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BC Geological Survey

Assessment Report
Title Page and Summary

TYPE OF REPORT [type of survey(s)]: Geochemical / geophysical

TOTAL COST: $150,263

AUTHOR(S): Tyler Bourne **SIGNATURE(S):**

NOTICE OF WORK PERMIT NUMBER(S)/DATE(S): na **YEAR OF WORK:** 2010

STATEMENT OF WORK - CASH PAYMENTS EVENT NUMBER(S)/DATE(S): Confimation event number4857914, April 28, 2011

PROPERTY NAME: Babine Property consisting of the Babine and Nak groups

CLAIM NAME(S) (on which the work was done): See Work Confirmation

COMMODITIES SOUGHT: Copper, molybdenum, silver, gold

MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN: 093M 10, 093M 09

MINING DIVISION: Omineca **NTS/BCGS:** 093M01E, 093M08E

LATITUDE: 55 ° 17 '10 " **LONGITUDE:** 126 ° 14 '17 " **(at centre of work)**

OWNER(S):
1) Redtail Metals (formerly Copper Ridge Explorations
2)

MAILING ADDRESS:
1100 - 888 Dunsmuir Street
Vancouver B.C
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OPERATOR(S) [who paid for the work]:
1) Redtail Metals (formerly Copper Ridge Explorations)
2)

MAILING ADDRESS:
as above

PROPERTY GEOLOGY KEYWORDS (lithology, age, stratigraphy, structure, alteration, mineralization, size and attitude):
Hornblende biotite feldspar porphyry, quartz diorite, Andesite, Conglomerate, Jurassic, Hazelton Group, Phyllic, Argillic, Copper Molybdenum, Gold, Porphyry

REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS: 1198, 3311, 23358, 23848, 24273 29855

Next Page

TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (IN METRIC UNITS)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)
GEOLOGICAL (scale, area)			
Ground, mapping			
Photo interpretation			
GEOPHYSICAL (line-kilometres)			
Ground			
Magnetic			
Electromagnetic			
Induced Polarization			
Radiometric			
Seismic			
Other			
Airborne		all as per attached list	$97,255
GEOCHEMICAL (number of samples analysed for...)			
Soil		552233, 55228,552226, 552252, 55223	$53,008
Silt			
Rock			
Other			
DRILLING (total metres; number of holes, size)			
Core			
Non-core			
RELATED TECHNICAL			
Sampling/assaying			
Petrographic			
Mineralographic			
Metallurgic			
PROSPECTING (scale, area)			
PREPARATORY / PHYSICAL			
Line/grid (kilometres)			
Topographic/Photogrammetric (scale, area)			
Legal surveys (scale, area)			
Road, local access (kilometres)/trail			
Trench (metres)			
Underground dev. (metres)			
Other			
		TOTAL COST:	$150,263

BC Geological Survey
Assessment Report
32356a

Assessment Report

Soil Geochemical Survey
Geophysical (ZTEM) Survey
on the
Babine Property

Babine Lake Area
North-Central British Columbia
Omenica Mining Division

55°17’ North 126°14’ West
NTS Map sheet 93M/8E and 93M/8W

Prepared for
Copper Ridge Explorations Inc.
11th floor 88 Dunsmuir St.
Vancouver, B.C

By
Tyler Bourne, B.Sc.

July 13, 2011

Table of Contents

LIST OF TABLES

LIST OF FIGURES

APPENDICES

Appendix I Geotech's Report on a Helicopter-Borne Z-Axis Tipper Electromagnetic (ZTEM) and Aeromagnetic Geophysical Survey

Appendix II Heberlein Geoconsulting's report on the Babine Project, B.C – An Interpretation of 2010 Ah and Historical B horizon Soil Geochemistry Results

Appendix III Soil Geochemistry Assay Procedures and Results

Pocket 1

Fact and Interpreted Geology

Pocket 2

2010 Soil Sample Locations with Sample Numbers, 2010 Soil Sample Locations with Copper, Molydenum, Silver and Gold Values.

Pocket 3

TMI with Drill Hole Locations and 30 Hz XIP PR with Drill Hole Locations.

1.0 SUMMARY

The Babine copper-gold project ("the Property") is located approximately 80 kilometres northeast of Smithers and approximately 2 kilometres east of Nakinilerak Lake in the Babine lake area of central British Columbia. The property comprises 29 contiguous claims staked according to the BC Government's Mineral Titles Online (MTO) staking system. Copper Ridge Exploration Inc. ("Copper Ridge") owns 100% of 16 of the 22 claims, while the remaining 13 are subject to underlying option agreements.

Both the Bell and Granisle mines in the vicinity are included in the Babine copper-gold porphyry belt, as well as the Morrison deposit and a multitude of undeveloped prospects. The past producing open pit copper mines produced a total of 130 million tonnes of ore grading 0.4% copper (Cu), 0.15 g/t gold (Au) and 0.75 g/t silver (Ag).

Noranda Resources originally explored the property in the 1960's and 1970's, and it has since been explored by a number of junior exploration companies through the mid 1990's. Historical drilling includes 107 core holes, 29 on the Dorothy Zone on the southern part of the property and 98 on the Nak Zone on the northern part of the property.

Copper Ridge carried out soil geochemical, induced polarization and magnetometer surveys and 1,265 metres of drilling in 5 holes in 2008. The soil geochemical survey identified anomalous copper, gold and molybdenum values locally within the vicinity of both the Nak and Dorothy deposits, however thick glacial till cover limited the effectiveness of this survey.

The IP survey defined a large, high chargeability zone surrounding a low to moderate chargeability zone in the area that covered most of the Nak historic drilling. The high chargeability zone likely represents a pyrite halo to the deposit, although there is relatively little drilling to confirm this. The Dorothy deposit appears to contain a similar annular pattern to the chargeability that has been bisected and offset by a strike-slip fault. The magnetometer survey demonstrated that the higher grade mineralization defined by previous drilling is associated with an area of higher magnetic response.

The first hole in the 2008 drill programme was drilled at Dorothy to test a copper soil anomaly and coincident chargeability high while the remaining four holes were drilled at Nak to test the eastern extension of the Southern Zone and a possible southwestern extension to this zone. The hole at Dorothy encountered predominantly disseminated pyrite, with minor chalcopyrite, and appeared to be drilled within the pyrite halo to the deposit. At Nak, the Southern Zone drill hole was mineralized from the collar to the end (316.5 m of 0.115% copper and 0.257 gpt gold), with significant intervals of higher grade. The remaining holes, targeted based on known geology and IP chargeability, as well as ease of access, encountered mainly pyrite mineralization, with narrow zones of low copper values.

This report is based on exploration and property information and from a review of public domain geological and exploration data for the property (primarily B.C. Assessment Reports), incorporation of relevant mining and geological literature and data generated by a winter 2010 geophysical ZTEM, and a 2010 soil sampling survey.

The 2010 work program consisted of a soil sampling program in which 460 Ah horizon soil samples were taken in a northeast-southwest oriented grid over the Nak deposit. Samples were spaced at 50 metres along lines which were separated by 200 metres. Two short line segments were also sampled over the Dorothy Deposit. The survey was based on techniques developed by Dave Heberlein during a Geoscience B.C. funded study of soil geochemical sampling techniques over the Kwanika deposit in central British Columbia. This study determined that the best anomaly contrast over thick glacial overburden was provided by an aqua regia digestion of the Ah soil horizon.

A helicopter-borne ZTEM (Z-Axis Tipper electromagnetic) survey was also flown in 2010. A total of 502 line-kilometres were flown covering an area approximately 124 km^2.

2.0 INTRODUCTION

This report describes work completed in 2010 by Copper Ridge on the Babine project which consisted of a ZTEM airborne geophysical survey completed during the period May 10th to 13th and a soil sampling survey which was completed in October. Total expenditures for both programmes were $150,263.

Geotech Ltd. of Missassauga, Ontario completed the ZTEM survey, Korax Mining Services of Smithers, B.C completed the soil sampling survey and Heberlein Geoconsulting of North Vancouver, B.C. provided an interpretation of the 2010 Ah and historical B horizon soil geochemistry. Analysis of the soil samples was completed by Acme analytical of Vancouver, B.C.

The word “deposit” when used in this report has no economic implications and refers only to an identified area of metallic mineralization.

3.0 LOCATION, ACCESS AND PHYSIOGRAPHY

The Babine property is located approximately 80 kilometres northeast of Smithers in central British Columbia, and approximately 2 kilometres east of Nakinilerak Lake (Figure 3-1). It lies within the Omenica Mining Division and is centred at 55°17’ N latitude and 126°14’ W longitude, on NTS map sheet 93M/8E and 93M/8W. The Yellowhead Highway provides access to Topley landing, after which one continues on a Canadian Forest Products barge across Babine Lake to Nose Bay, then via the Jinx, Hautete and Nakinlerak forestry roads to the

Property. The property may also be accessed through Fort St. James via the paved Tachi Road, then the Grostete, Leo Creek, 300 and 900 forest service roads.

The property is located in the Nechako Plateau, which forms a large portion of the Intermontane Belt of Central British Columbia. In the Babine region, the plateau is broken by a series of normal faults into a basin and range topography. Downfaulted trenches tend to be occupied by large bodies of fresh water. The uplands are heavily forested, with mature stands white spruce and lodgepole pine, and devil's club in swampy low lying areas. Though alpine is rare, sub-

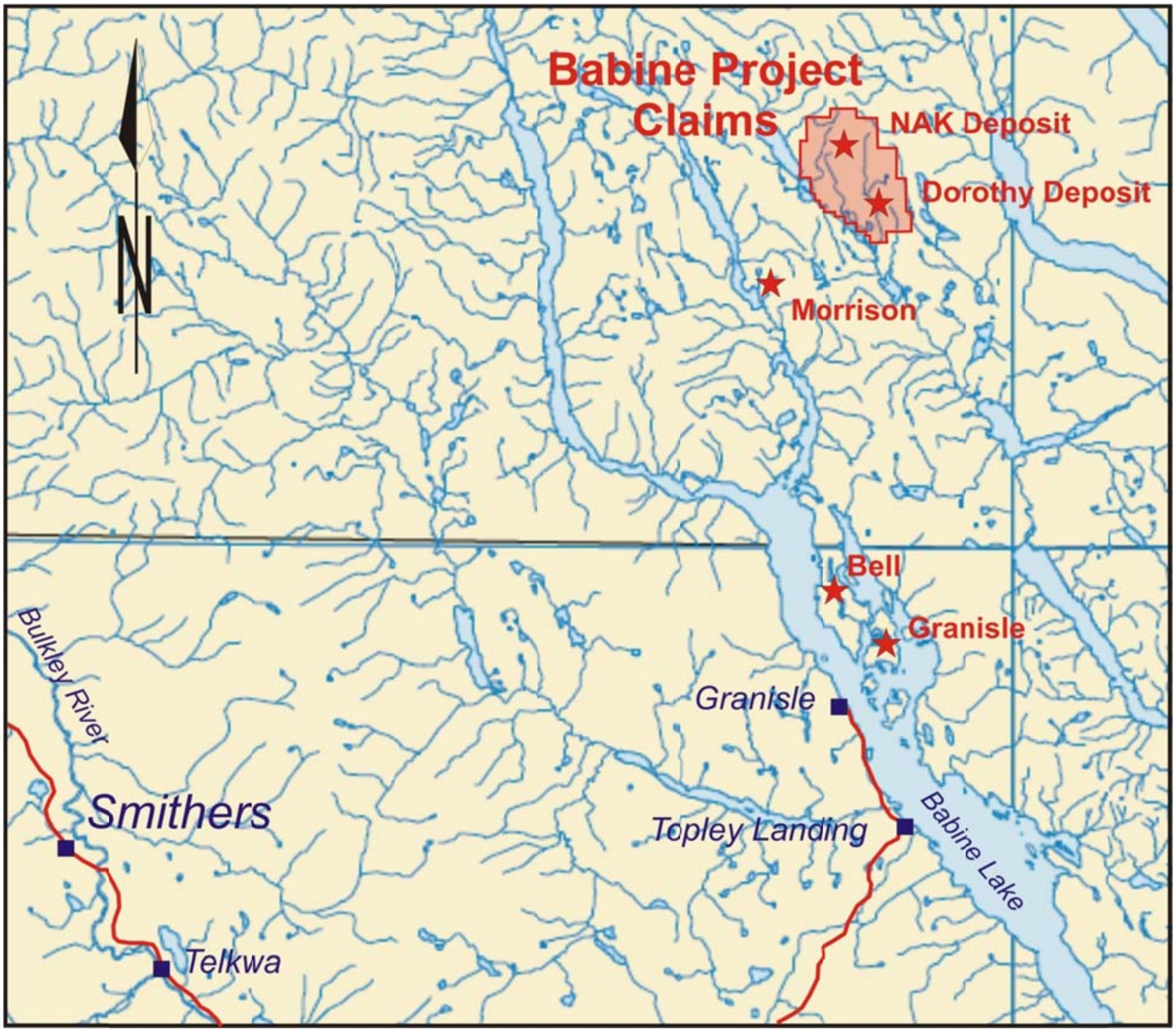

Figure 3-1 Babine Location Map

alpine meadows occur on the upper slopes of Old Fort Mountain (Ogryzlo 1990). The Nak property covers an area of moderate relief. The wide glacial valley central to the property averages 1,000 metre elevation above sea level, and ridges flanking the east and west of the valley have elevations of 1,200 metres and 1,400 metres respectively. Extensive glacial sediments cover the region, including gravels, sand and clay. This severely limits the available outcrop to high ridges and creek valleys (Carter, 1994). Winters tend to be relatively mild with a minimum January average of -12.7 degrees Celsius and approximately 50cm of precipitation, mostly snow. Summers are cool and wet with an average temperature for June and July of approximately 20 degrees Celsius, and 50mm of rain per month.

4.0 CLAIM STATUS

The Property consists of 29 Mineral Titles Online (MTO) claims located in the Omenica Mining Division, centred at 55°17’ N latitude and 126°14’ W longitude, on NTS map sheet 93M/O1 and 93M/O8, as shown in figure 4-1 and summarized in Table 4-1:

Table 4-1 Mineral Tenure Status

Tenure Number	Type	Claim Name	Good Until	Area (ha)
548719	Mineral	DOROTHY	20140430	903.708
548720	Mineral	LYNN	20140430	368.312
552226	Mineral	NAK	20140430	221.1051
552228	Mineral	NAK 1	20140430	294.7726
552233	Mineral	NAK 2	20140430	147.39
552235	Mineral	NAK 4	20140430	73.7214
552240	Mineral	NAK 5	20140430	36.8407
552244	Mineral	NAK 6	20140430	73.7218
552248	Mineral	NAK 7	20140430	36.8383
552252	Mineral	NAK 8	20140430	73.7173
552254	Mineral	NAK 9	20140430	331.7365
552256	Mineral	NAK 10	20140430	221.0042
558524	Mineral	NAK A	20140430	423.8962
558526	Mineral	NAK B	20140430	460.7511
558528	Mineral	NAK C	20140430	331.562
560184	Mineral	DEE 2	20140430	461.0193
564259	Mineral	NADO 1	20140430	460.952
564260	Mineral	NADO 2	20140430	461.0727
564261	Mineral		20140430	332.0902
564262	Mineral	NADO 4	20140430	368.607
580483	Mineral	NAK 11	20140430	461.0352
580484	Mineral	NAK 12	20140430	276.7797
598804	Mineral	SOUTH 1	20110430	442.7678
598805	Mineral	SOUTH 2	20110430	276.7869
598976	Mineral	WEST 1	20110430	128.9594
599517	Mineral	DOROTHY SOUTH 1	20110430	461.3647
599519	Mineral	DOROTHY SOUTH 3	20110430	368.9699
599520	Mineral	DOROTHY SOUTH 4	20110430	276.821

.

4.1 Nak Option:

NAK, NAK 1, NAK 2, and NAK 4 through 10, collectively known as the “Nak” option, are subject to an agreement with an underlying owner whereby Copper Ridge can earn a 100% interest in the claims by making payments totaling $250,000 over 6.5 years and paying $125,000 upon certain exploration expenditures being met. The vendor retains a 3% NSR royalty, two-thirds of which can be purchased by Copper Ridge for $1 million.

4.2 Dorothy Option:

The Dorothy, Lynn and Dee 2 claims, collectively known as the “Dorothy” option, are subject to an agreement whereby Copper Ridge can earn a 100% interest in the claims by making payments totaling $200,000, issuing 400,000 shares over 4 years and making additional payments upon certain exploration expenditures being met.

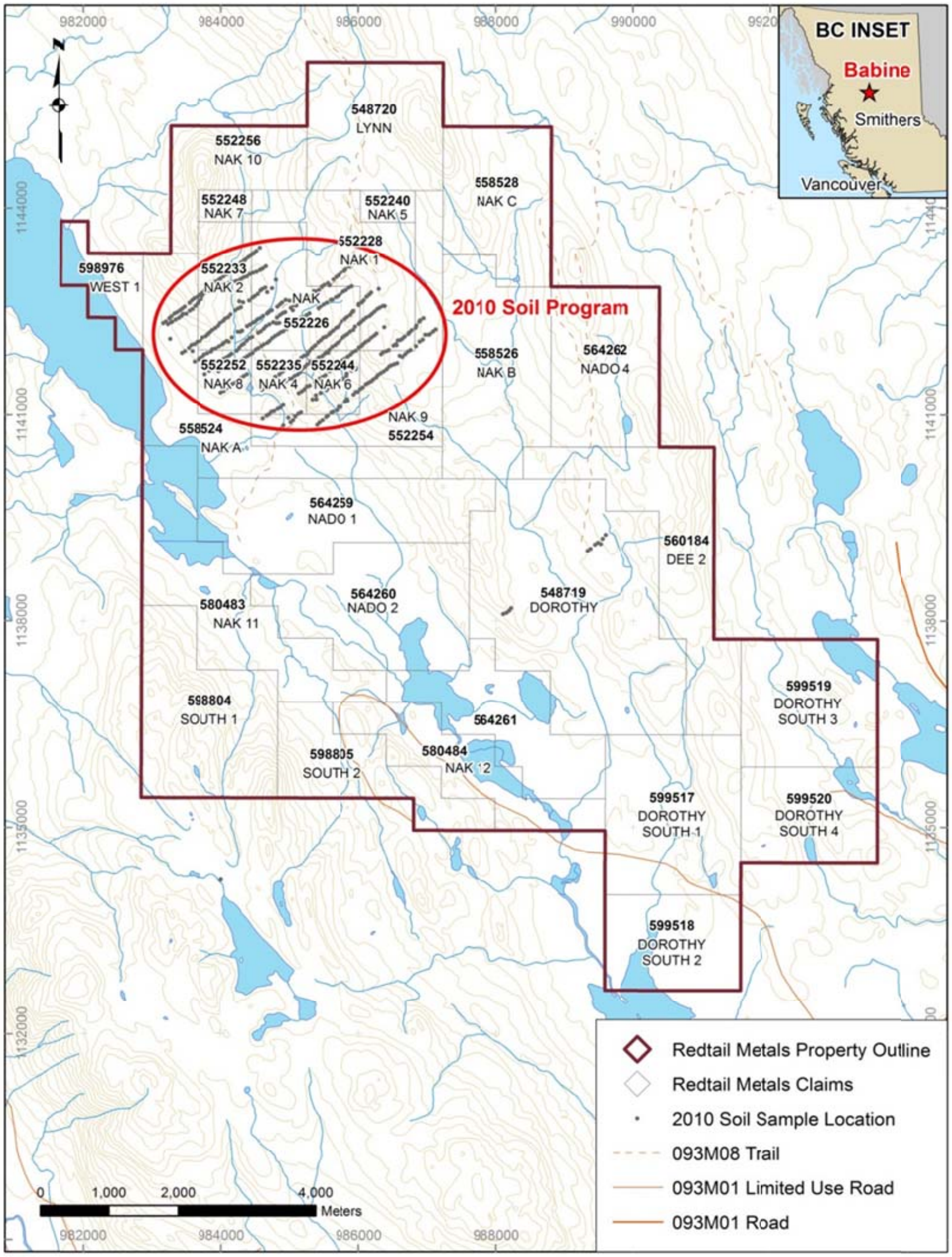

Figure 4-1 Babine Claim Map

5.0 HISTORY

1964-1971: Following the discovery of anomalous copper values in stream sediments northeast of Nakinilerak Lake, Noranda Exploration Company Ltd. performed mineral exploration work on the ground covered by the Nak Property between 1964 and 1970. This included soil geochemical, surface geophysical and geological mapping surveys. As well, limited trenching and diamond drilling of 28 holes totalling 1,837 metres in length was performed.

In 1971 geological, geochemical and geophysical surveys were also conducted by Noranda on the Sno claim group southeast of the main Nak property. This area became the south-western part of the Nak claims.

Early 1970's: Ducanex Resources performed geophysical and geochemical surveys on the Lynn property, which was subsequently included into the northern part of the Nak claims. Ducanex also performed 480 metres of diamond drilling in 8 holes. (Note: This area is well north of the 1995 and 1996 drill programs of Hera Resources Inc.).

1970-76: Dorothy property was staked by Evergreen Exploration. Exploration by Evergreen included an airborne magnetic survey and a ground IP survey. In 1971 Twin Peak Mines Ltd. and Ducanex Resources Ltd. completed a bulldozer trenching program and drilled 2,973 m in 29 diamond drill holes.

1992: The Nak 1, 2, 3 and 4 claims were located by Lorne B. Warren.

1992-1993: Tri-Alpha Investments began a new grid on the ground but subsequently cancelled their exploration program and returned the property to owner Lorne B. Warren.

1993: An airborne geophysical survey (16 line km helicopter–borne magnetometer, electromagnetic and VLF-EM) was carried-out on behalf of Noranda Exploration Company Ltd. over the central portion of the Nak claims. Also, requested Jim Oliver of Teck Exploration Ltd. carried out petrographic and lithogeochemical studies on surface rock and drill-core samples collected from the Nak property. Results of these programs were summarized by Carter (1994).

1994: The property was re-staked and the claims optioned by Hera Resources Inc. In late 1994 a camp was established and an induced polarization (IP) and magnetic survey was conducted on the Nak 1 to 5 claims over a newly constructed grid. A total of 45.2 kilometres of grid line was cut. The IP survey outlined several anomalous zones worthy of further exploration including a central zone of low chargeability surrounded by high chargeability indicating a probable pyrite halo surrounding a mineralized porphyry core (Howell, 1995).

1995: The 1994 grid was extended by Hera Resources Inc. and later covered by additional IP and magnetometer surveys. These surveys outlined a large, low chargeability response coincident with rare outcrops of a quartz diorite and other intrusive rocks containing up to 5% chalcopyrite (Bridge, 1996). The low chargeability response was rimmed by a strong but variable chargeability response which at the time was noted to coincide with known pyrite mineralization. Most of the anomalous areas were covered by glacial till.

Hera Resources Inc. carried-out a drill program on the Nak 95-1 and Nak 95-2 claims that consisted of 43 BQ diamond drill holes totalling 8,007.30 metres. This work resulted in the discovery of copper mineralization related to rhyodacite dykes along the western margin of a quartz diorite intrusion. Drilling to the south outlined copper-gold mineralization related to the quartz diorite and rhyodacite.

The eastern edge of the low chargeability area was also drilled and all but one drill hole encountered only trace amounts of copper and/or gold mineralization.

1996: Hera Resources Inc. drilled the north-trending highs in the center of the IP anomaly. In all, 28 BQ diamond drill holes were drilled totalling 5,304.10 metres; 1,600 core samples were assayed. The 1996 drilling program resulted in the identification of a zone of significant copper-gold mineralization in the south of the known mineralized area called the 'Southern Zone'. A study of copper-gold ratios in drill-core also suggested possible mineralized extensions of the Southern Zone elsewhere. As well, the Southern Zone was found to host localized high-grade copper veins (1.318% Cu and 0.203g/t Au over 18.28 metres) and associated disseminated mineralization in adjacent sedimentary units.

2007: Copper Ridge Explorations Inc. undertook an IP and magnetic survey to extend coverage from the Nak deposit in the northwest to the Dorothy deposit in the southeast. A 90 km grid with a 9.5km long northwest-southeast trending baseline was established to facilitate the program, and surveying commenced on November 19th. Due to severe winter conditions the survey was terminated before completion on December 13th. This work, however, confirmed the IP and magnetic results from earlier surveys and demonstrated that the pattern of a chargeability low flanked by a chargeability high continued to the southeast. Results of the magnetometer survey also confirmed that an area of increased magnetic susceptibility is associated with the known mineralization.

2008: The 2008 exploration program by Copper Ridge included a program of prospecting, soil geochemical surveying, induced polarization surveying and magnetometer geophysical surveying conducted between June 9th and July 13th 2008 This work was followed by 1,265 m of drilling in 5 holes completed between September 26th and October 19th 2008.

The soil survey included the collection of 735 soil samples at 50 metre intervals along 500 metre-spaced, northeast-southwest oriented lines extending from north of the Nak prospect to south of the Dorothy prospect. Although anomalous copper, gold and molybdenum values were encountered locally within the vicinity of both the Nak and Dorothy deposits, the effectiveness of the survey was limited by thick till cover, which locally includes impermeable clay layers, over much of the survey areas, as well as large areas of swampy conditions, covering roughly 10% of the property, where proper samples could not be collected.

The geophysical surveys comprised 54.54 line kilometres of pole-dipole induced polarization (IP) and 54.85 line kilometres of magnetometer readings. These surveys were a continuation of the work carried out at the end of 2007 and complemented and expanded surveys conducted by other explorers during the 1970's and 1990's. The 2007-2008 survey covered the known mineralization at both the Nak and Dorothy prospects and the ground between. The survey defined a large, high chargeability zone surrounding a low to moderate chargeability zone in the area of most of the historic Nak drilling. While the high chargeability zone likely represents a pyrite halo to the deposit, there is relatively little drilling to confirm this. At Dorothy, there appears to be a similar annular pattern to the chargeability that has been bisected and offset by a strike-slip fault. At Nak, the gold-rich southern zone is associated with a weak magnetic high which is open to the east and southeast.

The 2008 drill program included five holes for a total of 1264.7m. One hole was drilled at Dorothy to test a copper soil anomaly and coincident chargeability high (BB08-01). Four holes were drilled at Nak: One testing the eastern extension of the Southern Zone and three holes testing a possible south-western extension to this zone. The Dorothy drill hole encountered predominantly disseminated pyrite, with minor chalcopyrite, and appeared to be drilled within the pyrite halo to the deposit. At Nak, the Southern Zone drill hole (BB08-04) was mineralized from the collar to the end (316.5 m of 0.115% copper and 0.257 gpt gold), with significant intervals of higher grade. The remaining holes, targeted based on known geology and IP chargeability, as well as ease of access, encountered mainly pyrite mineralization, with narrow zones of low copper values. Highlights and drill collar locations from the 2008 drilling program can be seen below.

Table 5-1 Babine collar data, 2008 diamond drilling program

Prospect	Hole ID	Easting (UTM)	Northing (UTM)	Depth	Dip	Azimuth
Dorothy	BB08-01	679784	6125970	294	-50	45
Nak	BB08-02	675375	6128500	285	-55	50
Nak	BB08-03	675375	6128500	150	-55	230
Nak	BB08-04	675418	6129430	324	-60	230
Nak	BB08-05	675476	6128575	211.7	-60	50
			Total	1264.7		

Table 5-2 2008 Babine Drill highlights

Hole ID	From	To	Width	Cu(%)	Au(g/t)
BB08-02	166.0	226.00	60.0	0.11	0.05
BB08-03	62.35	65.20	2.85	0.12	3.35
BB08-04	7.50	324.00	316.50	0.115	0.257
includes	21.00	119.04	98.04	0.195	0.518
and	65.00	79.00	14.00	0.256	1.070
includes	137.00	153.00	16.00	0.232	0.705

*Results and collar locations from J. Hodge and J.G. Dawson 2009

6.0 Regional geology#

The Babine property is located within a belt of Tertiary and possible Cretaceous age porphyry occurrences in north-central British Columbia (MacIntyre et al., 1997). The Babine Igneous Suite intrusions are central to the mineralization in the area. Two of the more prominent and important deposits are the Granisle and Bell mines, which together produced a combination of 130 million tonnes of ore at 0.4% Cu, 0.15 g/t Au and 0.75 g/t Ag. The Morrison deposit, southwest of the Nak property, contains a measured and indicated resource of 206,869,000 tonnes grading 0.39% Cu, 0.2 g/t Au and 0.005% Mo (Pacific Booker Minerals Inc. web site). A narrow belt, 40 kilometres by 100 kilometres striking north-northwesterly from the northern part of Babine Lake contains both the mines, the Morrison deposit and the Nak and Dorothy claims, which are situated on the eastern edge of this belt.

The aforementioned Babine suite of igneous rocks intrudes Mesozoic volcanic and sedimentary rocks which comprise the Stikine Terrane, which in turn lies within the Intermontane Tectonic belt. The Stikine Terrane is formed of an ocean island arc which accreted to the western margin of North America. This Late-Triassic (Takla Group) and Early-Jurassic (Hazelton Group) marine volcanic, volcaniclastic and sedimentary package have been intruded by granitic rock of various ages. The intrusions are as follow; Early-Jurassic Topley intrusions; Early Cretaceous Omineca intrusions; Late-Cretaceous rhyolite and granodiorite porphyries of the Bulkley sequence and; Early-Tertiary (Eocene) Babine Igneous suite.

Marine and non-marine sedimentary rocks of the Mid- to Late-Jurassic Bowser Lake and Mid-Cretaceous Skeena groups overlie the older volcanic and sedimentary units, and are preserved in down-dropped basins bounded by north-northwest trending faults developed during extensional and trans-tentional tectonic activity in Late-Cretaceous and Early-Tertiary time (Carter et al, 1995).

Regionally the Nak property is underlain by an irregularly dipping sequence of Mesozoic andesite flows, breccias and lapili tuff in fault contact with volcaniclastic sandstone, siltstone, mudstone, volcanic-granitic cobble conglomerate, minor shale and argillaceous coal beds (Richards, 1973). These units were uplifted into a north-easterly trending arc (the Skeena Arc) during the development of the Bowser and Nechako basins to the north and south. The Nak Property is located just north of the axis of the Skeena Arc.

The northern basin filled with sedimentary rock of the Mid- to Late-Jurassic Bowser Lake Group and the Mid-Cretaceous Skeena Group. These rocks were subsequently preserved in down-dropped basins bounded by north-northwest trending faults systems developed during a period of regional extension and trans-tension faulting in the Late-Cretaceous to Early-Tertiary.

Several periods of intrusive activity have occurred along the Skeena Arc from Late-Cretaceous to Tertiary time. The most important porphyry copper mineralization in the area is associated with the Babine Intrusive Suite. These rocks are Eocene (and possibly Cretaceous) intrusions composed of an early quartz-diorite and quartz-monzonite suite were followed by distinctive biotite-feldspar porphyry intrusions. The Babine Intrusive Suite intruded along north to north-westerly trending faults developed during the Late Cretaceous and Early Tertiary. Field evidence indicates that these faults were active during the period of mineralization at the Morrison-Heame Hill deposits and possibly at the Nak property (Bridge, 1997).

Alteration zones associated with the Babine Intrusive suite include a potassic zone (central) containing hydrothermal biotite +/- K-spar, grading outwards to a phyllic (quartz-sericite-pyrite) zone and finally an outer zone of propylitic alteration (chlorite-carbonate +/- epidote).

Regionally, copper mineralization occurs within northeast and northwest striking, steeply dipping quartz-chalcopyrite +/- bornite veinlets less than 5 mm wide (Carter, 1994). Higher grades occur locally at, or adjacent to contacts between intrusive phases and volcanic and sedimentary rocks of the Hazelton Group.

7.0 LOCAL GEOLOGY#

Due to the thick till cover, bedrock exposure is limited. Thus, most interpretations of property scale geology is based on drill holes and geophysical data. Pocket 1 contains a local geology map.

The Nak deposit is underlain by a northwest-trending, east dipping sequence of andesite flows, volcaniclastics and argillaceous and cherty sedimentary rocks of the Jurassic Hazelton group. Bordering Nakinilerak Lake are sandstone and conglomerate units, which may belong to a younger sequence (Carter, 1994). The Hazelton Group of rocks at the Nak are intruded by Early-Cretaceous age diorite to monzonite bodies, and by Eocene sills, stocks and dykes of the Babine intrusive suite.

The centre of the property contains a polyphase intrusive stock consisting of fine-grained quartz diorite and monzonite (1.8 km2 in size), and numerous types of biotite-feldspar porphyry (Carter 1994). The spatial relationships between units are poorly defined due to the thick veneer of till which hampers efforts to define such relationships. The aforementioned polyphase intrusive is thought to be emplaced at the intersection of northeast and northwest faults. This is structurally similar to other porphyry systems in the region (Carter 1994).

Within the Dorothy deposit, two intrusive bodies occur including a granodiorite/diorite body with affinity to Omeneca Intrusive Suite and the Dorothy biotite-feldspar porphyry with an affinity to the Babine Intrusive Suite. The intrusions are aligned north-south, and north-northwest south-southeast conformably with the general tectonic trend.

Woolverton (1993) recognized a central potassic zone, peripheral propylitic zone and a pyrite halo moderately developed outside of the potassic zone. The potassic zone is characterized by hydrothermal biotite. Younger dykes (biotite feldspar porphyry) devoid of mineralization cut the potassic zone and are characterized by breccias texture.

A property geology is appended in Pocket 1.

8.0 ALTERATION AND MINERALIZATION#

Bridge (1997) described three distinct hydrothermal alteration phases at the Nak property: (1) prograde potassic–advanced argillic alteration overprinted by (2) retrograde phyllic and argillic alteration, and (3) late carbonate and sulphate veins.

