2018 ASSESSMENT REPORT

Airborne VTEM and Magnetic Survey, McCleery Property
Overland Resources (BC) Ltd.
NTS Sheets: 105B05, 105C08

MM 1-42 (YD81304 – YD81345)
MM 43-92 (YD81351 – YD81400)
MM 93-146 (YD81451 – YD81502)
MM 147-184 (YD81258 – YD81296)

60º 18’ 49.1” N, 132º 0’ 48.5” W
(UTM coordinates: 664970, 6690075, Zone 8)

Mayo Mining District

NTS Sheets: 105B05, 105C08

WORK PERFORMED:
August 23 – September 5, 2018

prepared for:
Overland Resources (BC) Ltd.

report prepared by:
Aurora Geosciences Ltd.

AURORA GEOSCIENCES

ASSESSMENT REPORT

Airborne VTEM and Magnetic Survey, McCleery Property

McCLEERY PROJECT
YUKON, CANADA

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1 SUMMARY

From August 23 to September 5, 2018, Overland Resources (BC) Ltd. (Overland) retained Aurora Geosciences Ltd. (Aurora) of Whitehorse, Yukon, to manage a combined airborne Versatile Time Domain Electromagnetic (VTEM^{EM}) and magnetometer survey across the MM 1 – 184 claims comprising the McCleery property. Aurora contracted Geotech Ltd. from Aurora, Ontario, to conduct the survey.

The property is located in the Watson Lake Mining District, roughly 42 km ENE of the Village of Teslin and 173 km east of the City of Whitehorse, Yukon. Access is by helicopter from Teslin. The claims cover very rugged terrain comprising part of the Englishmans Range, as well as more moderate terrain to the southwest. The property has a subarctic climate modified by its alpine to subalpine setting, with moderate precipitation. Teslin has average July high temperatures of 20.2^{o}C and January low temperatures of -21.5˚C, and annual precipitation of 346.3 mm, comprising 209.5 mm of rain and 148.4 mm of snow.

Exploration commenced in 1974 with the staking of the SURETHING and JACKALOO claims which underwent geological mapping, rock sampling and soil geochemical sampling in 1975. In 1982 and 1983, J.C. Stephen staked the FF claim block covering present northern property areas, and the CAL block covering north-central areas. Stephen followed up with soil and rock geochemical sampling and geological mapping, leading to the identification of a tin-tungsten target in the FF block. Subsequent drilling in 1984 returned low tin and tungsten values.

In 1997, Fairfield Minerals Ltd. (Fairfield) staked the CC claim block currently covered by the southwestern MM 137-184 sub-block. Fairfield conducted grid soil sampling, geological mapping, limited trenching and rock sampling. This work identified two targets, the Discovery and Claim Post showings, having potential for volcanogenic massive sulphide (VMS) style mineralization. Brett Resources visited the property in 1999, confirming the settings are viable for VMS-style mineralization.

The McCleery property is located within the Yukon-Tanana Terrane (YTT), comprising part of the Intermontane Superterrane, accreted on to the Ancient North American Continent northeast of the Tintina Fault Zone. In the property area, the YTT is marked by Neoproterozoic to Devonian Snowcap Assemblage metaclastics and metacherts, Devono-Mississippian Finlayson Assemblage mafic to felsic volcanic rocks, and Mississippian to Permian-aged Klinkit Assemblage limestone and dolostone, and mafic to intermediate metavolcanics rocks. The Upper Paleozoic rocks have been intruded by the Late Cretaceous-aged Hake Batholith comprised of granite to quartz monzonite. The property itself covers the southwestern part of the Hake Batholith, in contact with Klinkit Assemblage limestone, in turn in contact with Snowcap Assemblage metasediments. A cobalt occurrence, as well as several copper-silver-gold skarn occurrences, are hosted mainly by the limestone package. The southwestern property area, hosting the Discovery and Claim Post showings, is underlain by Finlayson Assemblage metavolcanics.

The airborne "VTEM^{TM}" electromagnetic survey revealed two significant conductive anomalies; one covered by the MM 120 and MM 127 claims, and the other in the northwest corner of the MM 137-184 block. The late time gate signatures indicate these are likely to have relatively deep-seated, bedrock-hosted sources. Magnetometer surveying revealed a strong linear high feature extending NNW from the VTEM^{TM} anomaly at the MM 120 and 127 claims, likely marking the Snowcap Assemblage metaclastics directly west of the limestone package. The VTEM anomaly likely extends farther SSE from the south boundary of the claim block and surveyed area. Magnetometer surveying also indicates the boundary of

the Hake Batholith in northeastern property areas, as well as an anomalous “high” feature along the north property boundary.

Further exploration should comprise staking of additional ground SSE of the conductive anomaly covered by the MM 120 and 27 claims. Follow-up work comprising grid soil geochemical sampling, geological mapping, rock sampling, and ground magnetic and VLF-EM surveying should be completed over the anomaly and its projected extension. This work should be undertaken from a helicopter-supported camp on the MM 120 claim. This phase of work would be followed by a second camp within the MM 1-42 sub-block to the northeast, focusing on reconnaissance-style soil sampling, geological mapping and rock sampling. A satellite camp, located on the western conductive anomaly, would focus on grid soil sampling and magnetic-VLF-EM surveying, geological mapping and rock sampling. The program would be carried out using a total of six personnel for about three weeks at some point between June 21 and Sept 1. Projected all-in costs, including contingency, stand at about CDN$224,000.

2 INTRODUCTION

This report describes the 2018 airborne "VTEM™" electromagnetic and magnetic survey conducted by Geotech Ltd. across the McCleery property, 100% held by Overland Resources (BC) Ltd. (Overland). The primary commodity sought is cobalt (Co), along with copper (Cu), lead (Pb), zinc (Zn), silver (Ag) and gold (Au). The airborne survey, which took place from August 23 to September 5, 2018, was managed by Aurora Geosciences Ltd. of Whitehorse, Yukon, for Overland, the operator of the McCleery project. The survey was conducted across the entire 184-claim property, extending slightly beyond property boundaries.

2.1 Terms of Reference

Overland Resources (BC) Ltd. engaged Aurora Geosciences Ltd. to complete an assessment report on the MM 1-184 claims comprising the McCleery property, located in south-central Yukon. The assessment report will satisfy requirements of the Yukon Mining Recorder of the Department of Energy, Mines and Resources, Government of Yukon, to hold the claims in good standing.

2.2 Terms, Definitions and Units

All geographic locations in this report are relative to North American Datum 1983. Angles are expressed relative to true north unless otherwise stated. Non-geodetic coordinates are expressed in Universal Transverse Mercator Zone 09N metric coordinates. All measurements are expressed in the metric system unless they are measurements quoted from historic reports expressed in other units of measure. All metric units conform to the SI system using standard abbreviations codified in the United States National Institute of Standards and Technology (NIST) publication NIST SP 330[1]. "VTEM™" is the abbreviation for the "Versatile Time Domain Electromagnetic" system, proprietary to Geotech Ltd. Other abbreviations are defined at point of first use.

3 PROPERTY DESCRIPTION AND LOCATION

The MM 1-184 claims, comprising the McCleery property, are a contiguous block located in south-central Yukon, and centered at 60° 18' 49.1" N, 132° 0' 48.5" W (UTM coordinates: 664970, 6690075, Zone 8) (Figures 1 and 2). The claims comprise approximately 3,842 Ha (9,490 acres), covering the central portion of the Englishman's Range. The property is located in the Watson Lake Mining District, roughly 42 km ENE of the Village of Teslin and about 173 km ESE of the City of Whitehorse, in southwestern Yukon. A claim tenure table is shown in Appendix 3.

The property is 100% owned by Overland Resources (BC) Ltd. and is located within the traditional territory of the Teslin Tlinkit First Nation (TTFN) which has a settled land claim with the Yukon government. There are no significant environmental liabilities on the property. There are no royalties, back-in clauses or other encumbrances on the McCleery property. The author is not aware of any other significant factors or risks potentially affecting access, title, or the right or ability to perform exploration on the property.

4 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

The McCleery property covers the central pat of the Englishmans Range, a NNW-trending mountain range characterized by rugged terrain ranging from 1,360 to 1,940 metres (4,460 to 6,365 feet). The southwest part of the property covers more moderate terrain ranging in elevation from 1,100 to 1,460 metres (3,610 to 4,790 feet). Access to the property is by helicopter from Teslin.

The area has a sub-arctic climate also influenced by the effects of higher elevation. Average January high and low temperatures are -12.6°C and -21.5°C respectively, and average July high and low temperatures are 20.2°C and 7.9°C respectively. Total annual precipitation averages 346.3 mm (13.63 in), comprising 209.5 mm (8.25 in.) of rain and 148.4 mm (5.84 in.) of snow (Wikipedia, 2019). Average temperatures are lower and precipitation is higher on the property, varying with elevation. Water is fairly abundant, provided by several small tarns and streams large enough to supply adequate water for diamond drilling. Alpine vegetation covers areas above about 1,500 metres; thick forests of subalpine fir occur below this level and gradually grade downslope to mixed spruce and fir forest with abundant shrub vegetation.

There is no infrastructure near the property. Teslin, population 260, including the Teslin Tlingit community (Wikipedia, 2019), is located along the Alaska Highway and provides basic grocery, hardware services and good accommodation and retail fuel services. A serviced airport, directly west of the village, also serves as a helicopter base. Whitehorse, with a population of 25,085 (Wikipedia, 2016) within city limits and roughly 30,000 including neighbouring communities, is the capital city of Yukon and a major service centre with an available skilled workforce. The city has full grocery, hardware and bulk and retail fuel services, excellent accommodations, and a well developed professional and trade service sector. Whitehorse also has a major airport, capable of servicing large commercial jet aircraft.

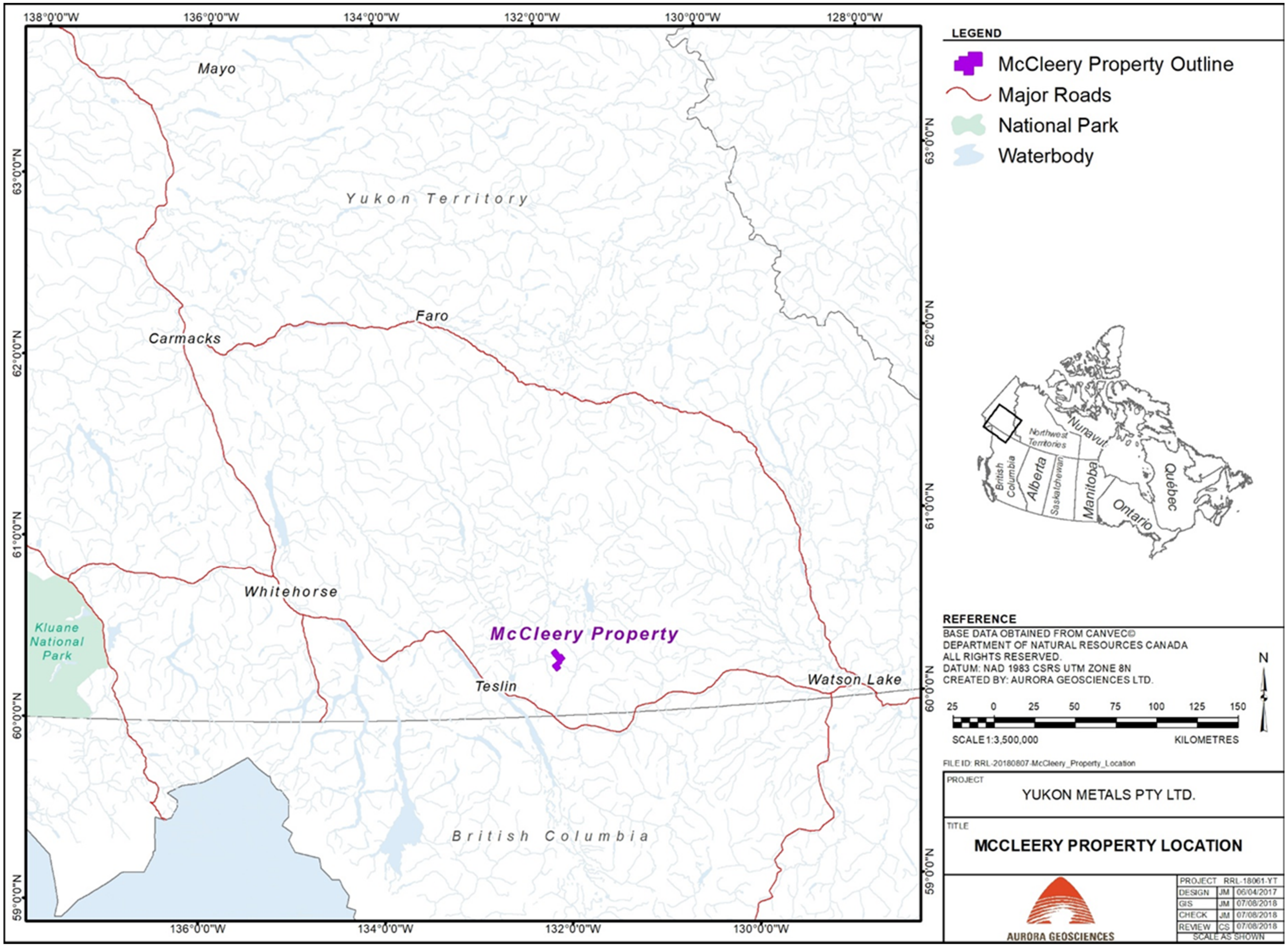

Figure 1: Project Location Map

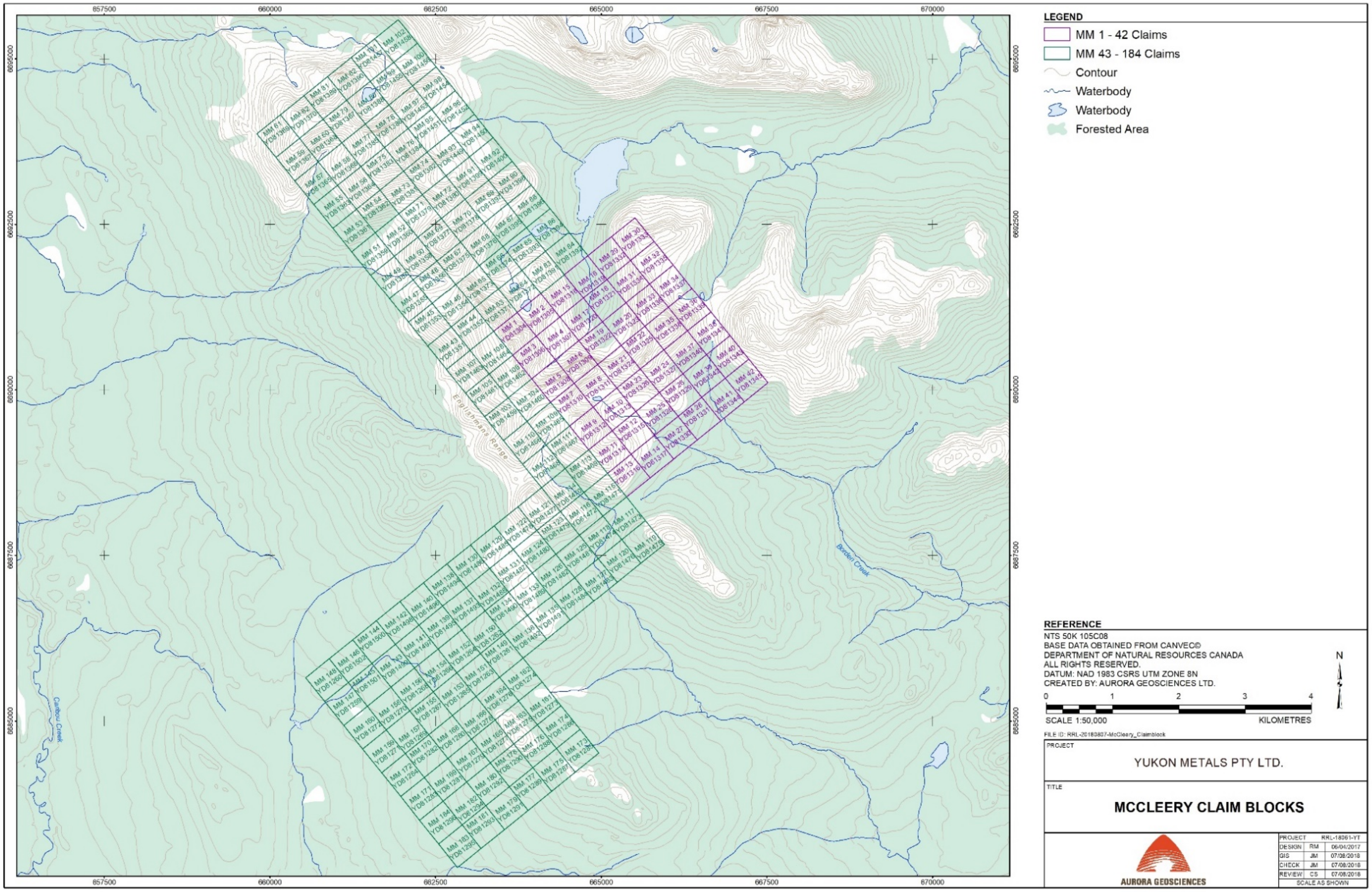

Figure 2: Claim Map, McCleery property (as of July 31, 2018)

5 EXPLORATION HISTORY

The Mount McCleery area was first staked in 1974 as the SURETHING 1-3 and JACKALOO 1-8 claims by R.J. Fleming. The claims covered the present north-central property area. In 1975, Fleming optioned the claims to United Keno E (United Keno Hill ML & Falconbridge Nickel ML) (Yukon Minfile, 2019). Later that year United Keno E conducted geological mapping and a 1,029-unit soil sampling program for copper (Cu), with some samples also analyzed for molybdenum (Mo), returning three areas of anomalous Cu values. No further work was recommended and the claims were allowed to lapse.

The present northern property area was staked as the FF 1-44 claims in August, 1982 by J.C. Stephen and funded by the DC Syndicate. Later that year, J.C. Stephen conducted rock geochemical sampling and detailed geological mapping across several known skarn occurrences, returning values to 0.216% tin (Sn), 0.097% tungsten (W) with slightly elevated gold (Au) values. J.C. Stephen recommended an extensive picket line grid across much of the FF property (Stephen and Webster, 1982).

Also, in 1982, J.C. Stephen staked the CAL 3-26 claims south of the FF claims, and followed up with detailed geological mapping, rock sampling and "talus" soil sampling in August of that year. Rock sampling returned values to 15.6% Cu, 13.5 g/t silver (Ag) and 0.01 oz/ton Au, with "significant cobalt values". The talus soil samples were never analyzed (Stephen, 1982).

In 1983, Stephen returned to the FF property and conducted a surface magnetometer survey and rock geochemical sampling of several skarn occurrences. Rock sampling returned values to 1.750 g/t Au with 2,100 ppm (0.21%) Cu. Stephen recommended a 445-metre diamond drilling program in 3 holes (Stephen, 1983). In 1984, Stephen followed up with diamond drilling totaling 924 feet (281.6m) in two holes testing for tin (Sn) and tungsten (W) mineralization towards the northern boundary of the present MM 43-102 sub-block. The best values returned from drilling were 0.36% Sn across 1.1m, and 0.08% Sn across 0.6m (Stephen, 1984).

In 1997, Fairfield Minerals Ltd. staked the CC 1-44 claims covering the southwestern part of the present MM claim block. Fairfield followed up with an 85-line km airborne electromagnetic (EM) and magnetic survey across the CC 1-30 claims, as well as a grid-controlled geological mapping, rock sampling, prospecting and grid soil geochemical program. The airborne survey identified several weak EM and magnetic trends parallel to stratigraphy. Soil sampling identified a "band" of coincident anomalous Cu, Pb, Zn and Ag values in the central and western part of the CC claim block (Ritcey and Balon, 1997).

In 1998, Fairfield followed up with a grid soil geochemical program of 1,069 samples, identifying coincident anomalous Cu, Pb and Zn values extending northwest from the "Discovery Showing", as well as high gold soil geochemical values at the "claim post showing" to the north. Blast trenching was done at both showings, returning anomalous gold values to 338 ppb from the Claim Post showing (Jakubowski and Balon, 1998).

In April 1999, Brett Resources Inc. optioned the CC 7-54 claims from Fairfield Minerals and conducted a brief program of geological mapping and limited rock sampling. Although rock sampling failed to produce significant values, geological and geochemical interpretation suggested the stratigraphic setting is appropriate to host volcanogenic massive sulphide (VMS) style of mineralization (Bradshaw, 1999).

No further exploration is known to have occurred from 1999 until the MM 1-42 claims were staked by Overland in March, 2017. In July 2018, Overland added the MM 43-184 claims, extending the claim block to the north and southwest.

Table 1 below summarizes the exploration history of the Mount McCleery area.

Table 1: Exploration history, Mt. McCleery area

Years	Operator	Work Performed
1975	United Keno E (United Keno Hill ML & Falconbridge Nickel ML)	SURETHING and JACKALOO claims: Geological mapping, rock and grid soil sampling: 1,029 soil samples.
1982 to 1983	J.C. Stephen (DC Syndicate)	FF block: Rock sampling and geological mapping, surface magnetometer surveying. CAL block: “Talus soil” sampling, rock sampling and geological mapping.
1984	J.C. Stephen (DC Syndicate)	FF block: diamond drilling program of 281.6 metres in 2 holes.
1997	Fairfield Minerals Ltd.	CC claims: 85 line-km airborne magnetometer and EM survey: geological mapping, rock sampling, grid soil sampling.
1998	Fairfield Minerals Ltd.	CC claims: Trenching, grid soil sampling (1,069 samples), geological mapping and rock sampling.
1999	Brett Resources Inc.	Limited geological mapping and rock sampling
2017	Overland Resources (BC) Ltd.	Staked MM 1-42 claims
2018	Overland Resources (BC) Ltd.	Staked MM 43-184 claims, flew airborne magnetometer and “VTEM” survey.

6 REGIONAL GEOLOGY

The McCleery property is located within the Yukon-Tanana Terrane (YTT), comprising part of the Intermontane Superterrane, which in turn comprises several accreted terranes abutting the southwest margin of the Ancient North American Platform. The Tintina Fault Zone, a major regional-scale NW-SE trending structure, forms the boundary between continental margin and accreted terranes. Stratigraphy throughout the accreted terranes trends northwest-southeast. The YTT is the most aerially extensive of the accreted terranes, and comprises meta-igneous and meta-sedimentary rock ranging in age from Neoproterozoic to early Tertiary, although the majority are Paleozoic rocks. Further east, the Intermontane superterrane includes Slide Mountain Terrane oceanic assemblage sedimentary and volcanic rocks (Colpron et al, 2016).

In the property area, the YTT is marked by Devono-Mississippian Finlayson Assemblage mafic to felsic volcanic rocks having arc and back-arc affinities, and Mississippian to Permian-aged Klinkit Assemblage mafic to intermediate volcanic rocks, intercalated with limestone, dolostone and chert (Yukon Geological Survey, Mineral Occurrence website, 2019). The Upper Paleozoic rocks have been intruded by the Late Cretaceous-aged Hake Batholith, which is coeval with the Seagull Batholith, comprised of granite to quartz monzonite. To the west, the Klinkit and Finlayson assemblages lie in south-dipping thrust-fault contact with Ediacaran (Neoproterozoic) to Devonian Snowcap Assemblage metasediments and minor metavolcanics intruded by Devono-Mississippian-aged metaplutonic rocks (Figure 4).

Table 2: Regional Stratigraphy, Mt. McCleery area (after Colpron et al, 2016)

Rock Unit [Age]	Name	Description
Late Cretaceous (103-94 Ma)	Hake Batholith	Granite, granodiorite, quartz monzonite
Mississippian- Permian (340 – 300 Ma)	Klinkit assemblage	Limestone, dolostone, chert, minor metavolcanics
Mississippian- Permian (340 – 300 Ma)	Klinkit assemblage	Mafic to intermediate metavolcanic and metavolcaniclastic rocks, minor felsic metavolcaniclastics
Devono-Mississippian (365 – 345 Ma)	Finlayson Assemblage	Mafic to felsic metavolcanics rocks, arc and back-arc affinities.
Paleozoic – Devonian (635 – 375 Ma)	Snowcap Assemblage	Metasediments, mainly siliciclastics, including quartzite, pelites, psammites and marble.

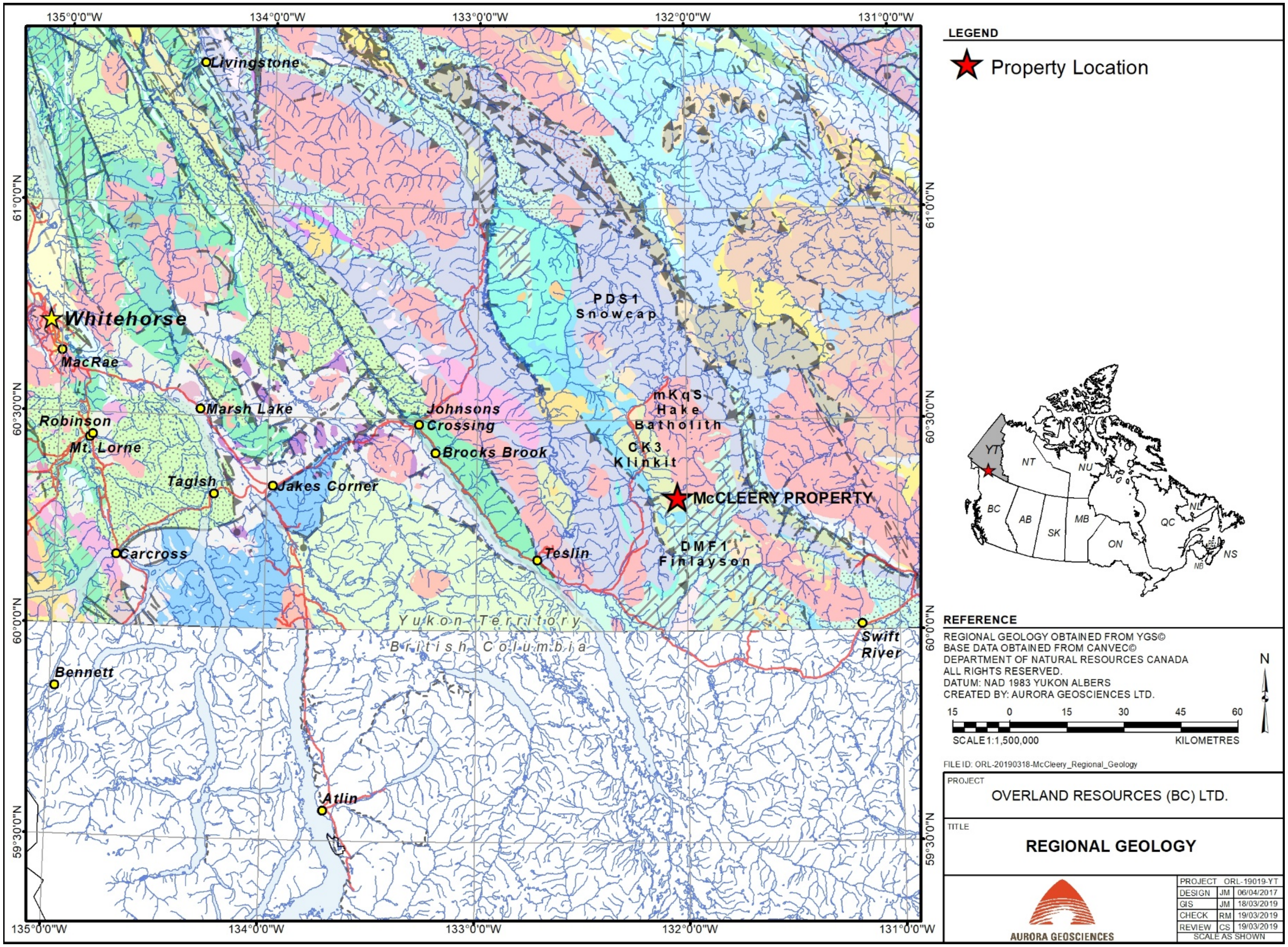

Figure 3: Regional geology of the Mt. McCleery area.

Figure 4: Legend for Regional Geology

7 PROPERTY GEOLOGY

This section describes the local geological setting of the Mount McCleery area based upon regional geological compilation by Colpron et al, and from assessment reports filed by J.C. Stephen (1982 and 1983) and Bradshaw (1999). The property did not undergo surface exploration in 2017 or 2018.

