# REPORT ON A GROUND MAGNETIC AND VLF-EM GEOPHYSICAL SURVEY, OGDEN PROPERTY, ONTARIO, CANADA

Presented to:

## KNICK EXPLORATION

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By:

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## 1. INTRODUCTION

Between February 3<sup>rd</sup> and 13<sup>th</sup> 2010, ground total field magnetic and VLF-electromagnetic surveys were performed on the Ogden property of Knick Exploration.

The magnetic and VLF-EM surveys were carried out on north-south grid lines over the central part of the property.

Field works were carried out by Georges Giga and Paul Adomatis.

## 2. LOCATION, PROPERTY AND ACCESS

The Ogden property project is located in north-eastern Ontario, approximately 12km southwest of the city of Timmins (NTS sheet 42A06). The general and detailed locations are shown in figure 1.

The Ogden property is comprised of 8 claims totalling 70 claim units covering 1,120 hectares (2,767 acres) in Ogden Township (figure 2). The claims are listed below:

**CLAIM LIST** 

Claim Number	Units	Hectares
4243882	16	256
4243883	4	64
4243884	2	32
4243885	10	160
4243886	12	192
4243887	12	192
4243888	8	128
4243889	6	96
Total	70	1,120

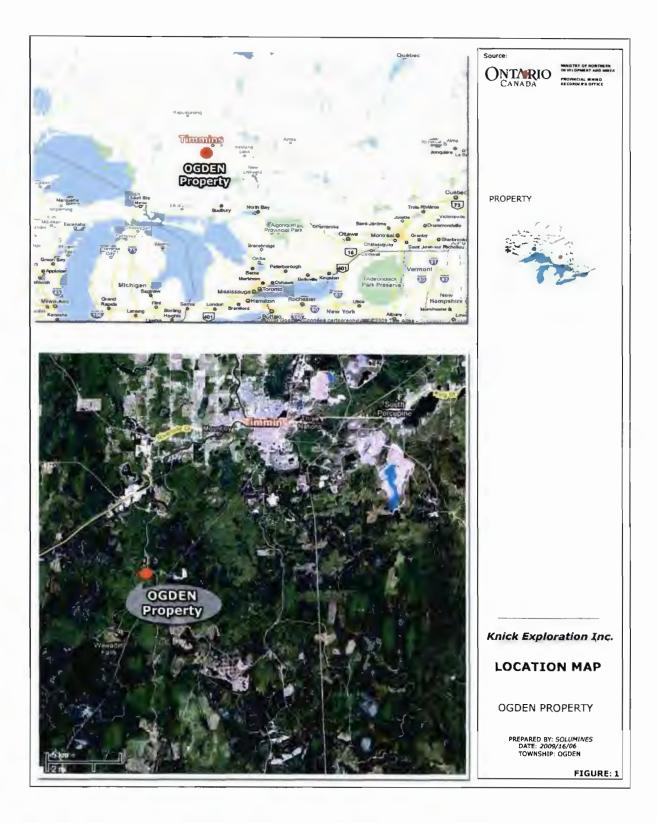


Figure 1. Location map (from D.Theberge, July 2008)

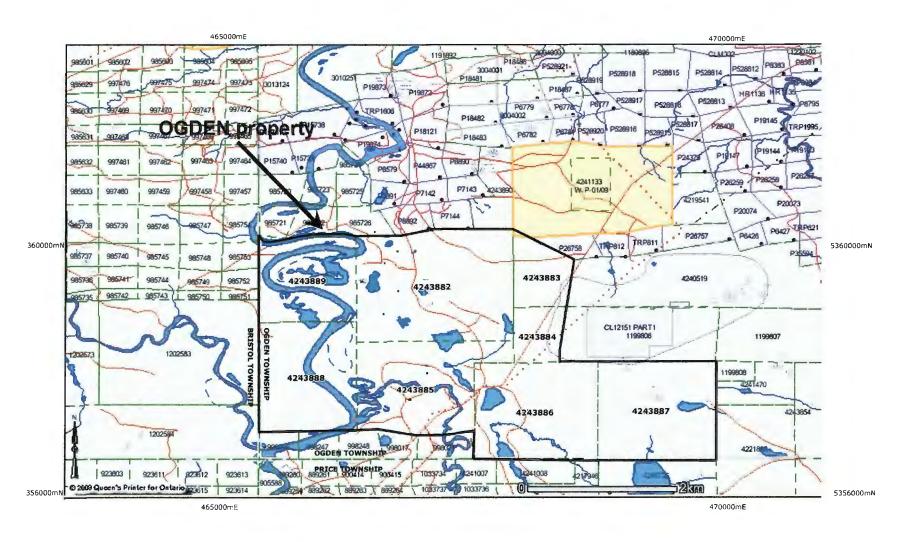


Figure 2. Claim map (modified from D.Theberge, July 2008)

Access to the property is obtained by a gravel road taken from Timmins (Wawiatin rd) or via a secondary road off the provincial highway #101.

