REPORT ON DETAILED AIRBORNE GEOPHYSICAL SURVEYING

LDL-001 & LDL-013 Properties
Lower Detour Lake Area & Atkinson Twps.
Porcupine Mining Division, ON

NTS: 32E-13 PROJ #602

FALCONBRIDGE LIMITED
October 25th, 2007

SUMMARY AND RECOMMENDATIONS

Detailed airborne electromagnetic and magnetic geophysical surveying was completed on two separate grids over Falconbridge Limited's (formerly Noranda Inc.) LDL-001 and LDL-013 Properties in Lower Detour Lake Area and Atkinson Lake Twps. , ON (Porcupine Mining Division). Surveying was completed by Geotech Ltd. on November 20th, 2004 over approximately 64.8 line km of surveying. The work was aimed at defining the location and quality of geophysical conductors previously identified on the property by a regional airborne survey.

The surveying defined several conductors with the two grid areas. Most responses appear to be formational in nature and have been previously tested along strike by historic drilling. A single short strike length conductor with a weak magnetic association was however identified on the western side of the LDL-013 grid. The response has not been previously tested and diamond drilling to evaluate the target is recommended.

TABLE OF CONTENTS

SUMMARY AND RECOMMENDATIONS 2
TABLE OF CONTENTS 3
INTRODUCTION, LOCATION & ACCESS 4
GENERAL GEOLOGY 6
PREVIOUS WORK 7
PURPOSE AND GEOPHYSICAL SURVEY DESCRIPTION 7
MAGNETIC SURVEY RESULTS 10
LDL-001 Target 10
LDL-013 Target 10
EM SURVEY RESULTS 10
LDL-001 Target 10
LDL-013 Target 11
RECOMMENDATIONS 12
REFERENCES 13

List of Figures

Fig. 1 – Property Location and Access 5
Fig. 2 – Detailed Property Map 5
Fig. 3 – Regional Geology and Property Location 6
Fig. 4 – LDL-001 Grid - Countered EM and Total Field Magnetics - Interpretation 8
Fig. 5 – LDL-013 Grid - Countered EM and Total Field Magnetics - Interpretation 9

List of Tables

Table 1 – LDL Property Description 4
Table 2 – Summary of Historic Work (ERME's) 7

APPENDICES

VTEM® Airborne Geophysical Survey Technical Specifications

LIST OF MAPS (Back Pockets)

1) LDL-001 Magnetic Survey Results (nT)
2) LDL-001 Airborne EM Survey (0.48ms time-gate)
3) LDL-001 Airborne EM Survey (3.18ms time-gate)
4) LDL-001 Airborne EM Survey (7.54ms time gate)
5) LDL-013 Magnetic Survey Results (nT)
6) LDL-013 Airborne EM Survey (0.48ms time-gate)
7) LDL-013 Airborne EM Survey (3.18ms time-gate)
8) LDL-013 Airborne EM Survey (7.54ms time gate)

INTRODUCTION, LOCATION & ACCESS

Detailed airborne electromagnetic and magnetic (VTEM®) geophysical surveys were completed over a large area covering portions of Falconbridge Limited's (formerly Noranda Inc.) LDL-001 & LDL-013 properties in Lower Detour Lake Area and Atkinson Twps., Porcupine Mining Division. The work was aimed at defining the location and quality of several geophysical conductors previously identified on the property by a regional airborne survey.

The LDL properties are located in southern Lower Detour Lake Twp. extending southward into Atkinson Lake Twp. within NTS quadrant 32E-13. The property is situated approximately 17km southeast of the past-producing Detour Lake Au Mine in northeastern Ontario. The closest population centre is the village of Normetal, QC, approximately 80km to the southeast. Although numerous logging roads exist in the area, access to the property is restricted due to the presence of several major rivers in the area, notably the Turgeon River in Quebec and the Detour River in Ontario. Ground access to the property is possible from the Detour Lake Mine via Hwy 652 during winter months however the property is most easily accessed by air.

The property consists of a single contiguous block of 6 mining claims totalling 69 units. The property is currently registered 100% to Falconbridge Limited (formerly Noranda Inc.) and was staked between March and November, 2004. Details of the property are provided in Table 1 and Figures 1 & 2 below.

Claim	Township	Units	Held	Recording Date	Due Date	Work Rq'd
3015038	Lower Detour Lake	14	Falconbridge Limited	2-Mar-04	2-Mar-08	$5,600
3015039	Lower Detour Lake	8	Falconbridge Limited	2-Mar-04	2-Mar-08	$3,200
3014962	Lower Detour Lake	12	Falconbridge Limited	2-Mar-04	2-Mar-08	$4,800
3019077	Lower Detour Lake	3	Falconbridge Limited	12-Nov-04	12-Nov-07	$1,200
3019078	Lower Detour Lake	16	Falconbridge Limited	12-Nov-04	12-Nov-07	$6,400
3014961	Lower Detour Lake	16	Falconbridge Limited	2-Mar-04	2-Mar-08	$6,400

Table 1 – LDL Property Description

Approximately 64.8km of airborne surveying was completed over two separate grids over the LDL Property by Geotech Ltd. of Aurora, ON on Nov. 20th, 2004. Interpretation and reporting of the geophysical results were performed by Falconbridge staff.