The MM 1-42 claims cover a unit of Klinkit Assemblage limestone occurring along the southern margin of the Hake Batholith (Figure 5). The western margin of the carbonate unit lies in NW-SE trending contact with Snowcap Assemblage metasedimentary rocks (Stephen, 1982). The eastern and southern boundaries lie in contact with Finlayson Assemblage mafic volcanic rocks. A copper-silver bearing skarn showing, with values up to 15.6% Cu and 461 g/t Ag from rock grab sampling, occurs toward the west boundary of the limestone unit. A single sample was analyzed for cobalt (Co), returning a value of 0.76% Co. Several copper-silver bearing skarn occurrences were also located somewhat northwest of the limestone unit.

The MM 43-102 claims cover the former FF and CAL claims held by J.C. Stephen. The western portion of the former FF block area is underlain by an intercalated sequence of quartzites, argillaceous quartzites and chert-pebble conglomerate, suggesting these are Snowcap assemblage sediments. Towards the northern boundary, a unit of andesitic volcanic tuffs and breccia likely belonging to the Klinkit Assemblage was mapped between the Hake Batholith to the east and clastic sediments to the west. A sample of skarn mineralization returning 1.750 g/t Au was obtained from mafic volcanic rocks near the Hake Batholith. Minor Sn-W skarn occurrences, including the target drilled in 1984, were identified within limestone to the northwest (Stephen, 1983).

The former CAL block to the south covers areas now overlain by the MM 1-42 and MM 103-112 claims. The CAL block covered the eastern margin of the Hake Batholith in western contact with a fairly thin unit of Klinkit Assemblage limestone, in turn lying in NNW-SSE contact with Snowcap Assemblage siliceous argillite and quartzite. The sample returning 0.76% Co was taken from a narrow limestone unit intercalated with volcanic rocks, slightly east of the limestone-siliciclastic contact (Stephen, 1982).

The former CC claims are currently covered by the MM 138-184 sub-block. Bradshaw (1999) mapped the CC claims as underlain primarily by mafic to intermediate metavolcanic tuff, with a lower greenschist metamorphic grade. The Discovery and Claim Post showings occur within the mafic metavolcanics package. Metavolcanic rocks display a strong northwest-striking, gently northeast-dipping penetrative foliation (Bradshaw) which roughly parallels regional stratigraphy. This unit is locally overlain to the east by a light green to grey, intermediate to felsic crystal tuff, distinguished by its higher silica content (Bradshaw). These correlate with Finlayson Assemblage mafic to felsic metavolcanics identified by Colpron et al. The east boundary of the felsic unit is bounded by a dark grey to white, thinly bedded limestone and highly carbonaceous towards it base. To the northeast, there is a unit of limonitic greenish-grey aphanitic metasediments, interpreted as a possible meta-chert (Bradshaw, 1999) and likely belonging to the Snowcap assemblage.

Rock units

The following rock units are present on the property:

Table 3: Property-scale rock units, McCleery area (after Stephen, 1982, 1983; Bradshaw, 1999)

Rock Unit [Age]	Name	Description
Late Cretaceous (103 - 94 Ma)	Hake Batholith	Granite, granodiorite, quartz monzonite
Mississippian- Permian (340 – 300 Ma)	Klinkit assemblage	Limestone, thin bedded, locally carbonaceous
Mississippian- Permian (340 – 300 Ma)	Klinkit assemblage	Andesite, volcanic breccia, tuff (Stephen)
Devono-Mississippian (365 – 345 Ma)	Finlayson Assemblage	Intermediate to felsic tuff (Bradshaw)
Devono-Mississippian (365 – 345 Ma)	Finlayson Assemblage	Mafic to intermediate tuffs, well foliated (Bradshaw)
Devono-Mississippian (365 – 345 Ma)	Finlayson Assemblage	Phyllite (Stephen)
Paleozoic – Devonian (635 – 375 Ma)	Snowcap Assemblage	Chert-pebble conglomerate (Stephen)
Paleozoic – Devonian (635 – 375 Ma)	Snowcap Assemblage	Argillaceous quartzite, black argillite, local chert (Stephen).

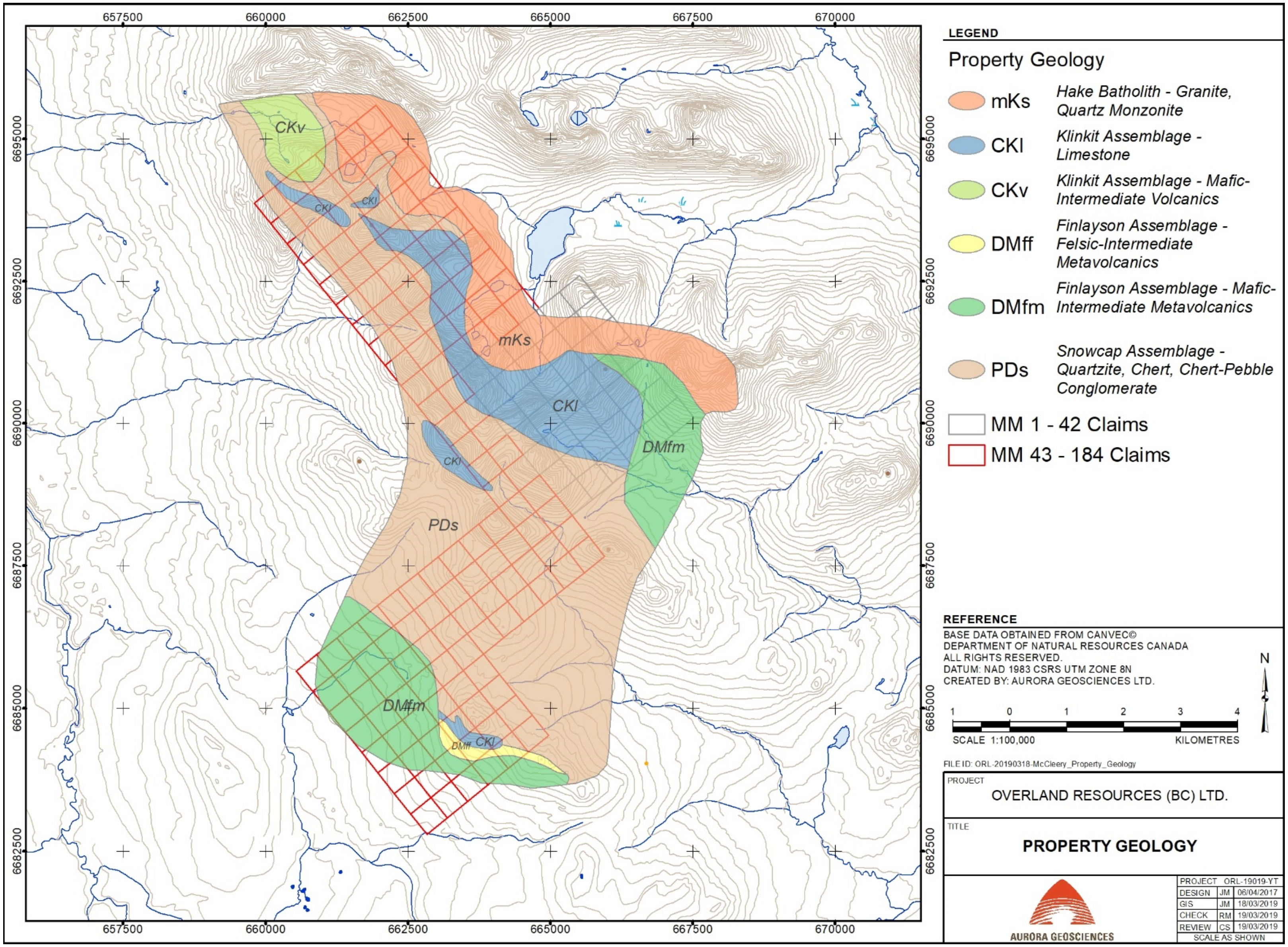

Figure 5: Property geology Sketch (after Stephen, 1982, 1983; Bradshaw, 1999)

8 2018 WORK PROGRAM

The 2018 program comprised a helicopter-borne Versatile Time Domain Electromagnetic (VTEM^{EM}) and magnetometer survey across the MM 1-184 claims. The program was conducted by Geotech Ltd. (Geotech) of Aurora, Ontario, Canada, utilizing their proprietary VTEM software for electromagnetic surveying, and a cesium magnetometer for magnetic surveying.

8.1.1 Crew and Equipment

The 2018 airborne survey was conducted by the following Geotech personnel:

Name	**Position**
Jimmy Morrison	Project Manager (Office)
Nick Venter	Data QC (Office), Preliminary Data Processing
Vickus Prinsloo	Crew Chief and Operator
Mark Light	Pilot (Geotech Aviation)
Dmitriy Danchenko, Tai-chyi Shei	Final Data Processing
Kanita Khaled, PhD	Data Processing Manager (Data QA/QC)
Alexander Pridhodko, PhD, PGeo	Data QA/QC
Joseli Soares	Reporting/ Mapping

The following equipment was used during this program:

Quantity	Equipment
1	Eurocopter Aerospatiale 350B3 helicopter
1	Geotech Time Domain EM (VTEM^{TM}) system
2	Transmitter Loop, diameter of 17.4m
1	Terra TRA 3000/TRI 40 radar altimeter
1	Geotech PC104 navigation system, utilizing a NovAtal WAAS (Wide Area Augmentation System) enabled GPS receiver
1	Digital Acquisition System
1	Combined magnetometer/GPS base system (Geometrics Caesium vapour magnetometer)

8.1.2 Specifications

Location Datum:	WGS84 Datum, UTM Zone 9
Magnetic Declination:	19˚E
Electromagnetic Data	Full Waveform EM, including: • Half-cycle stacking • System response correction • Parasitic and drift removal

8.1.3 Survey Methodology

The combined VTEM^{EM} and magnetometer survey was conducted between August 23rd and September 5th, 2018, across the MM 1 – 184 claim block. Survey lines extended slightly beyond claim boundaries to ensure data capture across the property. A total of 454 line-km was flown in an east-west direction (N 90^{o}E) azimuth, at a traverse line spacing of 100 metres (Figures 6, 7). The survey covered an area of 41 km^{2}, comprised of very rugged terrain with elevations ranging from 1,093 to 1,941 metres in elevation. The helicopter was maintained at a mean altitude of 88 metres above terrain, allowing for the transmitter-receiver loop to have a 51-metre average terrain clearance, and the magnetic sensor to have a 61-metre average clearance. The VTEM-EM receiver coil orientation Z-axis coil and transmitter coil are oriented parallel and are both horizontal to the ground. On a daily basis, data was uploaded via ftp to the Geotech office in Aurora, Ontario (Venter et al, 2018).

8.1.4 Data Processing

This section is based on Section 4.2 of the Geotech report for Aurora Geosciences Ltd. titled "Report on a Helicopter-Borne Versatile Time Domain Electromagnetic (VTEM^{EM}) and Aeromagnetic Geophysical Survey". See the attached report (Appendix 4) for further details.

The Full Waveform EM specific data processing operations included:

- Half-cycle stacking (performed at time of acquisition)
- System response correction
- Parasitic and drift removal

The electromagnetic data comprised a three-stage digital filtering process, utilized to reduce noise levels and to reject major sferic events, which can produce sharp, large-amplitude readings that cannot be filtered out by conventional filtering procedures. A computer algorithm was employed to identify and reject major sferic events. The signal to noise ratio was improved further by application of a low pass digital filter, which suppresses only variations with a wavelength length less than about 1 second (about 15 metres). The results are presented as stacked profiles showing EM voltages for the time gates, in linear-logarithmic scale for the B-field and dB/dt (change in amplitude of magnetic field (dB) and time to make that change (dt) (Website, MR-T Technology) in the Z component. The B-Field Z component was recorded at 0.880 milliseconds after the termination of the impulse (Figure 8).

Magnetic data processing involved correction for diurnal variations by using the digitally recorded surface base station magnetic values. Base station data was edited and merged into the Geosoft GDB database on a daily basis. Tie line levelling was done by adjusting intersection points along traverse lines. Corrected data was interpolated between survey lines utilizing a random point gridding method to provide x-y grid values for a standard grid cell size of 20 metres. The "Minimum Curvature" algorithm was employed to interpolate values onto a rectangular, regularly spaced grid (Venter et al, 2018).

8.1.5 Data Products provided by Geosoft Ltd.

The following data products from this work program are provided with this report:

- A final report in pdf format (Appendix 4);
- A Google Earth file showing the flight path of the block;
- Several maps at a 1:20,000-scale as follows (included in Appendix 3);
    - GL180188_20k_BFz10: B-field late time Z Component Channel 10, Time Gate 0.055 ms colour image (Figure 8).
    - GL180188_20K_dBdtz: dB/dt profiles Z Component, Time Gates 0.220-7.036 ms in linear-logarithmic scale (Figure 9).
    - GL180188_20k_Bfieldz: B-field profiles Z-Component, Time Gates 0.220-7.036 ms in linear-logarithmic scale (Figure 10).
    - GL180188_20k_TMI: Total Magnetic Intensity IGRF Corrected colour image and contours (Figure 11)
    - GL180188_20k_TauSF: dB/dt Calculated Time Constant (Tau) with Calculated Vertical Derivative contours (Figure 12).
- DVD with data (databases, grids and maps, as described in Geotech Report) and report in pdf format.

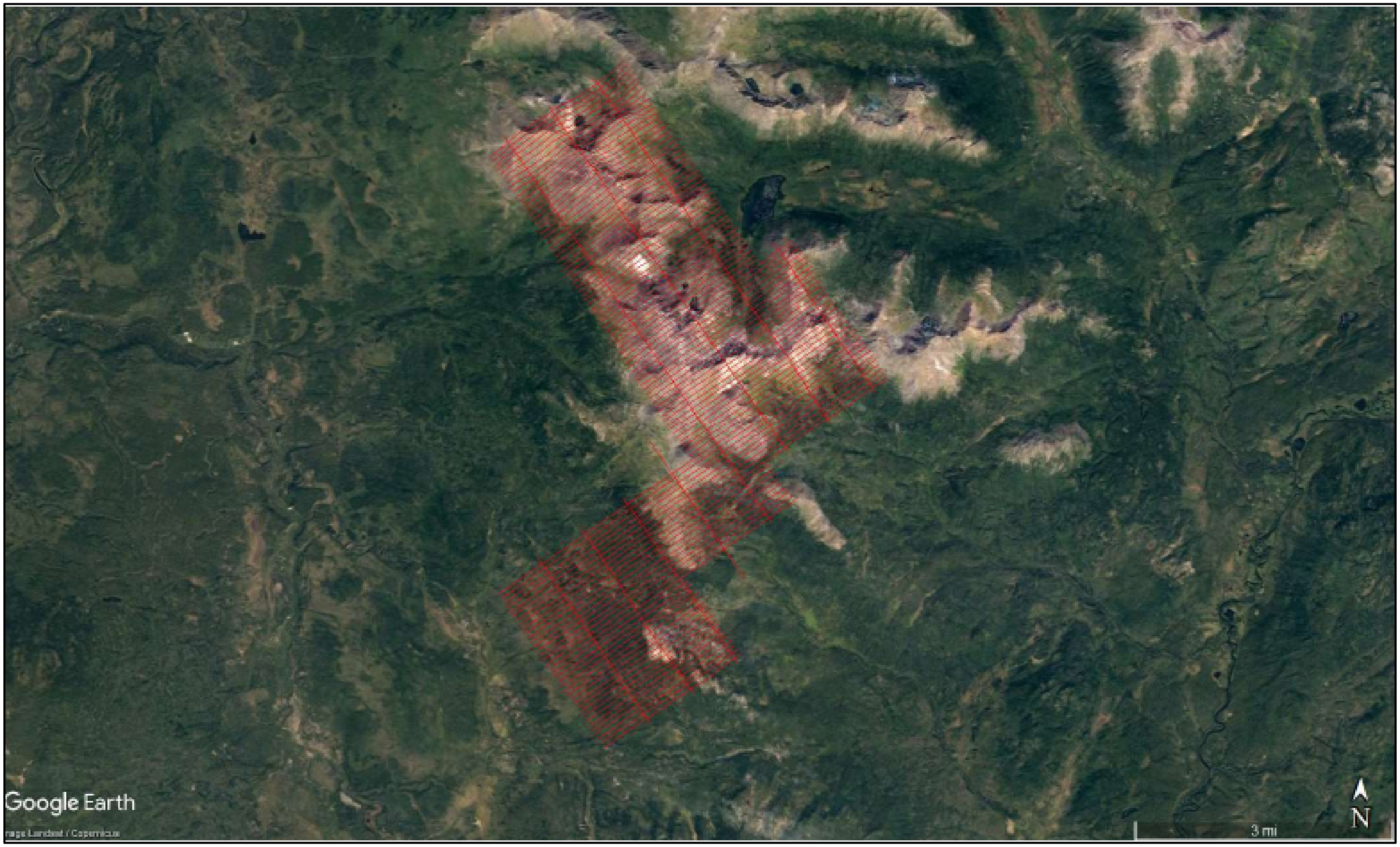

Figure 6: Flight lines overlying Google Earth image (after Figure 3, Appendix 4, Geotech report, 2018)

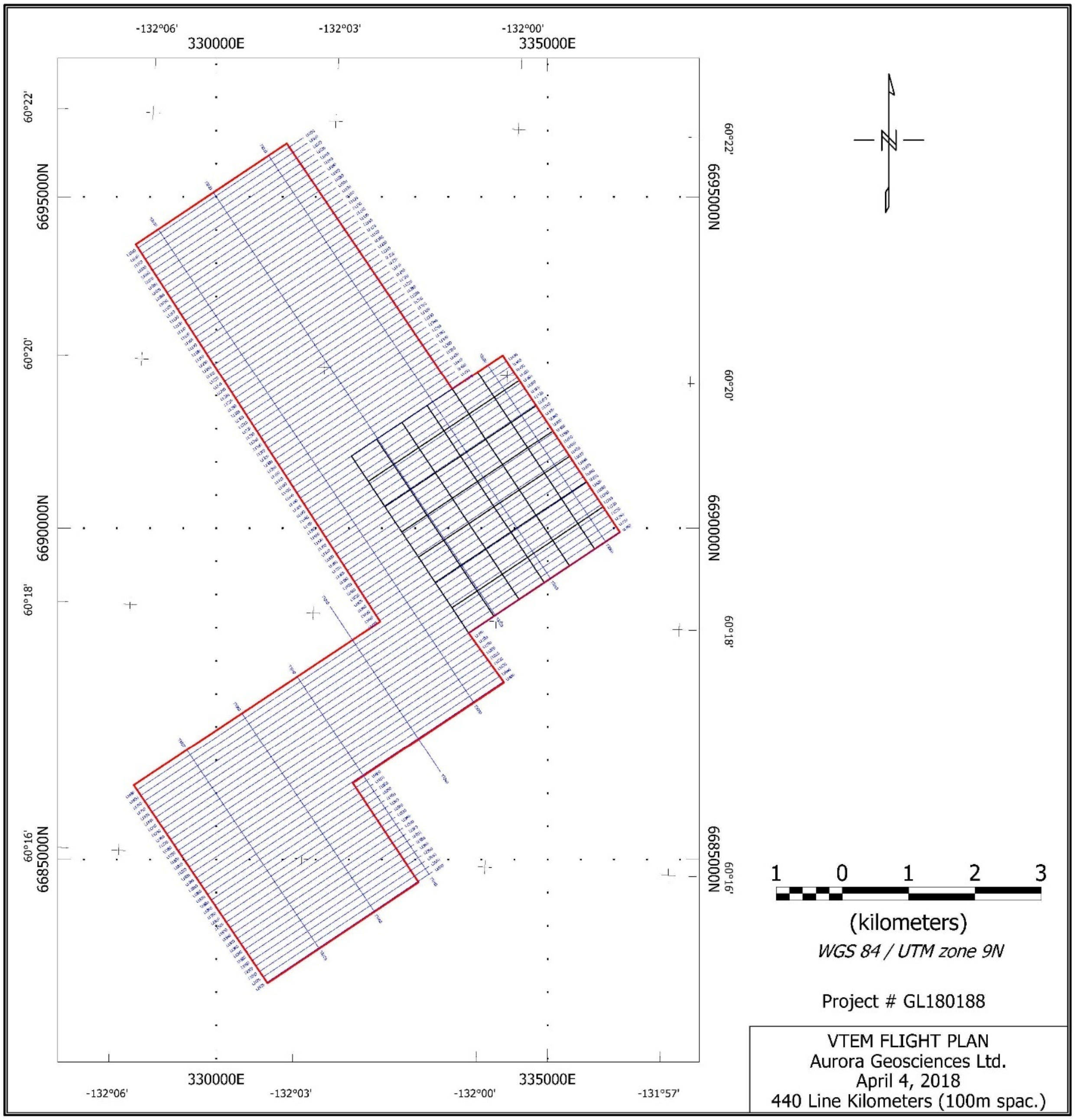

Figure 7: VTEM Flight Plan (after Geotech, 2018)

9 RESULTS AND INTERPRETATION

Results of stacked profiles produced from the VTEM surveying indicate that much of the area has a resistive electromagnetic signature, with relatively few conductive areas within the mountainous area covered by the MM 1-116 claims (Figures 8 and 9). The exception is an area of moderate conductivity towards the north-central property boundary. Directly south of the main block, a narrow, strongly conductive feature at depth is indicated by pronounced late time gate readings within claims MM 120 and MM 127. The most pronounced late time gate measurements are located directly along the south boundary of the claim block. Late time-gate features of similar intensity also occur along the eastern and southern margins of the MM 162 to MM 184 block, and may be related to the former.

Towards the southwestern property boundary, within areas of gently west-loping terrain, VTEM surveying revealed evidence of a deep-seated bedrock conductor. The surface is fairly wet, with boggy ground and fairly abundant small streams; however, this would result in a shallow early-time gate conductor.

Total Magnetic Intensity (TMI, Figure 11) imaging revealed a strong NNW – SSE trending magnetic high feature extending along the western property area. Although most of this feature shows no correlation with dB/dt conductive features, the extreme southern limit coincides with the strong late time-gate conductive feature within claims MM120 and MM 127. This may indicate that both anomalous features may be caused by a single geological or structural feature. There is no similar association with the aerially extensive deep-seated conductive feature to the southwest, although a moderate magnetic high occurs to the northeast of this.

The geological setting is ascertained only from previous workers (Figure 5); however, the strong magnetic high feature extending along the western property area likely represents Snowcap Assemblage metasediments. The eastern edge may represent the contact with a package of limestone and carbonate rocks to the east. A moderate high magnetic signature farther east is roughly coincident with the boundary of the Hake Batholith. Also, a fairly strong magnetic high signature along the north claim boundary is coincident with a unit of Klinkit Assemblage mafic to intermediate metavolcanics rocks.

3D “Apparent Resistivity Imaging” revealed two significant conductors: the narrow feature covered by the MM 120 and MM 127 claims, and the broad southwestern anomaly. A third resistivity feature occurs along the extreme southwestern corner (Figure 13).

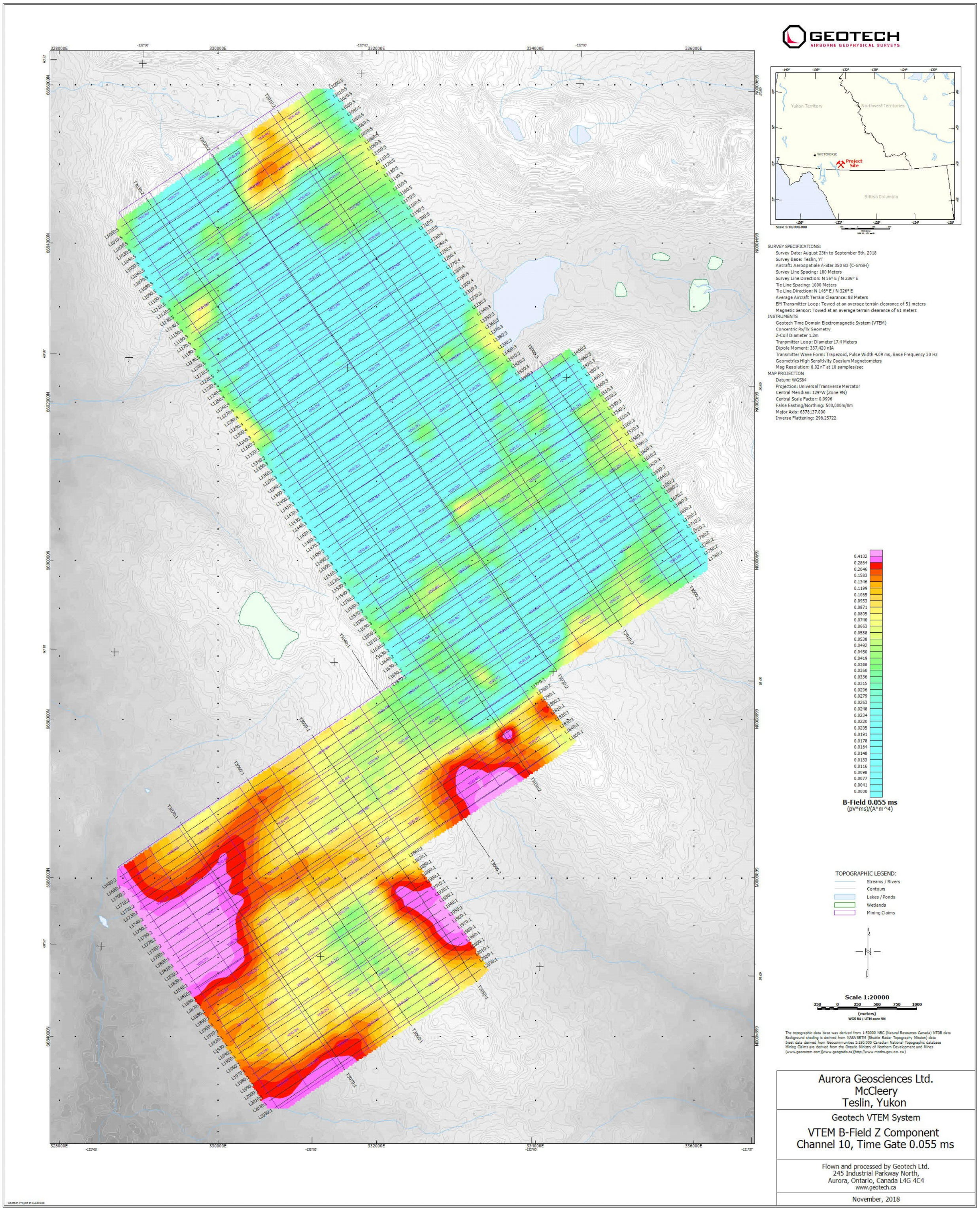

Figure 8: VTEM B-Field Z Component Channel 10, Time Gate 0.055 ms (after Geotech, 2018)