### 3. SURVEY METHODOLOGY AND INSTRUMENTS

#### 3.1 Grid Establishment

North-south grid lines were used for the geophysical survey at 100 metres separation. The grid covers the central part of the property (figure 3).

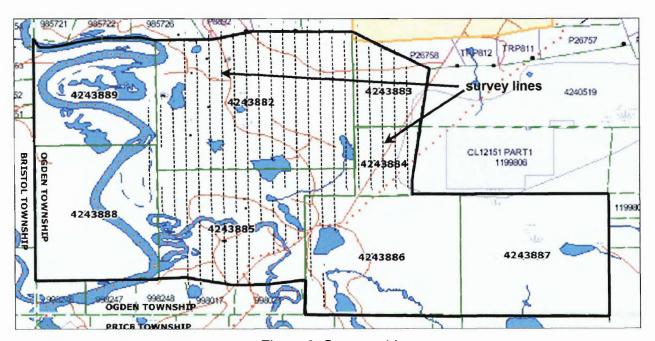


Figure 3. Survey grid

### 3.2 Total field magnetic survey

Between February 3<sup>rd</sup> and 13<sup>th</sup> 2010, approximately 47.1 km of total field magnetic readings at 12.5 m intervals were taken on the Ogden property totalling 3807 data points.

A GEM GSM-19 proton MAG/VLF system was used to measure the total field intensity of the earth's magnetic in nanotesla. The GSM-19 includes a built-in GPS and has a sensitivity of 0.15 nT with a rate of 1 reading/second with a resolution of 0.01 nT. The total magnetic field readings were corrected for diurnal variations using a magnetometer base station.

A simple interpretation of the magnetic survey can be done by producing a colour 2D grid. Local and regional variations of the earth's magnetic field can be described and matched with geology.

Data processing using spatial or spectral filters can enhance magnetic features. For this report, the first vertical derivative of the total magnetic field values was calculated in order to enhance sub-surface magnetic features.

The total magnetic intensity readings were plotted on profile maps at a scale of 1:5 000 (Appendix 2) and contoured maps over a colour grid of the total magnetic intensity (Appendix 2).

## 3.3 VLF-EM survey

Between February 3<sup>rd</sup> and 13<sup>th</sup> 2010, a VLF survey was completed using 2 VLF stations, NAA (24.0 KHz) and NLK (24.8 KHz). Approximately 42.225 km of VLF-EM readings at 12.5 m intervals were taken with NAA station totalling 3409 data points. Approximately 46.5 km of VLF-EM readings at 12.5m intervals were taken with NLK station totalling 3756 data points. Data was collected using the sign convention (facing northward).

A GEM GSM-19 proton MAG/VLF system was used to measure the vertical in-phase and outof-phase with resolution of 0.1% of the total VLF field.

The frequency domain VLF electromagnetic method (Very Low Frequency) is designed to measure the EM field tilt angle (created by powerful radio transmitters set up in different parts of the world for military communications).

The military powerful radio waves induce electrical currents then produce secondary magnetic fields which are detected at the surface through deviation of the VLF field. This secondary field from the conductor is added to the primary field vector, so that the resultant field is tilted up on one side of the conductor and down on the other. The technique consists in measuring the inphase and quadrature components of the vertical magnetic field as a percentage of the horizontal primary field (i.e. the tangent o the tilt angle and ellipticity).

Interpretation of VLF-EM is quite simple. The conductor axis is located at the inflection point marked at the crossover from positive tilt (vertical in-phase) to negative tilt. The main advantage of the VLF method is that it responds well to poor conductors and has proven to be a reliable tool in mapping fault-shear zones, conductive mineralization and rock contacts. The major disadvantage is that because of the high frequency of the transmitted wave, a multitude of anomalies from unwanted sources, such as swamp edges, creeks and topographical highs may be delineated. Therefore some amount of care must be taken in interpreting the results in areas containing these topographical features.

