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# SINO MINERALS CORP.

# Magnetometer and VLF EM Surveys Over the

# West Grid Greenlaw Property Greenlaw Township, Ontario



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# 1. SURVEY DETAILS

This project is known as the Greenlaw Property.

## 1.1 CLIENT

Sino Minerals Corp.

7-145 Riviera Drive Markham, Ontario L3R 5J6

## 1.2 LOCATION

The Greenlaw Property is located approximately 50km southeast of Chapleau, Ontario.



Figure 1: Location of the Greenlaw Property

# 1.3 ACCESS

Access to the property was attained with a 4x4 truck via an access road heading north from highway regional road 667 more commonly known as the Sultan Highway. Approximately 17km east of the intersection with highway 667, there is a forestry access road heading north from the Sultan Highway. This access road is travelled for an additional 27 kilometers to the survey area.



## 1.4 SURVEY GRID

The grid consists of 9 grid lines spaced at intervals of approximately 200m to 400 meters. The baseline was cut with a strike of 90 degrees and a total distance of 1.8 kilometers. Grid lines were established every 200-400 meters and picketed every 25 meters for a total of 36.8 line kilometers.



Figure 2: Claim Map with Grid



# 2. SURVEY WORK UNDERTAKEN

#### 2.1 SURVEY LOG

Date	Description	Line	Min Extent	Max Extent	Total
					Survey
					(m)
September 25, 2012	Locate survey area and begin survey.	7400W	875N	2500N	1625
		7600W	925N	2500N	1575
		7800W	900N	2500N	1600
		8000W	900N	2500N	1600
		2500N	8000W	7400W	600
September 26, 2012	Continue survey.	7000W	4000S	0	4000
		8200W	800N	2500N	1700
		8400W	0	2500N	2500
		8600W	4000S	2500N	5875
		8800W	625N	2500N	1875
		4000S	8600W	7000W	1600
		0	8800W	7000W	1800
		2500N	8800W	8000W	800
September 27, 2012	Continue survey.	7800W	4000S	0	4000
		8600W	0	625N	625
		8800W	0	625N	625
September 28, 2012	Complete survey.	7400W	0	875N	875
		7600W	0	925N	925
		7800W	0	900N	900
		8000W	0	900N	900
		8200W	0	800N	800

# Table 1: Survey Log

# 2.2 PERSONNEL

Bruce Lavalley and of Britt, Ontario and Tyler Potts of Larder Lake, Ontario conducted all the magnetic data collection.

## 2.3 SURVEY SPECIFICATIONS

The survey was conducted with a GSM-19 v7 Overhauser magnetometer/VLF with a second GSM-19 magnetometer in base station mode for diurnal correction.

A total of 36.8 line kilometers of magnetic survey was conducted on September 25<sup>th</sup> and 28<sup>th</sup>, 2012. This consisted of 2944 magnetometer and VLF EM samples taken at 12.5m intervals.



# 3. OVERVIEW OF SURVEY RESULTS

3.1 SUMMARY INTERPRETATION



Figure 3: Magnetic Plan Map



With the wide spacing of the survey grid lines, the coverage area of the survey is considerable. From this survey, numerous anomalies have been generated. Some higher priority anomalies should be further examined.

# Anomaly A

Within the central northern part of the survey area, there appears to be an intense magnetic response. This response appears to be associated with a linear magnetic feature approximately 200 meters wide that strikes across the survey grid. Within this, there is a weak VLF EM axis that appears to exhibit a sub-parallel strike to the magnetic anomaly. This may indicate the VLF response to be topographical or structural in nature. The intensity of the magnetic response in this anomaly indicates the source to be most likely related to an ultramafic or iron formation.



Figure 4: Anomaly A



# Anomaly B

Anomaly B appears as a magnetic high with an intense coinciding VLF EM axis. The intensity of the magnetic and VLF responses indicates a strong magnetic and conductive horizon. Where these anomalies cross on lines 7800W and 8600W, the response is narrow yet intense. This type of response resembles that seen from an iron formation. Exhibiting both a magnetic high with an intense coinciding VLF EM axis makes this a target for further exploration. The strike length of the anomaly is over 800 meters and it is visible on two out of three lines. This anomaly may justify having more infill lines cut to perform further magnetometer and VLF EM Surveys at a tighter spacing to better define it.



Figure 5: Anomaly B



# Anomalies C, D, and E

Anomalies C, D and E exhibit an intense VLF EM crossover with a slight increase in magnetic signature. The intensity of the VLF EM response indicates a strong conductive horizon. The magnetic response indicates it may be a result of a dike or a slightly magnetic unit. This may indicate the source being that of a graphite within a tuff or sedimentary unit. However, this can also indicate a chalcopyrite horizon with an associated pyrite.