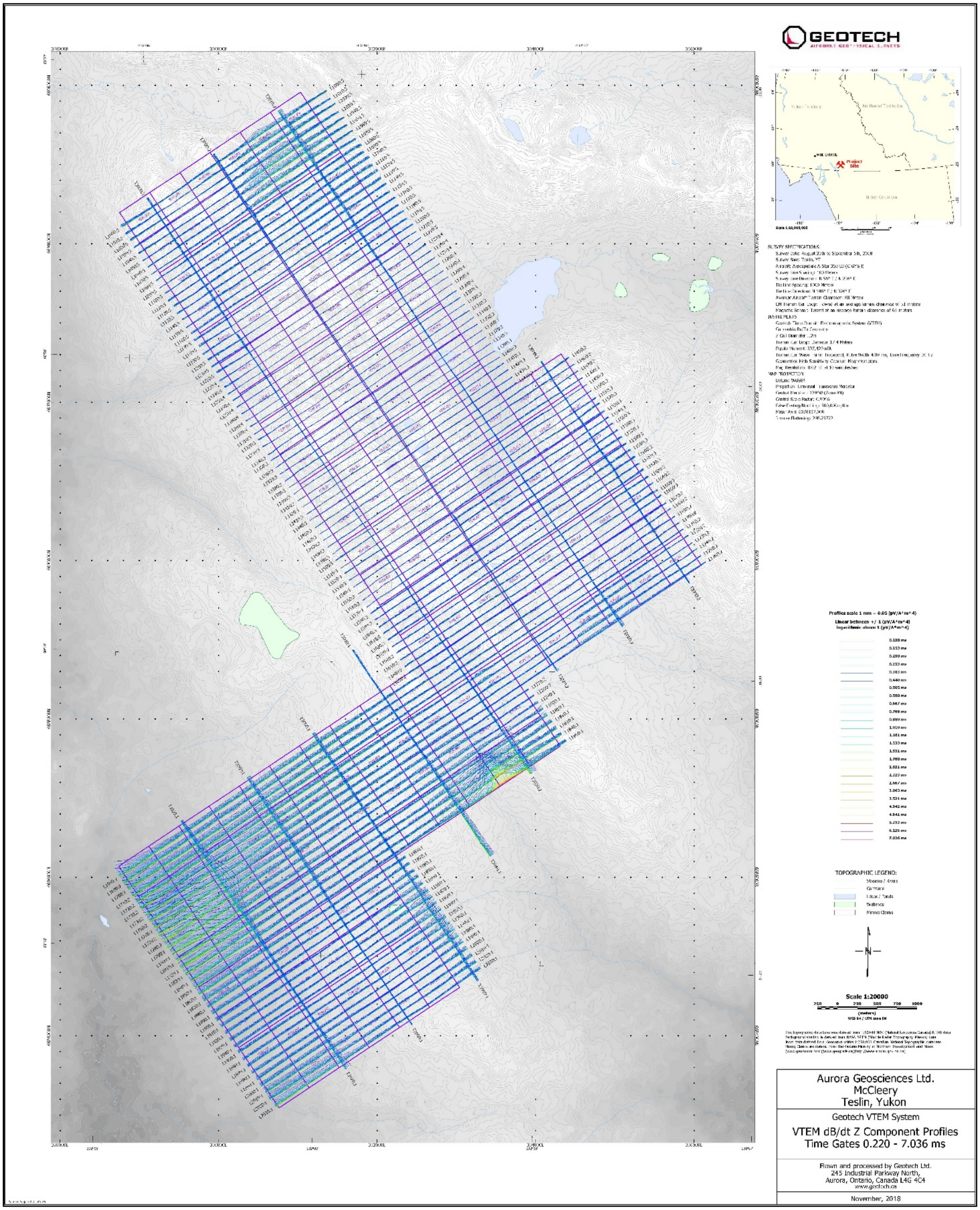

Figure 9: VTEM dB/dt Z Component Profiles, Time Gates 0.220 to 7.036 ms (after Geotech, 2018)

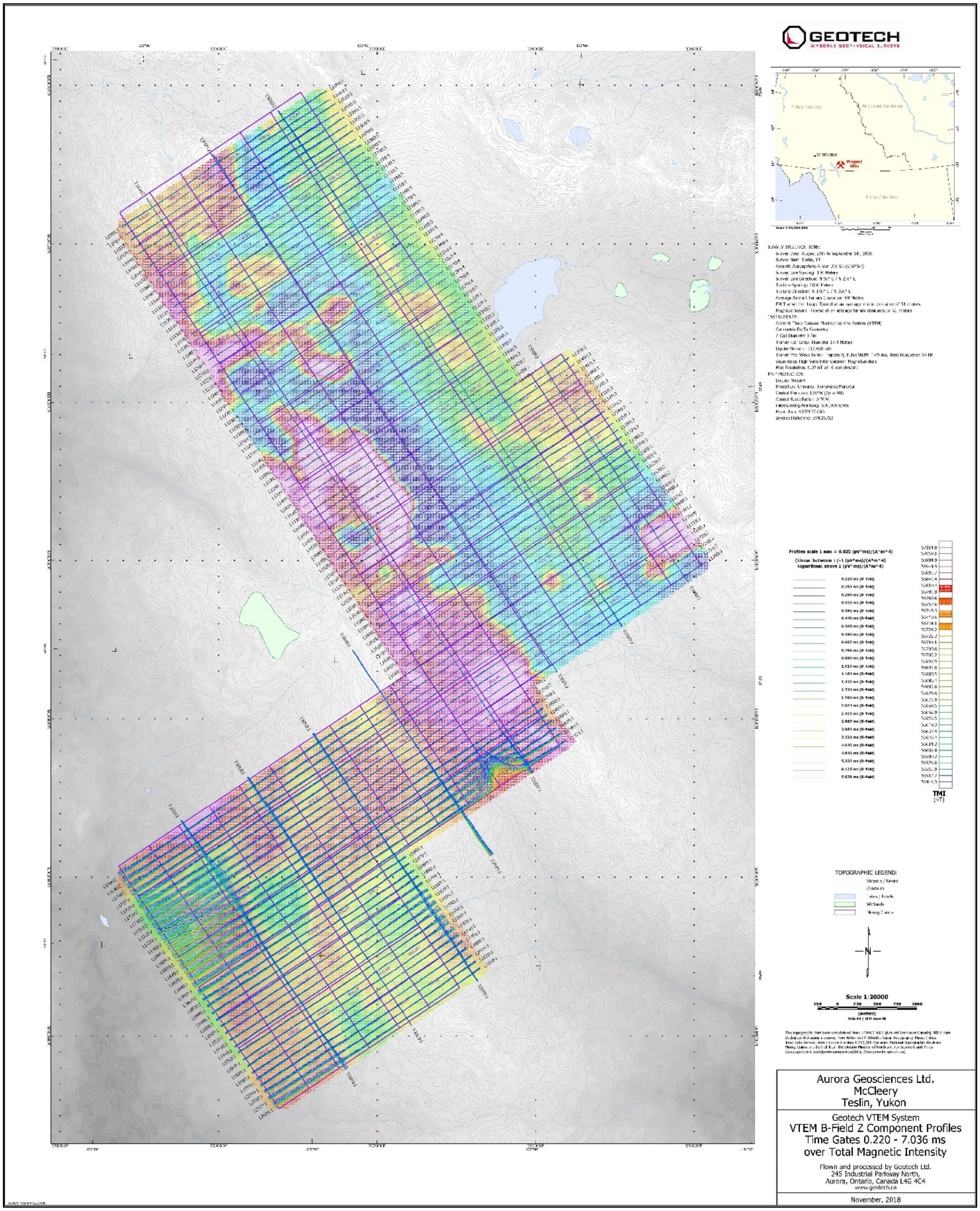

Figure 10: VTEM B-Field Z Component Profiles, Time Gates 0.220 to 7.036 ms

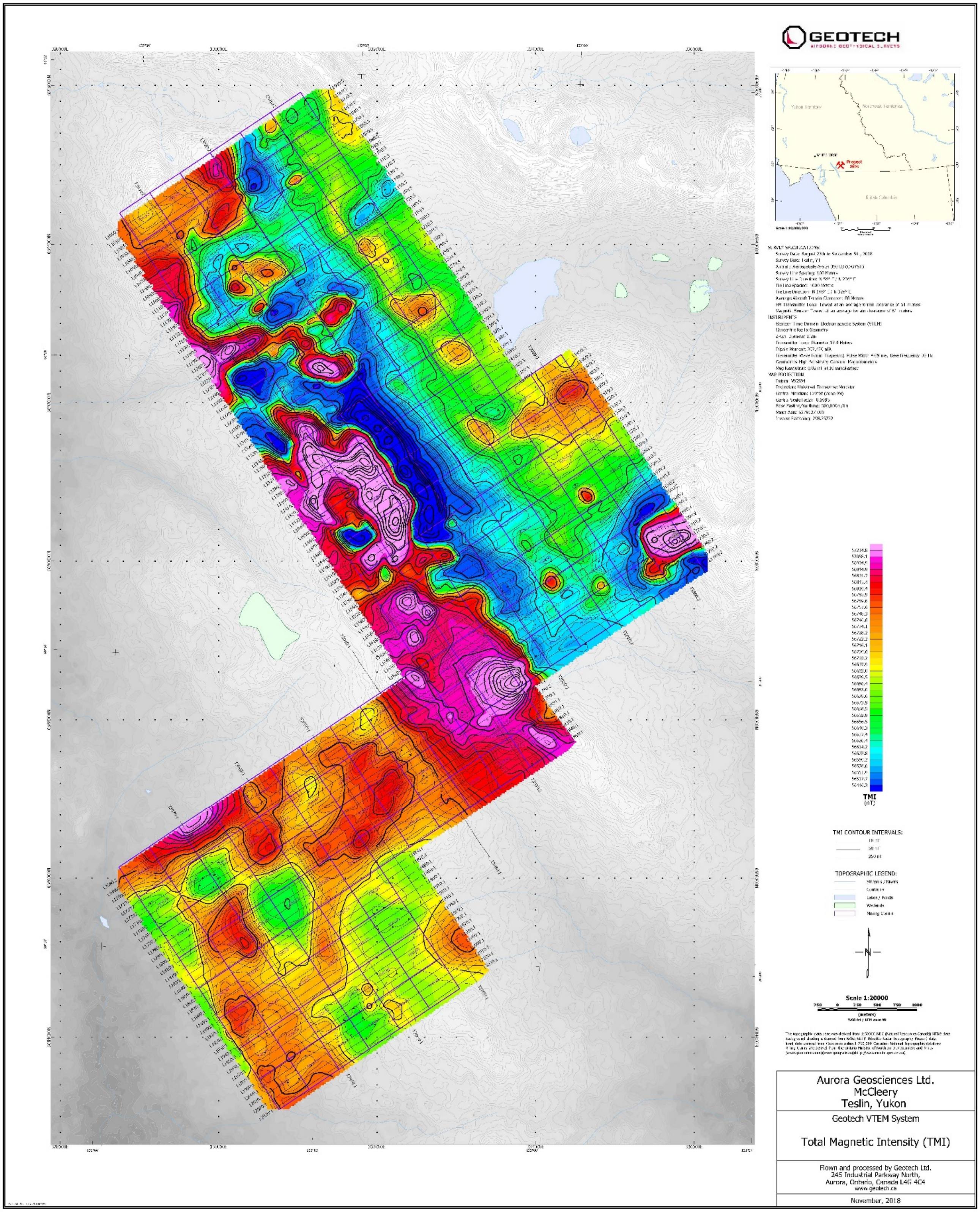

Figure 11: Total Magnetic Intensity (Geotech, 2018)

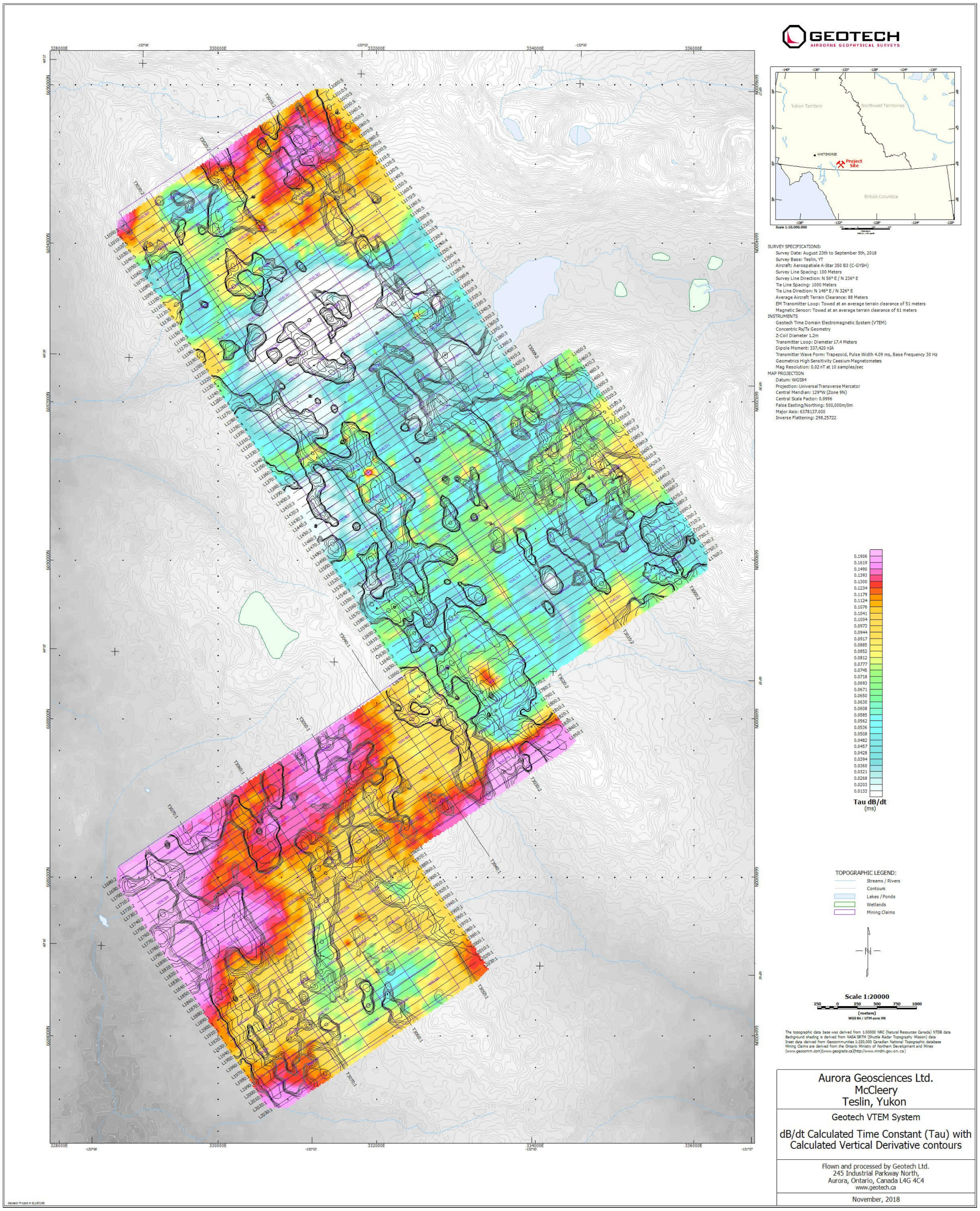

Figure 12: dB/dt Calculated Time Constant (Tau) with Calculated Vertical Derivative contours (after Geotech, 2018)

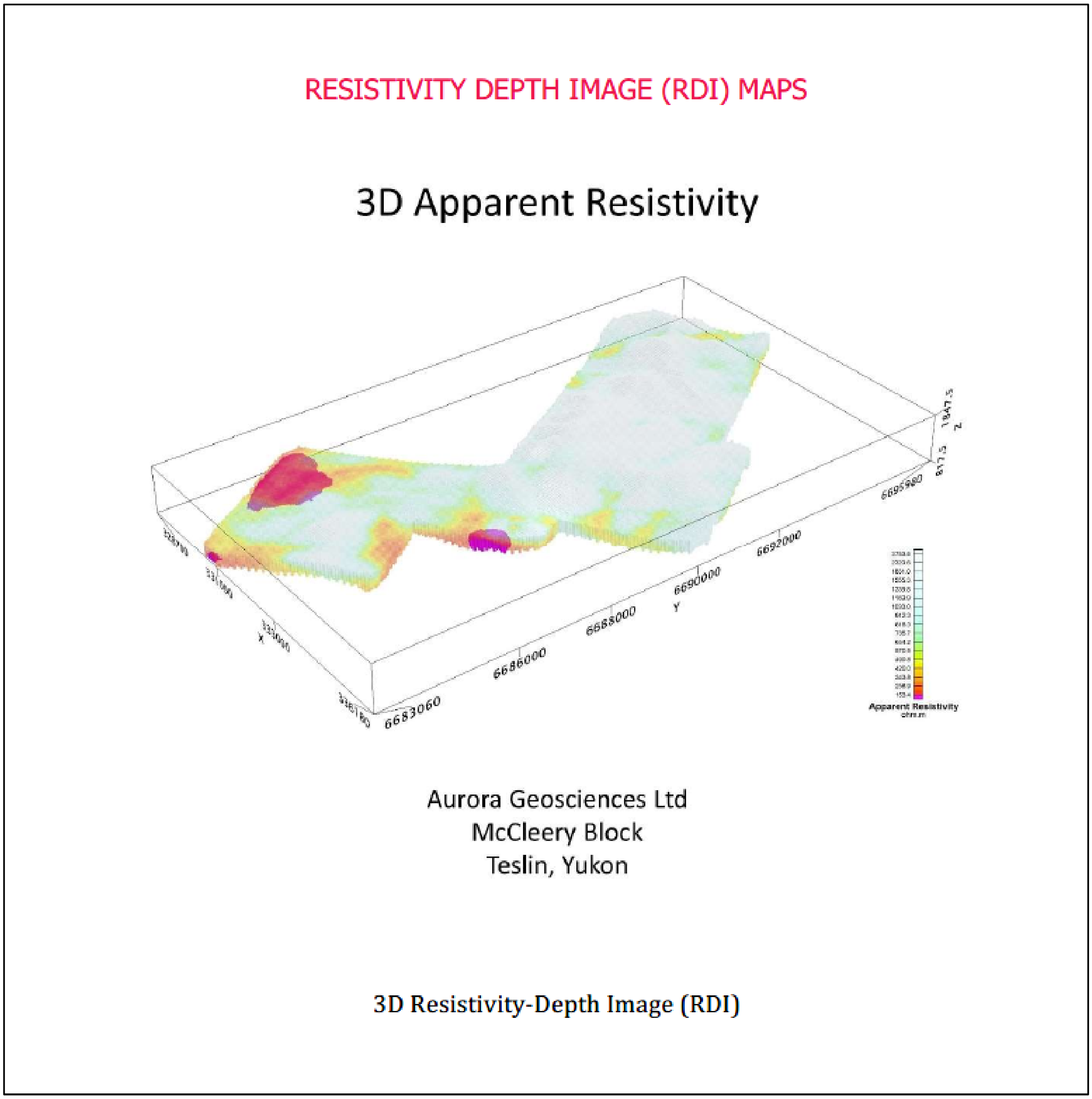

Figure 13: 3D Resistivity-Depth Image (RDI) (after Geotech, 2018)

10 CONCLUSIONS AND RECOMMENDATIONS

10.1 CONCLUSIONS

Historical work and the 2018 program can be summarized into the following conclusions:

- Compilation of geological mapping by previous workers indicates the northeastern property area is underlain by the southwest portion of the Hake Batholith, in contact with Klinkit Assemblage limestone to the west. The west boundary of the limestone package in turn lies in contact with Snowcap Assemblage metaclastics and metacherts. Finlayson Assemblage metavolcanics underlie extreme southwestern and southeastern property areas.

- Previous workers obtained a rock sample returning 0.76% cobalt, which lies within the carbonate package near its southwestern contact with Snowcap Assemblage metaclastics. However, the Claim Post and Discovery base metal showings are located within Finlayson Assemblage metavolcanics.

- The cobalt showing, and several copper-silver-gold occurrences, represent skarn-style mineralization hosted in carbonate rocks. The Discovery and Claim Post showings indicate potential Volcanogenic Massive Sulphide (VMS)-style mineralization.

- Plotting of VTEM dB/dt Z component profiles and B-Field Z Component readings indicate strong late time gate conductors covered by claims MM 120 and 127, and the northwest part of the MM 137 to MM 184 sub-block. These are the only two significant conductive features within property boundaries. A similar conductive feature occurs along the east margin of the MM 137-184 block and may be related to the feature within the MM 120 and 127 claims.

- A more subdued conductivity feature occurs along the north boundary of the claim block. This is accentuated in “Tau” (dB/dt) imagery and is somewhat east of a strong magnetic high anomaly which is coincident with a unit of Klinkit Assemblage mafic to intermediate metavolcanics.

- Total Magnetic Intensity (TMI) imaging shows a strongly defined magnetic high signature with a sharp eastern margin. The east margin likely represents the contact between Snowcap Assemblage chert and metaclastic sediments to the west with Klinkit Assemblage limestone to the east. The moderate high TMI signature in eastern areas indicates the presence of the Hake Batholith.

- The VTEM late time gate feature underlying claims MM 120 and MM 127 likely extends to the SSE, beyond the surveyed area boundary. Further evidence of a linear structure is provided by the SSE-flowing stream that parallels the trend of the magnetic high anomaly.

10.2 Recommendations

10.2.1 Recommendations

The next phase of exploration is recommended to focus on the two conductive anomalies located at the northwest corner of the MM 137 – 184 sub-block and within claims MM 120 and MM 127, respectively. Additional staking of another 60 claims, to extend the MM 120 and 127 block, should cover the southern extension of the conductor.

The staking should be followed by establishment of a helicopter-supported camp within, or near, claims MM 120 and MM 127. The camp would comprise six personnel: three soil samplers, one crew boss/ geologist, one prospector/geologist, and one geophysical technician to conduct magnetometer-VLF surveying. From this camp, a grid soil geochemical program comprising about 400 soils is recommended to be completed at a 200-metre line spacing and 50-metre station spacing. The grid will be established using non-directional GPS, utilizing flagged stations and will be centered on the conductive anomaly and its interpreted SSE extension. A combined ground magnetometer – VLF-EM survey is recommended to cover this grid. Prospecting and geological mapping would be completed and would focus on other accessible areas from the camp. This camp would have a duration of about 10 days, although the geophysical technician is likely to be on site for only 5-6 days.

Following this portion of the program, the camp would be moved to the south-central part of the MM 142 claim block. Geological mapping, prospecting, rock sampling, and reconnaissance-style soil sampling, at a 450-metre line spacing and 100-metre station spacing, will be based from this camp and cover all areas accessible from it. For the first 5 days, a three-person crew comprising two soil samplers and a prospector/ geologist will establish a satellite camp at the conductor in the southwestern corner of the MM 137-184 block. Work will comprise grid soil geochemical sampling with the same parameters mentioned above, along with geological mapping, rock sampling, and combined ground magnetometer-VLF surveying for 3 of the 5 days. The geophysical technician will be on site for a total of 7-8 days for both phases.

The project is recommended to take place between June 21 to Sept 1, to take advantage of the “window” of summer weather. Estimated expenses, including report writing and a 10% contingency, stand at CDN$224,000. These exclude the amounts for additional claim staking.

10.2.2 Recommended Budget

The following is a recommended budget for the 2019 program, exclusive of additional claim staking.

Table 4: Proposed 2019 Expenditures, McCleery Property

Job Preparation	$8,300
Field Program and Consumables (21 days)	$104,500
Sample Analysis	$28,800
Helicopter Support	$50,200
Field Report	$2,000
Assessment Report	$9,800
Contingency (10%)	$20,400
Estimated Total:	**$224,000**

Respectfully submitted,
Aurora Geosciences Ltd.

Carl Schulze

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Carl Schulze, B.Sc. P.Geo.

Reviewed by

______________, B.Sc. P.Geo.

11 REFERENCES

G.D. Bradshaw, 1999: "Report on Geological and Geochemical Surveys on the Caribou Creek Property, Yukon Territory". Assessment Report #094032, filed with the Watson Lake Mining Recorder, Energy, Mines and Resources, Government of Yukon.

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Appendix I

Statement of Qualifications
Silver Range Resources Ltd.
Aurora Geosciences Ltd.

I, Carl Schulze, BSc, with business and residence addresses in Whitehorse, Yukon Territory do hereby certify that:

1. I am a graduate of Lakehead University with a B.Sc. degree in Geology obtained in 1984.
2. I am a Professional Geoscientist registered with the Association of Professional Engineers and Geoscientists of British Columbia (registration number 25393), Association of Professional Geoscientists of Ontario (registration no. 1966) and with the Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists (NAPEG, registration number L3359).
3. I have been employed in mineral exploration as a geologist since 1984, primarily on projects in the Yukon Territory, Northwest Territories, Nunavut, Alaska and British Columbia.
4. I supervised the work described in this report and wrote this report.
5. I have no interest, direct or indirect, nor do I hope to receive any interest, direct or indirect, from Overland Resources (BC) Limited or any of its properties

Dated this 17 day of April, 2019 in Whitehorse, Yukon Territory.

Respectfully Submitted,

Carl Schulze

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Carl M. Schulze, BSc. P. Geo.

Appendix II

Statement of Expenditures
2018 Airborne VTEM/Mag survey
Aurora Geosciences Ltd.

VTEM and magnetometer survey	440 line-km @ $145/km	$111,200.00
Standby Days:	Day @ $3,800/day	$3,800
	Total Survey Charge:	**$115,000**

Appendix III

Claim Status
Overland Resources (BC) Ltd.
Aurora Geosciences Ltd.

Grant Number	Claim Name	Claim Number	Claim Owner	Recording Date	Expiry Date	NTS Map
YD81351	MM	43	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81352	MM	44	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81353	MM	45	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81354	MM	46	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81355	MM	47	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81356	MM	48	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81357	MM	49	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81358	MM	50	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
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YD81360	MM	52	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
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YD81362	MM	54	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
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YD81366	MM	58	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81367	MM	59	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81368	MM	60	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81369	MM	61	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08

YD81370	MM	62	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81371	MM	63	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81372	MM	64	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81373	MM	65	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81374	MM	66	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81375	MM	67	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81376	MM	68	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81377	MM	69	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81378	MM	70	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81379	MM	71	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
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YD81382	MM	74	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81383	MM	75	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
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YD81385	MM	77	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
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YD81493	MM	137	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
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YD81498	MM	142	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
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YD81259	MM	147	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81260	MM	148	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
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YD81262	MM	150	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81263	MM	151	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81264	MM	152	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
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YD81267	MM	155	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81268	MM	156	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81269	MM	157	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81270	MM	158	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81271	MM	159	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81272	MM	160	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81273	MM	161	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08

YD81274	MM	162	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
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YD81285	MM	173	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81286	MM	174	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81287	MM	175	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
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YD81289	MM	177	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
YD81290	MM	178	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
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YD81292	MM	180	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
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YD81294	MM	182	OVERLAND RESOURCES (BC) LIMITED - 100%	2018-07-30	2024-07-30	105C08
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YD81320	MM	17	OVERLAND RESOURCES (BC) LIMITED - 100%	2017-03-20	2024-03-20	105C08
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YD81332	MM	29	OVERLAND RESOURCES (BC) LIMITED - 100%	2017-03-20	2024-03-20	105C08

Appendix IV

GL 180188_Aurora_Report
Overland Resources (BC) Ltd.
Aurora Geosciences Ltd.

VTEM™

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

PROJECT:	MCCLEERY PROJECT
LOCATION:	TESLIN, YUKON
FOR:	AURORA GEOCIENCES LTD
SURVEY FLOWN:	AUGUST – SEPTEMBER 2018
PROJECT:	GL180188

Geotech Ltd.
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Aurora, ON Canada L4G 4C4

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Web: www.geotech.ca
Email: info@geotech.ca

GEOTECH
AIRBORNE GEOPHYSICAL SURVEYS

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EXECUTIVE SUMMARY

MCCLEERY PROJECT
TESLIN, YUKON

During August 23rd to September 5th 2018 Geotech Ltd. carried out a helicopter-borne geophysical survey over the McCleery Project situated near Teslin, Yukon.

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 454 line-kilometres of geophysical data were acquired during the survey.

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 the following maps:

- Electromagnetic stacked profiles of the B-field Z Component,
- Electromagnetic stacked profiles of dB/dt Z Components,
- B-Field Z Component Channel grid,
- Total Magnetic Intensity (TMI),
- Calculated Time Constant (Tau) with Calculated Vertical Derivative contours and
- Resistivity Depth Images (RDI) sections are presented.

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

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

1. INTRODUCTION

1.1 GENERAL CONSIDERATIONS

Geotech Ltd. performed a helicopter-borne geophysical survey over McCleery Project situated near Teslin, Yukon (Figure 1 & Figure 2).

Carl Schulze represented Aurora Geosciences 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 with Full-Waveform processing. Measurements consisted of Vertical (Z) component and aeromagnetics using a caesium magnetometer. A total of 454 line-km of geophysical data were acquired during the survey.

The crew was based out of Teslin (Figure 2) in Yukon for the acquisition phase of the survey. Survey flying started on August 23rd and was completed on September 5th, 2018.

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 November, 2018.

