK Mines Ltd

**Survey Company:** Phantom Exploration Services Ltd

**Author of Report:** J. A. Speir

**Address of Author:** 541 S. MARKET ST, Thunder Bay, Ont.

**Covering Dates of Survey:** March 1983 (linecutting to office)

**Total Miles of Line Cut:** 36.725 Kilometers

**SPECIAL PROVISIONS CREDITS REQUESTED**

<table>
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<tr>
<th>Survey Type</th>
<th>Days per Claim</th>
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<tbody>
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<td>Geophysical</td>
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<tr>
<td>Electromagnetic</td>
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<tr>
<td>Magnetometer</td>
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<tr>
<td>Radiometric</td>
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<td>Other</td>
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<tr>
<td>Geological</td>
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<td>Geochemical</td>
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**AIRBORNE CREDITS (Special provision credits do not apply to airborne surveys)**

- Magnetometer
- Electromagnetic
- Radiometric

**DATE:** April 83

**SIGNATURE:** J. A. Speir

Author of Report or Agent

**RESOLVED BY:**

**RECEIVED:**

**MINING LANDS SECTION**

**File No.**

**Type**

**Date**

**Claim Holder**

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**TOTAL CLAIMS:** 12
<table>
<thead>
<tr>
<th><strong>GEOPHYSICAL TECHNICAL DATA</strong></th>
</tr>
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</table>

**GROUND SURVEYS**  - If more than one survey, specify data for each type of survey

- Number of Stations: 11,000
- Number of Readings: 11,000
- Station interval: 0.25 meters
- Line spacing: 0.75 meters
- Profile scale: 1 cm = 100 ft
- Contour interval: Mag = 100 Y, U/I = > 10

**MAGNETIC**

- Instrument: Saintrix MP-2, Saintrix MBS-2 Base Station Recorder
- Accuracy - Scale constant: 1 Y
- Diurnal correction method: Base Station Recorder / 10 second monitor
- Base Station check-in interval (hours): Continuous throughout survey
- Base Station location and value: E 12.50 East, N 100 South, 5.9690 Y

**ELECTROMAGNETIC**

- Instrument: Geonics ULF EM-16
- Coil configuration: x coil
- Coil separation: NA
- Accuracy: Dip angle 1°, Quadrature 1
- Method: Fixed transmitter, Shoot back, In line, Parallel line
- Frequency: Cutler, Maine (specify V.I.F. station)
- Parameters measured: Dip Angle, Quadrature

**GRAVITY**

- Instrument: 
- Scale constant: 
- Corrections made: 
- Base station value and location: 
- Elevation accuracy: 

**INDUCED POLARIZATION**

- Instrument: 
- Method: Time Domain, Frequency Domain
- Parameters: On time, Off time, Delay time, Integration time
- Frequency: 
- Range: 
- Power: 
- Electrode array: 
- Electrode spacing: 
- Type of electrode: 
SELF POTENTIAL

Instrument ___________________________________________ Range ____________________

Survey Method _____________________________________________

Corrections made ___________________________________________

RADIOMETRIC

Instrument _____________________________________________

Values measured ___________________________________________

Energy windows (levels) ______________________________________

Height of instrument __________________________ Background Count __________________

Size of detector ____________________________________________

Overburden ________________________________________________

(type, depth – include outcrop map)

OTHERS (SEISMIC, DRILL WELL LOGGING ETC.)

Type of survey ___________________________________________

Instrument ________________________________________________

Accuracy _________________________________________________

Parameters measured _______________________________________

Additional information (for understanding results) _____________

AIRBORNE SURVEYS

Type of survey(s) __________________________________________

Instrument(s) ________________________________________________

(specific for each type of survey)

Accuracy __________________________________________________

(specific for each type of survey)

Aircraft used ________________________________________________

Sensor altitude ________________________________________________

Navigation and flight path recovery method __________________________

Aircraft altitude __________________________ Line Spacing ______

Miles flown over total area __________________________ Over claims only ________________________
**GEOCHEMICAL SURVEY – PROCEDURE RECORD**

Numbers of claims from which samples taken: 

<table>
<thead>
<tr>
<th>Total Number of Samples</th>
<th>Type of Sample (Nature of Material)</th>
<th>Average Sample Weight</th>
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</thead>
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<tr>
<th>Method of Collection</th>
<th>Soil Horizon Sampled</th>
<th>Horizon Development</th>
<th>Sample Depth</th>
<th>Terrain</th>
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<tr>
<th>Drainage Development</th>
<th>Estimated Range of Overburden Thickness</th>
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</table>

**SAMPLE PREPARATION**

(Includes drying, screening, crushing, ashing)

Mesh size of fraction used for analysis:

<table>
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<tr>
<th>General</th>
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</thead>
</table>

**ANALYTICAL METHODS**

Values expressed in: 

- per cent
- p. p. m.
- p. p. b.

Cu, Pb, Zn, Ni, Co, Ag, Mo, As, (circle)

<table>
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<tr>
<th>Others</th>
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Field Analysis (_________ tests)

- Extraction Method
- Analytical Method
- Reagents Used

Field Laboratory Analysis

No. (_________ tests)

- Extraction Method
- Analytical Method
- Reagents Used

Commercial Laboratory (_________ tests)

- Name of Laboratory
- Extraction Method
- Analytical Method
- Reagents Used

General: 

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