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REPORT ON COMBINED HELICOPTER BORNE MAGNETIC, ELECTROMAGNETIC AND VLF SURVEY BENNY PROJECT - PN-232 CARTIER AREA ONTARIO

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MINING LANDS SECTION

FOR FALCONBRIDGE LIMITED BY AERODAT LIMITED February 17, 1989

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LIST of MAPS

(Scale 1:10,000)

MAPS:

AIRBORNE ELECTROMAGNETIC PROFILES; showing flight lines, fiducials and inphase and quadrature profiles of 33 kHz coplanar response.

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VLF-EM TOTAL FIELD PROFILES; showing flight lines, fiducicals, and profiles of VLF-EM response from NSS (Annapolis, Maryland) operating at 21.4 kHz. 1. INTRODUCTION

This report describes an airborne geophysical survey carried out on behalf of Falconbridge Limited by Aerodat Limited. Equipment operated included a four frequency electromagnetic system, a high sensitivity cesium vapour magnetometer, a two frequency VLF-EM system, a power line monitor, a video tracking camera, an altimeter and an electronic positioning system. Electromagnetic, magnetic and altimeter data were recorded both in digital and analog form. Positioning data were stored in digital form, encoded on the VHS format video tape and recorded at regular intervals in UTM coordinates on the analog trace, as well as being marked on the flight path map by the operator while in flight.

A total of 1,255 kilometres of the recorded data were compiled in map form of which 291 kilometres is presented in this report covering claim groups in the following townships:

> Stralak Craig Ulster Moncrieff

Munster Hess

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2. SURVEY AREA LOCATION

The survey area is depicted on the index map shown below.



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3. AIRCRAFT AND EQUIPMENT

3.1 Aircraft

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An Aerospatiale A-Star 350B helicopter, (CG-JIX), owned and operated by Lakeland Helicopters Limited, was used for the survey. Installation of the geophysical and ancillary equipment was carried out by Aerodat. The survey aircraft was flown at a mean terrain clearance of 60 metres.

3.2 Equipment

3.2.1 Electromagnetic System

The electromagnetic system was an Aerodat 4-frequency system. Two vertical coaxial coil pairs were operated at 935 Hz and 4.6 kHz and two horizontal coplanar coil pairs at 4.2 kHz and 33 kHz. The transmitter-receiver separation was 7 metres. Inphase and quadrature signals were measured simultaneously for the four frequencies with a time constant of 0.1 seconds. The electromagnetic bird was towed 30 metres below the helicopter.

3.2.2 VLF-EM System

System was a Herz Totem 2A. This instrument measures the total field and quadrature components of two selected transmitters, preferably oriented at right angles to one

another. The sensor was towed in a bird 12 metres below the helicopter. The normal configuration of transmitting stations monitored was NSS, Annapolis, Maryland for the Line station and NLK, Jim Creek, Washington for the Ortho station broadcasting at 21.4 and 24.8 kHz respectively. Station NAA, Cutler, Maine at 24.5 kHz was also used and occasionally, combinations of the above three were required.

3.2.3 Magnetometer

The magnetometer employed a Scintrex Model VIW - 2321 H8 cesium, optically pumped magnetometer sensor. The sensitivity of this instrument was 0.1 nanoTeslas at a 0.1 second sampling rate. The sensor was towed in a bird 17 metres below the helicopter.

3.2.4 Magnetic Base Station

A Geometrics G-803 magnetometer was operated at the base of operations to record diurnal variations of the earth's magnetic field. The clock of the base station was synchronized with that of the airborne system to facilitate later correlation. 3.2.5 Radar Altimeter

A King KRA10A radar altimeter was used to record terrain clearance. The output from the instrument is a linear function of altitude for maximum accuracy.

3.2.6 Tracking Camera

A Panasonic video flight path recording system was used to record the flight path on standard VHS format video tapes. The system was operated in continuous mode and the flight number, real time and manual fiducial numbers were registered on the picture frame for cross-reference to the analog and digital data.

3.2.7 Analog Recorder

An RMS dot-matrix recorder was used to display the data during the survey. In addition to manual and time fiducials, the following data were recorded:

| Channel | Input | Scale |
|---------|---------------------------|------------|
| RALT | Altimeter (150 m at top | 3 m/mm |
| | of chart) | |
| CXI1 | 935 Hz Coaxial Inphase | 2.5 ppm/mm |
| CXQ1 | 935 Hz Coaxial Quadrature | 2.5 ppm/mm |
| CXI2 | 4.6 kHz Coaxial Inphase | 2.5 ppm/mm |

| Channel | Input | Scale |
|---------|-----------------------------|------------|
| CXQ2 | 4.6 kHz Coaxial Quadrature | 2.5 ppm/mm |
| CPI1 | 4.2 kHz Coplanar Inphase | 10 ppm/mm |
| CPQ1 | 4.2 kHz Coplanar Quadrature | 10 ppm/mm |
| CPI2 | 33 kHz Coplanar Inphase | 20 ppm/mm |
| CPQ2 | 33 kHz Coplanar Quadrature | 20 ppm/mm |
| VLT | VLF-EM Total Field, Line | 2.5 %/mm |
| VLQ | VLF-EM Quadrature, Line | 2.5 %/mm |
| VOT | VLF-EM Total Field, Ortho | 2.5 %/mm |
| VOQ | VLF-EM Quadrature, Ortho | 2.5 %/mm |
| MAGF | Magnetometer, fine | 2.5 nT/mm |
| MAGC | Magnetometer, coarse | 25 nT/mm |
| PWRL | Power Line Monitor | n/a |

