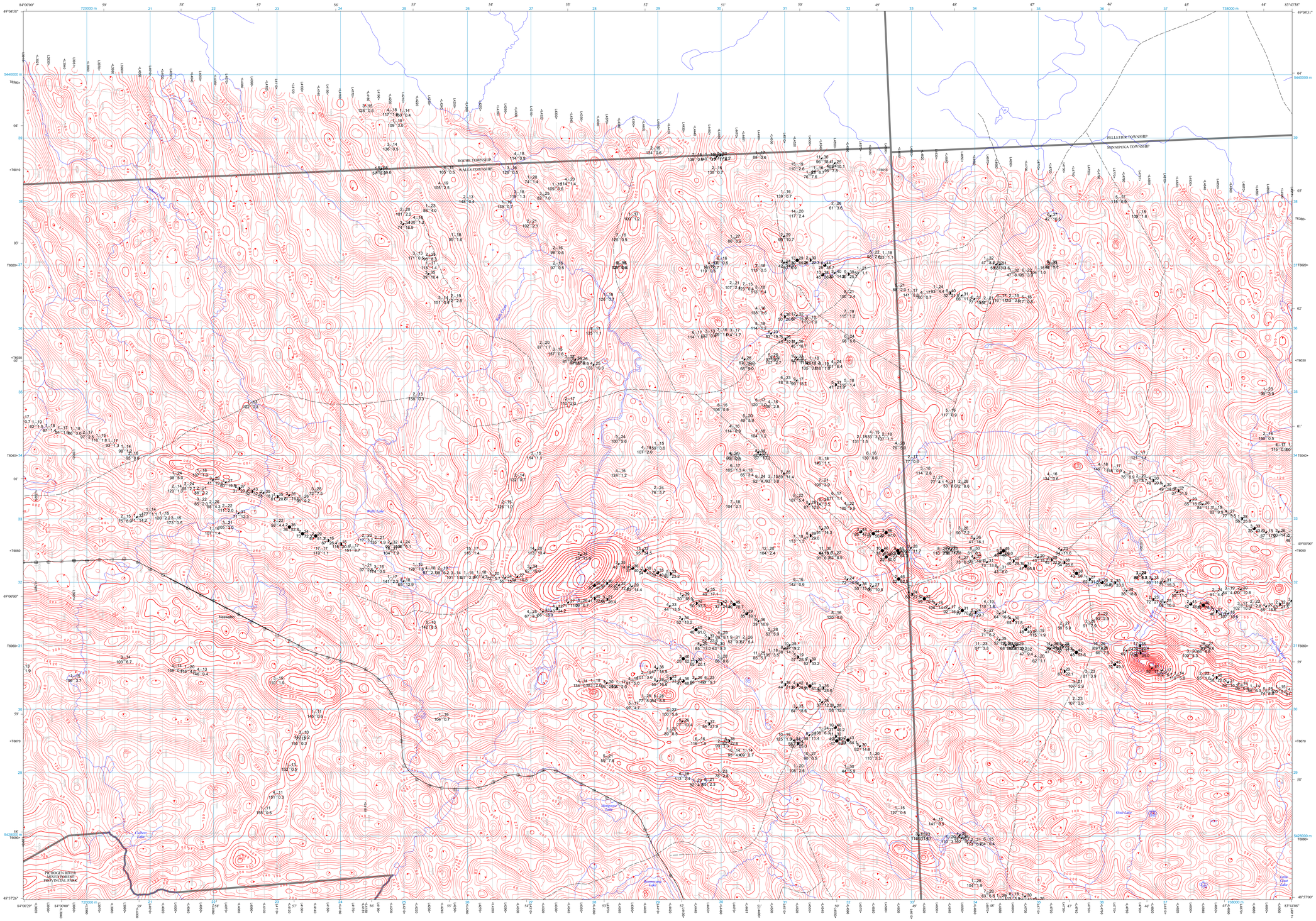
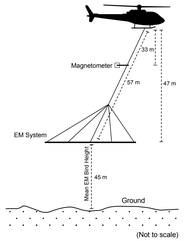