(1) The early potassic alteration forms a 1.2 km diameter circular feature with advanced argillic alteration forming a halo around the potassic core in elongate zones along northerly trending faults. The alteration types were differentiated on the basis of vein types and associated alteration envelopes. Potassic alteration can be divided into subtypes – mafic-potassic and potassic. Mafic-potassic alteration is characterized by biotite-K-feldspar-amphibole-magnetite-quartz-chalcopyrite-pyrite-bornite-molybdenite veins and occurs on the south-western contact of the intrusion in hornfelsed sedimentary rocks, and on the eastern side in drill hole N95-35. Magnetite is characteristic, and altered rocks become weakly to strongly magnetic due to its presence. Magnetometer surveys record a pronounced magnetic high along the south-eastern margin of the pluton. Potassic alteration consists of K-feldspar, quartz and

carbonate veins and is recognized in quartz diorite and sedimentary rocks north of the mafic-potassic zone. Advanced argillic alteration, which consists of clay-quartz-tourmaline flooding or bluish quartz-tourmaline±chalcopyrite±pyrite±magnetite±sericite veins, occurs along the margin of the potassic alteration and to the north and south along northerly trending faults.

(2) Phyllic alteration includes sericite-quartz and carbonate-pyrite-chalcopyrite-bornite veins with sericite alteration haloes that overprint hornfelsed volcanic and sedimentary rocks. The carbonate veins are also observed in fault zones that cross-cut the quartz diorite intrusion. Widespread, pervasive argillic alteration occurs west of the intrusion in extensively faulted sedimentary rocks. The alteration assemblage consists of clay-carbonate alteration with rare arsenopyrite-pyrite-calcite±quartz veins.

(3) Propylitic alteration, which comprises chlorite-calcite-epidote-pyrite, occurs in volcanic rocks in the northern and eastern parts of the Nak prospect At Dorothy, the potassic zone, which hosts the copper mineralization, is found within the core of the BFP and is defined mainly by hydrothermal biotite. Peripheral to this is a large propylitic zone which is present in the outer rim of the intrusive and in the host volcanics. A moderately developed pyrite halo exists along the rim of the intrusive, just outside the potassic zone. Much of the potassic alteration was overprinted by a lower grade alteration (propylitic), resulting in either rimming of the hydrothermal biotite with fine chlorite or complete replacement of the biotite. After the main event of alteration and mineralization, a late phase of BFP was emplaced as a set of large dikes within the potassic zone. This later phase is notably fresher, showing no signs of potassic alteration or mineralization, and is texturally distinct due to its brecciated nature.

Bridge (1997) calculated the copper-gold ratios in drill core assays and identified two distinct populations separated by a Cu:Au ratio of 2:1 and four distinct mineralization types at the Nak prospect. They are: (1) Southern Zone Cu-Au, (2) Northern Zone Cu, (3) high grade Cu veins, and (4) arsenopyrite veins.

(1) Copper-gold mineralization with a Cu:Au ratio of <2.0 is restricted to the southwest corner of the quartz diorite intrusion and may extend along the southern margin to link up with known mineralization on the eastern side. Hornfelsed sedimentary rocks on the eastern margin host mineralization, which comprises chalcopyrite, bornite, molybdenite and magnetite, and is associated with mafic potassic alteration.

(2) Copper-only mineralization with a Cu:Au ratio of >2.0, occurs on the western side of the intrusion and is concentrated on the margins of rhyodacite porphyry dykes that cross-cut the copper-gold mineralization to the south. Copper mineralization occurs as quartz-carbonate-chalcopyrite-bornite-pyrite-molybdenite veins which contain increasing amounts of gypsum at depth and are associated with advanced argillic alteration assemblages. The dykes are intensely

feldspar altered and locally contain minor disseminated chalcopyrite and bornite, which strongly elevates the copper tenor of the rock.

(3) High grade chalcopyrite veins (Cu:Au>2.0) occur on the south-southwest side of the quartz diorite intrusion and extend for up to 300 metres. They possibly occur along north-trending faults and are associated with phyllic alteration. Drill hole logs report that westerly oriented drill holes intersected numerous quartz veins at high angles to core axis whereas easterly oriented drill holes rarely encountered these veins. Based on these observations Bridge (1997) has postulated that the mineralized veins may strike in a northern direction and dip steeply to the east, and if so the copper tenor reported for intersections in units from easterly dipping holes may not completely reflect the metal content of these zones.

(4) Arsenopyrite veins, which contain minor gold, occur on the southwest side of the intrusion in faulted rocks and are associated with argillic alteration.

Though less information is available on the Dorothy portion of the property, mineralization lies within and around the potassic alteration core of the biotite-feldspar porphyry. Copper and minor molybdenum mineralization occurs as disseminations and/or subordinate stringers. Near surface 1 to 2 metre thick oxidation zone with limonite, minor cuprite and possibly supergene copper minerals overlie the primary porphyry mineralization. Breccia-related mineralization with elevated gold and copper has been reported form recent prospecting on the property (Harivel, 1997).

9.0 2010 EXPLORATION PROGRAM#

The 2010 work program consisted of an airborne geophysical survey completed in May, followed by a soil geochemical sampling programme completed in October. The 506 kilometer airborne survey utilized a helicopter borne ZTEM (Z-Axis Tipper Electromagnetic) system and covered an area of approximately 124 km2. The soil sampling survey was based on techniques developed by Dave Heberlein during a Geoscience B.C. funded study of soil geochemical sampling techniques over the Kwanika deposit in central British Columbia. This study determined that the best anomaly contrast for porphyry copper mineralization under thick glacial overburden was provided by an aqua regia digestion of the Ah soil horizon. A total of 460 Ah horizon soil samples were taken in a northeast-southwest oriented grid over the Nak deposit. Samples were spaced at 50 metres along lines which were separated by 200 metres.

A sample location map and maps showing copper, gold, molybdenum and silver values are appended to this report in the Pocket 2.

9.1 Soil Geochemical Survey

The soil samples were collected from the Ah soil horizon. This horizon consist of a thin layer of black humus material that occurs at the interface between the organic A horizon and the inorganic B horizon. Enough sample material was collected to half fill a standard Kraft sample bag.

The following interpretation of the soil sampling results was taken from Dave Herberlein's report "An Interpretation of 2010 Ah and Historical B horizon Soil Geochemistry Results For Copper Ridge Exploration (Heberlein, 2010).

Prior to plotting the results, the Ah and B horizon soil databases underwent the following steps.

a) Analytical results and field locations were merged using Geosoft Target software. Merged data was then exported into a csv file format.

b) The csv files were imported into ioGAS software where the results were validated. Validation included checking sample locations for coordinate errors and replacement of zero values with nulls. Several locations errors were identified and corrected. Three samples without coordinates were removed from the dataset.

c) Histograms for each element were then assessed to determine their distribution type (i.e. arithmetic or log normal).

d) Logarithmically distributed (trace) elements were transformed using a Log(10) Z-Score transformation. This transformation converts the data to a normal distribution and sets the median at zero. Values are distributed positively and negatively around zero with the larger positive values representing the most anomalous samples. In this way all elements are converted to the same range and units, which facilitates plotting and comparison. This method was applied to both the Ah and B-horizon soil datasets.

e) Scatter plots of the raw data for elements of interest were generated for the principal controlling variables. Controlling variables are elements that through their compounds, cause adsorption and concentration of mobile elements.

In central BC where Podzol and Brunisol soil profiles predominate, the controlling variables are typically Fe (through oxides and oxyhydroxides) and Mn but organic carbon can also be important. Elements showing positive correlations with the controlling variables need to be corrected by normalization to the controlling variable. If a correction is not applied, patterns displayed by elements of interest will likely reflect the bulk composition of a controlling variable in the soil and not necessarily patterns related to dispersion from mineralization. In this study, Fe was found to control the distribution of Bi, Co, Cs, Cu, Ni, Rb, Sb, Te, and Zn. Examples of positive correlations with Fe are shown in Figure 2. Normalization was carried out on the raw data values and then a Log(10) Z-Score was applied to the corrected values.

f) Colour symbol map themes were then generated in Mapinfo for the transformed data using the following percentile breaks: 50, 75, 83, 87, 93 and 98%.

g) Symbols were plotted over topography and geology layers for interpretation.

9.2 ZTEM Survey#

ZTEM surveys record vertical magnetic fields which result from natural sources. The Earth and the Ionosphere “transmit” source energy planar and horizontally. A vertical field will be caused by conductivity contrasts in the Earth. The data (vertical field) is then related to a horizontal field which is read by a fixed grounded reference station. The reference field compensates for unknown source field amplitude.

The ZTEM survey flown in 2010 consisted of helicopter borne AFMAG Z-axis Tipper electromagnetic (ZTEM) system and aero magnetic using a caesium magnetometer. In a ZTEM survey, a single vertical-dipole air-core receiver coil is flown over the survey area in a grid pattern, similar to regional airborne EM surveys. Two orthogonal, air-core horizontal axis coils are placed close to the survey site to measure the horizontal EM reference fields. Data from the three coils are used to obtain the Z/X and Z/Y Tipper (Vozoff, 1972) components at five frequencies in the 30 to 360 Hz band. The ZTEM was used to map geology using resistivity contrasts and magnetometer data were also collected to help map geology using magnetic susceptibility contrasts.

10.0 RESULTS

10.1 Soil Geochemical Survey

Figures 10-1 and 10-2 show a summary of the results from the Ah and B-Horizon soils superimposed on geology and total magnetic intensity (TMI) layers. Coloured polygons define interpreted bed rock sources and hydromorphic anomalies are shown as a red hatch. The most significant features are three coincident Cu-Mo–Bi anomalies (red lines). Two of these (A and B; Fig. 10-1) closely follow the south and east margin of the Babine porphyry intrusion at the Nak deposit (pink, Fig. 10-1; black outline, Fig. 10-2) and the third (C) lies about 300 metres to the south. All three anomalies coincide with prominent magnetic highs that appear to define the extent of the Au enriched South Zone mineralization (Fig. 10-1).

Isolated Mo anomalies (cyan, Figs 10-1 and 10-2) are noted. One (D) is present near the centre of the Babine porphyry intrusion and a second (E) within the sedimentary rocks about 1.4 km to the southwest.

Gold anomalies (yellow) occur at six places on the grid. The most significant anomaly (F) overlaps the western half of the largest Cu-Mo-Bi anomaly (A). This feature corresponds with the area of elevated Au mineralization in the Southern Zone. It also coincides with the highest intensity part of the magnetic anomaly. Two anomalies (G and H) occur within the basalt unit to the south of the porphyry intrusion. Anomaly G is an elongated feature trending parallel to the topographic contours to the south east of the porphyry intrusion. It coincides with a moderate intensity magnetic anomaly. Anomaly H lies due south of the intrusion and immediately west of Cu-Mo-Bi anomaly C.

Two other Au anomalies occur in the sedimentary rocks. Anomaly I is another elongated feature located at the southeast end of a linear ridge. This anomaly is a little south and east of an area where gold values have been discovered in quartz-arsenopyrite veins in black graphitic shales in the southern part of the Nak deposit. The gold anomaly overlaps a Bi-Sb anomaly that follows the ridge crest. Anomaly J is an isolated Au anomaly in the sedimentary unit to the east of the basalt. This area has no corresponding geophysical expression.

The sixth Au anomaly (K) occurs outside of the 2010 Ah soil grid in the vicinity of the Dorothy Deposit. This feature overlaps a Cu-Mo anomaly.

Hydromorphic Anomalies Several hydromorphic anomalies (red hatch; Figs 10-1 and 10-2) are present on the grid. They are defined by a variety mobile elements including: Cd, Co, Cu, Zn, Mn and Fe. These features follow breaks in slope (i.e. seepages) and drainage channels where metal bearing ground waters emerge at the surface. They can be regarded as transported anomalies derived from up the hydrological gradient. Metals are derived from supergene processes within the Nak Deposit where oxidation of sulphide minerals releases metals into the ground water.

Most of these anomalies can be related to the Nak Deposit itself, however the southernmost one appears to have a separate source derived from the vicinity of Au anomaly G. As mentioned above, this area also coincides with a moderate strength magnetic anomaly. It also falls within an area of relatively high resistivity values.

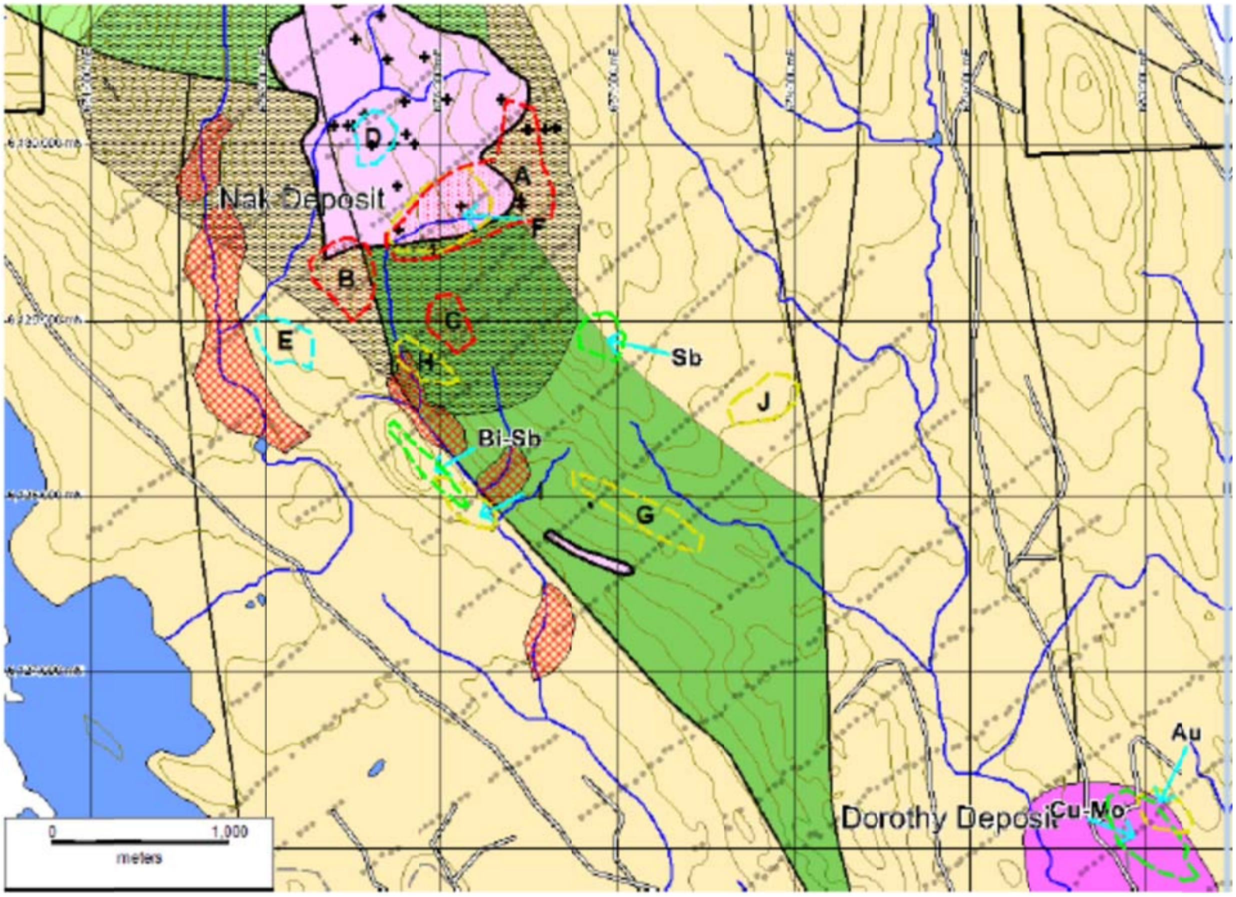

Figure 10-1 Soils from Ah (2010) and B horizons (2007/2008) over Geology

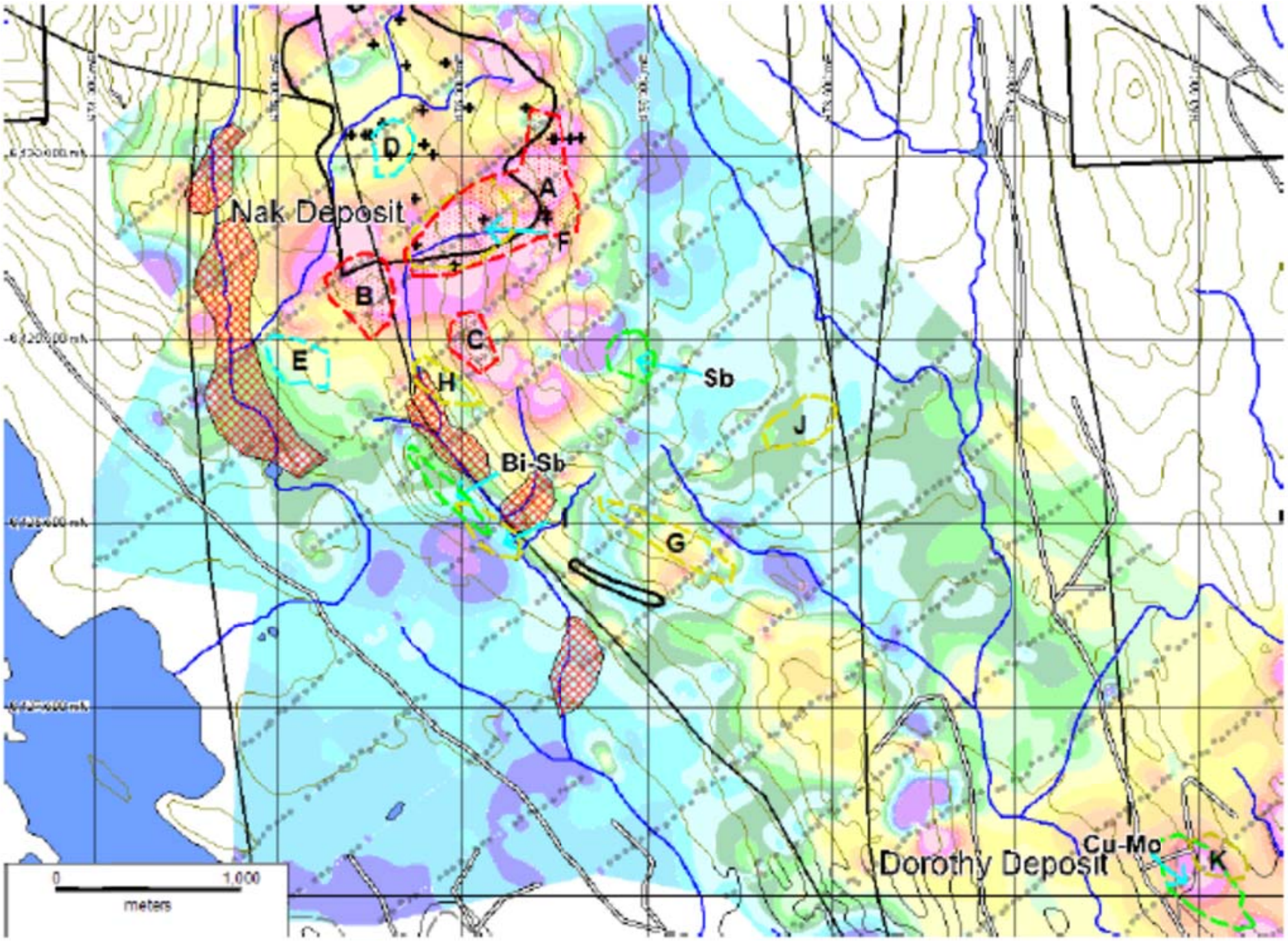

Figure 10-2 Soils from Ah (2010) and B (2007, 2008) over Total Magnetic Intensity

10.2 Geophysical Survey

An Induced Polarization (IP) survey completed on the Nak property in 1994 identified a circular zone of low chargeability approximately 1,600 metres in diameter that is flanked by a halo of high chargeability (Spencer, 1996). This was interpreted as a pyrite halo to a central mineralized zone that was, in part, confirmed through historical diamond drilling by Noranda and Hera Resources (Spencer, 1996). The majority of the copper - gold mineralization identified during Hera's 1994 and 1995 drill programs was associated with the large central area of low chargeability. A magnetometer survey outlined an area of weakly anomalous magnetics along the southern margin of the intrusive stock. Spencer (1996) reported that this appears to define a potassic alteration zone where amphibole and primary biotite have altered to secondary biotite and magnetite.

In 2007 and 2008 an IP and magnetometer survey was done in order to extend the coverage from the Nak deposit in the northwest to include the Dorothy deposit in the southeast. These surveys were successful in defining and outlining the limits of the higher concentrations of sulphide mineralization associated with the two deposits. Discontinuities in both the chargeability and resistivity indicate a possible series of sub-parallels north-northwest trending fault splays. These may offset mineralization (Dawson, 2009).

The 2010 ZTEM survey corroborated the results of the previous ground surveys and provided continuous magnetic and electromagnetic coverage for the entire property. Geotech's field report with maps and sections is included in this report as Appendix XX . Summary maps of the Total Magnetic Intensity and 30Hz Z/X Component In-Phase Phase Rotated signal overlaid with the locations of all previous drill holes on the property are appended to this report in Pocket 3.

The Total Magnetic Intensity Map clearly shows that the bulk of the known mineralization at the Nak area is associated with a pronounced magnetic high. As discussed above, this area of higher magnetic intensity could be reflecting the mafic-potassic alteration associated with the higher grade copper-gold mineralization at Nak. Of significant interest, a lobe of this magnetic high extends from the known higher grade mineralization of the Southern Zone for 500 m to the southeast. This area has little outcrop exposure and has never been tested by drilling.

The Total Magnetic Intensity Map also shows that the known mineralization at the Dorothy area occurs on the west flank of a large area of high magnetic intensity. The mineralization at Dorothy is not known to have an association with any magnetic minerals, so this area of higher magnetic intensity may be reflecting a large diorite intrusion that is mapped to occur to the east of the Dorothy mineralization.

The Z/X Component In-Phase Phase Rotated maps show the relative resistivity contrast in the Earth's crust, with the lower frequencies reflecting deeper features and the higher frequencies reflecting shallower and possibly surficial features. The 30Hz Z/X Component In-Phase Phase Rotated signal is therefore showing that the mineralization at Nak is associated with a zone of relatively low conductivity (eg, high resistivity) at depth. This likely reflects silicification associated with the mineralization at depth at the Nak deposit. This zone of high resistivity also extends to the south and east into areas not tested by drilling, but not to the same extent as the magnetic high. A large area of high resistivity similar to the mineralization at Nak occurs about 3 kilometres east of the Nak deposit. This area has very little outcrop and has not yet been tested by drilling so the source for the high resistivity response remains unexplained.

Another interesting feature of the 30Hz Z/X Component In-Phase Phase Rotated map is a northwest – southeast trending zone of high relative conductivity that occurs in the centre of the map. This feature likely represents a fault that is in turn offset to the southwest where it intersects the Nak mineralization.

The 30Hz Z/X Component In-Phase Phase Rotated map shows the Dorothy mineralization to occur on the flank of a northwest – southeast trending zone of relatively high conductivity. This feature likely also represents a fault. An area of high relative resistivity about 500 m to the west of the Dorothy mineralization could be reflecting silicification associated with additional porphyry style mineralization. This area of increased resistivity corresponds to an area of increased total magnetic intensity, suggesting that any associated porphyry mineralization may be more similar to the copper – gold mineralization that occurs at Nak than the copper – molybdenum mineralization that occurs at Dorothy.

11.0 CONCLUSIONS

11.1 Geochemistry

Results of the 2010 Ah soil geochemistry have confirmed anomalies produced by the 2007-08 B horizon soil survey. The most anomalous areas lie around the southern and eastern margin of the Babine porphyry intrusion at Nak. Cu-Mo-Bi anomalies faithfully outline the Southern Zone and the corresponding magnetic high. No significant new anomalies are defined by these results although there are several areas that warrant further investigation. These however are likely to represent relatively small satellite targets around the edges of the porphyry and associated hornfels zone. In order of priority they are (Figure 11-1):

A. The area of Cu-Mo-Bi anomaly C and Au anomaly H. This area lies within the basalt unit and the hornfels envelope around the intrusion and corresponds with the northwest end of a linear, southeast trending magnetic anomaly with amplitudes similar to the Southern zone. The target also lies in an area of moderate chargeability suggesting the presence of sulphides.
B. Molybdenum anomaly E. This is a single element anomaly located within the sedimentary rocks southwest of the porphyry intrusion. This feature also corresponds with an area of moderate chargeability and lies upslope from a large hydromorphic anomaly. These characteristics suggest that sulphides are likely present in this area.
C. Gold anomaly I. This is an apparent southeast extension of know quartzarsenopyrite mineralization in graphitic shales. The associated Bi-Sb anomaly and a hydromorphic copper anomaly in the drainage to the north make this an interesting target.
D. Gold anomaly G. This southeast elongated gold anomaly coincides with a
E. moderate intensity magnetic high. A Ag-Cu-Cd-Co-Mn hydromorohic anomaly in the drainage below (southwest) suggests the presence of sulphide mineralization, however chargeability values in this area are low. The target coincides with a zone of moderate resistivity values that likely represent unaltered or propylitized basalt.

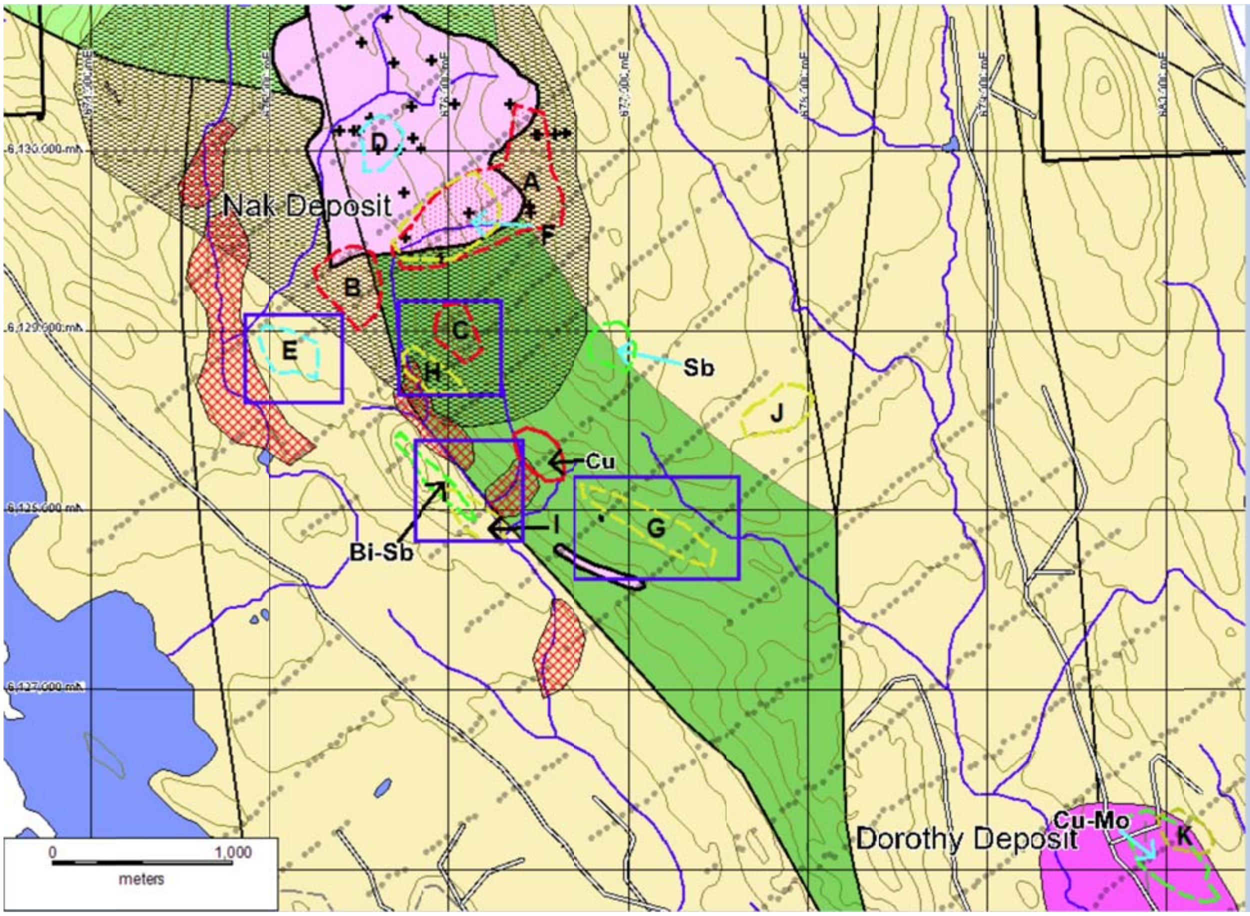

Figure 11-1 Targets for follow-up (blue squares).

11.2 VTEM Survey

The VTEM survey demonstrated that the known porphyry copper mineralization at Nak is associated with both a pronounced magnetic high and resistivity high. A lobe of the magnetic high extends 500 m to the east and southeast of the known mineralization at Nak into an area untested by drilling and with little outcrop. This lobe could be reflected mafic-potassic alteration associated with undiscovered copper-gold mineralization. As discussed above, this area of higher magnetic intensity also corresponds Cu-Mo-Bi anomaly C and Au anomaly H identified by the soil geochemical survey

The VTEM survey also identified an area of high resistivity 3 kilometers east of the Nak deposit that is similar in intensity to the resistivity values that correspond to the known Nak mineralization. There is, however, no corresponding magnetic high associated with this feature.

At Dorothy, an area of higher relatively resistivity and moderately high total magnetic intensity occurs about 500 m west of the known Dorothy mineralization. While some tuff has been mapped in this area, the geophysics could be reflecting underlying copper – gold mineralization similar to that found at the Nak to the north.

12.0 RECOMMENDATIONS

Based on the results of the 2010 airborne geophysical and soil geochemical programs at the Babine Property, the following is recommended:

1. Diamond drilling to test the magnetic high and corresponding geochemical anomaly southeast of the know mineralization at Nak.
2. Mapping, soil geochemistry and, if warranted, diamond drilling to test the area of high resistivity located about 3 km east of the Nak mineralization
3. Mapping, soil geochemistry and, if warranted, diamond drilling to test the area of coincident higher resistivity and higher total magnetic intensity 500 m west of the Dorothy mineralization.

13.0 2010 Expenditures

Table 13-1 Expenditures

Babine Project						
2010 Costs						
Item	**Unit**		**Unit Cost**		**Cost**	**Total Cost**
Airborne Geophysics	**484**	kilometres @	$ 200.94	per kilometre	$ 97,255	
Total						$ 97,255
Analytical						
Soil	460	samples @	$ 29.72	per sample	$ 13,671	
Total						$ 13,671
Labour						
Korex Mining	27	man days@	$ 1,226.60	per day	$ 33,118	
(All in inclusive of transportation, accommodation and field consumables)						
Total						$ 33,118
Reports						
Dave Heberlein	18	hours@	$ 125.00	per hour	$ 2,219	
Tyler Borne	8	days@	$ 500.00	per day	$ 4,000	
Total						$ 6,219
Total						**$ 150,263**

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I, Tyler Bourne, of the City of Vancouver, in the Province of British Columbia, do hereby certify that:

1) I am an employee and Geologist with Golden Predator Canada Corp. with an address at 201A-170 Titanium Way, Whitehorse, Yukon, Y1A 0G1

2) I graduated from the University of British Columbia with a B.Sc. in Earth and Environmental Science in 2009

3) From 2007 to present, I have been actively engaged in mineral exploration in Canada, with a focus in gold exploration.

4) The information for this report is based on information as itemized in the reference section of this report and from works the authors of this report performed on the Babine property in 2010.

Dated this 13th Day of July, 2011

Respectfully submitted

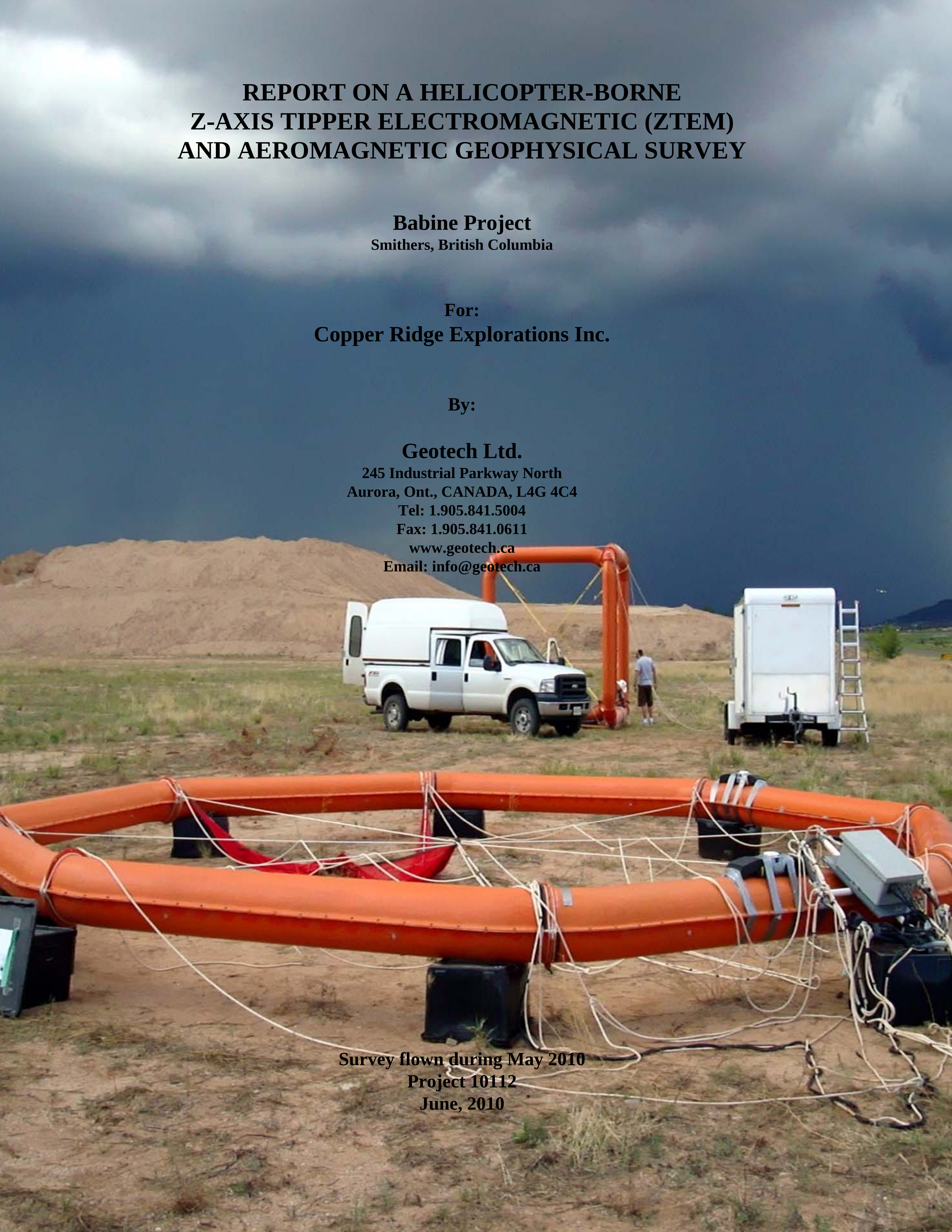
Tyler Bourne, B.Sc.