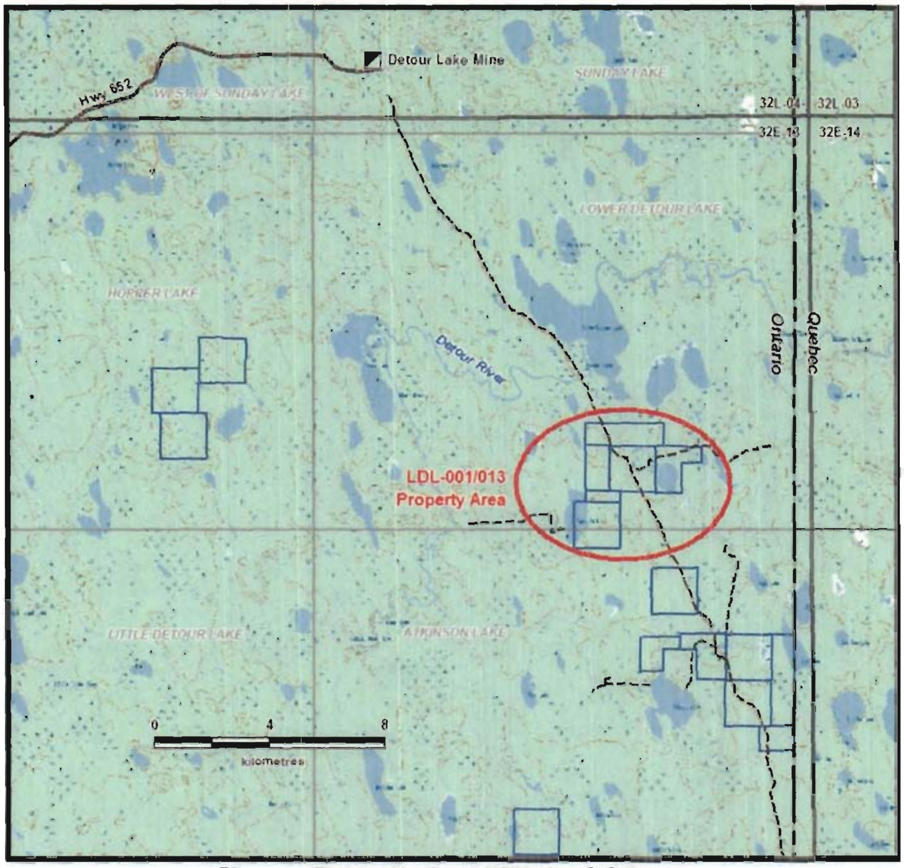


Fig. 1 – Property Location and Access

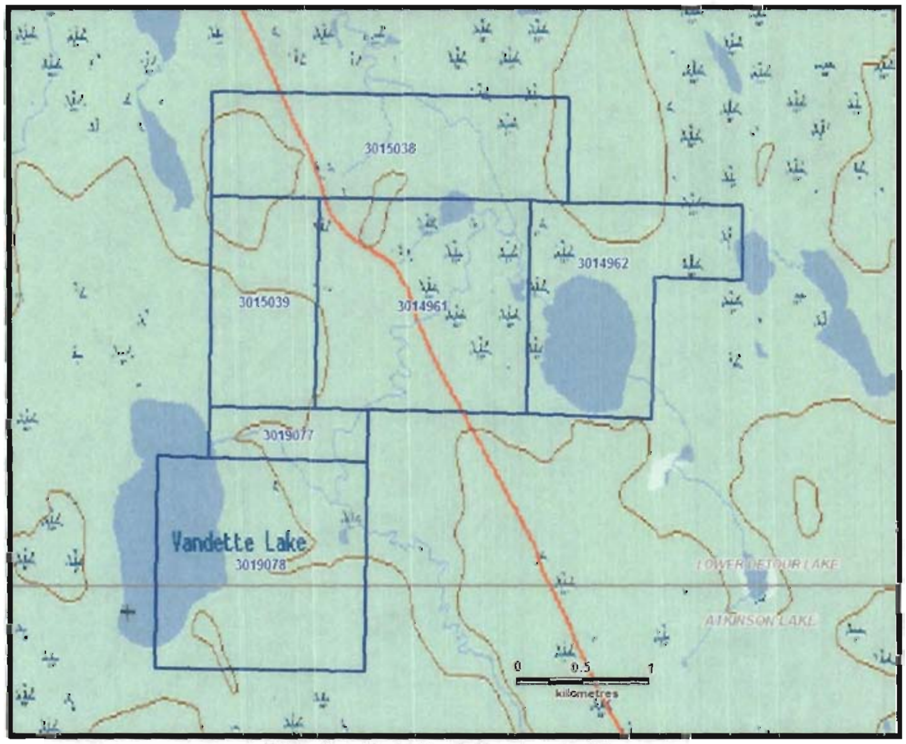


Fig. 2 – Detailed Property Map

GENERAL GEOLOGY

The most thorough and recent examination of the regional geology of the area was completed by G.W. Johns (1982). This portion of the Abitibi Greenstone Belt consists of east-west trending arcuate belts of mafic to felsic volcanic rocks which are intruded by several late granitc plutons. Thick sedimentary belts occur on the margins of the volcanic terraines and the volcanics themselves are intercalated with volumetrically minor amounts of detrital sedimentary rocks and iron formations (Fig. 3). No known outcrop is present within the property boundary although outcrop becomes more abundant to the north towards the Detour Lake Au Mine. The geology of the area is largely interpreted from historical diamond drilling completed on the western portions of the property and extrapolated using regional magnetic data. No current or past-producing base-metal deposits occur in the immediate area although the former Selbaie base-metal deposit is located with the same belt of rocks approximately 42km due east in Brouillan Twp, QC.

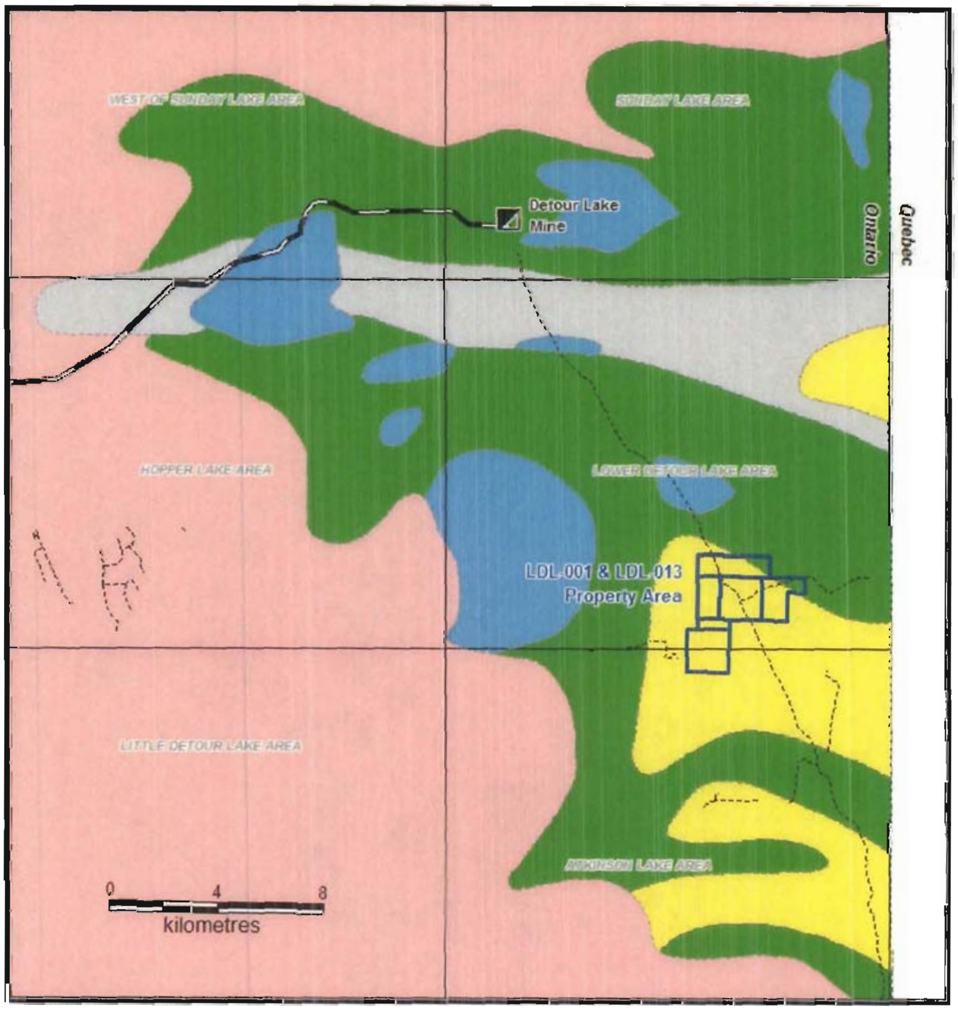


Fig. 3 – Regional Geology and Property Location

PREVIOUS WORK

Due to the presence of the nearby Selbaie and Detour Lake mines in the region historical work in the vicinity of the LDL property has been aimed at both gold and base-metal exploration. A summary of work completed in Ontario and available through the ERMES assessment file database is provided in Table 2.

