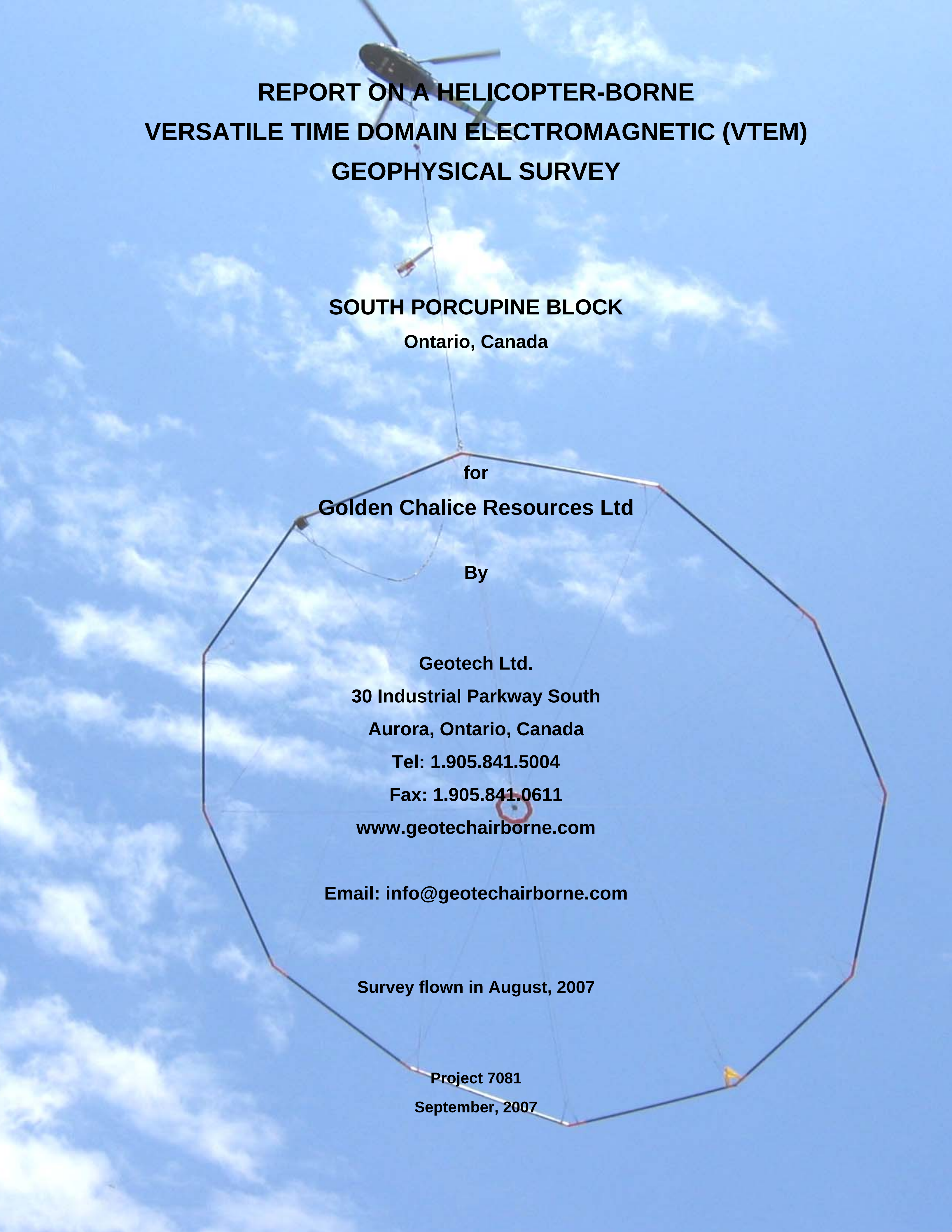

REPORT ON A HELICOPTER-BORNE VERSATILE TIME DOMAIN ELECTROMAGNETIC (VTEM) GEOPHYSICAL SURVEY

SOUTH PORCUPINE BLOCK

Ontario, Canada

for

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Survey flown in August, 2007

Project 7081

September, 2007

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APPENDICES

REPORT ON A HELICOPTER-BORNE
VERSATILE TIME DOMAIN ELECTROMAGNETIC SURVEY

Porcupine Block, Ontario, Canada

Executive Summary

During the period of August 10th to August 11th, 2007, Geotech Ltd. carried out a helicopter-borne geophysical survey for Golden Chalice Resources Ltd over around Timmins, Ontario, 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 270 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 Howard Johnson Hotel Timmins, in Ontario. Preliminary and final data processing, including generation of final digital data products were done at the office of Geotech Ltd. in Aurora, Ontario.

The processed survey results are presented as electromagnetic stacked profiles and the following grids,

- dB/dt time channel 3.286 ms
- B-field time channel 3.286 ms
- total magnetic intensity
- digital elevation model.

Digital 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 Geotech Ltd. and Golden Chalice Resources Ltd to perform a helicopter-borne geophysical survey over the South Porcupine block in Ontario, Canada.

270 line-km of geophysical data were acquired during the survey.

John Keating acted on behalf of Golden Chalice Resources Ltd during data acquisition and data processing phases of this project.

The survey block is as shown in Appendix A.

The crew was based in Timmins, Ontario for the acquisition phase of the survey, as shown in Section 2 of this report.

Survey flying was completed on August 11th, 2007. 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 Ltd. by September, 2007.

1.2. Survey and System Specifications

The survey block was flown at nominal traverse line spacing of 75 metres, at north- south direction. Tie lines were flown perpendicular to traverse lines.

Where possible, the helicopter maintained a mean terrain clearance of 75 metres, which translated into an average height of 35 meters above ground for the bird-mounted VTEM system and 60 meters for the magnetic sensor.

The survey was flown using an Astar B2 helicopter, registration C-FXFU. The helicopter was operated by Gateway 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 Ltd.

Databases, grids and maps of final products are presented to Golden Chalice Resources Ltd.

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 and cultural features

The survey block is located in central Ontario, Canada, approximately 15 kilometres east of Timmins and 3 kilometres east of the town of South Porcupine.

Topographically, the survey area exhibits a flat relief, with elevation ranging from 285 metres to 315 metres above sea level. Several lakes, rivers and swamp areas are observed.

Power line activity is detected in the northern and south-western part of the area. Hence, special care is recommended in identifying cultural features that might be detected in the survey data.

2. DATA ACQUISITION

2.1. *Survey Area*

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

Survey block	Line spacing (m)	Area (Km^2)	Line-km	Flight direction	Line number
South	75	15	244.3	N-S	L13010 - 13650
Porcupine	750		26.1	E-W	T13810 - 13880

Table 1 - Survey block

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

2.2. *Survey Operations*

Survey operations were based in Timmins, Ontario for the acquisition phase of the survey. The crew was housed at Howard Johnson Hotel in Timmins, as shown in the table bellow.

The following table shows the timing of the flying.

Date	Flight #	Km Flown	Block	Crew Location	Comments
10-Aug-2007	24	88.3	SP	Timmins	Production
10-Aug-2007	25	115.5	SP	Timmins	Production
11-Aug-2007	27	80.6	SP	Timmins	Production

Table 2 - Survey schedule

This block was flown as part of a larger survey on behalf of the same client.

2.3. Flight Specifications

The nominal EM sensor terrain clearance was 35 m (EM bird height above ground, i.e. helicopter is maintained 75 m above ground). Nominal survey speed was 75 km/hour. The data recording rates of the data acquisition was 0.1 second for electromagnetic and magnetometer, 0.2 second for altimeter and GPS data. 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 B2 helicopter, registration C-FXFU - owned and operated by Gateway 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 configuration is as indicated in Figure 1 below.