3.2.8 Digital Recorder

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An RMS DGR 33 system recorded the survey on magnetic tape. Information recorded was as follows:

| Equipment | Recording Interval |
|--------------|--------------------|
| EM system | 0.1 seconds |
| Magnetometer | 0.1 seconds |
| VLF-EM | 0.2 seconds |
| Altimeter | 0.5 seconds |
| NAV System | 0.2 seconds. |

3.2.9 Radar Positioning System

A Syledis SR3 UHF radio positioning system was used for navigation and track recovery. A network of antennae provided the pilot/operator with constant navigation information, with a positional accuracy of <u>+</u> 5 metres.

4. DATA PRESENTATION

4.1 Base Map

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A topographic base map at a scale of 1:10,000 was prepared from enlargements of Ontario Basic Mapping topographic maps (originals at 1:20,000).

4.2 Flight Path

The flight path was derived from the Syledis electronic positioning system. It is estimated that the flight path is generally accurate to about 10 metres with respect to the topographic detail of the base map. The flight path is presented with time and navigator's manual fiducials for cross reference to both the analog and digital data.

4.3 Electromagnetic Profiles

The electromagnetic data were recorded digitally at a sample rate of 10/second with a time constant of 0.1 seconds. A two stage digital filtering process was carried out to reject major sferic events and to reduce system noise.

Local sferic activity can produce sharp, large amplitude events that cannot be removed by conventional filtering procedures. Smoothing or stacking will reduce their amplitude

but leave a broader residual response that can be confused with geological phenomena. To avoid this possibility, a computer algorithm searches out and rejects major sferic events.

The signal to noise ratio was further enhanced by the application of a low pass digital filter. It has zero phase shift which prevents any lag or peak displacement from occurring, and it suppresses only variations with a wavelength less than about 0.25 seconds. This low effective time constant permits maximum profile shape resolution.

Following the filtering process, a base level correction was made. The correction applied is a linear function of time that ensures the corrected amplitude of the various inphase and quadrature components is zero when no conductive or permeable source is present. The filtered and levelled data were then presented in profile map form.

4.4 VLF-EM Total Field Profiles

The VLF-EM data from NSS (Annapolis, Maryland) operating at 21.4 KHz were presented in profile map form.

5. INTERPRETATION

The geophysical results presented in this report indicate the existence and position of conductivity anomalies. The response will be a maximum over the conductor, with the amplitude being related to the target's conductance and depth. Most of the surveyed blocks exhibit conductivity contrasts which may be interpreted as structural features. However, a more detailed evaluation of the significance of the data presented should be performed by those most familiar with the local geology and with access to additional geological and geophysical information.

> Respectfully submitted, AERODAT LIMITED

February 17, 1989 J8885MNR Anthony E.Valentini Geophysicist

APPENDIX I

GENERAL INTERPRETIVE CONSIDERATIONS

Electromagnetic

The Aerodat four frequency system utilizes two different transmitter-receiver coil geometries. The traditional coaxial coil configuration is operated at two widely separated frequencies and the lower frequency horizontal coplanar coil pair is operated at a frequency approximately aligned with one of the coaxial frequencies.

The electromagnetic response measured by the helicopter system is a function of the "electrical" and "geometrical" properties of the conductor. The "electrical" property of a conductor is determined largely by its electrical conductivity, magnetic susceptibility and its size and shape; the "geometrical" property of the response is largely a function of the conductor's shape and orientation with respect to the measuring transmitter and receiver.

Electrical Considerations

For a given conductive body the measure of its conductivity or conductance is closely related to the measured phase shift between the received and transmitted electromagnetic field. A small phase shift indicates a relatively high conductance, a large phase shift lower conductance. A small phase shift results in a large inphase to quadrature ratio and a large phase shift a low ratio. This relationship is shown quantitatively for a nonmagnetic vertical half-plane model on the accompanying phasor diagram. Other physical models will show the same trend but different quantitative relationships.

The phasor diagram for the vertical half-plane model, as presented, is for the coaxial coil configuration with the amplitudes in parts per million (ppm) of the primary field as measured at the response peak over the conductor. To assist the interpretation of the survey results the computer is used to identify the apparent conductance and depth at selected anomalies. The results of this calculation are presented in table form in Appendix II and the conductance and inphase amplitude are presented in symbolized form on the map presentation.

The conductance and depth values as presented are correct only as far as the model approximates the real geological situation. The actual geological source may be of limited length, have significant dip, may be strongly magnetic, its conductivity and thickness may vary with depth and/or strike and adjacent bodies and overburden may have modified the response. In general the conductance estimate is less affected by these limitations than is the

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depth estimate, but both should be considered as relative rather than absolute guides to the anomaly's properties.

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Conductance in mhos is the reciprocal of resistance in ohms and in the case of narrow slab-like bodies is the product of electrical conductivity and thickness.

Most overburden will have an indicated conductance of less than 2 mhos; however, more conductive clays may have an apparent conductance of say 2 to 4 mhos. Also in the low conductance range will be electrolytic conductors in faults and shears.