Company	Year	Work 1	Work 2	Work 3	Work 4	AFRI File	Work Report
Kesagami Syndicate	1959	PDRILL				32E13NE0101	n/a
Conwest Exploration	1959	EM				32E13NE0118	n/a
Amoco Petroleum	1975	ASSAY	PDRILL			32E13NE0112	n/a
Amoco Petroleum	1975	ASSAY	PDRILL			32E13NE0113	n/a
Westmin Resources	1981	GEOL				32E13NE0085	W8106-53623
Getty Canadian Metals	1983	GCHEM	PDRILL			32E13NE0064	W8906-00320
Getty Canadian Metals	1984	GCHEM	PDRILL			32E13NE0045	W8506-00125
Getty Canadian Metals	1984	PDRILL				32E13NE9323	n/a
Noranda Inc	1986	EM	MAG			32E13NE0124	W8706-00025
Westmin Resources	unknown	EM	GCHEM	MAG	PDRILL	32L04SE0018	n/a

Table 2 – Summary of Historic Work (ERME's)

A total of five drill holes are known to have been completed within the property boundary. **Amoco Petroleum** completed approximately 636m of drilling in four holes between 1974-'75. All the holes intersected mixed volcanic lithologies ranging from mafic to felsic volcanics. The holes appear to have been testing EM responses with each intersecting conductive, graphitic sediments. Anomalous Zn assays were returned from the sedimentary horizons with assays ranging up to 2,700ppm Zn over 1.5m. **Getty Resources** also completed two holes totaling 422m on the property in 1983. Both were drilled on the southern portion of the claim block intersecting graphitic argillite horizons with anomalous Zn within a sequence of mafic to felsic volcanic rocks.

PURPOSE AND GEOPHYSICAL SURVEY DESCRIPTION

The geophysical surveying described herein was completed to more closely evaluate several MegaTEM® AEM anomalies defined by airborne surveying in mid-2004 and to determine if drill testing of the targets was warranted. Given the difficult access conditions on the property, the helicopter-borne VTEM® time-domain EM and magnetics system was utilized to more closely evaluate and locate the EM targets. Surveying was completed over two separate grids, each covering approximately 1.4km^2 and totalling approximately 32.4 line km of surveying. A 50m line spacing was utilized for each grid with the LDL-011 grid oriented on a 011° bearing and the LDL-013 grid on a bearing of 332°. All surveying was completed on Nov. 20th, 2004. Details pertaining to the technical specifications of this survey are given in Appendix A.