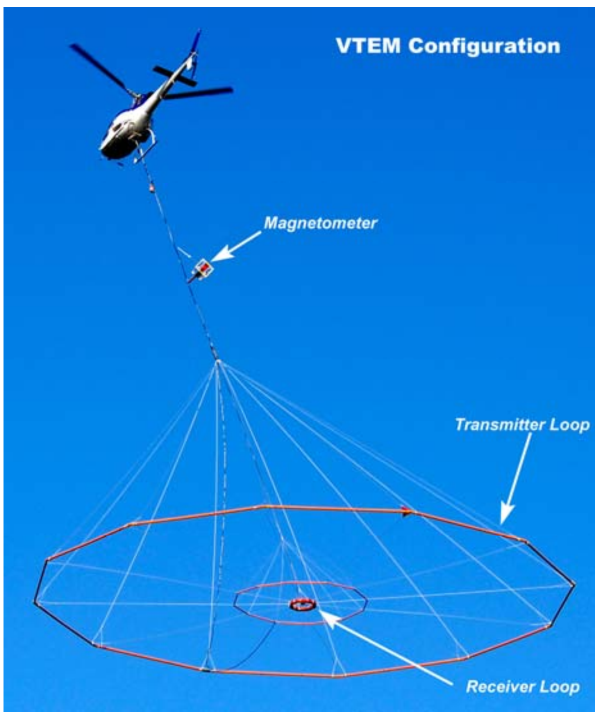

Figure 1 – VTEM configuration

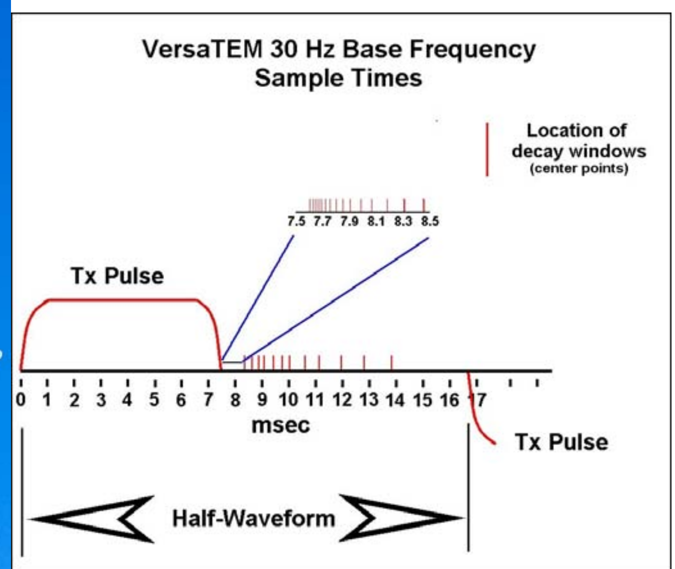

Figure 2 – Sample times

Receiver and transmitter coils are concentric and Z-direction oriented.
The receiver decay recording scheme is shown in Figure 2.

Twenty-four measurement gates were used in the range from 120 μs to 6578 μs, as shown in Table 3.

VTEM Decay Sampling scheme				
Array	(Microseconds)			
Index	Time Gate	Start	End	Width
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

Table 3 - VTEM decay sampling scheme

Transmitter coil diameter was 26 metres, the number of turns was 4.
Transmitter pulse repetition rate was 30 Hz.
Peak current was 207 Amp.
Pulse width was 7.5 ms
Duty cycle was 43%.
Peak dipole moment was 431,000 NIA.

Receiver coil diameter was 1.2 metre, the number of turns was 100.
Receiver effective area was 113.1 m^2
Wave form – trapezoid.
A 60 Hz power line monitor data is also recorded.
Recording sampling rate was 10 samples per second.

The EM bird was towed 42 m below the helicopter.

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 separated bird, towed 15 metres below the helicopter, as shown on figure 1. 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 40 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. The data type and sampling interval as provided in table 4.

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

Table 4 - Sampling Rates

2.4.5. 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 where the crew was housed, 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

Field Operation manager:	Shawn Grant
Crew chief:	Kyle Corriveau
Operators:	John Klimcsak
	Alex Smirnov

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

Pilots:	Francois Brisebois
Engineer:	Mike

Office

Project Manager/QC Geophysicist:	Harish Kumar
Data Processing / Reporting:	Biljana Milicevic

Data acquisition and processing phases were carried out under the supervision of Andrei Bagrianski, Surveys Manager. Overall management of the project was undertaken by Edward Morrison, President, Geotech Ltd.

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 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 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 stacked profiles of EM voltages for the time gates, in linear - logarithmic scale for both B-field and dB/dt response.

Generalized modeling results of the VTEM system, written by Geophysicist Roger Barlow, are shown in Appendix C.

Graphical representation of the VTEM output voltage of the receiver coil is shown in Appendix D.

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 five paper copies and digitally in PDF format.

5.2. *Maps*

Final maps were produced at a scale of 1:10,000. The coordinate/projection system used was WGS84, UTM zone 17 north. All maps show the flight path trace and topographic data. Latitude and longitude are also noted on maps.

The following maps are presented on paper,

- dB/dt profiles, Time Gates 0.234 – 6.578 ms in linear - logarithmic scale
- B-field profiles, Time Gates 0.234 – 6.578 ms in linear - logarithmic scale
- Total Magnetic intensity contours and colour image
- B-field time channel 3.286 ms contours and color image
- dB/dt time channel 3.286 ms contours and color image

5.3. *Digital Data*

Five copies of CD-ROMs were prepared.
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 following channels:

X:	X positional data (meters – WGS84, utm zone 17 north)
Y:	Y positional data (meters – WGS84, utm zone 17 north)

Lon:	Longitude data (degree – WGS84)
Lat:	Latitude data (degree – WGS84)
Z:	GPS antenna elevation (meters - ASL)
Radar:	Helicopter terrain clearance from radar altimeter (meters - AGL)
DEM:	Digital elevation model (meters)
Gtime1:	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:	Levelled Total Magnetic field 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 ($pV/A/m^4$)
SF[32]:	dB/dt 5495 microsecond time channel ($pV/A/m^4$)
SF[33]:	dB/dt 6578 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)
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BF[24]:	B-field 1370 microsecond time channel (pV*ms)/(A* m^4)
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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)
PLM:	Power line monitor

Electromagnetic B-field and dB/dt data is found in array channel format between indexes 10 – 33, as described above.

- Database VTEM_waveform.gdb in Geosoft GDB format, containing the following channels:

Time:	Sampling rate interval, 10.416 microseconds
Volt:	output voltage of the receiver coil (volt)

- Grids in Geosoft GRD format, as follow,

Mag_***bb***:	Total magnetic intensity (nT)
DEM_***bb***:	Digital elevation model (m)
Bfield_1151_***bb***:	B-field channel 1.151 ms (pV*ms)/(A*m4)
Bfield_3286_***bb***:	B-field channel 3.286 ms (pV*ms)/(A*m4)
dBdt_1151_***bb***:	dB/dt channel 1.151 ms (pV/A/m^4)
dBdt_3286_***bb***:	dB/dt channel 3.286 ms (pV/A/m^4)

Where,
bb represents the block name (SP: South Porcupine)

A Geosoft .GRD file has a .GI metadata file associated with it, containing grid projection information.
Grid cell size of 15 meters was used.

- Maps at 1:10,000 scale in Geosoft MAP format, as follow,

EMlog_dBdt:	dB/dt profiles, time channels 0.234 – 6.578 ms
EMlog_Bfield:	B-field profiles, time channels 0.234 – 6.578 ms
Bfield_3286:	B-field time channel 3.286 ms contours and color image
dBdt_3286:	dB/dt time channel 3.286 ms contours and color image
MAG:	Total Magnetic intensity contours and colour image

- Google Earth file *FP_7081_SouthPorcupine.kml* showing the flight path of the block.

  Free version of Google Earth software can be downloaded from,
  http://earth.google.com/download-earth.html

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

6. CONCLUSIONS

A helicopter-borne versatile time domain electromagnetic (VTEM) geophysical survey has been completed over the South Porcupine block, in Ontario, Canada.

The total area coverage is 15.5 km^2. Total survey line coverage is 270 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 1:10,000.