SYSTEM CONFIGURATION



SURVEY PARAMETERS

AIRCRAFT
Type: AS350B3
Registration: C-GEOC

MAGNETOMETER
Type: Geometrics® G823A cesium vapour
Sensitivity: 0.02 nT
Noise level: ±0.004 nT
Sample interval: 10 readings per second
Sensor location: 33 m below aircraft

ELECTROMAGNETIC SYSTEM
Type: VTEM®Plus
Base frequency: 30 Hz
Current waveform: trapezoid
Peak dipole moment (NIA): 388 640 Am²
Pulse width: 7.078 msec
Off-time: 8083 µsec
Pulse repetition: 30 cycles per second, 60 pulses per second
Parameters: Z-component of dB/dt
Noise levels: 0.0005 pV/(Am⁴)
Sample interval: 10 readings per second
Bird Location: 47 m below aircraft

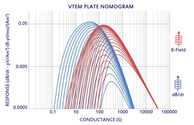
NAVIGATION SYSTEM
GPS receiver: MID-TECHB RX400p
GPS sample interval: 5 readings per second
Radar altimeter: Terra TRA3500/TRI-40
Radar sample interval: 5 readings per second
Video flight path recorder: Airchos™ 605 Wi-Fi

BASE STATION
Magnetometer: Geotech Base Station, Geometrics® cesium-vapour sensor
Magnetometer sample interval: 10 readings per second

SURVEY SPECIFICATIONS
Survey date: July 18 to October 22, 2014
Nominal aircraft terrain clearance: 92 m
Traverse line spacing: 200 m
Control line spacing: 1500 m
Traverse line direction: NS for Block 1 and NE-SW for Block 2
Control line direction: EW for Block 1 and NW-SE for Block 2

CO-ORDINATE SYSTEM
Projection: Universal Transverse Mercator
Datum: NAD83
Central meridian: 87°00'W (UTM zone 16)
Central scale factor: 0.9996
False easting: 500 000 m
False northing: 0 m

VERTICAL PLATE NOMOGRAM

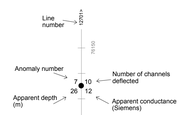


LEGEND

ELECTROMAGNETIC ANOMALY SYMBOLS

Anomaly	Conductance Classification
●	> 50 siemens
◉	35 - 50 siemens
◑	20 - 35 siemens
◕	10 - 20 siemens
⊕	5 - 10 siemens
○	< 5 siemens
⊞	cultural response

FLIGHT LINE INFORMATION



MAGNETIC CONTOURS

nanoteslas (nT)

- 5 nT contour
- 20 nT contour
- 100 nT contour
- 500 nT contour
- Magnetic depression

KEATING COEFFICIENTS

Positive correlation		Negative correlation
○	90%	○
○	85%	○
○	80%	○
+	75%	+

Ontario

Ontario Geological Survey

MAP 82 740

AIRBORNE MAGNETIC AND ELECTROMAGNETIC SURVEYS

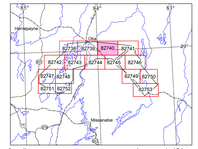
Residual magnetic field contours with electromagnetic anomalies and Keating coefficients

KABINAKAGAMI LAKE AREA

Scale 1:20 000

500 m 0 0.5 1 km

NTS Reference: 42 B/13; C/16; F/1; G/4



Location map 1 cm equals 15 km

SOURCES OF INFORMATION

Base map information derived from the Land Information Ontario Data Warehouse, Land Information Ontario, Ministry of Natural Resources and Forestry, scale 1:50 000.

Magnetic declination for the centre of the map area was approximately 8°42'W in 2015.

Meju, Maxwell, A. 1998. Short Note: A simple method of transient electromagnetic data analysis, Geophysics, v.63, no.2, p.405-410.

Keating, P.B. 1995. A simple technique to identify magnetic anomalies due to kimberlite pipes; Exploration and Mining Geology, v.4, no.2, p.121-125.