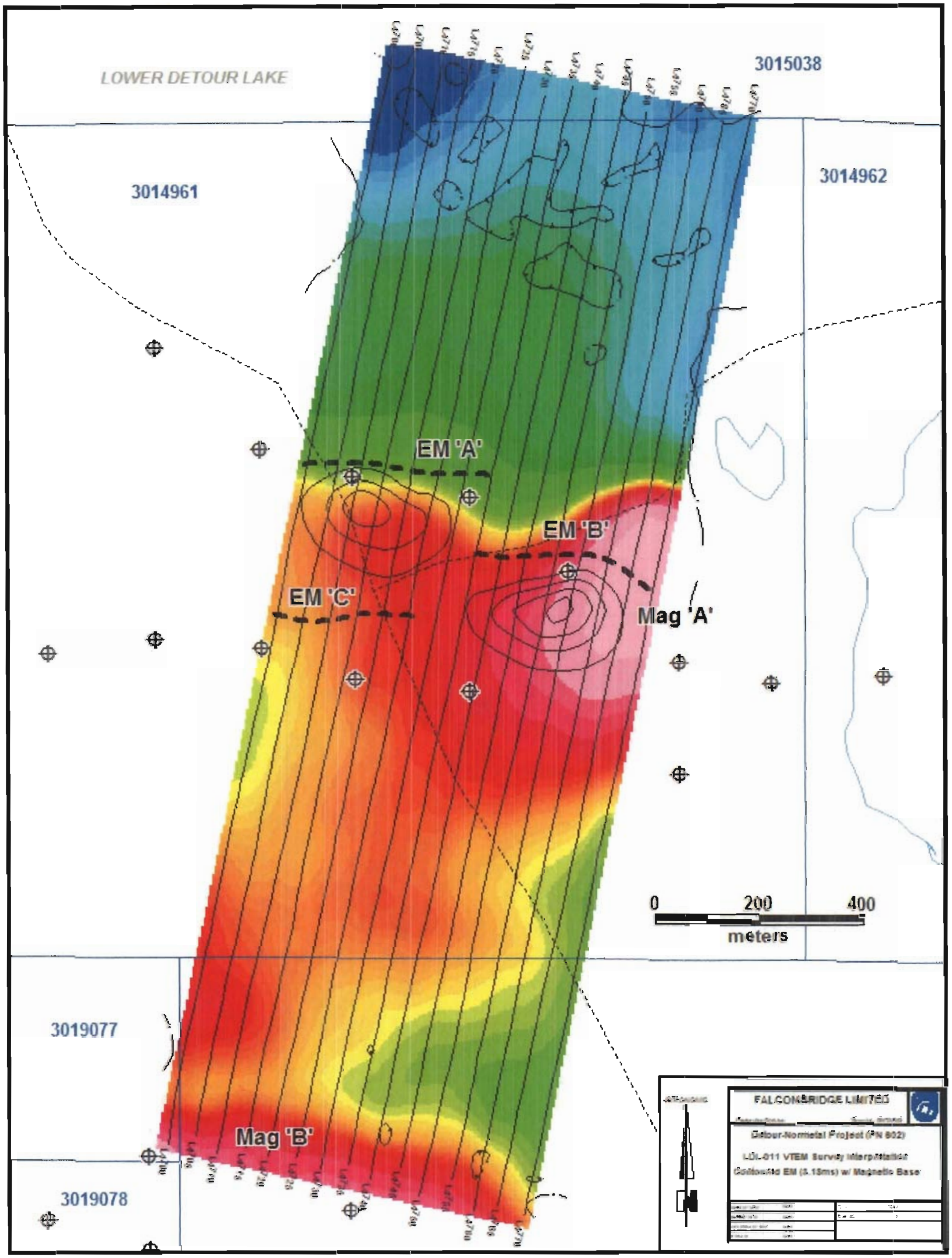


Fig. 4 – LDL-001 Grid - Countered EM and Total Field Magnetics - Interpretation

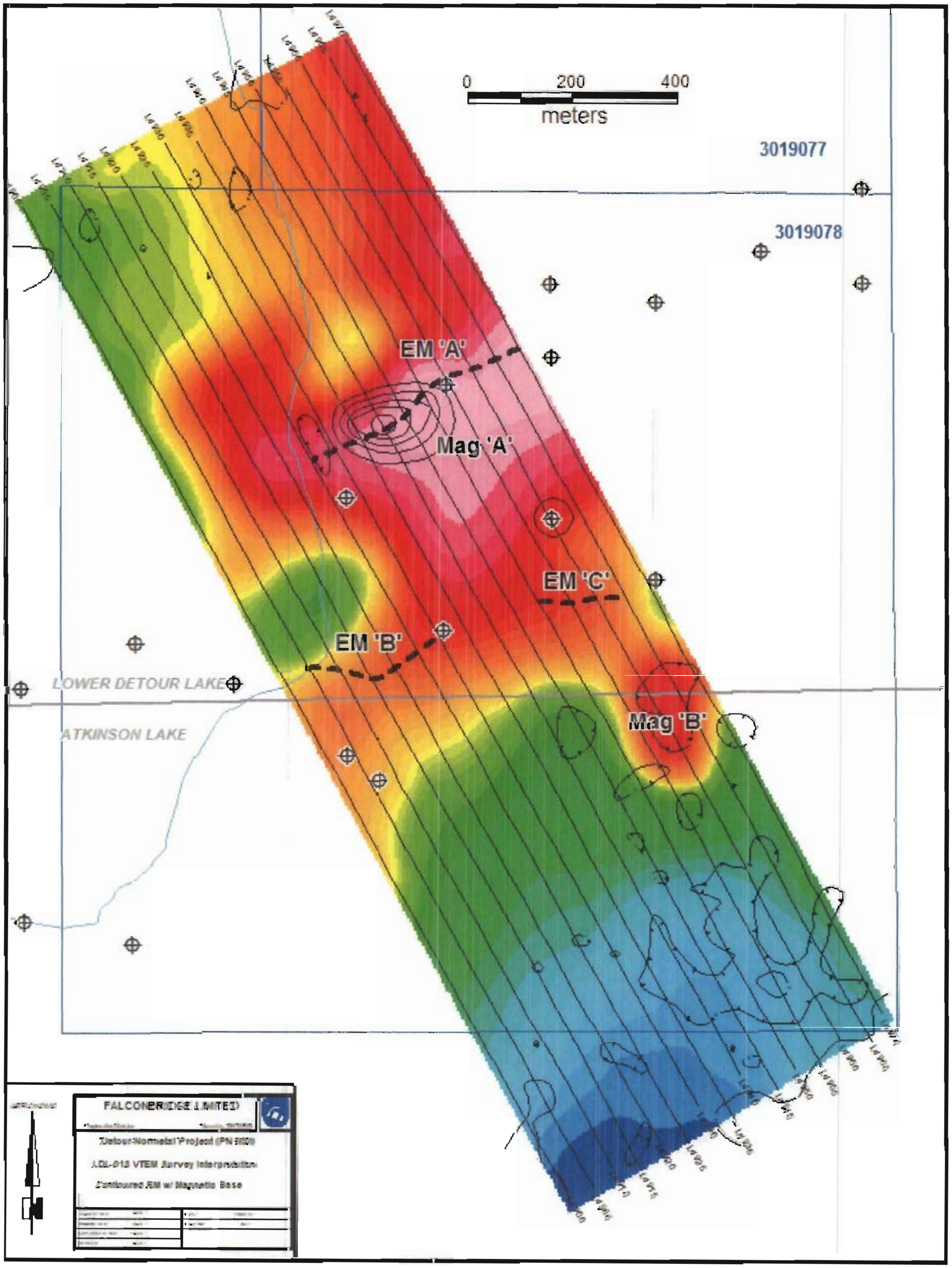


Fig. 5 – LDL-013 Grid - Countered EM and Total Field Magnetics - Interpretation

MAGNETIC SURVEY RESULTS

LDL-001 Target

The magnetic results for the LDL-001 grid are contoured and presented on the maps in the back pocket of this report and summarized on Fig. 4. Two magnetic high anomalies were defined within the survey area, one of which is indirectly associated with an EM anomaly. Magnetic anomaly **Mag 'A'** (Fig. 4) is located on the east-central portion of the LDL-001. It is sub-circular but somewhat irregular in form but is only partially defined, being located at the margin of the surveyed area. When compared to the regional magnetic pattern in the area however, the anomaly does stand out as a discreet 'bulls-eye' type anomaly. The feature has a maximum intensity of ~57,725nT and is possibly sourced by a concentration of pyrrhotite and/or magnetite mineralization or possibly a small intrusive body of mafic or ultramafic rock.

Magnetic anomaly **Mag 'B'** (Fig. 4) is a linear trending magnetic feature located at the extreme southern end of the LDL-001 grid. The anomaly has a maximum intensity >57,625nT but is again only partially defined within the survey area. Regionally the feature appears to be formation in nature, extending discontinuously for >10km in an arcuate, folded orientation with an associated string of EM anomalies. Given the nature of the anomaly, it is likely sourced by magnetite rich iron formation.

LDL-013 Target

The magnetic results for the LDL-013 grid are contoured and presented on the maps in the back pocket of this report and summarized on Fig. 5. Two discreet magnetic high anomalies were defined within the survey area. Magnetic anomaly **Mag 'A'** (Fig. 5) is an irregular shaped magnetic high along the eastern margin of the grid and reaching a maximum intensity of 57,650nT. The feature is actually the same anomaly defined at the southern end of the LDL-001 grid (see above) and is regional in extent. It's source is likely stratigraphic in nature, most likely a magnetite-rich iron formation.

Magnetic anomaly **Mag 'B'** (Fig. 5) is a small, discreet magnetic high in the south-eastern portion of the LDL-013 grid having an intensity of >57,550nT. The feature is somewhat circular in form with a diameter of approximately but has no associated EM response. The source of the anomaly may be a small intrusive body of mafic or ultramafic rocks.

EM SURVEY RESULTS

LDL-001 Target

Electromagnetic anomalies are picked along line profiles of the data collected using the VTEM® system. Electromagnetic anomalies defined from mid (3.18 ms) to high (>7.54 ms) time-gates are typically associated with bedrock conductors as opposed to overburden responses. All conductors shown on the LDL-001 Property in Fig. 4 (dashed lines) are interpreted as bedrock conductors. Related anomalies are grouped and described collectively.

Three separate EM conductors were identified on the LDL-001 grid. Anomaly **EM 'A'** and **EM 'B'** (Fig. 4) display similar characteristics and occupy very similar structural positions. The two trends likely represent a single, once continuous conductor but which has been off-set by faulting in the central portion of the grid. The conductivity of the anomaly is relatively high being well defined in the data to the latest 7.54ms time channel. The eastern portion of the response is indirectly associated with **Mag 'A'** (Fig. 4), occurring along the western margin of the magnetic feature. Regionally however, this conductor is formational in nature and extends to both the east and west of the current grid area.

Anomaly **EM 'C'** (Fig. 4) is a relatively weak short strike conductor trending subparallel to the anomalies EM 'A' and 'B' and apparently terminating at the interpreted fault which off-sets the conductor to the north. There is a weak suggestion of this conductor continuing across the grid however only isolated zones of conductivity are apparent in this area on the eastern side of the grid.

LDL-013 Target

Electromagnetic anomalies are picked along line profiles of the data collected using the VTEM® system. Electromagnetic anomalies defined from mid (3.18 ms) to high (>7.54 ms) time-gates are typically associated with bedrock conductors as opposed to overburden responses. All conductors shown on the LDL-013 Property in Fig. 5 (dashed lines) are interpreted as bedrock conductors. Related anomalies are grouped and described collectively.

Three distinct EM anomalies were defined on the LDL-013 grid. Anomaly **EM 'A'** (Fig. 5) trends east-northeast across the north-central portion of the grid where it mantles the northern edge of magnetic anomaly **Mag 'A'** (Fig. 5). The conductor shows a marked increase in strength along its western end and is apparent in the data to the very latest 7.54ms time-gate. Regionally however, the conductor is formational in nature and extends of the grid to the east for several kilometres and is likely sourced by iron formation.

Anomaly **EM 'B'** (Fig. 5) is an extremely isolated EM response located immediately south of **EM 'A'**. Again, the conductor maintains a strong response to the latest time-gates suggesting a feature of relatively good conductance. The conductor also displays a weak magnetic association, occurring along the irregular margin of anomaly **Mag 'A'** (Fig. 5).