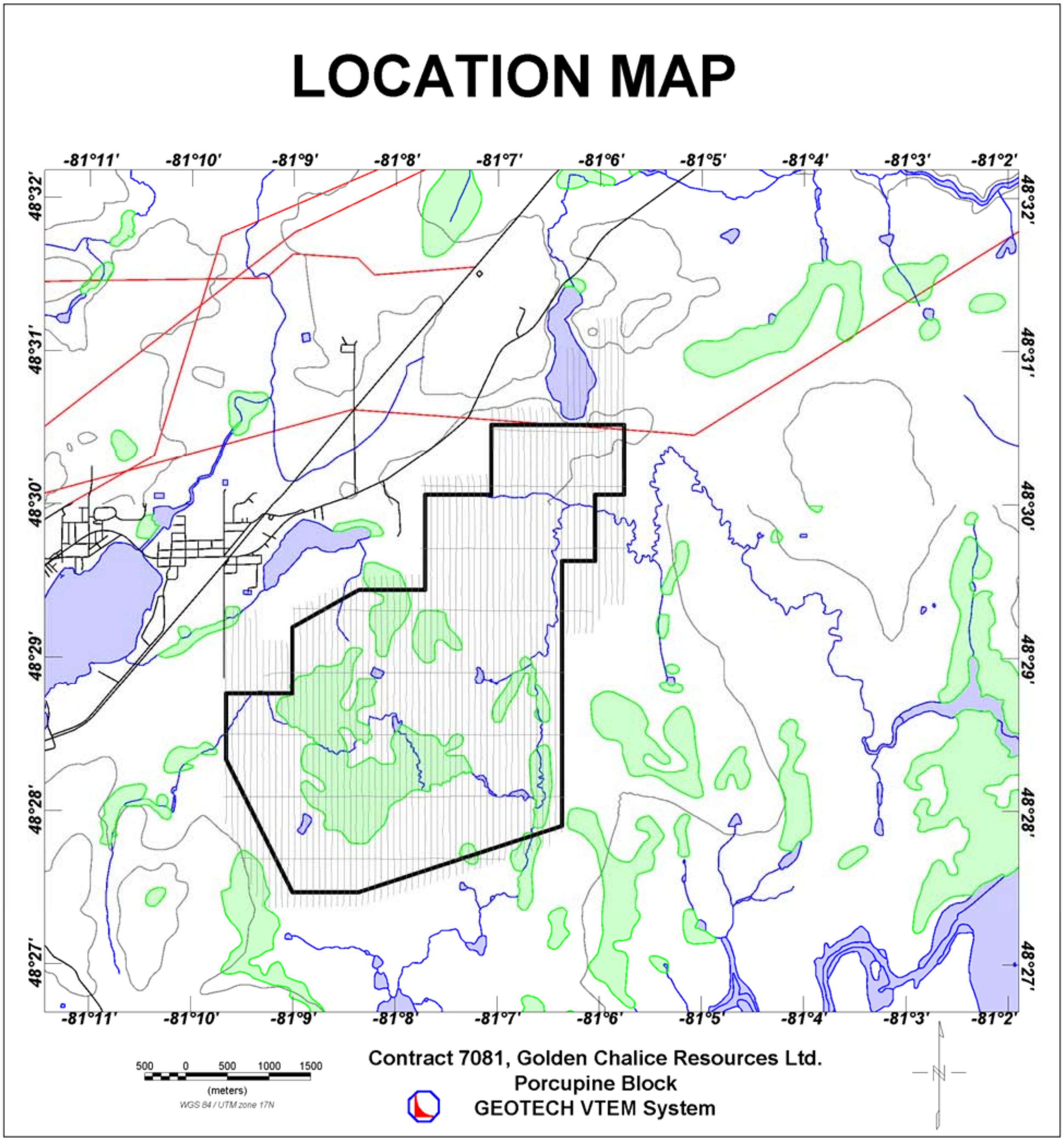
Final data processing at the office of Geotech Ltd. in Aurora, Ontario was carried out under the supervision of Andrei Bagrianski, Surveys Manager.

Respectfully submitted,

Biljana Milicevic,
Geotech Ltd.
September 2007

APPENDIX A

SURVEY BLOCK LOCATION MAP



APPENDIX B

SURVEY BLOCK COORDINATES
(WGS84, UTM zone 17 north)

South Porcupine Block

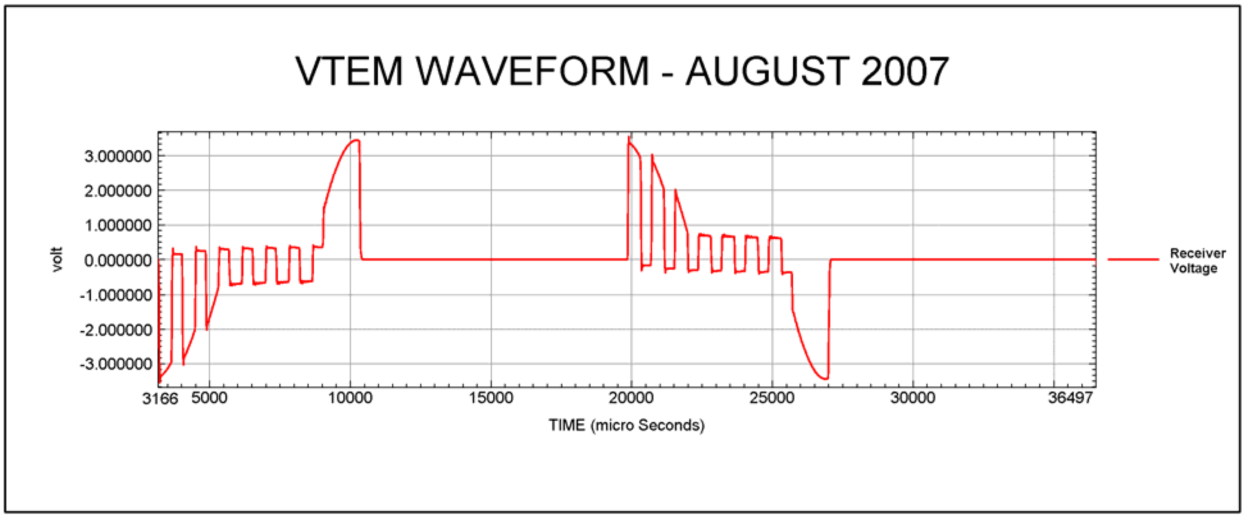
X	Y
488100	5369600
488100	5368800
488900	5367200
489700	5367200
492150	5368000
492150	5371200
492550	5371200
492550	5372000
492900	5372000
492900	5372850
491300	5372850
491300	5372000
490500	5372000
490500	5370850
489700	5370850
488900	5370400
488900	5369600