The higher ranges of conductance, greater than 4 mhos, indicate that a significant fraction of the electrical conduction is electronic rather than electrolytic in nature. Materials that conduct electronically are limited to certain metallic sulphides and to graphite. High conductance anomalies, roughly 10 mhos or greater, are generally limited to sulphide or graphite bearing rocks.

Sulphide minerals, with the exception of such ore minerals as sphalerite, cinnabar and stibnite, are good conductors; sulphides may occur in a disseminated manner that inhibits electrical conduction through the rock mass. In this case the apparent conductance can seriously underrate the quality of the conductor in geological terms. In a similar sense the relatively nonconducting sulphide minerals noted above may be present in significant consideration in association with minor conductive sulphides, and the electromagnetic response only relate to the minor associated mineralization. Indicated conductance is also of little direct significance for the identification of gold mineralization. Although gold is highly conductive, it would not be expected to exist in sufficient quantity to create a recognizable anomaly, but minor accessory sulphide mineralization could provide a useful indirect indication.

In summary, the estimated conductance of a conductor can provide a relatively positive identification of significant sulphide or graphite mineralization; however, a moderate to low conductance value does not rule out the possibility of significant economic mineralization.

Geometrical Considerations

Geometrical information about the geologic conductor can often be interpreted from the profile shape of the anomaly. The change in shape is primarily related to the change in inductive coupling among the transmitter, the target, and the receiver.

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In the case of a thin, steeply dipping, sheet-like conductor, the coaxial coil pair will yield a near symmetric peak over the conductor. On the other hand, the coplanar coil pair will pass through a null couple relationship and yield a minimum over the conductor, flanked by positive side lobes. As the dip of the conductor decreased from vertical, the coaxial anomaly shape changes only slightly, but in the case of the coplanar coil pair the side lobe on the down dip side strengthens relative to that on the up dip side.

As the thickness of the conductor increases, induced current flow across the thickness of the conductor becomes relatively significant and complete null coupling with the coplanar coils is no longer possible. As a result, the apparent minimum of the coplanar response over the conductor diminishes with increasing thickness, and in the limiting case of a fully 3 dimensional body or a horizontal layer or half-space, the minimum disappears completely.

A horizontal conducting layer such as overburden will produce a response in the coaxial and coplanar coils that is a function of altitude (and conductivity if not uniform). The profile shape will be similar in both coil configurations with an amplitude ratio (coplanar:coaxial) of about 4:1*.

In the case of a spherical conductor, the induced currents are confined to the volume of the sphere, but not relatively restricted to any arbitrary plane as in the case of a sheet-like form. The response of the coplanar coil pair directly over the sphere may be up to 8* times greater than that of the coaxial pair.

In summary, a steeply dipping, sheet-like conductor will display a decrease in the coplanar response coincident with the peak of the coaxial response. The relative strength of this coplanar null is related inversely to the thickness of the conductor; a pronounced null indicates a relatively thin conductor. The dip of such a conductor can be inferred from the relative amplitudes of the side-lobes.

Massive conductors that could be approximated by a conducting sphere will display a simple single peak profile form on both coaxial and coplanar coils, with a ratio between the coplanar to coaxial response amplitudes as high as 8*.

Overburden anomalies often produce broad poorly defined anomaly profiles. In most cases, the response of the coplanar coils closely follows that of the coaxial coils with a relative amplitude ratio of 4*.

Occasionally, if the edge of an overburden zone is sharply defined with some significant depth extent, an edge effect will occur in the coaxial coils. In the case of a horizontal conductive ring or ribbon, the coaxial response will consist of two peaks, one over each edge; whereas the coplanar coil will yield a single peak.

* It should be noted at this point that Aerodat's definition of the measured ppm unit is related to the primary field sensed in the receiving coil without normalization to the maximum coupled (coaxial configuration). If such normalization were applied to the Aerodat units, the amplitude of the coplanar coil pair would be halved.

Magnetics

The Total Field Magnetic Map shows contours of the total magnetic field, uncorrected for regional variation. Whether an EM anomaly with a magnetic correlation is more likely to be caused by a sulphide deposit than one without depends on the type of mineralization. An apparent coincidence between an EM and a magnetic anomaly may be caused by a conductor which is also magnetic, or by a conductor which lies in close proximity to a magnetic body. The majority of conductors which are also magnetic are sulphides containing pyrrhotite and/or magnetite. Conductive and magnetic

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bodies in close association can be, and often are, graphite and magnetite. It is often very difficult to distinguish between these cases. If the conductor is also magnetic, it will usually produce an EM anomaly whose general pattern resembles that of the magnetics. Depending on the magnetic permeability of the conducting body, the amplitude of the inphase EM anomaly will be weakened, and if the conductivity is also weak, the inphase EM anomaly may even be reversed in sign.

VLF Electromagnetics

The VLF-EM method employs the radiation from powerful military radio transmitters as the primary signals. The magnetic field associated with the primary field is elliptically polarized in the vicinity of electrical conductors. The Herz Totem uses three coils in the X, Y, Z configuration to measure the total field and vertical quadrature component of the polarization ellipse.