Anomaly **EM 'C'** (Fig. 5) is also a fairly isolated EM response to the east of **EM 'B'** (Fig. 5). The feature appears semi-continuous with EM 'B' to the west however there is a distinct break in the response between the two conductor. The conductor also occurs along the southern margin of magnetic anomaly **Mag 'A'** but does not display any direct magnetic association. The response is strong to the 3.18ms time-gate however it becomes less well defined in the 7.54ms gate suggesting a weaker conductor.

RECOMMENDATIONS

Although the magnetic anomaly with which it is associated shows a very isolated form, the main conductor identified on the LDL-001 (EM 'A' & 'B', Fig. 4) appears to be largely formation in nature. The conductor extends to both the west and east of the grid area where is has apparently been tested by previous drilling and proven to be sourced by graphitic interflow sediments. Drilling is therefore not recommended on the LDL-001 grid.

Surveying on the LDL-013 grid defined two conductors of significant strength however EM 'A' (Fig. 5) is formational in nature and has been tested along strike to the east by several historic drill holes. EM 'B' however is a relatively short strike length conductor with an indirect magnetic association. The conductor is untested by previously drilling and diamond drilling is recommended to evaluate the geophysical response.

Dean Rogers, P.Geo
Senior Project Geologist
Xstrata Copper Canada (formerly Falconbridge Limited)

REFERENCES

Johns, G.W.

1982: Geology of the Burntbush-Detour Lakes Area, District of Cochrane; Ontario Geological Survey Report 199, 82p. Accompanied by Map 2453, scale 1:100,000

Ontario Geological Survey

2003: Geological Compilation of the Abitibi Greenstone Belt -- Digital Data, Ontario Geological Survey MRD 143, scale 1:250,000

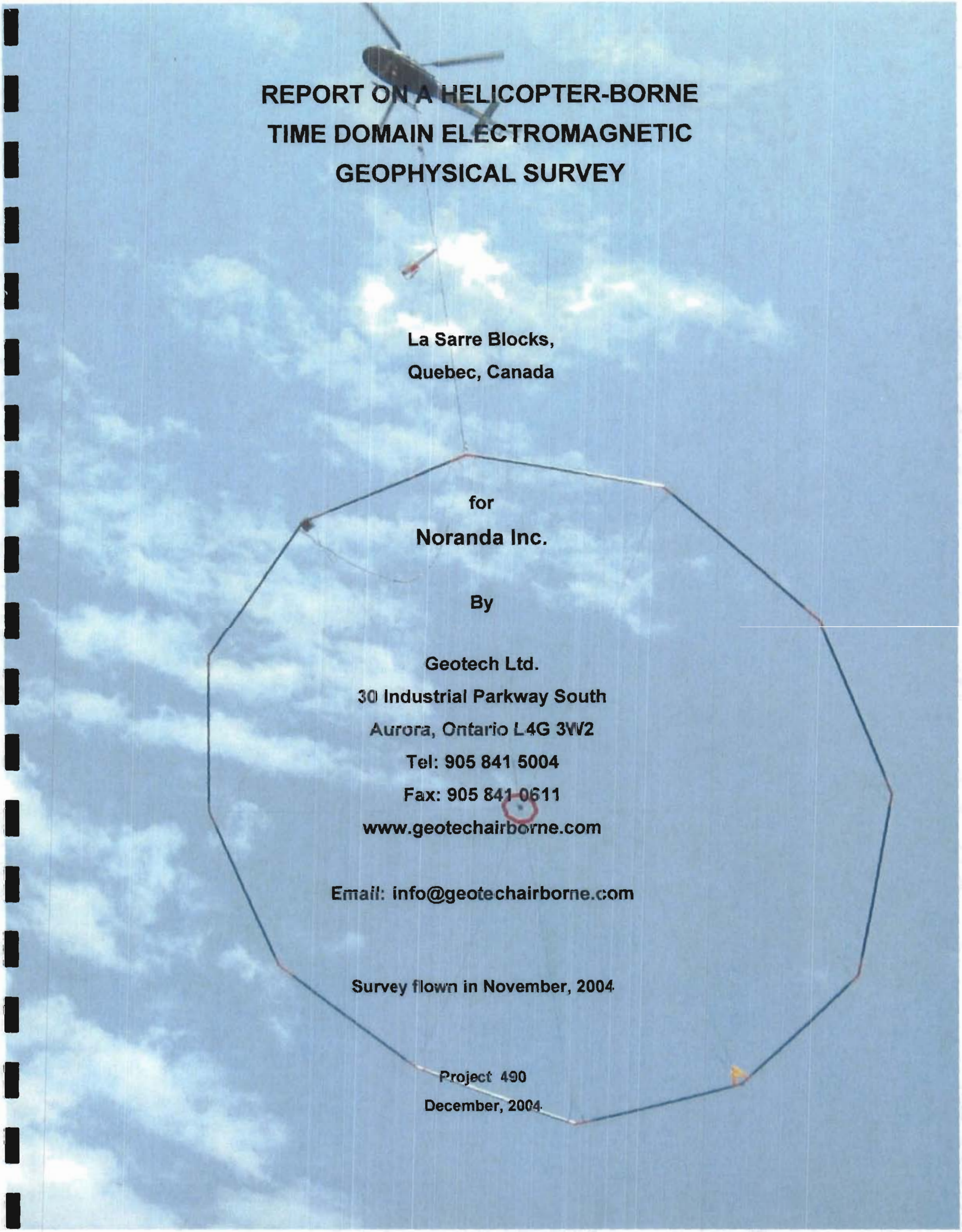
ERMES MNDM Website

Ontario Ministry of Northern Development and Mines; Various assessment files

Appendix A

VTEM® Airborne Geophysical Survey Technical Specifications

Geotech Ltd.



REPORT ON A HELICOPTER-BORNE TIME DOMAIN ELECTROMAGNETIC GEOPHYSICAL SURVEY

La Sarre Blocks,
Quebec, Canada

for

Noranda Inc.

By

Geotech Ltd.
30 Industrial Parkway South
Aurora, Ontario L4G 3W2
Tel: 905 841 5004
Fax: 905 841 0611
www.geotechairborne.com

Email: info@geotechairborne.com

Survey flown in November, 2004

Project 490
December, 2004

TABLE OF CONTENTS

Executive Summary 3
1. INTRODUCTION 4
1.1 General Considerations 4
1.2. Survey and System Specifications 4
1.3. Data Processing and Final Products 4
1.4. Topographic Relief 5
2. DATA ACQUISITION 6
2.1. Survey Areas 6
2.2. Survey Operations 6
2.3. Flight Specifications 7
2.4. Aircraft and Equipment 9
2.4.1. Survey Aircraft 9
2.4.2. Electromagnetic System 9
2.4.3. Airborne magnetometer 10
2.4.4. Ancillary Systems 10
2.4.5. Base Station 11
3. PERSONNEL 12
4. DATA PROCESSING AND PRESENTATION 13
4.1. Flight Path 13
4.2. Electromagnetic Data 13
4.3. Magnetic Data 13
5. DELIVERABLES 14
5.1. Survey Report 14
5.2. Maps 14
5.3. Gridded Data 14
5.4. Digital Data 14
6. CONCLUSIONS 18

APPENDIX

A. SURVEY AREAS LOCATION MAP

REPORT ON A HELICOPTER-BORNE
TIME DOMAIN ELECTROMAGNETIC SURVEY

La Sarre Blocks, Quebec, Canada

Executive Summary

During the period of November 8^{th} to 20^{th}, 2004, Geotech Limited carried out a helicopter-borne geophysical survey for Noranda Inc. over twenty one (21) blocks near La Sarre, Quebec.