Geologist

Golden Predator Canada Corp.

Appendix 1

Geotech's Report on a Helicopter-Borne Z-Axis Tipper Electromagnetic (ZTEM) and Aeromagnetic Geophysical Survey



REPORT ON A HELICOPTER-BORNE Z-AXIS TIPPER ELECTROMAGNETIC (ZTEM) AND AEROMAGNETIC GEOPHYSICAL SURVEY

Babine Project
Smithers, British Columbia

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Survey flown during May 2010
Project 10112
June, 2010

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

REPORT ON A HELICOPTER-BORNE Z-AXIS, TIPPER ELECTROMAGNETIC GEOPHYSICAL SURVEY

Babine Project
Smithers, British Columbia

Executive Summary

During May 10th to 13th, 2010 Geotech Ltd. carried out a helicopter-borne geophysical survey for Copper Ridge Explorations Inc. over the Babine Project situated near Smithers, British Columbia, Canada.

Principal geophysical sensors included a Z-Axis Tipper electromagnetic (ZTEM) system, and a caesium magnetometer. Ancillary equipment included a GPS navigation system and a radar altimeter. A total of 484 line-kilometres were planned to be flown.

The survey operations were based out of the town of Smithers, British Columbia. 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 survey report describes the procedures for data acquisition, processing, final image presentation and the specifications for the digital data set. There is no summary interpretation included in this report however, 2D inversions (Appendix F) have been provided in support of the data.

1. INTRODUCTION

1.1 General Considerations

These services are the result of the Agreement made between Geotech Ltd. and Copper Ridge Explorations Inc. to perform a helicopter-borne geophysical survey over the Babine Project located near Smithers, British Columbia, Canada (Figure 1).

Gerry Carlson acted on behalf of Copper Ridge Explorations Inc. during the data acquisition and data processing phases of this project.

The geophysical surveys consisted of helicopter borne AFMAG Z-axis Tipper electromagnetic (ZTEM) system and aero magnetics using a caesium magnetometer. A total of 502 line kilometres of geophysical data were acquired during the survey. The survey area is shown in Figure 2.

In a ZTEM survey, a single vertical-dipole air-core receiver coil is flown over the survey area in a grid pattern, similar to regional airborne EM surveys. Two orthogonal, air-core horizontal axis coils are placed close to the survey site to measure the horizontal EM reference fields. Data from the three coils are used to obtain the Z/X and Z/Y Tipper (Vozoff, 1972) components at five frequencies in the 30 to 360 Hz band. The ZTEM was used to map geology using resistivity contrasts and magnetometer data were also collected to help map geology using magnetic susceptibility contrasts.

Figure 1 -Property Location

The crew was based in Smithers, British Columbia, for the acquisition phase of the survey. Survey flying started on May 10th and was completed on May 13th, 2010.

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 reporting, data presentation and archiving were completed from the Aurora office of Geotech Ltd. in June, 2010.

1.2 Survey Location

The Block is located approximately 76 kilometres to the east of Smithers, British Columbia as shown in Figure 2.

Figure 2 – The Block, with ZTEM and Magnetic Base Station Locations

The block was flown in a SW to NE (N 49° E / N 229° E) direction, with a flight line spacing of 250 metres, as depicted in Figure 3. Tie lines were neither planned nor flown for this survey. For more detailed information on the flight spacing and direction see Table 1.

1.3 Topographic Relief and Cultural Features

The Block exhibits a high relief covering 124 square kilometres, with an elevation ranging from 863 to 1427 meters above sea level (see Figure 3). The survey area has visible signs of culture such as, roads and trails which are throughout the survey. There are also numerous river and streams which connect various lakes and wetlands. Special care is recommended in identifying any other potential cultural features from other sources that might be recorded in the data. The survey block covers a number of British Columbia Mining Claims, which are shown in Appendix A. The survey block is covered by NTS (National Topographic Survey) of Canada sheets 093M08, 093M01.

Figure 3 – Google Earth image of the Babine Project

2. DATA ACQUISITION

2.1 Survey Area

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

Table 1 - Survey Specifications

Survey block	Traverse Line spacing (m)	Area (Km^2)	Planned Line-km	Actual[1] Line-km	Flight direction	Line numbers
Block	Traverse: 250	124	484	502.6	N 49° E / N 229° E	L1000 – L2750
	Tie: n/a		n/a	n/a	n/a	n/a
TOTAL		**124**	**484**	**502.6**		

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

2.2 Survey Operations

Survey operations were based out of Smithers, British Columbia on May10th to 13th, 2010. The following table shows the timing of the flying.

Table 2 - Survey schedule

Date	Flight #	Block	Crew location	Comments
5-10-2010			Smithers BC	System Installation
5-11-2010	1,2		Smithers BC	Production
5-12-2010	3,4,5		Smithers BC	Production
5-13-2010			Smithers BC	Job Complete

[1] Actual line-km represents the total line-km contained in the final databases. These line-km normally exceed the Planned line-km's, as indicated in the survey NAV files.

2.3 Flight Specifications

During the survey the helicopter was maintained at a mean height of 155 metres above the ground with a nominal survey speed of 80 km/hour for the survey block. This allowed for a nominal EM sensor terrain clearance of 81 metres and a magnetic sensor clearance of 98 metres.

The output data sampling rate from the acquisition program was 0.4 second for electromagnetics, 0.1 second for magnetometer and 0.2 second for altimeter and GPS. This translates to electromagnetic readings at approximately 10m intervals and magnetic readings roughly every 2 to 5 metres along flight track. Navigation was assisted by a CDGPS receiver and data acquisition system, which reports GPS co-ordinates as latitude/longitude and directs the pilot over a pre-programmed survey flight path.

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

On return of the aircrew to the base camp the survey data was transferred from a compact flash card (PCMCIA) to the data processing computer. The data were then uploaded via ftp to the Geotech office in Aurora for daily quality assurance and quality control by trained personnel, operating remotely.

2.4 Aircraft and Equipment

2.4.1 Survey Aircraft

The survey was flown using a Eurocopter Aerospatiale (Astar) 350 B3 helicopters, registration number C-FEDS. The helicopters were owned and operated by Geotech Aviation Ltd. Installation of the geophysical and ancillary equipment was carried out by Geotech Ltd.

2.4.2 Airborne Receiver

The airborne ZTEM receiver coil measures the vertical component (Z) of the EM field. The receiver coil is a Geotech Z-Axis Tipper (ZTEM) loop sensor which is isolated from most vibrations by a patented suspension system and is encased in a fibreglass shell. It is towed from the helicopter using a 90 metre long cable as shown in Figure 4. The cable is also used to transmit the measured EM signals back to the data acquisition system.

The coil has a 7.4 metre diameter with an orientation to the Vertical Dipole. The digitizing rate of the receiver is 2000 Hz. Attitudinal positioning of the receiver coil is enabled using 3 GPS antennas mounted on the coil. The output sampling rate is 0.4 seconds (see Section 2.4.7)

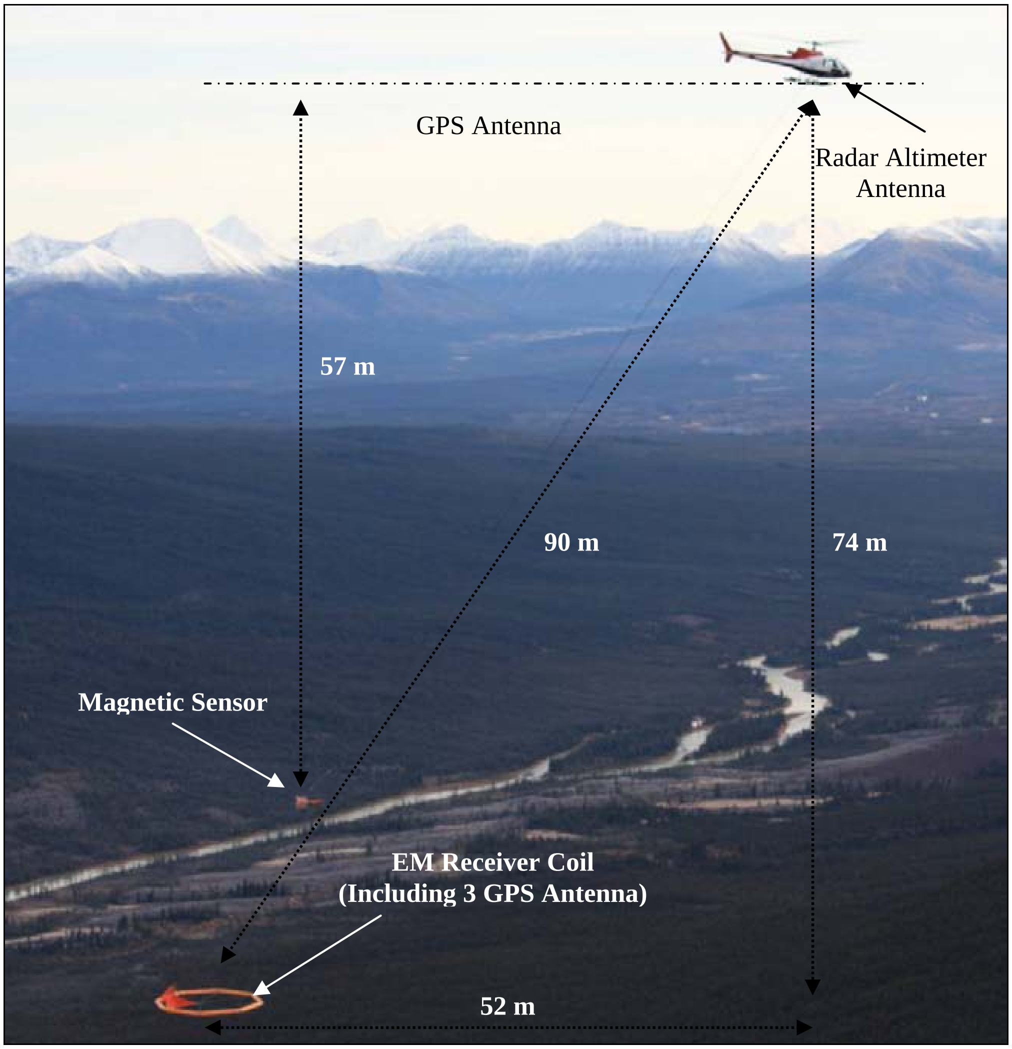

Figure 4 - ZTEM System Configuration

2.4.3 Base Station Receiver

The two Geotech ZTEM base station receiver coils measure the orthogonal, horizontal X and Y components of the EM reference field. They are set up perpendicular to each other and roughly oriented according to the flight line direction. The orientation of both units is not critical as the horizontal field can be further decomposed into the two orientations of the survey flight. The orientation of the base stations were measured using a compass.

The base station coils each have a diameter of 3.5 meters, with the coil orientations to the horizontal dipole, as shown in Figure 5.

The Block base station receiver coils were installed in a remote area outside the survey block (55°13.093' N, 126°11.817' W). The coils were oriented perpendicular to each other: Coil A was oriented at an N 102° E direction, with coil B oriented at an N 192° E direction.

Figure 5 - ZTEM base station receiver coils.

2.4.4 Airborne magnetometer

The magnetic sensor utilized for the survey was a Geometrics split-beam optically pumped caesium vapour magnetic field sensor, mounted in a separate bird, and towed on a cable at a mean distance of 57 metres below the helicopter (Figure 4). The sensitivity of the magnetic sensor is 0.02 nanoTesla (nT) at a sampling interval of 0.1 seconds. The magnetometer will perform continuously in areas of high magnetic gradient with the ambient range of the sensor approximately 20k-100k nT. The Aerodynamic magnetometer noise is specified to be less than 0.5 nT. The magnetometer sends the measured magnetic field strength as nanoTesla to the data acquisition system via the RS-232 port.

2.4.5 Radar Altimeter

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

2.4.6 GPS Navigation System

The navigation system used was a Geotech PC104 based navigation system utilizing a NovAtel CDGPS (Canada-Wide Differential Global Positioning System Correction Service) enabled Propak V3-RT20 GPS receiver. Geotech's Navigate software, using a full screen display with controls in front of the pilot, allows him to direct the flight.

5 NovAtel GPS antennas are utilized during the survey; one is mounted on the helicopter tail (Figure 4), one installed with the Receiver Base Station (Figure 5) and three are mounted on the airborne receiver (Figure 4). As many as 14 GPS and two CDGPS satellites may be monitored at any one time. The horizontal positional accuracy or circular error probability (CEP) is 1.8 m, with CDGPS active, it is 0.6 m. The co-ordinates of the block were set-up prior to the survey and the information was fed into the airborne navigation system.

2.4.7 Digital Acquisition System

The power supply and the data acquisition system are mounted on an equipment rack which is installed into the helicopter. Signal and power wires are run through the helicopter to connect on to the tow cable outside. The tow cable supports the ZTEM and magnetometer birds during flight via a safety shear pin connected to the helicopter hook. The major power and data cables have a quick disconnect safety feature as well. The installation was undertaken by the Geotech Ltd. crew and was certified before surveying.

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 3.

Table 3 - Acquisition and Processing Sampling Rates

DATA TYPE	ACQUISITION SAMPLING	PROCESSING SAMPLING
ZTEM Receiver	0.0005 sec	0.4 sec
Magnetometer	0.1 sec	0.4 sec
GPS Position	0.2 sec	0.4 sec
Radar Altimeter	0.2 sec	0.4 sec
ZTEM Base station	0.0005 sec	– –

2.4.8 Mag Base Station

A combined magnetometer/GPS base station was utilized on this project. A Geometrics Caesium split-beam 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 sensors for the Block (55°3'14.10 N, 126°30'34.61 W) were installed behind the lodge away from electric transmission lines and moving ferrous objects such as motor vehicles. The base station data were backed-up to the data processing computer at the end of each survey day.

3. PERSONNEL

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

Field:

Project Manager:	Darren Tuck (Office)
Data QA/QC:	Harish Kumar (Office)
Crew chief:	Roger Leblanc
System Operators:	Greg Roman

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

Pilot:	Bruno Prieur
Mechanical Engineer:	Tyler McLellan

Office:

Preliminary Data Processing:	Harish Kumar
Final Data Processing:	Harish Kumar
2D Inversions:	Vlad Kaminski
Final Data QC:	Greg Roman
Reporting/Mapping:	Wendy Acorn

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

4. DATA PROCESSING AND PRESENTATION

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

4.1 Flight Path

The flight path, recorded by the acquisition program as WGS 84 latitude/longitude, was converted into the WGS84, 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 In-field Processing and Quality Control

In-Field data processing and quality control are done on a flight by flight basis by a qualified data processor (see Section 3.0). Processing steps and check up procedures are designed to assure the best possible final quality of ZTEM survey data. A general overview of those steps is presented in the following paragraphs.

The In-Field quality control can be separated into several phases:

a. GPS Processing Phase: GPS Data are first examined and evaluated during the GrafMov processing.
b. Raw data, ZTEM viewer phase:
   Data can be viewed, examined for consistency, individual channel spectra examined and overall noise estimated in the viewer provided by the ZTEM proprietary software, on the raw flight data and raw base station data separately, on the merged data, and finally on the data that have undergone ZTEM processing.
c. Field Geosoft phase:
   Magnetic data, Radar altimeter data, GPS positioning data are re-examined and processed in this phase. Prior to splitting the lines EM data are examined flight by flight and the effectiveness of applying the attitude correction evaluated. After splitting the lines, a set of grids are generate for each parameter and their consistency evaluated. Data profiles are also re-evaluated on a line to line basis. A power line monitor channel is available in order to identify power line noise.

4.3 GPS Processing

Three GPS sensor (mounted on the airborne receiving loop) measurements were differentially corrected using the Waypoint GrafMov™ software in order to yield attitude corrections to recorded EM data.

4.4 ZTEM Electromagnetic Data

The ZTEM data were processed using proprietary software. Processing steps consist of the following preliminary and final processing steps:

4.4.1 Preliminary Processing

a. Airborne EM, Mag, radar altimeter and GPS data are first merged with EM base station data into one file.
b. Merged data are viewed and examined for consistency in an incorporated viewer
c. In the next, processing phase, the following entities are taken into account:
   - the Base station coils orientation with respect to the Magnetic North,
   - the Local declination of the magnetic field,
   - Suggested direction of the X coordinate (North or line direction),
   - Sensitivity coefficient that compensates for the difference in geometry between the base station and airborne coils.
   - Rejection filters for the 60 Hz and helicopter generated frequencies.
d. Six frequencies (In phase and Quadrature components) are extracted from the airborne EM coil response in the windows of 0.4 seconds and the base station coils in the windows of 1.0 seconds (30, 45, 90, 180, 360, and 720 Hz).
e. The ratios between the real parts (in phase) of the vertical Z component (airborne) over the horizontal X component (base station), and Z component over horizontal orthogonal Y component, as well as the ratios of their imaginary parts (quadrature), are calculated.
f. Such processed EM data are then merged with the GPS data, magnetic base station data and exported into a Geosoft xyz file.

4.4.2 Geosoft Processing

Next stage of the preliminary data processing is done in a Geosoft ™ environment, using the following steps:

a. Import the output xyz file from the AFMAG processing, as well as the base Mag data into one database.
b. Split lines according to the recorded line channel,
c. GPS processing, flight path recovery (correcting, filtering, calculating Bird GPS coordinates, line splitting)
d. Radar altimeter processing, yielding the altitude values in metres.
e. Magnetic spike removal, filtering (applied to both airborne and base station data). Calculation of a base station corrected mag.
f. Apply preliminary attitude corrections to EM data (In phase and Quadrature), filter and make preliminary grids and profiles of all channels.

4.4.3 Final Processing

Final data processing and quality control were undertaken by Geotech Ltd headquarters in Aurora, Ontario by qualified senior data processing personnel.

A quality control step consisted of re-examining all data in order to validate the preliminary data processing and to allow for final adjustments to the data.

Attitude corrections were re-evaluated, and re-applied, on component by component, flight by flight, and frequency by frequency bases. Any remaining line to line system noise was removed by applying a mild additional levelling correction.

4.4.4 ZTEM Profile Sign Convention

Z/X and Z/Y components do not exhibit maxima or minima above conductors, resistors or at contacts; in fact they produce cross-over type anomalies (Ward, 1959). The crossover polarity sign convention for ZTEM is according to the right hand Cartesian rule (Z positive –up) that is commonly used for multi-component transient electromagnetic methods.

For the NE SW lines at the Block the sign convention for the Z/X in-line component crossover is positive-negative pointing SW to NE for tabular conductors perpendicular to the profile (Figure 6). The corresponding Z/Y component in-phase cross-over polarity is positive-negative pointing SE to NW (90 degrees counter clockwise to Z/X) according to the right hand Cartesian rule.

Conversely, tabular resistive bodies produce In-Phase cross-over's that are opposite in sign to conductors. A brief discussion of ZTEM and AFMAG, along with selected forward model responses is presented in Appendix D.

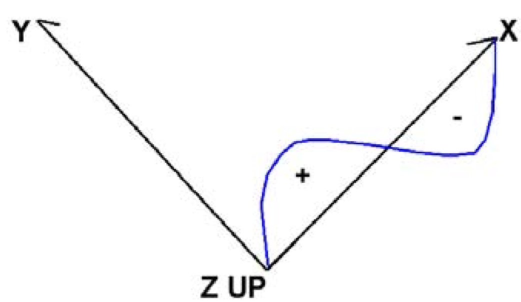

Figure 6 - ZTEM Crossover Polarity Convention of the Block

4.4.5 ZTEM Quadrature Sign Dependence

One important note regarding the sign of the ZTEM Quadrature, relative to the In-Phase component, particularly with regards to computer modeling and inversion.

The sign of the magnetotelluric Quadrature relative to the In-Phase tipper transfer function component pertains to the Fourier transformation of the time series to give frequency domain spectra. There are two widely used conventions for time dependence in the transformations, **exp(+iωt)** and **exp(-iωt).** That which is implemented largely is a matter of personal preference and precedent. The importance of the In-Phase and Quadrature sign convention is not critical, provided that it is known and documented.

In ZTEM, the data processing code used for the Fourier transformation the time-series data to frequency domain spectra adopts a **exp(-iωt)** time dependence (J. Dodds, Geo Equipment Manufacturing, pers. comm., Nov-2009). Whereas in the forward modeling and inversion program Zvert2d, the sign of the Quadrature relative to the In-Phase transfer function assumes an **exp(+iωt)** dependence[2].

The reasons for adopting $\mathbf{e^{-i\omega t}}$ used in ZTEM are several: a) In-phase and Quadrature profile and contour plan maps can be readily compared, since they are usually in the same-sign and quadrant (i.e.Figure 7); b) Phase-rotation and Total Divergence (DT) parameters need not be changed when comparing In-Phase versus Quadrature data.

As a result, for users interested in computer modeling and inversion of ZTEM data, the sign of the Quadrature will need to be reversed, relative to the In-Phase component, in order to provide a proper result (Figure 7). Indeed this reverse Quadrature polarity convention is assumed in all forward modeling and inversion of ZTEM data, as described in Figures 5-7 in Appendix D.

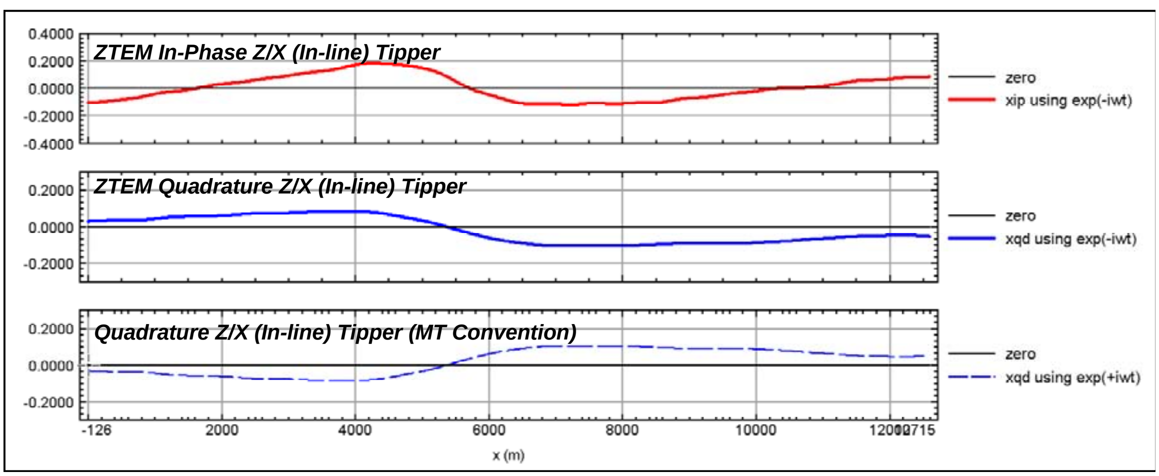

Figure 7 - Illustration of ZTEM In-Phase & Quadrature Tipper transfer function polarity convention (e-iωt) relative to equivalent MT Tipper Quadrature polarity convention (e+iωt) for a graphitic conductor in Athabasca Basin, SK.

2 Phillip E. Wannamaker (2009): Two-dimensional Inversion of ZTEM data: Synthetic Model Study and Test Profile Images, Internal Geotech technical report by Emblem Exploration Services Inc., January 22, 2009, 32 pp.

4.4.6 Total Divergence and Phase Rotation Processing

In a final processing step DT (Total Divergence) and PR (Phase Rotation) processing are applied to the multi-frequency In-phase and Quadrature ZTEM data. This is due to the crossover nature of the Tipper Responses; these additional processing steps are applied to convert them into local maxima for easier interpretation.

To present the data from both tipper components into one image, the Total Divergence parameter, termed the DT is calculated from the horizontal derivatives of the Z/X and Z/Y tippers (Lo and Zang, 2008). It is analogous to the "Peaker" parameter in VLF (Pedersen, 1998).

Total Divergence DT:	***DT = DIV (Z/X, Z/Y)*** ***= d(Z/X)/dx+d(Z/Y)/dy***

This DT parameter was introduced by Petr Kuzmin (Milicevic, 2007, p. 13) and is derived for each of the In Phase and Quadrature components at individual frequencies. These in turn allow for minima over conductors and maxima over resistive zones. DT grids for each of the extracted frequencies were generated accordingly, using a reverse colour scheme with warm colours over conductors and cool colours over resistors.

The DT gives a clearer image of conductor's location and shape but, as a derivative, it does not preserve some of the long wavelength information and is also sensitive to noise.

As an alternative, a 90 degree Phase Rotation (PR) technique is also applied to the grids of each individual component (Z/X and Z/Y). It transforms bipolar (cross over) anomalies into single pole anomalies with a maximum over conductors, while preserving long wavelength information (Lo et al., 2009). The two orthogonal grids are then usually added to obtain a Total Phase Rotated grid for the In-Phase and Quadrature.

Total Phase-Rotation:	***= PR (Z/X) + PR (Z/Y)***

A presentation of the ZTEM test survey results over unconformity uranium deposits that illustrates DT and TPR examples, as documented by Lo et al. (2009) is provided in Appendix E.

4.4.7 2D EM Inversion

2d inversions of the ZTEM results were performed over selected lines using the Geotech Zvert2d software developed by Phil Wannamaker, U. of Utah, for Geotech Ltd. The inversion algorithm is based on the 2D inversion code with Jacobians of de Lugao and Wannamaker (1996), the 2D forward code of Wannamaker et al (1987), and the Gauss-Newton parameter step equations of Tarantola (1987). Zvert2d has been developed/modified for use with our ZTEM platform by taking into account the 75-80m air-layer between radar bird and ground surface.

The 2D code only considers the In-Line (Z/X) data and assumes that the strike lengths of bodies are infinite and orthogonal to the profile. The code is designed to account for the ZTEM vertical coil receiver and fixed base station reference measurements – although this option was not used in this study. The inversion uses a model-mesh consisting of 440 cells laterally and 62 cells vertically. Typically the ZTEM data are de-sampled to 180-200 pts, in order to allow the inversion to run in 10minutes or less. Typically, between 1-2% errors are added to the In-line in-phase (XIP) and Quadrature (XQD) data obtained at 30,45,90,180,360 & 720Hz. Errors are adjusted until numerical convergence (<1.0 rms) is attained in 8 iterations or less. All inversions are based on a 1k ohm-m homogeneous starting half-space model.

4.5 Magnetic Data

The processing of the total magnetic field intensity (TMI) 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.

Due to the absence of tie-lines, further tie-line or micro levelling were not applied to the magnetic 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 50 metres. The Minimum Curvature algorithm was used to interpolate values onto a rectangular regular spaced grid.

5. DELIVERABLES

5.1 Survey Report

The survey report describes the data acquisition, processing, and final presentation of the survey results. The survey report is provided in two paper copies and digitally in PDF format.

5.2 Maps

Final maps were produced at scale of 1:20,000. The coordinate/projection system used was WGS84, 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 profile plans for the EM data that were generated for individual real (In-Phase) and imaginary parts (Quadrature) of the Z/X and Z/Y components. Colour contour maps of the corresponding TPR (Total Phase Rotated) Grids for three of the five frequencies, (30, 45, 90, 180 and 360Hz), as well as for corresponding Phase Rotated Grids for individual components.

3D views have been constructed by plotting the TPR grids at their respective penetration depths using a 1000 ohm-m half space, using the Bostick skin depth rule (Murakami, 1985) see Appendix D.

Final maps were chosen, in consultation with the client, to represent all collected data, are listed in Section 5.3.

Sample maps of the related 3D view, Magnetic and Total Phase Rotated are included in this report and presented in Appendix C.

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.

- DVD structure.

There are two (2) main directories;

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

Databases in Geosoft GDB format, containing the channels listed in Table 4.

Table 4 - Geosoft GDB Data Format

Column	Description
X:	UTM Easting WGS84 Zone 9N, (Centre of the ZTEM loop) (meters)
Y:	UTM Northing WGS84 Zone 9N , (Centre of the ZTEM loop) (meters)
Longitude:	Longitude – WGS84 (Centre of the ZTEM loop) (Decimal degree)
Latitude	Latitude – WGS84 (Centre of the ZTEM loop) (Decimal degree)
Z:	Elevation- WGS84 (Centre of the ZTEM loop) (metres)
Radar:	Helicopter terrain clearance from radar altimeter (metres - AGL)
Radar_B:	Calculated ZTEM Bird terrain clearance (metres)
DEM	Digital Elevation Model (meters)
Gtime	GPS Time (seconds)
basemag	Base station mag
Mag1	Measured Total Magnetic Intensity, raw (de-spiked)
Mag2	Measured Total Magnetic Intensity, diurnal corrected
Mag3:	Levelled Total Magnetic field data
xIp_030Hz:	Z/X In-Phase 30 Hz final corrected
xIp_045Hz:	Z/X In-Phase 45 Hz final corrected
xIp_090Hz:	Z/X In-Phase 90 Hz final corrected
xIp_180Hz:	Z/X In-Phase 180 Hz final corrected
xIp_360Hz:	Z/X In-Phase 360 Hz final corrected
xQd_030Hz:	Z/X Quadrature 30 Hz final corrected
xQd_045Hz:	Z/X Quadrature 45 Hz final corrected
xQd_090Hz:	Z/X Quadrature 90 Hz final corrected
xQd_180Hz:	Z/X Quadrature 180 Hz final corrected
xQd_360Hz:	Z/X Quadrature 360 Hz final corrected
yIp_030Hz:	Z/Y In-Phase 30 Hz final corrected
yIp_045Hz:	Z/Y In-Phase 45 Hz final corrected
yIp_090Hz:	Z/Y In-Phase 90 Hz final corrected
yIp_180Hz:	Z/Y In-Phase 180 Hz final corrected
yIp_360Hz:	Z/Y In-Phase 360 Hz final corrected
yQd_030Hz:	Z/Y Quadrature 30 Hz final corrected
yQd_045Hz:	Z/Y Quadrature 45 Hz final corrected
yQd_090Hz:	Z/Y Quadrature 90 Hz final corrected
yQd_180Hz:	Z/Y Quadrature 180 Hz final corrected
yQd_360Hz:	Z/Y Quadrature 360 Hz final corrected
PLM:	Power Line Monitor (60Hz)

- Grids in Geosoft GRD format, as follows:

MAG:	Total Magnetic Intensity
DEM:	Digital Elevation Model
XIP_30Hz_PR:	Z/X In-Phase Component Phase Rotated grid at 30 Hz
XIP_45Hz_PR:	Z/X In-Phase Component Phase Rotated grid at 45 Hz
XIP_90Hz_PR:	Z/X In-Phase Component Phase Rotated grid at 90 Hz
XIP_180Hz_PR:	Z/X In-Phase Component Phase Rotated grid at 180 Hz
XIP_360Hz_PR:	Z/X In-Phase Component Phase Rotated grid at 360 Hz
XIP_720Hz_PR[3]:	Z/X In-Phase Component Phase Rotated grid at 720 Hz
XQd_30Hz_PR:	Z/X Quadrature component Phase Rotated grid at 30 Hz
XQd_45Hz_PR:	Z/X Quadrature component Phase Rotated grid at 45 Hz
XQd_90Hz_PR:	Z/X Quadrature component Phase Rotated grid at 90 Hz
XQd_180Hz_PR:	Z/X Quadrature component Phase Rotated grid at 180 Hz
XQd_360Hz_PR:	Z/X Quadrature component Phase Rotated grid at 360 Hz
XQd_720Hz_PR[3]:	Z/X Quadrature component Phase Rotated grid at 720 Hz
YIP_30Hz_PR:	Z/Y In-Phase Component Phase Rotated grid at 30 Hz
YIP_45Hz_PR:	Z/Y In-Phase Component Phase Rotated grid at 45 Hz
YIP_90Hz_PR:	Z/Y In-Phase Component Phase Rotated grid at 90 Hz
YIP_180Hz_PR:	Z/Y In-Phase Component Phase Rotated grid at 180 Hz
YIP_360Hz_PR:	Z/Y In-Phase Component Phase Rotated grid at 360 Hz
YIP_720Hz_PR[3]:	Z/Y In-Phase Component Phase Rotated grid at 720 Hz
YQd_30Hz_PR:	Z/Y Quadrature component Phase Rotated grid at 30 Hz
YQd_45Hz_PR:	Z/Y Quadrature component Phase Rotated grid at 45 Hz
YQd_90Hz_PR:	Z/Y Quadrature component Phase Rotated grid at 90 Hz
YQd_180Hz_PR:	Z/Y Quadrature component Phase Rotated grid at 180 Hz
YQd_360Hz_PR:	Z/Y Quadrature component Phase Rotated grid at 360 Hz
YQd_720Hz_PR[3]:	Z/Y Quadrature component Phase Rotated grid at 720 Hz
IP_30Hz_DT:	Total Divergence grid from In-phase components at 30 Hz
IP_45Hz_DT:	Total Divergence grid from In-phase components at 45 Hz
IP_90Hz_DT:	Total Divergence grid from In-phase components at 90 Hz
IP_180Hz_DT:	Total Divergence grid from In-phase components at 180 Hz
IP_360Hz_DT:	Total Divergence grid from In-phase components at 360 Hz
IP_720Hz_DT[3]:	Total Divergence grid from In-phase components at 720 Hz
QD_30Hz_DT:	Total Divergence grid from Quadrature components at 30 Hz
QD_45Hz_DT:	Total Divergence grid from Quadrature components at 45 Hz
QD_90Hz_DT:	Total Divergence grid from Quadrature components at 90 Hz
QD_180Hz_DT:	Total Divergence grid from Quadrature components at 180 Hz
QD_360Hz_DT:	Total Divergence grid from Quadrature components at 360 Hz
QD_720Hz_DT[3]:	Total Divergence grid from Quadrature components at 720 Hz
IP_30Hz_TPR:	Total Phase Rotated grid from In-phase components at 30 Hz
IP_45Hz_TPR:	Total Phase Rotated grid from In-phase components at 45 Hz
IP_90Hz_TPR:	Total Phase Rotated grid from In-phase components at 90 Hz
IP_180Hz_TPR:	Total Phase Rotated grid from In-phase components at 180 Hz

[3] 720Hz grids for the Block were not provided due to lack of signal.

