095660

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# ASSESSMENT REPORT

describing

# AIRBORNE VTEM AND MAGNETOMETER GEOPHYSICAL SURVEYS

at the

**NICK PROPERTY**

Nick 1-336 YC55398-YC557339

NTS 106D/11 and 106D/14
Latitude 64°43'N; Longitude 133°13'W

in the

Mayo Mining District
Yukon Territory

prepared by

Archer, Cathro & Associates (1981) Limited

for

**SOUTHAMPTON VENTURES INC.**
and
**STRATEGIC METALS LTD.**

by

Daniel Gregory B.Sc., GIT
April 2009

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## INTRODUCTION

The Nick property hosts sedimentary rocks that are locally enriched with nickel, molybdenum and zinc. It is located in north-central Yukon and is owned by Strategic Metals Ltd. This property and seven others in northern Yukon are under option to Southampton Ventures Inc. as part of the NiMo Project. Southampton can earn a 100% interest by performing exploration on the properties and making certain cash and stock payments to Strategic.

This report describes airborne geophysical surveys that were conducted by Geotech Ltd. between the dates of June 24 and July 14, 2008. The surveys were supervised by Archer, Cathro & Associates (1981) Limited on behalf of Southampton Ventures. A compilation of historic data and the 2008 helicopter borne geophysical surveys are provided in this report. The author's Statement of Qualifications appears in Appendix I.

## PROPERTY LOCATION, CLAIM DATA AND ACCESS

The Nick property comprises 336 contiguous mineral claims located in north-central Yukon Territory on NTS map sheets 106D/11 and 106D/14 at latitude 64°43'N and longitude 135°13'W (Figure 1). The claims are registered with the Dawson Mining Recorder in the name of Archer Cathro, which holds them in trust for Strategic Metals. Claim data are listed below while the locations of individual claims are shown on Figure 2.

| Claim Number | Grant Number | Expiry Date* |
|---|---|---|
| Nick 1-336 | YC55398-YC55733 | February 26, 2012 |

* Expiry date includes 2008 field work which has been filed for assessment credit but not yet accepted.

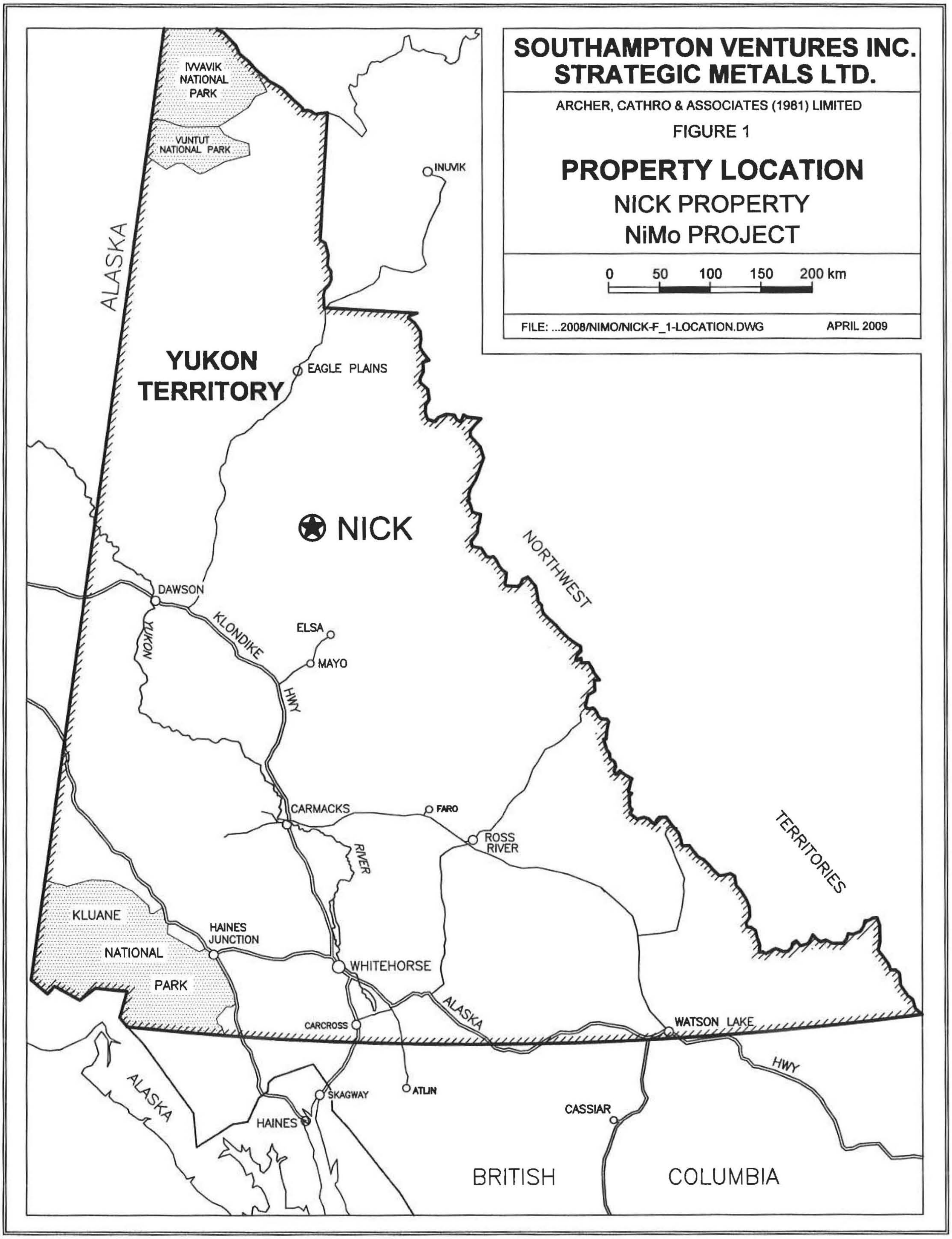
The Nick property is located 130 km north of Mayo. It can be accessed by helicopter from the Hart Lake airstrip which is 12 km to the southeast of the property, or from the closest road, at McQuesten Lake, 70 km to the south. The Hart Lake airstrip can be accessed from McQuesten Lake by way of the Wind River winter road and a bulldozer trail along Nash Creek.

The 2008 airborne geophysical surveys were conducted out of a temporary base at the Dawson City airport.

## HISTORY

The first evidence of base metal mineralization on the Nick claims was identified by the Geological Survey of Canada (GSC) in 1977 who reported strongly anomalous values for nickel, zinc and molybdenum from reconnaissance stream sediment samples. This led to the discovery by Cominco in 1981 of a 5 cm thick massive sulphide layer (the NiMo horizon) that assayed 5.8% nickel and 0.8% zinc.

The area was first staked in March 1988 by the Cooke Yukon syndicate and optioned to Archer, Cathro in May of that year. The option was transferred in June, 1988 to a joint venture between


SOUTHAMPTON VENTURES INC.
STRATEGIC METALS LTD.
ARCHER, CATHRO & ASSOCIATES (1981) LIMITED
FIGURE 1
PROPERTY LOCATION
NICK PROPERTY
NiMo PROJECT
0 50 100 150 200 km
FILE: ...2008/NIMO/NICK-F_1-LOCATION.DWG
APRIL 2009
IVVAVIK NATIONAL PARK
VUNTUT NATIONAL PARK
INUVIK
ALASKA
YUKON TERRITORY
EAGLE PLAINS
NICK
NORTHWEST
TERRITORIES
DAWSON
KLONDIKE
HWY
YUKON
ELSA
MAYO
CARMACKS
FARO
ROSS RIVER
RIVER
KLUANE
NATIONAL
PARK
HAINES JUNCTION
WHITEHORSE
ALASKA
CARCROSS
WATSON LAKE
HWY
SKAGWAY
ATLIN
HAINES
CASSIAR
ALASKA
BRITISH
COLUMBIA

NDU Resources Ltd. (50%), PakMan Resources Inc. (25%) and 2001 Resource Industries Ltd. (25%). In August and September, 1988 the joint venture carried out a program of geological mapping, geochemical sampling and diamond drilling (362 m in 4 holes) (Carne, 1991).

In July, 1989 Inco Limited optioned the property from the joint venture and performed 892 m of diamond drilling, geological mapping, prospecting and claim staking before terminating the option agreement in 1990.

The property was optioned to Falconbridge Limited by the Joint Venture in June 1991. They conducted mapping and hand trenching programs in 1991and 1992.

The claims were restaked by Strategic Metals Ltd. in 2007 and optioned to Southampton Ventures Inc. later the same year.

## GEOMORPHOLOGY

The Nick property covers a series of rolling hills within the Wernecke Mountains. It is drained by tributaries of Hart and Royal Creeks, which ultimately flow into the Arctic Ocean via the Wind, Peel and Mackenzie Rivers.

Local elevations range from 1100 to 1750 m. Outcrop is found along steep hillsides and deeply incised canyons. Vegetation consists of stunted spruce, arctic black birch, moss and grass.

## REGIONAL GEOLOGY

The Nick property is located within the MacKenzie Platform tectonic province at the east end of an inlier of Paleozoic shale (Figure 3). This inlier is separated from age-equivalent carbonate rocks by regional-scale faults to the north, southeast and east. These faults are the reactivated margins of a graben that was the locus of Ordovician to Devonian deep water sedimentation within the platform. The basinal shales are very similar to well documented age-equivalent Road-River Group strata of Selwyn Basin in east-central Yukon.

Cretaceous Laramide regional compression has resulted in vertical, northerly-verging, open to isoclinal folds with north-northwest trending axes. Devonian shales which host the stratiform nickel mineralization are preserved in the keels of two parallel synclines (Carne, 1991).

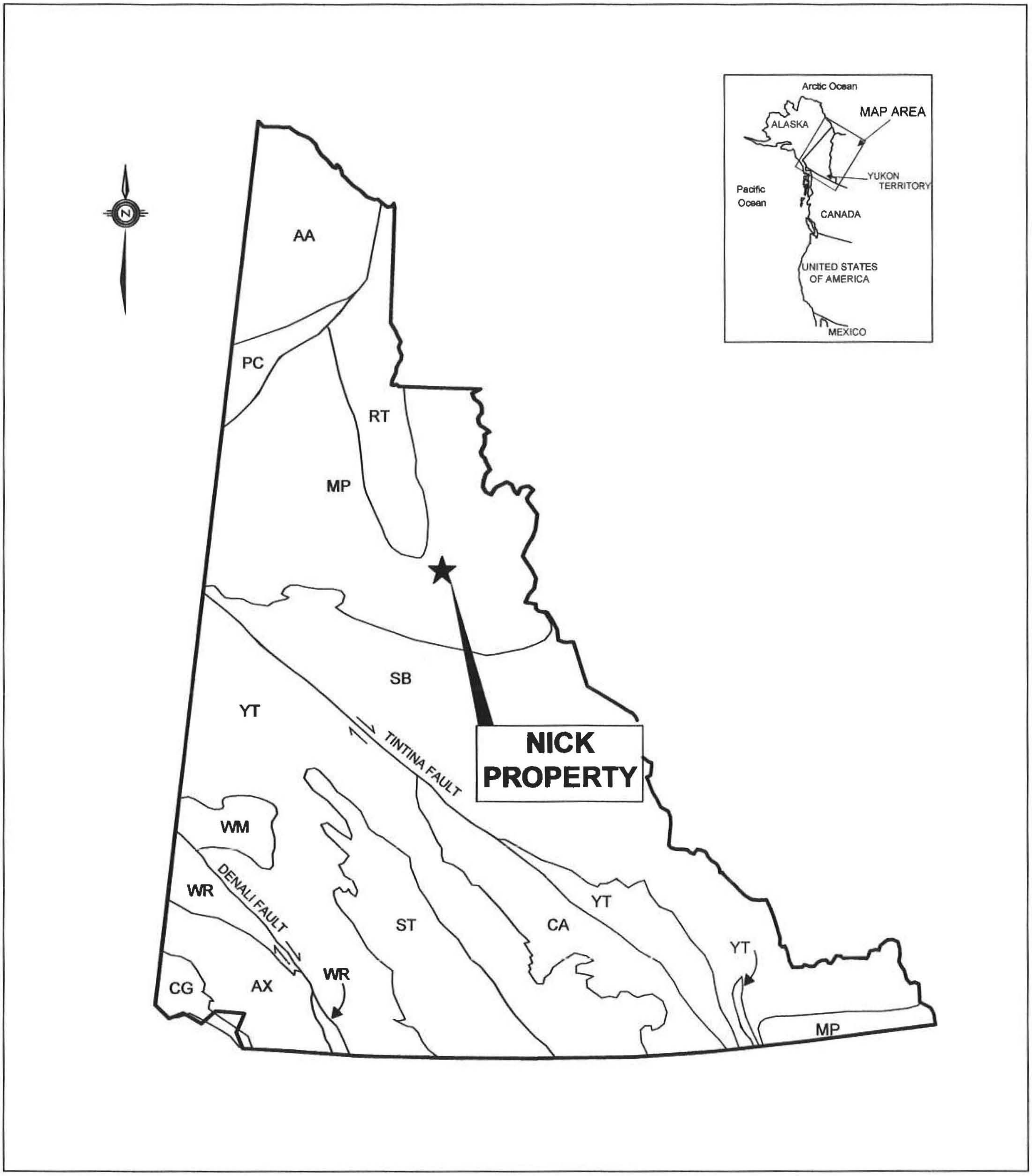
The following table summarizes the main lithologies in the Nick area from youngest to oldest (Thompson et al., 1995).

### Table I: Regional Lithological Descriptions

QUATERNARY
Fluvial silt, sand and gravel.

*-UNCONFORMITY-*

**SELWYN BASIN**




ANCESTRAL NORTH AMERICA

| | |
|---|---|
| MP | Mackenzie Platform |
| SB | Selwyn Basin |
| RT | Richardson Trough |

TERRANES
Displaced Continental Margin

| | |
|---|---|
| AA | Arctic Alaska |
| CA | Casslar |
| PC | Porcupine |

Pericratonic Terranes

| | |
|---|---|
| YT | Yukon-Tanana / Slide Mountain |

ACCRETED TERRANES

| | |
|---|---|
| ST | Stikinia / Cache Creek |
| AX | Alexander |
| WR | Wrangellia |
| CG | Chugach |
| WM | Windy McKinley |

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FIGURE 3

# TECTONIC SETTING
## NICK PROPERTY
## NiMo PROJECT

0 100 200 km

FILE: ...2008\NIMO\NICK\F_3-REGIONAL.DWG

DATE: APRIL 2009

LOWER TO UPPER DEVONIAN
**Earn Group:** a conformable marine sequence consisting of upper Imperial Formation and basal Canol Formation. Imperial Formation consists of sandstone, siltstone and shale. The Canol Formation is a sequence of siliceous shale representing a rapid rise of sea level in early Late Devonian.

ORDOVICIAN TO LOWER DEVONIAN
**Road River Group:** a 150 to 750 m thick sequence of fossiliferous limestone and calcareous shale.

*-UNCONFORMITY-*

**MACKENZIE PLATFORM**

LOWER AND MIDDLE CAMBRIAN
**Slats Creek Group:** Turbiditic, quartz sandstone with minor shale and siltstone.

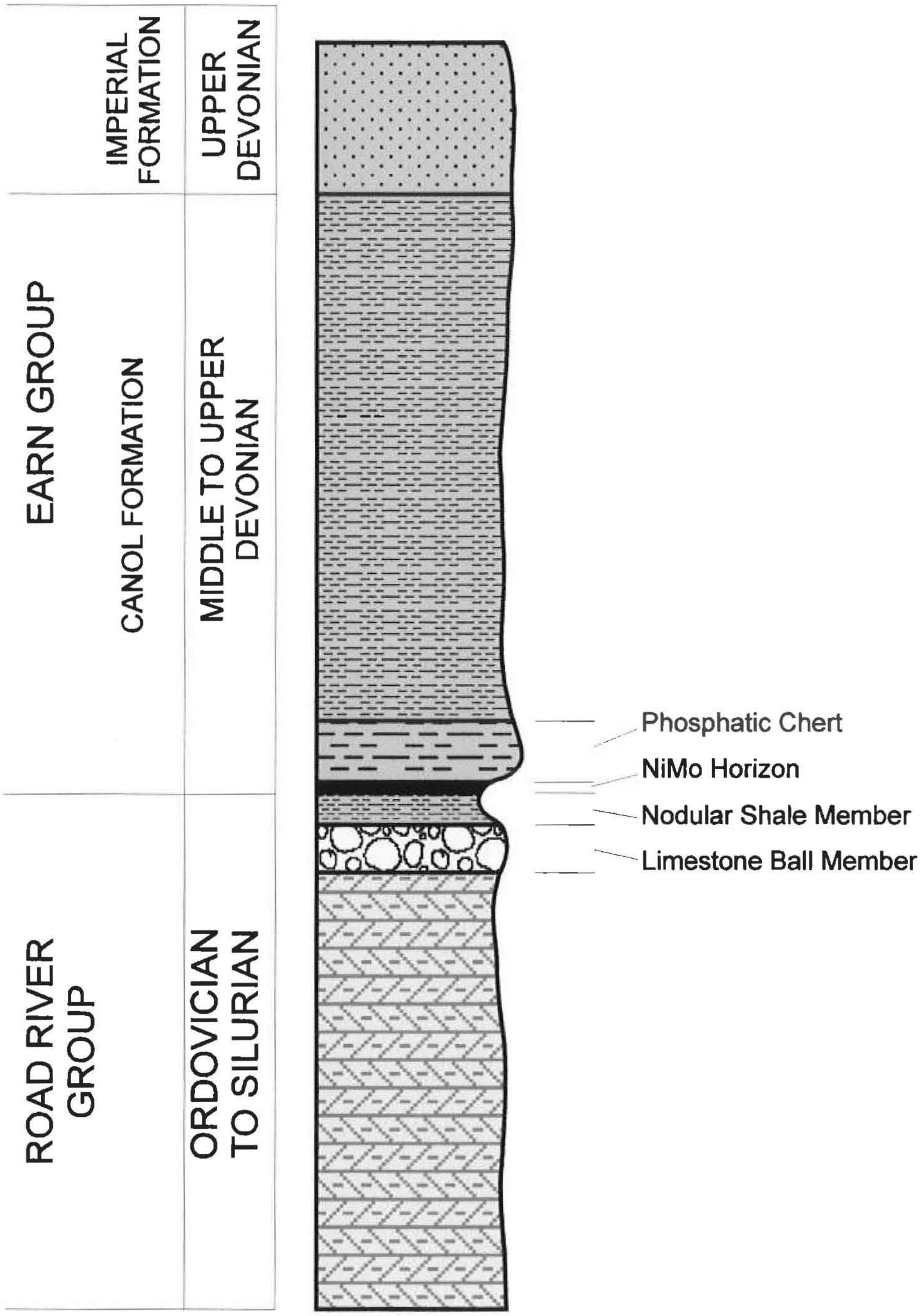
LOWER PROTEROZOIC
**Gillespie Lake Group:** Dolostone and silty dolostone with lesser black siltstone and shale, laminated mudstone and quartzose sandstone.
**Quartet Group:** Black weathering shale, finely laminated siltstone.

