# Report of Induced Polarization, Misse-a-la-Masse, and Total Field Magnetic Surveys 

On the
Groves Property Grid
Groves Township, Ontario
Mining Claim Nos. 1228922, 4217813, 4217815
Porcupine Mining Division

## For

Liberty Mines Inc.

September 12, 2011
Timmins, Ontario

Matthew Johnston
1226 Gatineau Blvd.
Timmins, Ont. P4R 1E3

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### 1.0 Introduction

The Groves grid is located on the Groves property of Liberty Mines [nc., located in northeast Groves Township, Porcupine Mining Division. The Groves grid in Groves Township covers portions of or all of mining claims numbered 1228922,4217813 , and 4217815. These claims are part of a larger group of claims comprising the Groves property of Liberty Mines Inc. During July and August of 2011, a geophysical survey program eonsisting of induced polarization and resistivity surveys, misse-a-la-masse, and total ficld magnetic surveys was conducted over a portion of these claims. Ray Meikle and Associates of North Bay, Ontario, carried out the IP geophysical surveys, misse-a-lamasse, and the magnetic surveys. The geophysical surveys were performed in order to evaluate and map the presence of disseminated to massive sulphides with respect to their location, width, and concentrations.

### 2.0 Location And Access

The Groves property is located approximately 98 kilometers south west of the city of Timmins in northeast Groves Township. Access to the grid area is via highway 144 south from Timmins for approximately 140 kilometers. From this point travel 24 kilometers east on Highway 560 and then 19 kilometers northwest on along West Londondary road. At this point a number of bush roads and trails can be accessed by four wheel drive vehicles, ATV, or snowmobiles for 10 kilometers in a northerly direction to the southern area of the cut grid (see figures 1 and 2 ).

### 3.0 Summary of 2011 Geophysical Program

The geophysical program consisted of induced polarization and resistivity surveying (I.P.), misse-a-la-masse surveys and total field magnetic surveys. These surveys were carried out on a grid of recently cut lines oriented at $0^{\circ}$ spaced every 25 meters and chained and marked every 25 meters. The grid lines were surveyed every 25 meters along a baseline 0.425 km . in length and ranged in length between 275 and 450 meters.



The I.P. survey was performed using a pole-dipole electrode configuration. The dipole ' $a$ ' spacing was 25 meters and increasing separations of $n=1, n=2, n=3, n=4, n=5$, and $n=6$, times the dipole spacing was measured in order to map the response at depth. A total of approximately 3.6 km . of I.P. data was measured and recorded. The I.P. equipment used for the survey consisted of a Phoenix IPT-1 3000 watt transmitter operating in the time domain powered by a 2 kilowatt motor generator. The chargeability (measured in $\mathrm{mV} / \mathrm{V}$ ) between the transmitted current and the received voltage is recorded by an Iris Elrec IP Pro receiver which records the chargeability and the apparent resistivity for each set of dipoles. The Misse-a-la-Masse survey used the same equipment and recorded surface chargeability from two drill hole current electrode locations. A total of 2.44 kilometers of misse-a-la-masse surveying was completed. The chargeability measured in this survey is a measure of the polarization of the underlying lithology.

The total field magnetic survey, using a GEM GSM-19 magnetometer/VLF system, totaled 8.775 kilometers with readings collected every 12.5 meters along all lines.

A description of the survey method and equipment used can be found in Appendix A.

### 4.0 Discussion of Results

The results of the I.P. survey are presented as contoured and posted pseudosections of the apparent resistivity and recorded chargeability's at a scale of 1:2500. In addition, plan maps at a scale of $1: 5,000$ showing the contours of the filtered apparent resistivity with the interpretation and location of the I.P. anomalies is also presented. All maps accompany this report in the pocket at the back of this report.

The magnctic data has been presented on plan maps at a scale of $1: 2500$, showing the contours and postings, as well as the interpretations (see maps in pocket).

The misse-a-la-masse data has been presented on plan maps at a scale of $1: 2500$, showing the contours and postings of the recorded chargeabilities. (see maps in pocket).

The resistivity data as displayed by the contoured resistivity plan map shows a moderate variation of measured resistivities in the range of 1258 to 51704 ohm-m with a
mean background resistivity of approximately 10482 ohm-m. The higher resistivity areas of the grid may likely be mapping areas of bedrock ridges and sub-cropping bedrock areas. These areas are quite evident on the plan map. It is also possible the high resistivity zones may be outlining more resistive felsic lithology or silica altered horizons as well.