APPENDIX C

MODELING VTEM DATA

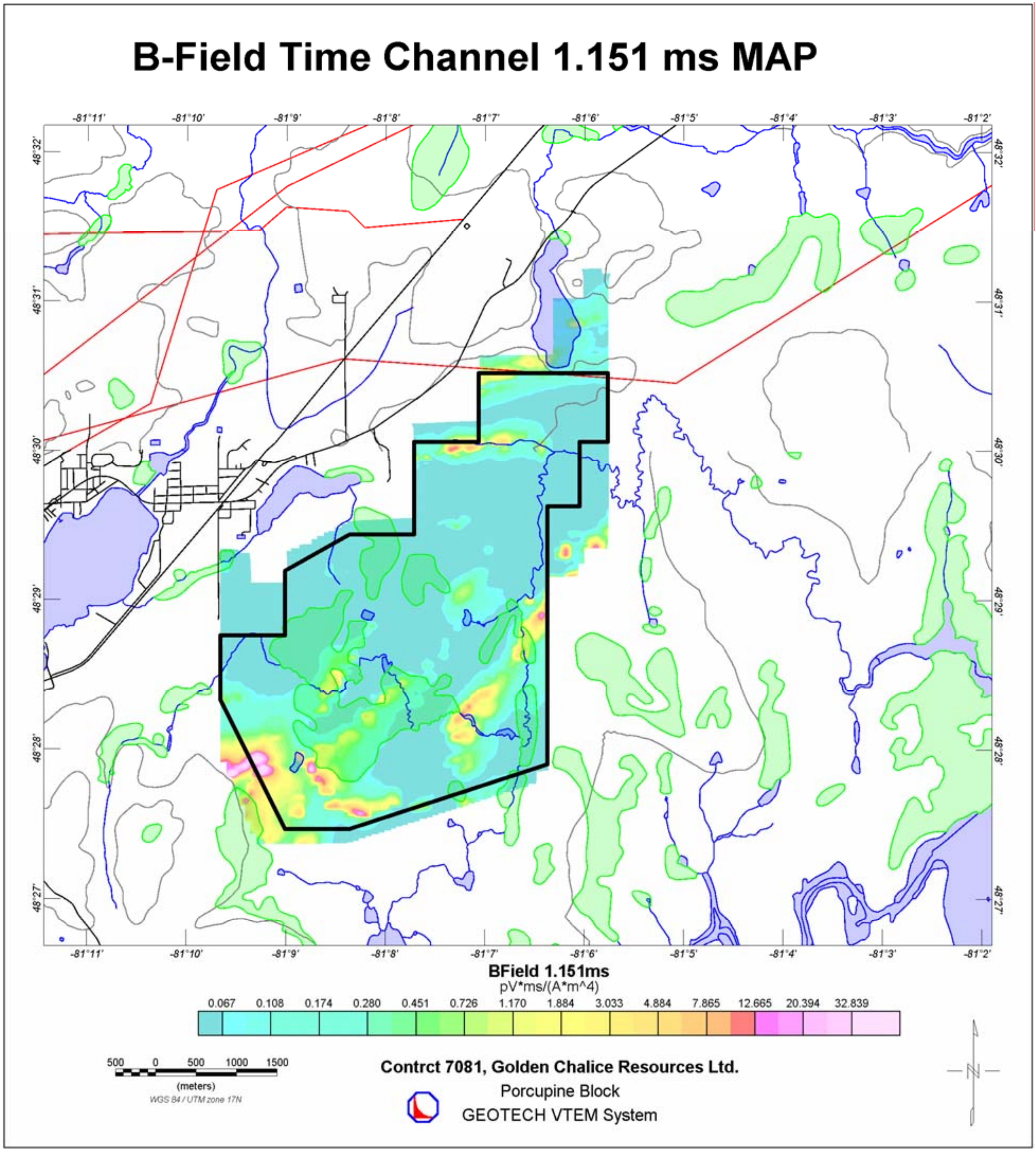
APPENDIX D

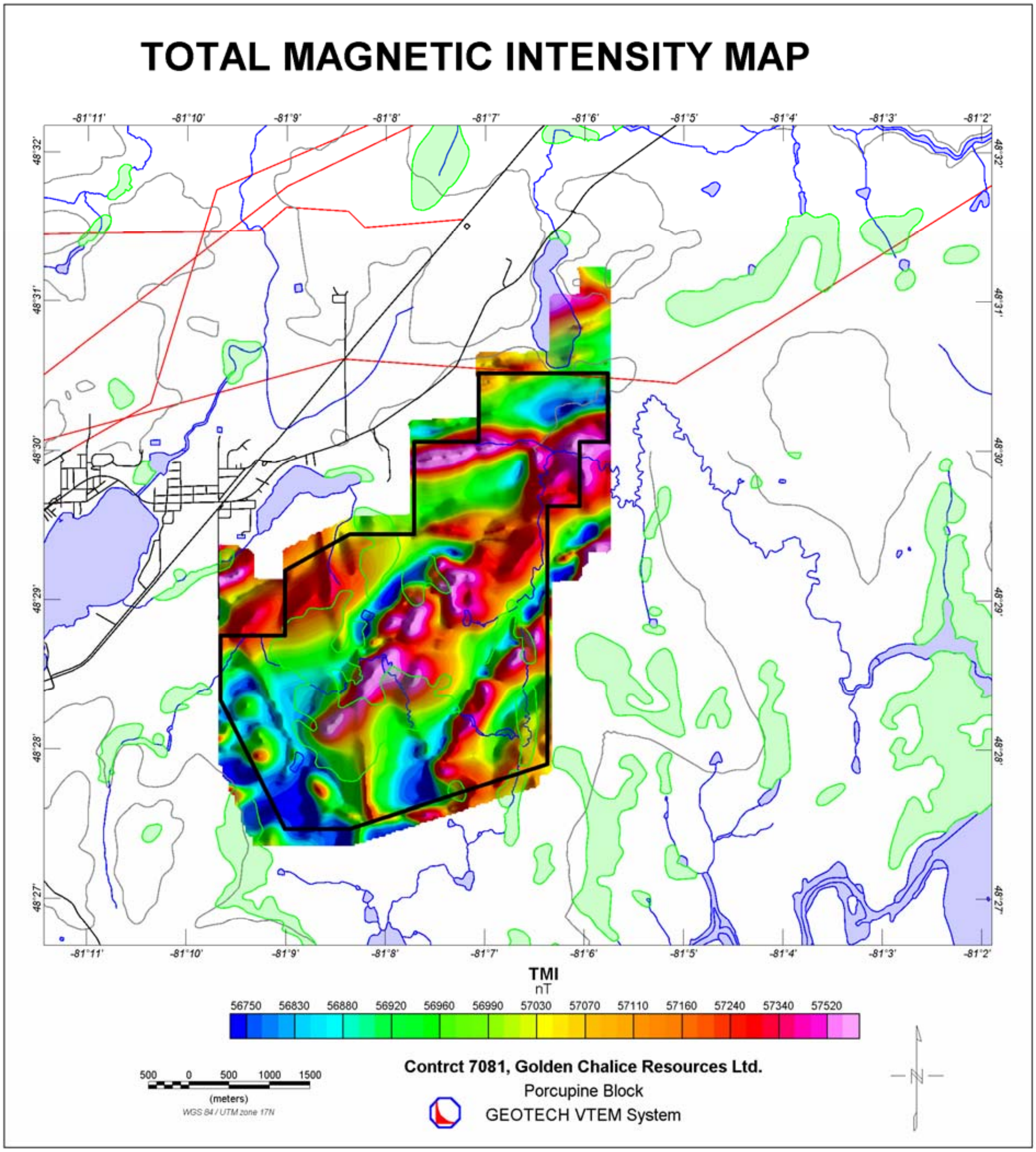
VTEM WAVE FORM



APPENDIX E

GEOPHYSICAL MAPS


B-Field Time Channel 1.151 ms MAP
BField 1.151ms
pV*ms/(A*m^4)
0.067
0.108
0.174
0.280
0.451
0.726
1.170
1.884
3.033
4.884
7.865
12.665
20.394
32.839
500 0 500 1000 1500
(meters)
WGS 84 / UTM zone 17N
Contrct 7081, Golden Chalice Resources Ltd.
Porcupine Block
GEOTECH VTEM System


TOTAL MAGNETIC INTENSITY MAP
TMI
nT
56750 56830 56880 56920 56960 56990 57030 57070 57110 57160 57240 57340 57520
500 0 500 1000 1500
(meters)
Contrct 7081, Golden Chalice Resources Ltd.
Porcupine Block
GEOTECH VTEM System

MODELING VTEM DATA

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 meters diameter transmitter loop that produces a dipole moment up to 625,000 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 7.2 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 off-time, when only the secondary field (representing the conductive targets encountered in the ground) is present.

Late in 2006, Geotech Ltd. incorporated a B-Field measurement in the VTEM system. The B-Field measurements have the advantage of containing more spectral energy at low spectral frequencies than the dB/dt measurements; hence, greater amplitudes and accuracies when encountering targets with higher conductances (> 500 Siemens). The converse is true at higher spectral frequencies where dB/dt measurements are best applied. The B-field is most widely used in nickel exploration where a small percentage of targets are extremely conductive (> 2500 Siemens) and less resolvable or invisible (below the noise threshold) using dB/dt measurements.

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.

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 A and G at two different depths, all other parameters remaining constant. With this transmitter-receiver geometry, the classic **M** shaped response is generated. Figure A shows 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. Figure G shows 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. Figure B shows a near surface plate dipping 80º. 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. Figure E shows a plate dipping 45º and, at this angle, the minimum shoulder starts to vanish. In Figure D, 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.