## PROPERTY GEOLOGY

The Nick property covers a sequence of moderately to strongly folded shales belonging to the Lower to Upper Devonian Earn Group and the Ordovician to Lower Devonian Road River Group (Figure 4). The Earn Group can be further divided into the upper Imperial and basal Canol Formations. The Canol Formation sits conformably above calcareous shale belonging to the Road River Group. Figure 5 shows a generalized stratigraphic section. The contact between the Canol Formation and Road River Group is marked by a distinctive lithological sequence consisting of phosphatic chert member, sulphide horizon, nodular shale and limestone ball member.

A 4 to 8 m thick Phosphatic Chert Member sits at the base of the Canol Formation. It is composed of dark grey weathering, resistant thin to medium thickness beds of cherty shale. Immediately below the phosphatic chert is the NiMo massive sulphide horizon that is described in the Mineralization and Geochemistry section in greater detail. Beneath the massive sulphide horizon is the 20 cm to 1.2 m thick Nodular Shale Member composed of a black weathering, friable mudstone that contains 5 to 10% barite rich nodules. These nodules range from 1 to 15 cm in diameter. Underlying the nodular shale is the Limestone Ball Member, which ranges between 1.5 and 10 m thick. It consists of black to grey weathering, moderately phosphatic, siliceous shale containing 35 to 40% limestone spheroids. The spheroids consist of laminated micritic limestone ranging from 5 cm to 1.5 m in diameter. Layering within the spheroids is sub-parallel to the adjacent bedding.

The oldest rocks identified on the property are light grey weathering dolomitic limestone and shale that grades upward into calcareous shale. This unnamed sequence is at least several hundred metres thick although the base has not been observed. It is possible that this unit is older than currently believed and part of the Proterozoic Gillespe Lake Group.




**SOUTHAMPTON VENTURES INC.**
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FIGURE 5

**STRATIGRAPHIC SECTION**

NICK PROPERTY
NiMo PROJECT

not to scale

...2008/NICKI/F_5-STRAT.CDR APRIL 2009

## MINERALIZATION AND GEOCHEMISTRY

A thin, nickeliferous, massive sulphide layer, known as the NiMo Horizon, is occasionally present within the contact zone between the Earn and Road River Groups on a regional basis.

At the Nick property, the massive sulphide horizon apparently covers an area greater than 80 $km^2$ and comprises pyrite, vaesite, melnikovite-type pyrite, sphalerite and wurtzite hosted in a gangue of phosphatic-carbonaceous chert, silica and bitumen (Hulbert et al, 1992). Assays from the Nick horizon average 3.01% nickel, 0.20% molybdenum, 0.82% zinc, 0.82% vanadium, 310 ppb platinum and 150 ppb palladium. Anomalous rhenium (up to 61 ppm), uranium (up to 107.7 ppm), barium (up to 4300 ppm), selenium (up to 2400 ppm) and arsenic (up to 4200 ppm) were also reported.

For nickel soil geochemistry, drill hole locations and hand trench locations refer to Figure 6.

## VTEM GEOPHYSICAL SURVEY

On June 24, 25 and July 14, 2008, helicopter-borne magnetometer and VTEM surveys were flown over the Nick Property, by Geotech Ltd. of Aurora, Ontario. The surveys were flown with an Astar 350 B3 helicopter operated by TRK Helicopters Ltd. from a temporary base in Dawson City. Appendix II contains Geotech's report describing equipment and survey methodology.

A total of 443 line-km were flown on north-south lines spaced 100 m apart. Average height above ground was 40 m for the VTEM bird and 62 m for the magnetic sensor. Survey results are presented in Figures 7, 8 and 9.

The airborne magnetic survey obtained no significant anomalies showing only a minor increase in magnetic intensity towards the north northeast side of the survey area.

The VTEM results were significantly more interesting with highs for both B-field and dB/dT over the Canol Formation and the upper part of the Road River Group. To obtain a better understanding of these anomalies the data has been sent to a geophysical contactor for a more rigorous analysis.

## DISCUSSION AND CONCLUSIONS

Regionally, the nickel-rich, NiMo horizon occurs at a predictable stratigraphic location and has demonstrated considerable lateral continuity. These factors coupled with the horizon's diverse metal suite and consistently high metal value makes it an attractive exploration target.

The favourable horizon has been traced by mapping and sampling for an area of over 80 $km^2$ on the Nick property. Where drill holes intersected the prospective stratigraphy the Nick horizon averaged 3.01% nickel, 0.20% molybdenum, 0.82% zinc, 0.82% vanadium, 310 ppb platinum and 150 ppb palladium.

VTEM surveys conducted in 2008 obtained strong anomalies within the Canol Formation and the upper part of the Road River Group. The VTEM data has been sent to a geophysical contractor for a more rigorous analysis. Based on the outcome of this analysis, diamond drilling should be conducted to test whether mineralized horizons of economic thicknesses exist on the property.

Respectfully submitted,

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

Daniel Gregory, B.Sc. GIT.

## REFERENCES

Carne, R.C. and Talbot, I.J.
1991 1991 Geological, Geochemical and Diamond Drilling Report on the Nick Property; prepared by Archer, Cathro & Associates (1981) limited for Falconbridge Resources limited and NDU Resources Inc.

Hulbert, L.J., Grégoire, D.C., Paktunc, D. and Carne, R.C.
1992 Sedimentary Nickel, Zinc, and Platinum-group-element Mineralization in Devonian black Shales at the Nick Property, Yukon, Canada: A New Deposit Type; Exploration Mining Geology, Vol. 1, No. 1, pp 39-62.

Thompson, R.I., Roots, C.F. and Mustard, P.S.
1995 Geology, North Fork Pass (116B/09), Yukon Territory; Geological Survey of Canada, Open File 2849.

**APPENDIX I**

**STATEMENT OF QUALIFICATIONS**

## STATEMENT OF QUALIFICATIONS

I, Daniel Gregory, geologist, with business addresses in Vancouver, British Columbia and Whitehorse, Yukon Territory and residential address in Vancouver, British Columbia, do hereby certify that:

1. I graduated from the University of British Columbia in 2007 with a B.Sc. (Hons.) in Geology.

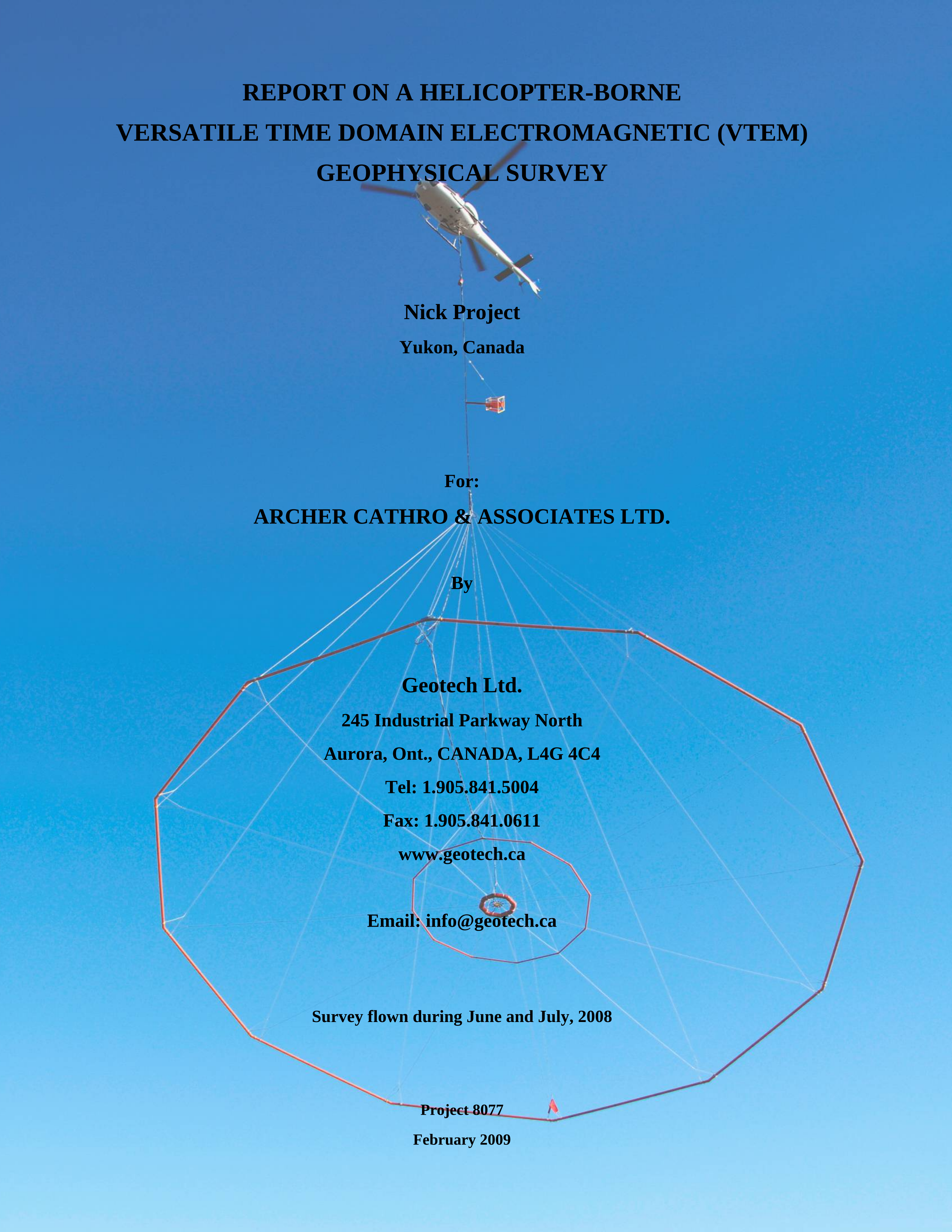
2. From 2004 to present, I have been actively engaged in mineral exploration in the Yukon Territory.

3. I am a Geoscientist in Training (GIT) with the Association of Professional Engineers and Geoscientists of British Columbia (Member Number 153805).

Daniel Gregory, B.Sc., GIT

## APPENDIX II

## GEOPHYSICAL REPORT BY GEOTECH LTD.



# REPORT ON A HELICOPTER-BORNE VERSATILE TIME DOMAIN ELECTROMAGNETIC (VTEM) GEOPHYSICAL SURVEY

## Nick Project

**Yukon, Canada**

**For:**

## ARCHER CATHRO & ASSOCIATES LTD.

**By**


## Geotech Ltd.

**245 Industrial Parkway North**

**Aurora, Ont., CANADA, L4G 4C4**

**Tel: 1.905.841.5004**

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**www.geotech.ca**

**Email: info@geotech.ca**


**Survey flown during June and July, 2008**

**Project 8077**

**February 2009**

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### APPENDICES

# REPORT ON A HELICOPTER-BORNE VERSATILE TIME DOMAIN ELECTROMAGNETIC SURVEY

Nick Project
Yukon, Canada

## Executive Summary

During June 24th to June 25th and July 14th, 2008 Geotech Ltd. carried out a helicopter-borne geophysical survey for Archer Cathro & Associates Ltd. over one (1) block of the Nick Project situated near Dawson City, Yukon, Canada.

Principal geophysical sensors included a versatile time domain electromagnetic (VTEM) system, and a caesium magnetometer. Ancillary equipment included a GPS navigation system and a radar altimeter. A total of 443 line-kilometres were flown.

The survey operations were based out of Dawson City, Yukon. In-field data quality assurance and preliminary processing were carried out on a daily basis during the acquisition phase. Preliminary and final data processing, including generation of final digital data and map products were undertaken from the office of Geotech Ltd. in Aurora, Ontario.

The processed survey results are presented as electromagnetic stacked profiles, and as a colour grid of the B-field EM late time channels and total magnetic intensity.

Digital data includes all electromagnetic and magnetic products, plus ancillary data including the waveform.

The survey report describes the procedures for data acquisition, processing, final image presentation and the specifications for the digital data set. No formal interpretation is included.

# 1. INTRODUCTION

## 1.1 General Considerations

These services are the result of the Agreement made between Geotech Ltd. and Archer Cathro & Associates Ltd. to perform a helicopter-borne geophysical survey one (1) block on the Nick property located near Dawson City, Yukon, Canada (Figure 1).

Matthew Dumala acted on behalf of Archer Cathro & Associates Ltd. during the data acquisition and data processing phases of this project.

The geophysical surveys consisted of helicopter borne EM using the versatile time-domain electromagnetic (VTEM) system and aeromagnetics using a caesium magnetometer. A total of 443 line-km of geophysical data were acquired during the survey. The survey area is shown in Figure 2.

The crew was based out of dawson City, Yukon for the acquisition phases of the survey. Survey flying started on June 24th and was completed on July 14th, 2008.

Data quality control and quality assurance, and preliminary data processing were carried out on a daily basis during the acquisition phase of the project. Final data processing followed immediately after the end of the survey. Final reporting, data presentation and archiving were completed from the Aurora office of Geotech Ltd. in February, 2009.


**Figure 1 -** Property Location

## 1.2 Survey Location and Specifications

The Nick block (64°44'59.60"N, 135°20'20.75"W) is located approximately 132 kilometres north-east of Dawson City, Yukon, the base of operations for the survey.

The survey block was flown in a N 26° E direction with a traverse line spacing of 300 metres, as depicted in Figure 2. Tie lines were flown perpendicular to the traverse lines at a spacing of 2300 metres in the direction of N 116° E. For more detailed information on the flight spacing and direction see Table 1.

## 1.3 Topographic Relief and Cultural Features

Topographically, the property exhibits high relief, with elevations ranging from 1057 to 2169 metres above sea level (see Figure 2). There are a number of small rivers and streams located throughout the block. There are no roads leading to the block, making it accessible only by air. The survey block is covered by NTS (National Topographic Survey) of Canada sheets 106D11, 106D12, 106D13 and 106D14.

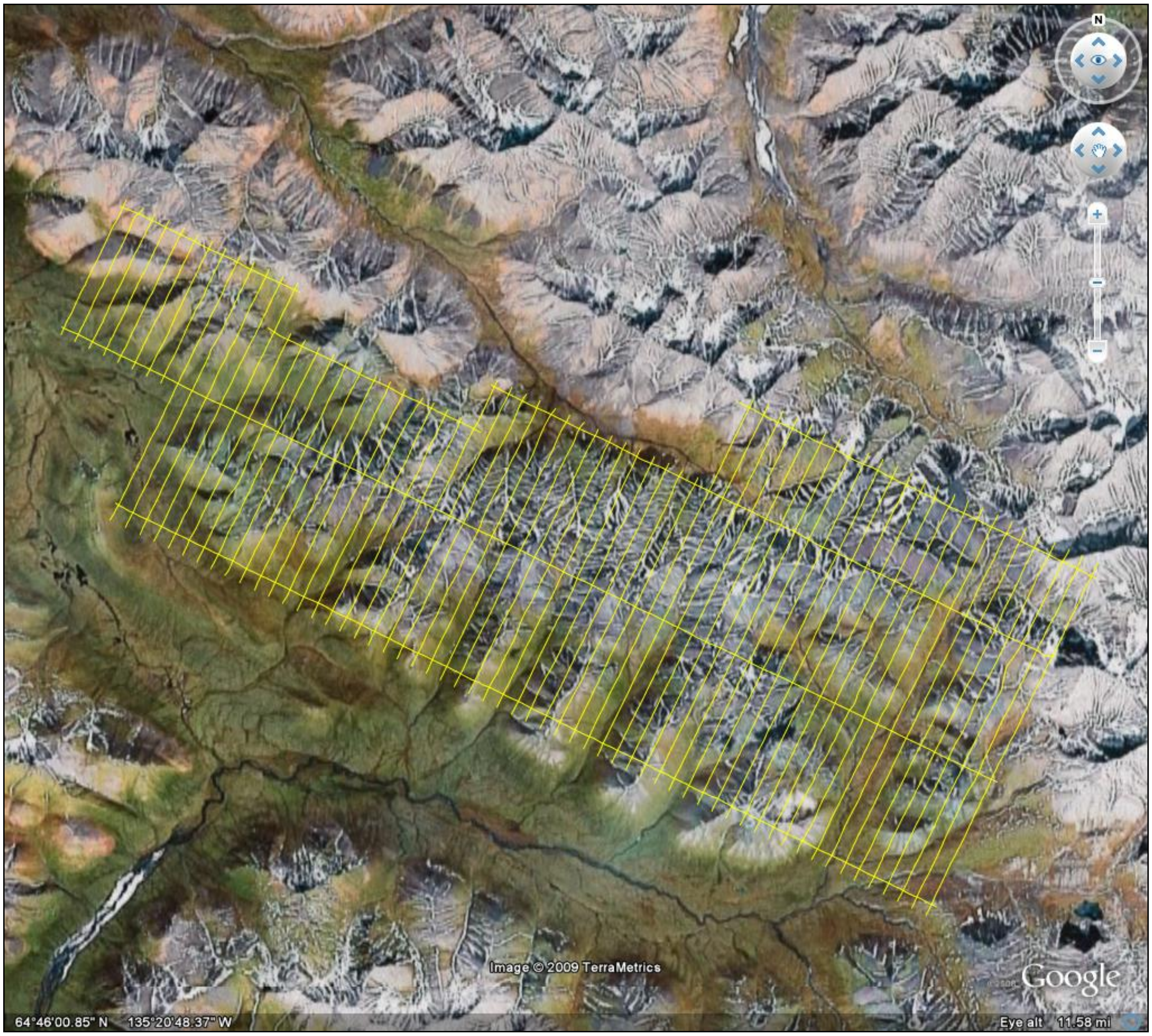



**Figure 2 -** Google Earth Image with Flight Paths

# 2. DATA ACQUISITION

## 2.1 Survey Area

The survey block (see Location map, Figure 2) and general flight specifications are as follows:

**Table 1** - Survey blocks

| Survey block | Line spacing (m) | Area ($km^2$) | Planned Line-km | Actual Line-km[1] | Flight direction | Line number |
|---|---|---|---|---|---|---|
| Nick | Traverse: 300 | 109.5 | 375 | 380 | N 26 °E | L15000 – L15650 |
| | Tie: 2300 | | 68 | 65 | N 116 °E | T15800 – T15850 |
| TOTAL | | 109.5 | 443 | 445 | | |

Survey block boundaries co-ordinates are provided in Appendix B.