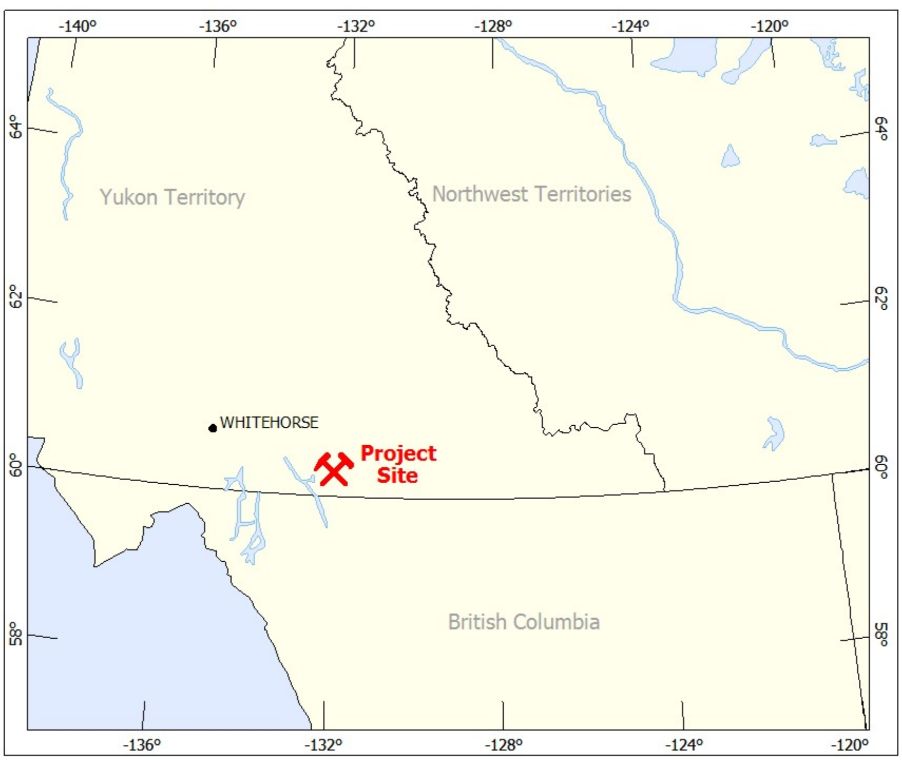

Figure 1: Survey location.

1.2 SURVEY AND SYSTEM SPECIFICATIONS

The survey areas, McCleery Project were located approximately 36 kilometres northeast of Teslin, Yukon (Figure 2).

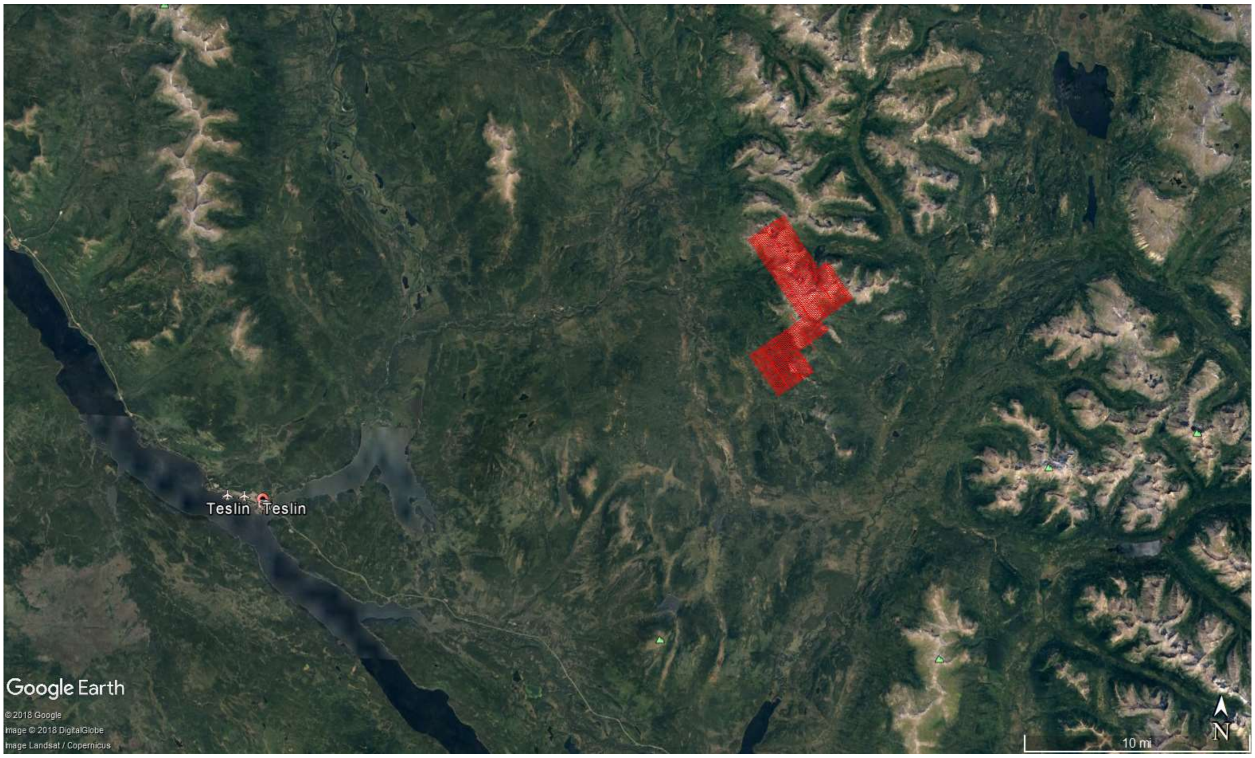

Figure 2: Survey area locations on Google Earth.

The survey areas were flown in an east to west (N 90° E azimuth) direction, with traverse line spacing of 100 metres as depicted in Figure 3 to 5. Tie lines were flown perpendicular to the traverse lines. For more detailed information on the flight spacing and direction see Table 1.

1.3 TOPOGRAPHIC RELIEF AND CULTURAL FEATURES

Topographically, the survey areas exhibits a highly rugged relief with an elevation ranging from 1093 to 1941 metres above mean sea level over an area of 41 square kilometres.

There are various rivers and streams running through the survey area. There are no visible signs of culture.

Figure 3: Flight path over a Google Earth Image.

2. DATA ACQUISITION

2.1 SURVEY AREA

The survey area (see Figure 3 and Appendix A) and general flight specifications are as follows:

Table 1: Survey Specifications

Survey block	Line spacing (m)	Area (Km^2)	Planned[1] Line-km	Actual Line-km	Flight direction	Line numbers
McCleery	Traverse: 100	41	440	454	N 56° E / N 236° E	L1000 – L2030
	Tie: 1000				N 146° E / N 326° E	T3000 – T3070
TOTAL		41	440	454		

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

2.2 SURVEY OPERATIONS

Survey operations were based out of Teslin in Yukon from August 23th until Septemberth 2018. The following table shows the timing of the flying.

Table 2: Survey schedule

Date	Flight #	Flown km	Block	Crew location	Comments
2018-08-23				Teslin, Yukon	Crew arrived on site in the evening and checked into hotel.
2018-08-24				Teslin, Yukon	Too much rain to begin loop assembly. Minor component assembly done under cover of shelter.
2018-08-25				Teslin, Yukon	Loop assembly began but delayed due to rain.
2018-08-26				Teslin, Yukon	Loop assembly completed.
2018-08-27				Teslin, Yukon	Fuel arrived onsite, awaiting helicopter.
2018-08-28				Teslin, Yukon	Helicopter to arrive by early afternoon. Heli install to commence.
2018-08-29				Teslin, Yukon	Helicopter arrived in the morning. Heli installation was completed. Ground run and geometry tests completed. Pending test flight.
2018-08-30				Teslin, Yukon	Weather prevented calibration flights.
2018-09-01	1	106.24	McCleery	Teslin, Yukon	106.24 km flown and accepted.
2018-09-02				Teslin, Yukon	Weather standby
2018-09-03	2	264.26	McCleery	Teslin, Yukon	264.26 km flown and accepted
2018-09-04				Teslin, Yukon	Project completed
2018-09-05				Teslin, Yukon	Demobilization

2.3 FLIGHT SPECIFICATIONS

[1] Note: Actual Line kilometres represent the total line kilometres in the final database. These line-km normally exceed the Planned Line-km, as indicated in the survey NAV files.

During the survey the helicopter was maintained at a mean altitude of 88 metres above the ground with an average survey speed of 80 km/hour. This allowed for an average Transmitter-receiver loop terrain clearance of 51 metres and a magnetic sensor clearance of 61 metres.

The on board operator was responsible for monitoring 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 features.

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.

2.4 AIRCRAFT AND EQUIPMENT

2.4.1 SURVEY AIRCRAFT

The survey was flown using a Eurocopter Aerospatiale 350B3 helicopter, registration C-GYSH. The helicopter is owned and operated by Geotech Aviation. Installation of the geophysical and ancillary equipment was carried out by a Geotech Ltd crew.

2.4.2 ELECTROMAGNETIC SYSTEM

The electromagnetic system was a Geotech Time Domain EM (VTEM™) full receiver-waveform streamed data recorded system. The "full waveform VTEM system" uses the streamed half-cycle recording of transmitter and receiver waveforms to obtain a complete system response calibration throughout the entire survey flight. VTEM with the Serial number 17 had been used for the survey. The VTEM™ transmitter current waveform is shown diagrammatically in Figure 4.

The VTEM™ Receiver and transmitter coils were in concentric-coplanar and Z-direction oriented configuration. The Transmitter-receiver loop was towed at a mean distance of 31 metres below the aircraft as shown in Figure 5.

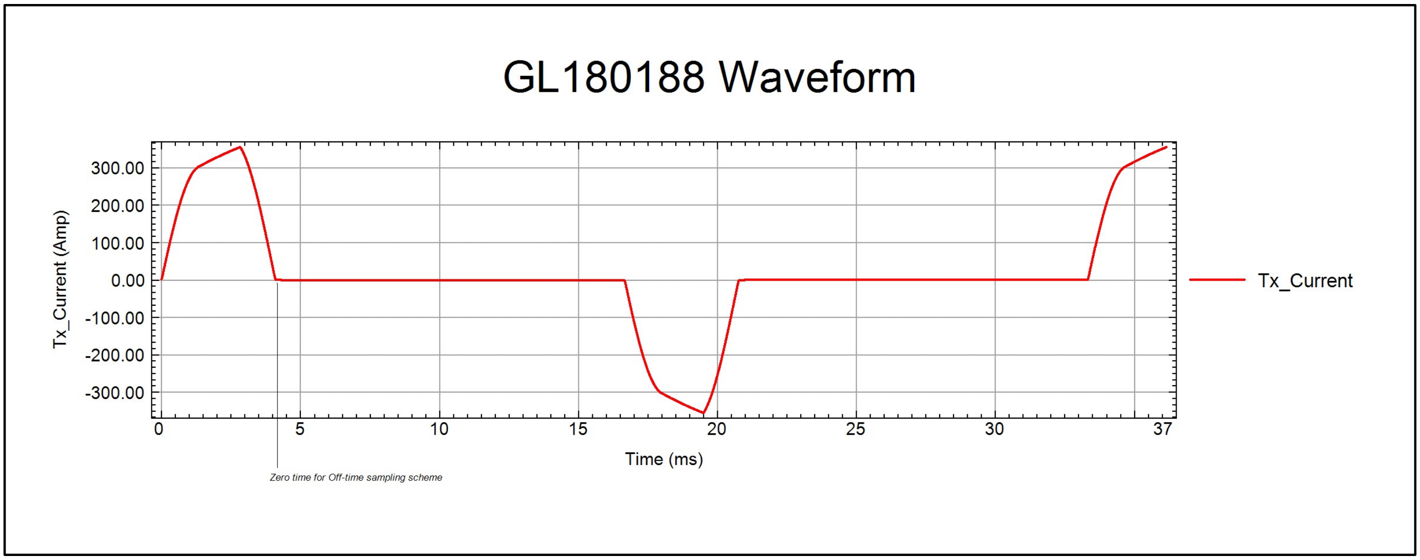

Figure 4: VTEM™ Transmitter Current Waveform.

The VTEM™ decay sampling scheme is shown in Table 3 below. Forty-one time measurement gates were used for the final data processing in the range from 0.042 to 10.667 msec. Zero time for the off-time sampling scheme is equal to the current pulse width and is defined as the time near the end of the turn-off ramp where the dI/dt waveform falls to 1/2 of its peak value.

Table 3: Off-Time Decay Sampling Scheme

VTEM™ Decay Sampling Scheme				
Index	Start	End	Middle	Width
Milliseconds				
8	0.039	0.045	0.042	0.006
9	0.045	0.051	0.048	0.007
10	0.051	0.059	0.055	0.008
11	0.059	0.068	0.063	0.009
12	0.068	0.078	0.073	0.010
13	0.078	0.090	0.083	0.012
14	0.090	0.103	0.096	0.013
15	0.103	0.118	0.110	0.015
16	0.118	0.136	0.126	0.018
17	0.136	0.156	0.145	0.020
18	0.156	0.179	0.167	0.023
19	0.179	0.206	0.192	0.027
20	0.206	0.236	0.220	0.030
21	0.236	0.271	0.253	0.035
22	0.271	0.312	0.290	0.040
23	0.312	0.358	0.333	0.046
24	0.358	0.411	0.383	0.053
25	0.411	0.472	0.440	0.061
26	0.472	0.543	0.505	0.070
27	0.543	0.623	0.580	0.081
28	0.623	0.716	0.667	0.093
29	0.716	0.823	0.766	0.107
30	0.823	0.945	0.880	0.122
31	0.945	1.086	1.010	0.141
32	1.086	1.247	1.161	0.161
33	1.247	1.432	1.333	0.185
34	1.432	1.646	1.531	0.214
35	1.646	1.891	1.760	0.245
36	1.891	2.172	2.021	0.281
37	2.172	2.495	2.323	0.323
38	2.495	2.865	2.667	0.370
39	2.865	3.292	3.063	0.427
40	3.292	3.781	3.521	0.490
41	3.781	4.341	4.042	0.560
42	4.341	4.987	4.641	0.646

VTEM™ Decay Sampling Scheme				
Index	Start	End	Middle	Width
Milliseconds				
43	4.987	5.729	5.333	0.742
44	5.729	6.581	6.125	0.852
45	6.581	7.560	7.036	0.979
46	7.560	8.685	8.083	1.125
47	8.685	9.977	9.286	1.292
48	9.977	11.458	10.667	1.482

Z Component: 8 - 48 time gates

VTEM™ system specifications:

Transmitter	Receiver
• Transmitter loop diameter: 17.4 m • Number of turns: 4 • Effective Transmitter loop area: 973 m^2 • Transmitter base frequency: 30 Hz • Peak current: 354.8 A • Pulse width: 4.1 ms • Waveform shape: Bi-polar trapezoid • Peak dipole moment: 337,420 nIA • Average transmitter-receiver loop terrain clearance: 51 metres above the ground	• Z-Coil diameter: 1.2 m • Number of turns: 100 • Effective coil area: 113.04 m^2

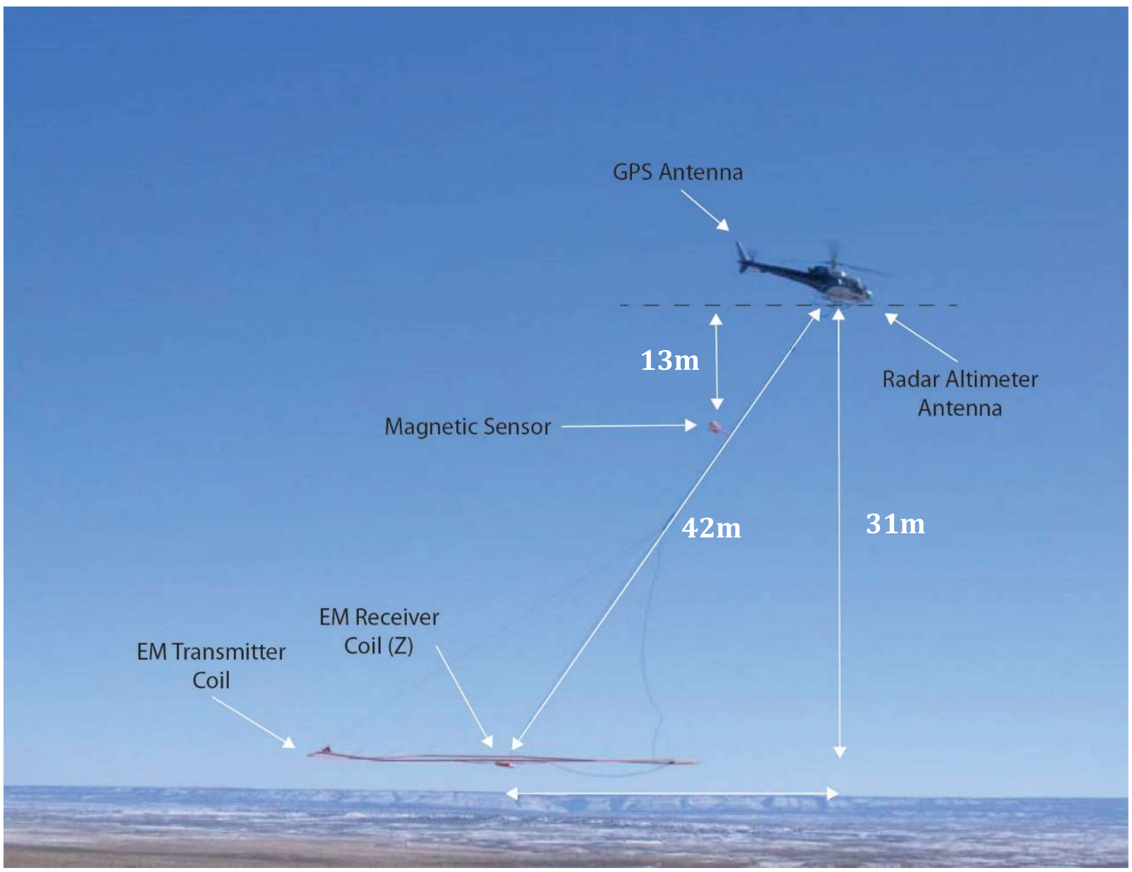

Figure 5: VTEM™ System Configuration.

2.4.3 FULL WAVEFORM VTEM™ SENSOR CALIBRATION

The calibration is performed on the complete VTEM™ system installed in and connected to the helicopter, using special calibration equipment. This calibration takes place on the ground at the start of the project prior to surveying.

The procedure takes half-cycle files acquired and calculates a calibration file consisting of a single stacked half-cycle waveform. The purpose of the stacking is to attenuate natural and man-made magnetic signals, leaving only the response to the calibration signal.

This calibration allows the transfer function between the EM receiver and data acquisition system and also the transfer function of the current monitor and data acquisition system to be determined. These calibration results are then used in VTEM full waveform processing.

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's WAAS (Wide Area Augmentation System) enabled GPS receiver, Geotech navigate software, a full screen display with controls in front of the pilot to direct the flight and a NovAtel GPS antenna mounted on the helicopter tail (Figure 5). As many as 11 GPS and two WAAS satellites may be monitored at any one time. The positional accuracy or circular error probability (CEP) is 1.8 m, with WAAS active, it is 1.0 m. The co-ordinates of the survey area were set-up prior to the survey and the information was fed into the airborne navigation system. The second GPS antenna is installed on the additional magnetic loop together with Gyro Inclinometer.

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

2.5 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 20 metres behind the cabin on the edge of the lake (132° 42'19.50" W, 30° 10'2.62"N); 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.

<u>FIELD:</u>

Project Manager:	Jimmy Morrison (Office)
Data QC:	Nick Venter (Office)
Crew chief:	Vickus Prinsloo
Operator:	Vickus Prinsloo

The survey pilot and the mechanical engineer were employed directly by the helicopter operator – Geotech Aviation.

Pilot:	Mark Light
Mechanical Engineer:	n/a

<u>OFFICE</u>:

Preliminary Data Processing:	Nick Venter
Final Data Processing:	Dmitriy Danchenko Tai-chyi Shei
Data QA/QC:	Kanita Khaled, P.Geo and Data Processing Manager Alexander Prikhodko, P.Geo, PhD
Reporting/Mapping:	Joseli Soares

Processing and Interpretation phases were carried out under the supervision of Alexander Prikhodko, P.Geo, PhD, and Director of Geophysics. The customer relations were looked after by David Hitz.

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 WGS84 Datum, UTM Zone 9 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

The Full Waveform EM specific data processing operations included:

- Half cycle stacking (performed at time of acquisition);
- System response correction;
- Parasitic and drift removal.

A three stage digital filtering process was used to reject major sferic events and to reduce noise levels. 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 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 the B-field and dB/dt responses in the Z component. B-field Z component time channel recorded at 0.880 milliseconds after the termination of the impulse is also presented as a colour image. Calculated Time Constant (TAU) with Calculated Vertical Derivative contours is presented in Appendix C and E. Resistivity Depth Image (RDI) is also presented in Appendix F and G.

VTEM™ receiver coil orientation Z-axis coil is oriented parallel to the transmitter coil axis and both are horizontal to the ground. Generalized modeling results of VTEM data, are shown in Appendix D.

Z component data produce double peak type anomalies for "thin" sub vertical targets and single peak for "thick" targets.

The limits and change-over of "thin-thick" depends on dimensions of a TEM system (Appendix D, Figure D-16).

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 20 metres 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 for best representation of the survey size and line spacing. The coordinate/projection system used was WGS84 Datum, UTM Zone 9 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 a colour magnetic TMI contour map.

- Maps at 1:00,000 in Geosoft MAP format, as follows:

GL180188_20k_dBdtz:	dB/dt profiles Z Component, Time Gates 0.220 – 7.036 ms in linear – logarithmic scale.
GL180188_20k_Bfieldz:	B-field profiles Z Component, Time Gates 0.220 – 7.036 ms in linear – logarithmic scale.
GL180188_20k_BFz10:	B-field late time Z Component Channel 10, Time Gate 0.055 ms colour image.
GL180188_20k_TMI:	Total Magnetic Intensity IGRF Corrected colour image and contours.
GL180188_20k_TauSF:	dB/dt Calculated Time Constant (Tau) with Calculated Vertical Derivative contours

- Maps are also presented in PDF format.
- The topographic data base was derived from 1:50000 NRC (Natural Resources Canada)
- A Google Earth file *GL180188_Aurora.kml* showing the flight path of the block is included. Free versions of Google Earth software from: http://earth.google.com/download-earth.html

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.

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	Units	Description
X:	metres	UTM Easting WGS84 Zone 9 North
Y:	metres	UTM Northing WGS84 Zone 9 North
Longitude:	Decimal Degrees	WGS 84 Longitude data
Latitude:	Decimal Degrees	WGS 84 Latitude data
Z:	metres	GPS antenna elevation (above Geoid)
Zb:	metres	EM bird elevation (above Geoid)
Radar:	metres	Helicopter terrain clearance from radar altimeter
Radarb:	metres	Calculated EM transmitter-receiver loop terrain clearance from radar altimeter
DEM:	metres	Digital Elevation Model
Gtime:	Seconds of the day	GPS time
Mag1:	nT	Total Magnetic Field data
Basemag:	nT	Magnetic diurnal variation data
Mag2:	nT	Diurnal corrected Total Magnetic Field data
Mag3:	nT	Levelled Total Magnetic field data
CVG:	nT/m	Calculated Magnetic Vertical Gradient
SFz[8]:	$pV/(A*m^4)$	Z dB/dt 0.042 millisecond time channel
SFz[9]:	$pV/(A*m^4)$	Z dB/dt 0.048 millisecond time channel
SFz[10]:	$pV/(A*m^4)$	Z dB/dt 0.055 millisecond time channel
SFz[11]:	$pV/(A*m^4)$	Z dB/dt 0.063 millisecond time channel
SFz[12]:	$pV/(A*m^4)$	Z dB/dt 0.073 millisecond time channel
SFz[13]:	$pV/(A*m^4)$	Z dB/dt 0.083 millisecond time channel
SFz[14]:	$pV/(A*m^4)$	Z dB/dt 0.096 millisecond time channel
SFz[15]:	$pV/(A*m^4)$	Z dB/dt 0.110 millisecond time channel
SFz[16]:	$pV/(A*m^4)$	Z dB/dt 0.126 millisecond time channel
SFz[17]:	$pV/(A*m^4)$	Z dB/dt 0.145 millisecond time channel
SFz[18]:	$pV/(A*m^4)$	Z dB/dt 0.167 millisecond time channel
SFz[19]:	$pV/(A*m^4)$	Z dB/dt 0.192 millisecond time channel
SFz[20]:	$pV/(A*m^4)$	Z dB/dt 0.220 millisecond time channel
SFz[21]:	$pV/(A*m^4)$	Z dB/dt 0.253 millisecond time channel
SFz[22]:	$pV/(A*m^4)$	Z dB/dt 0.290 millisecond time channel
SFz[23]:	$pV/(A*m^4)$	Z dB/dt 0.333 millisecond time channel
SFz[24]:	$pV/(A*m^4)$	Z dB/dt 0.383 millisecond time channel
SFz[25]:	$pV/(A*m^4)$	Z dB/dt 0.440 millisecond time channel
SFz[26]:	$pV/(A*m^4)$	Z dB/dt 0.505 millisecond time channel
SFz[27]:	$pV/(A*m^4)$	Z dB/dt 0.580 millisecond time channel
SFz[28]:	$pV/(A*m^4)$	Z dB/dt 0.667 millisecond time channel
SFz[29]:	$pV/(A*m^4)$	Z dB/dt 0.766 millisecond time channel
SFz[30]:	$pV/(A*m^4)$	Z dB/dt 0.880 millisecond time channel
SFz[31]:	$pV/(A*m^4)$	Z dB/dt 1.010 millisecond time channel
SFz[32]:	$pV/(A*m^4)$	Z dB/dt 1.161 millisecond time channel
SFz[33]:	$pV/(A*m^4)$	Z dB/dt 1.333 millisecond time channel
SFz[34]:	$pV/(A*m^4)$	Z dB/dt 1.531 millisecond time channel
SFz[35]:	$pV/(A*m^4)$	Z dB/dt 1.760 millisecond time channel
SFz[36]:	$pV/(A*m^4)$	Z dB/dt 2.021 millisecond time channel
SFz[37]:	$pV/(A*m^4)$	Z dB/dt 2.323 millisecond time channel
SFz[38]:	$pV/(A*m^4)$	Z dB/dt 2.667 millisecond time channel
SFz[39]:	$pV/(A*m^4)$	Z dB/dt 3.063 millisecond time channel
SFz[40]:	$pV/(A*m^4)$	Z dB/dt 3.521 millisecond time channel

Channel name	Units	Description
SFz[41]:	pV/(A*m^4)	Z dB/dt 4.042 millisecond time channel
SFz[42]:	pV/(A*m^4)	Z dB/dt 4.641 millisecond time channel
SFz[43]:	pV/(A*m^4)	Z dB/dt 5.333 millisecond time channel
SFz[44]:	pV/(A*m^4)	Z dB/dt 6.125 millisecond time channel
SFz[45]:	pV/(A*m^4)	Z dB/dt 7.036 millisecond time channel
SFz[46]:	pV/(A*m^4)	Z dB/dt 8.083 millisecond time channel
SFz[47]:	pV/(A*m4)	Z dB/dt 9.286 millisecond time channel
SFz[48]:	pV/(A*m4)	Z dB/dt 10.667 millisecond time channel
BFz	(pV*ms)/(A*m^4)	Z B-Field data for time channels 8 to 48
NchanBF		Latest time channels of TAU calculation
TauBF	ms	Time constant B-Field
NchanSF		Latest time channels of TAU calculation
TauSF	ms	Time constant dB/dt
PLM:		60 Hz power line monitor

Electromagnetic B-field and dB/dt Z component data is found in array channel format between indexes 8 – 48, as described above.