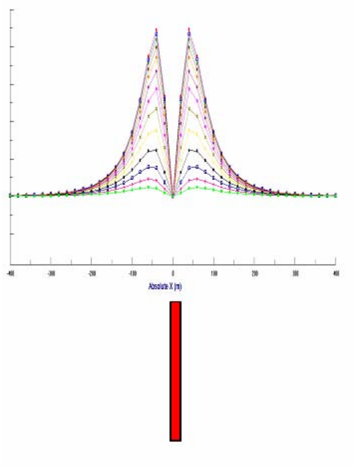
Figure H shows a special case where two plates are positioned to represent a synclinal structure. Note that the main characteristic to remember is the centre amplitudes are higher (approximately double) compared to the high shoulder of a single plate. This model is very representative of tightly folded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

Variation of Prism Depth

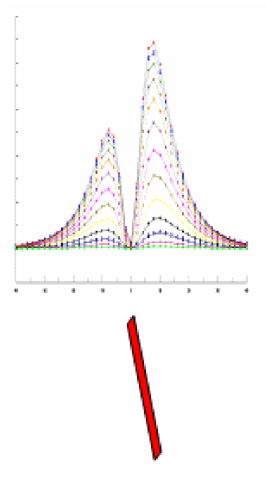
Finally, with prism models, another algorithm is required to represent current on the plate. A plate model is considered to be infinitely thin with respect to thickness and incapable of representing the current in the thickness dimension. A prism model is constructed to deal with this problem, thereby,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

Figures C, F and I show the same prism at increasing depths. Aside from an expected decrease in amplitude, the side lobes of the anomaly show a widening with deeper prism depths of the bell shaped early time channels.

A



B



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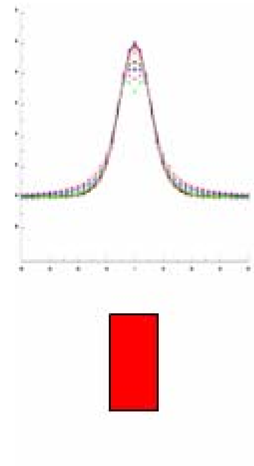
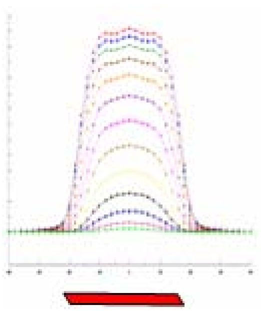
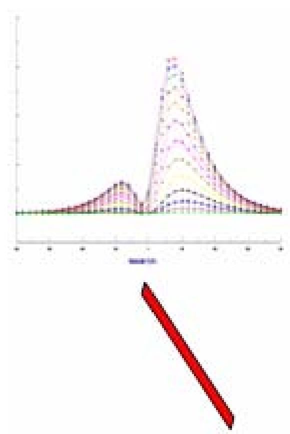


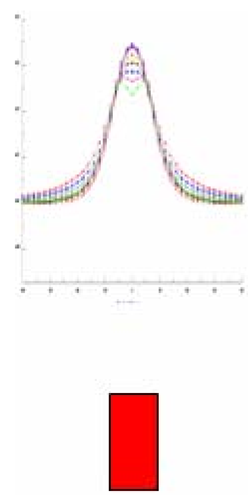
D



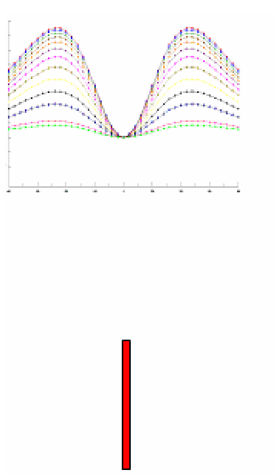
E



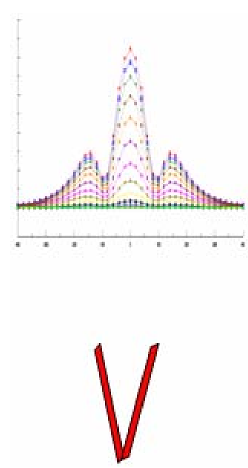
F



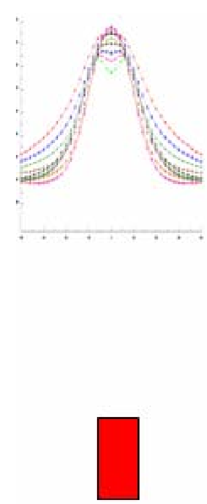
G



H



I



General Modeling Concepts

A set of models has been produced for the Geotech VTEM® system with explanation notes (see models A to I above). 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 (see model H). Only concentric loop systems can map this type of target.

The modelling program used to generate the responses was prepared by PetRos Eikon Inc. and is one of a very few that can model a wide range of targets in a conductive half space.

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 colour 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 surfacial 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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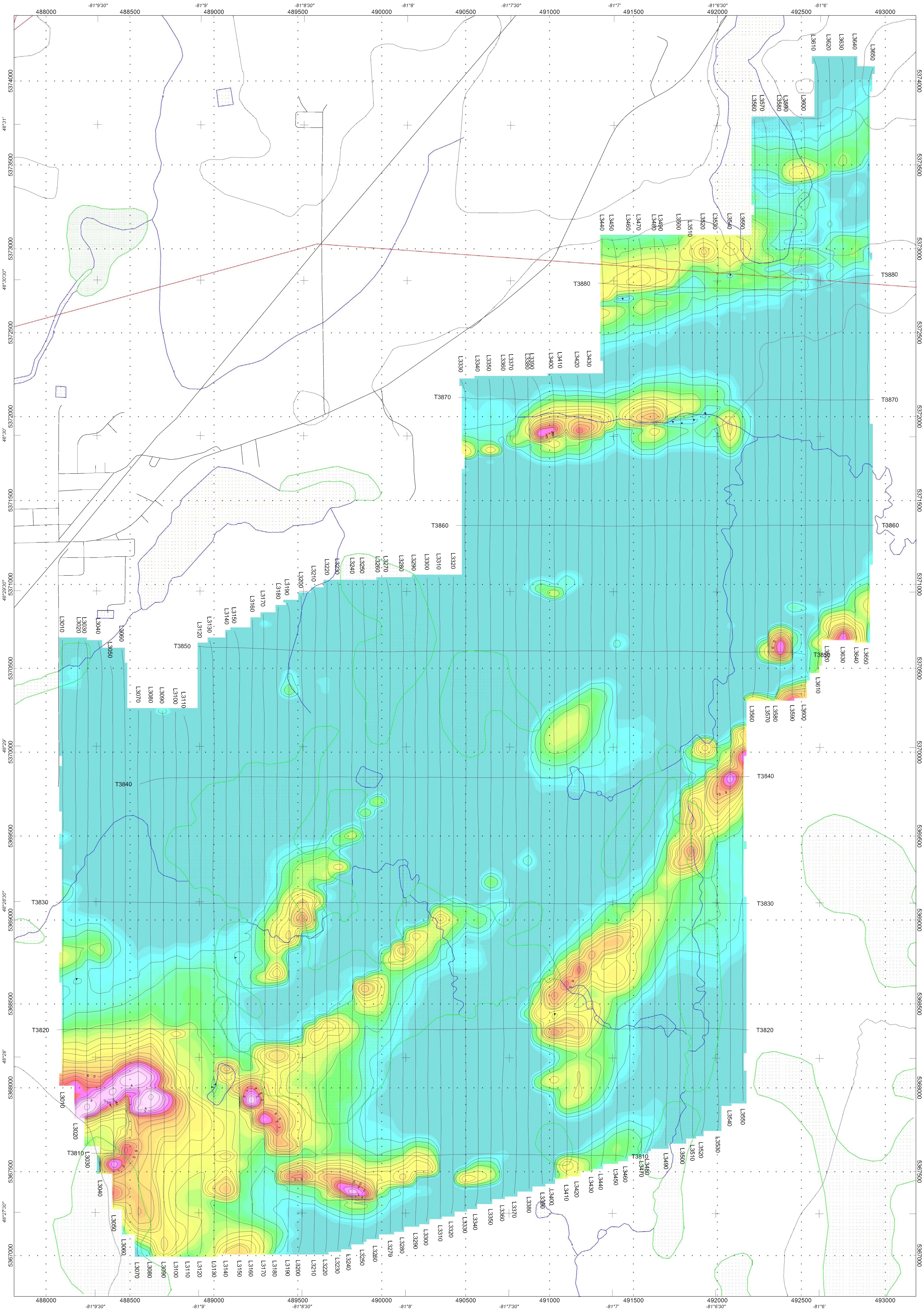