## 2.2 Survey Operations

Survey operations were based out of Dawson City, Yukon from June 24th to July 14th, 2008. The following table shows the timing of the flying.

**Table 2 -** Survey schedule

| Date | Flight # | Flown km* | Block | Crew location | Comments |
|---|---|---|---|---|---|
| 24-June-08 | 25 | 52 | NICK | Dawson, Yukon | Production |
| 25-June-08 | 26 - 29 | 296 | NICK | Dawson, Yukon | Production |
| 14-July-08 | 38 - 40 | 140 | NICK / RAU | Dawson, Yukon | Production aborted – rain in p.m. |

[1]Note: Actual line-km represents the total line-km contained in the final databases. These line-km normally exceed the Planned line-km, as outlined in the contract-proposal and defined in the survey NAV files.
* Note: Flown line kilometers include line-km flown the same day for other blocks not included in this study.

## 2.3 Flight Specifications

The helicopter was maintained at a mean height of 75 metres above the ground where possible (due to rugged terrain) with a nominal survey speed of 80 km/hour. This allowed for a nominal EM sensor terrain clearance of 40 metres and a magnetic sensor clearance of 62 metres. The data recording rates of the data acquisition was 0.1 second for electromagnetics, magnetometer and 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 CDGPS 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. The data were then uploaded via ftp to the Geotech office in Aurora for daily quality assurance and quality control by qualified personnel, operating remotely.

## 2.4 Aircraft and Equipment

### 2.4.1 Survey Aircraft

The survey was flown using a Eurocopter Aerospatiale (Astar) 350 B3 helicopter. The helicopters were operated by TRK Helicopters Ltd, registration C-GTRK. 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 configuration is as indicated in Figure 3 below.

Receiver and transmitter coils are concentric and Z-direction oriented. The coils were towed at a mean distance of 35 metres below the aircraft as shown in Figures 3 and 5. The receiver decay recording scheme is shown diagrammatically in Figure 4.

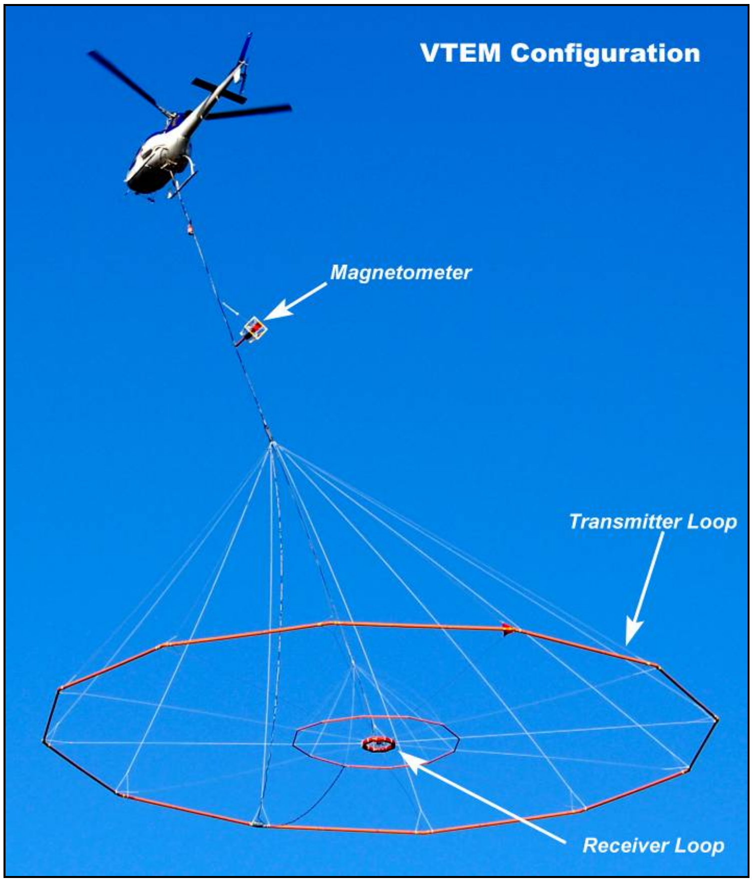



**Figure 3 -** VTEM Configuration

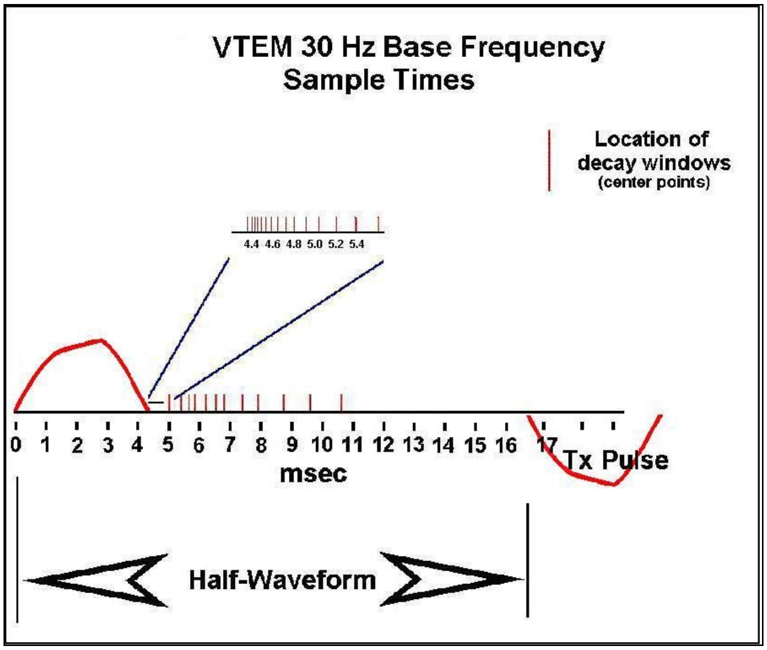



**Figure 4 –** VTEM Short Pulse Waveform & Sample Times

The VTEM decay sampling scheme is shown in Table 3 below. Twenty six measurement gates (ch 10-35) were used for the final data processing in the range from 120 to 9245 µ sec, as shown in Table 5.

**Table 3** – Decay Sampling Scheme

| VTEM Decay Sampling scheme[2] | | | | |
|---|---|---|---|---|
| Array Index | ( Microseconds ) | | | |
| | Time Gate | Start | End | Width |
| 0 | 0 | | | |
| 1 | 10 | 10 | 21 | 11 |
| 2 | 21 | 16 | 26 | 11 |
| 3 | 31 | 26 | 37 | 11 |
| 4 | 42 | 37 | 47 | 11 |
| 5 | 52 | 47 | 57 | 10 |
| 6 | 62 | 57 | 68 | 11 |
| 7 | 73 | 68 | 78 | 11 |
| 8 | 83 | 78 | 91 | 13 |
| 9 | 99 | 91 | 110 | 19 |
| 10 | 120 | 110 | 131 | 21 |
| 11 | 141 | 131 | 154 | 24 |
| 12 | 167 | 154 | 183 | 29 |
| 13 | 198 | 183 | 216 | 34 |
| 14 | 234 | 216 | 258 | 42 |
| 15 | 281 | 258 | 310 | 53 |
| 16 | 339 | 310 | 373 | 63 |
| 17 | 406 | 373 | 445 | 73 |
| 18 | 484 | 445 | 529 | 84 |
| 19 | 573 | 529 | 628 | 99 |
| 20 | 682 | 628 | 750 | 123 |
| 21 | 818 | 750 | 896 | 146 |
| 22 | 974 | 896 | 1063 | 167 |
| 23 | 1151 | 1063 | 1261 | 198 |
| 24 | 1370 | 1261 | 1506 | 245 |
| 25 | 1641 | 1506 | 1797 | 292 |
| 26 | 1953 | 1797 | 2130 | 333 |
| 27 | 2307 | 2130 | 2526 | 396 |
| 28 | 2745 | 2526 | 3016 | 490 |
| 29 | 3286 | 3016 | 3599 | 583 |
| 30 | 3911 | 3599 | 4266 | 667 |
| 31 | 4620 | 4266 | 5058 | 792 |
| 32 | 5495 | 5058 | 6037 | 979 |
| 33 | 6578 | 6037 | 7203 | 1167 |
| 34 | 7828 | 7203 | 8537 | 1334 |
| 35 | 9245 | 8537 | 10120 | 1584 |

[2] Note: Measurement time-delays are referenced to time-zero marking the end of the transmitter current turn-off, as illustrated in Figure 6 and Appendix C.

VTEM system parameters:

Transmitter Section
- Transmitter coil diameter: 26 m
- Number of turns: 4
- Transmitter base frequency: 30 Hz
- Peak current: 262 A
- Pulse width: 4.2 ms
- Pulse width: Duty cycle: 25%
- Peak dipole moment: 556,400 nIA
- Nominal terrain clearance: 75 m where possible

Receiver Section
- Receiver coil diameter: 1.2 m
- Number of turns: 100.
- Effective coil area: 113.04 $m^2$
- Wave form shape: trapezoid
- Power Line Monitor: 60 Hz

Magnetometer
- Nominal terrain clearance: 62 m

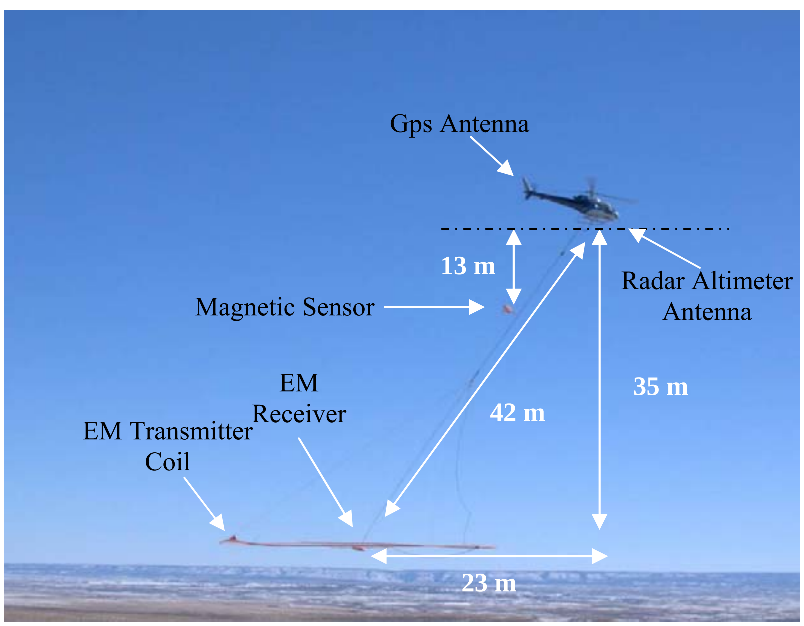



**Figure 5 -** VTEM system configuration

### 2.4.3 Airborne magnetometer

The magnetic sensor utilized for the survey was a Geometrics optically pumped caesium vapour magnetic field sensor, mounted in a separate bird, 13 metres below the helicopter, as shown in Figure 5. 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 nanoTesla to the data acquisition system via the RS-232 port.

### 2.4.4 Radar Altimeter

A Terra TRA 3000/TRI 40 radar altimeter was used to record terrain clearance. The antenna was mounted beneath the bubble of the helicopter cockpit (Figure 5).

### 2.4.5 GPS Navigation System

The navigation system used was a Geotech PC104 based navigation system utilizing a NovAtel CDGPS (Canada-Wide Differential Global Positioning System Correction Service) enabled OEM4-G2-3151W GPS receiver. Geotech's Navigate software uses a full screen display with controls in front of the pilot that then allows him to direct the flight. A NovAtel GPS antenna is mounted on the helicopter tail (Figure 5). As many as 11 GPS and two CDGPS satellites may be monitored at any one time. The positional accuracy or circular error probability (CEP) is 1.8 m, with CDGPS active, it is 1.0 m. The co-ordinates of the block were set-up prior to the survey and the information was fed into the airborne navigation system.

### 2.4.6 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. The data type and sampling interval as provided in Table 4.

**Table 4** – Acquisition Sampling Rates

| DATA TYPE | SAMPLING |
|---|---|
| TDEM | 0.1 sec |
| Magnetometer | 0.1 sec |
| GPS Position | 0.2 sec |
| Radar Altimeter | 0.2 sec |

### 2.4.7 Base Station

A combined magnetometer/GPS base station was utilized on this project. A Geometrics Caesium 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 approximately 100 metres behind the Trans North helipad, close to the riverbank (64° 03'02.8"N, 139° 25'50.2"W), away from electric transmission lines and moving ferrous objects such as motor vehicles. The base station data were 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:

| | |
|---|---|
| Project Manager: | Les Moschuk (office) |
| Data QC/QA: | Nick Venter (office) |
| Crew Chief: | Colin Lennox |
| System Operator: | Eric MacNeill |

The survey pilot and the mechanical engineer were employed directly by the helicopter operator – TRK Helicopters Ltd.

| | |
|---|---|
| Pilots: | Roy Stevenson/Randy Marks |
| Mechanical Engineers: | Andrew Hawkins/Chris Ward |

Office:

| | |
|---|---|
| Preliminary Data Processing: | Nick Venter |
| Final Data Processing: | Neil Fiset |
| Mapping/Reporting: | Kyle Orlowski |

Data acquisition phase was carried out under the supervision of Andrei Bagrianski, P. Geo, Surveys Manager. Processing phase was carried out under the supervision of Jean Legault, P. Geo, Manager of Processing and Interpretation. The overall contract management and customer relations were by Paolo Berardelli.

# 4. DATA PROCESSING AND PRESENTATION

Data compilation and processing were carried out by the application of Geosoft OASIS Montaj and programs proprietary to Geotech Ltd.

## 4.1 Flight Path

The flight path, recorded by the acquisition program as WGS 84 latitude/longitude, was converted into the NAD83 Datum, UTM Zone 8 North coordinate 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 easting's (x) and UTM northing's (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 15 metres. This filter is a symmetrical 1 sec linear filter.

The results are presented as stacked profiles of EM voltages for the time gates, in linear - logarithmic scale for both B-field and dB/dt response. B-field time channel recorded at 0.818 milliseconds after the termination of the impulse is also presented as contour colour image. A de-corrugation and micro levelling was applied to the B-field 0.818 millisecond grid to reduce the effects, due to varying radar clearance resulting from roughed terrain.

Graphical representations of the VTEM transmitter current waveform output voltage of the receiver coil are shown in Appendix C.

Generalized modeling results of VTEM data, written by consultant Roger Barlow and

Nasreddine Bournas, P. Geo., are shown in Appendix E.

## 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 aeromagnetic data was corrected for diurnal variations by subtracting the observed magnetic base station deviations.

Tie line levelling was carried out by adjusting intersection points along traverse lines. A micro-levelling procedure was applied to remove persistent low-amplitude components of flight-line noise remaining in the data.

The corrected magnetic data 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 digitally in PDF format.

## 5.2 Maps

Final maps were produced at scale of 1:20,000. The coordinate/projection system used was NAD 83, UTM Zone 8 North. All maps show the flight path trace and topographic data; latitude and longitude are also noted on maps.

The preliminary and final results of the survey are presented as EM profiles, a late-time gate gridded EM channel, and color magnetic TMI contour maps. The following maps are presented on paper;

- VTEM B-field profiles, Time Gates 0.234 – 9.245 ms in linear - logarithmic scale over total magnetic intensity colour grid and.
- VTEM dB/dt profiles, Time Gates 0.234 – 9.245 ms in linear – logarithmic scale.
- VTEM B-field late time, Time Gate 0.818 ms colour image.
- Total magnetic intensity (TMI) colour image and contours.

.

## 5.3 Digital Data

- Two copies of the data and maps on DVD were prepared to accompany the report. Each DVD contains a digital file of the line data in GDB Geosoft Montaj format as well as the maps in Geosoft Montaj Map and PDF format.

- DVD structure.

There are two (2) main directories;

**Data** contains databases, grids and maps, as described below.
**Report** contains a copy of the report and appendices in PDF format.

Databases in Geosoft GDB format, containing the channels listed in Table 5.