IP_360Hz_TPR: Total Phase Rotated grid from In-phase components at 360 Hz
IP_720Hz_TPR[3]: Total Phase Rotated grid from In-phase components at 720 Hz
QD_30Hz_TPR: Total Phase Rotated grid from Quadrature components at 30 Hz
QD_45Hz_TPR: Total Phase Rotated grid from Quadrature components at 45 Hz
QD_90Hz_TPR: Total Phase Rotated grid from Quadrature components at 90 Hz
QD_180Hz_TPR: Total Phase Rotated grid from Quadrature components at 180 Hz
QD_360Hz_TPR: Total Phase Rotated grid from Quadrature components at 360 Hz
QD_720Hz_TPR[3]: Total Phase Rotated grid from Quadrature components at 720 Hz

A Geosoft .GRD file has a .GI metadata file associated with it, containing grid projection information. A grid cell size of 50 metres was used.

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

10112_20K_TMI: Total Magnetic Intensity (TMI)
10112_20K_3D_IP_TPR:3D View of In-Phase Total Phase Rotated Grids versus Skin Depth
10112_20K_30Hz_XIP_PR: 30Hz Z/X Component In-Phase Phase Rotated
10112_20K_90Hz_XIP_PR: 90Hz Z/X Component In-Phase Phase Rotated
10112_20K_360Hz_XIP_PR: 360Hz Z/X Component In-Phase Phase Rotated
10112_20K_30Hz_IP_TPR: 30Hz In-Phase Total Phase Rotated Grid
10112_20K_90Hz_IP_TPR: 90Hz In-Phase Total Phase Rotated Grid
10112_20K_360Hz_IP_TPR: 360Hz In-Phase Total Phase Rotated Grid
10112_20K_30Hz_QD_TPR: 30Hz Quadrature Total Phase Rotated Grid
10112_20K_90Hz_QD_TPR: 90Hz Quadrature Total Phase Rotated Grid
10112_20K_360Hz_QD_TPR: 360Hz Quadrature Total Phase Rotated Grid
10112_20K_XIP_profiles_XIP_PR: Z/X (In-line) In-Phase Profiles over 90Hz Phase Rotated In-Phase Grid
10112_20K_XQD_profiles_XQD_PR:Z/X (In-line) Quadrature Profiles over a 90Hz Phase Rotated Quadrature Grid.
10112_20K_YIP_profiles_YIP_PR:Z/Y (Cross-line) In-Phase Profiles over 90Hz Phase Rotated In-Phase Grid
10112_20K_YQD_profiles_YQD_PR:Z/Y (Cross-line) Quadrature Profiles over a 90Hz Phase Rotated Quadrature Grid.

- 2D Resistivity Inversion maps:

10112_L1050_res: resistivity inversion of line 1050
10112_L1060_res: resistivity inversion of line 1060
10112_L1070_res: resistivity inversion of line 1070
10112_L1080_res: resistivity inversion of line 1080
10112_L1090_res: resistivity inversion of line 1090
10112_L1100_res: resistivity inversion of line 1100
10112_L1110_res: resistivity inversion of line 1110
10112_L1120_res: resistivity inversion of line 1120
10112_L1260_res: resistivity inversion of line 1260

10112_L1270_res:	resistivity inversion of line 1270
10112_L1280_res:	resistivity inversion of line 1280
10112_L1290_res:	resistivity inversion of line 1290
10112_L1300_res:	resistivity inversion of line 1300
10112_L1310_res:	resistivity inversion of line 1310
10112_L1320_res:	resistivity inversion of line 1320
10112_L1330_res:	resistivity inversion of line 1330
10112_L1340_res:	resistivity inversion of line 1340
10112_L1350_res:	resistivity inversion of line 1350
10112_L1360_res:	resistivity inversion of line 1360
10112_L1370_res:	resistivity inversion of line 1370

- Maps are also presented in PDF format.

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

  Mining Claims are derived from the British Columbia Government Land and Resources Data Warehouse: http://aardvark.gov.bc.ca)

- A Google Earth file *"10112_CopperRidge.kml"* is included, showing the flight path of each block. Free versions of Google Earth software from: http://earth.google.com/download-earth.html

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

A helicopter-borne ZTEM and aeromagnetic geophysical survey has been completed over the Babine Project located near Smithers, British Columbia.

The total area coverage is 124 km^2. Total survey line coverage is 502 line kilometres. The principal sensors included a Z-Axis Tipper electromagnetic (ZTEM) system and a caesium magnetometer. Results have been presented as stacked profiles and contour colour images at a scale of 1:20,000.

There is no summary interpretation included in this report however, 2D inversions (Appendix F) have been provided in support of the data.

6.2 Recommendations

Based on the geophysical results obtained, a number of interesting conductive structures were identified across the property. The magnetic results also contain worthwhile information in support of exploration targets of interest. We therefore recommend a more detailed interpretation of the available geophysical data, including VTEM, in conjunction with the geology, prior to ground follow up and drill testing.

Respectfully submitted[6],

Harish Kumar **Geotech Ltd.**	Jean Legault, P. Geo, P. Eng **Geotech Ltd.**
Vlad Kaminski **Geotech Ltd.**	Gord Smith **Geotech Ltd.**

June 2010

[6] Final data processing of the EM and magnetic data were carried out by Harish Kumar, and 2Dinversions were carried out by Vlad Kaminski from the office of Geotech Ltd. in Aurora, Ontario, under the supervision of Gord Smith, Manager of Data Processing and Jean Legault, P. Geo, P. Eng, Chief Geophysicist (Interpretation)

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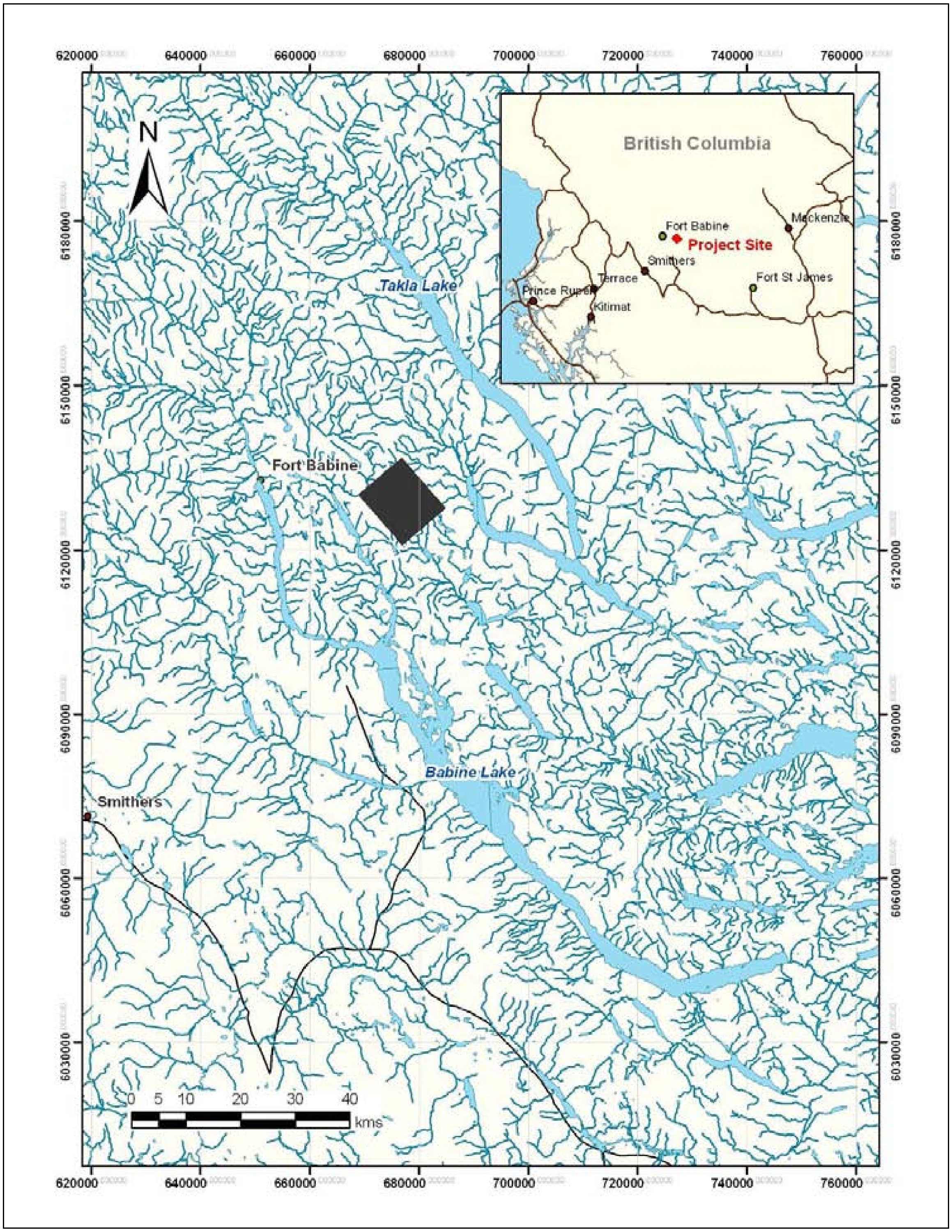
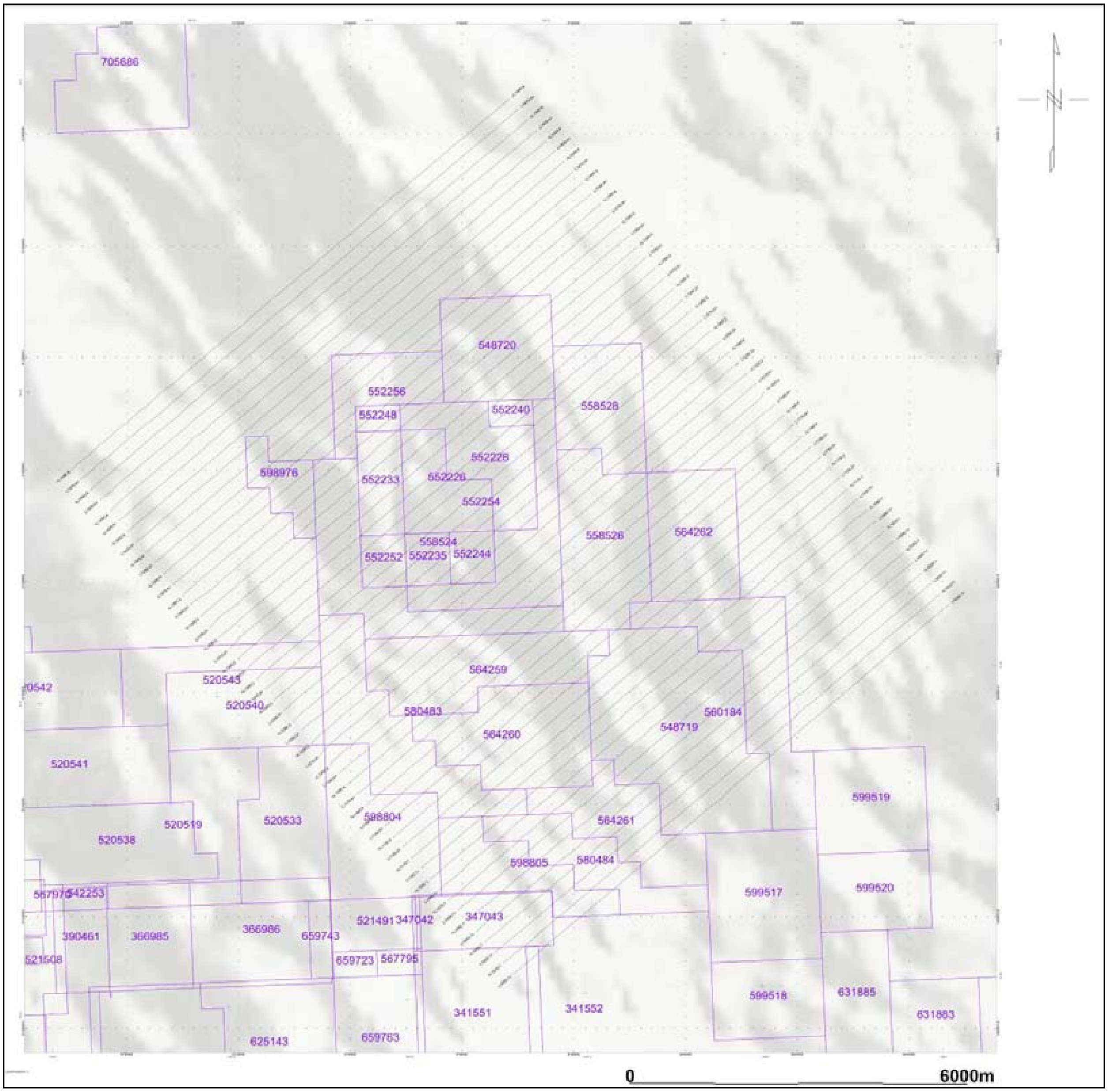
APPENDIX A

SURVEY BLOCK LOCATION MAP



Survey Overview Location Map



Mining Claims for the block

APPENDIX B

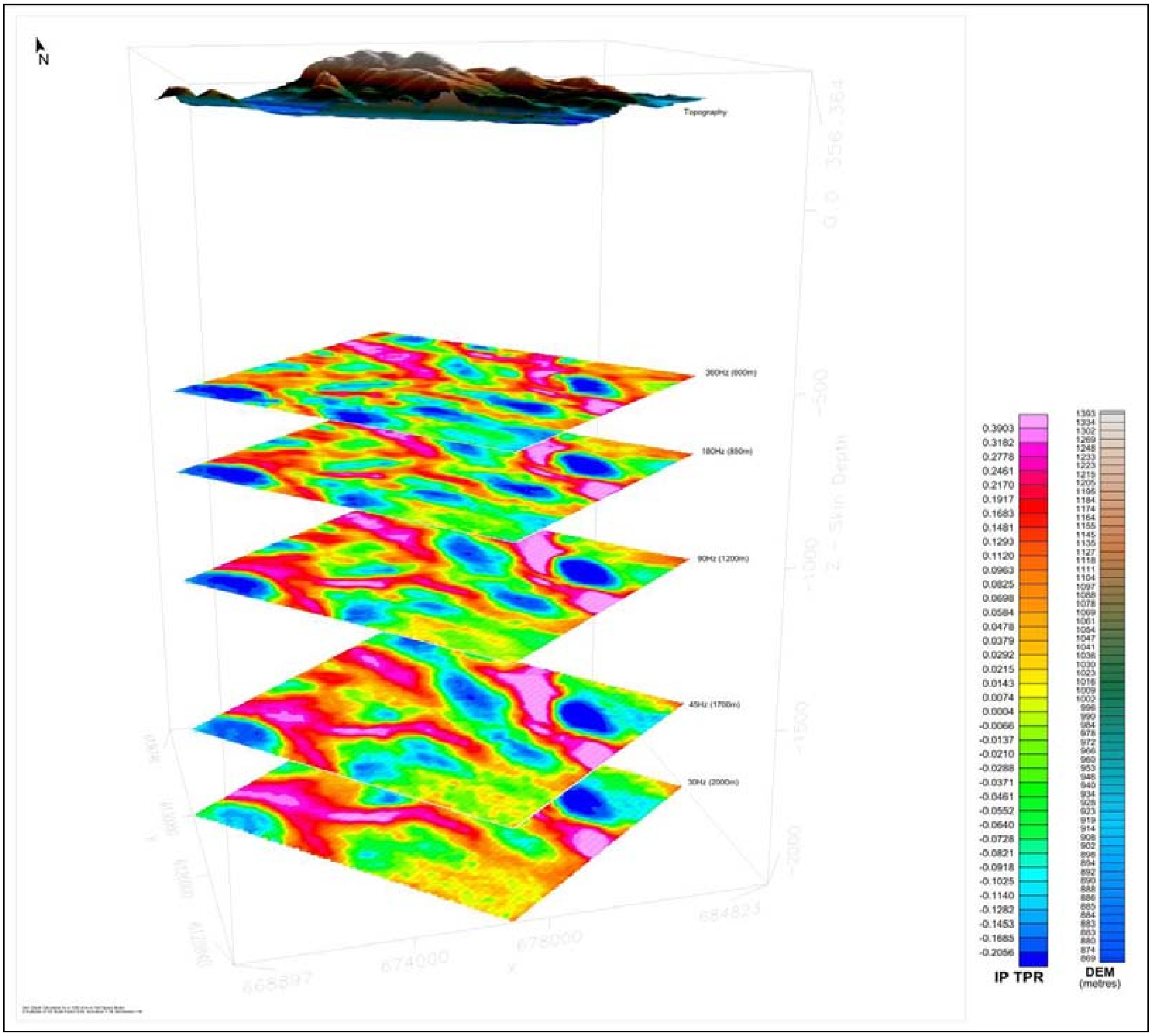
SURVEY BLOCK COORDINATES

(WGS 84, UTM Zone 9 North)

X	Y
676685.1	6136543
684575.8	6127465
677045.8	6121092
669119.7	6130169

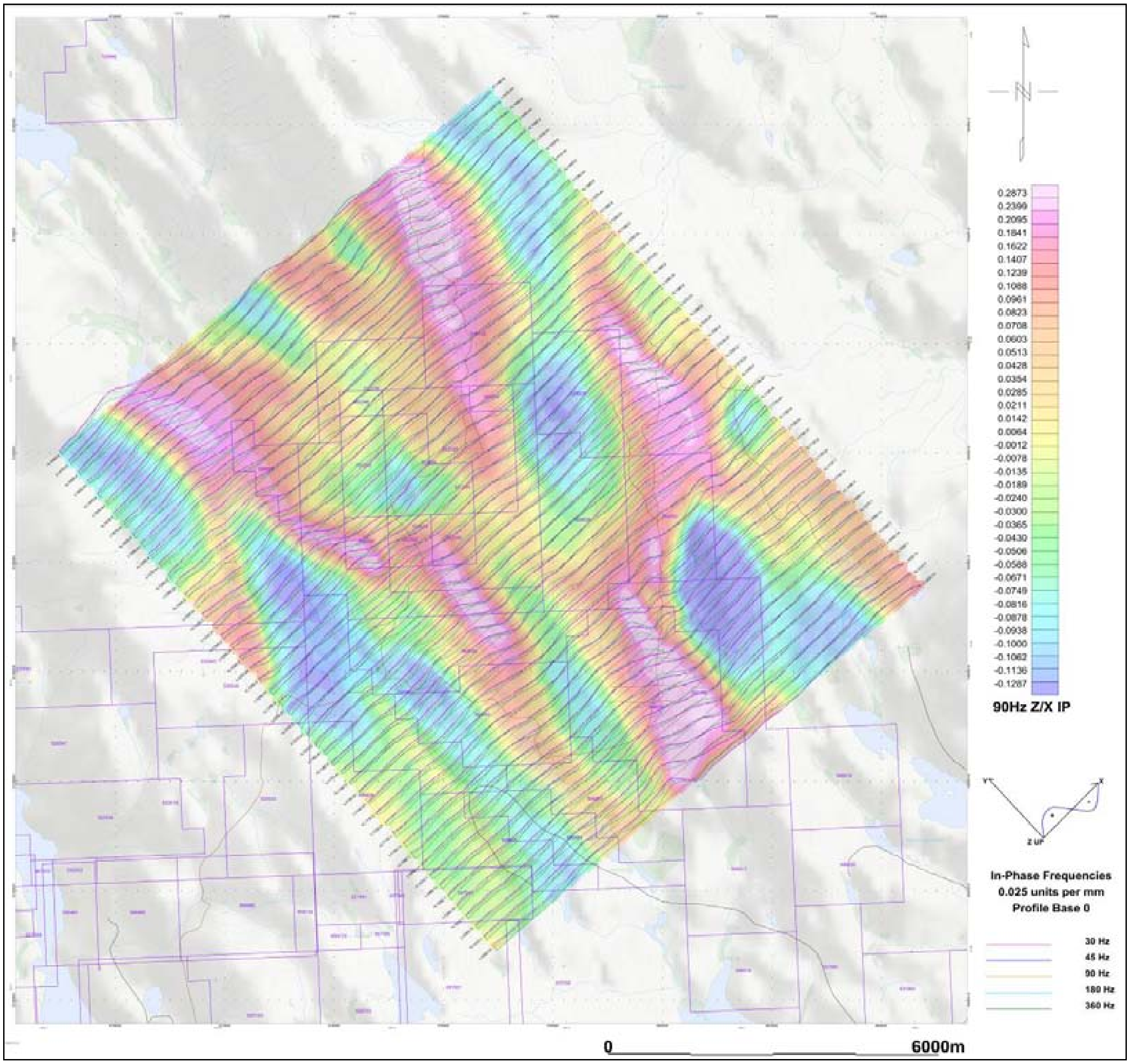
APPENDIX C

GEOPHYSICAL MAPS[1]

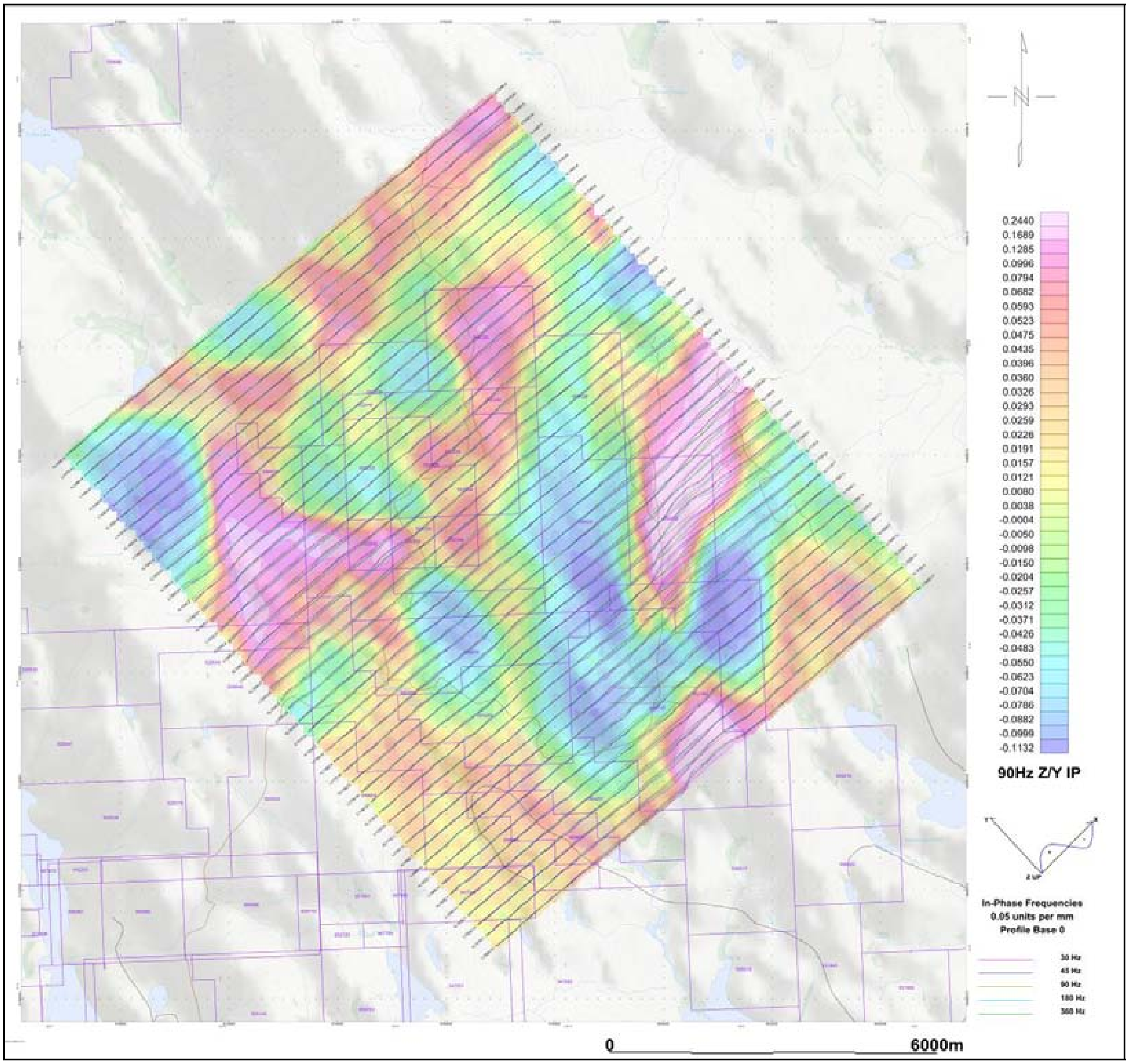


3D View of In-Phase, Total Phase Rotated (TPR) grids versus Skin Depth (30 Hz - 360 Hz)

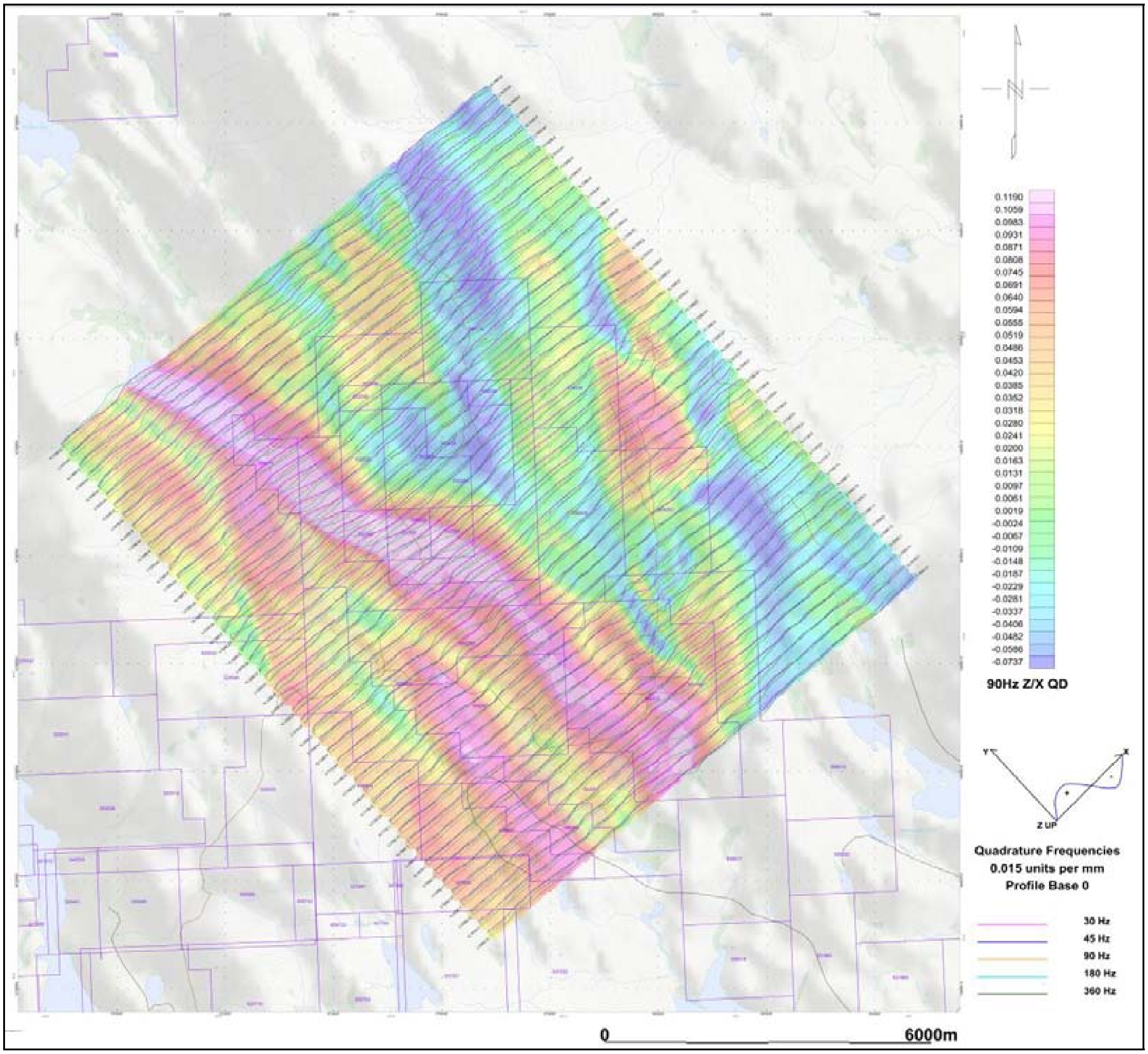
[1] Full size geophysical maps are also available in PDF format on the final DVD



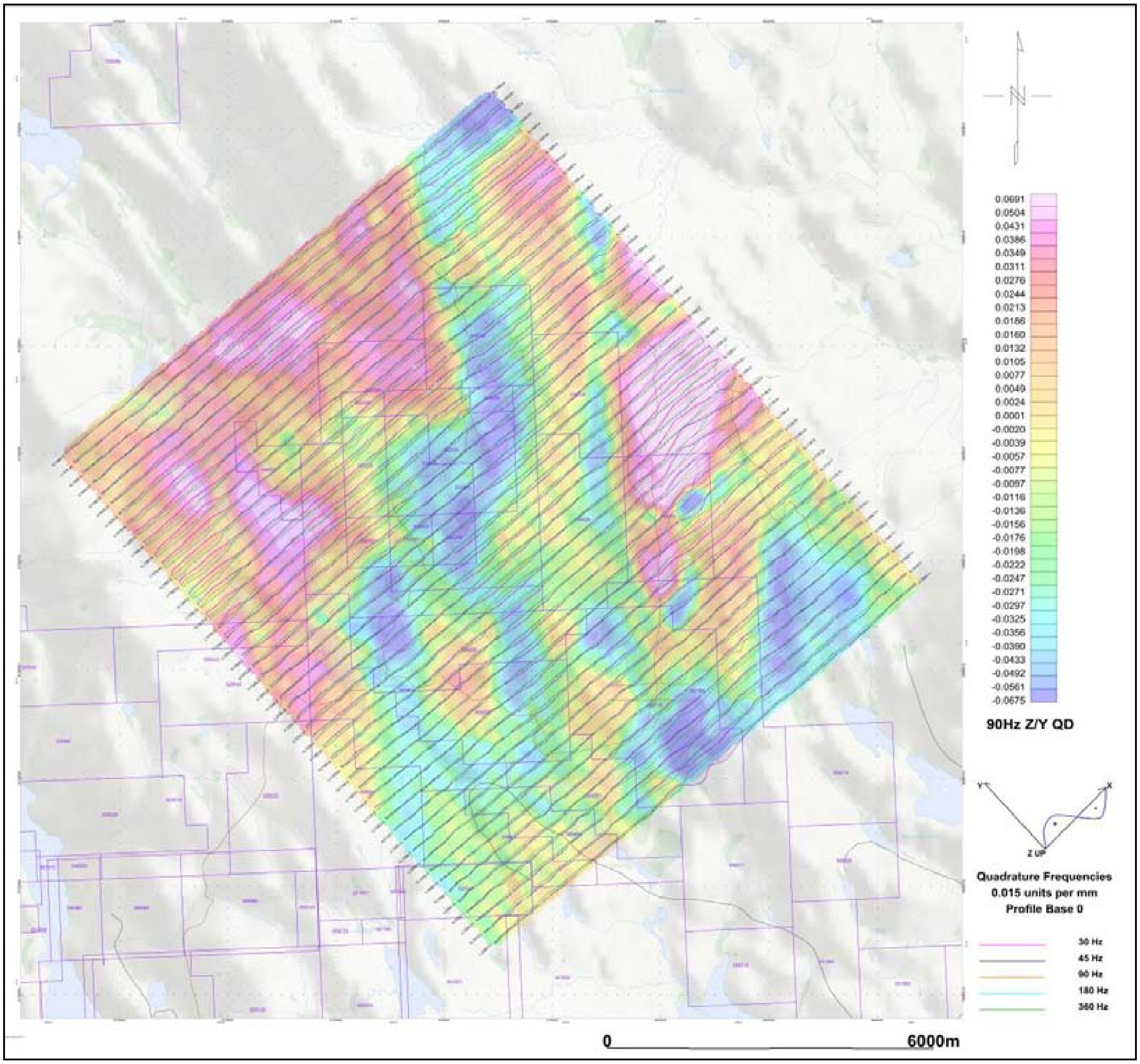
Z/X (In-line) In-Phase Profiles over 90 Hz Phase Rotated Z/X In-Phase Grid