PROJECT 7081

SURVEY SPECIFICATIONS:

Survey date: Aug 10 - 11, 2007
Survey base: Timmins, Ontario
Aircraft: Astar 350-FX2 helicopter, Registration C-FXFU
Nominal Flight Line Spacing: 75 metres
Nominal Flight Line Direction: N0°E
Nominal Tie Line Spacing: 750 metres
Nominal Tie Line Direction: N90°E
Nominal helicopter terrain clearance: 75 metres
EM Loop is 40 metres under helicopter
Magnetic sensor is 15 metres under helicopter

INSTRUMENTS:

Geotech Time Domain Electromagnetic System (VTEM) with concentric Rx/Tx geometry
Transmitter Loop Diameter 26 m, Base Frequency 30 Hz
Dipole Moment: 431,000 NIA
Transmitter Wave Form: Trapezoid, Pulse Width 7.5 ms
Geometrics Optically-pumped,
High Sensitivity Cesium Magnetometer
Magnetometer Resolution 0.02 nT at 10 samples/sec

dB/dt 3.286 ms
pV/(A*m^4)

Legend:
Roads
Lakes, Rivers
Utility lines
Railways
Swamps
Topographic contours

Scale 1:10000

(meters)
WGS 84 / UTM zone 17N

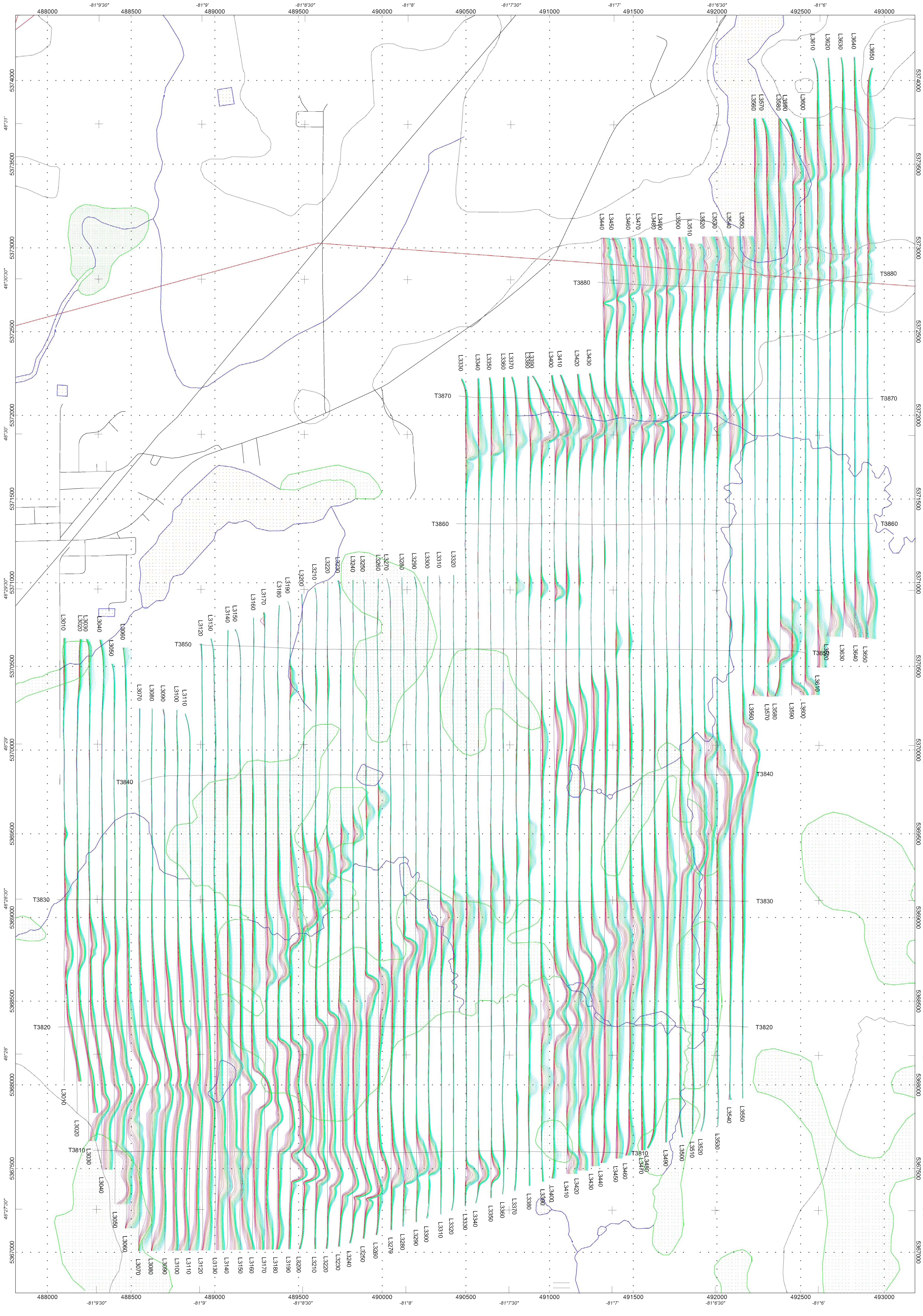
Golden Chalice Resources Ltd
South Porcupine Block
Ontario, Canada

Geotech VTEM System
dB/dt Time channel 3.286 ms

Flown and processed by Geotech Ltd.
30 Industrial Parkway South,
Aurora, Ontario, Canada L4G 3W2
www.geotechairborne.com

August 2007

project 7081



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Profiles scale 1 mm = 0.1 (pV*ms)/(A*m^4)
(Linear between +/-0.4 (pV*ms)/(A*m^4)
logarithmic above 0.4 (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)

Legend:

Roads
Lakes, Rivers
Utility lines
Railways
Swamps
Topographic contours

Scale 1:10000

100 0 100 200 300 400 500
(meters)
WGS 84 / UTM zone 17N

Golden Chalice Resources Ltd
South Porcupine Block
Ontario, Canada

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B-Field Profiles
Time Channels 0.234 - 6.578 ms

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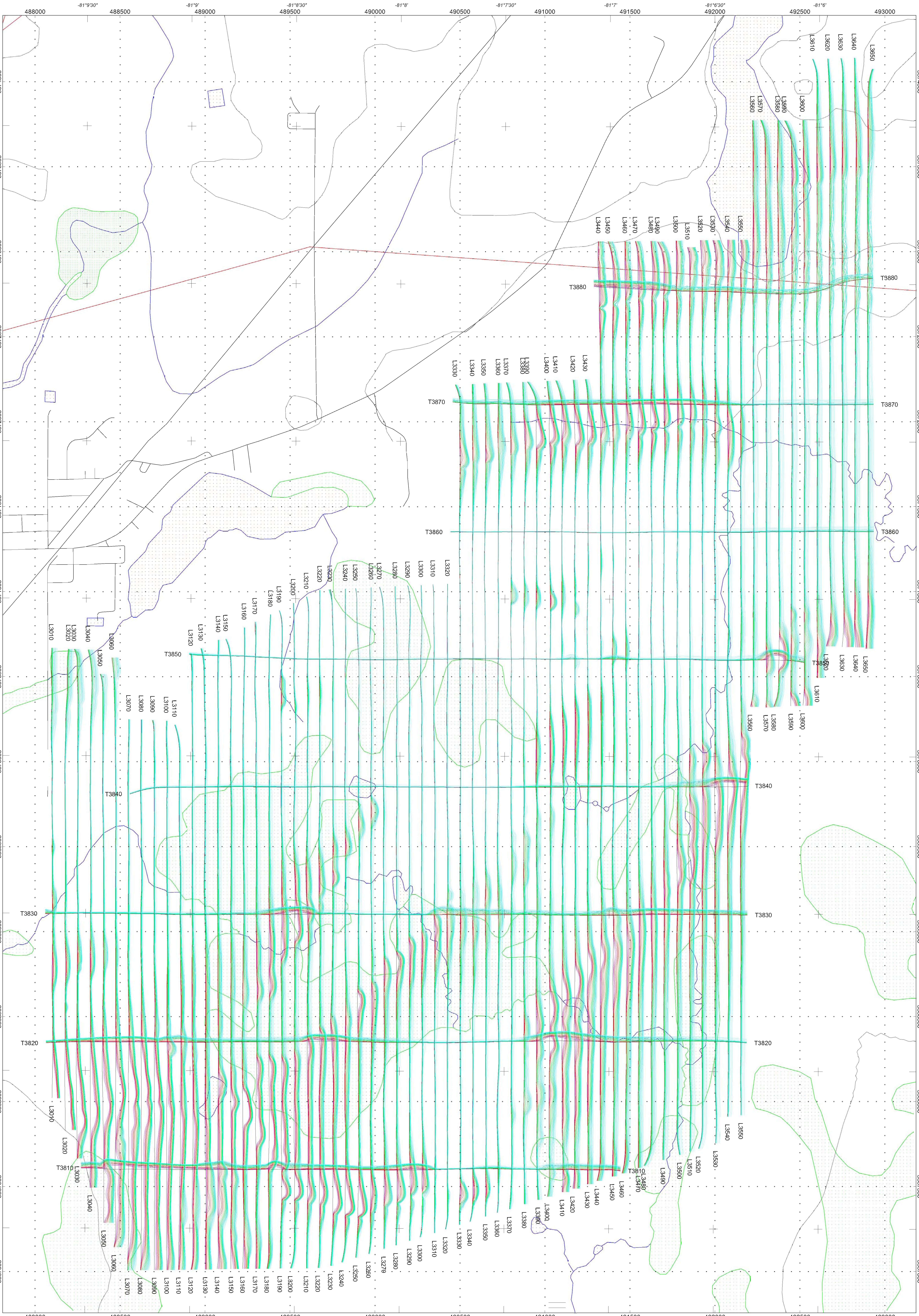