Principal geophysical sensors included a time domain electromagnetic system (VTEM) and a cesium magnetometer. Ancillary equipment included a GPS navigation system and a radar altimeter. A total of 790.4 line-km were flown.

In-field data processing involved quality control and compilation of data collected during the acquisition stage, using the in-field processing centre established at La Sarre. Preliminary and final data processing, including generation of final digital data products were done at the office of Geotech Limited in Aurora, Ontario.

The processed survey results are presented as two (2) grids and digital profile data for each block. The grids are:

- Total Field Magnetics.
- Time Gate 3.18 miliseconds.

Profile data includes all electromagnetic and magnetic products plus positional, altitude and raw data.

1. INTRODUCTION

1.1 General Considerations

These services are the result of the Agreement made between Noranda Inc. and Geotech Limited, to perform a helicopter-borne geophysical survey over twenty one (21) blocks near La Sarre, Quebec. 790.4 line-km of geophysical data were acquired during the survey.

Mr. Michel Allard acted on behalf of Noranda Inc. during data acquisition and processing phases of this project.

The survey blocks are as shown in the Location map in Appendix A.

The crew was based in Mot Villa Repos Motel at La Sarre for the acquisition phase of the survey, as shown in Section 2 of this report.

The helicopter was based at the Abitibi Helicopters base located in La Sarre. Survey flying was completed on November 20th, 2004. Preliminary data processing was carried out daily during the acquisition phase of the project. Final data presentation and data archiving was completed in the Aurora office of Geotech Limited by December, 2004.

1.2. Survey and System Specifications

The survey blocks were flown with a nominal traverse line spacing of 50 metres.

Where possible, the helicopter maintained a mean terrain clearance of 75 metres, which translated into an average height of 30 meters above ground for the bird-mounted VTEM system and 60 meters above ground for the magnetic sensor.

The survey was flown using an Astar BA+ helicopter, registration C-GHSM, operated by Abitibi Helicopters Ltd. Details of the survey specifications may be found in Section 2 of this report.

1.3. Data Processing and Final Products

Data compilation and processing were carried out by the application of Geosoft OASIS Montaj and programs proprietary to Geotech Limited. Maps, profile data and fourty two (42) grids of final products were presented to Noranda Inc.

The survey report describes the procedures for data acquisition, processing, final image presentation and the specifications for the digital data set.

1.4. Topographic Relief

The twenty one (21) blocks are located approximately 32 - 110 kilometers NW of La Sarre.

Topographically, elevation range from 250 metres to 350 metres above sea level.

The blocks intersect lakes and rivers.

Some blocks have road access.

2. DATA ACQUISITION

2.1. *Survey Areas*

The survey blocks (see location map, Appendix A) and general flight specifications are as follows:

Block	Line spacing (m)	Area (Km^2)	Line-km	Flight direction	Line number
ADR-08	50	1.6	32.3	N0°E	L1000 - 1070
ABB-09a	50	1.7	32.3	N33.3°E	L1100 - 1170
BRA-09	50	5.4	105.0	N40.28°E	L1200 - 1315
Block 14	50	1.7	32.8	N1.97°E	L1400 - 1470
BLA-13	50	1.7	32.5	N13.36°W	L1500 - 1570
BLA-10	50	1.7	33.1	N13.35°W	L1600 - 1670
BLA-06	50	1.7	32.8	N8.4°W	L1700 - 1770
BLA-03	50	1.7	33.4	N17.83°E	L1800 - 1870
HOB-0304	50	2.2	44.4	N10.64°E	L1900 - 1995
BLA-18	50	1.5	30.8	N17.76°E	L2105 - 2170
HUR-02	50	1.7	32.3	N26.1°W	L3000 - 3070
HUR-03a	50	2.3	43.8	N26.12°E	L3100 - 3195
NOS-09	50	2.1	41.5	N0°E	L3300 - 3390
HUR-10	50	1.9	37.0	N1.46°W	L3500 - 3580
NOS-02	50	1.7	32.3	N9.42°W	L3700 - 3770
ENJ-03	50	1.7	32.5	N19.75°E	L3900 - 3970
ATK-22	50	1.7	32.2	N25.94°E	L4100 - 4170
ATK-21	50	1.7	32.3	N55.81°E	L4300 - 4370
MSS-04	50	1.7	32.1	N0°E	L4500 - 4570
LDL-01	50	1.7	32.4	N11.76°E	L4700 - 4770
LDL-13	50	1.7	32.4	N28.7°W	L4900 - 4970

Table 1 – Survey blocks

2.2. *Survey Operations*

Survey operations were based in Mot Villa Repos Motel, in La Sarre from November 8 to 20, 2004 for the acquisition phase of the survey.

The following table shows the timing of the flying.

Date	Crew Location	Flight #	Km flown	Comments
8-Nov	Mot Villa Repos Motel, La Sarre			Crew mobilization.
9-Nov	Mot Villa Repos Motel, La Sarre			System installation.
10-Nov	Mot Villa Repos Motel, La Sarre			System installation.
11-Nov	Mot Villa Repos Motel, La Sarre			Test flights.
12-Nov	Mot Villa Repos Motel, La Sarre	1, 2	118.4	
13-Nov	Mot Villa Repos Motel, La Sarre	3, 4	120.2	
14-Nov	Mot Villa Repos Motel, La Sarre	6, 7	194.3	
15-Nov	Mot Villa Repos Motel, La Sarre	8	83.7	
16-Nov	Mot Villa Repos Motel, La Sarre	9, 10, 11	78.1	
17-Nov	Mot Villa Repos Motel, La Sarre			Rain, low ceiling. Stand by.
18-Nov	Mot Villa Repos Motel, La Sarre			Rain, low ceiling. Stand by
19-Nov	Mot Villa Repos Motel, La Sarre	12	4.4	
20-Nov	Mot Villa Repos Motel, La Sarre	13, 14, 15	191.4	
Total			**790.4**	

Table 2 – Survey schedule

2.3. *Flight Specifications*

The nominal EM sensor terrain clearance was 30 m (EM bird height above ground, i.e. helicopter is maintained 75 m above ground). Nominal survey speed was 80 km/hour. The data recording rates of the data acquisition was 0.1 second for electromagnetics and magnetometer, 0.2 second for altimeter and GPS. This translates to a geophysical reading about every 2 metres along flight track. Navigation was assisted by a GPS receiver and data acquisition system, which reports GPS co-ordinates as latitude/longitude and directs the pilot over a pre-programmed survey grid.

The operator was responsible for monitoring of the system integrity. He also maintained a detailed flight log during the survey, tracking the times of the flight as well as any unusual geophysical or topographic feature.

On return of the aircrew to the base camp the survey data was transferred from a compact flash card (PCMCIA) to the data processing computer.

2.4. Aircraft and Equipment

2.4.1. Survey Aircraft

An Astar BA+ helicopter, registration C-GHSM - owned and operated by Abitibi Helicopters Ltd. was used for the survey. Installation of the geophysical and ancillary equipment was carried out by Geotech Ltd.

2.4.2. Electromagnetic System

The electromagnetic system was a Geotech Time Domain EM (VTEM) system. The layout is as indicated in Figures 1 below.