- Database of the Resistivity Depth Images in Geosoft GDB format, containing the following channels:

Table 6: Geosoft Resistivity Depth Image GDB Data Format

Channel name	Units	Description
Xg	metres	UTM Easting WGS84 Zone 9 North
Yg	metres	UTM Northing WGS84 Zone 9 North
Dist:	meters	Distance from the beginning of the line
Depth:	meters	array channel, depth from the surface
Z:	meters	array channel, depth from sea level
AppRes:	Ohm-m	array channel, Apparent Resistivity
TR:	meters	EM system height from sea level
Topo:	meters	digital elevation model
Radarb:	metres	Calculated EM transmitter-receiver loop terrain clearance from radar altimeter
SF:	pV/(A*m^4)	array channel, dB/dT
MAG:	nT	TMI data
CVG:	nT/m	CVG data
DOI:	metres	Depth of Investigation: a measure of VTEM depth effectiveness
PLM:		60Hz Power Line Monitor

- Database of the VTEM Waveform “GL180188_waveform_final.gdb” in Geosoft GDB format, containing the following channels:

Table 7: Geosoft database for the VTEM waveform

Channel name	Units	Description
Time:	milliseconds	Sampling rate interval, 5.2083 microseconds
Tx_Current:	amps	Output current of the transmitter

- Geosoft Resistivity Depth Image Products:

Sections:	Apparent resistivity sections along each line in .GRD and .PDF format
Slices:	Apparent resistivity slices at selected depths from 25m to depth of investigation, at an increment of 25m in .GRD and .PDF format
Voxel:	3D Voxel imaging of apparent resistivity data clipped by digital elevation and depth of investigation

- Grids in Geosoft GRD and GeoTIFF format, as follows:

GL180188_BFz10:	B-Field Z Component Channel 10 (Time Gate 0.055 ms)
GL180188_CVG:	Calculated Vertical Derivative (nT/m)
GL180188_DEM:	Digital Elevation Model (metres)
GL180188_TMI:	Total Magnetic Intensity (nT)
GL180188_SFz13:	dB/dt Z Component Channel 13 (Time Gate 0.083 ms)
GL180188_SFz20:	dB/dt Z Component Channel 20 (Time Gate 0.220 ms)
GL180188_SFz30:	dB/dt Z Component Channel 30 (Time Gate 0.880 ms)
GL180188_TauBF:	B-Field Z Component, Calculated Time Constant (ms)
GL180188_TauSF:	dB/dt Z Component, Calculated Time Constant (ms)

A Geosoft .GRD file has a .GI metadata file associated with it, containing grid projection information. A grid cell size of 20 metres was used.

6. CONCLUSIONS AND RECOMMENDATIONS

A helicopter-borne versatile time domain electromagnetic (VTEM™) geophysical survey has been completed over McCleery Project situated near Teslin, Yukon.

The total area coverage is 41 km^2. Total survey line coverage 454 line kilometres. The principal sensors included a Time Domain EM system, and a magnetometer system. Results have been presented as stacked profiles, and contour colour images at a scale of 1:20,000. A formal Interpretation has not been included in this report.

Based on the geophysical results obtained, much of the survey area is resistive with few conductive anomalies observed beneath the mountainous region making up most of the block. However, within the southwestern extension located over flatter terrain there exists evidence of deeper, larger conductors. Conversely the major magnetic anomalies are concentrated around the western slopes of the mountain range. It is recommended to go forward with a formal interpretation to determine the geological implications of these findings.

Respectfully submitted[2],

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Geotech Ltd.

Dmitriy Danchenko
Geotech Ltd.

Tai-chyi Shei
Geotech Ltd.

Joseli Soares
Geotech Ltd.

Alexander Prikhodko, P.Geo, PhD
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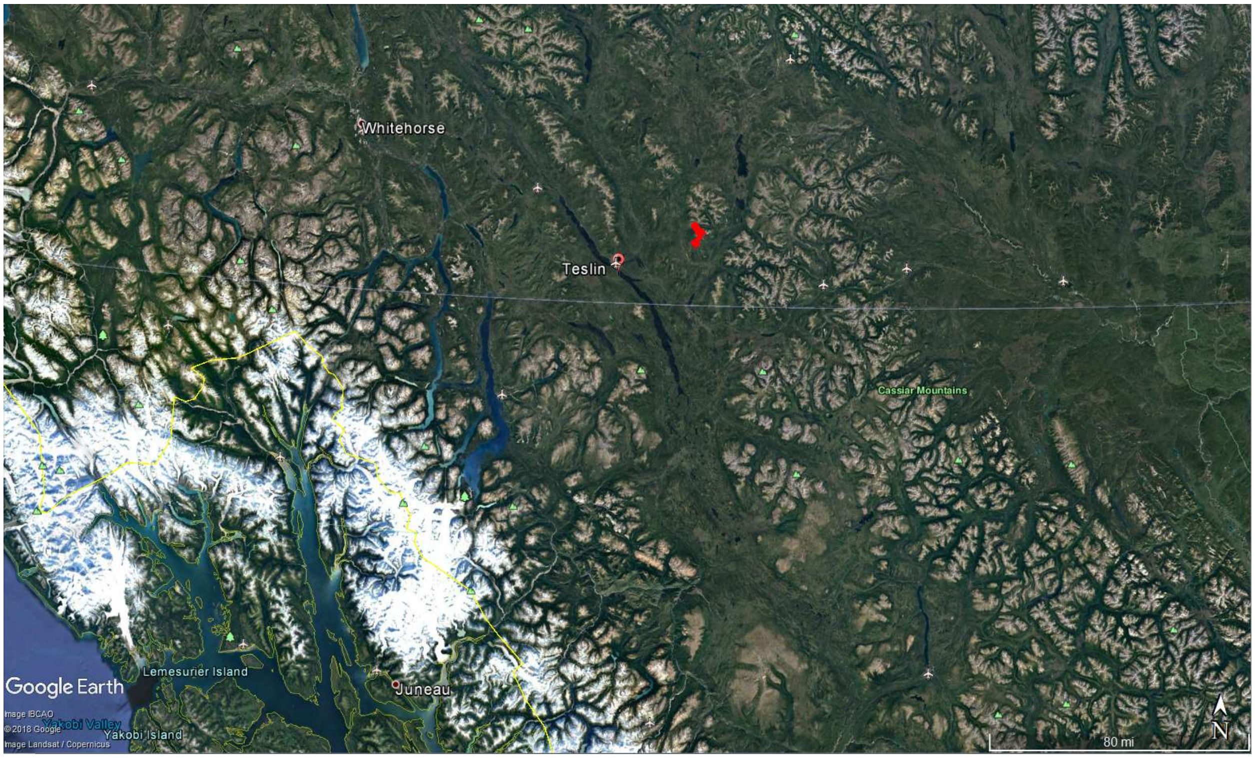
Kanita Khaled, P.Geo
Geotech Ltd.

November, 2018.

[2] Final data processing of the EM and magnetic data were carried out by Tai-chyi Shei and Keeme Mokubung, from the office of Geotech Ltd. in Aurora, Ontario, under the supervision of Geoffrey Plastow, P.Geo. Data Processing Manager.

APPENDIX A

SURVEY AREA LOCATION MAP



Overview of the Survey Area

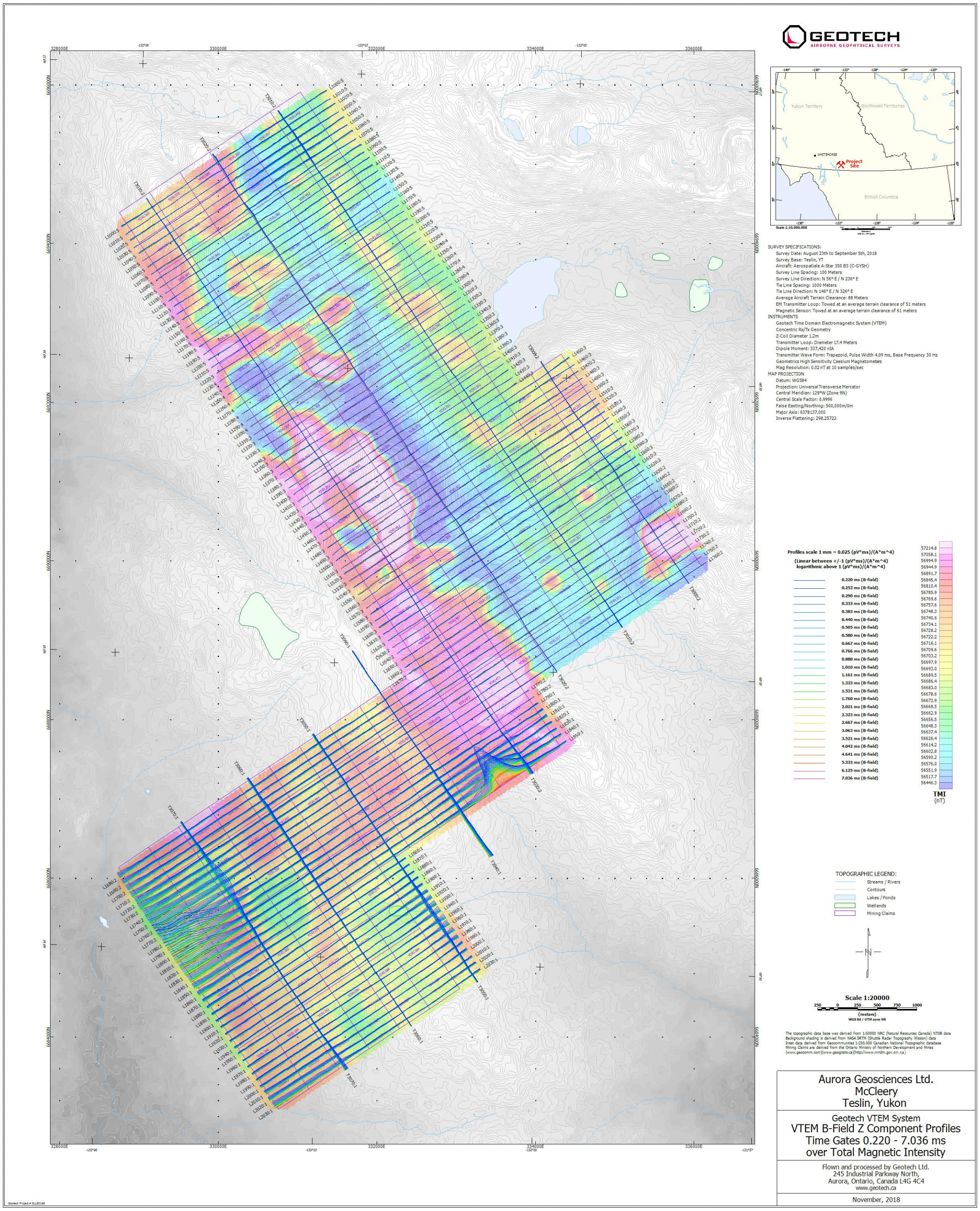
APPENDIX B

SURVEY AREA COORDINATES

(WGS 84, UTM Zone 9 North)

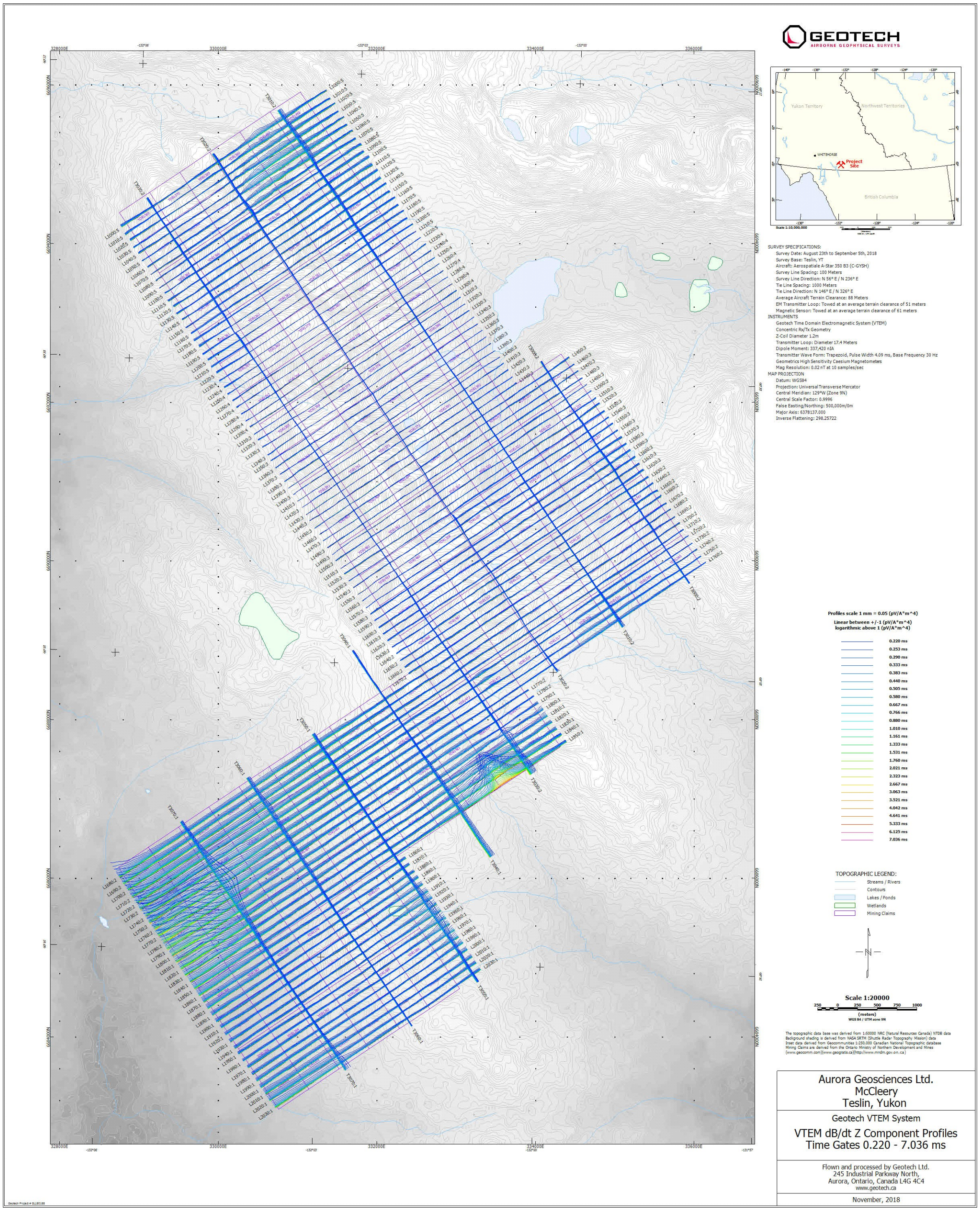
X	Y
336090	6689940
334322	6692608
333710	6692200
331277	6695951
328784	6694284
332474	6688592
328754	6686122
330771	6683135
333265	6684803
332261	6686291
334342	6687673
333809	6688419
336090	6689940

APPENDIX C - GEOPHYSICAL MAPS[1]

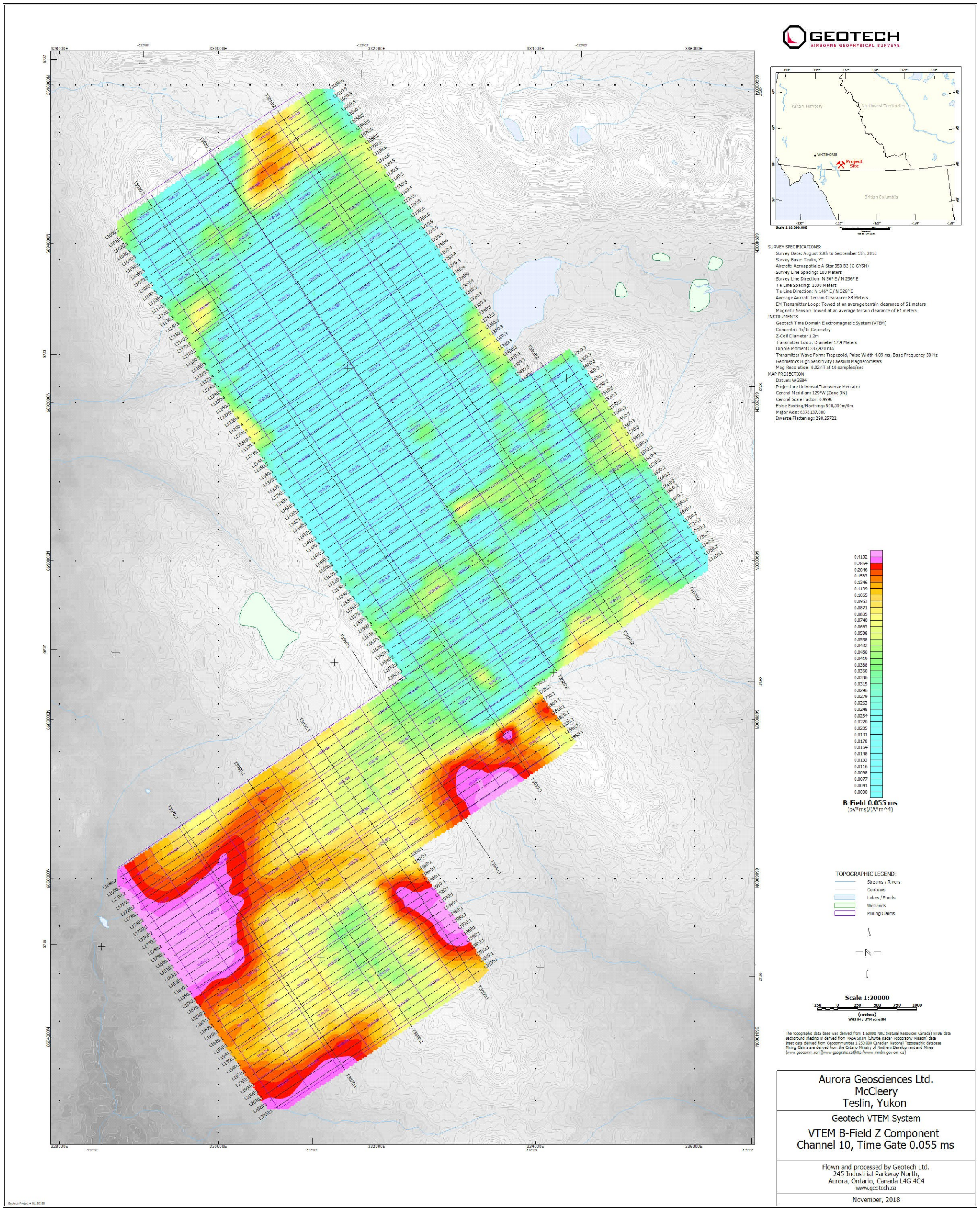


VTEM B-Field Z Component Profiles, Time Gates 0.220 to 7.036 ms

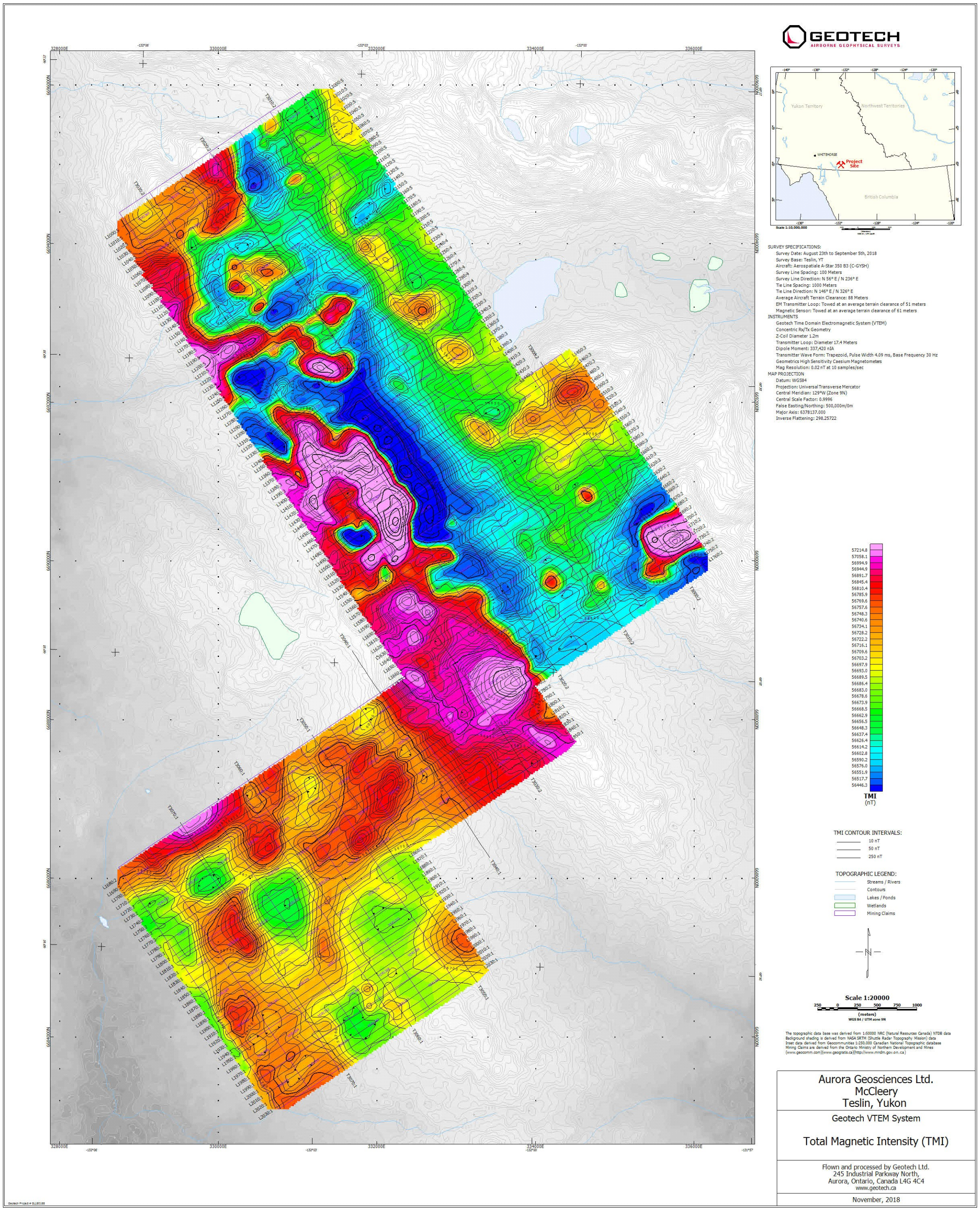
[1] Complete full size geophysical maps are also available in PDF format located in the final data maps folder



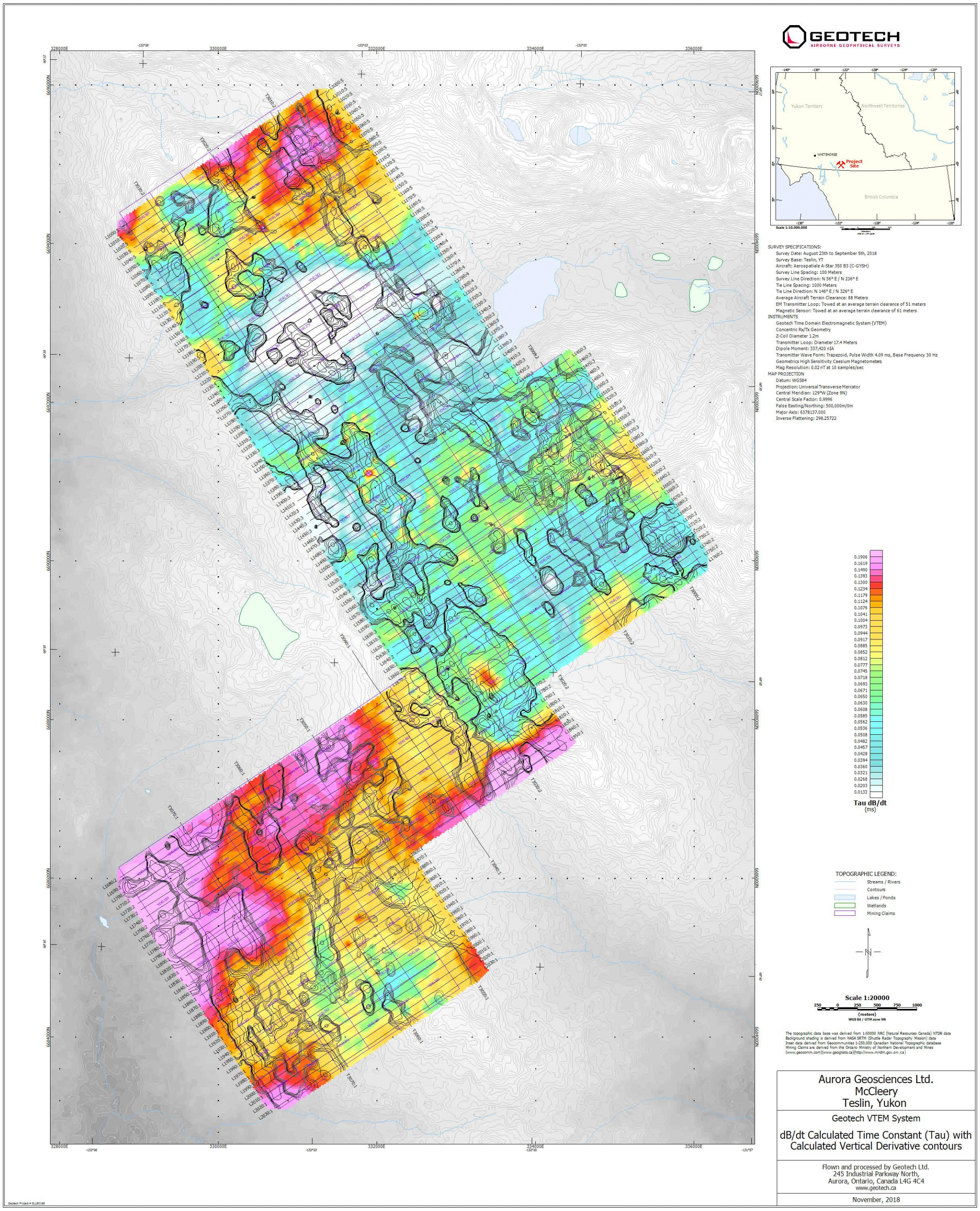
VTEM dB/dt Z Component Profiles, Time Gates 0.220 to 7.036 ms



VTEM B-Field Z Component Channel 10, Time Gate 0.055 ms

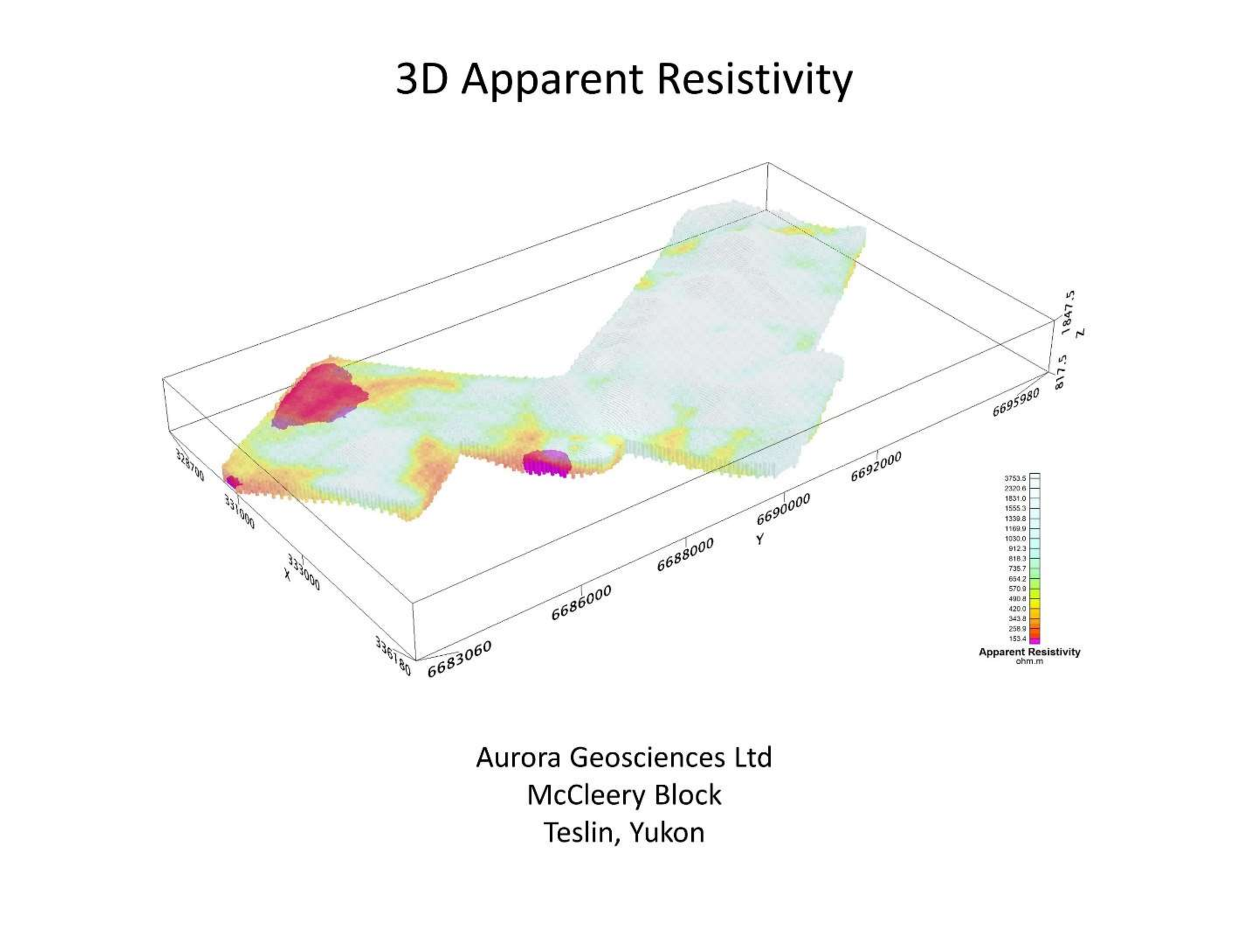


Total Magnetic Intensity



dB/dt Calculated Time Constant (Tau) with Calculated Vertical Derivative contours

RESISTIVITY DEPTH IMAGE (RDI) MAPS



3D Resistivity-Depth Image (RDI)

APPENDIX D

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 transmitter loop that produces a primary field. The wave form is a bi-polar, modified square wave with a turn-on and turn-off at each end.