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6.578 ms

Legend:

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Lakes, Rivers
Utility lines
Railways
Swamps
Topographic contours

Scale 1:10000

100 0 100 200 300 400 500

(meters)

WGS 84 / UTM zone 17N

Golden Chalice Resources Ltd
South Porcupine Block
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Geotech VTEM System
dB/dT Profiles
Time Channels 0.234 - 6.578 ms

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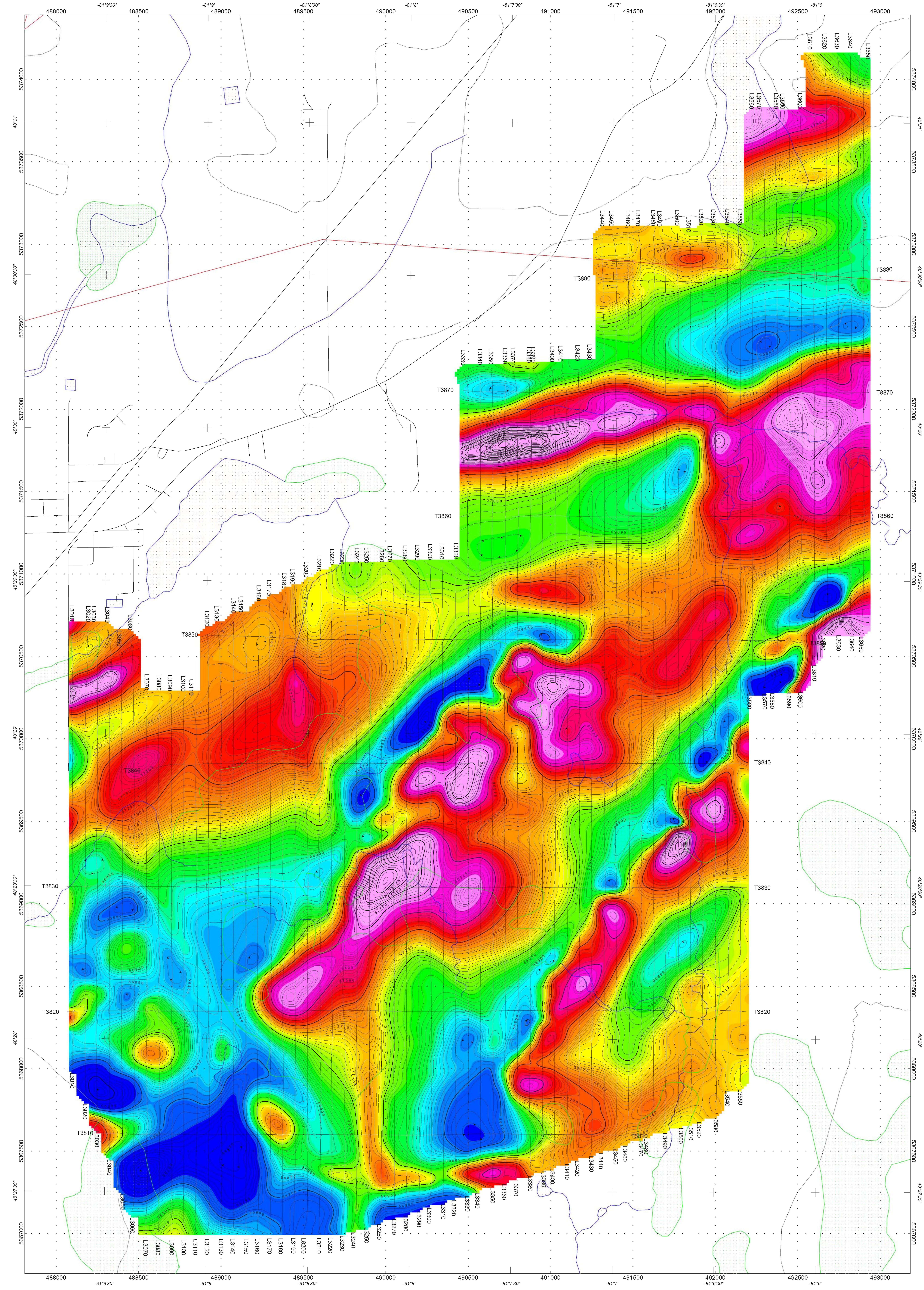

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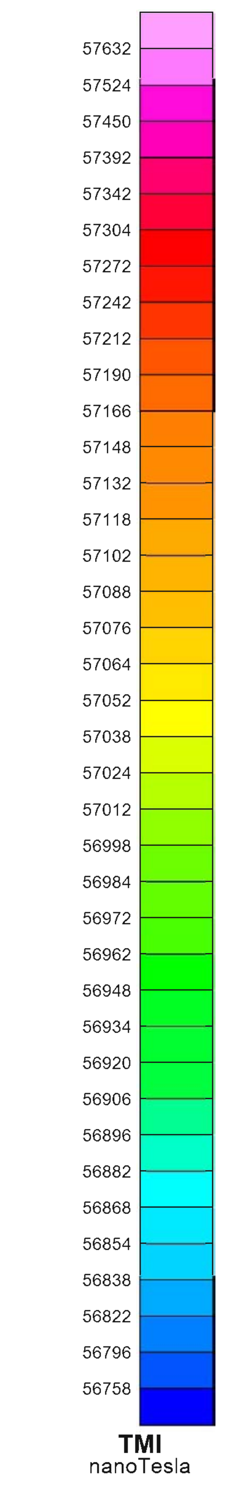