The relatively high frequency of VLF (15-25) kHz provides high response factors for bodies of low conductance. Relatively "disconnected" sulphide ores have been found to produce measureable VLF signals. For the same reason, poor conductors such as sheared contacts, breccia zones, narrow faults, alteration zones and porous flow tops normally produce VLF anomalies. The method can therefore be used effectively for geological mapping. The only - 9 -

relative disadvantage of the method lies in its sensitivity to conductive overburden. In conductive ground the depth of exploration is severely limited.

The effect of strike direction is important in the sense of the relation of the conductor axis relative to the energizing electromagnetic field. A conductor aligned along a radius drawn from a transmitting station will be in a maximum coupled orientation and thereby produce a stronger response than a similar conductor at a different strike angle. Theoretically, it would be possible for a conductor, oriented tangentially to the transmitter to produce no signal. The most obvious effect of the strike angle consideration is that conductors favourably oriented with respect to the transmitter location and also near perpendicular to the flight direction are most clearly rendered and usually dominate the map presentation.

The total field response is an indicator of the existence and position of a conductivity anomaly. The response will be a maximum over the conductor, without any special filtering, and strongly favour the upper edge of the conductor even in the case of a relatively shallow dip.

The vertical quadrature component over steeply dipping sheet-like

conductor will be a cross-over type response with the cross-over closely associated with the upper edge of the conductor.

The response is a cross-over type due to the fact that it is the vertical rather than total field quadrature component that is measured. The response shape is due largely to geometrical rather than conductivity considerations and the distance between the maximum and minimum on either side of the cross-over is related to target depth. For a given target geometry, the larger this distance the greater the depth.

The amplitude of the quadrature response, as opposed to shape is function of target conductance and depth as well as the conductivity of the overburden and host rock. As the primary field travels down to the conductor through conductive material it is both attenuated and phase shifted in a negative sense. The secondary field produced by this altered field at the target also has an associated phase shift. This phase shift is positive and is larger for relatively poor conductors. This secondary field is attenuated and phase shifted in a negative sense during return travel to the surface. The net effect of these 3 phase shifts determine the phase of the secondary field sensed at the receiver.

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A relatively poor conductor in resistive ground will yield a net positive phase shift. A relatively good conductor in more conductive ground will yield a net negative phase shift. A combination is possible whereby the net phase shift is zero and the response is purely in-phase with no quadrature component.

A net positive phase shift combined with the geometrical crossover shape will lead to a positive quadrature response on the side of approach and a negative on the side of departure. A net negative phase shift would produce the reverse. A further sign reversal occurs with a 180 degree change in instrument orientation as occurs on reciprocal line headings. During digital processing of the quadrature data for map presentation this is corrected for by normalizing the sign to one of the flight line headings.

APPENDIX II

PERSONNEL

FIELD

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Flown - January, 1989

Pilot - Roger Morrow

Operator - Steve Robinson

OFFICE

Processing - Anthony E. Valentini - George McDonald

Report - Anthony E. Valentini

APPENDIX III

CERTIFICATE OF QUALIFICATIONS

Anthony E. Valentini

- 1. I am a geophysicist and have been working in this field since 1985.
- I reside at 48 Village Drive, Stoney Creek, Ontario. 2.
- 3. I hold an honours B.Sc. in Geophysics from the University of Western Ontario having graduated in 1985.
- 4. I hold the position of Geophysicist at Aerodat Limited. I have been employed by Aerodat since July 1986.
- 5. I am a member of the Canadian Exploration Geophysical Society.
- 6. The accompanying report was prepared from a review of the airborne geophysical survey flown by Aerodat for Falconbridge Limited. I have not visited the property.
- 7. I have no interest in the property described nor do I hold any securities in Falconbridge Limited.

Signed,

Anthony &. Colentini

Anthony E. Valentini

Geophysicist Juni 10275

Mississauga, Ontario



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Ministry of Northern Development and Mines

Ministère du Développement du Nord et des Mines November 24, 1989 Mining Lands Section 880 Bay Street, 3rd Floor Toronto, Ontario M5S 1Z8

Telephone: (416) 965-4888

Your File: W8907-045 Our File: 2.12328

Mining Recorder Ministry of Northern Development and Mines Bag 3000 200 Brady Street, 6th floor Sudbury, Ontario P3A 5W2

Dear Sir:

Re: Notice of Intent dated October 23, 1989 for Geophysical (Magnetometer and Electromagnetic) Survey submitted on Mining Claims S 993569 et al in Ulster, Moncrieff, Hess, Munster and Craig Townships.

The assessment work credits, as listed with the above-mentioned Notice of Intent have been approved as of the above date.