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.

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.

A set of models has been produced for the Geotech VTEM™ system dB/dT Z and X components (see models D1 to D15). The Maxwell ™ modeling program (EMIT Technology Pty. Ltd. Midland, WA, 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.

As the plate dips and departs from the vertical position, the peaks become asymmetrical.

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.

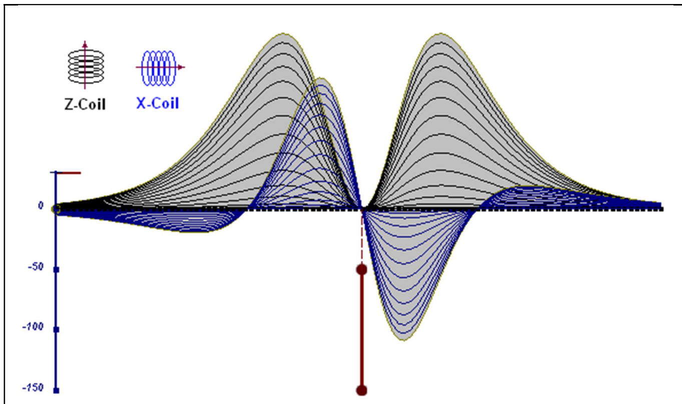


Figure D-1: vertical thin plate

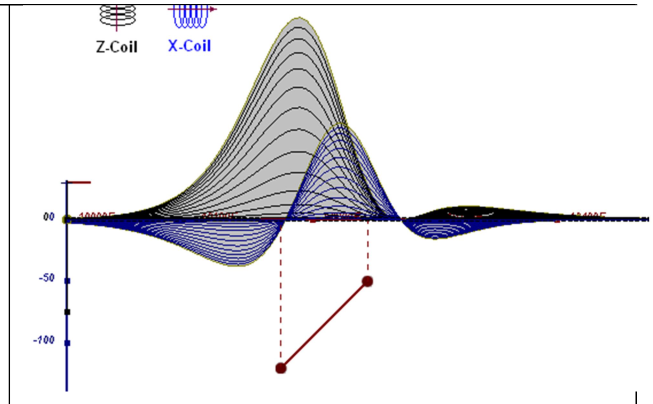


Figure D-2: inclined thin plate

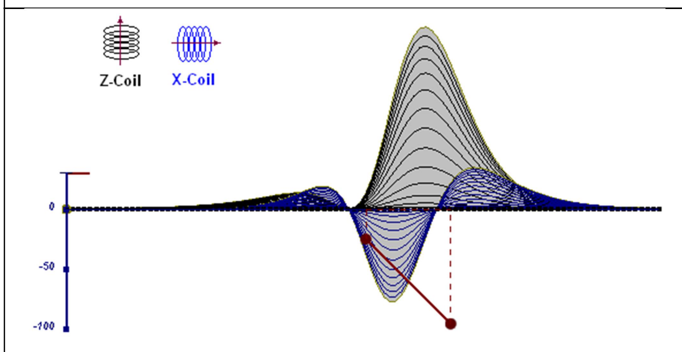


Figure D-3: inclined thin plate

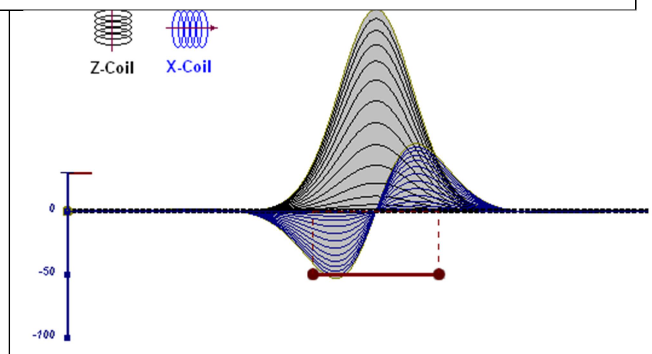


Figure D-4: horizontal thin plate

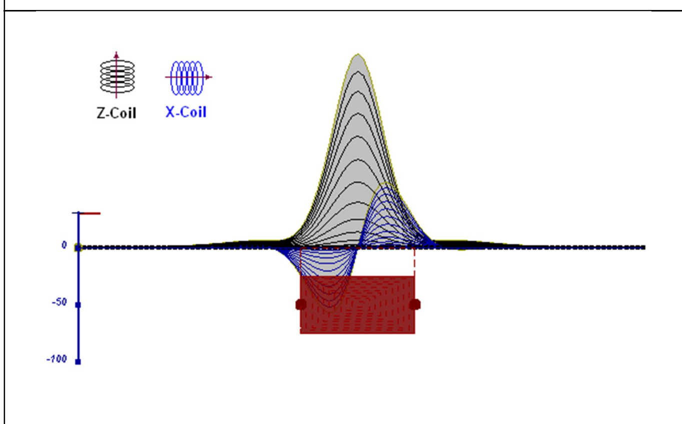


Figure D-5: horizontal thick plate (linear scale of the response)

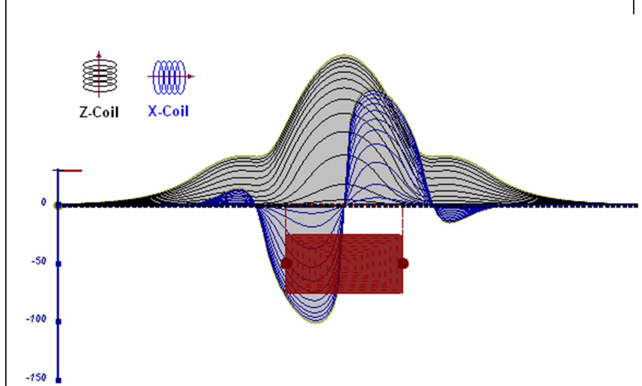


Figure D-6: horizontal thick plate (log scale of the response)

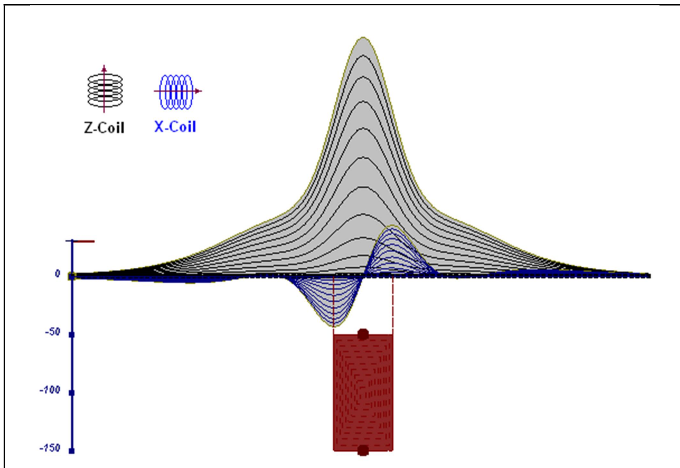


Figure D-7: vertical thick plate (linear scale of the response). 50 m depth

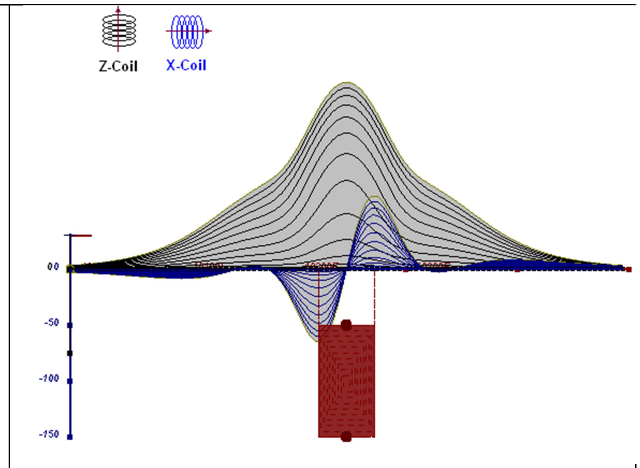


Figure D-8: vertical thick plate (log scale of the response). 50 m depth

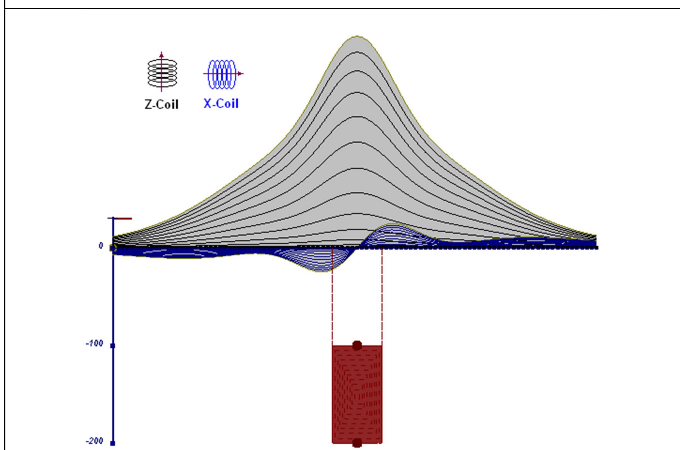


Figure D-9: vertical thick plate (linear scale of the response). 100 m depth

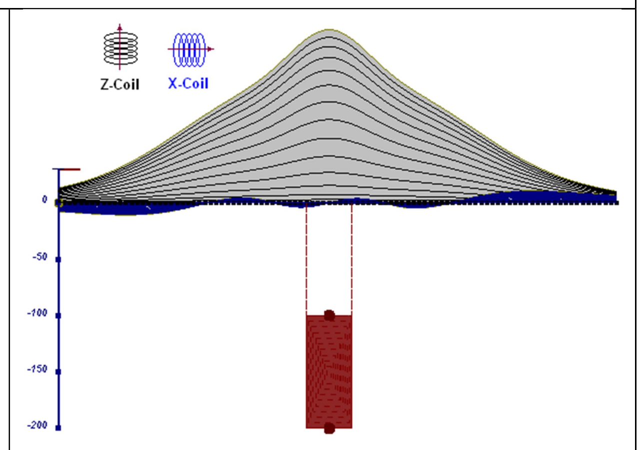


Figure D-10: vertical thick plate (linear scale of the response). Depth / horizontal thickness=2.5

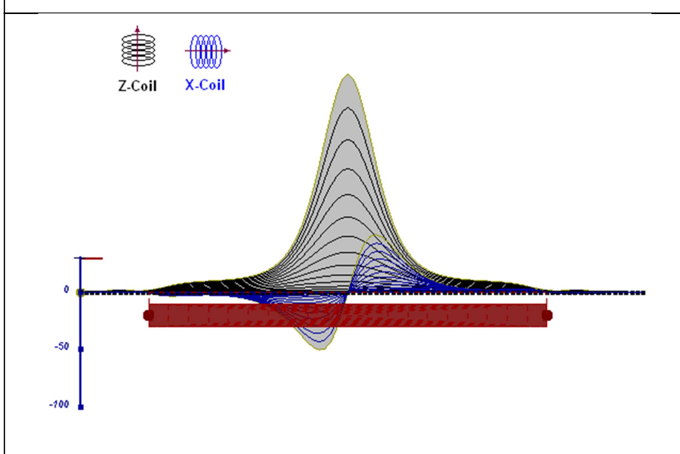


Figure D-11: horizontal thick plate (linear scale of the response)

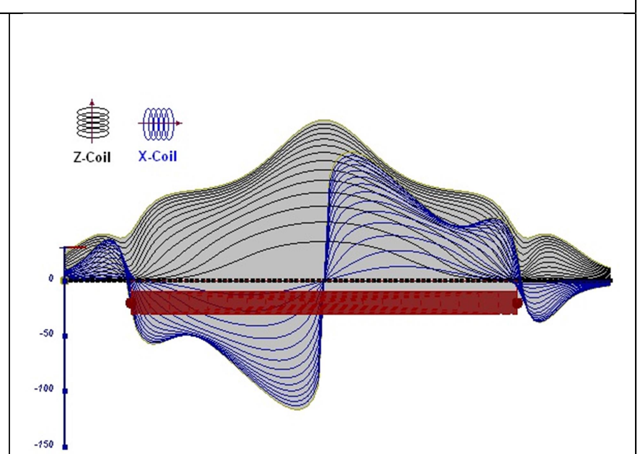


Figure D-12: horizontal thick plate (log scale of the response)

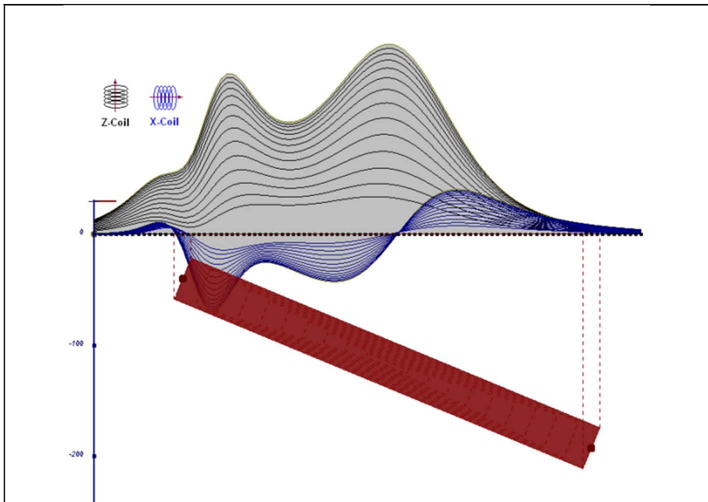


Figure D-13: inclined long thick plate

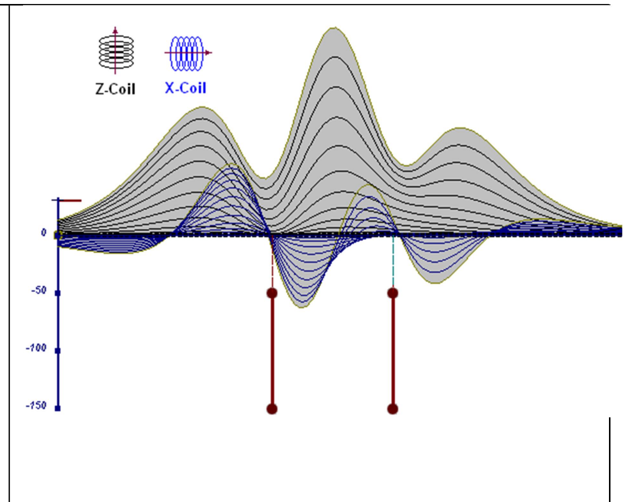


Figure D-14: two vertical thin plates

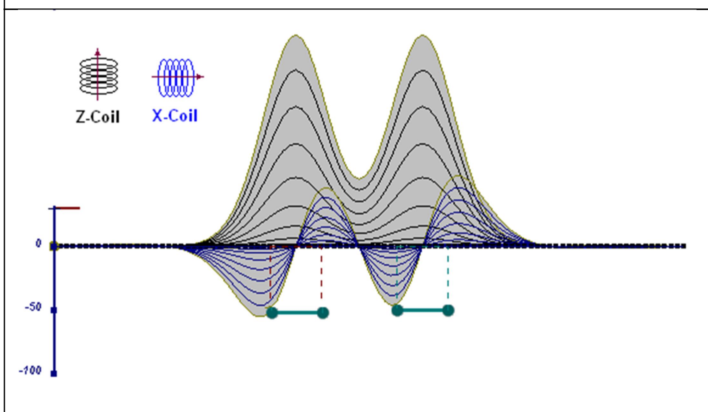


Figure D-15: two horizontal thin plates

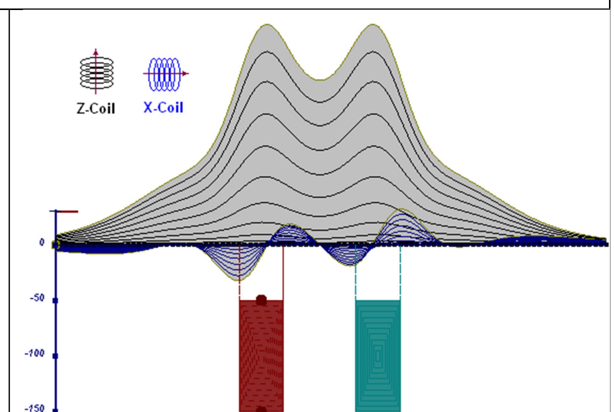


Figure D-16: two vertical thick plates

The same type of target but with different thickness, for example, creates different form of the response:

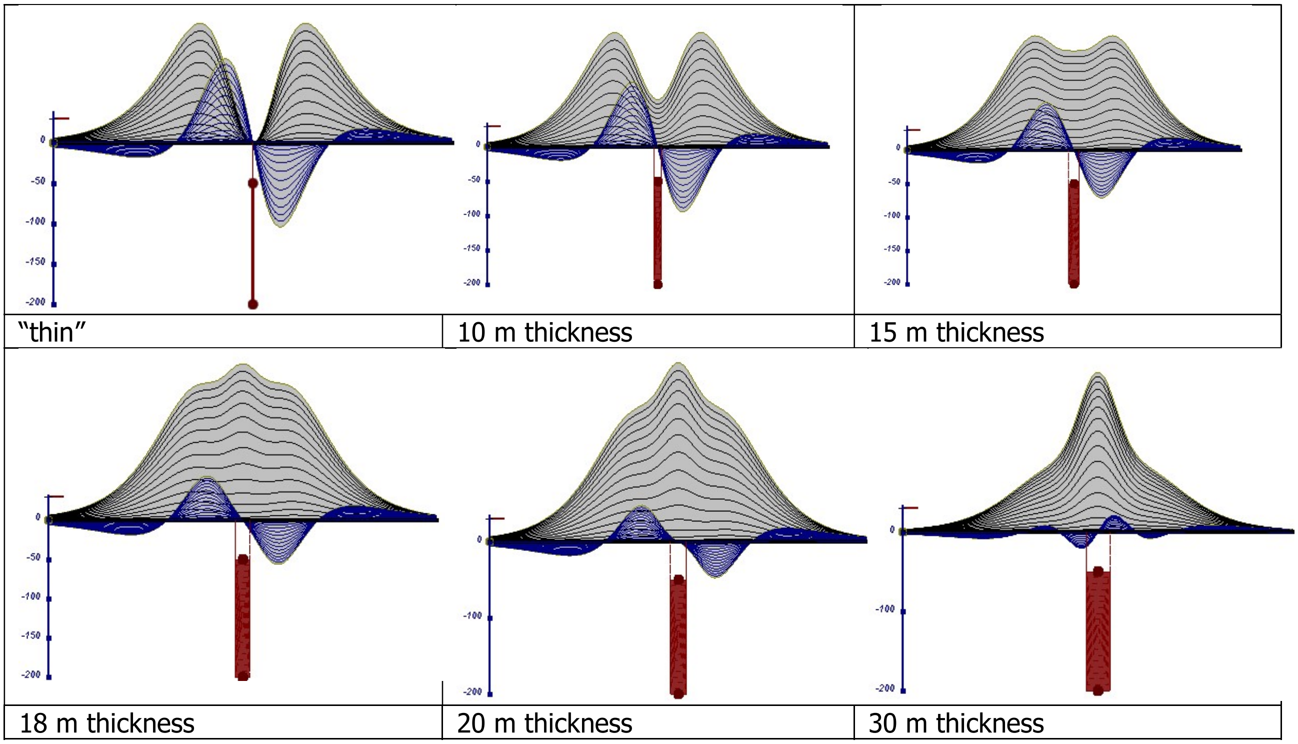


Figure D-17: Conductive vertical plate, depth 50 m, strike length 200 m, depth extends 150 m.

Alexander Prikhodko, PhD, P.Geo
Geotech Ltd.

September 2010

APPENDIX E

EM TIME CONSTANT (TAU) ANALYSIS

Estimation of time constant parameter[1] in transient electromagnetic method is one of the steps toward the extraction of the information about conductances beneath the surface from TEM measurements.

The most reliable method to discriminate or rank conductors from overburden, background or one and other is by calculating the EM field decay time constant (TAU parameter), which directly depends on conductance despite their depth and accordingly amplitude of the response.

THEORY

As established in electromagnetic theory, the magnitude of the electro-motive force (emf) induced is proportional to the time rate of change of primary magnetic field at the conductor. This emf causes eddy currents to flow in the conductor with a characteristic transient decay, whose Time Constant (Tau) is a function of the conductance of the survey target or conductivity and geometry (including dimensions) of the target. The decaying currents generate a proportional secondary magnetic field, the time rate of change of which is measured by the receiver coil as induced voltage during the Off time.

The receiver coil output voltage (**e_0**) is proportional to the time rate of change of the secondary magnetic field and has the form,

$$e_0 \; \alpha \; (1 / \tau) \; e^{-(t/\tau)}$$

Where,
τ = L/R is the characteristic time constant of the target (TAU)
R = resistance
L = inductance

From the expression, conductive targets that have small value of resistance and hence large value of τ yield signals with small initial amplitude that decays relatively slowly with progress of time. Conversely, signals from poorly conducting targets that have large resistance value and small τ, have high initial amplitude but decay rapidly with time[1] (Fig. E1).

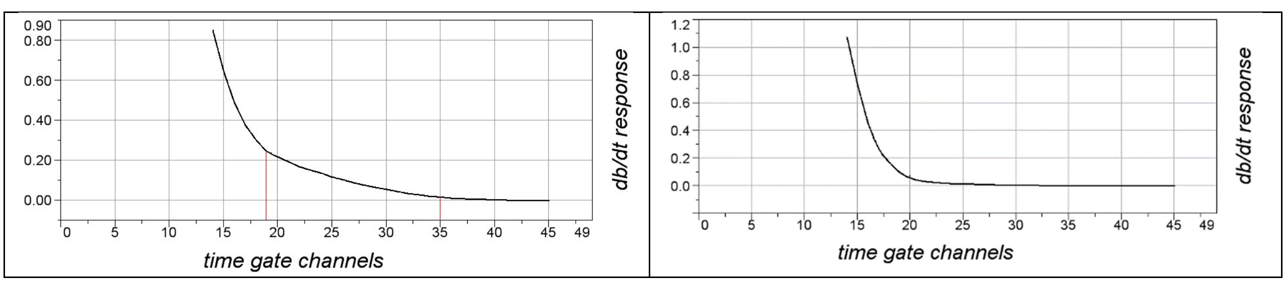


Figure E-1: Left – presence of good conductor, right – poor conductor.

[1] McNeill, JD, 1980, "Applications of Transient Electromagnetic Techniques", Technical Note TN-7 page 5, Geonics Limited, Mississauga, Ontario.

EM Time Constant (Tau) Calculation

The EM Time-Constant (TAU) is a general measure of the speed of decay of the electromagnetic response and indicates the presence of eddy currents in conductive sources as well as reflecting the "conductance quality" of a source. Although TAU can be calculated using either the measured dB/dt decay or the calculated B-field decay, dB/dt is commonly preferred due to better stability (S/N) relating to signal noise. Generally, TAU calculated on base of early time response reflects both near surface overburden and poor conductors whereas, in the late ranges of time, deep and more conductive sources, respectively. For example early time TAU distribution in an area that indicates conductive overburden is shown in Figure 2.

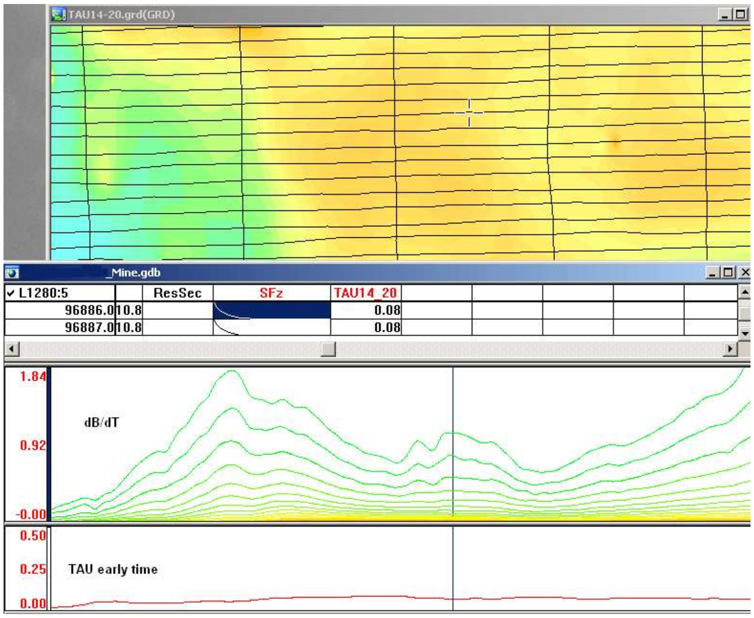


Figure E-2: Map of early time TAU. Area with overburden conductive layer and local sources.

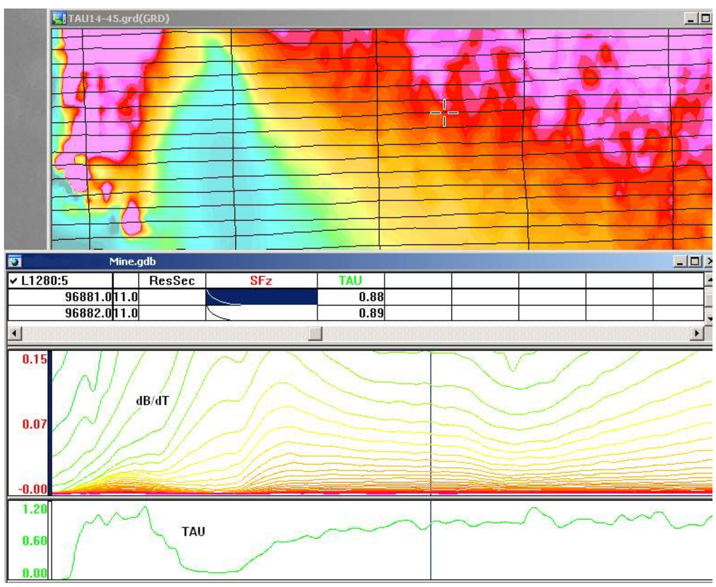


Figure E-3: Map of full time range TAU with EM anomaly due to deep highly conductive target.

There are many advantages of TAU maps:

- TAU depends only on one parameter (conductance) in contrast to response magnitude;
- TAU is integral parameter, which covers time range and all conductive zones and targets are displayed independently of their depth and conductivity on a single map.
- Very good differential resolution in complex conductive places with many sources with different conductivity.
- Signs of the presence of good conductive targets are amplified and emphasized independently of their depth and level of response accordingly.

In the example shown in Figure 4 and 5, three local targets are defined, each of them with a different depth of burial, as indicated on the resistivity depth image (RDI). All are very good conductors but the deeper target (number 2) has a relatively weak dB/dt signal yet also features the strongest total TAU (Figure 4). This example highlights the benefit of TAU analysis in terms of an additional target discrimination tool.