contour intervals:
10 nT
50 nT
200 nT

Legend:
Roads
Lakes, Rivers
Utility lines
Railways
Swamps
Topographic contours

Scale 1:10000
100 0 100 200 300 400 500
(meters)
WGS 84 / UTM zone 17N

Golden Chalice Resources Ltd
South Porcupine Block
Ontario, Canada

Geotech VTEM System
Total Magnetic Intensity Map

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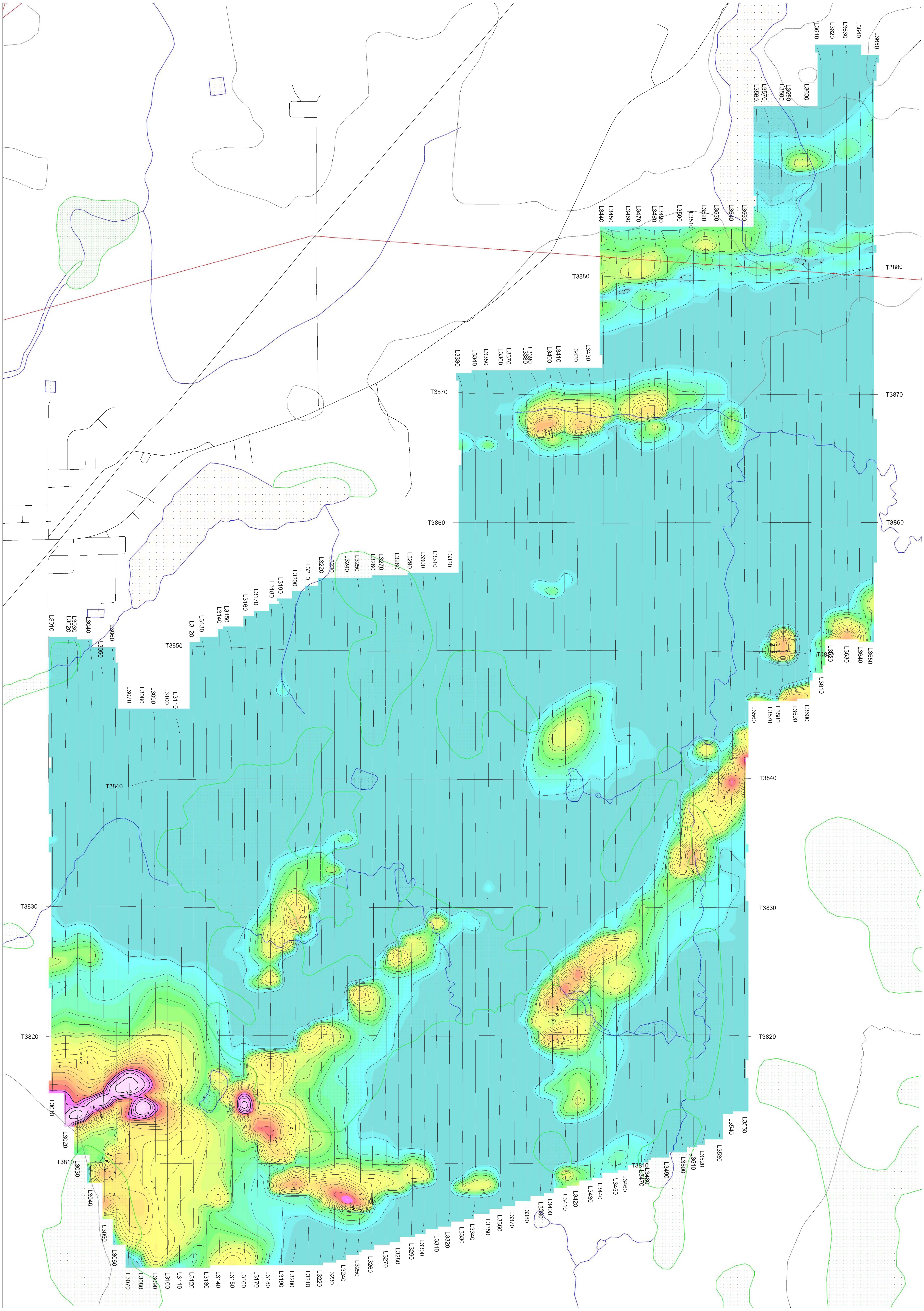

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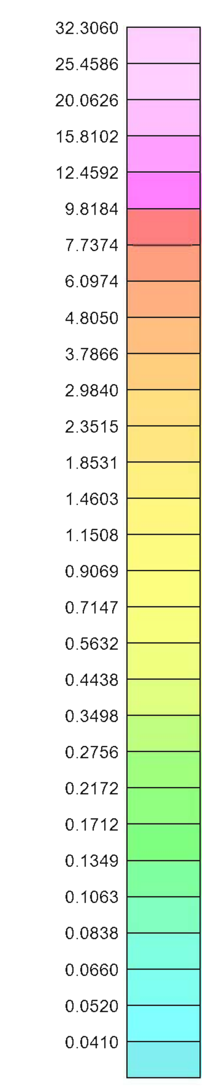

B-FIELD 3.286 ms
(pV*ms)/(A*m^4)

Legend:

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Topographic contours

Scale 1:10000

100 0 100 200 300 400 500
(meters)
WGS 84 / UTM zone 17N

Golden Chalice Resources Ltd
South Porcupine Block
Ontario, Canada

Geotech VTEM System
B-FIELD Time channel 3.286 ms

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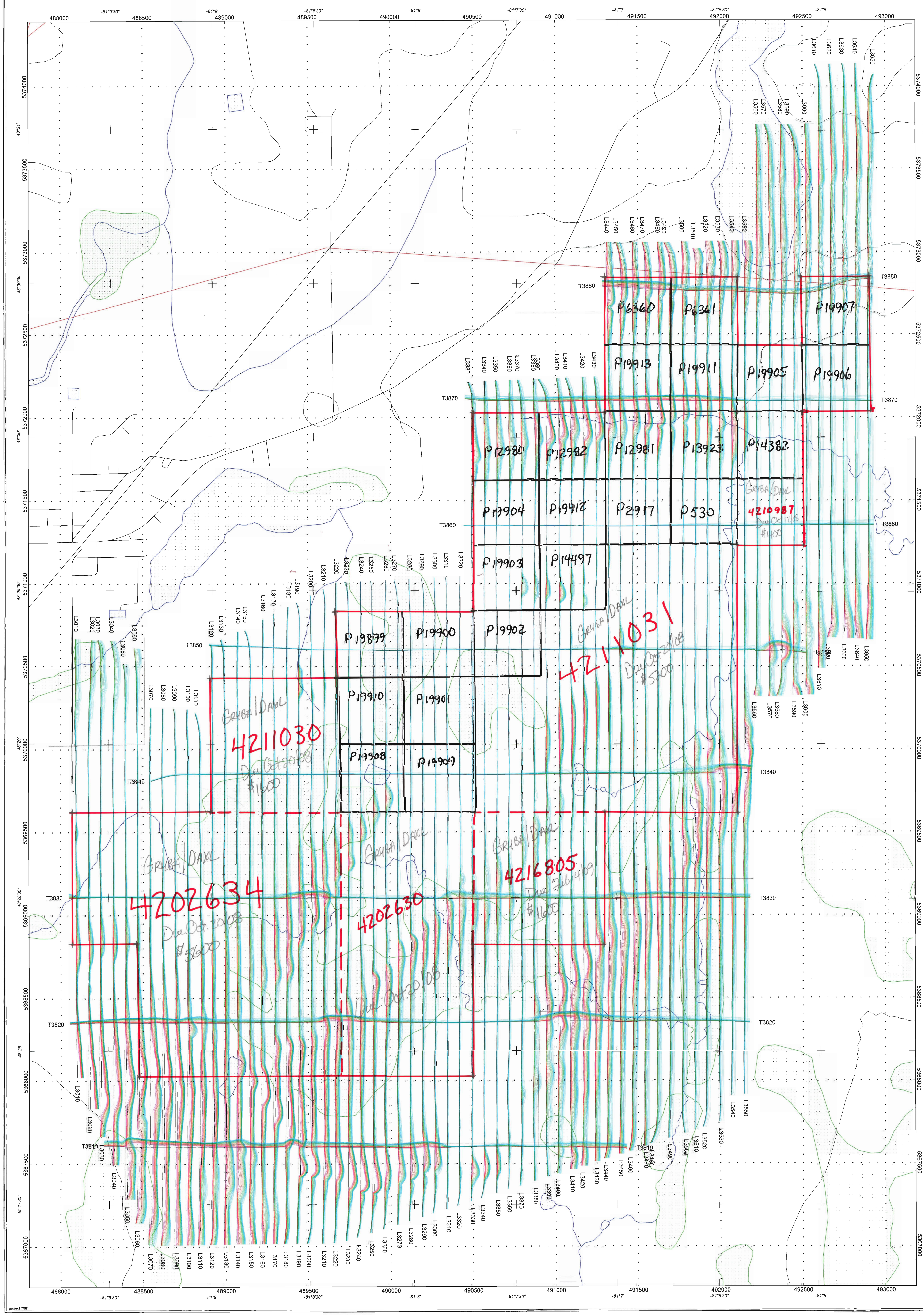

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Legend:

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(meters)
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