Figure 6: Anomalies C, D and E



# Anomaly F

Anomaly F represents an elevated magnetic signature with a small flanking VLF EM axis. The intensity of this signature is not as strong of that of anomaly A and the strike is more east-west. These two features indicate that the two anomalies are more than likely unrelated. The elevated magnetic signature may be related to a more acidic volcanic unit or a sedimentary unit. The broad nature of the signature may indicate the source is deeper which may indicate a possible ultramafic or iron formation exists.



Figure 7: Anomaly F

# **Conclusion**

Anomalies A to F should all be further investigated. Any additional exploration programs that have occurred should be compiled together to determine if any of these anomalies have been already tested or explained. I would, however, recommend cutting infill lines to the south to better explore anomaly B. The intensity of the signatures is favorable; however, the present line spacing may hide a broader anomalous signature. An IP survey over the anomalies may also further identify their sources and economic potential.



# **APPENDIX A**

#### **STATEMENT OF QUALIFICATIONS**

I, C. Jason Ploeger, hereby declare that:

- I am a professional geophysicist with residence in Larder Lake, Ontario and am presently employed as a Geophysicist and Geophysical Manager of Canadian Exploration Services Ltd. of Larder Lake, Ontario.
- 2. I am a Practicing Member of the Association of Professional Geoscientists, with membership number 2172.
- 3. I graduated with a Bachelor of Science degree in geophysics from the University of Western Ontario, in London Ontario, in 1999.
- 4. I have practiced my profession continuously since graduation in Africa, Bulgaria, Canada, Mexico and Mongolia.
- 5. I am a member of the Ontario Prospectors Association, a Director of the Northern Prospectors Association and a member of the Society of Exploration Geophysicists.
- 6. I do not have nor expect an interest in the properties and securities of Sino Minerals Corp.
- 7. I am responsible for the final processing and validation of the survey results and the compilation of the presentation of this report. The statements made in this report represent my professional opinion based on my consideration of the information available to me at the time of writing this report.



C. Jason Ploeger, P.Geo., B.Sc. Geophysical Manager Canadian Exploration Services Ltd.

Larder Lake, ON October 31, 2012



#### **APPENDIX B**

#### THEORETICAL BASIS AND SURVEY PROCEDURES

#### TOTAL FIELD MAGNETIC SURVEY

Base station corrected Total Field Magnetic surveying is conducted using at least two synchronized magnetometers of identical type. One magnetometer unit is set in a fixed position in a region of stable geomagnetic gradient, and away from possible cultural effects (i.e. moving vehicles) to monitor and correct for daily diurnal drift. This magnetometer, given the term 'base station', stores the time, date and total field measurement at fixed time intervals over the survey day. The second, remote mobile unit stores the coordinates, time, date, and the total field measurements simultaneously. The procedure consists of taking total magnetic measurements of the Earth's field at stations, along individual profiles, including Tie and Base lines. A 2 meter staff is used to mount the sensor, in order to optimally minimize localized near-surface geologic noise. At the end of a survey day, the mobile and base-station units are linked, via RS-232 ports, for diurnal drift and other magnetic activity (ionospheric and sferic) corrections using internal software.

For the gradiometer application, two identical sensors are mounted vertically at the ends of a rigid fiberglass tube. The centers of the coils are spaced a fixed distance apart (0.5 to 1.0m). The two coils are then read simultaneously, which alleviates the need to correct the gradient readings for diurnal variations, to measure the gradient of the total magnetic field.

## **VLF Electromagnetic**

The frequency domain VLF electromagnetic survey is designed to measure both the vertical and horizontal inphase (IP) and Quadrature (OP) components of the anomalous field from electrically conductive zones. The sources for VLF EM surveys are several powerful radio transmitters located around the world which generate EM radiation in the low frequency band of 15-25kHZ. The signals created by these long-range communications and navigational systems may be used for surveying up to several thousand kilometres away from the transmitter. The quality of the incoming VLF signal can be monitored using the field strength. A field strength above 5pT will produce excellent quality results. Anything lower indicates a weak signal strength, and possibly lower data quality. A very low signal strength (<1pT) may indicate the radio station is down.

The EM field is planar and horizontal at large distances from the EM source. The two components, electric (E) and magnetic (H), created by the source field are orthogonal to each other. E lies in a vertical plane while H lies at right angles to the direction of propagation in a horizontal plane. In order to ensure good coupling, the strike of possible conductors should lie in the direction of the transmitter to allow the H vector to pass through the anomaly, in turn, creating a secondary EM field.