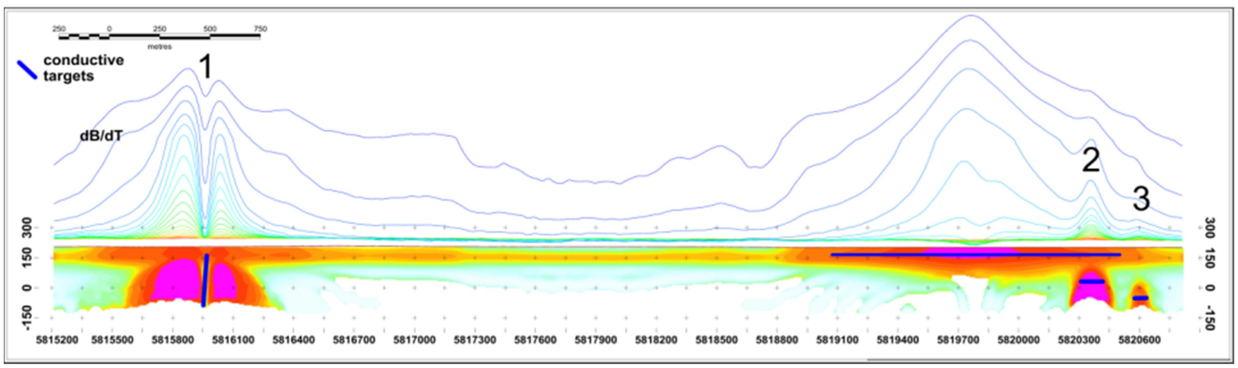


Figure E-4: dB/dt profile and RDI with different depths of targets.

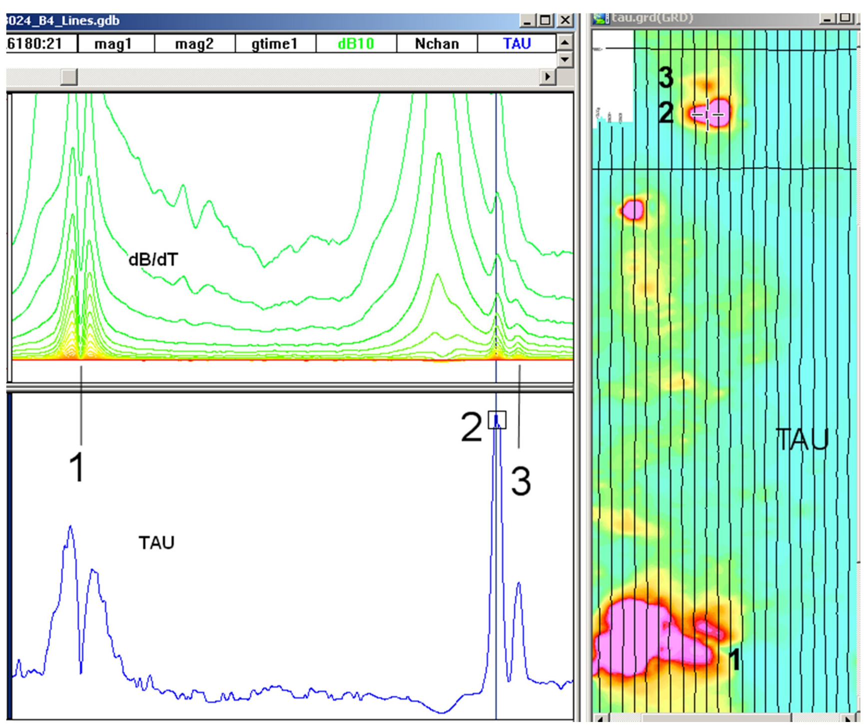


Figure E-5: Map of total TAU and dB/dt profile.

The EM Time Constants for dB/dt and B-field were calculated using the "sliding Tau" in-house program developed at Geotech[2]. The principle of the calculation is based on using of time window (4 time channels) which is sliding along the curve decay and looking for latest time channels which have a response above the level of noise and decay. The EM decays are obtained from all available decay channels, starting at the latest channel. Time constants are taken from a least square fit of a straight-line (log/linear space) over the last 4 gates above a pre-set signal threshold level (Figure F6). Threshold settings are pointed in the "label" property of TAU database channels. The sliding Tau method determines that, as the amplitudes increase, the time-constant is taken at progressively later times in the EM decay. Conversely, as the amplitudes decrease, Tau is taken at progressively earlier times in the decay. If the maximum signal amplitude falls below the threshold, or becomes negative for any of the 4 time gates, then Tau is not calculated and is assigned a value of "dummy" by default.

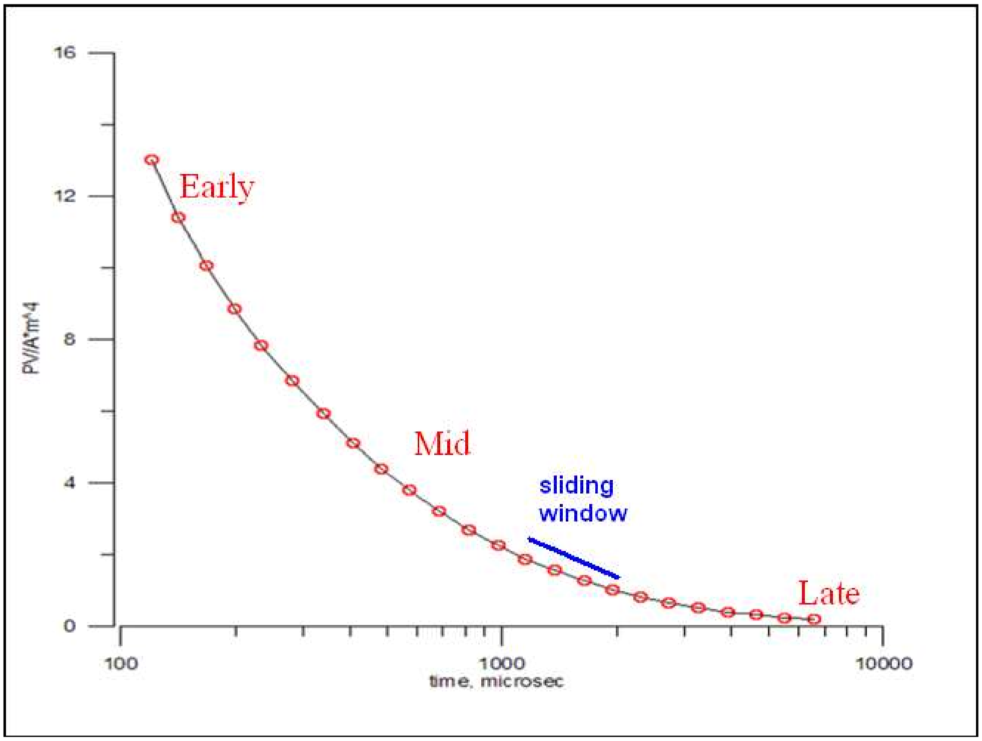


Figure E-6: Typical dB/dt decays of VTEM data

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September 2010

[2] by A.Prikhodko

APPENDIX F

TEM RESISTIVITY DEPTH IMAGING (RDI)

Resistivity depth imaging (RDI) is technique used to rapidly convert EM profile decay data into an equivalent resistivity versus depth cross-section, by deconvolving the measured TEM data.
The used RDI algorithm of Resistivity-Depth transformation is based on scheme of the apparent resistivity transform of Maxwell A.Meju (1998)[1] and TEM response from conductive half-space. The program is developed by Alexander Prikhodko and depth calibrated based on forward plate modeling for VTEM system configuration (Fig. 1-10).

RDIs provide reasonable indications of conductor relative depth and vertical extent, as well as accurate 1D layered-earth apparent conductivity/resistivity structure across VTEM flight lines. Approximate depth of investigation of a TEM system, image of secondary field distribution in half space, effective resistivity, initial geometry and position of conductive targets is the information obtained on base of the RDIs.

Maxwell forward modeling with RDI sections from the synthetic responses (VTEM system).

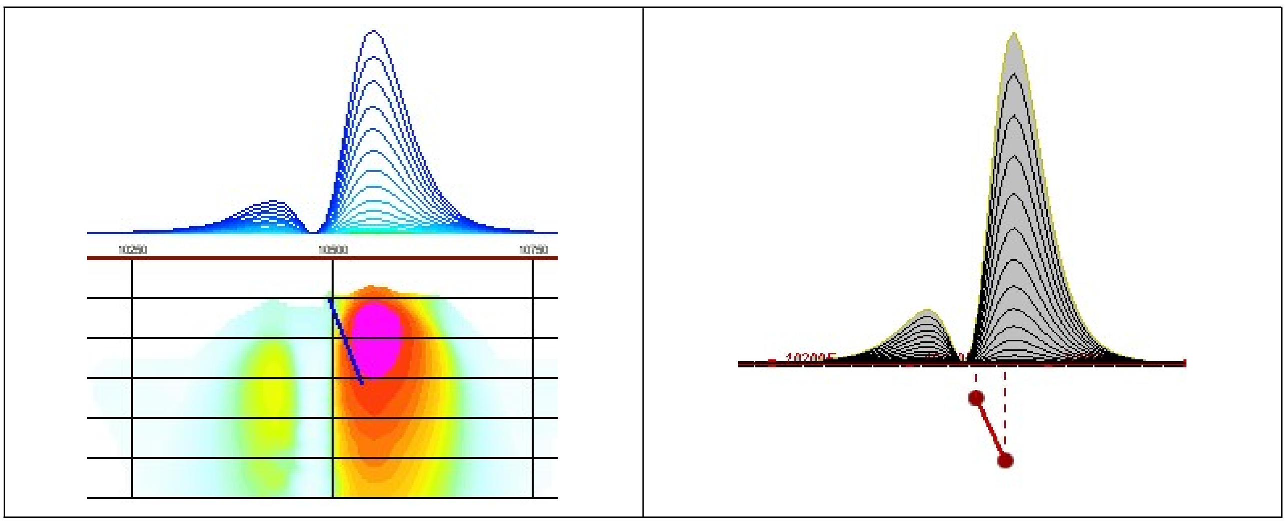


Figure F-1: Maxwell plate model and RDI from the calculated response for conductive "thin" plate (depth 50 m, dip 65 degree, depth extend 100 m).

[1] Maxwell A.Meju, 1998, Short Note: A simple method of transient electromagnetic data analysis, Geophysics, **63**, 405–410.

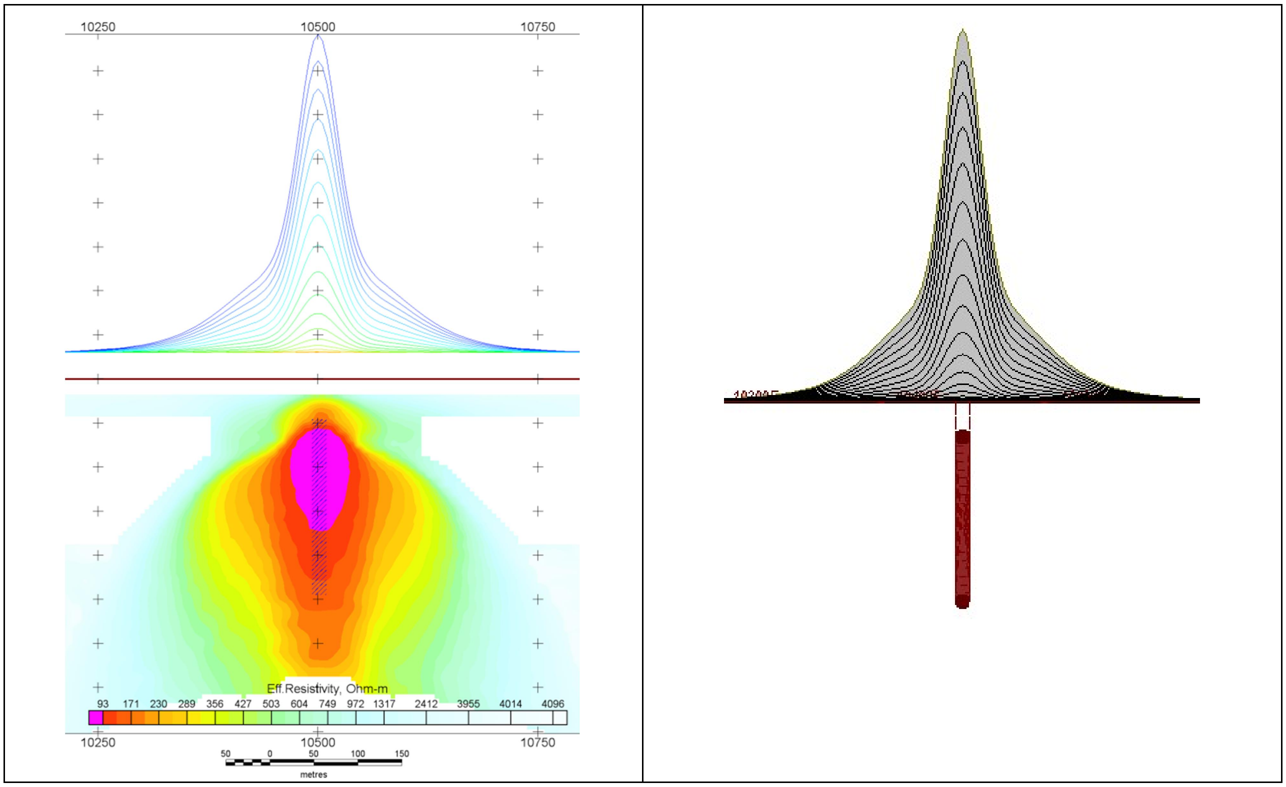


Figure F-2: Maxwell plate model and RDI from the calculated response for "thick" plate 18 m thickness, depth 50 m, depth extend 200 m).

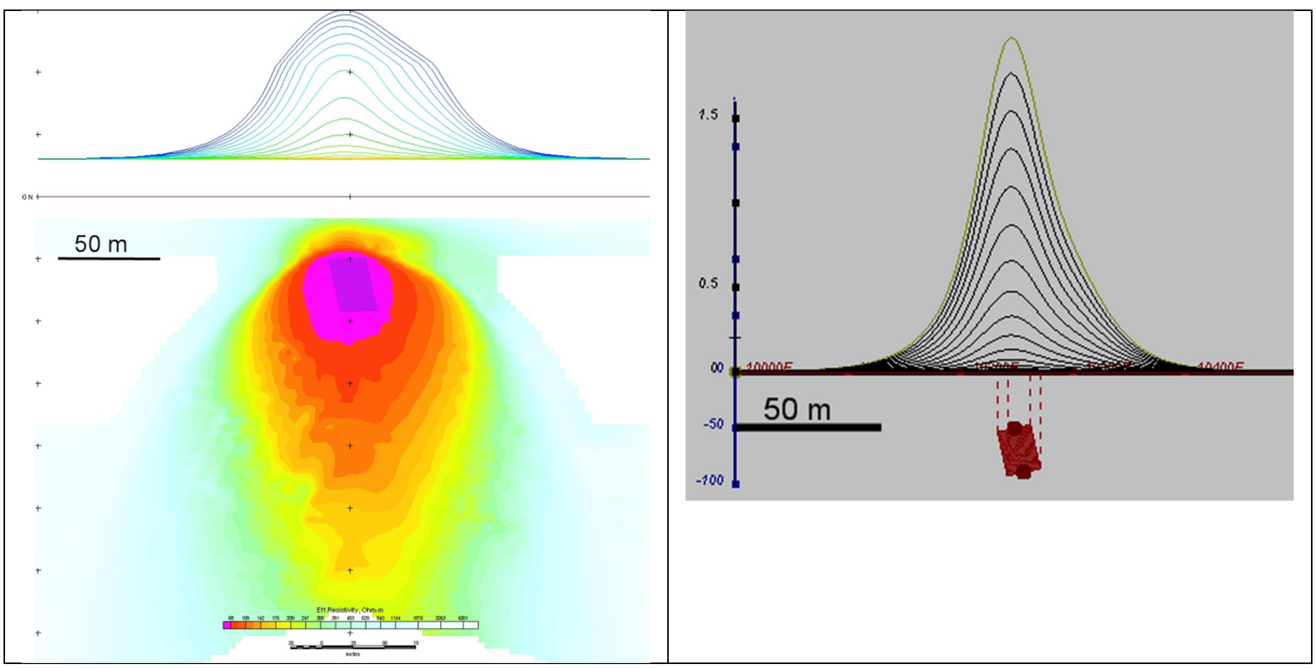


Figure F-3: Maxwell plate model and RDI from the calculated response for bulk ("thick") 100 m length, 40 m depth extend, 30 m thickness

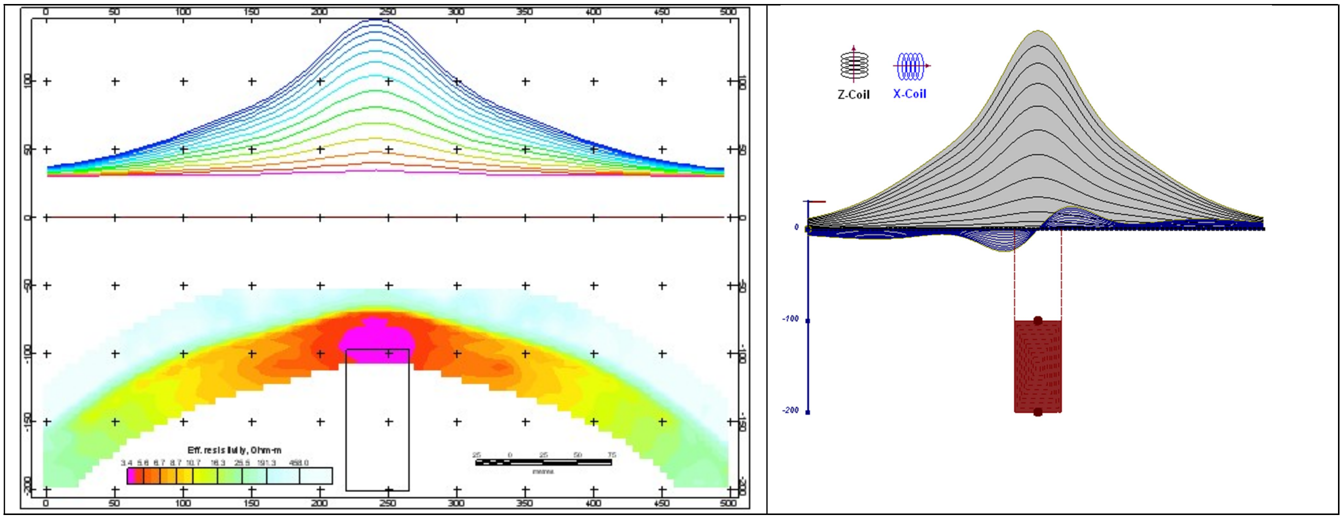


Figure F-4: Maxwell plate model and RDI from the calculated response for "thick" vertical target (depth 100 m, depth extend 100 m). 19-44 chan.

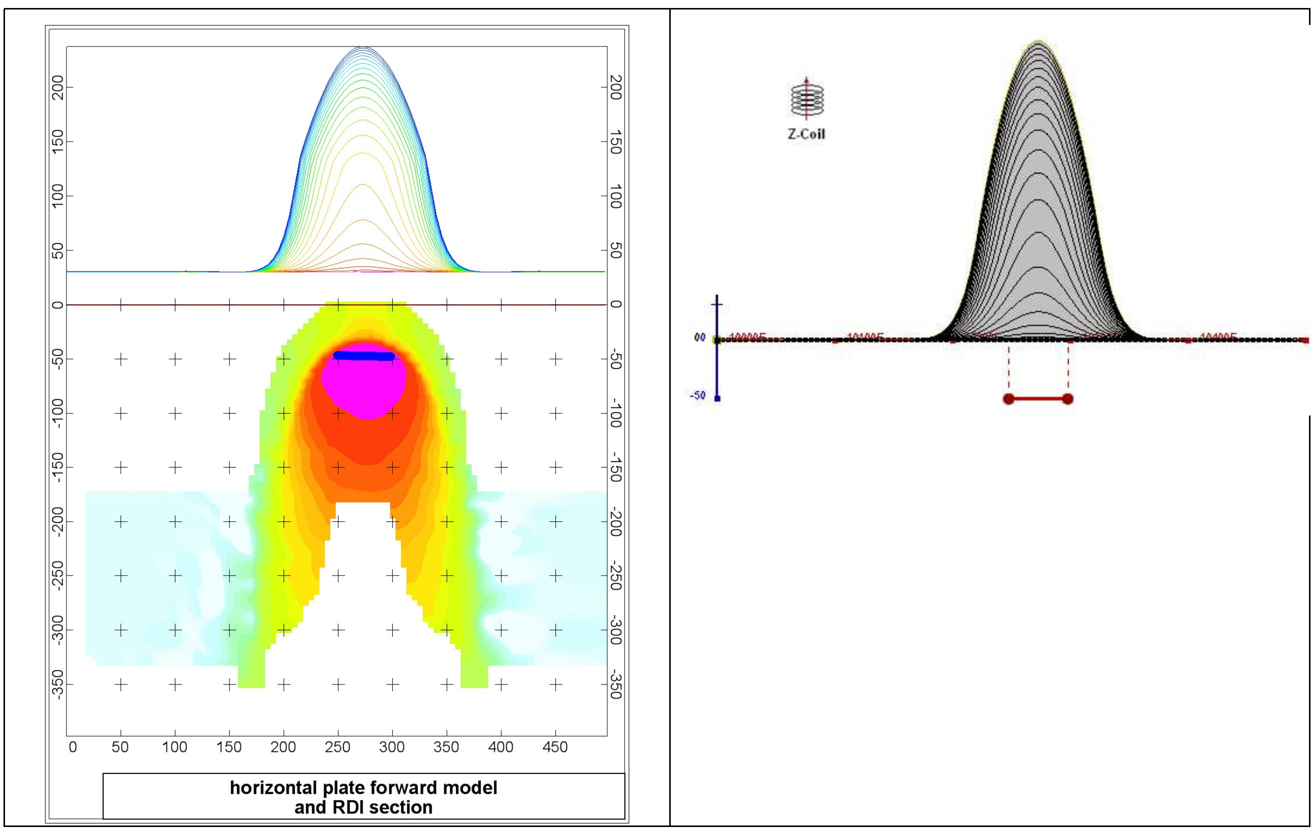


Figure F-5: Maxwell plate model and RDI from the calculated response for horizontal thin plate (depth 50 m, dim 50x100 m). 15-44 chan.

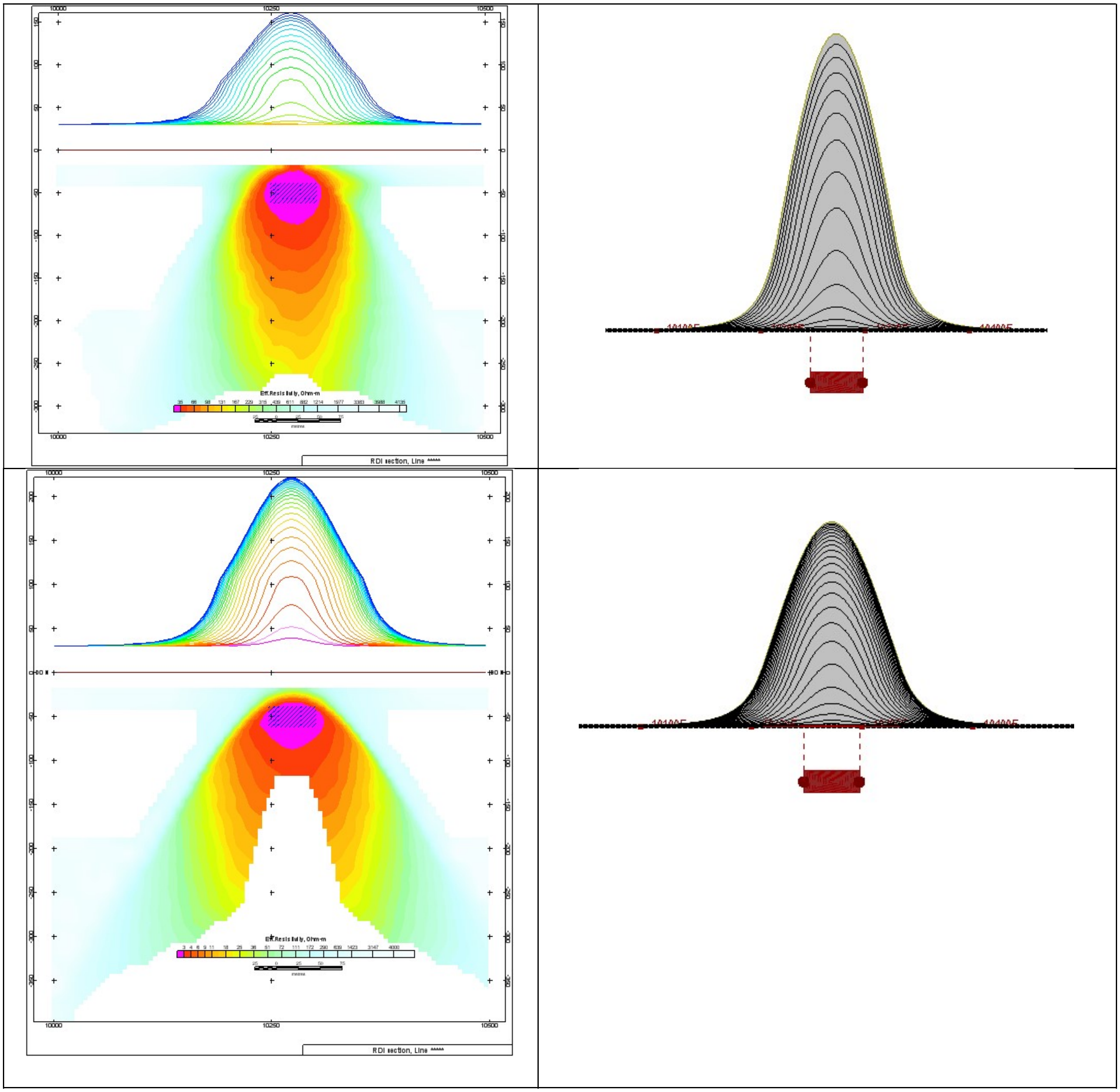


Figure F-6: Maxwell plate model and RDI from the calculated response for horizontal thick (20m) plate – less conductive (on the top), more conductive (below).

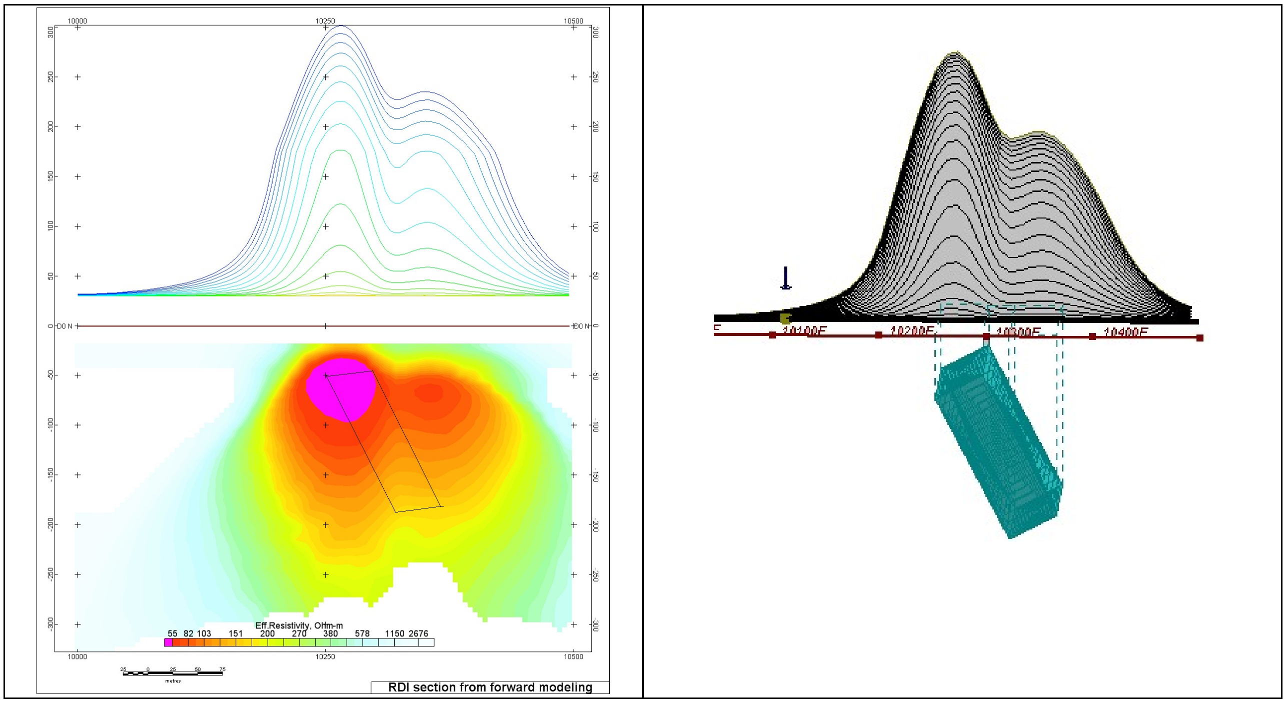


Figure F-7: Maxwell plate model and RDI from the calculated response for inclined thick (50m) plate. Depth extends 150 m, depth to the target 50 m.