#### 4. INTERPRETATION

## 4.1 Magnetic interpretation

The magnetic survey results show a moderate to strong magnetic relief. The measured local magnetic field varies between 19014 and 67929 nT with a background value of 56534nT. The wide range of magnetic values reflects the presence of power lines and roads.

Two main magnetic features are noted. The first one is located in the north part of the survey grid and the second is located in the center part (figure 4). Both features are roughly oriented east-west and both are truncated on their west end by a north-north-east interpreted structure.

A second structure, similar to the first one is interpreted on the western edge of the survey grid. Both structures are possibly associated with proterozoic mafic dykes.

Finally, some very low magnetic features located on the eastern part of the grid are probably associated by power lines.

Appendix 5 shows the magnetic interpretation of the survey.

## 4.2 VLF-EM interpretation

Two distinct groups of VLF anomalies were interpreted using the two distinct VLF stations. Each group were divided in strong and weak VLF anomalies. Figure 4 and appendix 5 show the VLF-EM interpretation using both VLF stations.

One major VLF axis is directly associated with a powerline along a road. Most of the VLF axis appears to be truncated by the interpreted magnetic structures.

Finally, the most important magnetic feature (to the north) is bordered by a VLF axis to the east.

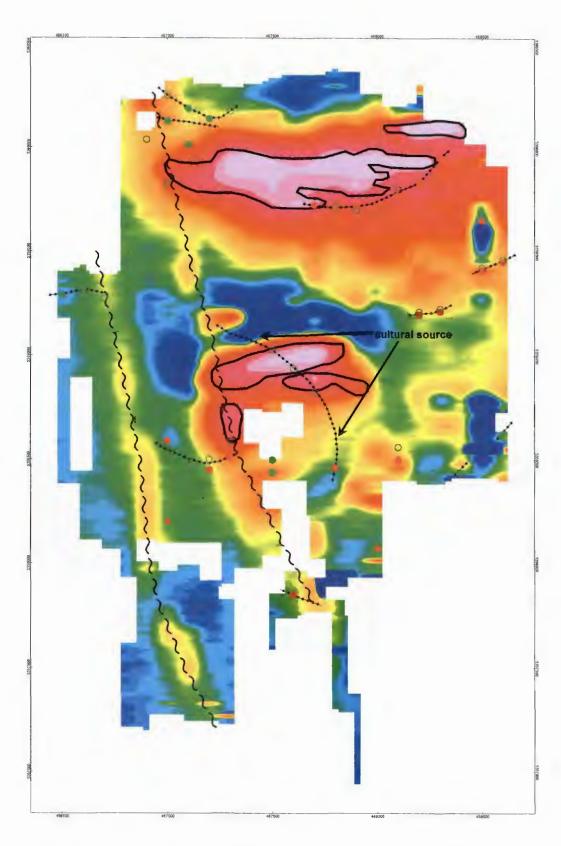


Figure 4. Interpreted magnetic/VLF surveys

### 5. Conclusions

A ground magnetic and VLF-EM surveys were completed on the Ogden property.

The magnetic survey has accurately outlined two significant high magnetic features partly controlled by interpreted structures. These structures are possibly associated with proterozoic mafic dyke.

The VLF-EM results permitted to interpret several conductive anomalies for each VLF station read. These VLF anomalies were roughly classified as weakly defined and strongly defined conductors.

A geological compilation is strongly recommended to enhance the geophysical features defined by the magnetic/VLF survey.

Respectfully submitted,

Marc Boivin, P.Geo. (OGQ # 351)

## **Statements of Qualification**

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- I, Marc Boivin, P.Geo, do hereby certify that:
  - 1. I am an independent consulting geophysicist, registered in Quebec under MB Geosolutions.
  - 2. I earned a Bachelor of Science in Geology in 1983 at Université du Québec à Montréal.
  - 3. I am a Professional Geoscientist registered with the Ordre des Géologues du Québec, No. 351.
  - 4. I have practised my profession for 24 years in mining exploration geophysics.
  - 5. I have not received and do not expect to receive a direct or indirect interest in the properties covered by this report or in Knick Exploration.

Dated this 29th of November, 2010

Marc Boivin, P.Geo., (OGQ) #351