A prominent area of resistivity highs can be observed between lines 150 E and 350 E from 5275000 N to 5275200 N .

The I.P. anomalies have been interpreted and are displayed on the plan map of the filtered resistivity as well. Emphasis was placed on identifying I.P. anomalies, which were thought to originate within the bedrock as opposed to those I.P. anomalies that, may be associated with bedrock relief. Two anomaly trends were identified and labeled on the plan map as G1 and G2. In addition, several isolated, moderate and strong IP anomalies were also mapped which are not readily grouped into trends. Anomaly trend Gl (L100E/5050N, Ll $50 \mathrm{E} / 5075 \mathrm{~N}, \mathrm{~L} 200 \mathrm{E} / 5062.5 \mathrm{~N}, \mathrm{~L} 225 \mathrm{E} / 5062.5 \mathrm{~N}, \mathrm{~L} 250 \mathrm{E} / 5062.5 \mathrm{~N}$, and L300E/5062.5N) is comprised of strong, well defined IP chargeability anomalies. The responses however, suggest a limited depth extent to the mapped mineralization. Anomaly trend G2 is comprised of weak to moderate strength IP chargeabilty responses.

The interpreted depths to the top of the chargeable zones is between 4 and 10 meters for all of the IP anomalies.

If possible the anomalies and trends should be followed up by prospecting and geological mapping in order to determine their sources. These anomalies may reflect underlying lithology containing sulphide or graphitic mineralization which could be considered prospective for base metals.

The magnetic survey on the Groves grid indicates a relatively active magnetic background with magnetic values ranging between 55322 nT . and 60144 nT . The background magnetic field strength is 56466 nT . The overall magnetic pattern is disrupted by a moderate strength linear anomalous magnetic high striking at approximately 340 degrees azimuth. This anomaly is labeled as MI. This magnetic
anomaly may represent a mafic diabase dike, common to this geologic setting or possibly mafic or ultramafic lithology.

The isomagnetic contour pattern suggests an underlying lithology striking in an generally east-west direction through the grid area. All of the anomalies are easily identified and are labeled on the plan maps.

In addition to magnetic anomaly M1, several fault zones have been interpreted within the grid area. These anomalies may represent major lithological contacts or structural anomalies which may be significant in this area. These anomaly locations are indicated and shown on the contour map. There is no direct correlation between the magnetic responses and the mapped IP anomalies

The misse-a-la-masse survey on the Groves grid utilized mineralization located in previously drill holes GR-90-C45 and GR-90-E68. These hole locations are shown on the plan maps of the IP chargeabilities recorded on the surrounding lines. The results of the misse-a-la-masse survey display nearly identical responses with a very strong chargeability zone indicated between lines 125 E and 275 E from 5000 N to 5 I 25 N .

### 5.0 Conclusions and Recommendations

The induced polarization, misse-a-la-masse, and magnetic surveys completed over the Groves grid were successful in mapping several zones of anomalous I.P. effects, and magnetic anomalies, as well as mapping the bedrock resistivity. All of the interpreted I.P. anomalies are strong to moderate in strength and generally well defined and will likely require further investigation in order to determine their causes. The most promising I.P. anomalies, which are thought to arise from bedrock sources, have been interpreted and identified. In particular IP anomaly trends G1, and G2 should be considered as priority exploration follow-up targets. Anomaly Gl has a direct correlation with the strongest portion of the misse-a-la-masse responses.

It is always difficult to quantitatively rate all of the I.P. anomalies in terms of their economic potentia! when searching for exploitable mineral deposits, but it is possible that some of the I.P. anomalies mapped by this survey are caused by disseminated to semi-
massive metallic mineralization. This type of mineralization is often associated which valuable deposits of massive sulphides and platinum group minerals.

All of the responses should be investigated further in order to determine the priority of follow-up needed. The anomalies should be further screened utilizing any other different types of geophysical surveys that may have been undertaken on the Groves grid. This would aid greatly in further refining the interpretation of the I.P. survey. Any existing geological, diamond drilling or geochemical information that may exist in the mining recorder assessment files should be investigated and compiled prior to further exploration of the Groves property in order to accurately assess the area of the current geophysical surveys and to determine the most effective follow-up exploration method for this property.