DESCRIPTIVE NOTES

Introduction

This survey was flown using the Geotech VTEM®Plus helicopter-mounted magnetic and electromagnetic system. The aircraft was also equipped with a GPS navigation system and a digital data acquisition system.

Residual Magnetic Field Map

The contours of residual magnetic intensity were generated from digitally recorded data. The magnetic data were corrected for diurnal variations, levelled to the control lines and interpolated onto a 40 m regular grid, using the minimum curvature algorithm. An International Geomagnetic Reference Field (IGRF) correction was applied to the total magnetic field data at survey altitude using the 2010 model year extrapolated to September 18, 2014. A regional correction was applied to level the magnetic field to the Ontario Master Aeromagnetic Grid.

Magnetic declination from July 18, 2014 to October 22, 2014 for the centre of the survey area was 8.5°W. Magnetic inclination from July 18, 2014 to October 22, 2014 for the centre of the survey area was 74.2°N. Magnetic field strength was 56609 nT (calculated using IGRF).

EM Anomalies

The VTEM®Plus system will respond to conductive overburden, near-surface horizontal conducting layers, man-made sources and bedrock conductors. Identification of natural conductors is based on the rate of transient decay, magnetic correlation and response shape, together with the response pattern and topography. Man-made responses are identifiable by examining the power line monitor and the flight track video.

Anomalies were classified as having an inductively thin source, which produces a double-peaked (M-shaped) response with the trough centered over the conductor, or an inductively thick source, which produces a single-peaked response centered over the conductor. The anomaly source conductance was computed assuming a 100 m by 100 m thin plate.

Keating Correlation Coefficients

Possible kimberlite targets have been identified from the residual magnetic intensity data, based on the identification of roughly circular anomalies. This procedure was automated by using a known pattern-recognition technique (Keating 1995), which consists of computing, over a moving window, a first-order regression between a vertical cylinder model anomaly and the gridded magnetic data. Only the results where the absolute value of the correlation coefficient is above a threshold of 75% were retained. The results are depicted as circular symbols, scaled to reflect the correlation value. The most favourable targets are those that exhibit a cluster of high amplitude solutions. Correlation coefficients with a negative value correspond to reversely magnetized sources. It is important to be aware that other magnetic sources may correlate well with the vertical cylinder model, whereas some kimberlite pipes of irregular geometry may not.

Cylinder model parameters:
Cylinder diameter: 200 m
Cylinder length: Infinite
Overburden thickness: 6.6 m
Magnetic inclination: 74.18 degrees N
Magnetic declination: 8.45 degrees W
Window size: 13 x 13 cells (520 m by 520 m)

CREDITS

Data acquisition, data compilation and map production by Geotech Limited, Aurora, Ontario.

Project management and quality assurance by Paterson, Grant and Watson Limited, Toronto, Ontario.

Contract management, base maps and map surrounds by the Ministry of Northern Development and Mines, Sudbury, Ontario.

Corresponding digital data for this survey are available from the following Ontario Geological Survey publications:

Ontario Geological Survey 2015. Ontario airborne geophysical surveys, magnetic and electromagnetic data, grid and profile data (ASCII format) and vector data, Kabinakagami Lake area; Ontario Geological Survey, Geophysical Data Set 1079a.

Ontario Geological Survey 2015. Ontario airborne geophysical surveys, magnetic and electromagnetic data, grid and profile data (Geosoft® format) and vector data, Kabinakagami Lake area; Ontario Geological Survey, Geophysical Data Set 1079b.

Issued 2015.

Information from this publication may be quoted if credit is given. It is recommended that reference be made in the following form:

Ontario Geological Survey 2015. Airborne magnetic and electromagnetic surveys, residual magnetic field contours with electromagnetic anomalies and Keating coefficients, Kabinakagami Lake area; Ontario Geological Survey, Map 82 740, scale 1:20 000.

Users of OGS products are encouraged to contact those Aboriginal communities whose traditional territories may be located in the mineral exploration area to discuss their project.