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

Yours sincerely,

W/Upur W.R. Cowan

W.R. Lowan Provincial Manager, Mining Lands Mines & Minerals Division

LS:eb Enclosure

> cc: Mr. G.H. Ferguson Mining and Lands Commissioner Toronto, Ontario

> > Falconbridge Ltd. Falconbridge, Ontario

Anthony E. Valentini Stoney Creek, Ontario

Michael J. Gray Sudbury, Ontario



Resident Geologist Sudbury, Ontario



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Ministry of Northern Development and Mines

Technical Assessment Work Credits

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| Special credits under section 77 (16) for the following mining claims |
| <u>10 days Airborne VLF+10 days Airborne Electromagnetic</u> \$ 993568, 993570, 994048 |
| 1042368, 1042377, 1042387, 1046883-84. |
| <u>20 days Airborne VLF + 15 days Airborne Electromagnetic</u> S 830744 to 747 incl. |
| |
| No credits have been allowed for the following mining claims |
| M not sufficiently covered by the survey |
| S 1042469 |
| 1042488 |
| 1042504 |
| |
| |
| |
| |

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; Geologocal - 40; Geochemical - 40; Section 77(19) - 60.

| | | | | | | | 1 | | Page 1 of | 5 |
|---|-------------|-------------------------------------|-----------------------------|-----------------|-----------------|---|---------------------------|------------------------|---------------------------------|----------------|
| Ministry of | onment | Report of We | ork | | DOC | CUMENT No. In | structions: | Please typ | e or print. | Are are used |
| and Mines | opment | (Geophysical, (| Geologica | ۱, | W | 3907- 04 5 | 5 | exceeds sp | bace on this form, a | attach a list. |
| Ontazio | ~ | Geochemical a | nd Expen | diture | es) | | NO(8: | "Expendit | ures" section may | be entered |
| - 1. 1. JA | <u> </u> | | | | Mining | g Act | | Do not us | e shaded areas below | v. |
| Feanbysical | (Airbo) | ELEC.TRO | MAGNE | TIC | .) (Ar | RBORNE Em.v | Renny | or Area - Cani | ier Area | |
| Claim Holder(s) | 1/11/001 | , | | | | · · · · · · · · · | Denny | Prospecto | r's Licence No. | |
| Falconbridge | Limite | ed | | | | | | A 2 | 1647 | |
| P.O. Box 40, | Falcor | nbridge, Ont | ario | POM | 1S0 | | | | | |
| Survey Company | | | | | | Date of Survey | (from & to) 89 28 | 1 89 | Total Miles of line | Cut |
| Name and Address of Auth | or (of Geo | -Technical report) | e | · · · | | Day Mo. | Yr. Day I | Mo. Yr. | N/ A | |
| Anthony E. V | alentir | ni <u>48 Villa</u> | ge Dr. | ,Sto | oney (| Creek, Ontar | ·io 18 | <u>E-3</u> | NI. | |
| Credits Requested per E | ach Claim | n in Columns at r | ight Davs per | | ining C | laims Traversed (tining Claim | List in nume | rical seque | ence) liping Claim | TExand |
| For first survey: | Geo | ophysical | Claim | - | Prefix | Number | Days Cr. | Profix | Number | Days Cr. |
| Enter 40 days. (This | | Electromagnetic | | | S | 1042483 | 80 | S | 1046917 | 80 |
| includes line cutting |) | Magnetometer | | | 1 | 1042463 | 80 | | 1046918 | 80 |
| For each additional sur | vey: | - Radiometric | | | | 1042464 | 80 | | 1046919 | 80 |
| Enter 20 days (for e | ach) | • Other | | | | 1042465 | 80 | | 1046920 | 80 |
| | Geo | ological | | | | 1042466 | 80 | | 1046921 | 80 |
| ទប | DI | Schamical | | | · · · | 1042468 | 80 | | 1046923 | 80 |
| Man Days REC | FIG | physical | Days per | | ан (| 1042469 | 80 | | 1046924 | 80 |
| Complete reverse side | | · Electromagnetic | Clairin | | | 1042400 | 00 | | 1046025 | 00 |
| and enter total(s) here | 3 - 19 | 80 | | | | 1042470 | 00 | | 1040925 | 00 |
| A.M. 7181911011 | 11121111 | P. P4. | | | | 1042479 | 80 | | 1046931 | 80 |
| f .totained | | 1. Kadiometric | | | | 1042480 | 80 | | 1046932 | 80 |
| | 3 | · Other | | | | | | | 1046933 | 80 |
| | Ged | blogical | | | | 1046857 | 80 | | 1046934 | 80 |
| | Geo | ochemical | ļ | | | 1046858 | 80 | | 1046935 | 80 |
| Airborne Credits | | | Days per Claim | | | 1046859 | 80 | | 1046936 | 80 |
| Note: Special provision | s Ele | ctromagnetic | 40 | | | 1046860 | 80 | | 1046937 | 80 |
| to Airborne Surv | eys. Mai | gnetometer | | | | 1046861 | 80 | | 1046938 | 80 |
| | flat | Hormetric , VLF | 40 | | | 1046872 | 80 | | 1046939 | 80 |
| Expenditures (excludes | power str | ippingl | <u> </u> | | | 10/6873 | 80 | | 1046940 | 80 |
| Type of Work Performed | K | ECEIVE | ν | | | 1046974 | 00 | | 1046041 | 20 |
| Performed on Claim(s) | | PR 1 9 1989 | | | | 1040074 | 00 | | 1040941 | |
| | ; | | • • <u></u> · • | | | 1046875 | 80 | | 1046942 | 80 |
| | MININ | G LANDS SEC | CTION | | | 1046876 | 80 | | 1046943 | 80 |
| Calculation of Expenditure | Days Cree | jits 1 | rotal | | | 1046916 | <u>•80</u> | | 1046944 | 80 |
| Total Expenditures | 1 | Days | Credits | | |) | L] | | | |
| \$ | · · | + [15] = [| | * () ト iu | hangi S LL G | consde pro ce regulik. Eiron | nversalin x . 19.01.01 | Total nur claims co | nber of mining vered by this | 189 |
| Instructions Total Days Credits may | be apporti | ioned at the claim h | older's | - | | | | report of | work. | |
| choice. Enter number o | f days cred | lits per claim selecte | :d | T | otal Day | For Office Use C s Cr. Date Recorded | Dnly | Mining Re | corder |) |
| | | | | R | ecorded | APRIL " | 1, 1989 . | | · 11/1/11/1.3 | |
| Date 2 Anil 1909 | Recorde | d Holder or Agent IS | Signature) | r | 4,460 | Date Approved | as Recorded | Branch D | ector | - |
| Certification Verifying | Report of | Work | <u>Grin</u> j | | | - we ret | vised 1 | Nor | - Diciter | |
| I hereby certify that I h | ave a perso | onal and intimate kr | nowleckye o | f the f | acis set f | forth in the Report | of Work annex | ed hereto, | having performed t | ne work |
| or witnessed same durin | ig and/or a | fter its completion : | and the ani | nexed | report is | true. | | | | |
| Michael J. | Grav | | #6-3 | 51 k | le]]ir | ngton Hts. | | | | |
| Sudbury. Or | ntario | P3E 3V8 | | | | Date Certified | 1999 | Certified I | by (Signaturo) | Rana |
| 1 | | | | | | 1 2 11/10 | 1101 | 1 Mail | 1:001 4 k | 1191 |