**Table 5** – Geosoft GDB Data Format.

| Channel Name | Description |
|---|---|
| X: | X positional data (metres – NAD83, UTM zone 8 north) |
| Y: | Y positional data (metres – NAD83, UTM zone 8 north) |
| Z: | GPS antenna elevation (metres - ASL) |
| Lon: | Longitude data (degree – NAD83) |
| Lat: | Latitude data (degree – NAD83) |
| Date: | Flight Date (DD/MM/YYYY) |
| FltNo | Flight Number |
| Radar: | Helicopter terrain clearance from radar altimeter (metres - AGL) |
| RadarB: | EM Bird terrain clearance from radar altimeter (metres - AGL) |
| DEM: | Digital elevation model (metres) |
| Gtime: | GPS time (seconds of the day) |
| Mag1: | Raw Total Magnetic field data (nT) |
| Basemag: | Magnetic diurnal variation data (nT) |
| Mag2 | Total Magnetic field diurnal variation corrected data (nT) |
| Mag3 | Total Magnetic field final microlevelled data (nT) |
| SF[10]: | dB/dt 120 microsecond time channel pV/(A*$m^4$) |
| SF[11]: | dB/dt 141 microsecond time channel pV/(A*$m^4$) |
| SF[12]: | dB/dt 167 microsecond time channel pV/(A*$m^4$) |
| SF[13]: | dB/dt 198 microsecond time channel pV/(A*$m^4$) |
| SF[14]: | dB/dt 234 microsecond time channel pV/(A*$m^4$) |
| SF[15]: | dB/dt 281 microsecond time channel pV/(A*$m^4$) |
| SF[16]: | dB/dt 339 microsecond time channel pV/(A*$m^4$) |
| SF[17]: | dB/dt 406 microsecond time channel pV/(A*$m^4$) |
| SF[18]: | dB/dt 484 microsecond time channel pV/(A*$m^4$) |
| SF[19]: | dB/dt 573 microsecond time channel pV/(A*$m^4$) |
| SF[20]: | dB/dt 682 microsecond time channel pV/(A*$m^4$) |
| SF[21]: | dB/dt 818 microsecond time channel pV/(A*$m^4$) |
| SF[22]: | dB/dt 974 microsecond time channel pV/(A*$m^4$) |
| SF[23]: | dB/dt 1151 microsecond time channel pV/(A*$m^4$) |
| SF[24]: | dB/dt 1370 microsecond time channel pV/(A*$m^4$) |
| SF[25]: | dB/dt 1641 microsecond time channel pV/(A*$m^4$) |
| SF[26]: | dB/dt 1953 microsecond time channel pV/(A*$m^4$) |
| SF[27]: | dB/dt 2307 microsecond time channel pV/(A*$m^4$) |
| SF[28]: | dB/dt 2745 microsecond time channel pV/(A*$m^4$) |
| SF[29]: | dB/dt 3286 microsecond time channel pV/(A*$m^4$) |
| SF[30]: | dB/dt 3911 microsecond time channel pV/(A*$m^4$) |
| SF[31]: | dB/dt 4620 microsecond time channel pV/(A*$m^4$) |

| Channel Name | Description |
|---|---|
| SF[32]: | dB/dt 5495 microsecond time channel pV/(A*m$^4$) |
| SF[33]: | dB/dt 6578 microsecond time channel pV/(A*m$^4$) |
| SF[34]: | dB/dt 7828 microsecond time channel pV/(A*m$^4$) |
| SF[35]: | dB/dt 9245 microsecond time channel pV/(A*m$^4$) |
| BF[10]: | B-field 120 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[11]: | B-field 141 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[12]: | B-field 167 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[13]: | B-field 198 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[14]: | B-field 234 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[15]: | B-field 281 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[16]: | B-field 339 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[17]: | B-field 406 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[18]: | B-field 484 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[19]: | B-field 573 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[20]: | B-field 682 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[21]: | B-field 818 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[22]: | B-field 974 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[23]: | B-field 1151 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[24]: | B-field 1370 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[25]: | B-field 1641 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[26]: | B-field 1953 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[27]: | B-field 2307 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[28]: | B-field 2745 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[29]: | B-field 3286 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[30]: | B-field 3911 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[31]: | B-field 4620 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[32]: | B-field 5495 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[33]: | B-field 6578 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[34]: | B-field 7828 microsecond time channel (pV*ms)/(A*m$^4$) |
| BF[35]: | B-field 9245 microsecond time channel (pV*ms)/(A*m$^4$) |
| PLM: | Power Line monitor (60Hz) |

Electromagnetic B-field and dB/dt data is found in array channel format between indexes 10 – 35, as described above.

- Database of the VTEM Waveform "VTEM_waveform.gdb" in Geosoft GDB format, containing the following channels:

  Time: Sampling rate interval, 10.416 microseconds
  Rx_Voltage: Output voltage of the receiver coil (Volt)
  Tx_Current: Output current of the transmitter (Amp)

- Grids in Geosoft GRD format, as follows:

  BF21_Nick: B-Field Channel 21 (Time Gate 0.818 ms)
  Mag3_Nick: Total magnetic intensity (nT)

  A Geosoft .GRD file has a .GI metadata file associated with it, containing grid projection information. A grid cell size of 75 metres was used.

- Maps at 1:20,000 in Geosoft MAP format, as follows:

  Bfield_20k_Nick: B-field profiles, Time Gates 0.234 – 9.245 ms in linear logarithmic scale over TMI.
  dBdt_20k_Nick: dB/dt profiles, Time Gates 0.234 – 9.245 ms in linear logarithmic scale.
  BF21_20k_Nick: B-field Time Gate 0.818 ms colour image.
  TMI_20k_Nick: Total magnetic intensity colour image and contours.

  Maps are also presented in PDF and MapInfo format.

  1:50,000 topographic vectors were taken from the NRCAN Geogratis database at; http://geogratis.gc.ca/geogratis/en/index.html.

- Google Earth files *8077_Nick_fltpath.kml* showing the flight path of each block. Free versions of Google Earth software from: http://earth.google.com/download-earth.html

## 6. CONCLUSIONS AND RECOMMENDATIONS

### 6.1 Conclusions

A helicopter-borne versatile time domain electromagnetic (VTEM) geophysical survey has been completed over the Nick Project located near Dawson City, Yukon, Canada.

The total area coverage is 109.5 $km^2$. Total survey line coverage is 443 line kilometres. The principal sensors included a Time Domain EM system and a magnetometer. Results have been presented as stacked profiles and contour colour images at a scale of 1:20,000. No formal interpretation is included in this report.

### 6.2 Recommendations

Based on the geophysical results obtained, a number of interesting EM and magnetic anomaly groupings were identified across the property. We therefore recommend a more detailed interpretation of the EM and magnetic data, in conjunction with the known geology. It should include EM anomaly picking and magnetic derivative processing, as well as 3D inversion and modelling techniques to further characterize the observed anomalies and to more accurately determine their parameters (depth, conductance, dip, etc.) prior to ground follow up and drill testing.

Respectfully submitted[6],

Kyle Orlowski
**Geotech Ltd.**

Jean Legault, P. Geo, P. Eng
**Geotech Ltd.**

Neil Fiset
**Geotech Ltd.**

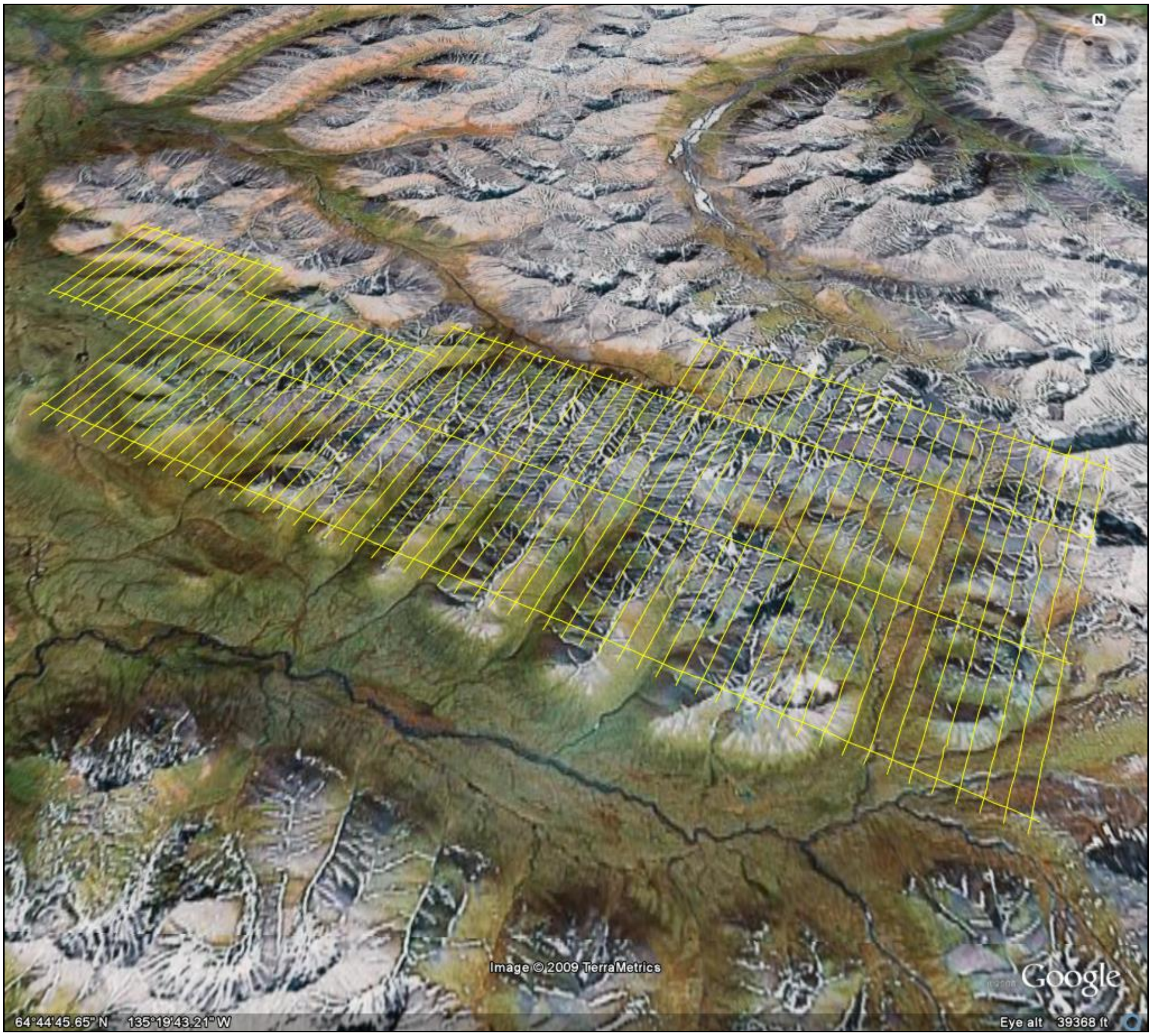
February 2009

[6]Final data processing and interpretation of the EM and magnetic data were carried out by Neil Fiset, from the office of Geotech Ltd. in Aurora, Ontario, under the supervision of Jean Legault, P. Geo, Manager of Data Processing and Interpretation.

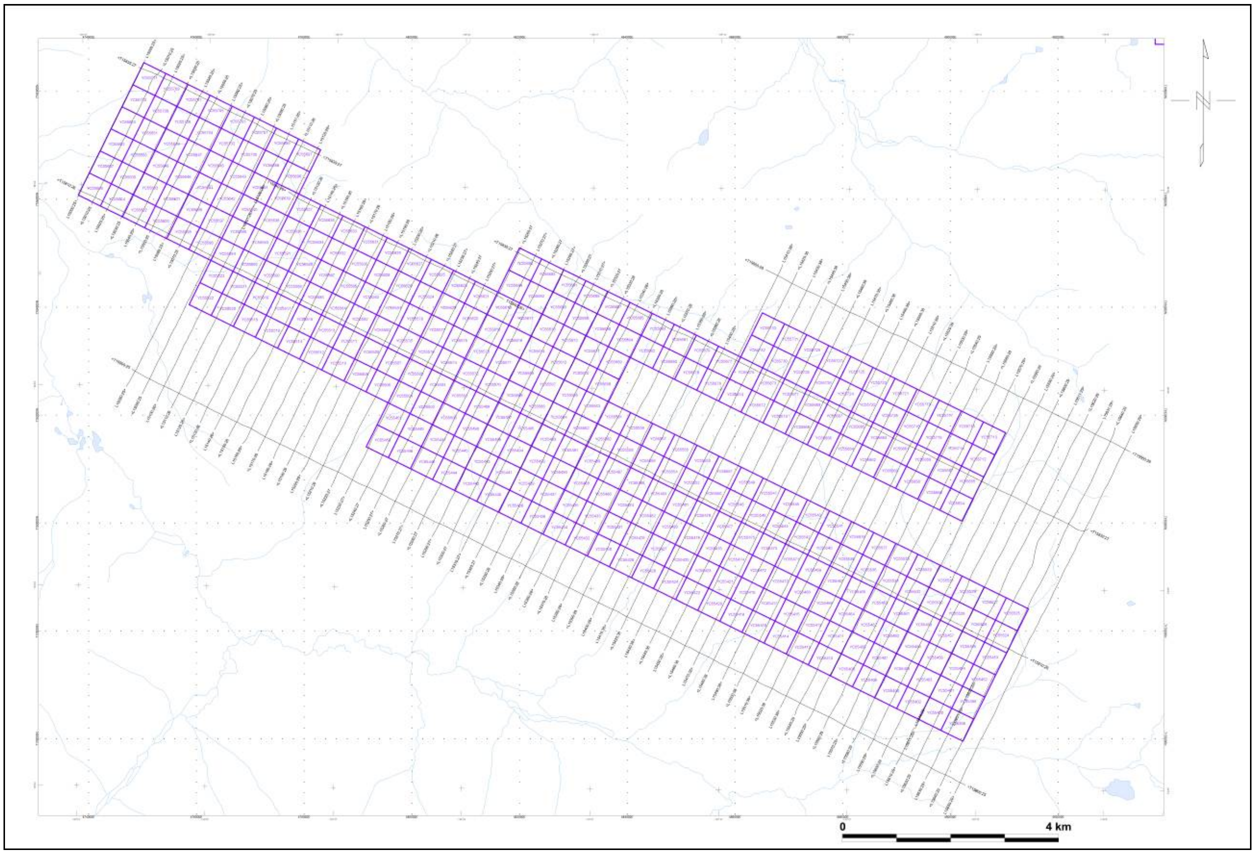
# APPENDIX A

## SURVEY BLOCK LOCATION MAPS


**Google Earth Image: Nick Project**




**Google Earth Image: Nick Block**




**Mining Claims Map: Nick Project**

## APPENDIX B

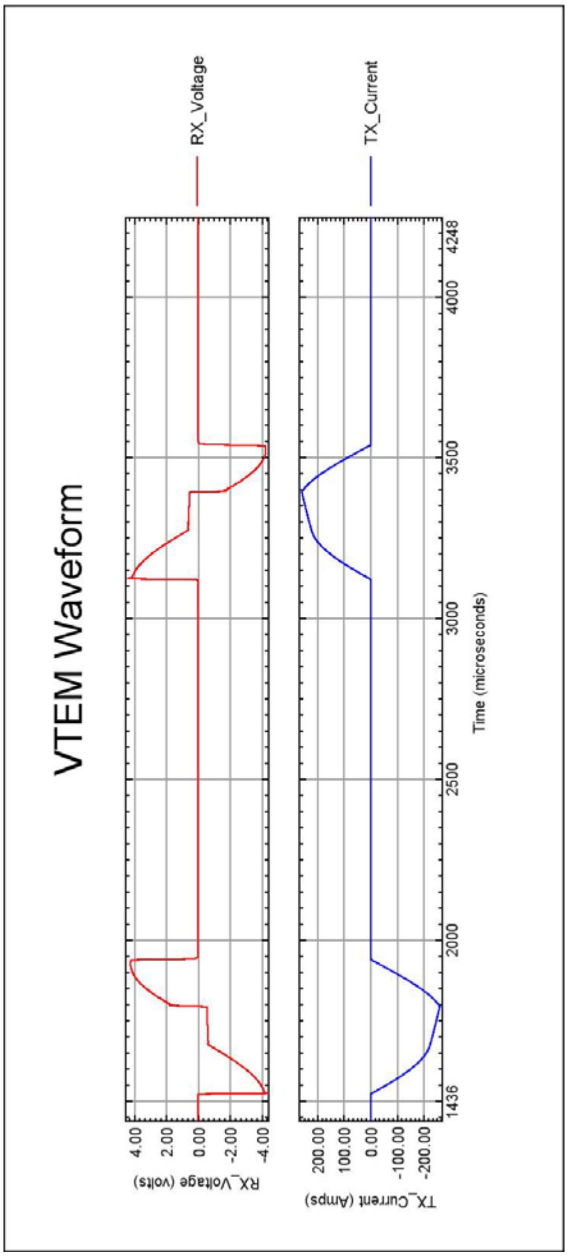
## SURVEY BLOCK COORDINATES

(NAD83, UTM Zone 8 North)

| Nick | |
|---|---|
| X | Y |
| 473808.1 | 7186080 |
| 475024.5 | 7188534 |
| 478307.4 | 7186917 |
| 477902 | 7186099 |
| 481595.3 | 7184280 |
| 482000.7 | 7185098 |
| 485880.1 | 7183187 |
| 486691.1 | 7184824 |
| 493395.1 | 7181551 |
| 490151.4 | 7175005 |
| 474695.1 | 7182589 |
| 475911.5 | 7185044 |