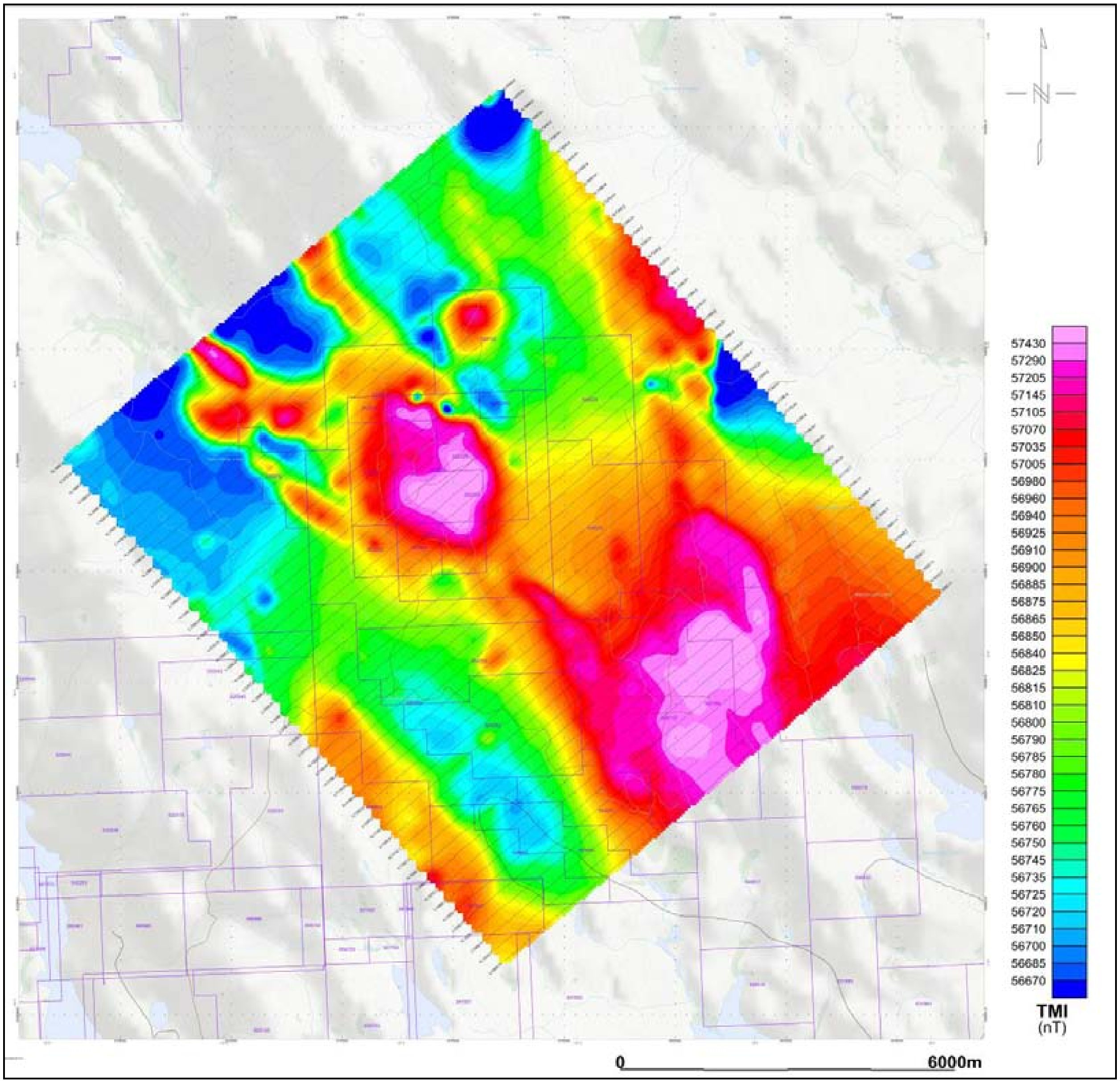
Z/Y (Cross-line) In-Phase Profiles over 90 Hz Phase Rotated Z/Y In-Phase Grid



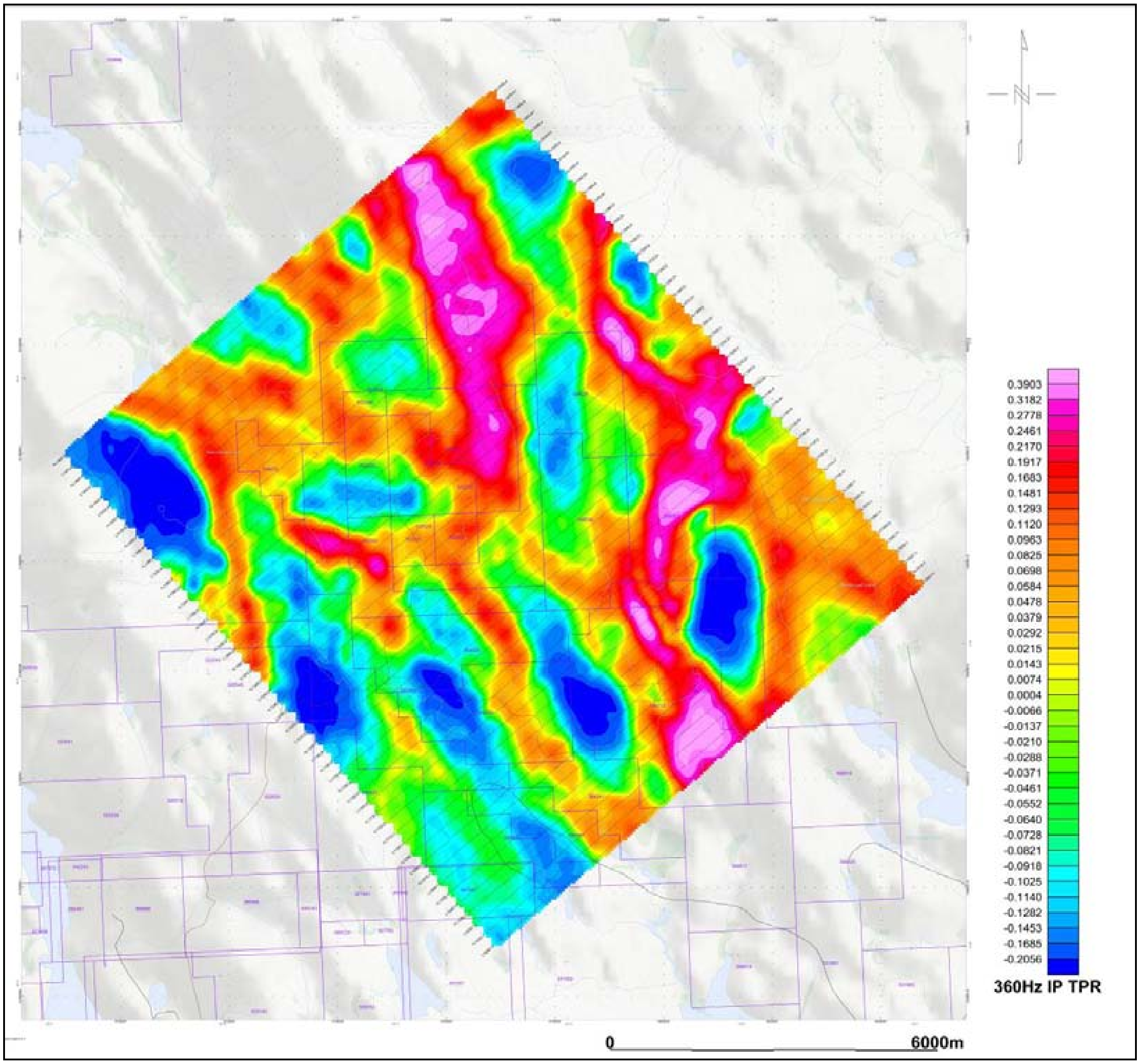
Z/X (In-line) Quadrature Profiles over 90 Hz Phase Rotated Z/X Quadrature Grid



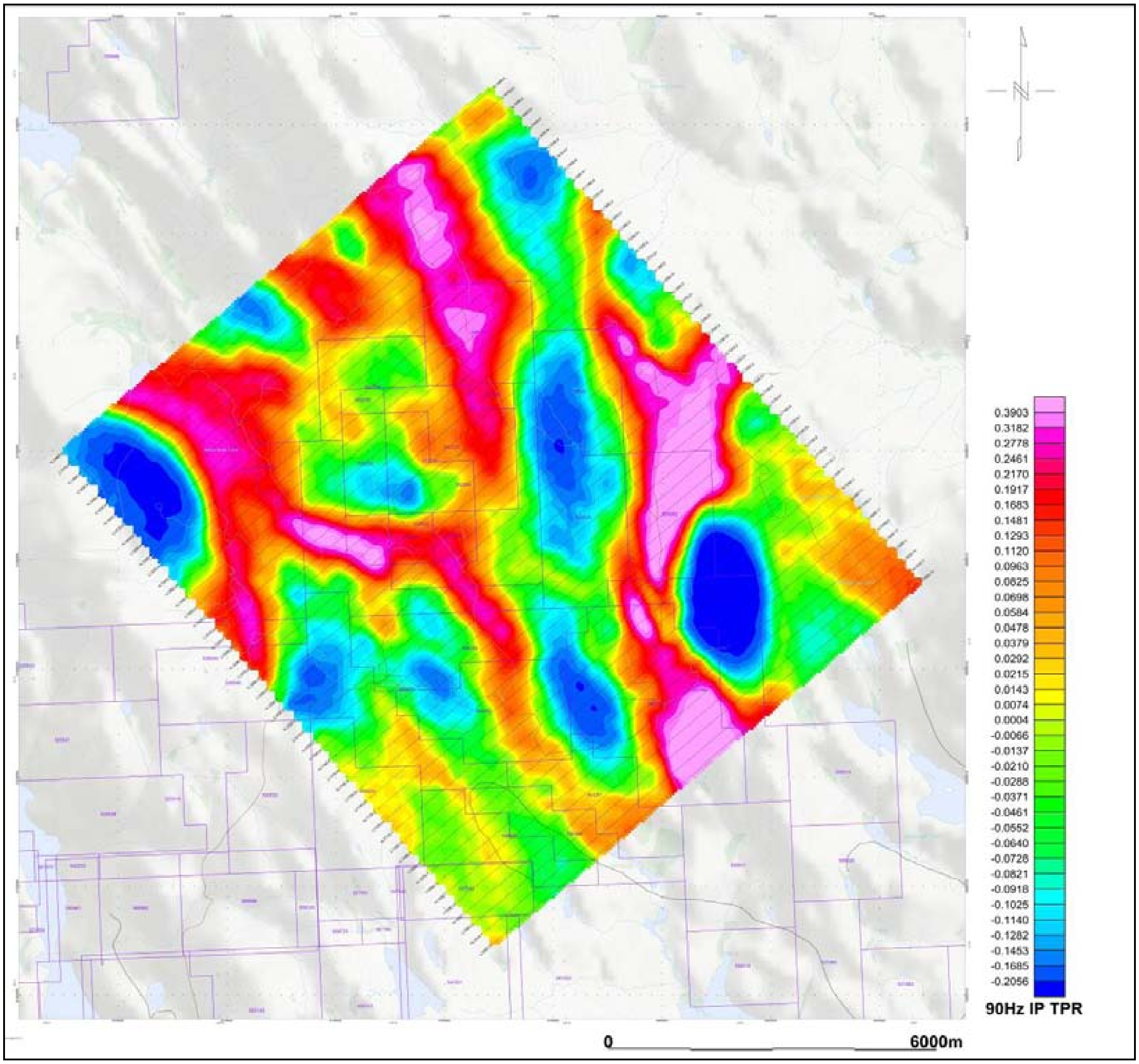
Z/Y (Cross-line) Quadrature Profiles over 90 Hz Phase Rotated Z/Y Quadrature Grid



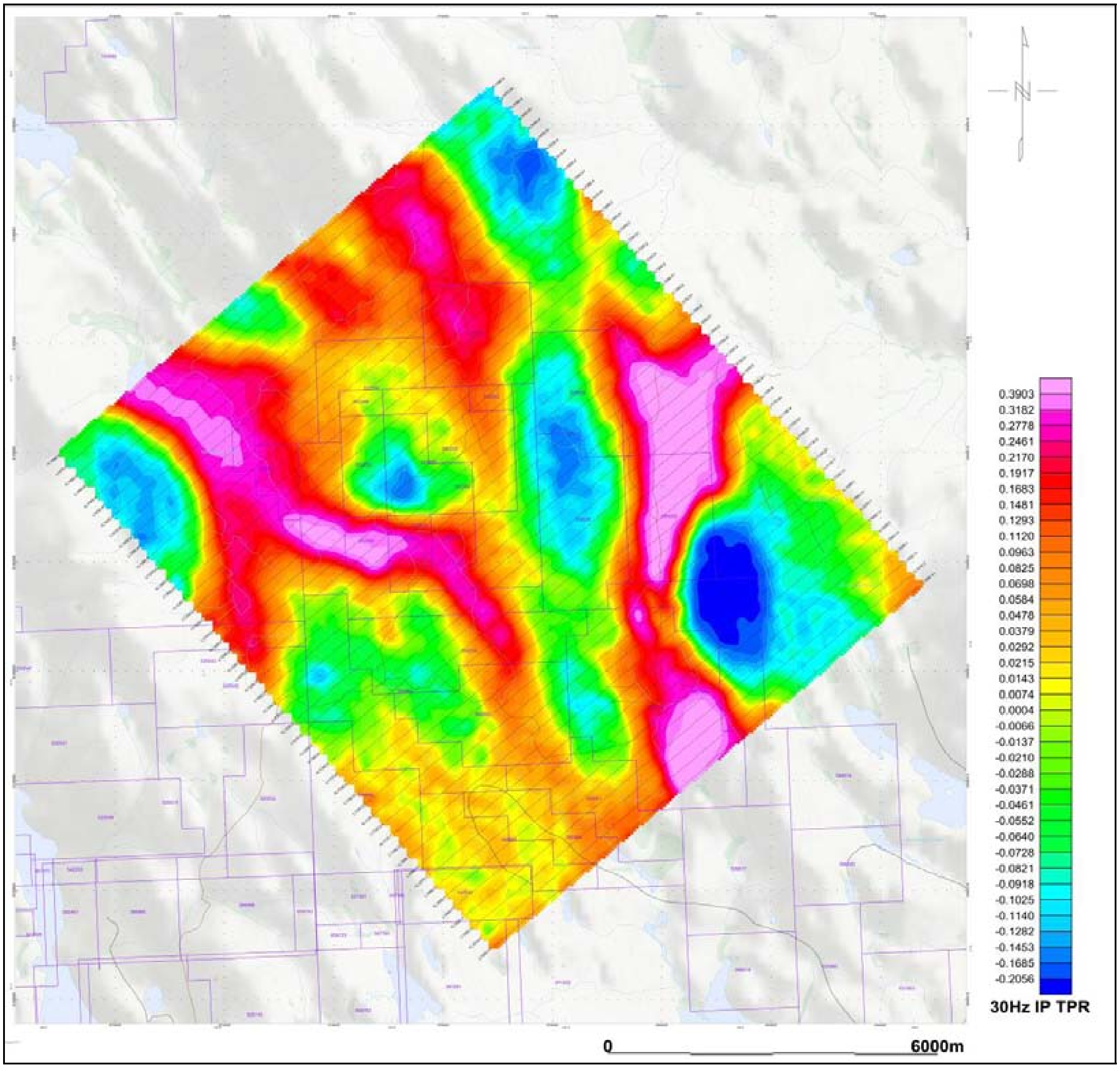
Total Magnetic Intensity (TMI) Grid



High Frequency (360Hz) In-Phase Total Phase Rotated (TPR)



Mid Frequency (90Hz) In-Phase Total Phase Rotated (TPR)



Low Frequency (30Hz) In-Phase Total Phase Rotated (TPR)

APPENDIX D

ZTEM THEORETICAL CONSIDERATIONS

A brief section on the theory behind the AFMAG technique is provided for completeness and a more comprehensive development of the theory can be found in standard texts. The natural EM field is normally horizontally polarized. Subsurface lateral variations of conductivity generate a vertical component, which is linearly related to the horizontal field. Although the fields look like random signals, they may be treated as the sum of sinusoids. At each frequency the field can be expressed as a complex number with magnitude and argument equal to the amplitude and phase of the sinusoid. The relation between the field components can then be expressed by a linear complex equation with two complex coefficients at any one frequency. These coefficients are dependent upon the subsurface and not upon the horizontal field present at any particular time and are appropriate parameters to measure (Vozoff, 1972).

$$Hz(f) = Tx(f)\,Hx(f) + Ty(f)\,Hy(f), \qquad (1)$$

Where

Hx(f), Hy(f) and Hz(f) are x, y and z components of the field,

Tx(f) and Ty(f) are the "tipper" coefficients.

In the case of a horizontally homogeneous environment, Tx and Ty are equal to zero because Hz =0. They show certain anomalies only by the presence of changes in subsurface conductivity in the horizontal direction. The real parts of the coefficients correspond to tangents of tilt angles measured with a controlled source. The complex tensor [Tx, Ty] known as the "tipper" defines the vertical response to horizontal fields in the x and y directions respectively.

Tx and Ty are two unknown coefficients in one equation, and we therefore must combine two or more sets of measurements to solve them. To reduce effects of noise, multiple sets of measurements can be made, and the coefficients, which minimize the squared error in predicting the measured Z from X and Y, can be found. This leads to next formulas for estimating the coefficients.

$$Tx = ([HzHx^*]\,[HyHy^*] - [HzHy^*]\,[HyHx^*]) \,/\, ([HxHx^*]\,[HyHy^*] - [HxHy^*]\,[HyHx^*]), \qquad (2)$$

and

$$Ty = ([HzHy^*]\,[HxHx^*] - [HzHx^*]\,[HxHy^*]) \,/\, ([HxHx^*]\,[HyHy^*] - [HxHy^*]\,[HyHx^*]\;. \qquad (3)$$

Where

[HxHy*] (For example) denotes a sum of the product of Hx with the complex conjugate of Hy.
In practical processing algorithms, all numbers Hx, Hy and Hz can be obtained by applying the same digital band-pass filters to three incoming parallel data signals. FFT algorithms are also applicable. All sums like [HxHy*] can be calculated on the basis of a discrete time interval in the range from 0.1 to 1 sec or on a sliding time base.

Using platform attitude data in the EM data processing can be done at different stages of the signal processing. The most obvious idea is to transform parallel data from local coordinates of the platform into absolute geographical coordinates before the main signal processing procedure. Unfortunately, the proper algorithms of attitude data obtained, often require some post-processing algorithms such as using post-calculated accelerations based on GPS data etc. That is why it is preferable to treat x-y-z coordinates in formulas above in the local coordinate system of the platform and to recalculate resulting local tilt angles into a geographical or global coordinate system later, during the data post processing.

In weak field conditions where the level of the signal is comparable with input noise levels in preamplifiers, the bias in the estimated values of Tx and Ty caused by noise in the horizontal signals become substantial and can not be reduced by any averaging. This bias can be removed by the use of separate reference signals containing noise uncorrelated with noise in signals Hx and Hy. (Anav et al., 1976).

$$Tx = ([HzRx^*]\,[HyRy^*] - [HzRy^*]\,[HyRx^*]) \,/\, ([HxRx^*]\,[HyRy^*] - [HxRy^*]\,[HyRx^*]), \qquad (4)$$

and

$$Ty = ([HzRy^*]\,[HxRx^*] - [HzRx^*]\,[HxRy^*]) \,/\, ([HxRx^*]\,[HyRy^*] - [HxRy^*]\,[HyRx^*]). \qquad (5)$$

Where:

Rx is the reference field x component,
Ry is the reference field y component.

An additional two electromagnetic sensors, providing these reference signals can be placed at some distance away from the main x, y and z sensors. Currently, though, no additional remote-reference processing are applied to ZTEM data.

Numerical Modelling

In order to understand the airborne AFMAG responses to conductors for a variety of geological environments, EMIGMA^{TM} modelling code from PetRos EiKon (Toronto, ON) was obtained to conduct the formulated model studies.

Below are some of the modelling results from their study.

Modelling assumption:

The assumptions for the modelling are that:

3 components of the magnetic field are measured and they are processed according to:

$$Hz(f) = Tx(f)\,Hx(f) + Ty(f)\,Hy(f)$$

The vector (Tx,Ty) is usually referred to as the 'tipper' vector and is determined in the frequency domain through processing. This is normally done by determining transfer functions from an extended time series.

For the modelling exercise, the 3 components of the magnetic vector (Hx,Hy,Hz) are modelled twice for 2 orthogonal polarizations of a plane wave source field and then the tipper is calculated from a matrix calculation using the results of the 2 source polarizations' models. For the 2D forward modelling results, the tipper vectors are shown as a function of frequency

Basic Model Response

For the initial models, we assume a thin plate-like model. The model is perpendicular to the flight direction. Initially, we will assume very long strike directions. From this quasi-2D model, there are 2 basic responses. The so-called TE response and the so-called TM response.

For the initial models, we will assume the strike is in the y (North) directions and the flight is in the x (East) direction Sensor heights are 30m above ground.

TE Mode: For the TE response, the electric field excitation flows along strike (current channelling) and the horizontal H field (Hx) flows perpendicular to strike thus causing induction through Faraday's law. The Hz response is generated both from channelling and induction.

TM Mode: For this response, the electric field excitation flows perpendicular to strike generating quasi-static charges on faces and the horizontal H field (Hx) flows parallel to strike. Since, the XZ face is very small for this model, little current is induced. The charges on the faces have a small dipole moment due to the thinness of the model.

For the rest of the models unless otherwise noted, the parameters used are:

Strike Length: 1km
Depth Extent: 1km
Conductance: 100S
Depth to Top: 10m
Background: Thin-overburden (10m), Resistive Basement (1000 Ohm-m)

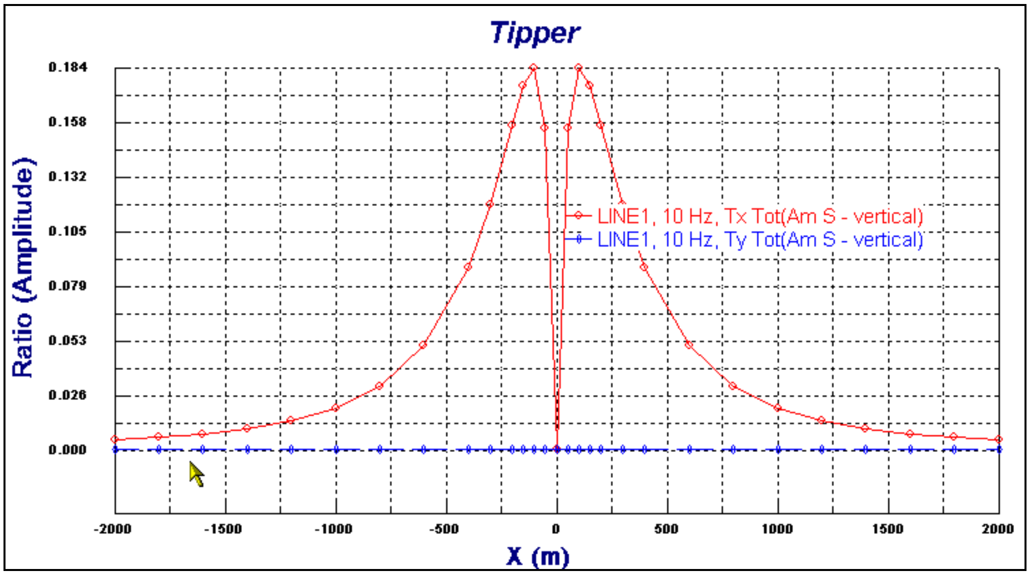


Figure D-1 – Calculated Tipper components at 10 Hz for above model parameters.

Figure D1 shows the Tipper (Tx,Ty) Amplitudes at 10Hz using a10Ωm overburden. Note small Ty (ie quasi-TM response)

Amplitude Response

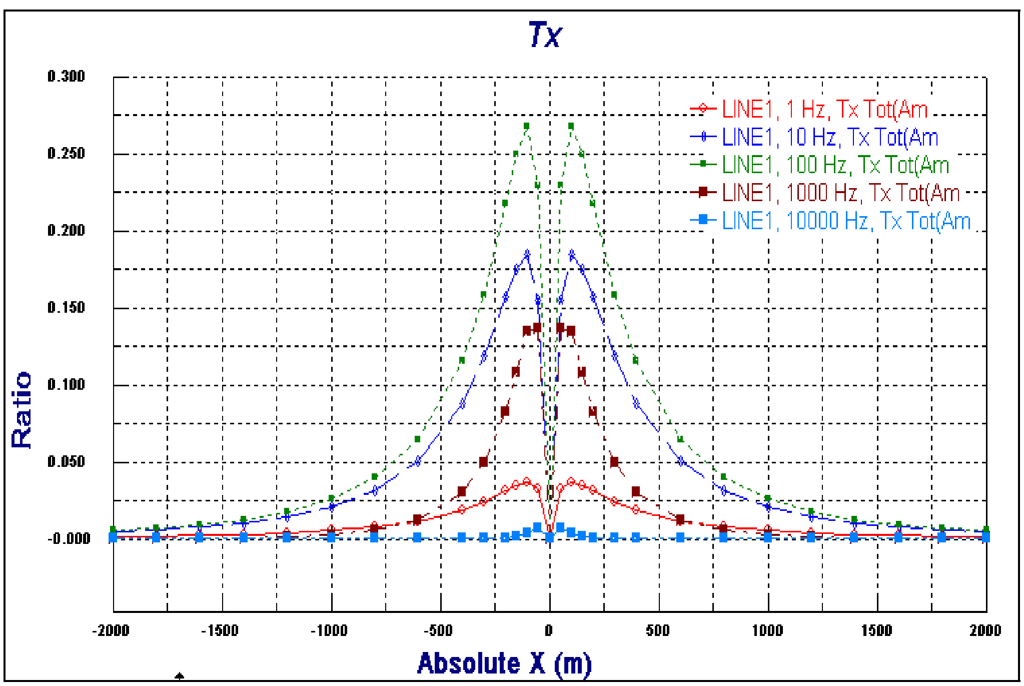


Figure D-2 – Calculated Tx component of the Tipper at various frequencies

The (Tx) response amplitude at 1,10,100,1000,10000 Hx. Peak amplitude at 100Hz

Inphase and Quadrature Response

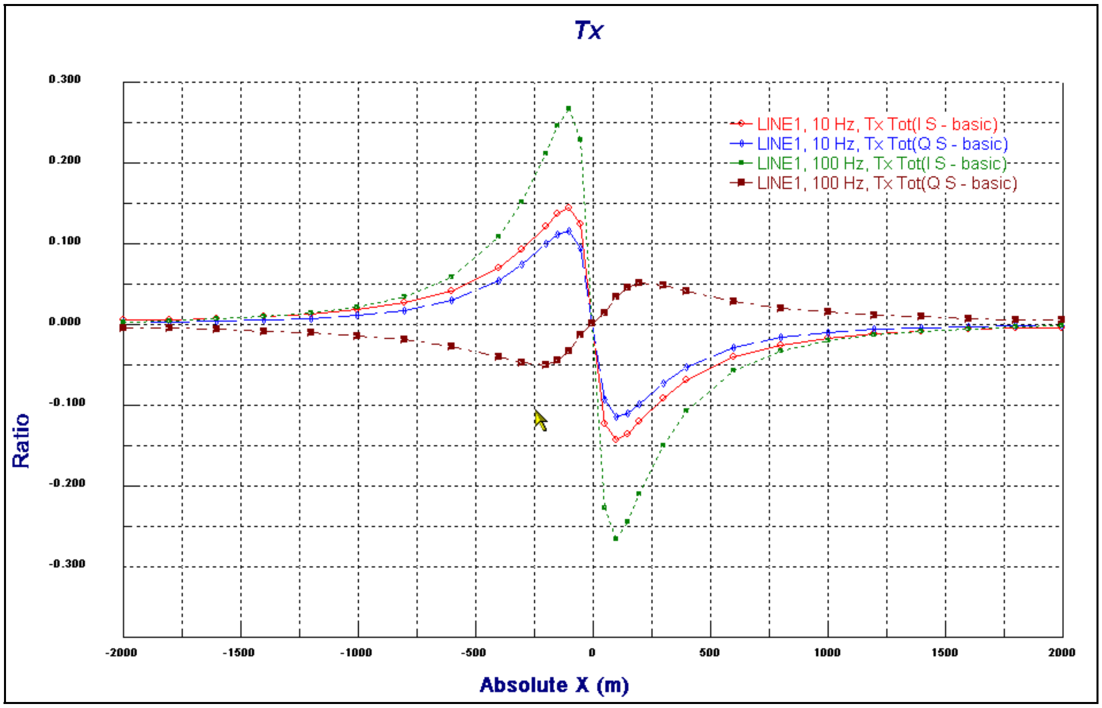


Figure D-3 – Calculated In-phase and Quadrature of the Tx component at various frequencies

Figure D-3 shows the In-phase and Quadrature response at 10 and 100Hz. Note the crossovers in the In-phase and Quadrature, and the phase reversal in the Quadrature responses from low to high frequencies.

Bo Lo, P.Eng, B.Sc. (Geophysics), Consultant
Geotech Ltd.
September, 2007

AFMAG Source Fields and ZTEM method[1]

AFMAG uses naturally occurring audio frequency magnetic fields as the source of the primary field signal, and therefore requires no transmitter (Ward, 1959). The primary fields resemble those from VLF except that they are lower frequency (tens & hundreds of Hz versus tens of kHz) and are usually not as strongly directionally polarized (Labson et al., 1985). These EM fields used in AFMAG are derived from world wide atmospheric thunderstorm activity, have the unique characteristic of being uniform, planar and horizontal, and also propagate vertically into the earth – to great depth, up to several km, as determined by the magnetotelluric (MT) skin depth (Vozoff, 1972), which is directly proportional to the ratio of the bedrock resistivity to the frequency (Figure D4).

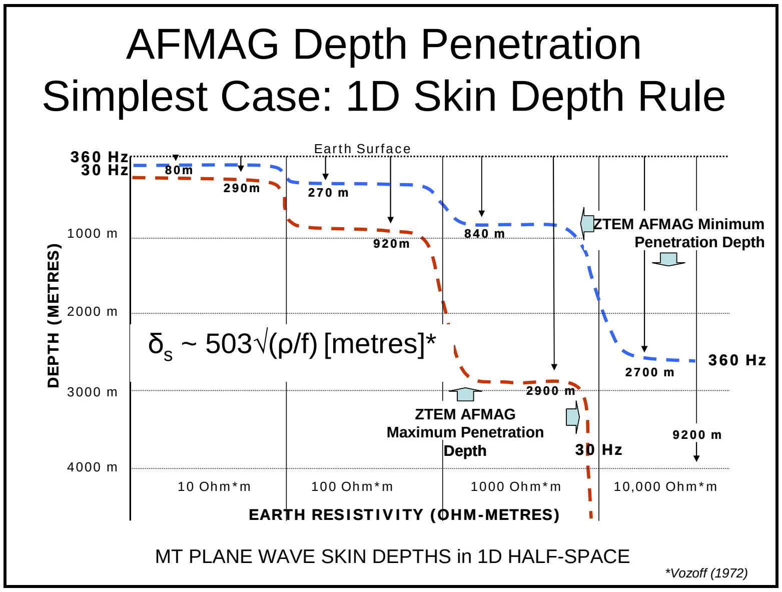


Figure D4: MT Skin Depth Penetrations for ZTEM in 30-360Hz and 10-1000 ohm resistivity

At the frequencies used for ZTEM, the penetration depths likely range between approx. 600m to 2km in this region (approx. 1k ohm-m avg. resistivity assumed), according to the following equation for the Bostick skin depth $\delta_B = 356 * \sqrt{(\rho / f)}$ metres (Murakami, 1985), which is considered appropriate as a rule of thumb equivalent depth estimate.

The other unique aspect of AFMAG fields is that they react to relative contrasts in the resistivity, and therefore do not depend on the absolute conductance, as measured using inductive EM systems, such as VTEM. Hence poorly, conductive targets, such as alteration zones and fault zones can be mapped, as well as higher conductance features, like graphitic units. Conversely, resistive targets can also be detected using AFMAG– provided they are of a sufficient size and contrast to produce a vertical field anomaly. Indeed resistors produce reversed anomalies relative to conductive features. Hence AFMAG can be effective as an

[1] From: Legault, J.M., Kumar, H., and Milicevic, B. (2009): ZTEM tipper AFMAG and 2D inversion results over an unconformity uranium target in northern Saskatchewan, Expanded Abstract submitted to Society of Exploration Geophysics SEG conference, Houston, Tx, Nov-2009, 5 pp.

all-round resistivity mapping tool, making it unique among airborne EM methods. A series of 2D synthetic models that illustrate these aspects have been created using the 2D forward MT modelling code of Wannamaker et al. (1987) and are presented in figures D5-D7.

The tipper from a single site contains information on the dimensionality of the subsurface (Pedersen, 1998), for example, in a horizontally stratified or 1D earth, $\boldsymbol{T}$=0 and as such H_Z is absent. For a 2D earth with the y-axis along strike, T_Y=0 and $H_Z = T_X * H_X$. In 3D earths, both T_X and T_Y will be non-zero. H_Z is therefore only present, as a secondary field, due to a lateral resistivity contrast, whereas the horizontal H_X and H_Y fields are a mixture of secondary and primary fields (Stodt et al., 1981). But, as an approximation, as in the telluric-magnetotelluric method (T-MT; Hermance and Thayer, 1975) used by distributed MT acquisition systems, the horizontal fields are assumed to be practically uniform, which is particularly useful for rapid reconnaissance mapping purposes. By measuring the vertical magnetic field H_X, using a mobile receiver and the orthogonal horizontal H_X and H_Y fields at a fixed base station reference site, ZTEM is a direct adaptation of this technique for airborne AFMAG surveying.

