REPORT ON GEOPHYSICAL SURVEYS

60° 37'N / / 132° 20'W

MINDY CLAIMS – YUKON TERRITORY

AUGUST 20-23, 1979

by

H. Limion
Geophysicist

September 24th, 1979

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Introduction

The MINDY claim group is located 160 km west of Whitehorse. The claims were staked in July of 1979. Line preparation, geological mapping, and geochemical sampling were carried out in July. The claims are shown in Figure 1, the grid in Figures 2 & 3, and the geology in Figure 4.

In August, a limited geophysical survey was performed on the property. Horizontal loop electromagnetic, and vertical field magnetic surveys were completed.

The electromagnetic work failed to detect a discrete conductive horizon for follow-up. The magnetic field readings defined magnetic units and anomalies which could be of significance in future geological mapping and exploration.

Grid Control Survey

The grid was surveyed in such a manner as to provide information on the vertical and horizontal separation between stations. The distance between points was measured with a surveyor's chain, and the slope with a pocket clinometer. Calculations then provided the horizontal and vertical separations.

Pickets had been established at a nominal 40m or 20m horizontal separation prior to the start of the geophysical survey.

Geology and Mineralization

The Mindy Claims are underlain by sediments belonging to the Mississippian Englishman's Group. They are, in order of abundance, hornfels, chert, argillite, limestone, conglomerate and skarn.

The nearest intrusion mapped by the G.S.C. (Memoir 326) occurs approximately 6.5 km NW of the property. It is doubtful that it could have caused the widespread hornfelsing and skarn development seen on the property, thus, a shallow intrusion is suspected to exist here.
The sediments on and immediately around the claims are generally gently dipping (-20°) and locally reverse from NE to SW. Steep block faults are seen in cirques separating hornfels, argillite and limestone from each other.

On the grid a shallow to moderately dipping skarn/limestone assemblage of unknown thickness is overlain by a biotite hornfels and in part is underlain by quartzite, chert and chert-pebble conglomerate (Figure 3).

On LIN an iridescent bluish/black weathering quartz-diopside-calcite skarn was exposed by hand trenching over a thickness of 7 m. Float traced uphill from the outcrop indicates a possible maximum thickness of 10 m. The skarn is in fault contact with a creamy-white quartzite at the footwall (see Figure 4) and is probably in fault contact with hornfels to the north. Float of this skarn has been traced in talus and moss covered overburden for 500 m to the north.

The skarn has a deep weathered rind, locally up to 3 cm thick. It is light green and coarsely granular on fresh surface with sparsely disseminated arsenopyrite, pyrrhotite and scheelite occurring throughout. A 1.3 m wide massive pyrrhotite vein cuts the skarn but truncates quickly.

Between L6N and L7N occur numerous boulders of a black actinolite-magnetite-green grossularite garnet skarn and limestone. This skarn type was not seen in outcrop but occurs in mud boils in and near the base of a talus slope derived from the overlying hornfels. A grab sample of this material assayed 0.31% Sn. Minor chalcopyrite, sphalerite and smithsonite was introduced later in the skarn.

A thin-bedded, impure and unaltered limestone outcrops between L9N and L10N. It is postulated that this limestone and the skarns may be of the same carbonate horizon but the lack of good exposure fails to prove this.

A third skarn type is found between L6N and L7N at the base of the hornfels outcrop. It consists primarily of green, fibrous, ferrotremolite and reddish/brown andradite garnet with minor amounts of creamy/white "baked" carbonate. The skarn occurs irregularly within the carbonate and in turn garnet rich zones are segregated within it. The garnetiferous zones appear to yield the most scheelite mineralization; one sample assayed 0.42% WO₃ over 2.0 m. No sulphides were observed in this skarn.

Electromagnetic Survey

The electromagnetic survey was performed with a MAXMIN II F instrument, described in Appendix III. Coverage is shown on the geophysical interpretation map, Figure 22.

Readings were taken generally at 444 and 1777 Hz, except for two lines where all the frequencies were used: 222 Hz, 444 Hz, 888 Hz, 1777 Hz, and 3555 Hz.

Receiver-transmitter spacings of 40m and 120m were utilized.
The receiver and transmitter coils were kept coplanar during readings. The results of the topographic survey provided information for calculating the slope between reading stations, and the plane of each coil was aligned along that slope. The total distance between coils was calculated. In-Phase readings were corrected to compensate for any departures from the nominal coil separation for which the instrument was set up. For example, if the expected in-phase reading at a nominal coil separation of N is 100% in the absence of ground conductivity, then the correction to the in-phase reading at a coil separation of R will be:

\[ C = \left[ 1 - \left( \frac{N}{R} \right)^3 \right] \times 100\% \]

where \( C \) is the correction to be applied in %
\( N \) is the nominal instrument coil separation
\( R \) is the actual coil separation

The electromagnetic results are shown in Figures 8-21.