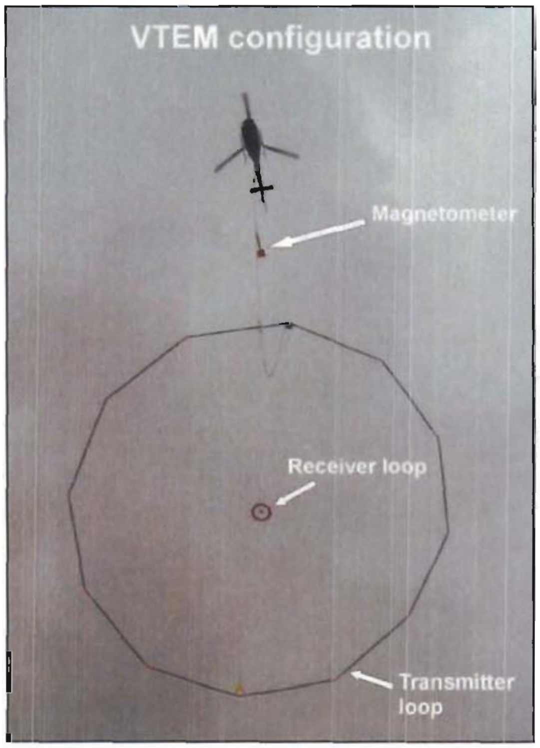


Figure 2

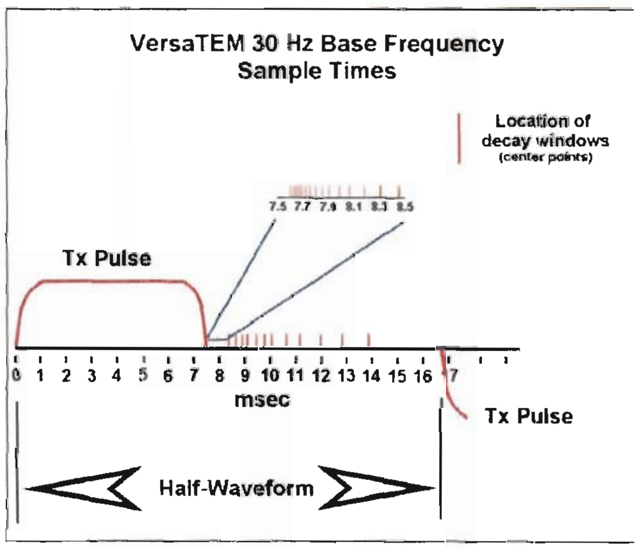


Figure 1

Receiver and transmitter coils were concentric and Z-direction oriented.
Transmitter coil diameter was 26 metres, the number of turns was 4.
Receiver coil diameter was 1.1 metre, the number of turns was 60.
Transmitter pulse repetition rate was 30 Hz.
Peak current was 200 A.
Duty cycle was 40%.
Peak dipole moment was 425000 NIA.
Wave form – trapezoid.
Twenty-five measurement gates were used in the range from 130 μs to 6340 μs.
The transmitter waveform and the receiver decay recording scheme is shown diagrammatically in Figure 2.
Recording sampling rate was 10 samples per second.
The EM bird was towed 45 m below the helicopter.

2.4.3. Airborne magnetometer

The magnetic sensor utilized for the survey was a Geometrics optically pumped cesium vapor magnetic field sensor, mounted in a separate bird towed 15 m below the helicopter. The sensitivity of the magnetic sensor is 0.02 nanoTesla (nT) at a sampling interval of 0.1 seconds. The magnetometer sends the measured magnetic field strength as nanoTeslas to the data acquisition system via the RS-232 port.

2.4.4. Ancillary Systems

2.4.4.1. Radar Altimeter

A Terra TRA 3000/TRI 30 radar altimeter was used to record terrain clearance. The antenna was mounted beneath the bubble of the helicopter cockpit.

2.4.4.2. GPS Navigation System

The navigation system used was a Geotech PC based navigation system utilizing a NovAtel's WAAS enable OEM4-G2-3151W GPS receiver, Geotech navigate software, a full screen display with controls in front of the pilot to direct the flight and an NovAtel GPS antenna mounted on the helicopter tail.
The co-ordinates of the block were set-up prior to the survey and the information was fed into the airborne navigation system.

2.4.4.3. Digital Acquisition System

A Geotech data acquisition system recorded the digital survey data on an internal compact flash card. Data is displayed on an LCD screen as traces to allow the operator to monitor the integrity of the system. Contents and update rates were as follows:

DATA TYPE	SAMPLING
TDEM	0.1 sec
Magnetometer	0.1 sec
GPS Position	0.2 sec
RadarAltimeter	0.2 sec

Table 3 - Sampling Rates

2.4.5. Base Station

A combine magnetometer/GPS base station was utilized on this project. A Geometrics Cesium vapour magnetometer was used as a magnetic sensor with a sensitivity of 0.001 nT. The base station was recording the magnetic field together with the GPS time at 1 Hz on a base station computer. The base station magnetometer sensor was installed near the Abitibi Helicopters base, away from electric transmission lines and moving ferrous objects such as motor vehicles. The magnetometer base station's data was backed-up to the data processing computer at the end of each survey day.

3. PERSONNEL

The following Geotech Ltd. personnel were involved in the project.

Field

Geophysicist/Crew Chief:	Shawn Grant
Operator:	Claude Berthelot

The survey pilot and the mechanic were employed directly by the helicopter operator – Abitibi Helicopters Ltd.

Pilot:	Joel Breton

Office

Data Processing:	Andrei Bagrianski
Data Processing/Reporting:	Marta Orta

Final data processing at the office of Geotech Limited in Aurora, Ontario was carried out under the supervision of Andrei Bagrianski, Data Processing Manager.

Overall management of the survey was carried out from the Aurora offices of Geotech Ltd. by Edward Morrison, President.

4. DATA PROCESSING AND PRESENTATION

4.1. *Flight Path*

The flight path, recorded by the acquisition program as WGS 84 latitude/longitude, was converted into the UTM co-ordinate system in Oasis Montaj.

The flight path was drawn using linear interpolation between x,y positions from the navigation system. Positions are updated every second and expressed as UTM eastings (x) and UTM northings (y).

4.2. *Electromagnetic Data*

A three stage digital filtering process was used 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 the major sferic events. The filter used was a 16 point non-linear filter.

The signal to noise ratio was further improved by the application of a low pass linear digital filter. This filter has zero phase shift which prevents any lag or peak displacement from occurring, and it suppresses only variations with a wavelength less than about 1 second or 20 metres. This filter is a symmetrical 1 sec linear filter.

The results are presented as EM Time Gate 3.18 milisecond grid, from the channel located 3 miliseconds after the termination of the impulse.

4.3. *Magnetic Data*

The processing of the magnetic data involved the correction for diurnal variations by using the digitally recorded ground base station magnetic values. The base station magnetometer data was edited and merged into the Geosoft GDB database on a daily basis. The aero magnetic data was corrected for diurnal variations by subtracting the observed magnetic base station deviations. The corrected magnetic line data from the survey was interpolated between survey lines using a random point gridding method to yield x-y grid values for a standard grid cell size of approximately 0.2 cm at the mapping scale. The Minimum Curvature algorithm was used to interpolate values onto a rectangular regular spaced grid.

5. DELIVERABLES

5.1. *Survey Report*

The survey report describes the data acquisition, processing, and final presentation of the survey results.

The survey report is provided in two paper copies and in PDF format.

5.2. *Maps*

Final maps were produced at a scale of 1:10,000. The coordinate/projection system used was WGS 84, UTM zone 17 north. For reference the WGS 84 latitude and longitude are also noted on the maps. All maps show the flight path trace.