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| Ministry o Northern and Mines | f Developmer s | nt (Geophysical, Geochemical a | ork [•] Geological, nd Expendi | tures) | In | structions: | Please ty If numb exceeds to Only da | pe or print, er of mining clair space on this form, ays credits calcula | ns travers attach a listed in t |
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| Claim Holder(s) | 100 | N- 1984 | | | | | Prospect | or's Licence No. | |
| Address | <u>/^\\</u> | 2,13. | | | | | -l | | |
| Survey Company | 7181911011 | 111211213111513 | | | Date of Survey | (from & to) | • • • • | Total Miles of line | Cut |
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| Name and Address o | f Author (of | Geo-Technical report) | | · | | • • • | • | • •••• | |
| Credits Requested | per Each C | laim in Columns at r | ight | Mining C | aims Traversed (I | .ist in nume | rical sequ | ience) | |
| Special Provisions | | Geophysical | Days por Claim | Prefix | ining Claim | Expend. Days Cr. | Prefix | Mining Claim | Exper |
| For first survey: | (= | - Electromagnetic | | S | 1046856 | 80 | S | 1042332 | 80 |
| Enter 40 days includes line c | utting) | - Magnetometer | | | 1046862 | 80 | | 1042333 | 80 |
| For each addition | al survey. | - Radiometric | | | 1046863 | 80 | | 1042334 | 80 |
| using the same gri | d: | - Other | | | 10/6964 | 80 | | 1042326 | 00 |
| Enter 20 days | (for each) | Geological | | | 1040004 | 80 | | 1042330 | 00 |
| | | Geochemical | | | 1040000 | - 00 | | 1042337 | 00 |
| Man Days | 1 | Geophysical | Days per | | 1040009 | | | 1042400 | 00 |
| Complete reverse | side | | Claim | | 1046890 | 80 | | 1042481 | 80 |
| and enter totai(s) | here | - Electromagnetic | | | 1046891 | 80 | | 1042482 | 08 |
| | | • Magnetometer | | | 1046892 | 08 | | 1042484 | 80 |
| | | Radiometric | | | 1046893 | 80 | | 1042485 | 80 |
| | | - Other | | | 1046894 | 80 | | 1042486 | 80 |
| | | Geological | | | 1046895 | 80 | | 1042487 | 80 |
| Airborne Credite | | Geochemical | Davis par | | 1046896 | 80 | | 1042488 | 80 |
| | | | Claim | | 1046897 | 80 | | 1042504 | 80 |
| Note: Special pro credits do e | visions not apply | Electromagnetic | 40 | | 1046904 | 80 | | 1046871 | 80 |
| to Airborn | e Surveys. | Magnetometer | | | 1046905 | 80 | | 1046877 | 80 |
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| xpenditures (excl | udes powe med | er stripping) | | | | | | 1046879 | 80 |
| | | | | | 1042327 | 80 | | 1046880 | 80 |
| Performed on Claim(| s) | | | | 1042328 | 80 | | 1046881 | 80 |
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| Calculation of Fur- | diture Deve | Cradite | | | 1042330 | 80 | 1 | 1046884 | 3'80 |
| Total Expenditur | es | Day | Total s Credits | | 1042331 | 80 | | 1046922 | 80 |
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| Total Days Credit choice. Enter num | s may be ap nber of days | Report of Work ' Instructions: - Press types of print. Mining Complysical, Geological, Geophysical, Geoph | | | | | | | |
| in columns at righ | it. | | | Total Days Recorded | Cr. Date Recorded | | Mining R | acorder | |
| Date | Rec | orded Helder or Agent (| Sign free | | Date Approved | s Recorded | Branch D | Director | |
| 3April 19 | 189 7 | Tuchael 4 | Ang | | 20 | | | | <u></u> |
| Jertification Verif | ying Kepo hat I have a | rt of Work / | nowledge of t | he facts set f | orth in the Report of | of Work annex | ked hereto. | , having performed | the work |
| or witnessed same | during and | /or after its completion | and the anne | xed report is | true. | | | | |
| Name and Postal Add | aress of Pers | on Certifying | | | | | | | |
| | | | | | | | | | .1 |