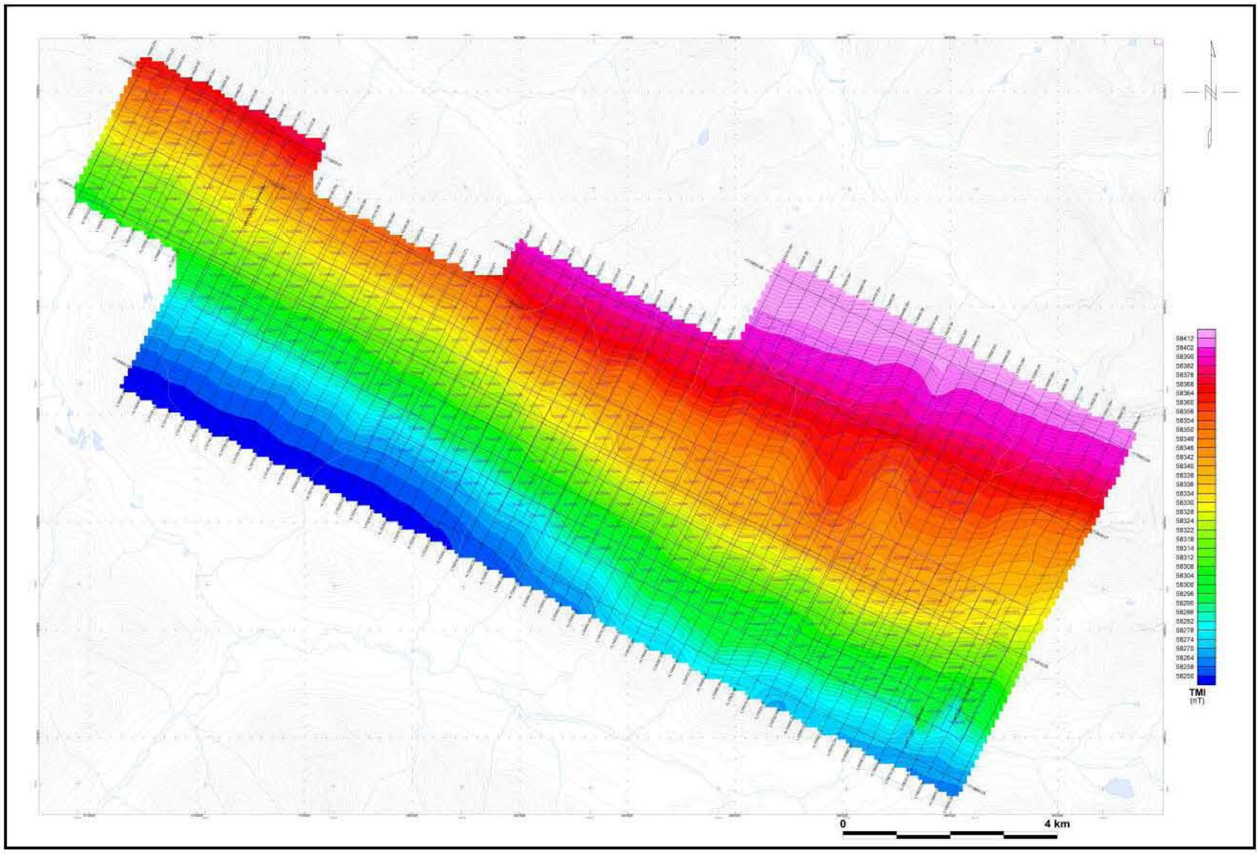
## APPENDIX C

## VTEM WAVEFORM



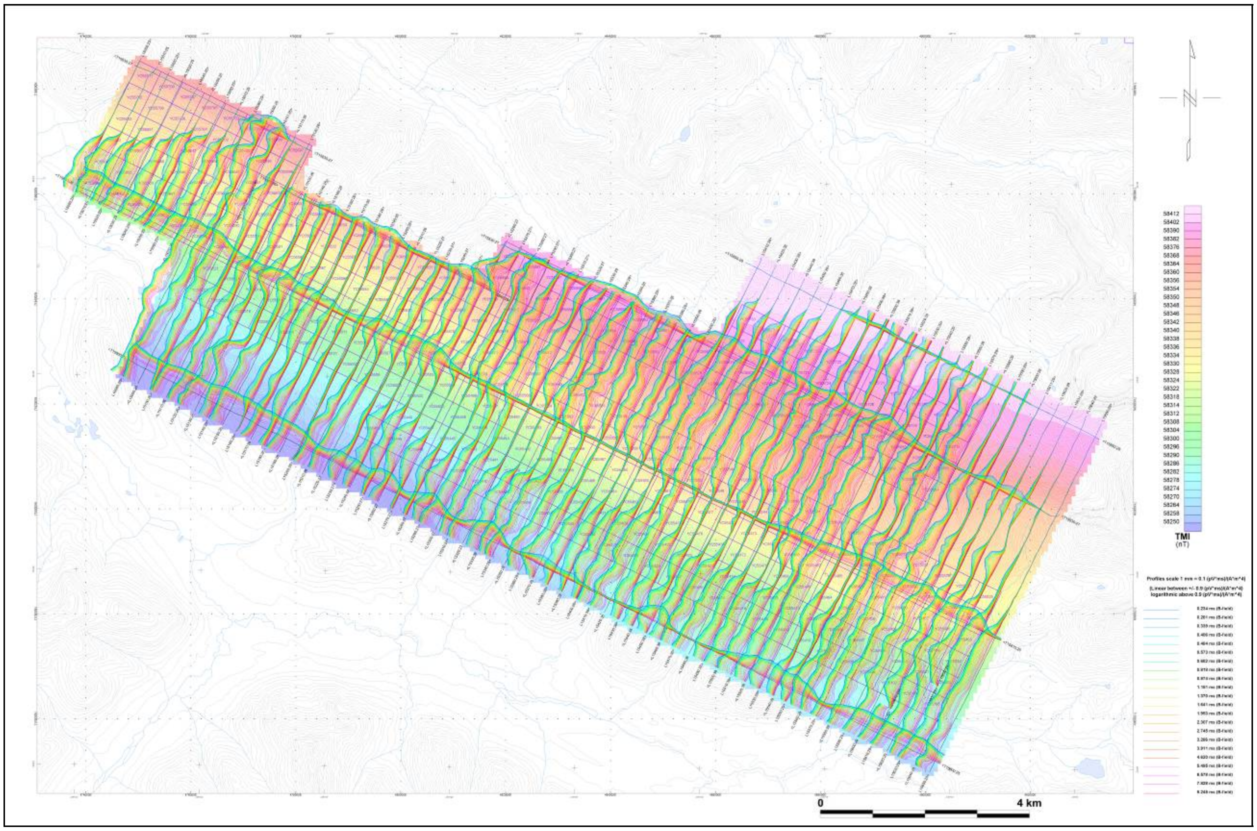
## APPENDIX D

## GEOPHYSICAL MAPS[1]

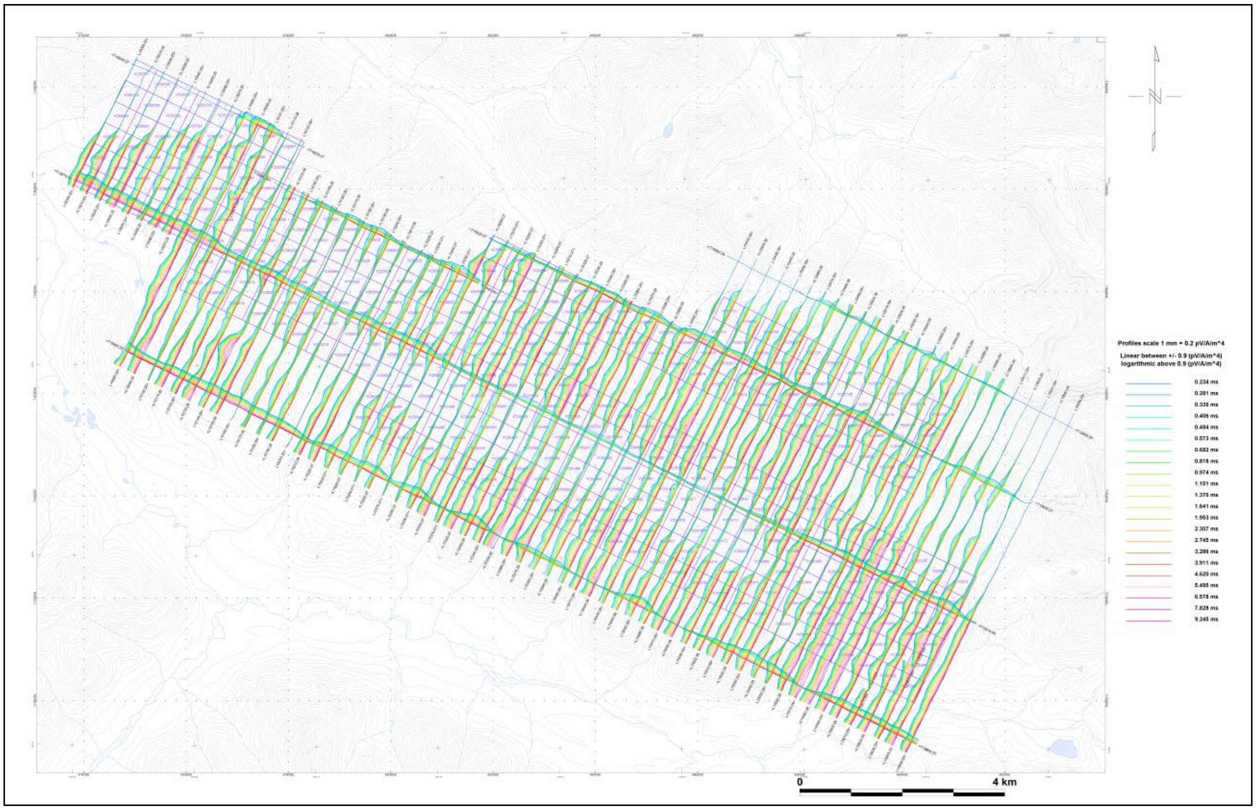



**Nick Property: Total Magnetic Intensity (TMI)**

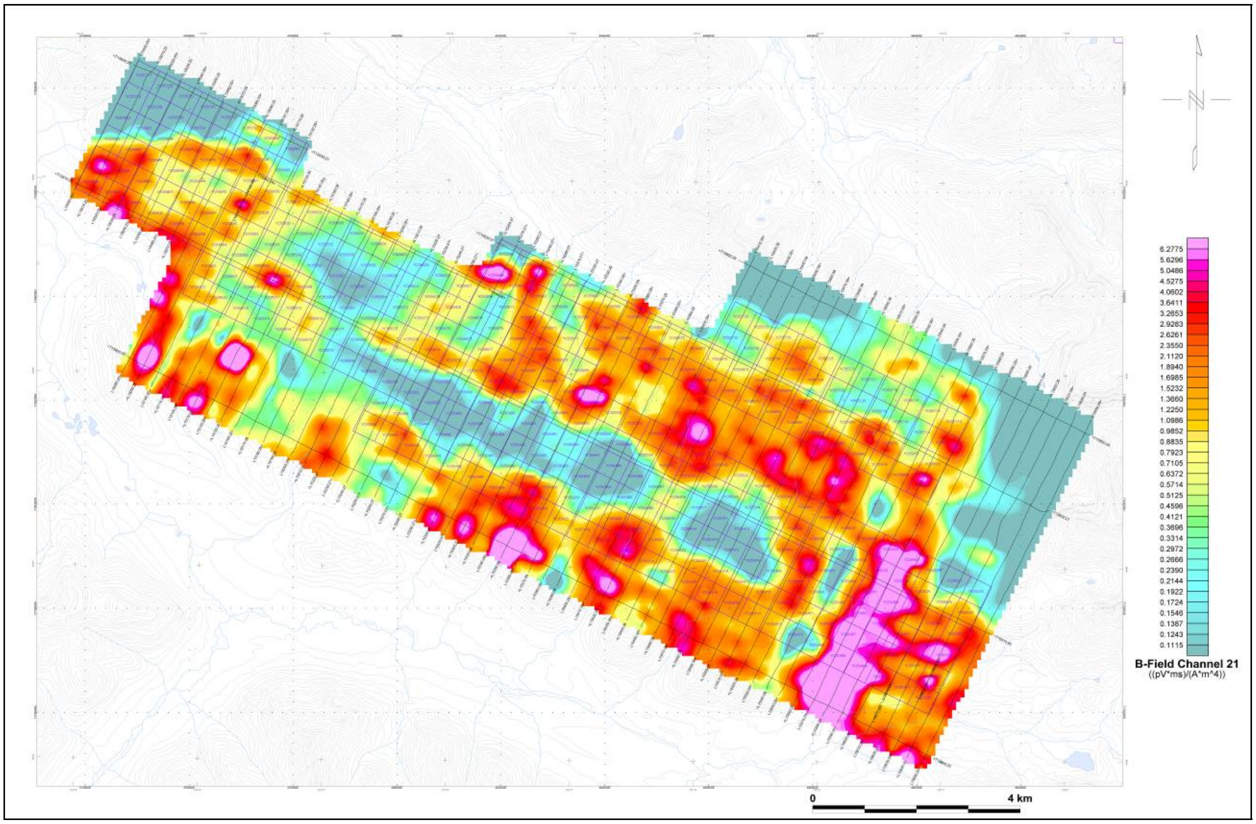
[1] Note: Present maps are a selection of the final geophysical maps. Full size geophysical maps are also available in PDF format on the final DVD.




**Nick Property: VTEM B-Field Profiles**
**– Time Gates 0.234 to 9.245 ms, over TMI**




**Nick Property: VTEM dB/dt Profiles**
**- Time Gates 0.234 to 9.245 ms**




**Nick Property: VTEM B-Field Contours**
**- Time Gate 0.818 ms**

## APPENDIX E

## GENERALIZED MODELING RESULTS OF THE VTEM SYSTEM

### Introduction

The VTEM system is based on a concentric or central loop design, whereby, the receiver is positioned at the centre of a 26.1 metres diameter transmitter loop that produces a dipole moment up to 556,400 nIA at peak current. The wave form is a bi-polar, modified square wave with a turn-on and turn-off at each end. With a base frequency of 30 Hz, the duration of each pulse is approximately 4.2 milliseconds followed by an off time where no primary field is present.

During turn-on and turn-off, a time varying field is produced (dB/dt) and an electro-motive force (emf) is created as a finite impulse response. A current ring around the transmitter loop moves outward and downward as time progresses. When conductive rocks and mineralization are encountered, a secondary field is created by mutual induction and measured by the receiver at the centre of the transmitter loop.

Measurements are made during the on and off-time, when only the secondary field (representing the conductive targets encountered in the ground) is present.

Efficient modeling of the results can be carried out on regularly shaped geometries, thus yielding close approximations to the parameters of the measured targets. The following is a description of a series of common models made for the purpose of promoting a general understanding of the measured results.

### General Modeling Concepts

A set of models has been produced for the Geotech VTEM® system with explanation notes (see models C1 to C18). The Maxwell ™ modeling program (EMIT Technology Pty. Ltd., Midland, AU) used to generate the following responses assumes a resistive half-space. The reader is encouraged to review these models, so as to get a general understanding of the responses as they apply to survey results. While these models do not begin to cover all possibilities, they give a general perspective on the simple and most commonly encountered anomalies.
When producing these models, a few key points were observed and are worth noting as follows:

- For near vertical and vertical plate models, the top of the conductor is always located directly under the centre low point between the two shoulders in the classic **M** shaped response.

- As the plate is positioned at an increasing depth to the top, the shoulders of the **M** shaped response, have a greater separation distance.

- When faced with choosing between a flat lying plate and a prism model to represent the target (broad response) some ambiguity is present and caution should be exercised.

- With the concentric loop system and Z-component receiver coil, virtually all types of conductors and most geometries are most always well coupled and a response is generated. Only concentric loop systems can succefully map this type great variety of targets.

### Variation of Plate Depth

Geometries represented by plates of different strike length, depth extent, dip, plunge and depth below surface can be varied with characteristic parameters like conductance of the target, conductance of the host and conductivity/thickness and thickness of the overburden layer.

Diagrammatic models for a vertical plate are shown in Figures C-1 & C-2 and C-5 & C-6 at two different depths, all other parameters remaining constant. With this transmitter-receiver geometry, the classic **M** shaped response is generated. Figures C-1 and C-2 show a plate where the top is near surface. Here, amplitudes of the duel peaks are higher and symmetrical with the zero centre positioned directly above the plate. Most important is the separation distance of the peaks. This distance is small when the plate is near surface and widens with a linear relationship as the plate (depth to top) increases. Figures C-5 and C-6 show a much deeper plate where the separation distance of the peaks is much wider and the amplitudes of the channels have decreased.

### Variation of Plate Dip

As the plate dips and departs from the vertical position, the peaks become asymmetrical. Figures C-3 & C-4 and C-7 and C-8 show a near surface plate dipping 80º at two different depths. Note that the direction of dip is toward the high shoulder of the response and the top of the plate remains under the centre minimum.

As the dip increases, the aspect ratio (Min/Max) decreases and this aspect ratio can be used as an empirical guide to dip angles from near 90º to about 30º. The method is not sensitive enough where dips are less than about 30º. For example, for a plate dipping 45º, the minimum shoulder starts to vanish. In Figures C-9 & C-10 and C-11 & C-12, a flat lying plate is shown, relatively near surface. Note that the twin peak anomaly has been replaced by a symmetrical shape with large, bell shaped, channel amplitudes which decay relative to the conductance of the plate.

In the special case where two plates are positioned to represent a synclinal structure. Note that the main characteristic is that the centre amplitudes are higher (approximately double) compared to the high shoulder of a single plate. This model is very representative of tightly folded formations where the conductors where once flat lying.

### Variation of Prism Dip

Finally, with thicker, prism models, another algorithm is required to represent current on the plate. A plate model is considered to be infinitely thin with respect to thickness and incapable of representing the current in the thickness dimension. A prism model is constructed to deal with this problem, thereby, representing the thickness of the body more accurately.

Figures C-13 & C-14 and C-15 & C-16 show the same prism at the same depths with variable dips. Aside from the expected differences asymmetry prism anomalies show a characteristic change from a double-peaked anomaly to single peak signatures.