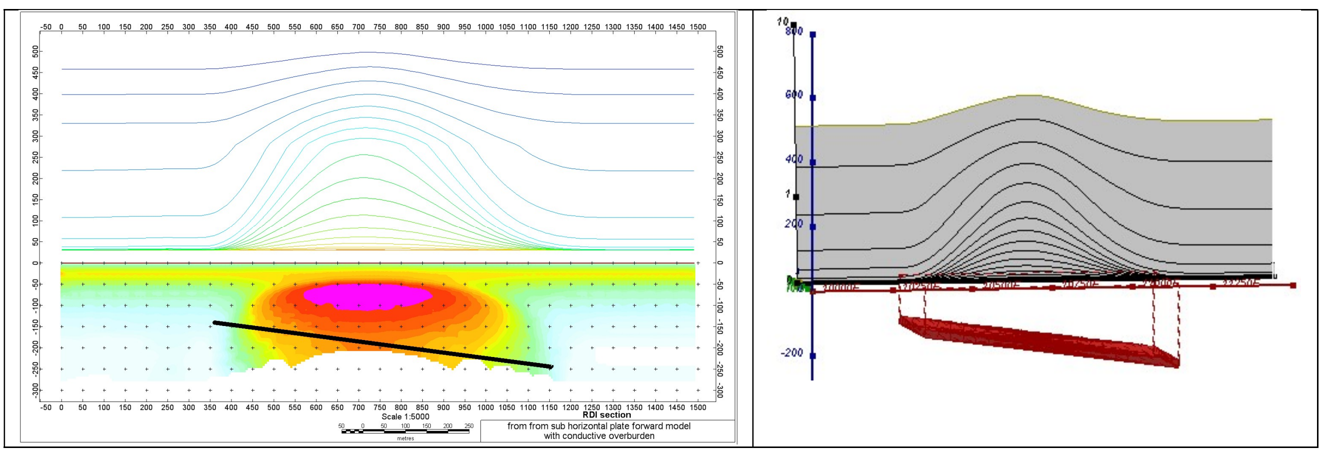


Figure F-8: Maxwell plate model and RDI from the calculated response for the long, wide and deep subhorizontal plate (depth 140 m, dim 25x500x800 m) with conductive overburden.

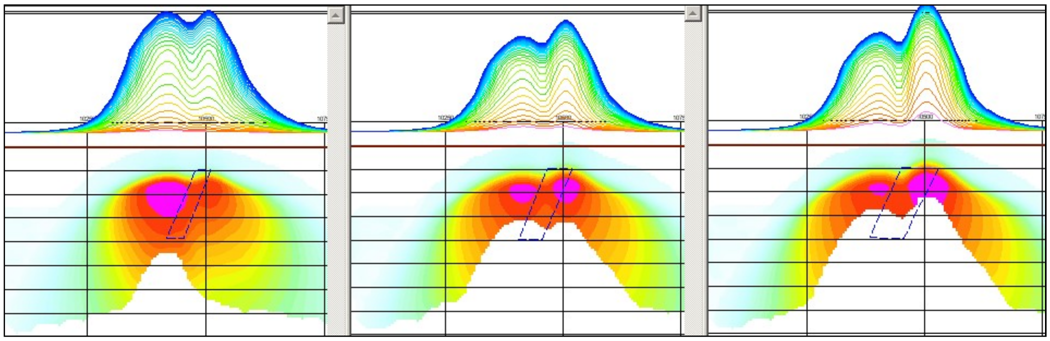


Figure F-9: Maxwell plate models and RDIs from the calculated response for “thick” dipping plates (35, 50, 75 m thickness), depth 50 m, conductivity 2.5 S/m.

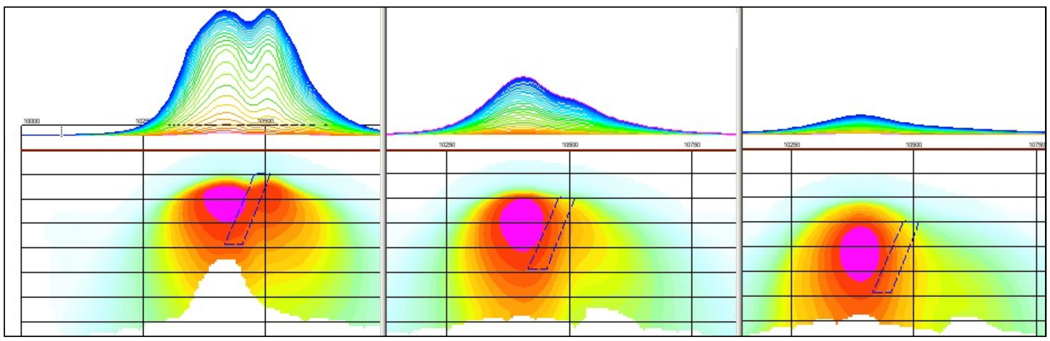


Figure F-10: Maxwell plate models and RDIs from the calculated response for “thick” (35 m thickness) dipping plate on different depth (50, 100, 150 m), conductivity 2.5 S/m.

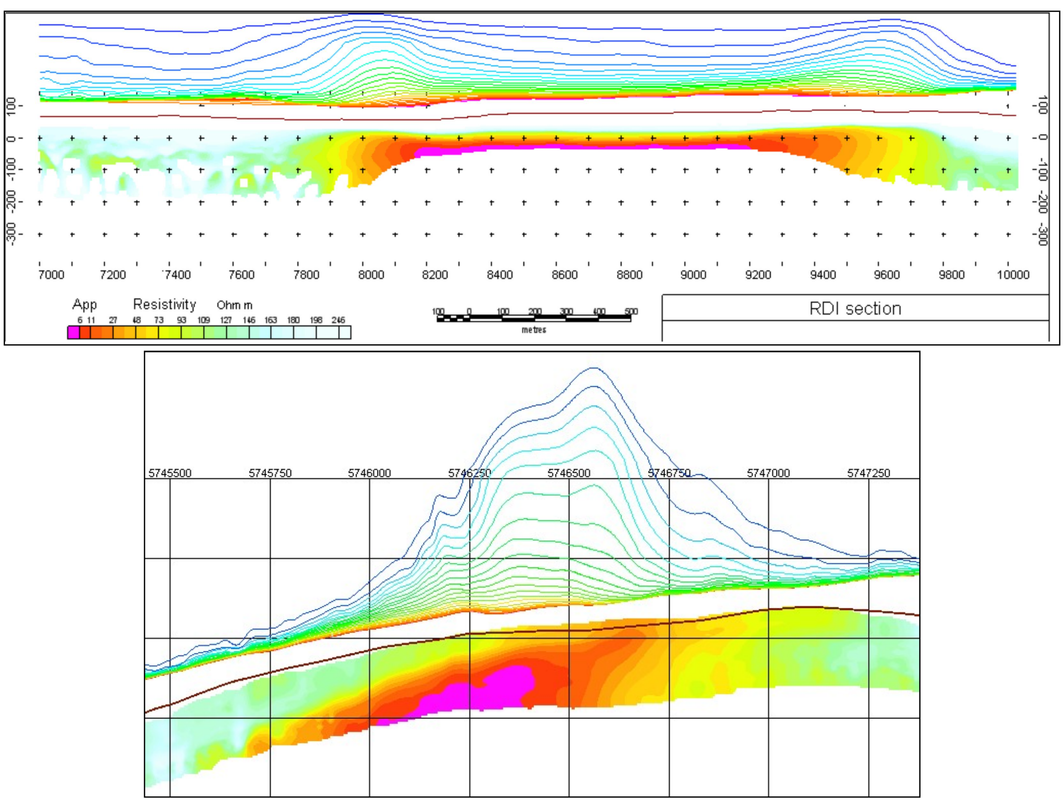
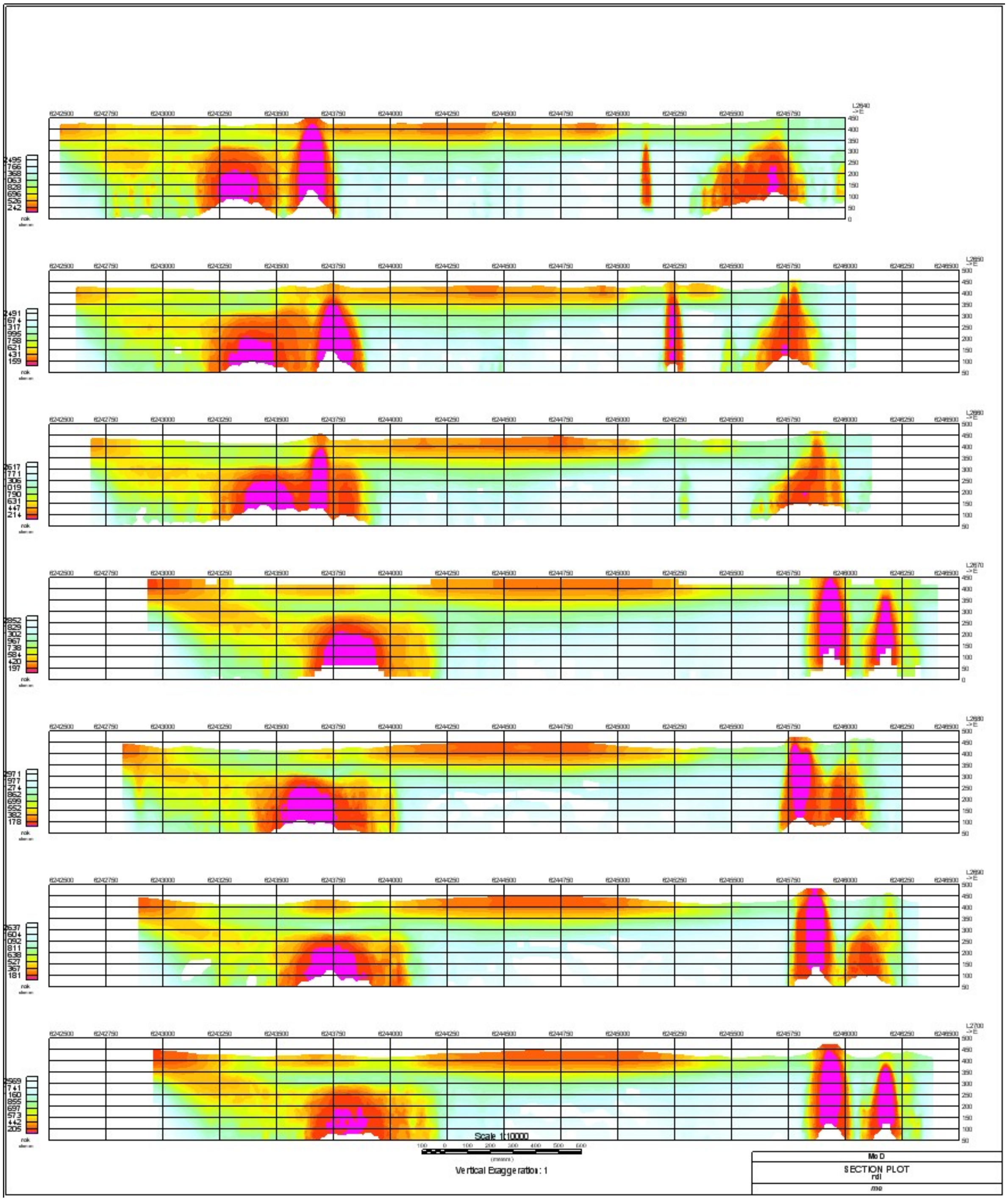


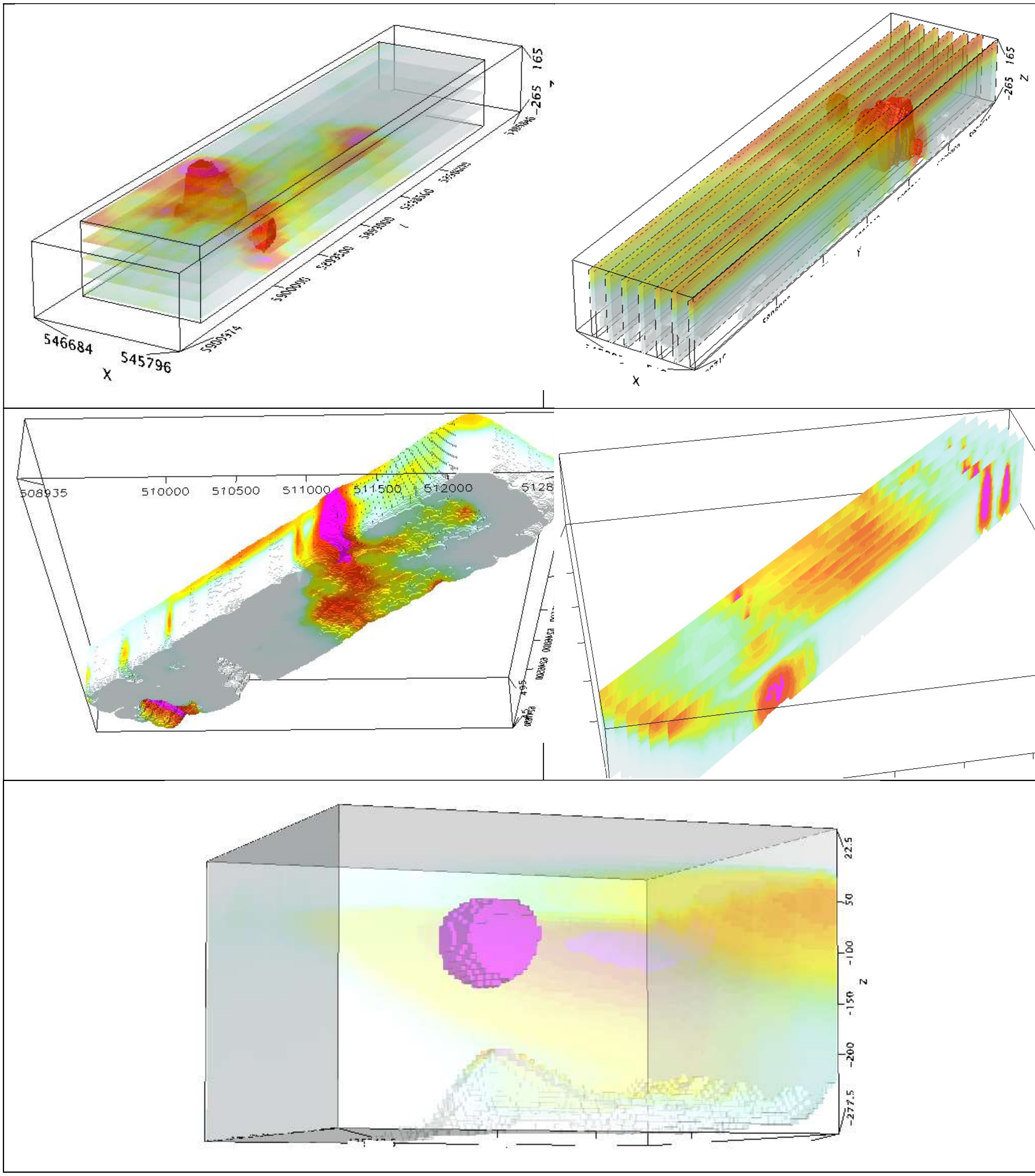
Figure F-11: RDI section for the real horizontal and slightly dipping conductive layers

FORMS OF RDI PRESENTATION

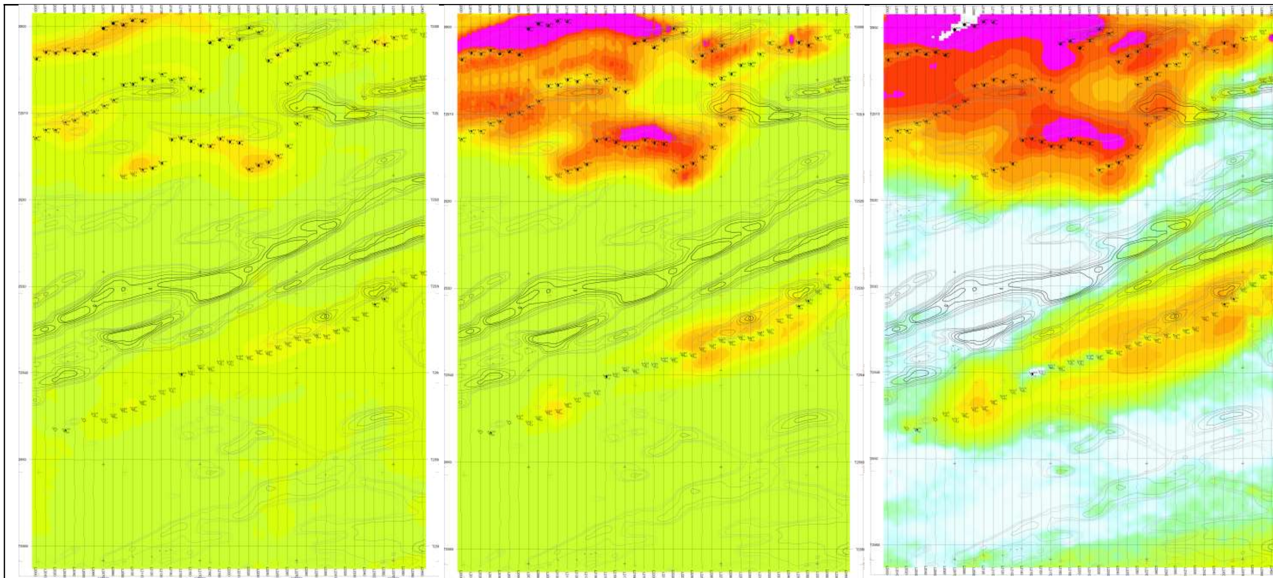
PRESENTATION OF SERIES OF LINES



3D PRESENTATION OF RDIS

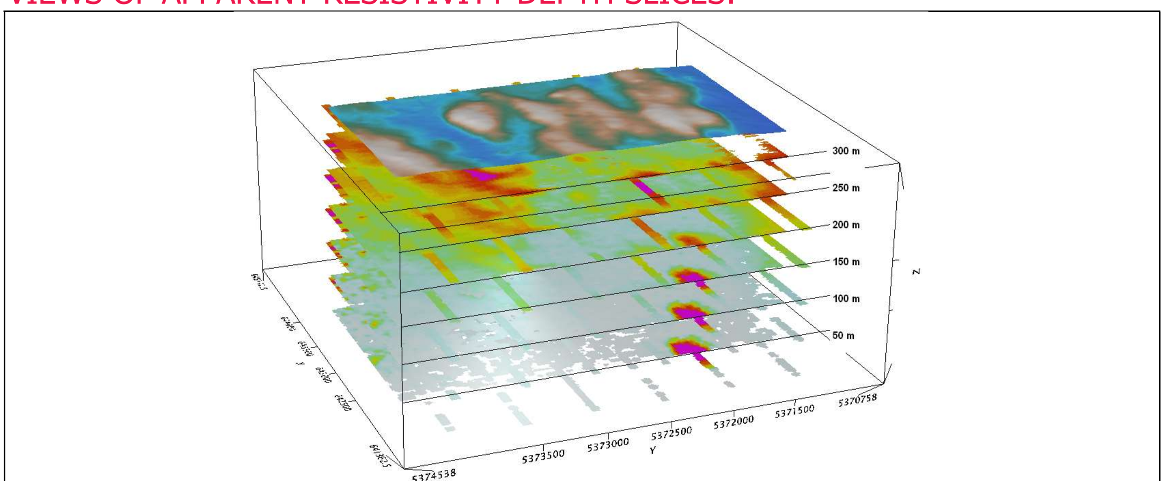


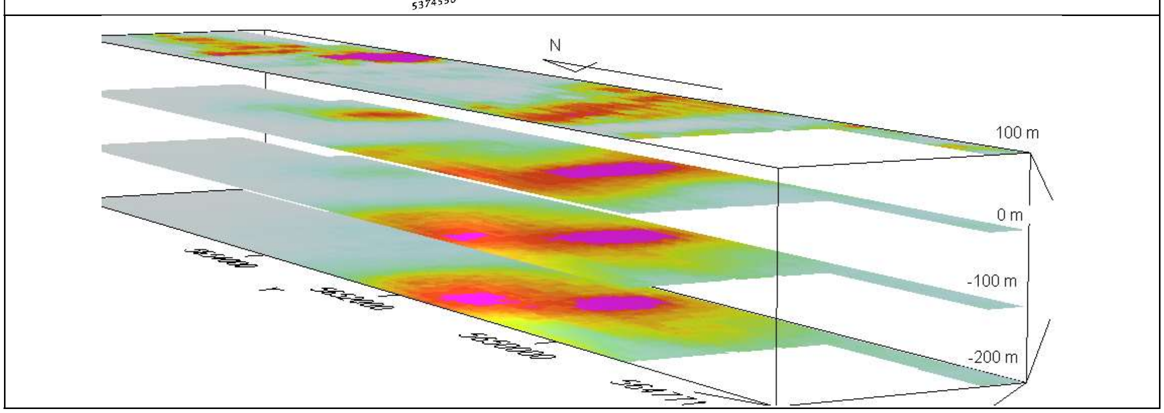
APPARENT RESISTIVITY DEPTH SLICES PLANS:



0 m (surface)	-100 m	-200 m

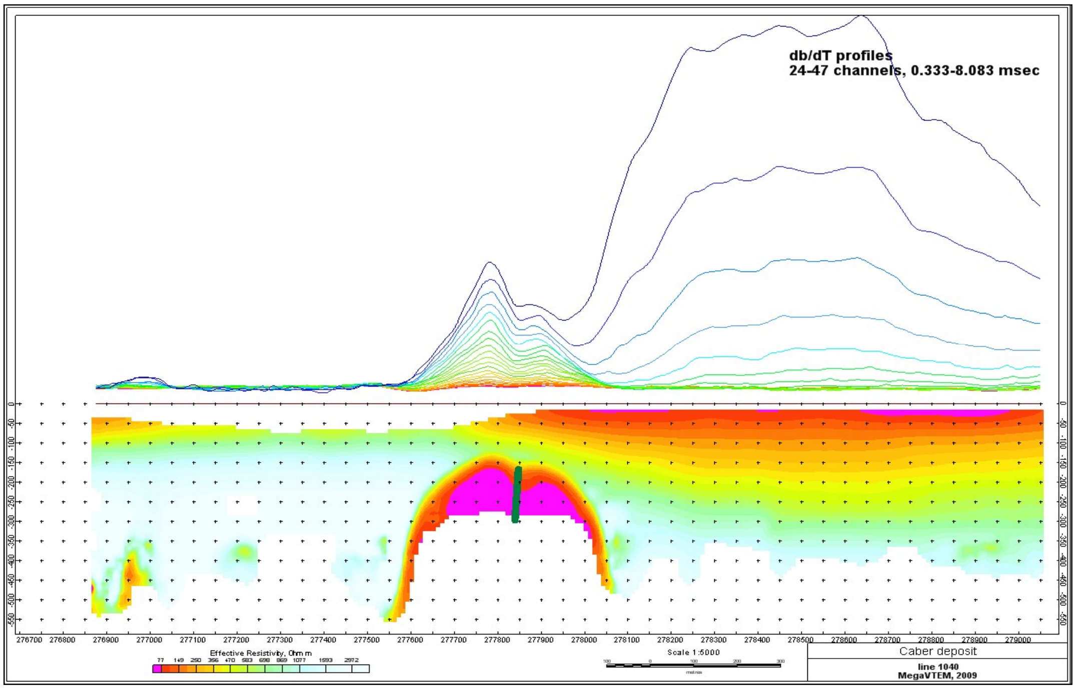
3D VIEWS OF APPARENT RESISTIVITY DEPTH SLICES:



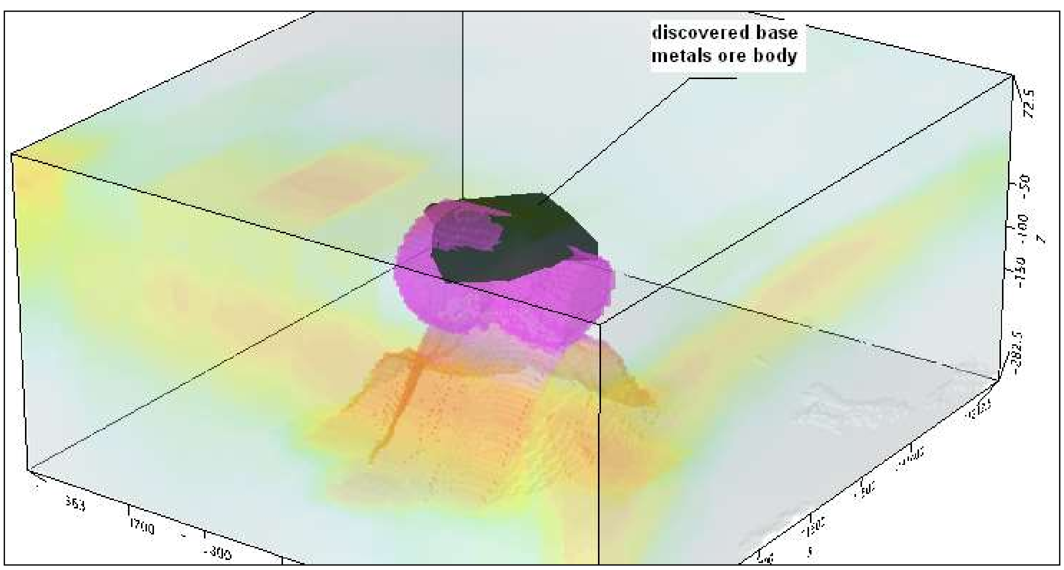


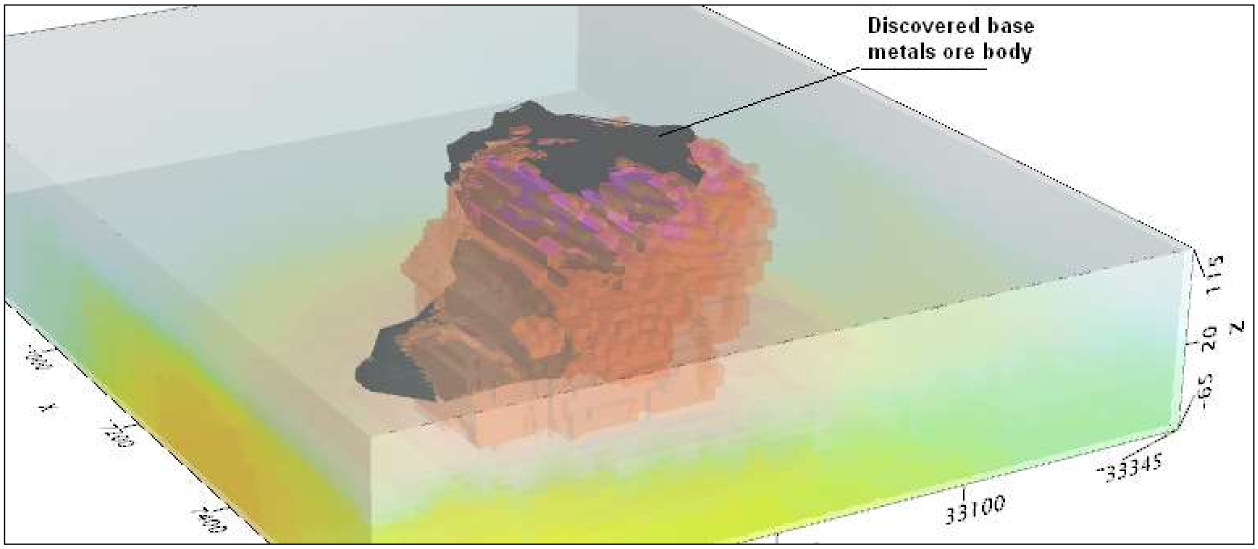
REAL BASE METAL TARGETS IN COMPARISON WITH RDIS:

RDI section of the line over Caber deposit ("thin" subvertical plate target and conductive overburden.



3D RDI VOXELS WITH BASE METALS ORE BODIES (MIDDLE EAST):





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April 2011

APPENDIX G

RESISTIVITY DEPTH IMAGES (RDI)

Please see RDI Folder on DVD for the PDF's