| Ministry of Northern Developmen and Mines | nt (Geophysical, (Geochemical a | ork Geological, nd Expenditi | ures) | 11 | nstructions: Note: | Please typ If numbe exceeds sy Only day .''Expendit | Page 3 o be or print. r of mining claim bace on this form, a s credits calculat lures" section may | f 5 is travers attach a li ted in t be enter |
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| Type of Survey(s) | RECEI | VED | | | Township | or Area | | |
| Claim Holder(s) | | 3000 | - | · | I | Prospecto | r's Licence No. | |
| Address | APR 0- | 1900 | | | | | | |
| | 718191101111211 | 12101/1510 | | | | •••••••••••••••••••••••••••••••••••••• | | |
| Survey Company | L | 2.151 | 1 | Date of Survey | (from & to) | | Total Miles of line | Cut |
| Name and Address of Author (of | Geo-Technical report) | | .• . | I Day 1 mo. 1 | | | I | |
| Credits Requested per Each C | laim in Columns at ri | ight | Mining Cl | aims Traversed (| List in nume | rical segui | ence) | |
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| For first survey: | - Electromagnetic | | S | 1046926 | 80 | S | 1042341 | 80 |
| = includes line cutting) | Magnetometer | | | 1046927 | 80 | | 1042342 | 80 |
| For each additional survey: | - Radiometric | | | 1046928 | 80 | | 1042343 | 80 |
| using the same grid: Enter 20 days (for each) | - Other | [] | | 1046929 | 80 | | 1042344 | 80 |
| | Geological | | | 1046930 | 80 | | 1042345 | 80 |
| | Geochemical | | | | | | 1042346 | 80 |
| Man Days | Geophysical | Days per Claim | | 1013391 | 80 | | 1042347 | 80 |
| Complete reverse side | - Electromagnetic | | | 1013392 | 80 | | 1042348 | 80 |
| | - Magnetometer | | | 1042317 | 80 | | 1042349 | 80 |
| | - Radiometric | | | 1042318 | 80 | | 1042350 | 80 |
| | - Other | | | 1042319 | 80 | | 1042351 | 80 |
| | Geological | | - | 1042320 | 80 | | 1042352 | 80 |
| | Geochemical | | | 1042321 | 80 | | 1042353 | 80 |
| Airborne Credits | | Days per Claim | | 1042322 | 80 | | 1042354 | 80 |
| Note: Special provisions | Electromagnetic | 40 | | 1042323 | 80 | | 1042355 | - 80 |
| credits do not apply to Airborne Surveys. | Magnetometer | | | 1042324 | 80 | | 1042359 | 80 |
| | Rediometric AVI FC | 40 | | 1042325 | 80 | | 1042358 1042360 | - 80 - 80 |
| xpenditures (excludes powe | r stripping) | ····· | · | 1042326 | 80 | | 1042361 | 80 |
| I YDE OT WORK PERIORMED | | | | 1042335 | 80 | | 1042362 | 80 |
| Performed on Claim(s) | | | | 1042337 | 80 | | 1042363 | 80 |
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| Total Expenditures | Dayı | Fotal Credits | | 1042340 | 80 | | | |
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| Date 3 April 1989 Certification Verifying Renor | orded Holder or Agent (S Miinal 4 t of Work | ionary/el | | Date Approved | as Recorded | Branch Di | rector | |
| I hereby certify that I have a or witnessed same during and, Name and Postal Address of Pers | personal and intimate kr for after its completion i on Certifying | nowledge of the annex | e facts set fe ed report is | orth in the Report true. | of Work anne: | ced hereto, | having performed t | he work |
| | | | | Date Certified | 1 11/29 | Cortified | by (Signature) | Ĥ |