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Geotech Ltd.

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Pedersen, L.B., 1998, Tensor VLF measurements: Our first experiences, Exploration Geophysics, **29**, 52-57.

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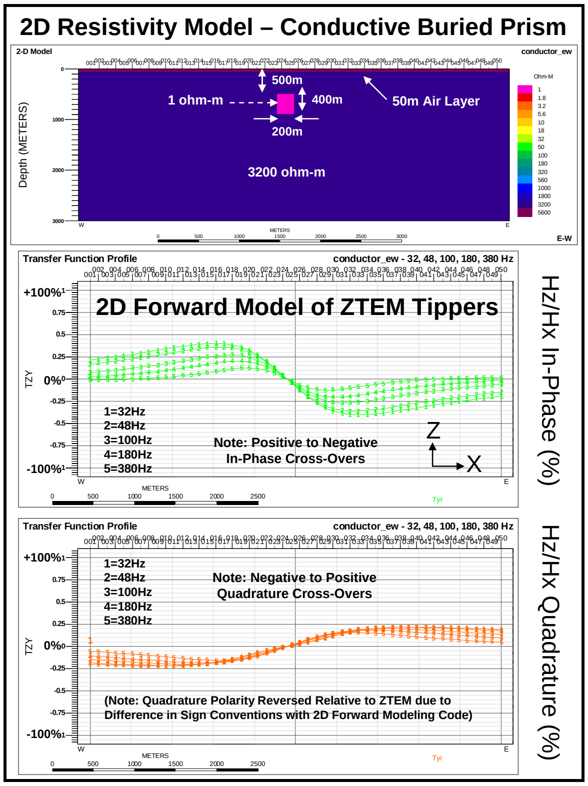

Figure D5: 2D synthetic forward model Tipper responses for conductive brick model.

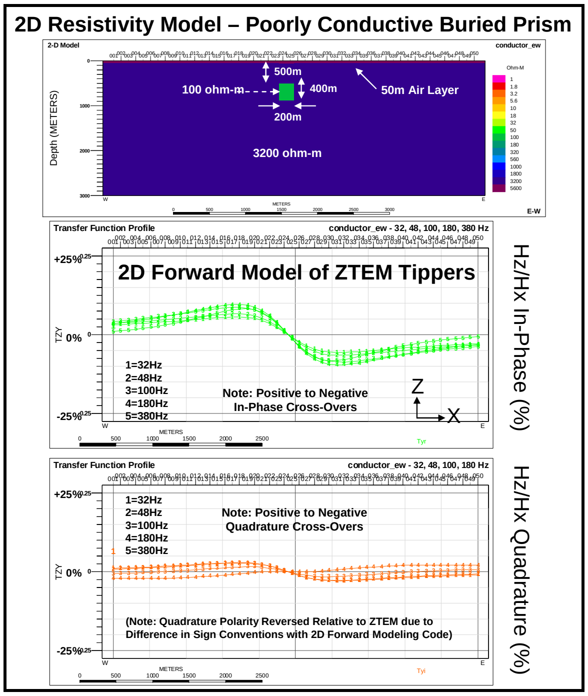

Figure D6: 2D synthetic forward model Tipper response for poorly conductive brick model.

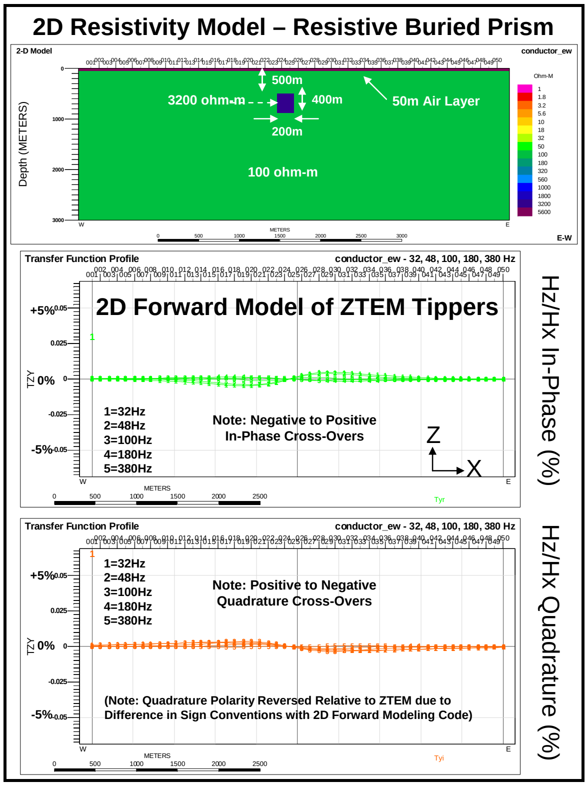

Figure D7: 2D synthetic forward model Tipper response for resistive brick model.

APPENDIX E

ZTEM (AIRBORNE AFMAG) TESTS OVER UNCONFORMITY URANIUM DEPOSITS[6]

Bob Lo[1], Jean Legault[2],Petr Kuzmin[3] [1]Formerly Geo Equipment Manufacturing Ltd., now Exploration Syndicate, Inc., bob.lo@expsyn.com, [2]Geotech Ltd., jean@geotech.ca, [3]Geo Equipment Manufacturing Ltd., petr@geotech.ca*

Key Words: ZTEM, AFMAG, electromagnetic, airborne, uranium, Athabasca.

INTRODUCTION

A series of demonstration tests were conducted using the ZTEM, airborne AFMAG system over deep targets in the Athabasca Basin of Saskatchewan, Canada. These tests were conducted in mid-2008 and were flown to test ZTEM's ability to detect large conductive targets at depth; deeper than conventional airborne EM methods. Data are presented over areas where the conductors are located 450-600 metres beneath the surface. As well, a case of ZTEM following the plunge of a conductor to over 800 metres depth is shown.

BACKGROUND

The ZTEM system is the latest implementation of an airborne AFMAG system first commercialized in late 2006. ZTEM uses a large, 8 metre diameter airborne air core coil, slung from a helicopter, to measure the vertical component of the AFMAG signal. Two 4 metre square coils are deployed on the ground to measure the horizontal field. The ZTEM system has flown successful demonstration surveys over porphyry copper deposits in the southwest USA (Zang et al., 2008).

ZTEM was tested in the Athabasca Basin in Canada in May of 2008 to determine its depth of investigation and to determine its suitability for mapping deep conductors in the crystalline basement. Over 30% of the world's U3O8 is mined in the Athabasca Basin from unconformity uranium deposits. Unconformity uranium deposits of the Athabasca Basin are often associated with conductors located in the crystalline basement. The search for economic uranium deposits is moving to areas of the basin which are deeper and beyond the detection limits of modern airborne instrumentation. This creates the requirement for a system which can detect conductivity past the detection limits of modern traditional EM systems. This was the motivation behind the field trials of the ZTEM system in the Athabasca Basin. Several areas where known deep conductors (450-600m+) were located were flown. Also, a test survey block in the northern part of the basin was able to trace a deep and plunging conductor to depths that no other airborne EM system has been able to achieve.

ATHABASCA BASIN GEOLOGY

The high-grade uranium deposits within the Athabasca Basin are associated with the unconformity between the essentially flat-lying Proterozoic Athabasca Group sandstones and the underlying Archean-Paleoproterozoic metamorphic and igneous basement rocks. The deposits occupy a range of positions from wholly basement-hosted to wholly sediment-hosted, at structurally favourable sites in the interface between the deeply weathered basement and overlying sediments of the Athabasca Basin (Ruzicka, 1997). The locations of These deposits are lithologically and structurally controlled by the sub-Athabasca unconformity and basement faults and fracture zones, which are localized in graphitic pelitic gneisses that may flank structurally competent Archean granitoid domes (Quirt, 1989).

In general, most of the known important deposits tend to occur within a few tens to a few hundred metres of the unconformity and within 500 m of the current ground surface. This may be more of a limitation of exploration techniques. There is no reason to believe that the distribution of the deposits is dependent on the modern day depth of

[6] Extended abstract submitted to 20[TH] ASEG International Geophysical Conference & Exhibition, Adelaide, AU, 22-26 Feb, 2009.

burial.

Empirically, the geophysical exploration for unconformity type uranium targets have been to search for large basement structures which post date the sandstone deposition of the basement (Matthews et. al, 1997). All the deposits located so far are associated with fault structures associated with a graphitic conductive basement. An alteration zone of clay silicification and enrichment around the deposits probably leads to magnetite destruction causing the magnetic low observed around the deposits. The clay alteration should give rise to a resistivity low signature about the deposits. The low conductivity of the clay alteration makes it a difficult target for airborne EM if it is buried at significant depth.

ZTEM INSTRUMENTATION AND PRESENTATION

ZTEM is an airborne AFMAG system introduced by Geotech Ltd. of Canada in early 2007 (Lo et al., 2008). In a ZTEM survey, a single vertical dipole air-core coil is flown over the survey area in a grid pattern similar to other airborne electromagnetic surveys. Two orthogonal, air-core, horizontal axis coils placed close to the survey site measures the horizontal EM fields for reference. A GPS array on the airborne coil monitors its attitude for post-flight corrections.

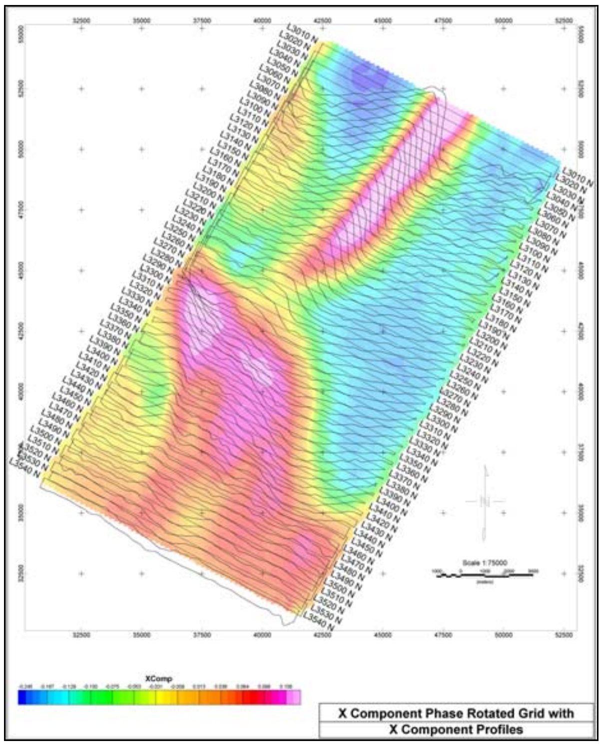

Figure 1 – Stacked profiles of the x-component Tipper over the gridded values of the phase rotated x-component data. Note that the cross-overs in the profiles are now peaks on the image.

As the source field is assumed to be far away, the excitation of the ground is more or less uniform. For large structures, the signal fall-off will be much slower than from a dipole source, such as those energized by traditional airborne systems. With the ZTEM system being less susceptible to terrain clearance, the planned ground clearance height is higher and the terrain drape is looser as compared to standard helicopter EM surveys.

The two Tippers obtained from the relationship between the vertical airborne coil and the two ground coils have a cross-over over a steeply dipping, plate-like body. The cross-overs can be made into local maxima via a 90 degree phase rotation which allows for easier interpretation of the gridded values. Figure 1 is an example of this transformation.

To present the data of both Tippers as one image, we calculate a parameter termed the DT which is the horizontal divergence of the two Tippers, much in the same manner as the "peaker" parameter in VLF (Pedersen, 1998). The DT is typically plotted with an inverted colour bar as it is negative over a steeply dipping thin body.

ZTEM RESULTS – NORTHERN ATHABASCA BASIN

Figure 2 shows gridded values from a number of ZTEM lines over an area where the sedimentary cover is approximately 450-600 metres thick. A number of traditional EM systems have also been flown over this block. While they were able to detect conductors, the resolution of the conductive features is not nearly as detailed as the information provided by ZTEM.

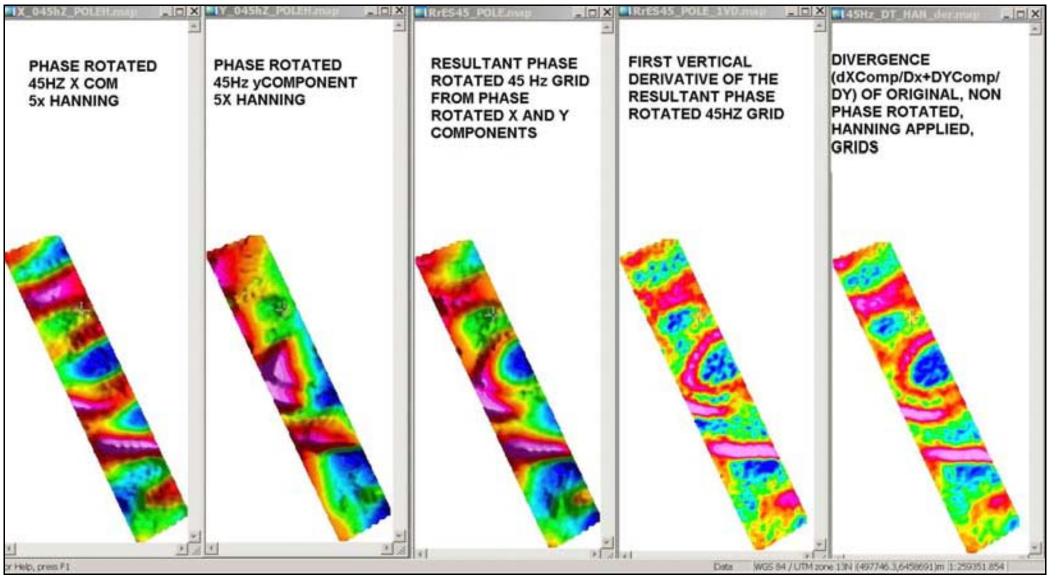

Figure 2 – ZTEM results over an area of 450-600 metre thick sedimentary cover.

Figure 3, from another area, shows the data from one of the larger blocks that was flown. It is a 3D composite image of the DT at various frequencies plotted at the equivalent skin depth assuming a 1,000 ohm-m average resistivity.

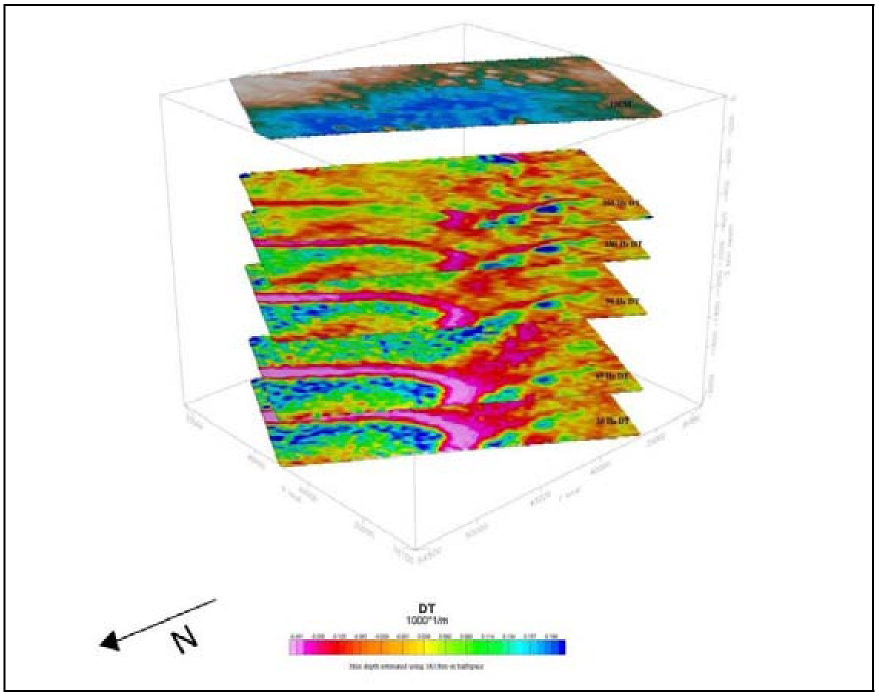

Figure 3 - Perspective view of DT's of different frequencies plotted at the skin depth (using a 1,000 ohm-m Earth.

The data in Figure 3 come from a survey over the north rim of the Athabasca Basin. The sandstone cover is about 500m on the left hand side of the image, and progressively getting deeper to the right. It is about 700m in the middle part of the image and over 800 metres thick on the right middle portion where exploration drilling is concentrated. Starting in the middle left and trending to the right of the image, there is a known graphitic shear.

In the uppermost (600m) "depth slice", Figure 3 shows a linear conductive feature that progressively weakens as one moves to the right until it is no longer seen. This is interpreted to be due to the graphitic shear conductor plunging deeper past the depth of investigation of the 360 Hz data. The lower frequencies penetrate more into the sedimentary cover that is deeper towards the right. DT's of decreasing frequency show the linear conductive feature extending more and more to the right. The feature also strengthens/sharpens into a synformal shape with lower frequencies. This fits with what the known geology of a plunging conductor at depth is doing.

At the nose of the fold, in the right third of the images, we also see another, broader anomalous zone that trends towards the back of the image. At this location, two radioactive springs are situated. These spring waters which are anomalously high in uranium and radon may reflect the upward migration of deep waters along faults, suggesting structural targets in areas where basinal waters may have tapped a radioactive source. This broad DT trend might be the plunge of the fold axis that is aligned away from the front of the image. An anomaly along this trend, at the highest frequency, that steadily grows with each decreasing frequency can be seen. This might represent an alteration zone in the sandstone that is detected at the shallowest depth. By about the 90Hz DT depth slice or so, we are possibly in the deeper basement and into a basement graphitic unit.

CONCLUSIONS

A number of successful ZTEM tests were conducted over the Athabasca Basin. The tests demonstrated that ZTEM can easily detect conductivity to 800 metres beneath relatively resistive sedimentary cover. Assuming a 1,000 ohm-metre resistivity, the skin depth of the 30 Hz data is approximately 2,000 metres. The 30 Hz data presented have good signal to noise ratios indicating a deep depth of exploration. The observation that ZTEM may be detecting the clay alteration above the crystalline basement is a significant advantage for exploration of unconformity uranium deposits.

More demonstration surveys are planned in the Athabasca Basin later this year. And more target types for testing are also planned.

ACKNOWLEDGEMENTS

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APPENDIX F
ZVERT2D INVERSIONS

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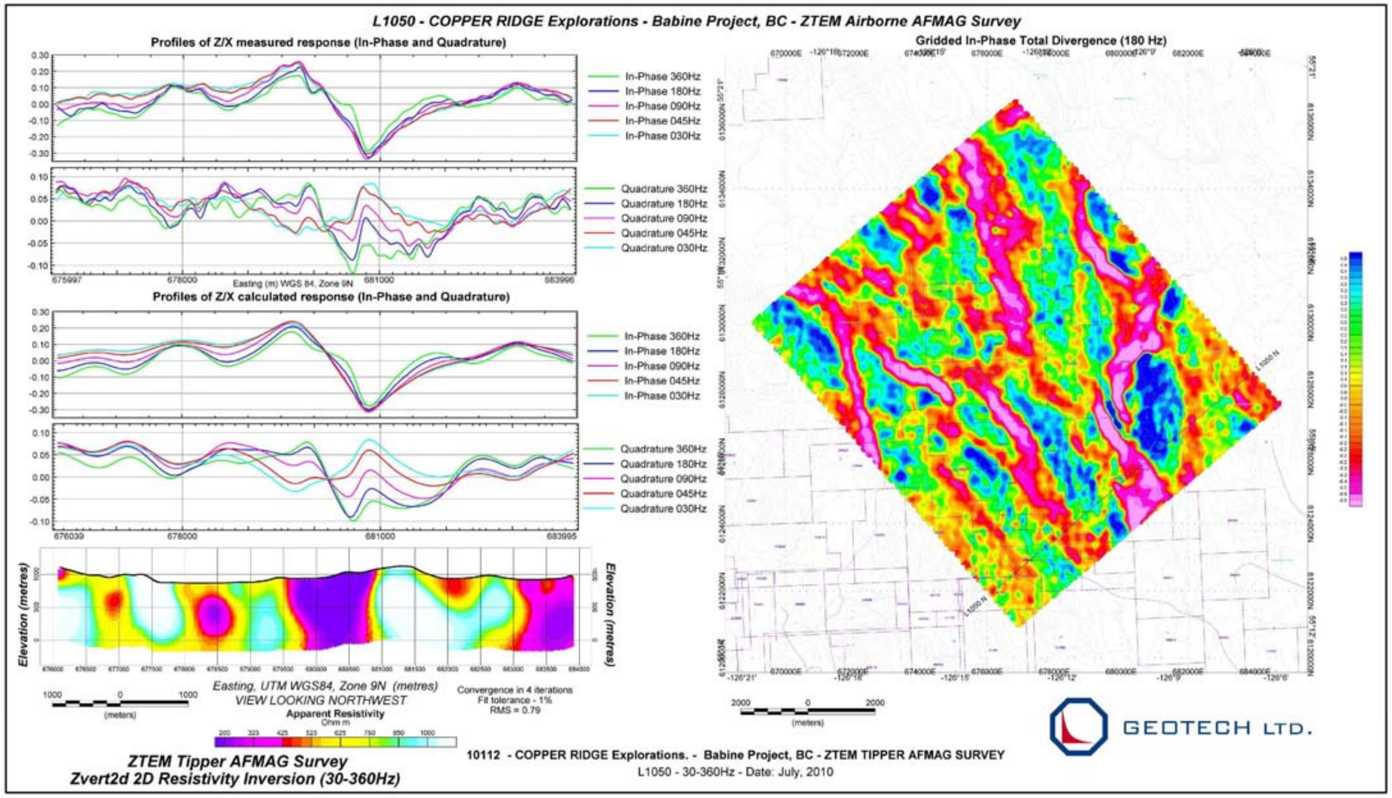

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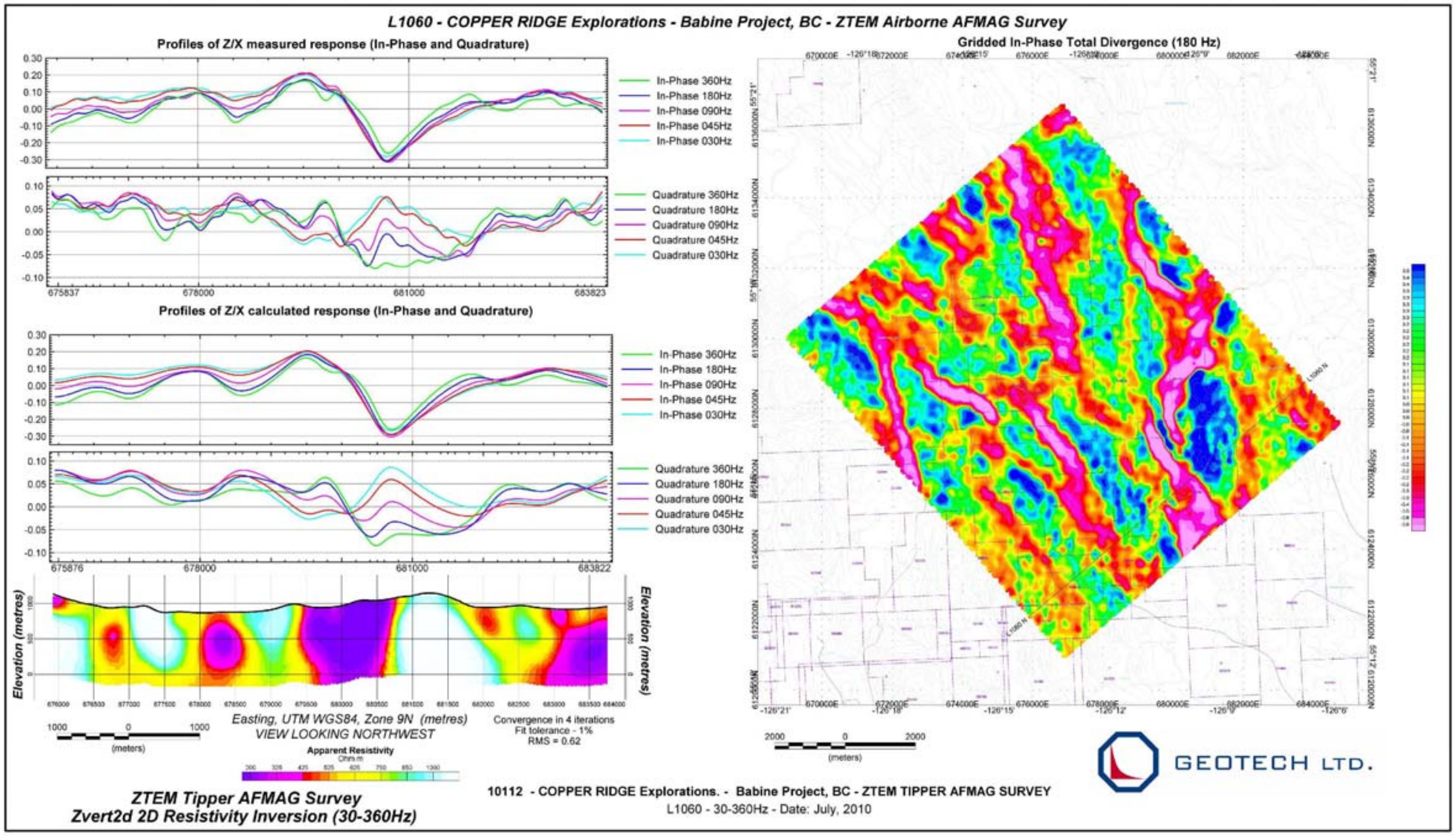
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Profiles of Z/X measured response (In-Phase and Quadrature)
In-Phase 360Hz
In-Phase 180Hz
In-Phase 090Hz
In-Phase 045Hz
In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Gridded In-Phase Total Divergence (180 Hz)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 4 iterations
Fit tolerance - 1%
RMS = 0.62
Apparent Resistivity
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
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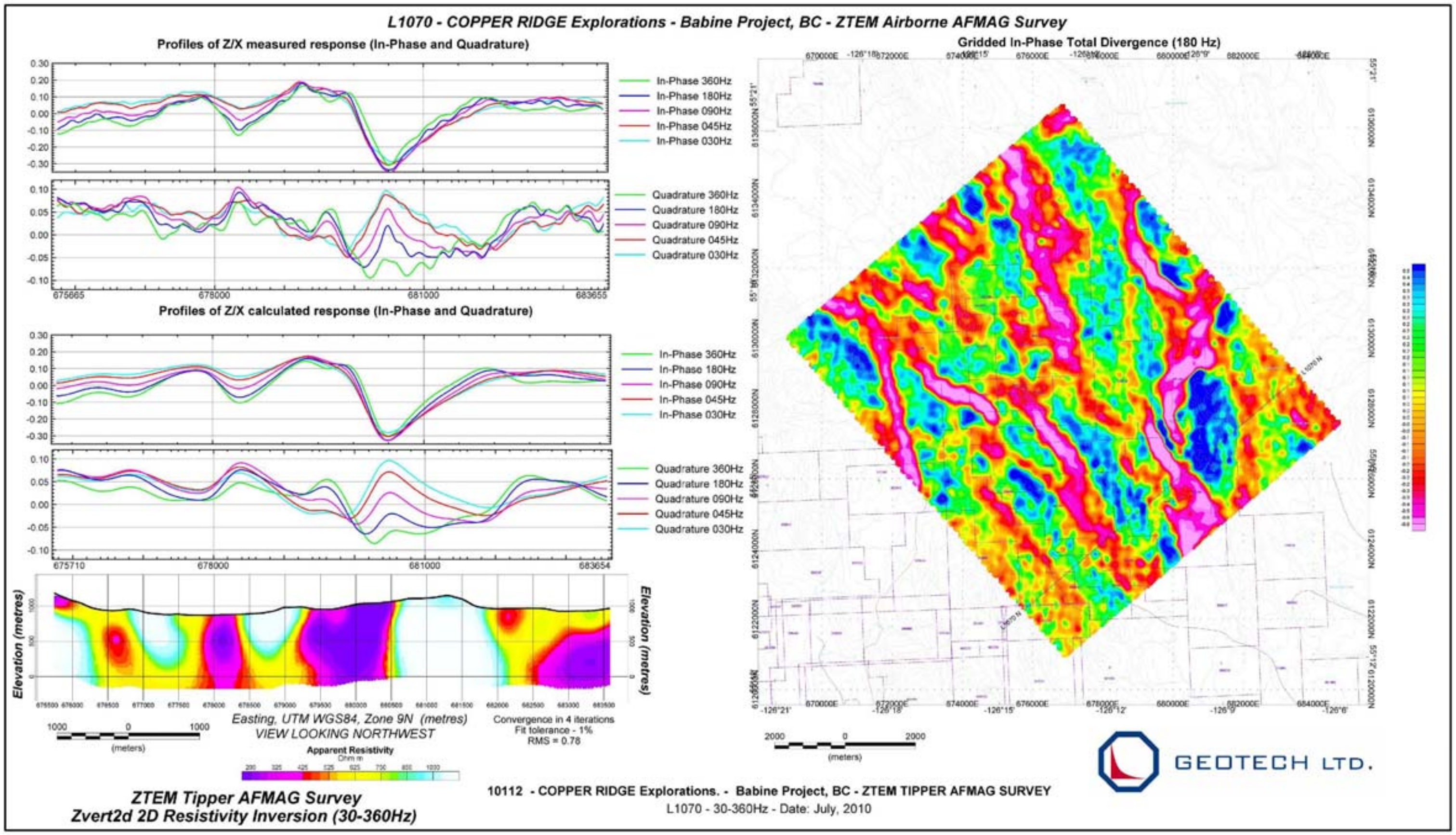
L1060 - 30-360Hz - Date: July, 2010
GEOTECH LTD.