## I. THIN PLATE

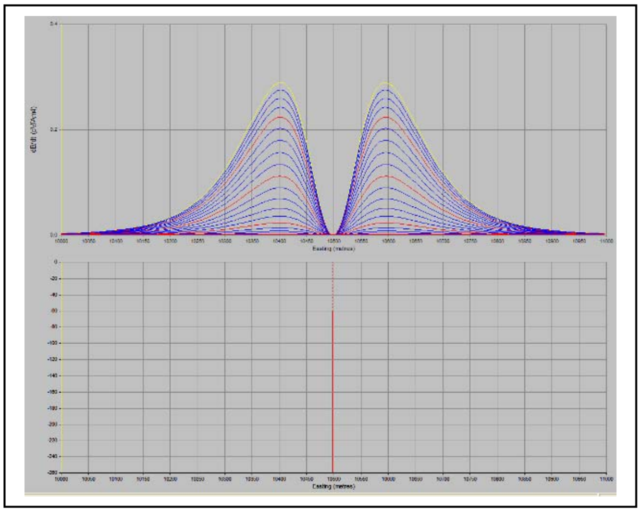


Figure C-1: dB/dt response of a shallow vertical thin plate. Depth=100 m, CT=20 S. The EM response is normalized by the dipole moment and the Rx area.

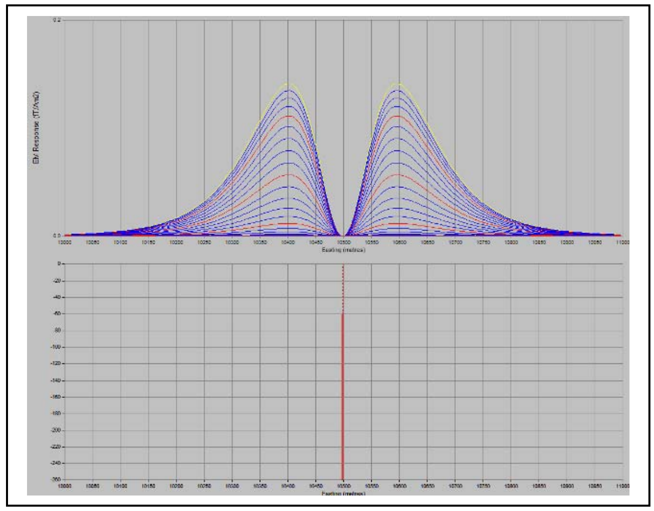


Figure C-2: B-field response of a shallow vertical thin plate. Depth=100 m, CT=20 S. The EM response is normalized by the dipole moment.

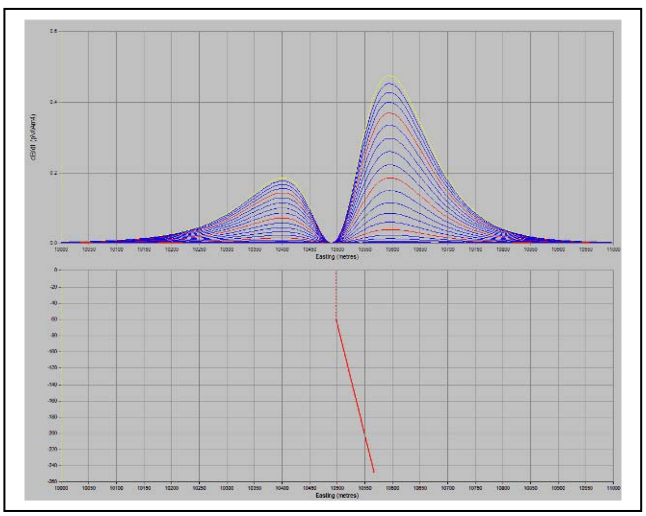


Figure C-3: dB/dt response of a shallow skewed thin plate. Depth=100 m, CT=20 S. The EM response is normalized by the dipole moment and the Rx area.

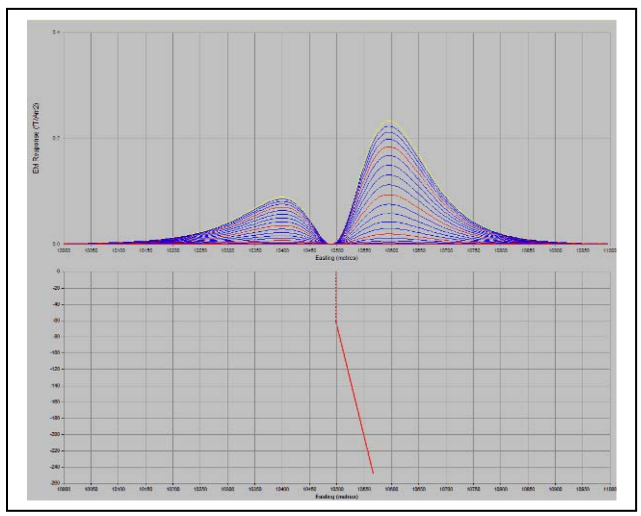


Figure C-4: B-field response of a shallow skewed thin plate. Depth=100 m, CT=20 S. The EM response is normalized by the dipole moment.

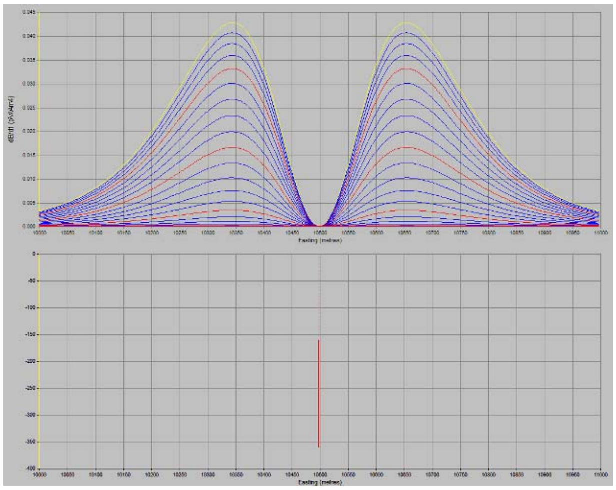


Figure C-5: dB/dt response of a deep vertical thin plate. Depth=200 m, CT=20 S. The EM response is normalized by the dipole moment and the Rx area.

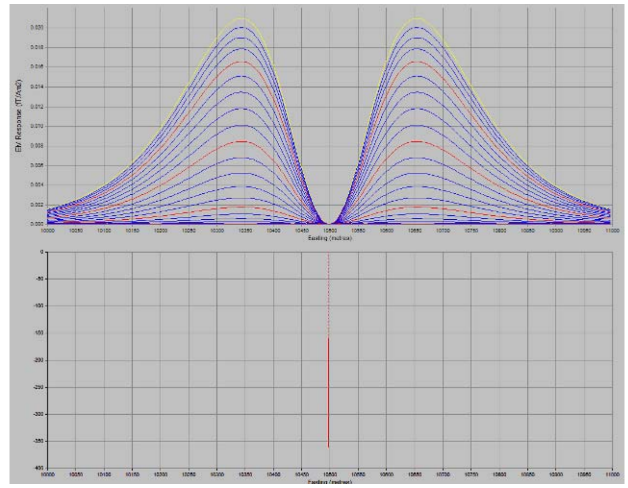


Figure C-6: B-Field response of a deep vertical thin plate. Depth=200 m, CT=20 S. The EM response is normalized by the dipole moment.

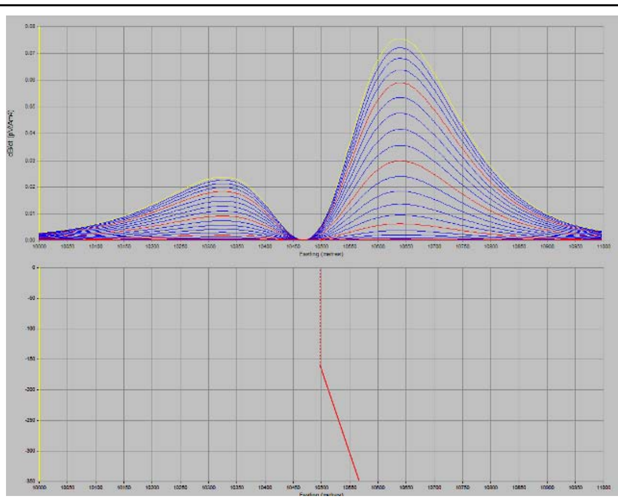


Figure C-7: dB/dt response of a deep skewed thin plate. Depth=200 m, CT=20 S. The EM response is normalized by the dipole moment and the Rx area.

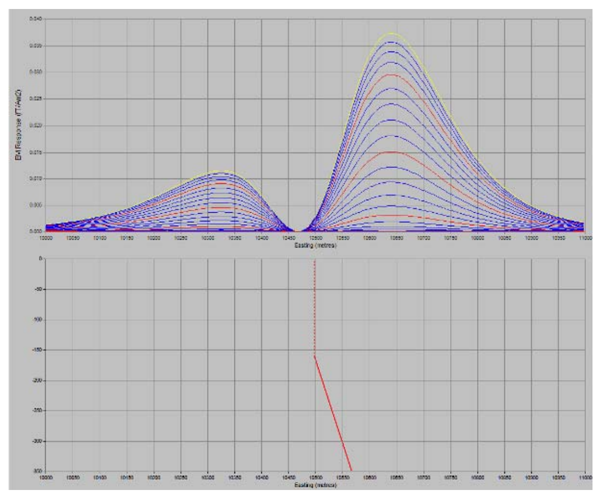


Figure C-8: B-field response of a deep skewed thin plate. Depth=200 m, CT=20 S. The EM response is normalized by the dipole moment.

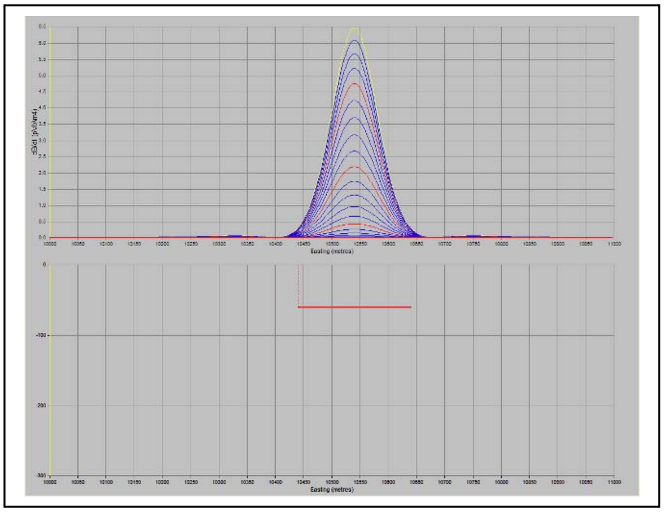


Figure C-9: dB/dt response of a shallow horizontal thin plate. Depth=100 m, CT=20 S. The EM response is normalized by the dipole moment and the Rx area.

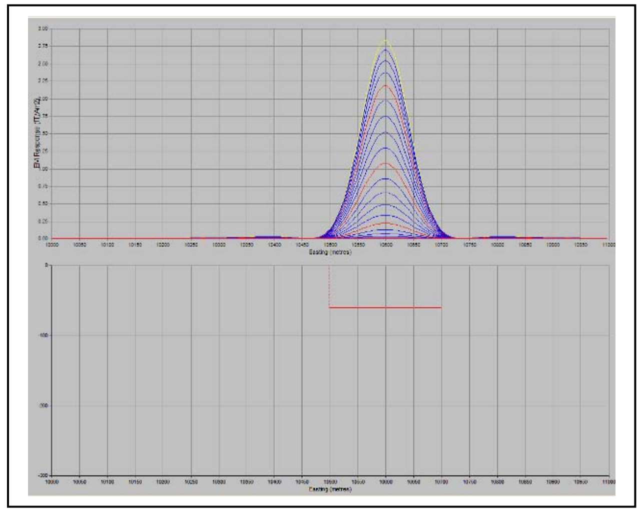


Figure C-10: B-Field response of a shallow horizontal thin plate. Depth=100 m, CT=20 S. The EM response is normalized by the dipole moment.

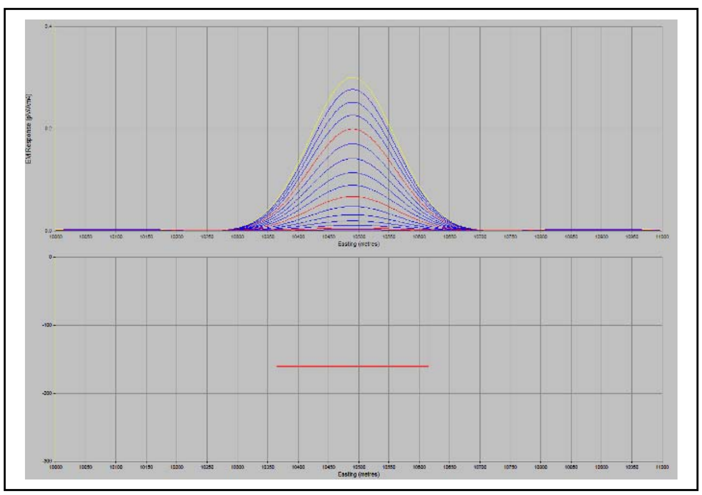


Figure C-11: dB/dt response of a deep horizontal thin plate. Depth=200 m, CT=20 S. The EM response is normalized by the dipole moment and the Rx area.

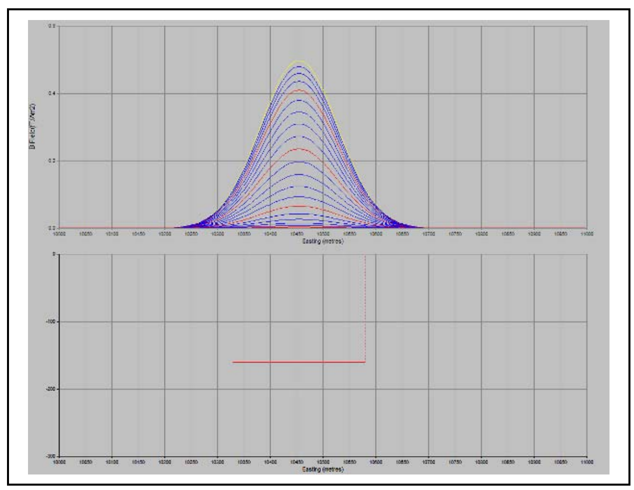


Figure C-12: B-Field response of a deep horizontal thin plate. Depth=200 m, CT=20 S. The EM response is normalized by the dipole moment.

## II. THICK PLATE

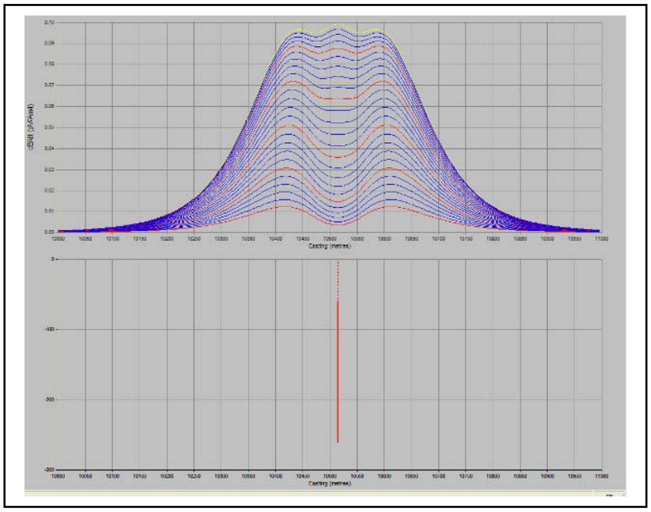


Figure C-13: dB/dt response of a shallow vertical thick plate. Depth=100 m, C=12 S/m, thickness=20 m. The EM response is normalized by the dipole moment and the Rx area.

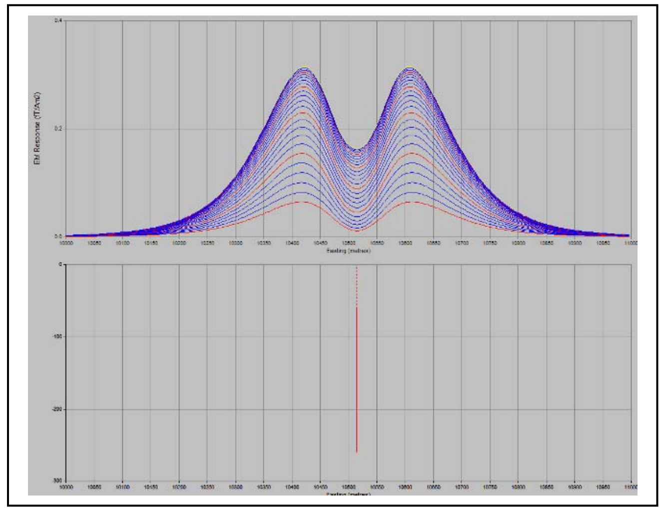


Figure C-14: B-Field response of a shallow vertical thick plate. Depth=100 m, C=12 S/m, thickness= 20 m. The EM response is normalized by the dipole moment.

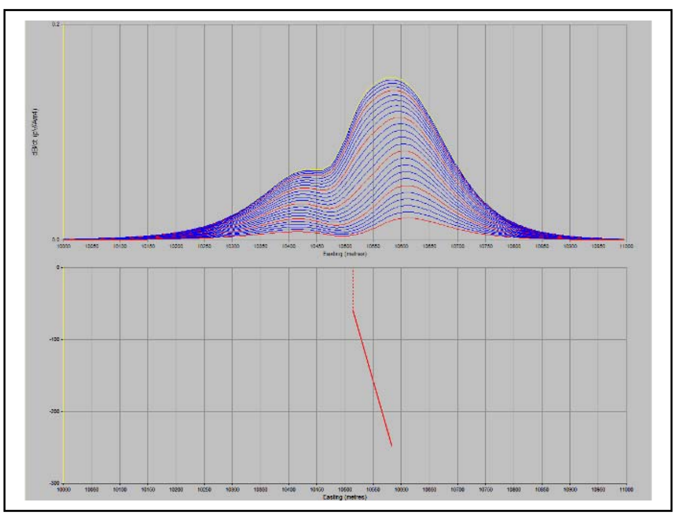


Figure C-15: dB/dt response of a shallow skewed thick plate. Depth=100 m, C=12 S/m, thickness=20 m. The EM response is normalized by the dipole moment and the Rx area.