Respectively Submitted,


Matthew Johnston

## Statement of Qualifications

This is to certify that: MATTHEW JOHNSTON
I am a resident of Timmins; province of Ontario since June 1, 1995.
I am self-employed as a Consulting Geophysicist, based in Timmins, Ontario.
I have received a B. Sc. in geophysics from the University of Saskatchewan; Saskatoon, Saskatchewan in 1986.

I have been employed as a professional geophysicist in mining exploration, environmental and other consulting geophysical techniques since 1986.

Signed in Timmins, Ontario, this September 12, 2011


Appendix A

# Survey Theory - Total Field Magnetics 

Magnetic Survey

Theory:
The magnetic method is based on measuring alteration in the shape and magnitude of the earth's naturally occurring magnetic field caused by changes in the magnetization of the rocks in the earth. These changes in magnetization are due mainly to the presence of the magnetic minerals, of which the most common is magnetite, and to a lesser extent illuminate, pyrrhotite, and some less common minerals. Magnetic anomalies in the earth's filed are caused by changes in two types of magnetization: (1) Induced, caused by the magnetic field being altered and enhanced by increases in the magnetic susceptibility of the rocks, which is a function of the concentration of the magnetic minerals. (2) Remanent magnetism is independent of the earth's magnetic field, and is the permanent magnetization of the magnetic particles (magnetite, etc.) in the rocks. This is created when these particles orient themselves parallel to the ambient field when cooling. This magnetization may not be in the same direction as the present earth's field, due to changes in the orientation of the rock or the field. The unit of measurement (variations in intensity) is commonly known as the Gamma which is equivalent to the nanotesla ( nT ).

## Method:

The magnetometer, a GEM Systems GSM-19 with an Overhauser sensor measures the Total Magnetic Field (TFM) perpendicular to the earth's field (horizontal position in the polar region). The unit has no moving parts, produces an absolute and relatively high resolution measurement of the field and displays the measurement on a digital lighted display and is recorded (to memory). Initially, the tuning of the instrument should agree with the nominal value of the magnetic field for each particular area. The Overhauser procession magnetometer collected the data with a 0.2 nanoTesla accuracy. The operator read each and every line at a 12.5 m intervals with the sensor attached to the top of four $(56 \mathrm{~cm})$, aluminum tubing sections. The readings were corrected for changes in the earth's magnetic field (diurnal drift) with a similar GSM-19 magnetometer, acting as a stationary base station which automatically read and stored the readings at every 15 seconds. The data from both nnits was then downloaded to PC and base corrected values were computed.

## Mise-a-la-Masse

The Mise-a-la-Masse method of surveying is used for examining highly conductive subsurface bodies and the area around them. The continuity, extent, dip and strike of the body can be determined with greater ease if the current is injected directly into the conductive body than by the other resistivity mapping methods. If the body does not extend to the surface, the connection could be made through a drill hole.

One current electrode ( C -) is connected to the conductive body and the other current electrode ( $\mathrm{C}^{+}$) is placed at a considerable distance. One potential electrode ( P -) is located in line with the two current connections and at considerable distance on the opposite side of the conductive body. The survey is then conducted with only one potential electrode ( $\mathrm{P}+$ ) being moved over a square grid of measuring points. The readings from the instrument and the potential electrode $(\mathrm{P}+)$ coordinates are recorded. A contour map is then generated from these data.

The distance of the far current electrode ( $\mathrm{C}+$ ) from the potential electrode grid ( $\mathrm{P}+$ ) should be at least 2 or 3 times the maximum dimension of the grid. The same is true for the distance between the grid and the stationary potential electrode ( $\mathrm{P}-$ ).


## Induced Polarization Surveys

Time domain IP surveys involve measurement of the magnitude of the polarisation voltage ( Vp ) that results from the injection of pulsed current into the ground.