Magnetic Survey

The magnetic survey was carried out with a Scintrex MF-1 magnetometer. This instrument measures changes in the vertical magnetic field. A description is given in Appendix IV.

A magnetic base station was established at the camp site, which was situated at approximately 700N/1000W in relation to the grid. Magnetometer readings were made regularly at the base station, and all data were corrected for drift. The base station is marked on a rock, and it was selected after ensuring that all gradients of vertical field did not exceed 3 gammas per foot.

Mag readings were taken over lines of the entire grid at 10m spacing, and over three detail lines at 1 metre spacing. Coverage and results are shown on Figures 5, 6, and 7.

Discussion of Results and Recommendations

The Maxmin horizontal loop electromagnetic survey failed to detect any strong conductive features. Some weak indications of conductive material exist, and these are noted on Figure 22.

On line 6N, it is possible that the west end of the line is close to a large conducting body.

The magnetic survey produced some features which should aid geologic mapping. The detailed mag over the showing area indicated that the mineralized zone is magnetic, and is more than 10 metres in width.
The magnetic survey over the grid defined two magnetically active zones. A small zone is centred on line 1N at 50W. A larger zone extends from line 3N to 7N. The edges of this zone have been picked from the magnetic profiles on Figures 8-21, and plotted on Figure 22. Individual high or low readings within this zone are loci for further investigation. These individual highs are probably caused by highly magnetic, near surface features. They can be readily identified on the profiles - Figures 8-21. An example is to be found at 4N/230W.
<table>
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APPENDIX II
Five frequencies: 222, 444, 888, 1777 and 3555 Hz.

Maximum coupled (horizontal-loop) operation with reference cable.

Minimum coupled operation with reference cable.

Vertical-loop operation without reference cable.

Coil separations: 25, 50, 100, 150, 200 and 250 m (with cable) or 100, 200, 300, 400, 600 and 800 ft.

Reliable data from depths of up to 180 m (600 ft).

Built-in voice communication circuitry with cable.

Tilt meters to control coil orientation.
SPECIFICATIONS:

Frequencies: 222, 444, 888, 1777 and 3555 Hz.

Modes of Operation: MAX: Transmitter coil plane and receiver coil plane horizontal (Max-coupled; Horizontal-loop mode). Used with reference cable.
MIN: Transmitter coil plane horizontal and receiver coil plane vertical (Min-coupled mode). Used with reference cable.
V.L.: Transmitter coil plane vertical and receiver coil plane horizontal (Vertical-loop mode). Used without reference cable, in parallel lines.

Coil Separations: 25, 50, 100, 150, 200 & 250m (MMI) or 100, 200, 300, 400, 600 and 800 ft. (MM II F).
Coil separations in VL mode not restricted to fixed values.

Parameters Read: In-Phase and Quadrature components of the secondary field in MAX and MIN modes.
- Tilt-angle of the total field in VL mode.

Readouts: Automatic, direct readout on 90mm (3.5") edgewise meters in MAX and MIN modes. No nulling or compensation necessary.
- Tilt angle and null in 90mm edgewise meters in VL mode.

Scale Ranges: In-Phase: ±20%, ±100% by push-button switch.
Quadrature: ±20%, ±100% by push-button switch.
Tilt: ±75° slope.
Null (VL): Sensitivity adjustable by separation switch.

Readability: In-Phase and Quadrature: 0.5 %.
Tilt: 1 %.

Repeatability: ±0.5 % to ±1 % normally, depending on conditions, frequencies and coil separation used.

Transmitter Output: 222Hz: 175 Atm²;
444Hz: 160 Atm²;
888Hz: 100 Atm²;
1777Hz: 60 Atm²;
3555Hz: 30 Atm².

Receiver Batteries: 8V trans radio type batteries (4). Life: approx. 35 hrs continuous duty (alkaline, 0.5 Ah), less in cold weather.

Transmitter Batteries: 12V 75Ah Gel-Cell rechargeable batteries (2 x 6 V in series).

Reference Cable: Light weight 2-conductor teflon cable for minimum friction. Unshielded. All reference cables optional at extra cost. Please specify.

Voice Link: Built-in intercom system for voice communication between receiver and transmitter operators in MAX and MIN modes, via reference cable.

Indicator Lights: Built-in signal and reference warning lights to indicate erroneous readings.

Temperature Range: -40°C to +60°C (-40°F to +140°F).