Line 1070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In-Phase 360Hz
In-Phase 180Hz
In-Phase 090Hz
In-Phase 045Hz
In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Gridded In-Phase Total Divergence (180 Hz)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 4 iterations
Fit tolerance - 1%
RMS = 0.78
Apparent Resistivity
Ohm m
(meters)
GEOTECH LTD.
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
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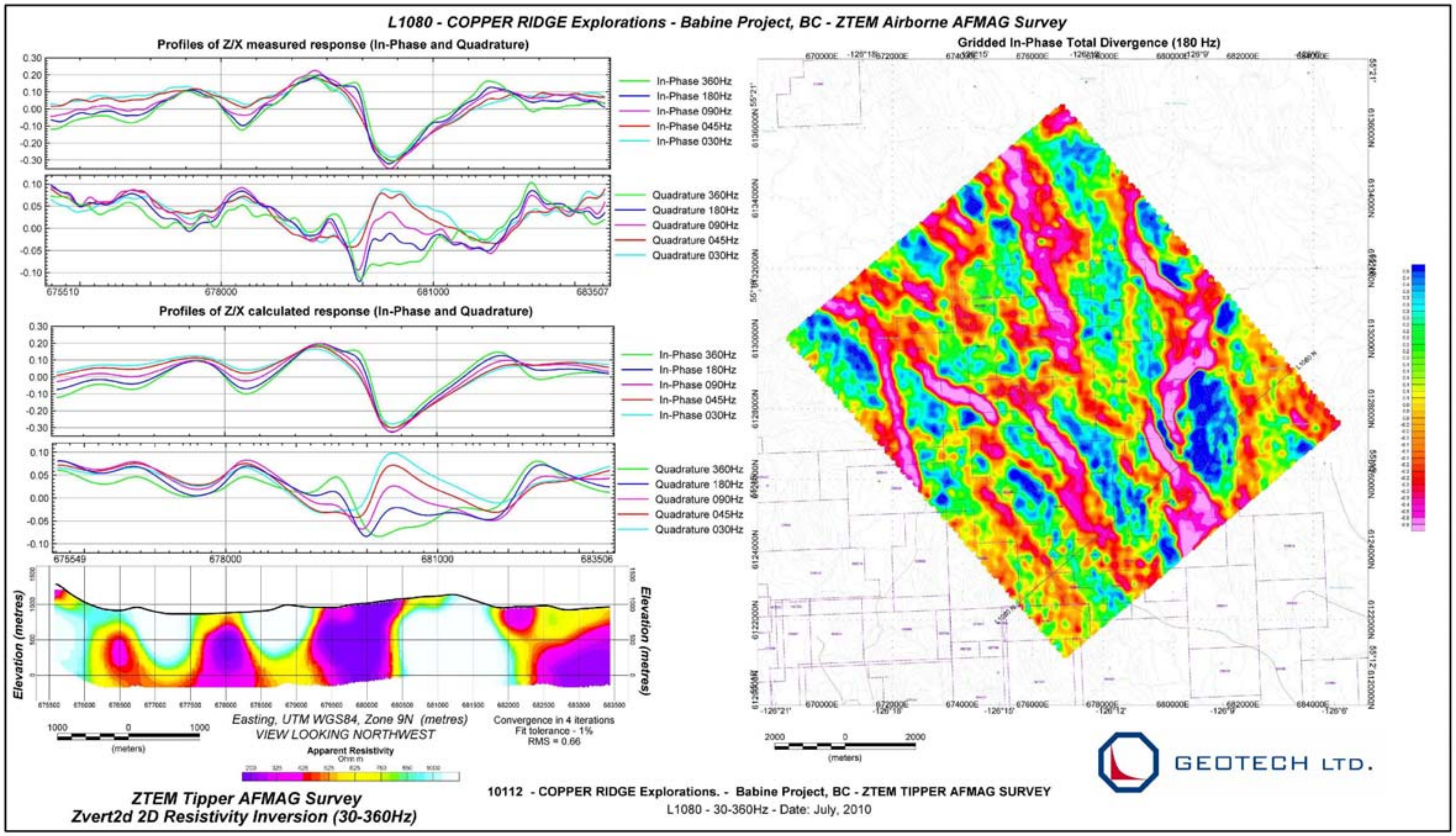
L1070 - 30-360Hz - Date: July, 2010

Line 1080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Profiles of Z/X measured response (In-Phase and Quadrature)
In-Phase 360Hz
In-Phase 180Hz
In-Phase 090Hz
In-Phase 045Hz
In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 4 iterations
Fit tolerance - 1%
RMS = 0.66
Apparent Resistivity
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
Gridded In-Phase Total Divergence (180 Hz)
GEOTECH LTD.
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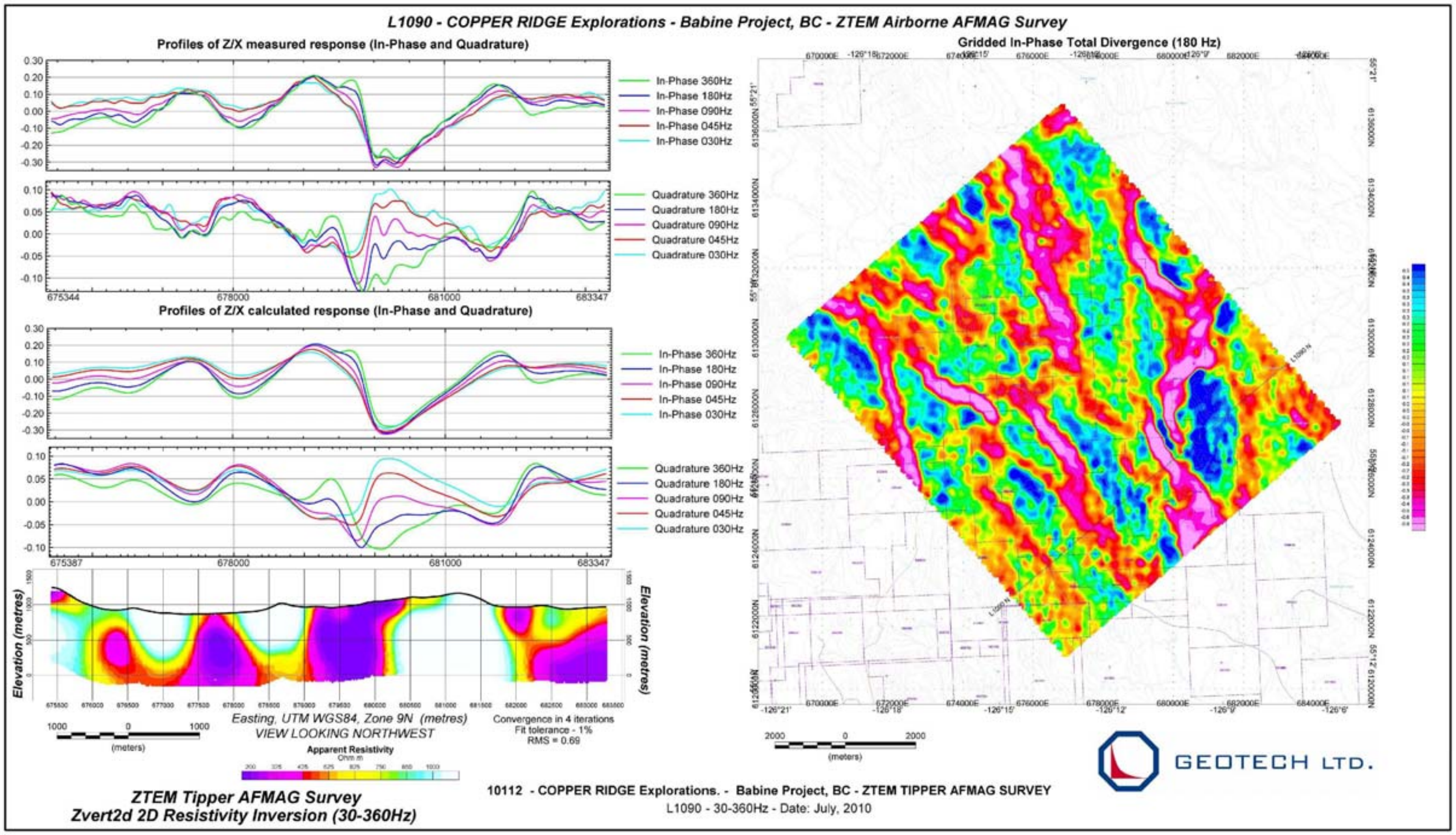
L1080 - 30-360Hz - Date: July, 2010

Line 1090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In-Phase 360Hz
In-Phase 180Hz
In-Phase 090Hz
In-Phase 045Hz
In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 4 iterations
Fit tolerance - 1%
RMS = 0.69
Apparent Resistivity
Ohm.m
(meters)
Gridded In-Phase Total Divergence (180 Hz)
GEOTECH LTD.
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
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L1090 - 30-360Hz - Date: July, 2010

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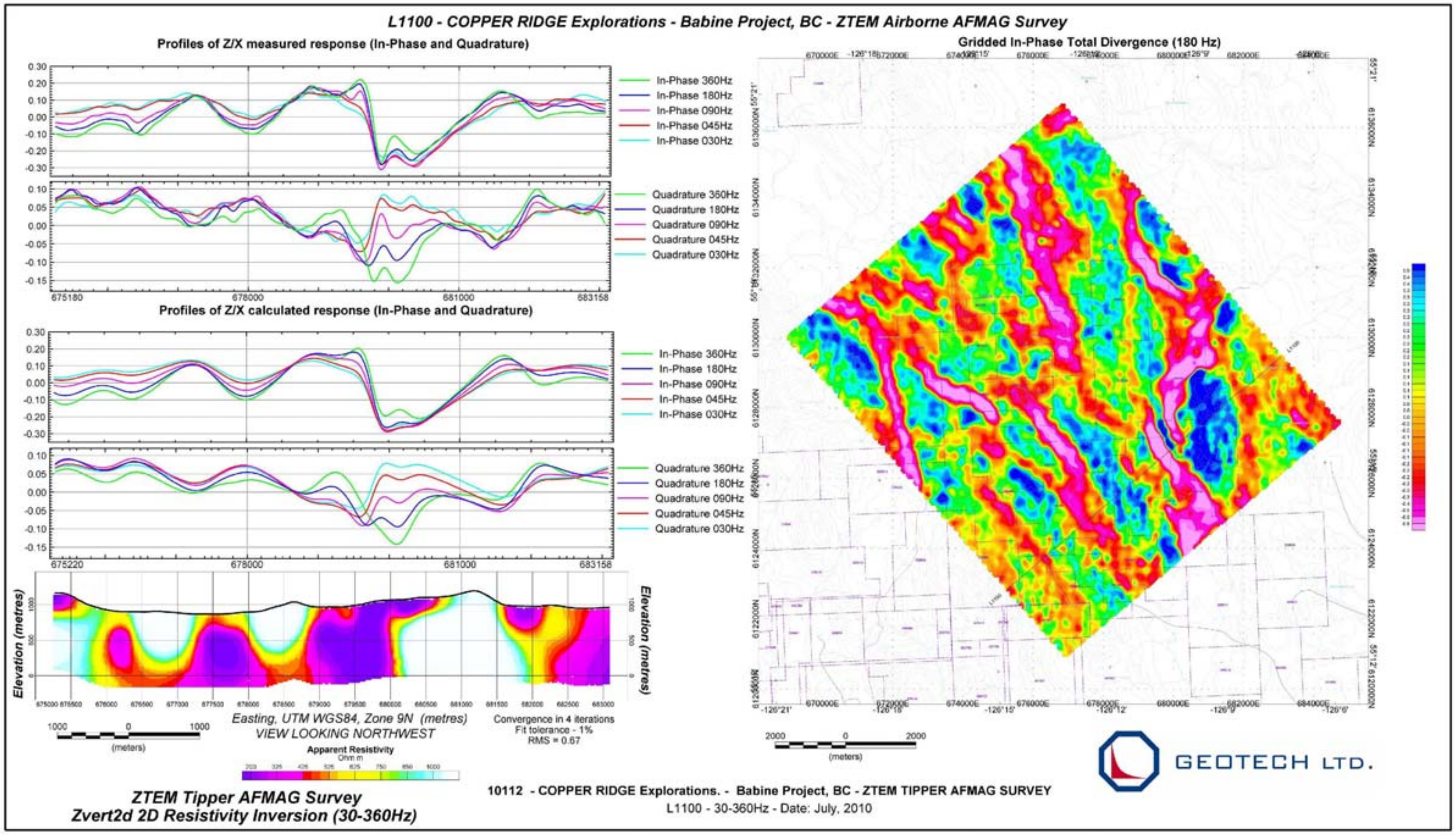

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In-Phase 180Hz
In-Phase 090Hz
In-Phase 045Hz
In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 4 iterations
Fit tolerance - 1%
RMS = 0.67
Apparent Resistivity
Gridded In-Phase Total Divergence (180 Hz)
GEOTECH LTD.
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
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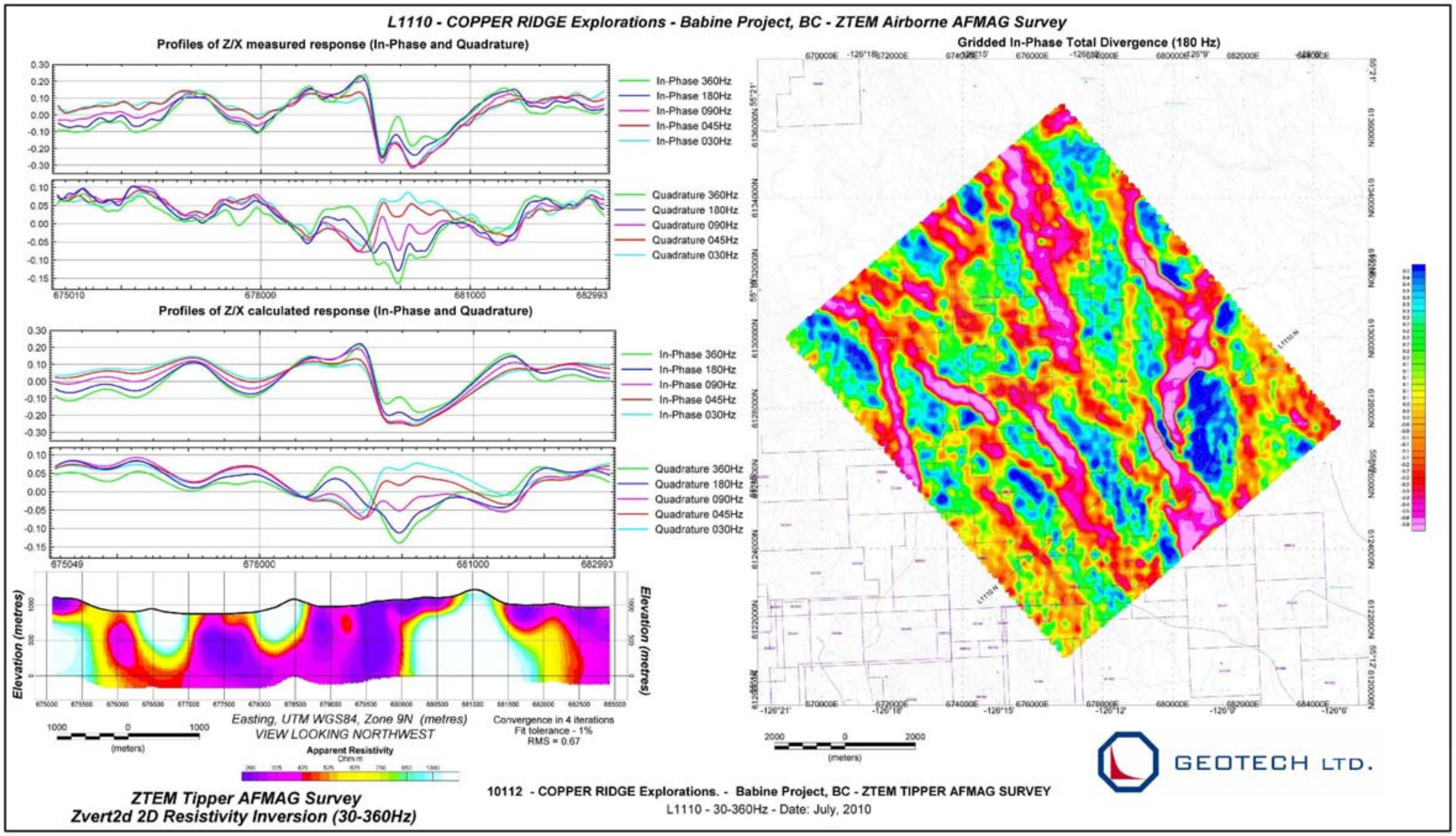
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In-Phase 360Hz
In-Phase 180Hz
In-Phase 090Hz
In-Phase 045Hz
In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 4 iterations
Fit tolerance - 1%
RMS = 0.67
Apparent Resistivity
Ohm m
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
Gridded In-Phase Total Divergence (180 Hz)
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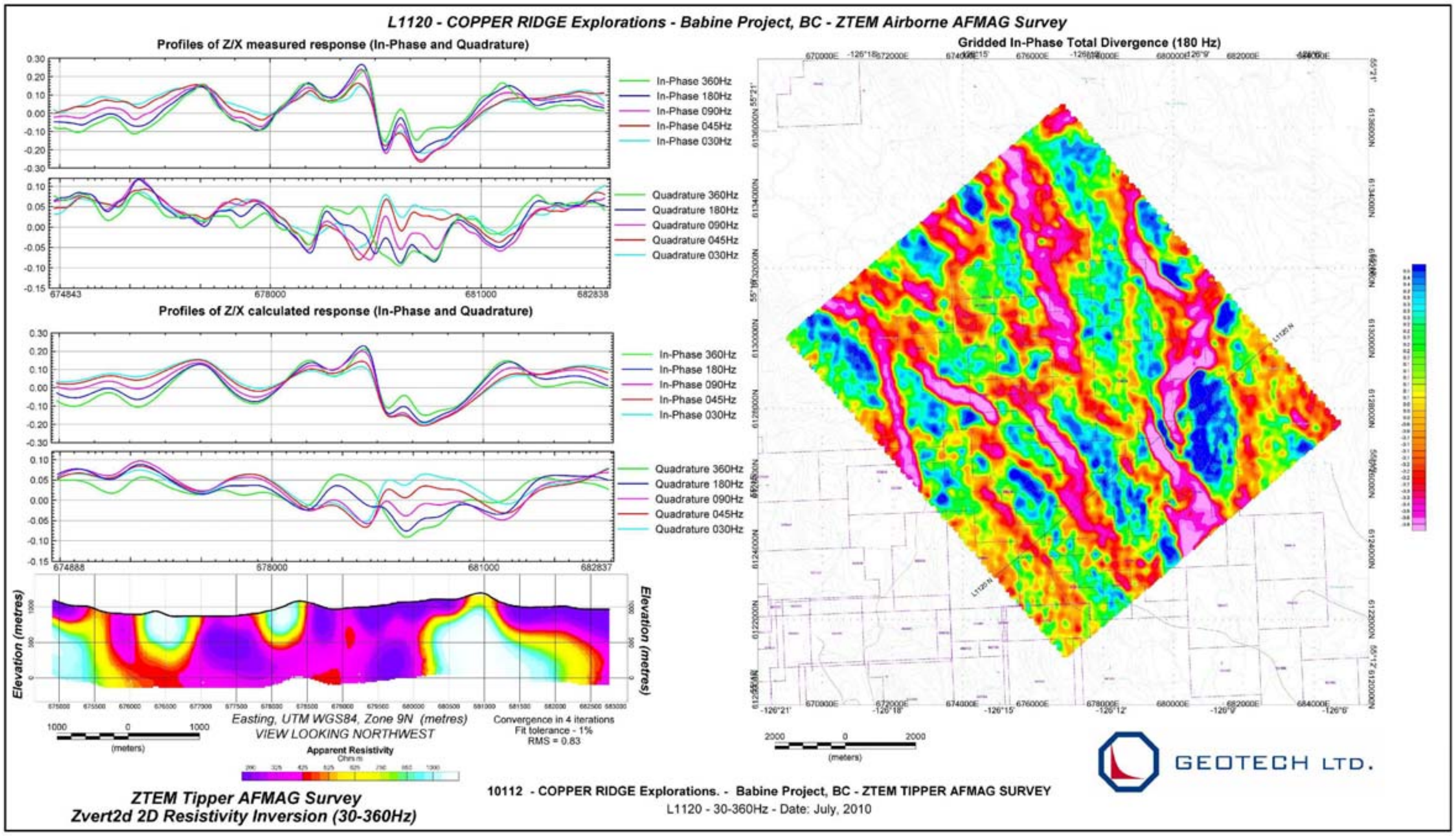
Line 1120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In-Phase 180Hz
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In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Gridded In-Phase Total Divergence (180 Hz)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 4 iterations
Fit tolerance - 1%
RMS = 0.83
Apparent Resistivity
Ohm·m
(meters)
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
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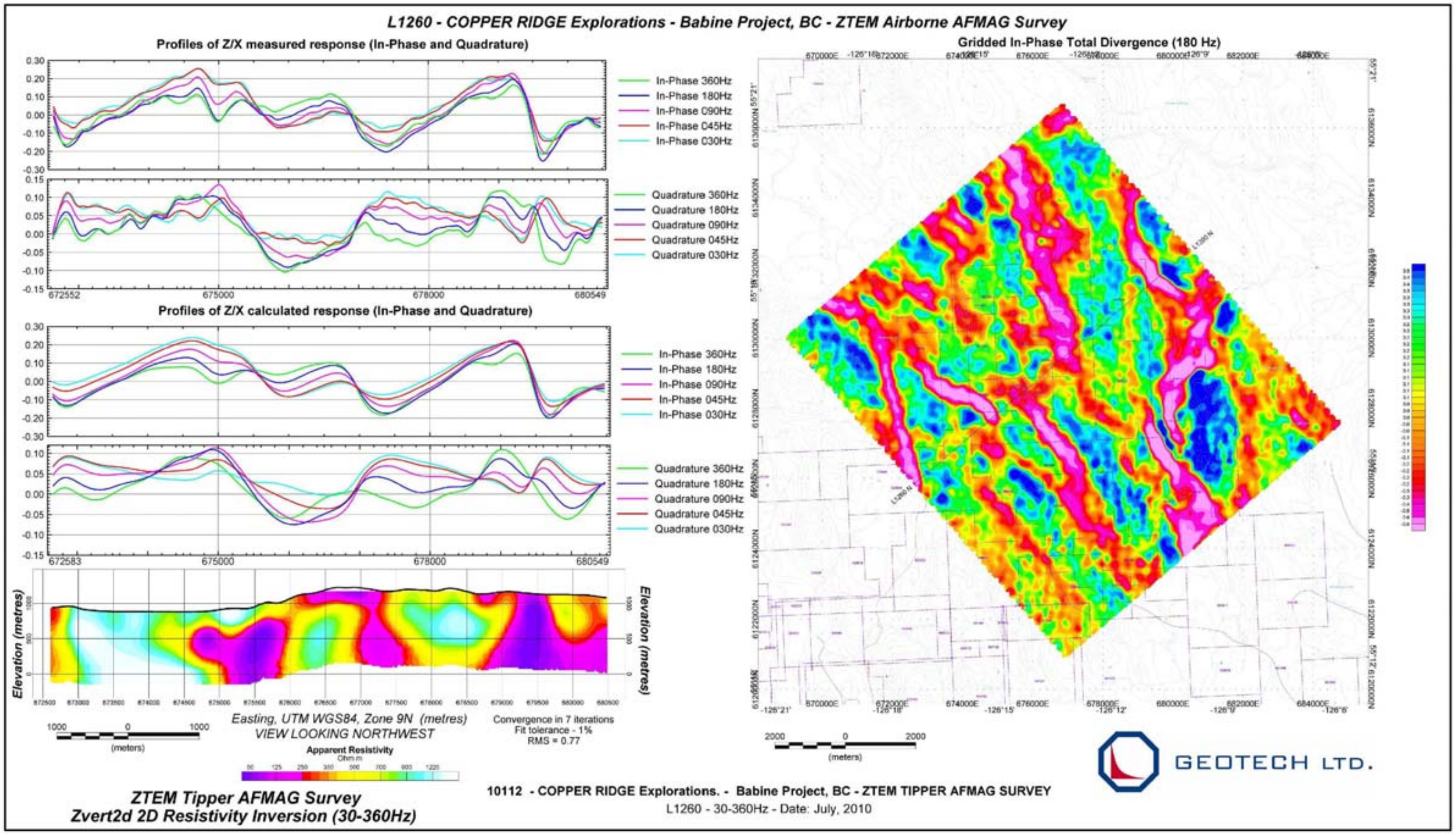
GEOTECH LTD.

Line 1260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In-Phase 180Hz
In-Phase 090Hz
In-Phase 045Hz
In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 7 iterations
Fit tolerance - 1%
RMS = 0.77
Apparent Resistivity
Ohm.m
(meters)
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
Gridded In-Phase Total Divergence (180 Hz)
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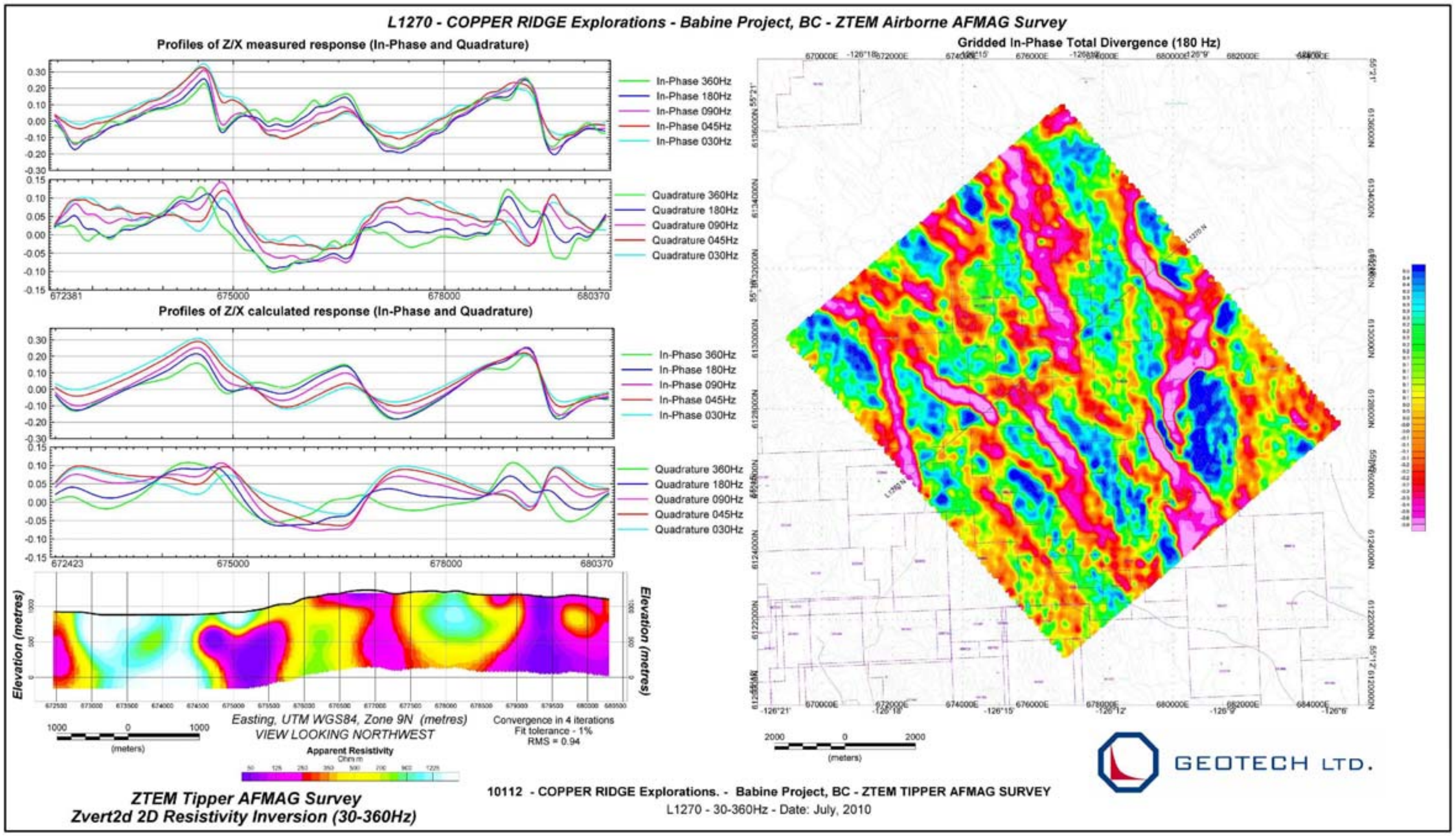
Line 1270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In-Phase 360Hz
In-Phase 180Hz
In-Phase 090Hz
In-Phase 045Hz
In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 4 iterations
Fit tolerance - 1%
RMS = 0.94
Apparent Resistivity
Ohm·m
(meters)
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
Gridded In-Phase Total Divergence (180 Hz)
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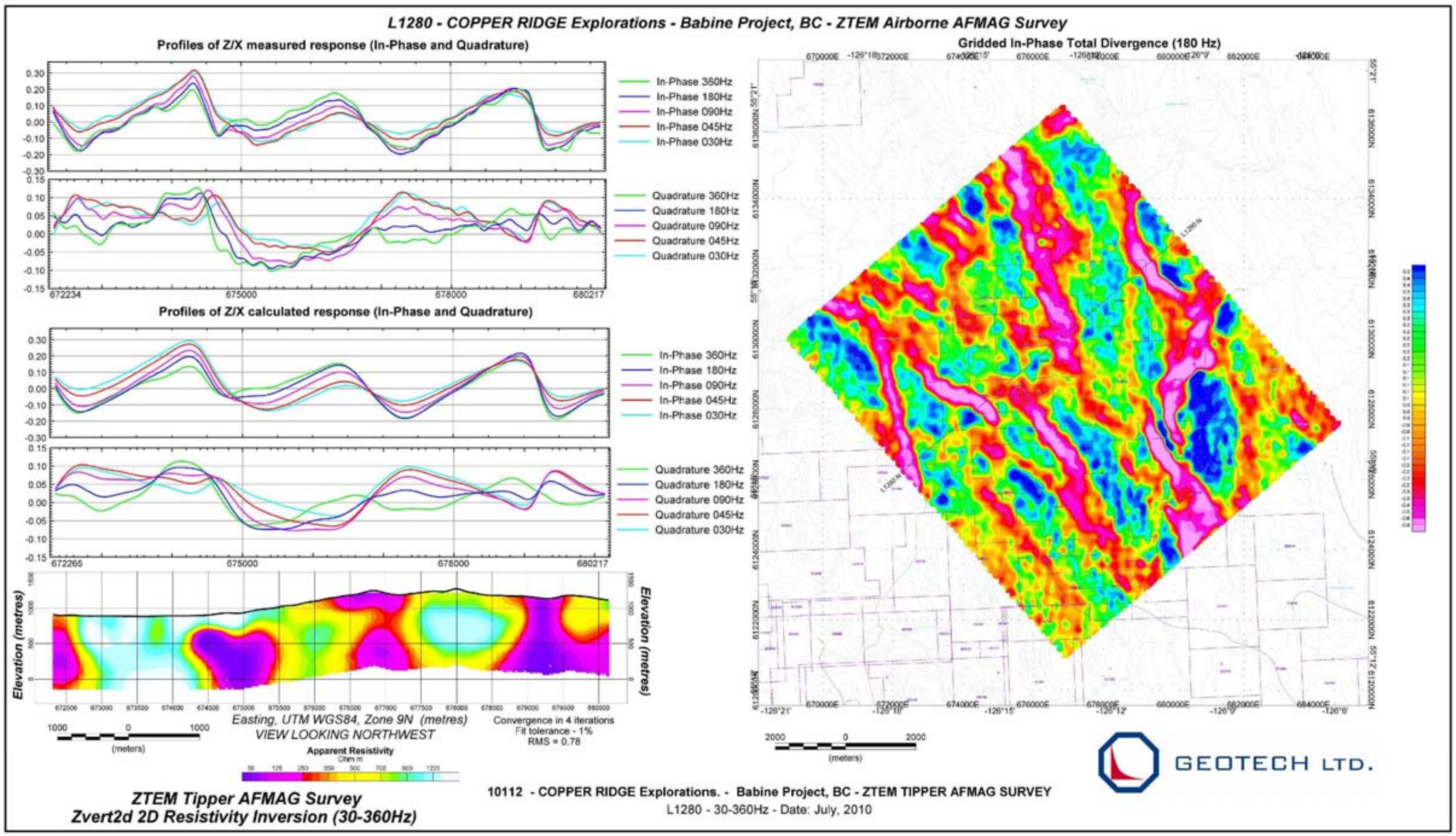
Line 1280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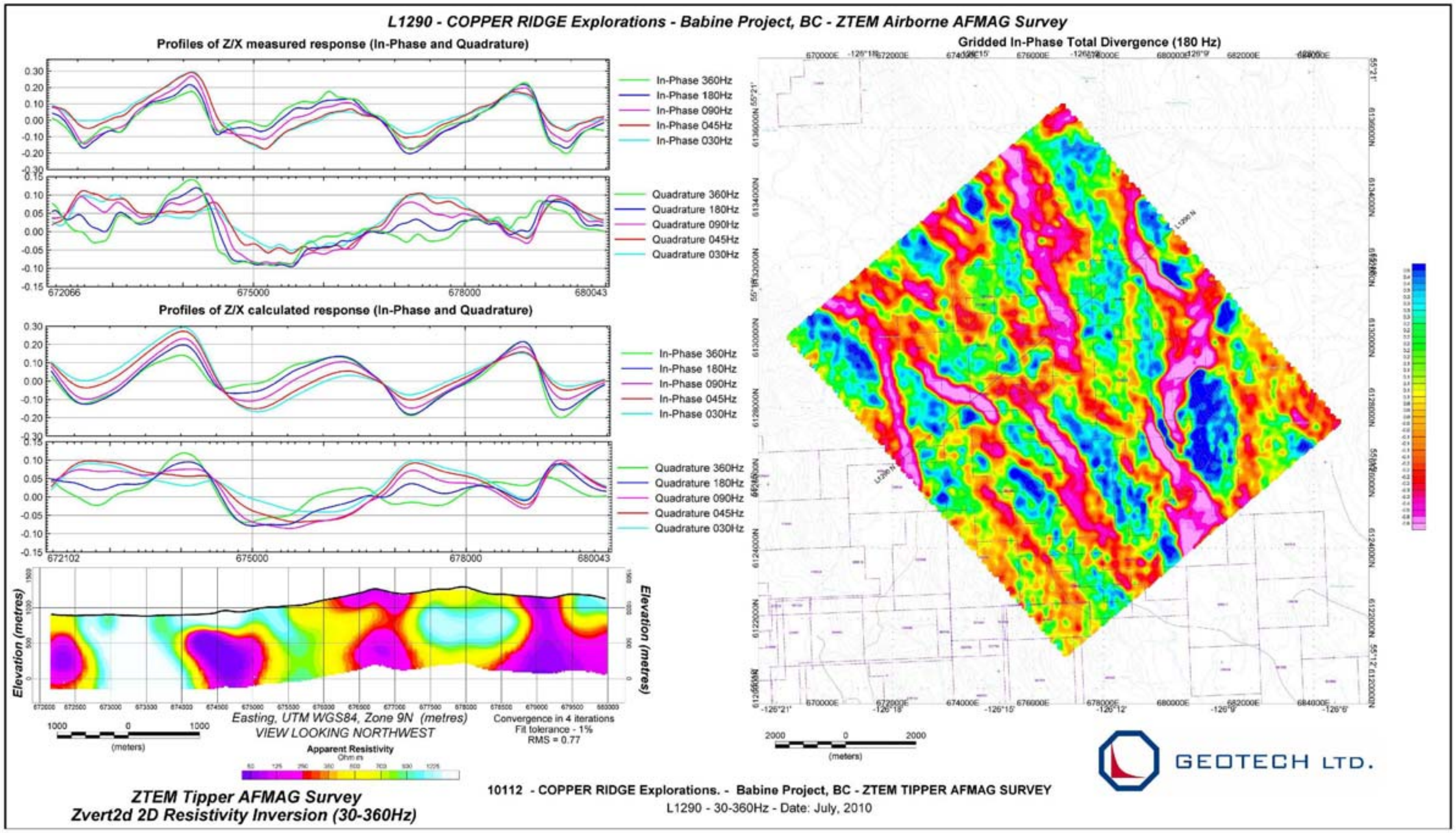
In-Phase 180Hz
In-Phase 090Hz
In-Phase 045Hz
In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 4 iterations
Fit tolerance - 1%
RMS = 0.78
Apparent Resistivity
Ohm m
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
Gridded In-Phase Total Divergence (180 Hz)
GEOTECH LTD.
10112 - COPPER RIDGE Explorations. - Babine Project, BC - ZTEM TIPPER AFMAG SURVEY
L1280 - 30-360Hz - Date: July, 2010