Two main mechanisms are known to be responsible for the IP effect although the exact causes are still poorly understood. The main mechanism in rocks containing metallic conductors is electrode polarisation (overvoltage effect). This results from the build up of charge on either side of conductive grains within the rock matrix as they block the flow of current. On removal of this current the ions responsible for the charge slowly diffuse back into the electrolyte (groundwater) and the potential difference across each grain slowly decays to zero. The second mechanism, membrane polarisation, results from a constriction of the flow of ions around narrow pore channels. It may also result from the excessive build up of positive ions around clay particles. This cloud of positive ions similarly blocks the passage of negative ions through pore spaces within the rock. On removal of the applied voltage the concentration of ions slowly returns to its original state resulting in the observed IP response. In TD-IP the current is usually applied in the form of a square waveform, with the polarisation voltage being measured over a series of short time intervals after each current cut-off, following a short delay of approximately 0.5 s . These readings are integrated to give the area under the decay curve, which is used to define $V p$. The integral voltage is divided by the observed steady voltage (the voltage due to the applied current plus the polarisation voltage) to give the apparent chargeability ( Ma ) measured in milliseconds or $\mathrm{mV} / \mathrm{V}$. For a given charging period and integration time the measured apparent chargeability provides qualitative information on the subsurface geology.

The polarisation voltage is measured using a pair of non-polarising electrodes similar to those used in spontaneous potential measurements and other IP techniques.













## Liberty Mines Inc. - Groves Property

| Claim Number | UNITS | $\$$ req/yr | TWP | Recorded | Due Date |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1228922 | 1 | 800 | GROVES | 1997-Sep-18 | 2011-Nov-18 |
| 4214921 | 16 | 12800 | GROVES | 2007-Sep-19 | 2011-Nov-19 |
| 4217799 | 16 | 12800 | GROVES | 2007-Sep-19 | 2011-Nov-19 |
| 4217800 | 16 | 12800 | GROVES | 2007-Sep-19 | 2011-Nov-19 |
| 4217801 | 16 | 12800 | GROVES | 2007-Sep-06 | 2011-Nov-19 |
| 4217802 | 16 | 12800 | GROVES | 2007-Sep-06 | 2011-Nov-19 |
| 4217803 | 16 | 12800 | GROVES | 2007-Sep-06 | 2011-Nov-19 |
| 4217804 | 16 | 12800 | GROVES | 2007-Sep-06 | 2011-Nov-19 |
| 4217809 | 16 | 12800 | GROVES | 2007-Sep-06 | 2011-Nov-19 |
| 4217810 | 16 | 12800 | GROVES | 2007-Sep-06 | 2011-Nov-19 |
| 4217811 | 16 | 12800 | BRUNSWICK | 2007-Sep-19 | 2011-Nov-19 |
| 4217812 | 16 | 12800 | BRUNSWICK | 2007-Sep-19 | 2011-Nov-19 |
| 4217813 | 10 | 8000 | GROVES | 2007-Sep-19 | 2011-Nov-19 |
| 4217814 | 2 | 1600 | GROVES | 2007-Sep-19 | 2011-Nov-19 |
| 4217815 | 3 | 2400 | GROVES | 2007-Sep-19 | 2011-Nov-19 |
| 4217816 | 16 | 12800 | GROVES | 2007-Sep-19 | 2011-Nov-19 |
| 4217817 | 16 | 12800 | GROVES | 2007-Sep-06 | 2011-Nov-19 |
| 4217818 | 16 | 12800 | GROVES | 2007-Sep-19 | 2011-Nov-19 |
| 4217819 | 16 | 12800 | TOGO | 2007-Sep-19 | 2011-Nov-19 |
| 4217820 | 16 | 12800 | TOGO | 2007-Sep-19 | 2011-Nov-19 |
| 4217821 | 16 | 12800 | TOGO | 2007-Sep-19 | 2011-Nov-19 |
| 4217822 | 16 | 12800 | TOGO | 2007-Sep-19 | 2011-Nov-19 |
| 4217823 | 16 | 12800 | BRUNSWICK | 2007-Sep-19 | 2011-Nov-19 |
| 4217824 | 16 | 12800 | BRUNSWICK | 2007-Sep-19 | 2011-Nov-19 |
| 4217825 | 16 | 12800 | BRUNSWICK | 2007-Sep-19 | 2011-Nov-19 |
| 4217826 | 16 | 12800 | GROVES | 2007-Sep-06 | 2011-Nov-19 |
| 4217827 | 16 | 12800 | GROVES | 2007-Sep-06 | 2011-Nov-19 |
| 4217828 | 16 | 12800 | GROVES | 2007-Sep-06 | 2011-Nov-19 |
| Claim Blocks | $\mathbf{2 8}$ |  |  |  |  |
| Claim Units | $\mathbf{4 0 0}$ |  |  |  |  |

Liberty Mines Inc. - Groves Property