Receiver Weight: 6kg (13 lbs.)
Transmitter Weight: 13kg (29 lbs.)

Shipping Weight: Typically 60kg (135 lbs.), depending on quantities of reference cable and batteries included. Shipped in two field/shipping cases.

Specifications subject to change without notification.

APEX PARAMETRICS LIMITED
200 STEELCASE RD. E., MARKHAM, ONT., CANADA, L3R 1G2

Phone: (416) 495-1812 Cables: APEX PARA TORONTO Telex: 06-966773 NOROVIRK TOR
The MF-1 Fluxgate Magnetometers and their extended sensitivity series, the MF-1-100's are designed primarily for the oil and mineral exploration industries. They incorporate advanced transistorized circuitry and extensive temperature compensation with lightweight and a self-levelling mechanism. Although the basic MF-1 and MF-1-100 are intended primarily for accurate ground surveys in the mining industry, modifications are available for base station recording, for vertical gradient measurements, for measuring susceptibilities, determining remanence of rock samples and for storm monitoring on aeromagnetic surveys.

MF-1 SERIES
(a) MF-1
The MF-1 Fluxgate Magnetometer is a vertical component magnetometer designed for accurate ground surveys in the mining industry. Advanced transistorized circuitry and extensive temperature compensation is the core of its accuracy, comparable to precision tripod mounted Schmidt type magnetometers. It is a hand held instrument and needs only coarse levelling and no orientation. Features such as direct reading of gamma values and the possibility of accurate zero settings at base stations ensure simplicity of operation and high field economy. The readability is 5 gammas on the 1000 gamma range.

(b) MF-1-G
The MF-1-G Fluxgate Magnetometer has the same electronics and specifications as the MF-1. The difference lies in that the sensor is detached and enclosed in a small cylindrical tube thus permitting the sensor (geoprobe) to be oriented and tilted in any desired direction. Since a 25 foot connecting cable joins the sensor to the instrument housing, the geoprobe may be placed away from local spurious magnetic disturbances in the vicinity of the electronics housing. Thus this magnetometer may be used for the study of the magnetic properties of rocks, remanence etc.

(c) MF-1-GS
The MF-1-GS Magnetometer again has the same electronics and specifications as the MF-1 but has two sensors, the attached self-levelling sensor of the MF-1 as well as the detached geoprobe of the MF-1-G. Thus this magnetometer may be employed on rapid ground magnetometer surveys and also used for vertical gradient measurements and to measure the magnetic properties of rocks.
# SPECIFICATIONS OF FLUXGATE MAGNETOMETER
## MODEL MF-1

<table>
<thead>
<tr>
<th>Ranges:</th>
<th>Plus or minus —</th>
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<tbody>
<tr>
<td></td>
<td>1,000 gammas f. sc.</td>
</tr>
<tr>
<td></td>
<td>3,000 &quot;</td>
</tr>
<tr>
<td></td>
<td>10,000 &quot;</td>
</tr>
<tr>
<td></td>
<td>30,000 &quot;</td>
</tr>
<tr>
<td></td>
<td>100,000 &quot;</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>20 gammas/div.</td>
</tr>
<tr>
<td></td>
<td>50 &quot;</td>
</tr>
<tr>
<td></td>
<td>200 &quot;</td>
</tr>
<tr>
<td></td>
<td>500 &quot;</td>
</tr>
<tr>
<td></td>
<td>2,000 &quot;</td>
</tr>
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<thead>
<tr>
<th>Meter:</th>
<th>Taut-band suspension</th>
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<tr>
<td></td>
<td>1000 gammas scale 1 7/8&quot; long — 50 div.</td>
</tr>
<tr>
<td></td>
<td>3000 gammas scale 1 11/16&quot; long — 60 div.</td>
</tr>
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| Accuracy: | 1000 to 10,000 gamma ranges ± 0.5% of full scale |
|           | 30,000 and 100,000 gamma ranges ± 1% of full scale |

| Operating Temperature: | —40°C to +40°C |
|                       | —40°F to +100°F |

| Temperature Stability: | Less than 2 gammas per °C (1 gamma /°F) |
|                       | Total 1 gamma P-P |

| Long Term Stability: | ± 1 gamma for 24 hours at constant temperature |

| Bucking Adjustments: | 10,000 to 75,000 gammas by 9 steps of approximately 8,000 gammas and fine control by 10 turn potentiometer. Convertible for southern hemisphere or ± 30,000 gammas equatorial. |

| Recording Output: | 1.7 ma per oersted for 1000 to 100,000 gamma ranges with maximum termination of 15,000 ohms. |