| Ministry of Northern Developme and Mines | Report of We ent (Geophysical, (Geochemical a | ork Geologica nd Expen | l, diti | ures) | Ins | structions: Note: | Please typ If numbe exceeds sp Only clay "Expendit in the " | Page 4 of e or print. r of mining claim bace on this form, a s credits calculat ures" section may Expend. Days Cr | 5 s traversed attach a list. ed in the be entered columns. |
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| Type of Survey(s) Claim Holder(s) | REGELV | 'ED | | | | Township | Prospecio | r's Licenco No. | |
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| Survey Company | 7181911611111211121 | 3141516 | | •• •• •• | Date of Survey | (from & to) | | Total Miles of line | Cut |
| Name and Address of Author (c | of Geo-Technical report) | o,:4≦,1 | • | | Day Mo. 1 | Yr. Day | Ma. Yr. | . | |
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| For first survey: | - Electromagnetic | | [| c | 1042260 | 00 | C | 1046001 | 00 |
| Enter 40 days. (This includes line cutting) | Magnetometer | | | | 1042309 | 00 | | 1040901 | 80 |
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| For each additional survey: using the same grid: | • naciometric | | | | 1042371 | 80 | | 1046903 | 80 |
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| | Page 4 of 5 Instruction: | | | | | | | | |
| | Geochemical | | | | 1042378 | 80 | | 1046909 | 80 |
| Man Days | Geophysical | Days per | 1 | | 1042387 * | 2088 | | 10/6010 | 00 |
| Complete reverse side | • Electromannetic | | 1 | | 1042307 | <u>nº 00</u> | | 1040910 | 00 |
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| | • Magnetometer | | | | 1042389 | 80 | | 1046912 | 80 |
| | - Radiometric | | | | 1042390 | 80 | | 1046913 | 80 |
| | - Other | | | | 1042391 | 80 | | 1046914 | 80 |
| | Geological | | | | 1042392 | 80 | | 994096 | 80 |
| | Geochemical | | | | 1042397 | 80 | | 1042952 | 80 |
| Airborne Credits | | Days per | 1 | | 10/2302 | 00 | | 10/20/6 | 00 |
| Note: Special provisions | Electromagnetic | | | | 1042350 | 00 | | 1042940 | - <u>-ov</u> |
| credits do not apply | | 40 | | | 1042461 | 80 | | | |
| to Airborne Surveys. | wagnetometer | | | | 1042462 | 80 | | 993569 | 80 |
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| Expenditures (excludes pow Type of Work Performed | er stripping) | | } | | 1046886 | 80 | | 993654 | 80 |
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| Performed on Claim(s) | | | | | 1046888 | 80 | | | |
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| Calculation of Expenditure Day | s Credits | otal | | | 1040899 | <u> </u> | ļ | | { |
| Total Expenditures | | Credits | . | | 1046900 | <u>80</u> | I | | <u> </u> |
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| in columns at right. | s credits por claim solecte | :a | ļ | Total Day | Cr. Date Recorded | | Mining Re | corder | |
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| I hereby certify that I have a or witnessed same during and Name and Postal Address of Per | personal and intimate kr d/or after its completion i son Certifying | nowledge o and the ani | of th nexe | e facts set f ed report is | orth in the Report of true. | of Work annes | ed hereto, | having performed th | ne work |
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| | | | | | 3 Arni | 1989 | al. | 1. 1. A. | nanti |

| Child Holdwrife Preizzeter's Lleaner Né. Addirate Preizzeter's Lleaner Né. Sortev Company Date of Survey (frien & to) Name and Address of Aurhor (of Geo Teomises report) Date of Survey (frien & to) Traits Encyceted per Each Claim in Columns at right Survey (frien & to) Social Provision Cesophysical Per first survey: Beer do Givery (frien & to) Per end days, (This indicate claim in Columns at right Social Provision Cesophysical Other Data Geodescent Other Data Geodescent Beer do Givery (for each) Other Data Geodescent Order Field Survey: Preint Reported Control Data Geodescent Other Data Geodescent And Order Field Survey: Preint Reported Social Provision Cestoprese Control Data Geodescent Data Survey And Order Field Survey: Data Survey And Order Field Survey: Electromagnetic Anter Social provision Cestoprese Control Data Geodescent Data Survey Anter Grand Claim Data Survey Anter Social provision Electromagnetic Statistican at ringo | Northern Developme and Mines | nt (Geophysica!, Geological, Geochemical and Expend | itures) Mining Act | | If number of mining exceeds space on this for Only days credits ca "Expenditures" section in the "Expend. Day: Do not use shaded areas | claims t rm, atta iculated may be s Cr." (below. |
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| Name and Address of Author (of Geo Technical report) Por lats provide and the provide and the comparation of the provide and the provide theory. Previde the | Survey Company | | Date of Surv | ey (from & to) | Total Miles of | line Cut |
| Credits Requested por Each Claim in Columns at right Mining Claim Traversed (List in numerical sequence) Sepecial Provisions Geophylical Por first survey: Electromagnetic Indides line curring) Mining Claim For each additional survey: Indigeta Claim uing the same grid: Other Compose Formatical Other And Dyn Electromagnetic Other Contract Compose Formatical Other And Dyn Electromagnetic Other Contract Compose Formatical One server And Dyn Electromagnetic One server And Dyn Mining Claim DideBed An Dyn | Name and Address of Author (o | Geo-Technical report) | Day Mo. | Yr, Day I | Ло. Yr. | |
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INDEX TO LAND DISPOSITION

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AREAS WITHDRAWN FROM DISPOSITION

+ S - Mining and Surface Rights

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IRO - Mining Rights Only SRO - Surface Rights Only

SAND AND GRAVEL HO GRAVEL REBERVE , FILE No. 10146 & 74146.

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B MTC GRAVEL PIT No. 4840

IOMATRY OF MAILING TOWNSHIP SUBJECT TO: FURESTRY OPERATIONS

IVISION OF THE TOMBLE PITE LOTS SOTH JUNE INFE

2) 400 FOOT SURFACE NIGHTS REVERVATION AROUND A LAKES AND NIVERS.

3) DOWEB LAKE DEVELOPMENT PLAN DATED 11TH JANE 1970, FILE 183096.

PATE OF ISSUE Ø OCT 1 7 1989 SUDBURY MINING RECORDER'S OFFICE

Map base and land disposition drafting by Surveys and Mapping Branch, Ministry of Natural Resources.



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