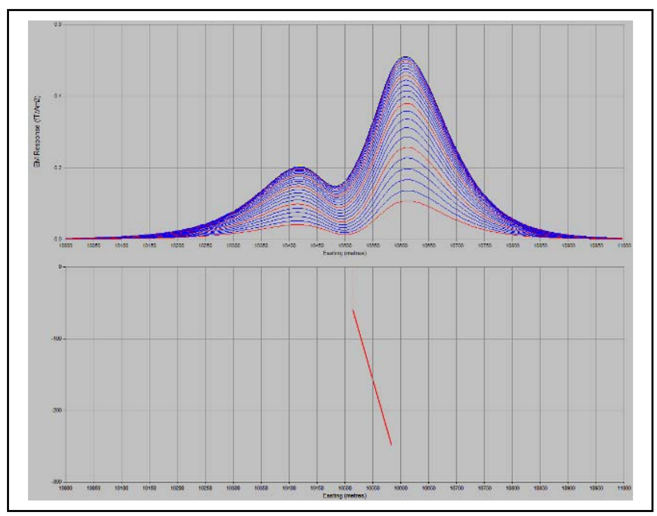


Figure C-16: B-Field response of a shallow skewed thick plate. Depth=100 m, C=12 S/m, thickness=20 m. The EM response is normalized by the dipole moment.

## III. MULTIPLE THIN PLATES

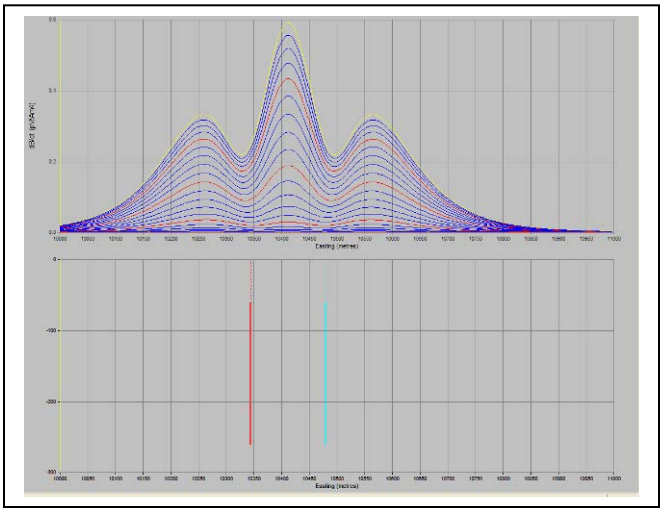


Figure C-17: dB/dt response of two vertical thin plates. Depth=100 m, CT=20 S. The EM response is normalized by the dipole moment and the Rx area.

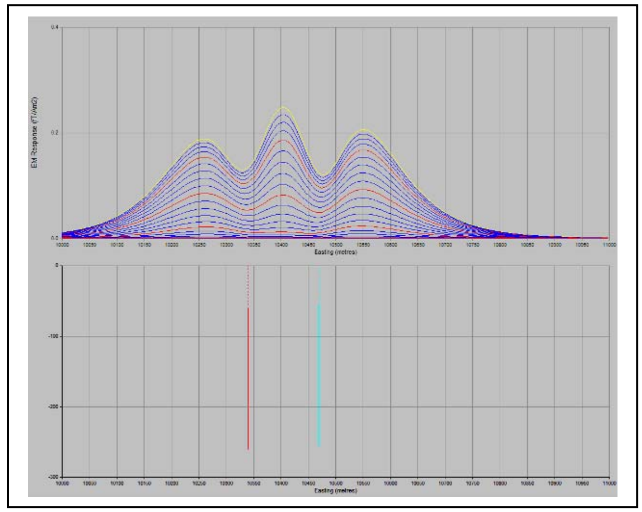


Figure C-18: B-Field response of two vertical thin plates. Depth=100 m, CT=20 S. The EM response is normalized by the dipole moment.

## General Interpretation Principals

*Magnetics*

The total magnetic intensity responses reflect major changes in the magnetite and/or other magnetic minerals content in the underlying rocks and unconsolidated overburden. Precambrian rocks have often been subjected to intense heat and pressure during structural and metamorphic events in their history. Original signatures imprinted on these rocks at the time of formation have, it most cases, been modified, resulting in low magnetic susceptibility values.

The amplitude of magnetic anomalies, relative to the regional background, helps to assist in identifying specific magnetic and non-magnetic rock units (and conductors) related to, for example, mafic flows, mafic to ultramafic intrusives, felsic intrusives, felsic volcanics and/or sediments etc. Obviously, several geological sources can produce the same magnetic response. These ambiguities can be reduced considerably if basic geological information on the area is available to the geophysical interpreter.

In addition to simple amplitude variations, the shape of the response expressed in the wave length and the symmetry or asymmetry, is used to estimate the depth, geometric parameters and magnetization of the anomaly. For example, long narrow magnetic linears usually reflect mafic flows or intrusive dyke features. Large areas with complex magnetic patterns may be produced by intrusive bodies with significant magnetization, flat lying magnetic sills or sedimentary iron formation. Local isolated circular magnetic patterns often represent plug-like igneous intrusives such as kimberlites, pegmatites or volcanic vent areas.

Because the total magnetic intensity (TMI) responses may represent two or more closely spaced bodies within a response, the second derivative of the TMI response may be helpful for distinguishing these complexities. The second derivative is most useful in mapping near surface linears and other subtle magnetic structures that are partially masked by nearby higher amplitude magnetic features. The broad zones of higher magnetic amplitude, however, are severely attenuated in the vertical derivative results. These higher amplitude zones reflect rock units having strong magnetic susceptibility signatures. For this reason, both the TMI and the second derivative maps should be evaluated together.

Theoretically, the second derivative, zero contour or color delineates the contacts or limits of large sources with near vertical dip and shallow depth to the top. The vertical gradient map also aids in determining contact zones between rocks with a susceptibility contrast, however, different, more complicated rules of thumb apply.

*Concentric Loop EM Systems*

Concentric systems with horizontal transmitter and receiver antennae produce much larger responses for flat lying conductors as contrasted with vertical plate-like conductors. The amount of current developing on the flat upper surface of targets having a substantial area in this dimension, are the direct result of the effective coupling angle, between the primary magnetic field and the flat surface area. One therefore, must not compare the amplitude/conductance of responses generated from flat lying bodies with those derived from near vertical plates; their ratios will be quite different for similar conductances.

Determining dip angle is very accurate for plates with dip angles greater than 30º. For angles less than 30º to 0º, the sensitivity is low and dips can not be distinguished accurately in the presence of normal survey noise levels.

A plate like body that has near vertical position will display a two shoulder, classic **M** shaped response with a distinctive separation distance between peaks for a given depth to top.

It is sometimes difficult to distinguish between responses associated with the edge effects of flat lying conductors and poorly conductive bedrock conductors. Poorly conductive bedrock conductors having low dip angles will also exhibit responses that may be interpreted as surficial overburden conductors. In some situations, the conductive response has line to line continuity and some magnetic correlation providing possible evidence that the response is related to an actual bedrock source.

The EM interpretation process used, places considerable emphasis on determining an understanding of the general conductive patterns in the area of interest. Each area has different characteristics and these can effectively guide the detailed process used.

The first stage is to determine which time gates are most descriptive of the overall conductance patterns. Maps of the time gates that represent the range of responses can be very informative.

Next, stacking the relevant channels as profiles on the flight path together with the second vertical derivative of the TMI is very helpful in revealing correlations between the EM and Magnetics.

Next, key lines can be profiled as single lines to emphasize specific characteristics of a conductor or the relationship of one conductor to another on the same line. Resistivity Depth sections can be constructed to show the relationship of conductive overburden or conductive bedrock with the conductive anomaly.

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Roger Barlow
**Consultant**

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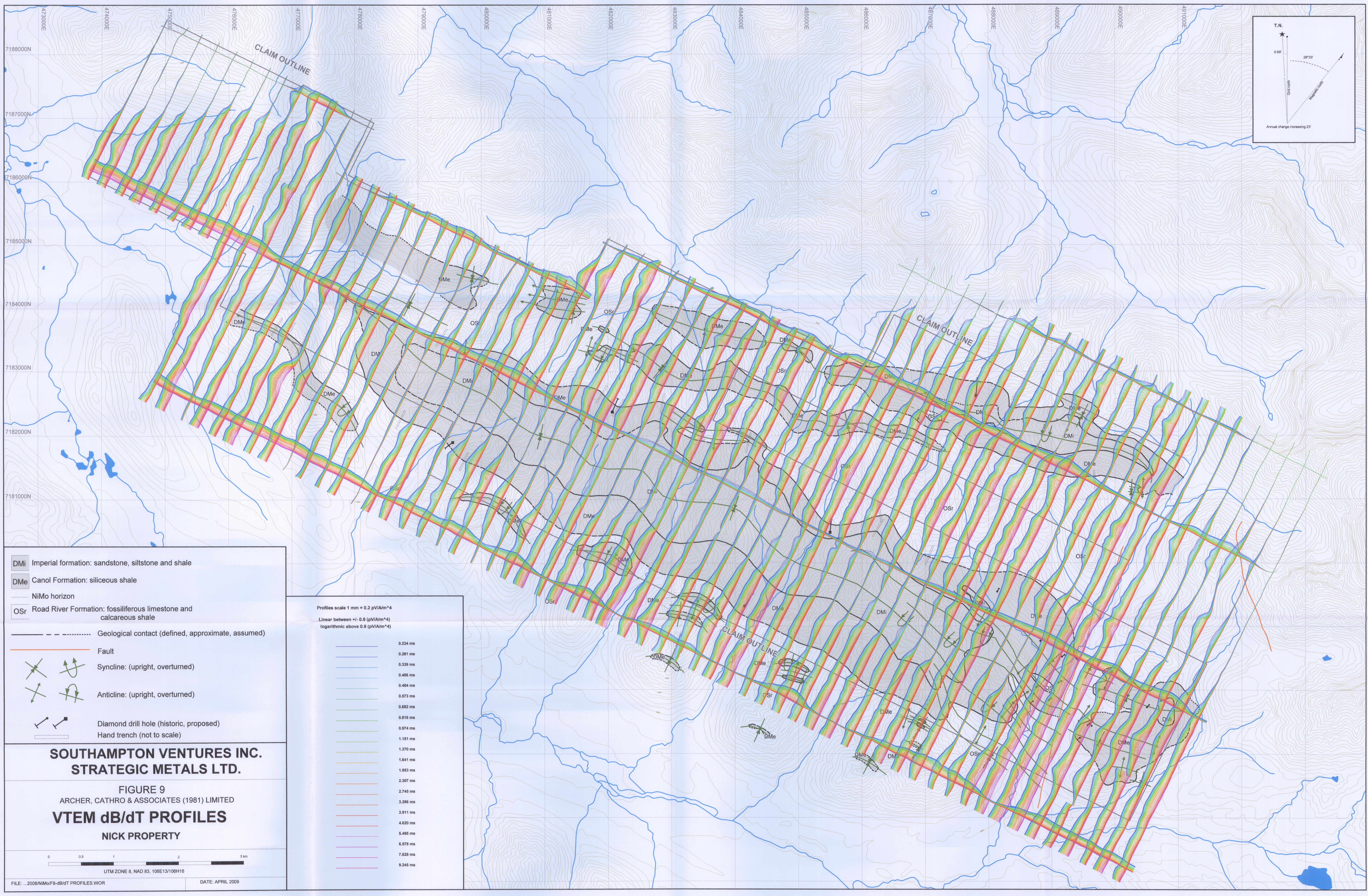
Nasreddine Bournas, P. Geo.
**Geotech Ltd.**

December 2008




**SOUTHAMPTON VENTURES INC.**
**STRATEGIC METALS LTD.**

FIGURE 9
ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

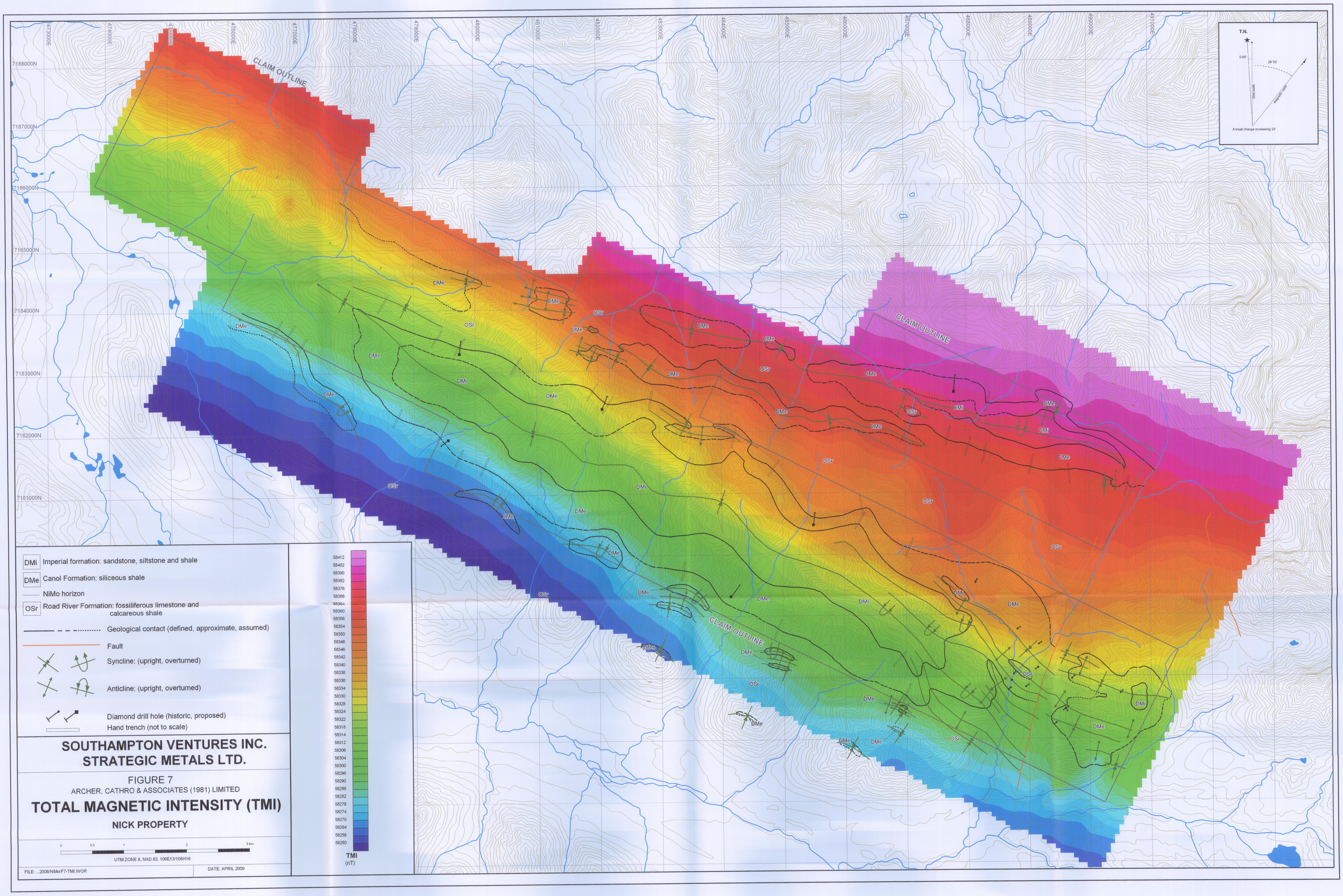
# VTEM dB/dT PROFILES

**NICK PROPERTY**

FILE: ...2008/NiMo/F8-dB/dT PROFILES.WOR

DATE: APRIL 2009

095660




# SOUTHAMPTON VENTURES INC.
# STRATEGIC METALS LTD.

FIGURE 7

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

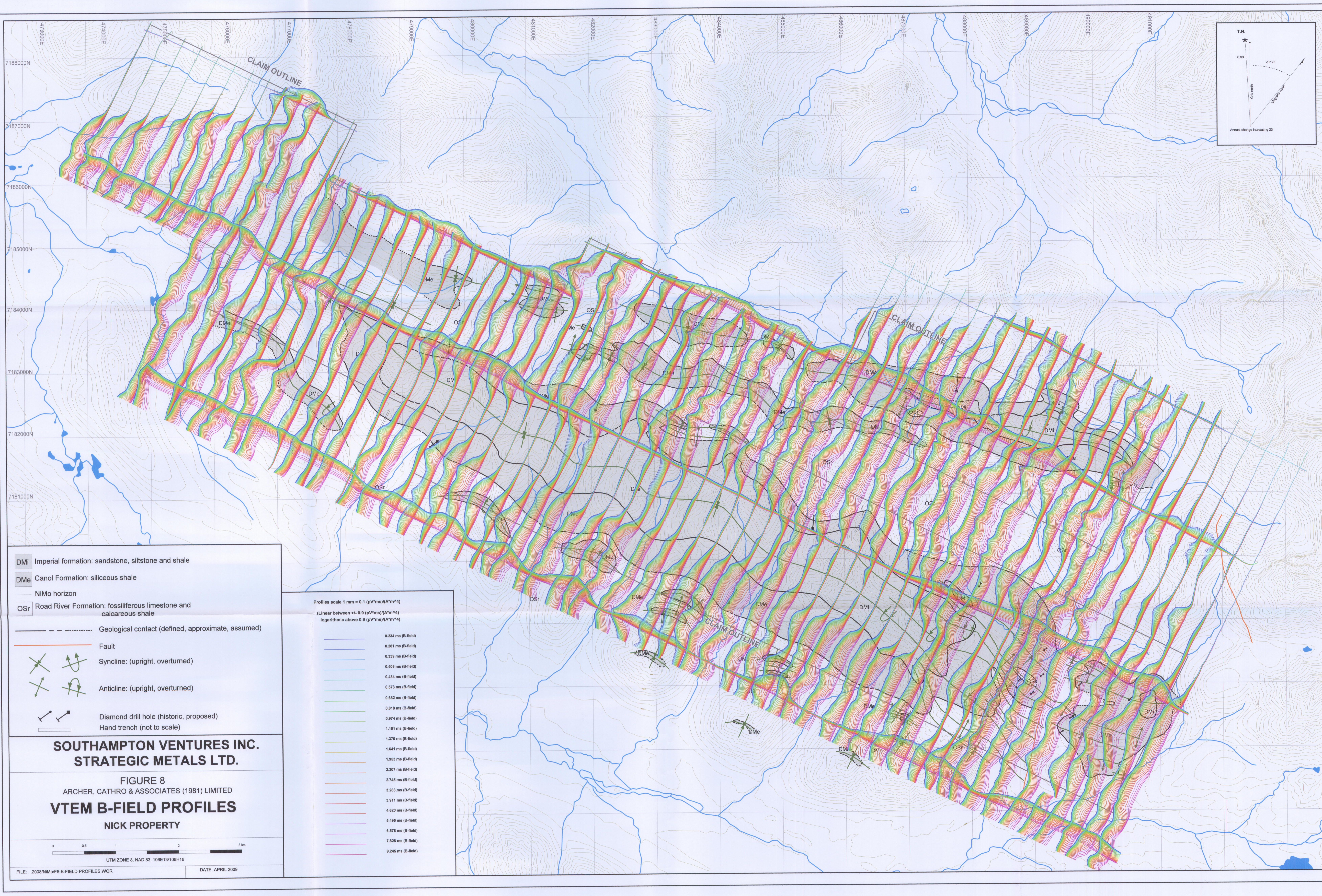
## TOTAL MAGNETIC INTENSITY (TMI)