| Response: | DC to 5 cps (3db down) |

| Connector: | Amphenol 91-MC3F1 |

| Batteries: | 12 x 1.5V-flashlight batteries “C” cell type |
|           | (AC Power supply available) |

| Consumption: | 50 milliamperes |

| Dimensions: | Instrument — 6 1/2" x 3 1/2" x 12 1/2" |
|            | 165 x 90 x 320 mm |
|            | Battery pack — 4" x 2" x 7" |
|            | 100 x 50 x 180 mm |
|            | Shipping Container — 10" dia x 16" |
|            | 254 mm dia. x 410 mm |

| Weights: | Instrument — 5 lbs. 12 oz. 2.6 kg. |
|          | Battery Pack — 2 lbs. 4 oz. 1.0 kg. |
|          | Shipping — 13 lbs. 6.0 kg. |

SCINTREX LIMITED
79 Martin Ross Avenue. Downsview, Ontario, Canada
Personnel engaged in Survey

The personnel who worked on the Mindy geophysical survey included:

Gordon Bibby
Newmont Exploration of Canada Limited
1400 - 750 West Pender Street,
Vancouver, B.C.

Mike Holmes
Newmont Exploration of Canada Limited
1400 - 750 West Pender Street,
Vancouver, B.C.

Heikki Limion,
Newmont Exploration of Canada Limited
1400 - 750 West Pender Street,
Vancouver, B.C.
H. LIMION

STATEMENT OF QUALIFICATIONS

I, Heikki Limion, received my B.A.Sc degree in Engineering Science (Geophysics Option) from the University of Toronto in 1965.

I spent two summers in geophysical field work; one with Hudson's Bay Oil and Gas, and one with INCo exploration.

In 1965-66 I worked for one year with Hudson's Bay Oil & Gas as a Junior Geophysicist in seismic field work.

From 1967-1976 I worked with INCo Exploration, on ground and airborne geophysical surveys. I was in charge of airborne geophysical operations for four years, and worked on research and development of airborne geophysical systems. I conducted ground geophysical surveys in Canada, U.S.A., and Brazil.

In 1977 and 1978 I was the head of the geophysics section in the Kenya Department of Mines and Geology. During this time, I was under contract to CIDA (the Canadian International Development Agency).

Since the beginning of 1979, I have held the position of Chief Geophysicist of Newmont Exploration of Canada Limited.

I am a member of the Society of Exploration Geophysicists, the Association of Professional Engineers of Ontario, the Prospectors and Developers Association.

H Limion
MINDY CLAIMS - INDEX MAP

SCALE: 1:250,000
LOCATION: 105 C/9
DATE:
SURVEY BY: J. NEBOCAT
DRAWN BY: J. NEBOCAT
FIGURE: 1

NEWMONT EXPLORATION OF CANADA LTD.
NEWMONT EXPLORATION OF CANADA
MINDY PROPERTY
MAG PROFILES

NTS 105 C-9 AUG 1979
WORK BY: M. HOLMES, G. BIBBY
INSTRUMENT: SCINTREX MF-1

Horizontal Scale 1:250
Profile Scale 1 cm : 100 B
-97 Mag Values are in 10's of gammas of vertical mag field.
NEWMONT EXPLORATION OF CANADA LTD

MINDY PROPERTY

PRELIMINARY GEOLOGY

SURVEY, DRAWN - J. NEBOCAT
NTS. 105C9 AUG. 1979

Scale: 1:2500

BASINLINE: N 45° E

BIGITE HORNFELS,
SOME PYRRHOTITE
BROWN TO BLUE WEATHERING QUARTZ-
ACTINOLITE - PYROXENE - GARNET SKARN
GREEN WEATHERING, FIBROUS ACTINOLITE -
TREMOLITE - GARNET SKARN
IMPURE, CHLORITE, THIN-BEDDED, LIMESTONE

YELLOWISH TO WHITE QUARTZITE

MASSIVE PYRRHOTITE, MAGNETITE, BLACK ACTINOLITE,
STIBNITE, SPHALERITE, SCHERPITE, CHALCOPYRITE.
Lines of detailed mag over showing

Contour Values (d's)
- 100's
- 500's
- 1000's
-10,000's

Numbers are in 10's of gammas of vertical mag field as measured by Scintrex MF-I mag
NEWMONT EXPLORATION OF CANADA LTD

MAXMIN SURVEY

Area
Project Line
N.T.S.
Unit Serial No.
Coil Spacing

\[ \begin{align*}
\text{In-Phase Signal} & : \quad 10 \text{ cm} : 0.1 \%
\end{align*}\]

Surveyed by: (Signature)
Drafted by: (Signature)
Date: [Date]

Scale: 1:25000