The VLF EM receiver has two orthogonal aerials which are tuned to the frequency of the transmitting station. The direction of the source station is located by rotating the sensor around a vertical axis until a null position is found. The VLF EM survey procedure consists of taking measurements at stations along each line on the grid. The receiver is rotated about a horizontal axis, right angles to the traverse and the tilt recorded at the null position.



#### **APPENDIX C**

#### **GSM 19**



#### **Specifications**

#### **Overhauser Performance**

Resolution: 0.01 nT Relative Sensitivity: 0.02 nT Absolute Accuracy: 0.2nT Range: 20,000 to 120,000 nT Gradient Tolerance: Over 10,000nT/m Operating Temperature: -40°C to +60°C

#### **Operation Modes**

Manual: Coordinates, time, date and reading stored automatically at min. 3 second interval. Base Station: Time, date and reading stored at 3 to 60 second intervals. Walking Mag: Time, date and reading stored at coordinates of fiducial. Remote Control: Optional remote control using RS-232 interface. Input/Output: RS-232 or analog (optional) output using 6-pin weatherproof connector.

#### **Operating Parameters**

Power Consumption: Only 2Ws per reading. Operates continuously for 45 hours on standby. Power Source: 12V 2.6Ah sealed lead acid battery standard, other batteries available Operating Temperature: -50°C to +60°C

#### Storage Capacity

Manual Operation: 29,000 readings standard, with up to 116,000 optional. With 3 VLF stations: 12,000 standard and up to 48,000 optional.

Base Station: 105,000 readings standard, with up to 419,000 optional (88 hours or 14 days uninterrupted operation with 3 sec. intervals)

Gradiometer: 25,000 readings standard, with up to 100,000 optional. With 3 VLF stations: 12,000, with up to 45,000 optional.

#### Omnidirectional VLF

Performance Parameters: Resolution 0.5% and range to ±200% of total field. Frequency 15 to 30 kHz.

Measured Parameters: Vertical in-phase & out-of-phase, 2 horizontal components, total field coordinates, date, and time.

Features: Up to 3 stations measured automatically, in-field data review, displays station field strength continuously, and tilt correction for up to  $\pm 10^{\circ}$  tilts.

Dimensions and Weights: 93 x 143 x 150mm and weighs only 1.0kg.

Dimensions and Weights

Dimensions: Console: 223 x 69 x 240mm Sensor: 170 x 71mm diameter cylinder Weight:



Console: 2.1kg Sensor and Staff Assembly: 2.0kg

Standard Components

GSM-19 magnetometer console, harness, battery charger, shipping case, sensor with cable, staff, instruction manual, data transfer cable and software.

#### Taking Advantage of a "Quirk" of Physics

Overhauser effect magnetometers are essentially proton precession devices except that they produce an orderof magnitude greater sensitivity. These "supercharged" quantum magnetometers also deliver high absolute accuracy, rapid cycling (up to 5 readings / second), and exceptionally low power consumption.

The Overhauser effect occurs when a special liquid (with unpaired electrons) is combined with hydrogen atoms and then exposed to secondary polarization from a radio frequency (RF) magnetic field. The unpaired electrons transfer their stronger polarization to hydrogen atoms, thereby generating a strong precession signal-- that is ideal for very high-sensitivity total field measurement. In comparison with proton precession methods, RF signal generation also keeps power consumption to an absolute minimum and reduces noise (i.e. generating RF frequencies are well out of the bandwidth of the precession signal).

In addition, polarization and signal measurement can occur simultaneously - which enables faster, sequential measurements. This, in turn, facilitates advanced statistical averaging over the sampling period and/or increased cycling rates (i.e. sampling speeds).

• The unique Overhauser unit blends physics, data quality, operational efficiency, system design and options into an instrumentation package that ... exceeds proton precession and matches costlier optically pumped cesium capabilities



#### **APPENDIX D**

LIST OF MAPS (IN MAP POCKET)

Posted Contoured TFM Plan Map (1:10000)

1) SINO-GREENLAW-WEST-MAG-CONT

Posted Profiled Fraser Filtered VLF EM Plan Map (1:10000)

2) SINO-GREENLAW-WEST-VLF-NAA

Summary Interpretation Plan Map (1:10000)

3) SINO-GREENLAW-WEST-INTERP

Grid Sketch on Claim Map (1:40000)

4) SINO-GREENLAW-WEST-GRID

TOTAL MAPS=4