### NICK PROPERTY

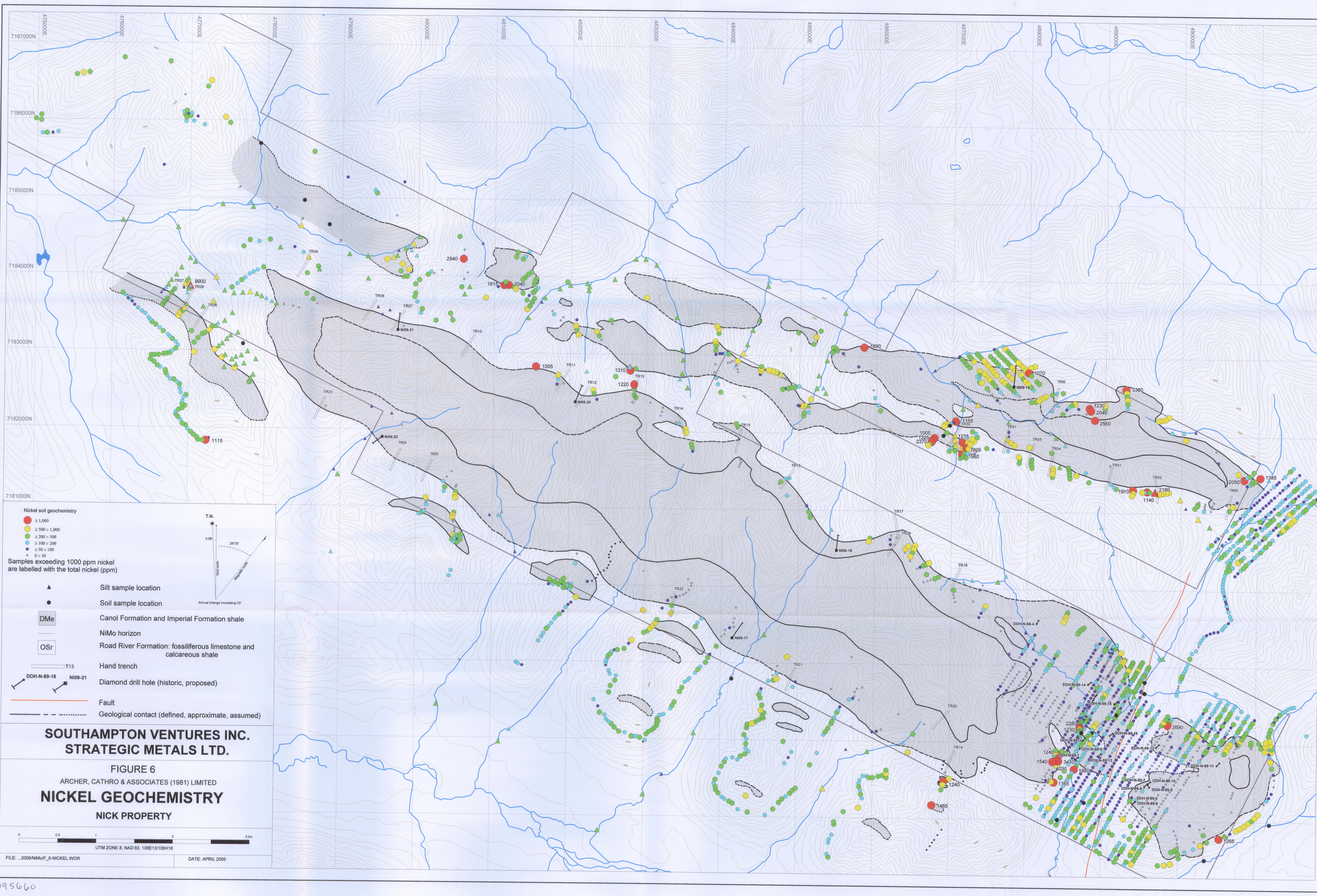
FILE: ...2008/NiMo/F7-TMI.WOR

DATE: APRIL 2009

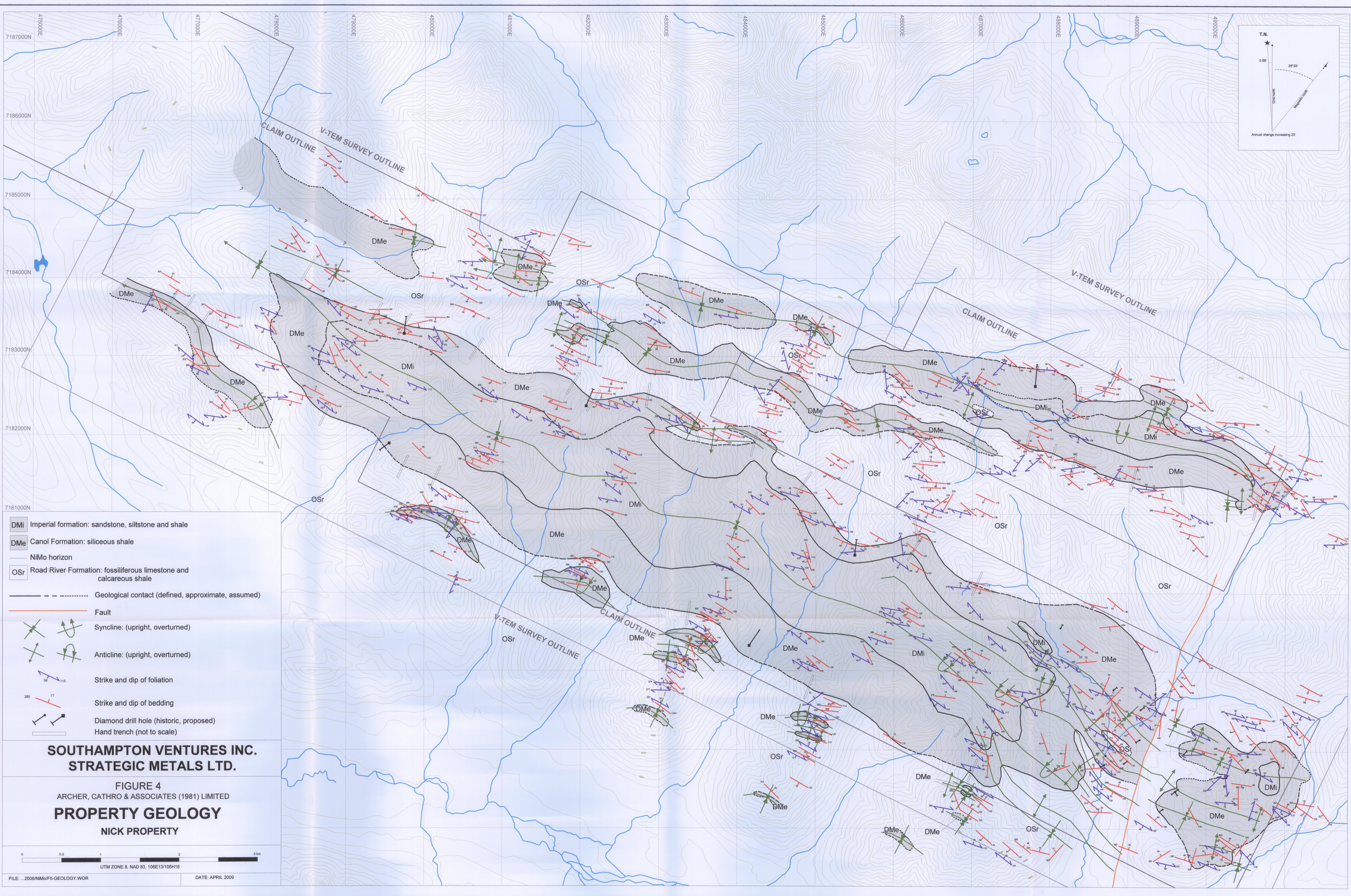
095660


CLAIM OUTLINE
CLAIM OUTLINE
CLAIM OUTLINE
7188000N
7187000N
7186000N
7185000N
7184000N
7183000N
7182000N
7181000N
T.N.
DMi Imperial formation: sandstone, siltstone and shale
DMe Canol Formation: siliceous shale
NiMo horizon
OSr Road River Formation: fossiliferous limestone and calcareous shale
Geological contact (defined, approximate, assumed)
Fault
Syncline: (upright, overturned)
Anticline: (upright, overturned)
Diamond drill hole (historic, proposed)
Hand trench (not to scale)
SOUTHAMPTON VENTURES INC.
STRATEGIC METALS LTD.
FIGURE 8
ARCHER, CATHRO & ASSOCIATES (1981) LIMITED
VTEM B-FIELD PROFILES
NICK PROPERTY
0 0.5 1 2 3 km
UTM ZONE 8, NAD 83, 106E13/106H16
FILE: ...2008/NiMo/F8-B-FIELD PROFILES.WOR
DATE: APRIL 2009
Profiles scale 1 mm = 0.1 (pV*ms)/(A*m^4)
(Linear between +/- 0.9 (pV*ms)/(A*m^4)
logarithmic above 0.9 (pV*ms)/(A*m^4)
0.234 ms (B-field)
0.281 ms (B-field)
0.339 ms (B-field)
0.406 ms (B-field)
0.484 ms (B-field)
0.573 ms (B-field)
0.682 ms (B-field)
0.818 ms (B-field)
0.974 ms (B-field)
1.151 ms (B-field)
1.370 ms (B-field)
1.641 ms (B-field)
1.953 ms (B-field)
2.307 ms (B-field)
2.745 ms (B-field)
3.286 ms (B-field)
3.911 ms (B-field)
4.620 ms (B-field)
5.495 ms (B-field)
6.578 ms (B-field)
7.828 ms (B-field)
9.245 ms (B-field)

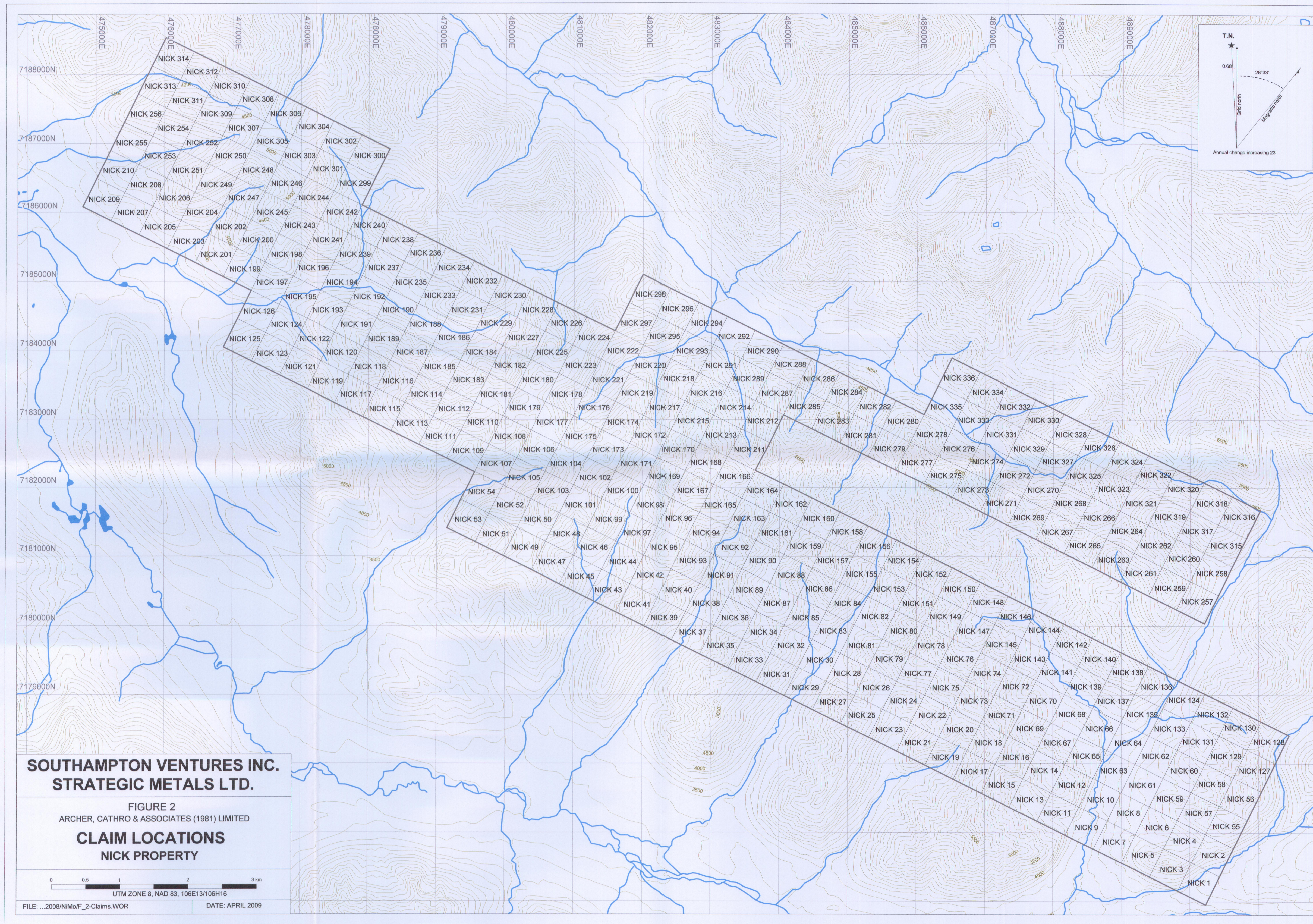
095660


Nickel soil geochemistry
≥ 1,000
≥ 500 > 1,000
≥ 200 > 500
≥ 100 > 200
≥ 50 > 100
0 > 50
Samples exceeding 1000 ppm nickel are labelled with the total nickel (ppm)
T.N.
Grid north
Magnetic north
28°33'
Annual change increasing 23'
Silt sample location
Soil sample location
DMe
Canol Formation and Imperial Formation shale
NiMo horizon
OSr
Road River Formation: fossiliferous limestone and calcareous shale
T13
Hand trench
DDH-N-89-16
NI09-21
Diamond drill hole (historic, proposed)
Fault
Geological contact (defined, approximate, assumed)
SOUTHAMPTON VENTURES INC.
STRATEGIC METALS LTD.
FIGURE 6
ARCHER, CATHRO & ASSOCIATES (1981) LIMITED
NICKEL GEOCHEMISTRY
NICK PROPERTY
0 0.5 1 2 3 km
UTM ZONE 8, NAD 83, 106E13/106H16
FILE: ...2008/NiMo/F_6-NICKEL.WOR
DATE: APRIL 2009

95660


DMi Imperial formation: sandstone, siltstone and shale
DMe Canol Formation: siliceous shale
NiMo horizon
OSr Road River Formation: fossiliferous limestone and calcareous shale
Geological contact (defined, approximate, assumed)
Fault
Syncline: (upright, overturned)
Anticline: (upright, overturned)
Strike and dip of foliation
Strike and dip of bedding
Diamond drill hole (historic, proposed)
Hand trench (not to scale)
SOUTHAMPTON VENTURES INC.
STRATEGIC METALS LTD.
FIGURE 4
ARCHER, CATHRO & ASSOCIATES (1981) LIMITED
PROPERTY GEOLOGY
NICK PROPERTY
UTM ZONE 8, NAD 83, 106E13/106H16
FILE: ...2008/NiMo/F5-GEOLOGY.WOR
DATE: APRIL 2009
CLAIM OUTLINE
V-TEM SURVEY OUTLINE
T.N.
Annual change increasing 23'

095660


475000E
476000E
477000E
478000E
479000E
480000E
481000E
482000E
483000E
484000E
485000E
486000E
487000E
488000E
489000E
7188000N
7187000N
7186000N
7185000N
7184000N
7183000N
7182000N
7181000N
7180000N
7179000N
T.N.
SOUTHAMPTON VENTURES INC.
STRATEGIC METALS LTD.
FIGURE 2
ARCHER, CATHRO & ASSOCIATES (1981) LIMITED
CLAIM LOCATIONS
NICK PROPERTY
0
0.5
1
2
3 km
UTM ZONE 8, NAD 83, 106E13/106H16
FILE: ...2008/NiMo/F_2-Claims.WOR
DATE: APRIL 2009

095660