The following maps are presented to Noranda Inc. on paper as results of the helicopter-borne geophysical survey carried out over twenty one (21) blocks near La Sarre, Quebec.

- Total Field Magnetics contour and color image map
- EM Time Gate 3.18 milisecond contour and color image map (channel located 3 ms after the termination of the impulse).

5.3. *Gridded Data*

The following grids are presented to Noranda Inc. in Geosoft GRD format. All grids have a cell size of 10 metres.

- Total Magnetic Field grid
- EM Time Gate 3.18 milisecond grid.

5.4. *Digital Data*

Two copies of CD-ROMs were prepared.

There are twenty one (21) directories containing digital data for each survey block. Each of these directories contains data as described below.

Directory root contains the LaSarre.gdb file.

There is also a **Report** directory where a copy of the report and appendix map is found in PDF format.

- LaSarre.gdb database contains the following channels:

X:	X positional data (meters - WGS84, zone 17N)
Y:	Y positional data (meters - WGS84, zone 17N)
Z:	GPS antenna elevation (meters - ASL) (on the tail of the helicopter)
Gtime1:	GPS time (seconds of the day)
Radar:	Helicopter terrain clearance from radar altimeter (meters)
Mag1:	Raw Total Magnetic field data (nT)
Basemag:	Base station magnetic data (nT)
Mag2:	Total Magnetic field base station corrected data (nT)
Mag3:	Leveled Total Magnetic field data (nT)
C130f:	Raw 130 microsecond time channel ($pV/A/m^4$)
C150f:	Raw 150 microsecond time channel ($pV/A/m^4$)
C170f:	Raw 170 microsecond time channel ($pV/A/m^4$)
C190f:	Raw 190 microsecond time channel ($pV/A/m^4$)
C220f:	Raw 220 microsecond time channel ($pV/A/m^4$)
C260f:	Raw 260 microsecond time channel ($pV/A/m^4$)
C300f:	Raw 300 microsecond time channel ($pV/A/m^4$)
C350f:	Raw 350 microsecond time channel ($pV/A/m^4$)
C410f:	Raw 410 microsecond time channel ($pV/A/m^4$)
C480f:	Raw 480 microsecond time channel ($pV/A/m^4$)
C570f:	Raw 570 microsecond time channel ($pV/A/m^4$)
C680f:	Raw 680 microsecond time channel ($pV/A/m^4$)
C810f:	Raw 810 microsecond time channel ($pV/A/m^4$)
C960f:	Raw 960 microsecond time channel ($pV/A/m^4$)
C1130f:	Raw 1.130 milisecond time channel ($pV/A/m^4$)
C1340f:	Raw 1.340 milisecond time channel ($pV/A/m^4$)
C1600f:	Raw 1.600 milisecond time channel ($pV/A/m^4$)
C1900f:	Raw 1.900 milisecond time channel ($pV/A/m^4$)
C2240f:	Raw 2.240 milisecond time channel ($pV/A/m^4$)
C2660f:	Raw 2.660 milisecond time channel ($pV/A/m^4$)
C3180f:	Raw 3.180 milisecond time channel ($pV/A/m^4$)
C3780f:	Raw 3.780 milisecond time channel ($pV/A/m^4$)
C4460f:	Raw 4.460 milisecond time channel ($pV/A/m^4$)
C5300f:	Raw 5.300 milisecond time channel ($pV/A/m^4$)
C6340f:	Raw 6.340 milisecond time channel ($pV/A/m^4$)

C7540f:	Raw 7.540 milisecond time channel ($pV/A/m^4$)
D130f:	Deconvolved 130 microsecond time channel ($pV/A/m^4$)
D150f:	Deconvolved 150 microsecond time channel ($pV/A/m^4$)
D170f:	Deconvolved 170 microsecond time channel ($pV/A/m^4$)
D190f:	Deconvolved 190 microsecond time channel ($pV/A/m^4$)
D220f:	Deconvolved 220 microsecond time channel ($pV/A/m^4$)
D260f:	Deconvolved 260 microsecond time channel ($pV/A/m^4$)
D300f:	Deconvolved 300 microsecond time channel ($pV/A/m^4$)
D350f:	Deconvolved 350 microsecond time channel ($pV/A/m^4$)
D410f:	Deconvolved 410 microsecond time channel ($pV/A/m^4$)
D480f:	Deconvolved 480 microsecond time channel ($pV/A/m^4$)
D570f:	Deconvolved 570 microsecond time channel ($pV/A/m^4$)
D680f:	Deconvolved 680 microsecond time channel ($pV/A/m^4$)
D810f:	Deconvolved 810 microsecond time channel ($pV/A/m^4$)
D960f:	Deconvolved 960 microsecond time channel ($pV/A/m^4$)
D1130f:	Deconvolved 1.130 milisecond time channel ($pV/A/m^4$)
D1340f:	Deconvolved 1.340 milisecond time channel ($pV/A/m^4$)
D1600f:	Deconvolved 1.600 milisecond time channel ($pV/A/m^4$)
D1900f:	Deconvolved 1.900 milisecond time channel ($pV/A/m^4$)
D2240f:	Deconvolved 2.240 milisecond time channel ($pV/A/m^4$)
D2660f:	Deconvolved 2.660 milisecond time channel ($pV/A/m^4$)
D3180f:	Deconvolved 3.180 milisecond time channel ($pV/A/m^4$)
D3780f:	Deconvolved 3.780 milisecond time channel ($pV/A/m^4$)
D4460f:	Deconvolved 4.460 milisecond time channel ($pV/A/m^4$)
D5300f:	Deconvolved 5.300 milisecond time channel ($pV/A/m^4$)
D6340f:	Deconvolved 6.340 milisecond time channel ($pV/A/m^4$)
D7540f:	Deconvolved 7.540 milisecond time channel ($pV/A/m^4$)
PLinef:	Power line monitor

- Fourty two (42) grids in Geosoft .grd format, as follow,

Mag_*bbbbbb*:	Total Magnetic field
C3180_*bbbbbb*:	EM Time Gate 3.18 milisecond

Where, *bbbbbb* is the block name

- Fourty two (42) maps in Geosoft .map format, as follow,

Map*bbbbbb*_**1**:	Total Magnetic field
Map*bbbbbb*_**2**:	EM Time Gate 3.18 milisecond

Where, *bbbbbb* is the block name

- Fourty two (42) maps in .pdf format (same as Geosoft .map format)
- Twenty one (21) selection files in Geosoft SEL format.

  bbbbbb.sel: describes line numbers for each block

  Where, *bbbbbb* is the block name

- A *readme.txt* file describing the content of digital data, as described above.

6. CONCLUSIONS

A time domain electromagnetic helicopter-borne geophysical survey has been completed over twenty one (21) blocks near La Sarre, Quebec, Canada.

The total areal coverage amounts to 40.76 km^2. Total survey line coverage is 790.4 line kilometres. The principal sensors included a Time Domain EM system and a magnetometer. Results have been presented as colour contour maps at a scale of 1:10,000.

Final data processing at the office of Geotech Limited in Aurora, Ontario was carried out under the supervision of Andrei Bagrianski, Data Processing Manager.

A number of EM anomaly groupings were identified. Ground follow-up of those anomalies should be carried out if favourably supported by other geoscientific data.

Respectfully submitted,

Marta Orta,
Geotech Ltd.

APPENDIX A

SURVEY AREAS LOCATION MAP