Line 1290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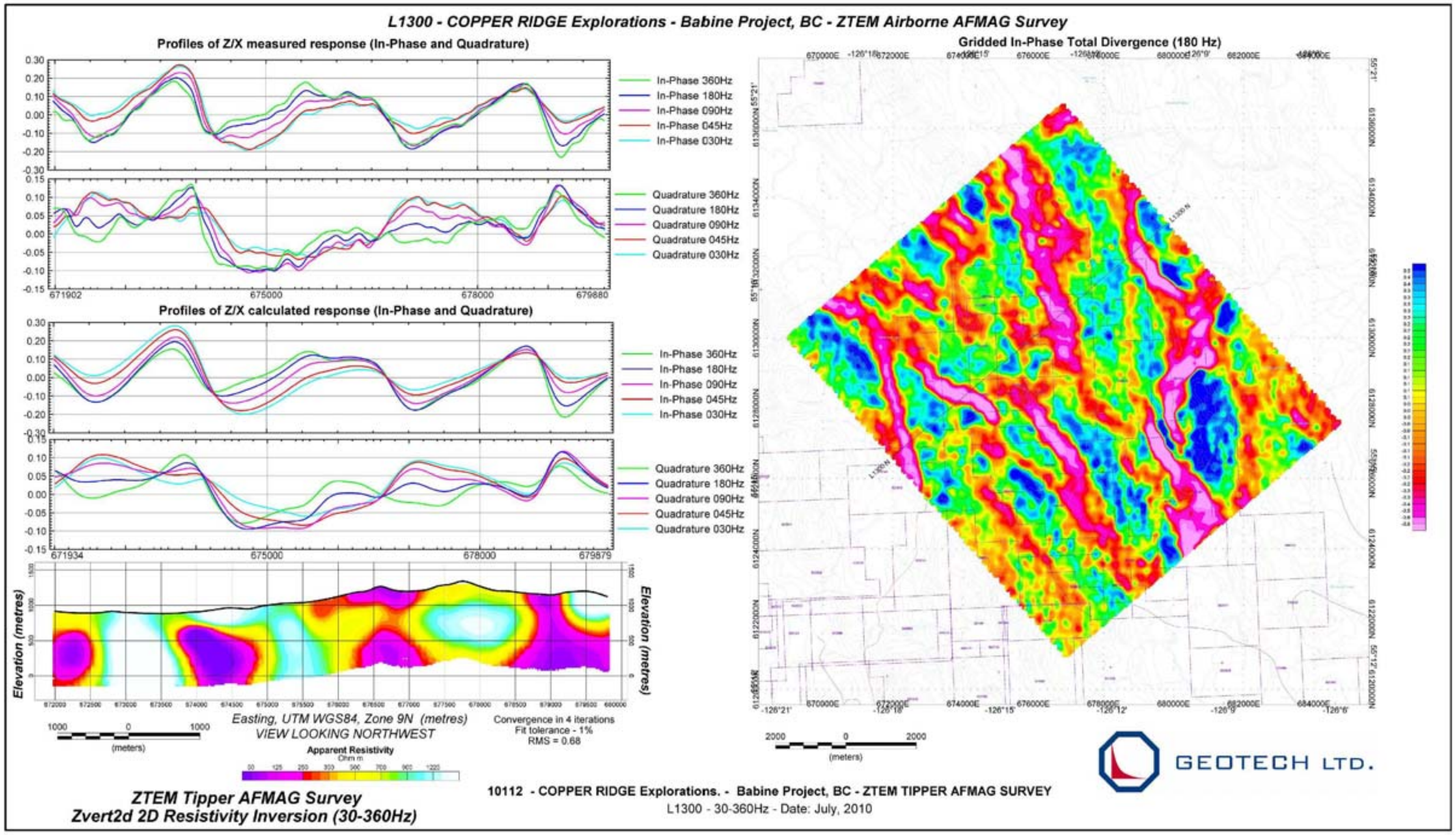
Profiles of Z/X measured response (In-Phase and Quadrature)
In-Phase 360Hz
In-Phase 180Hz
In-Phase 090Hz
In-Phase 045Hz
In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 4 iterations
Fit tolerance - 1%
RMS = 0.77
Apparent Resistivity
Ohm-m
Gridded In-Phase Total Divergence (180 Hz)
GEOTECH LTD.
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
10112 - COPPER RIDGE Explorations. - Babine Project, BC - ZTEM TIPPER AFMAG SURVEY
L1290 - 30-360Hz - Date: July, 2010

Line 1300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In-Phase 180Hz
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In-Phase 045Hz
In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 4 iterations
Fit tolerance - 1%
RMS = 0.68
Apparent Resistivity
Ohm m
(meters)
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
Gridded In-Phase Total Divergence (180 Hz)
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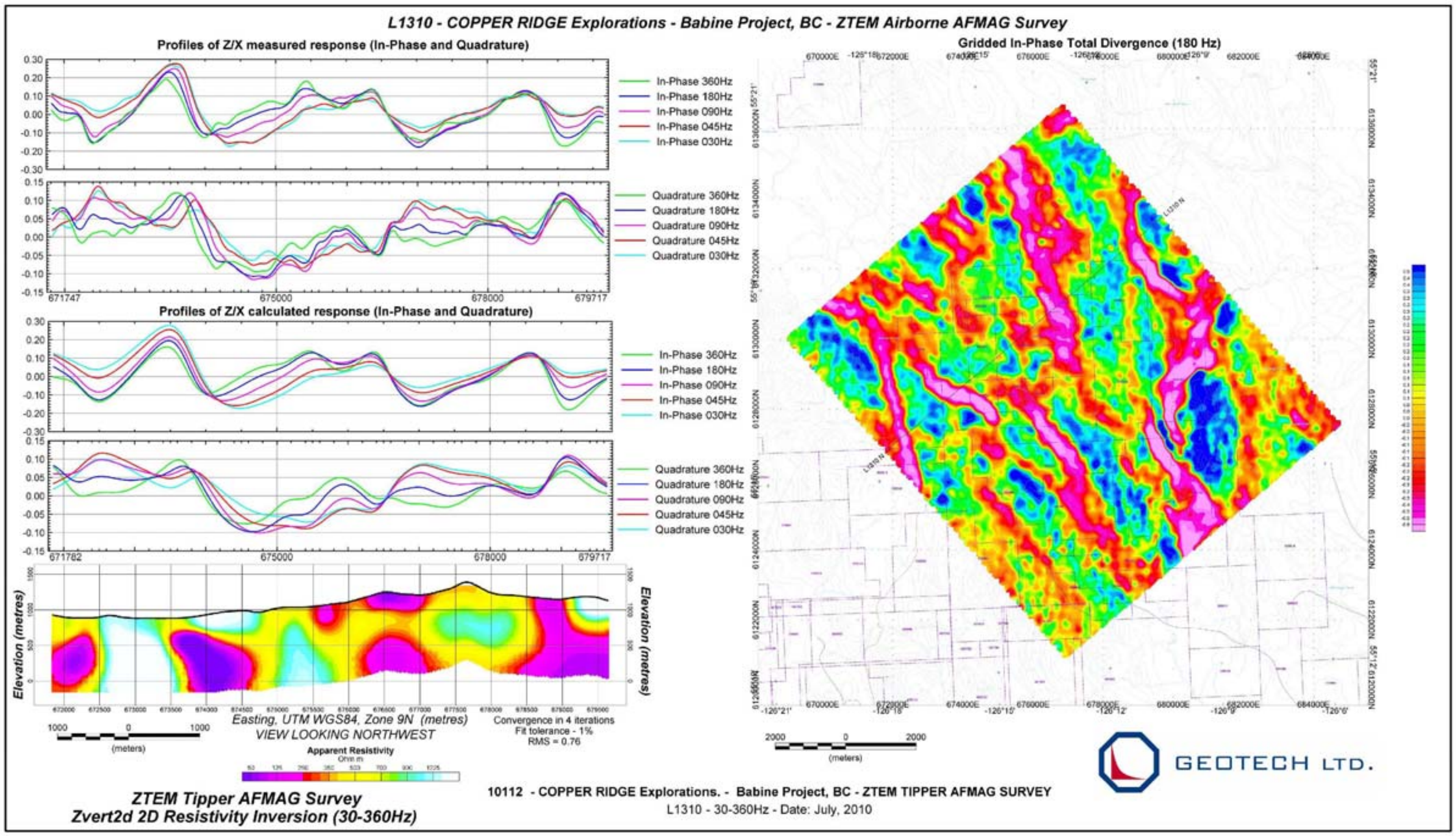
L1300 - 30-360Hz - Date: July, 2010
GEOTECH LTD.

Line 1310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In-Phase 180Hz
In-Phase 090Hz
In-Phase 045Hz
In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 4 iterations
Fit tolerance - 1%
RMS = 0.76
Apparent Resistivity
Ohm m
Gridded In-Phase Total Divergence (180 Hz)
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
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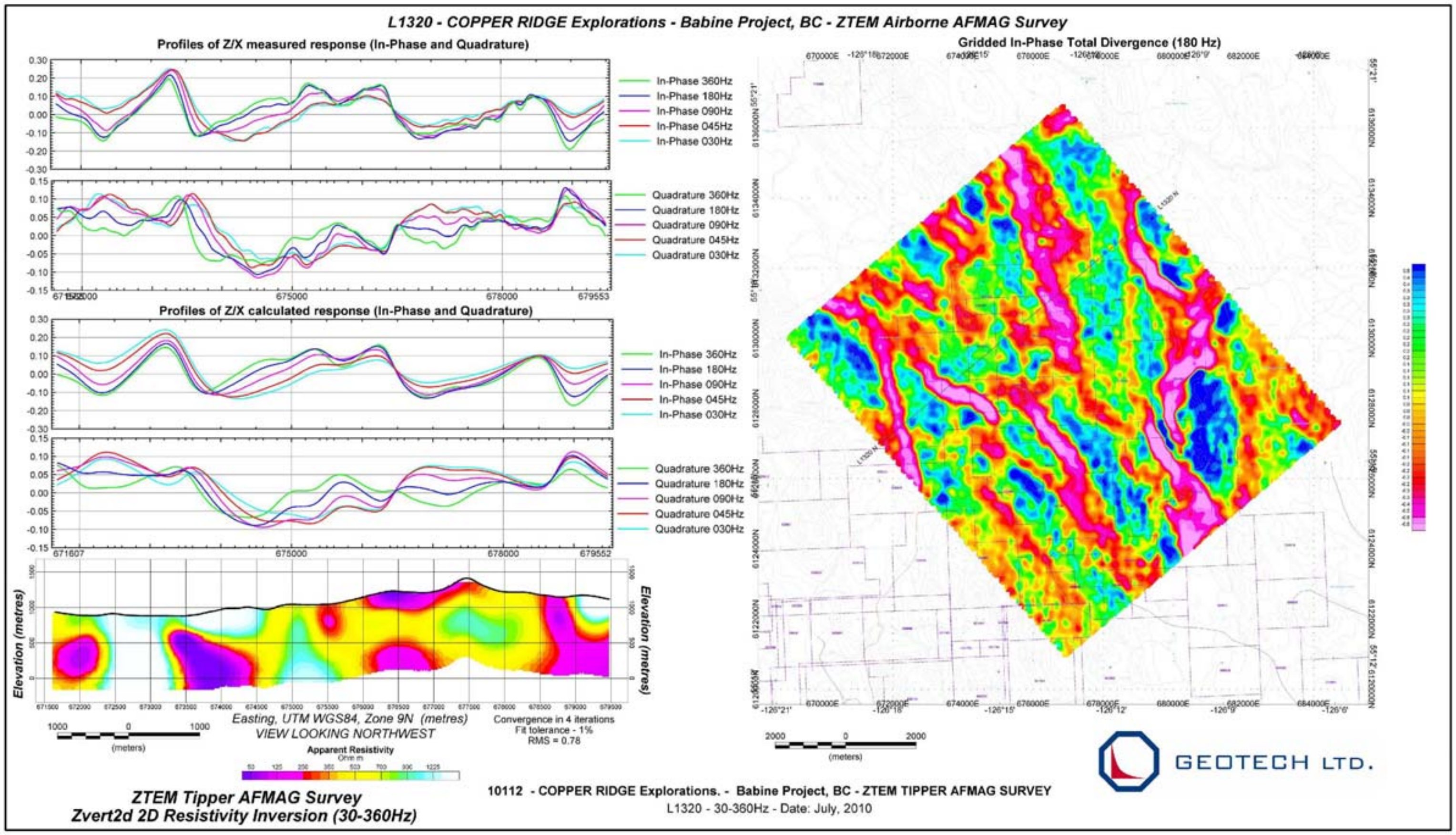
L1310 - 30-360Hz - Date: July, 2010
GEOTECH LTD.

Line 1320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In-Phase 360Hz
In-Phase 180Hz
In-Phase 090Hz
In-Phase 045Hz
In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 4 iterations
Fit tolerance - 1%
RMS = 0.78
Apparent Resistivity
(meters)
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
Gridded In-Phase Total Divergence (180 Hz)
GEOTECH LTD.
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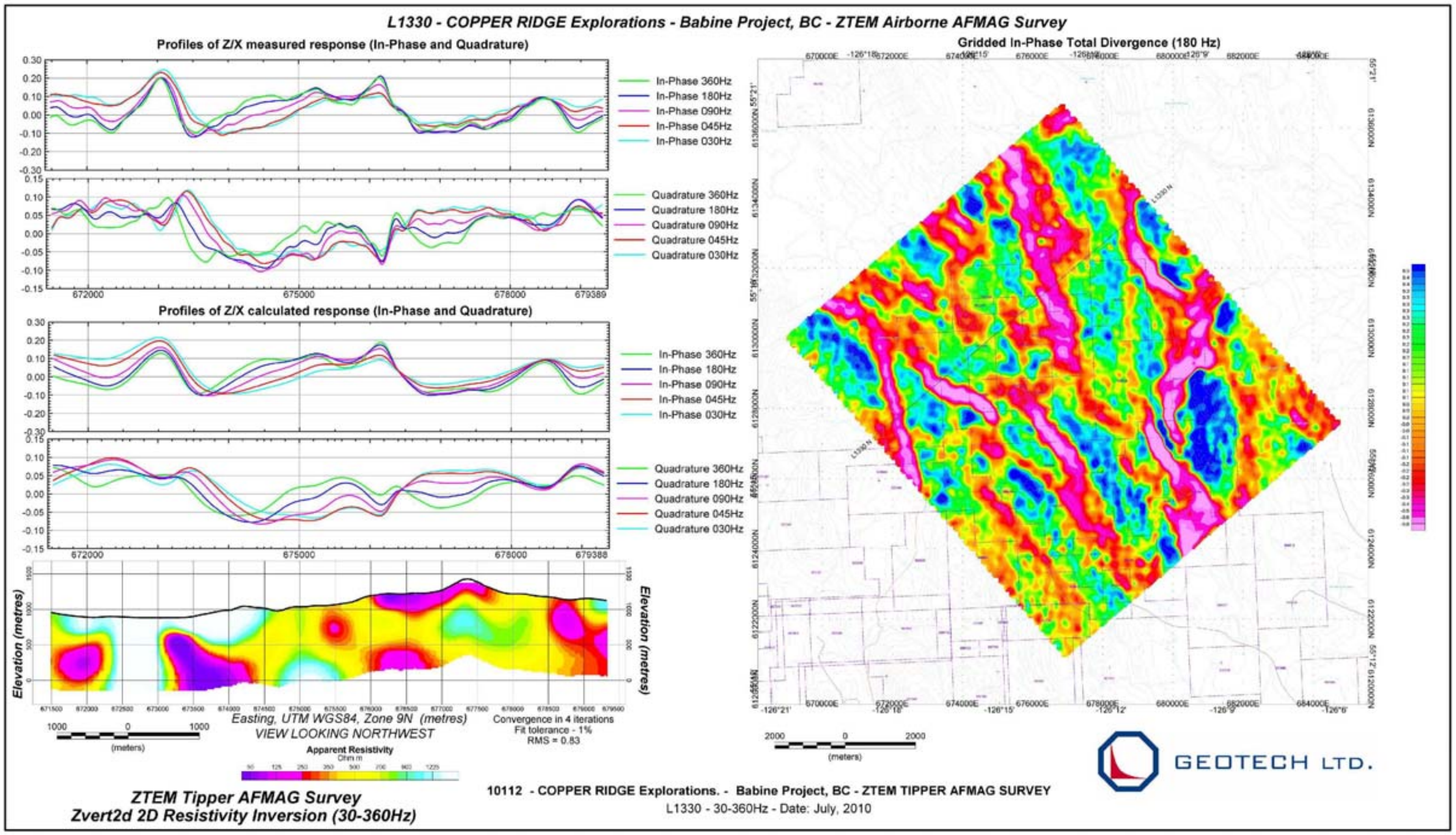
L1320 - 30-360Hz - Date: July, 2010

Line 1330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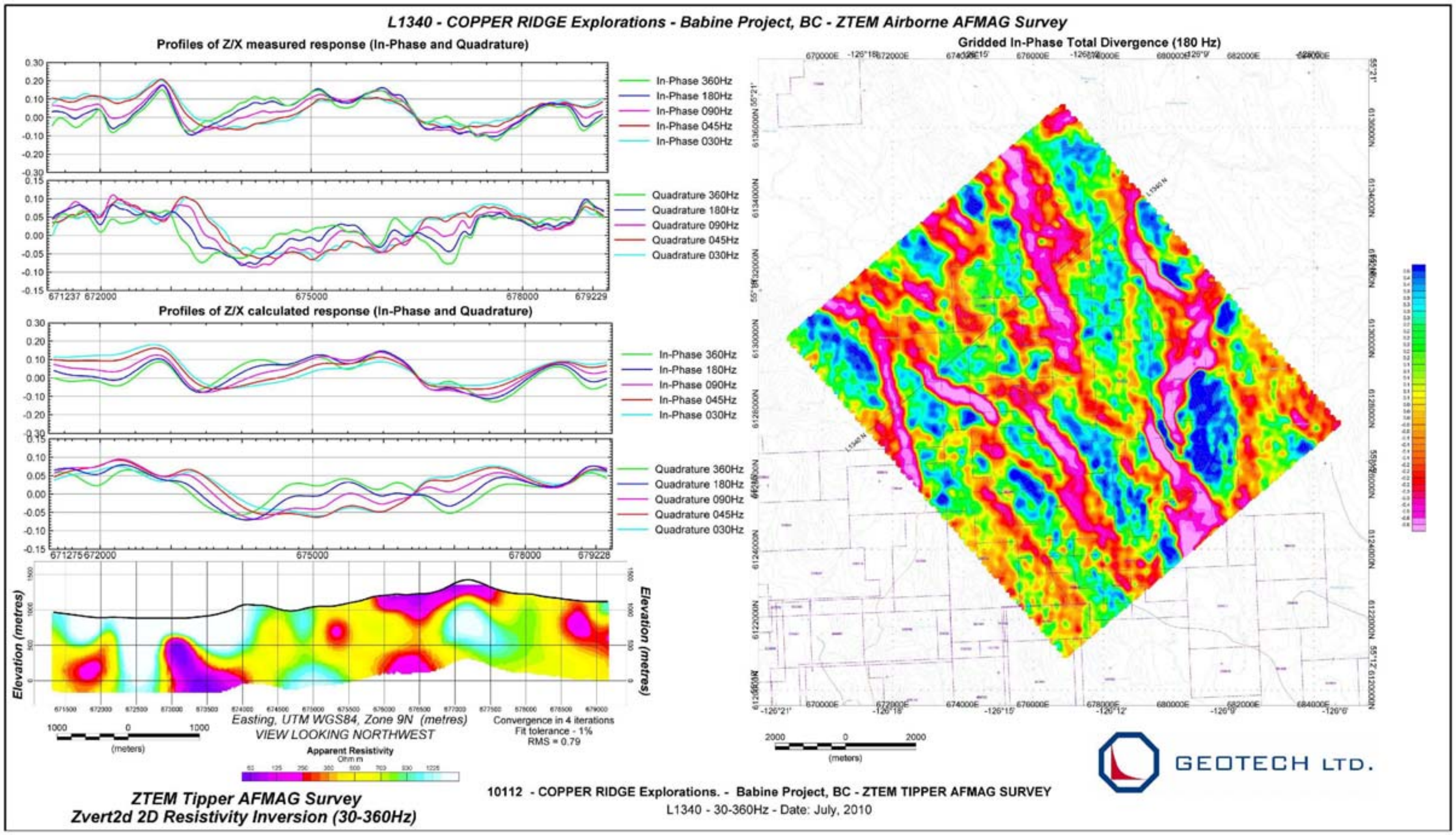
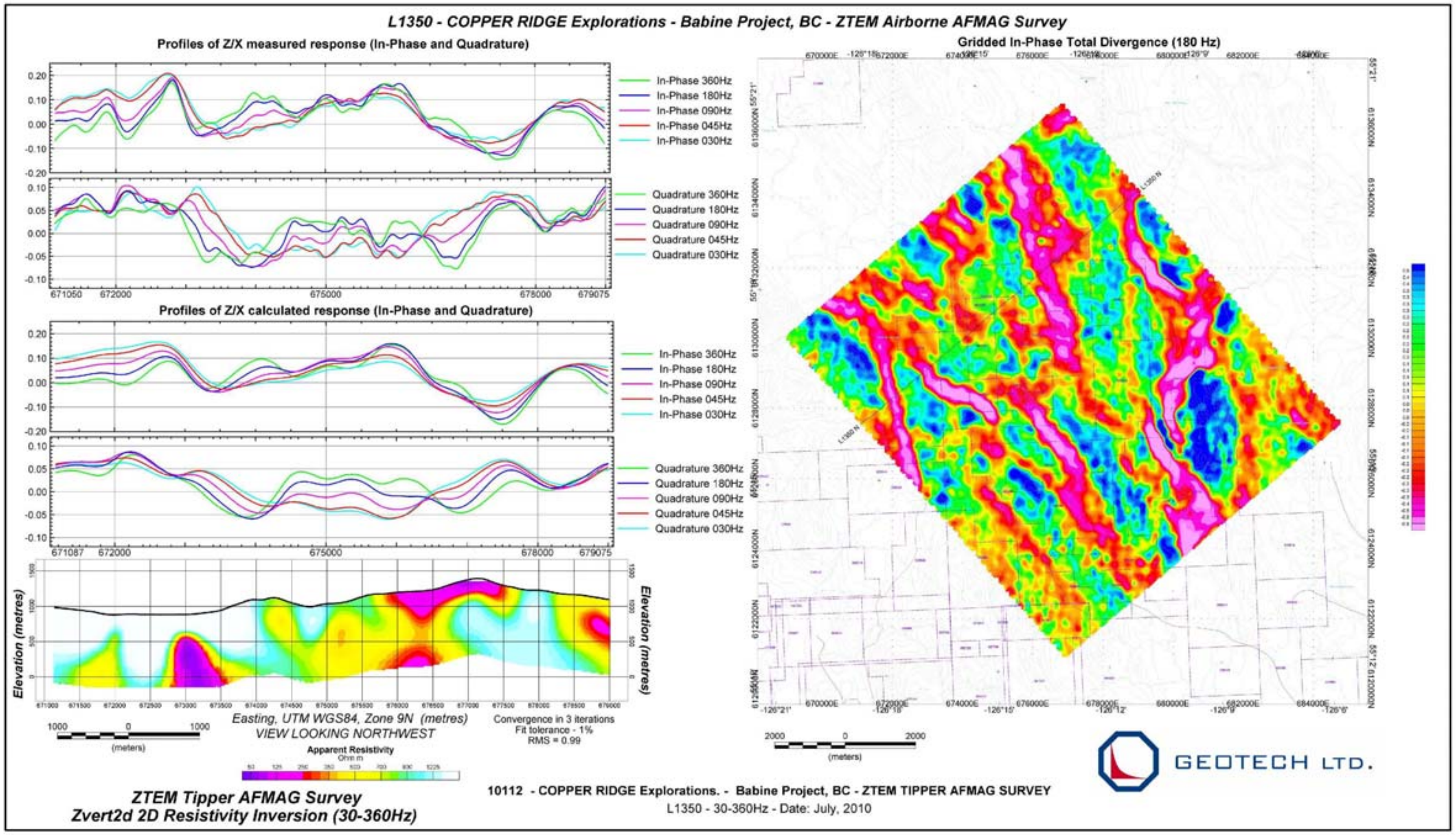
Profiles of Z/X measured response (In-Phase and Quadrature)
In-Phase 360Hz
In-Phase 180Hz
In-Phase 090Hz
In-Phase 045Hz
In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 4 iterations
Fit tolerance - 1%
RMS = 0.83
Apparent Resistivity
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
Gridded In-Phase Total Divergence (180 Hz)
GEOTECH LTD.
10112 - COPPER RIDGE Explorations. - Babine Project, BC - ZTEM TIPPER AFMAG SURVEY
L1330 - 30-360Hz - Date: July, 2010

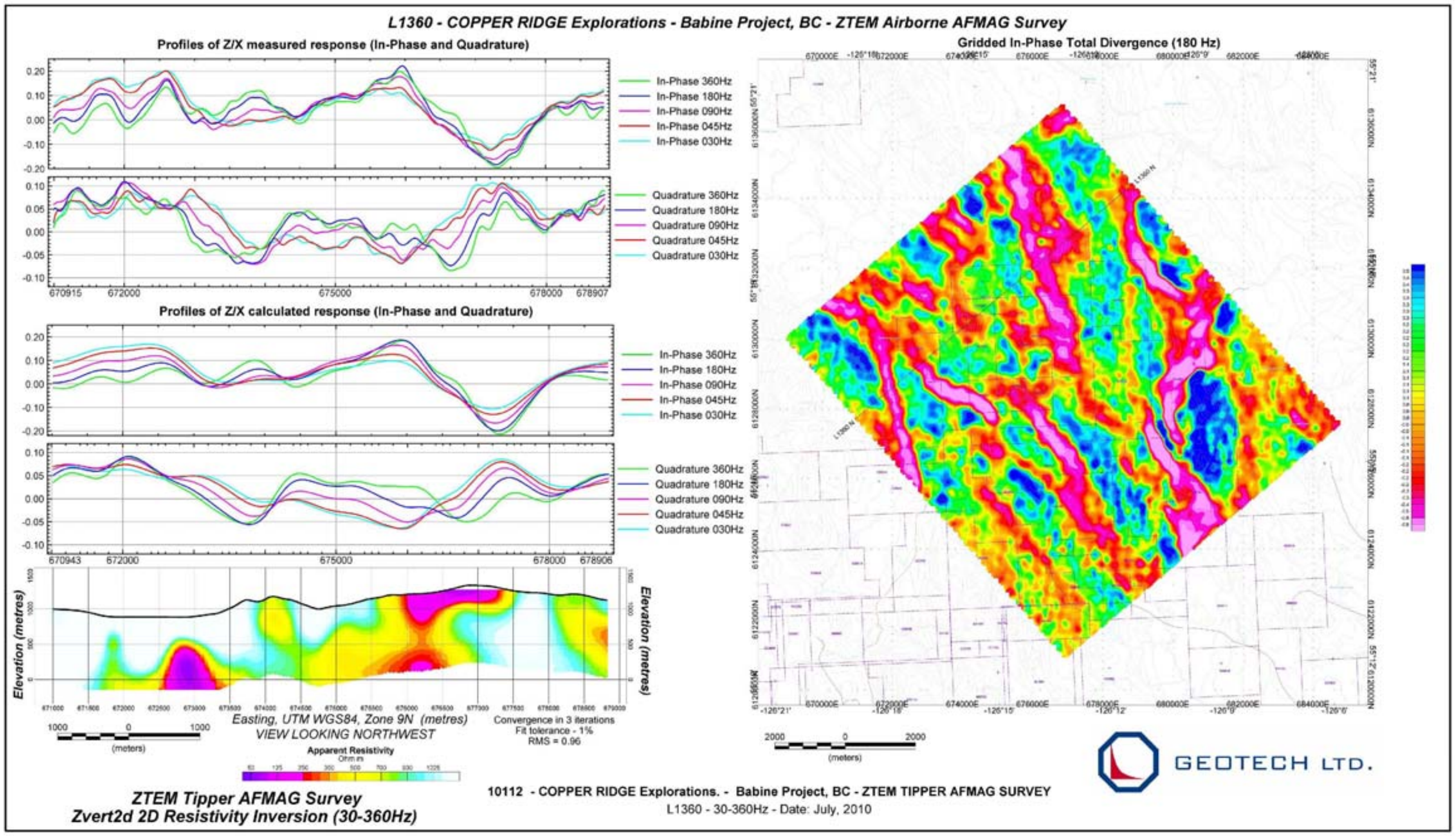
Line 1340


L1340 - COPPER RIDGE Explorations - Babine Project, BC - ZTEM Airborne AFMAG Survey
Profiles of Z/X measured response (In-Phase and Quadrature)
In-Phase 360Hz
In-Phase 180Hz
In-Phase 090Hz
In-Phase 045Hz
In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 4 iterations
Fit tolerance - 1%
RMS = 0.79
Apparent Resistivity
Ohm m
(meters)
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
Gridded In-Phase Total Divergence (180 Hz)
GEOTECH LTD.
10112 - COPPER RIDGE Explorations. - Babine Project, BC - ZTEM TIPPER AFMAG SURVEY
L1340 - 30-360Hz - Date: July, 2010

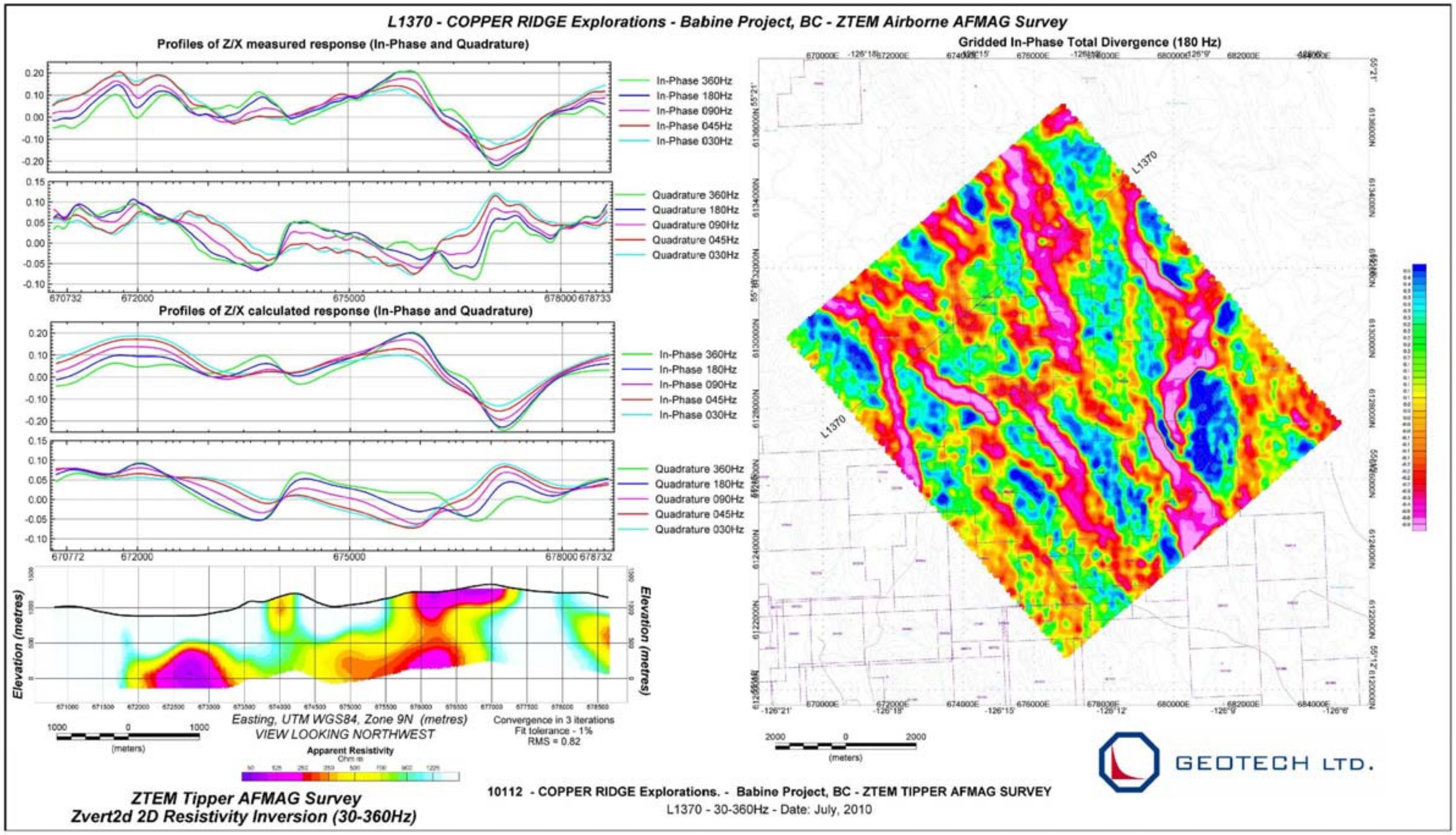
Line 1350


L1350 - COPPER RIDGE Explorations - Babine Project, BC - ZTEM Airborne AFMAG Survey
Profiles of Z/X measured response (In-Phase and Quadrature)
In-Phase 360Hz
In-Phase 180Hz
In-Phase 090Hz
In-Phase 045Hz
In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 3 iterations
Fit tolerance - 1%
RMS = 0.99
Apparent Resistivity
Ohm m
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
Gridded In-Phase Total Divergence (180 Hz)
GEOTECH LTD.
10112 - COPPER RIDGE Explorations. - Babine Project, BC - ZTEM TIPPER AFMAG SURVEY
L1350 - 30-360Hz - Date: July, 2010

Line 1360


L1360 - COPPER RIDGE Explorations - Babine Project, BC - ZTEM Airborne AFMAG Survey
Profiles of Z/X measured response (In-Phase and Quadrature)
In-Phase 360Hz
In-Phase 180Hz
In-Phase 090Hz
In-Phase 045Hz
In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 3 iterations
Fit tolerance - 1%
RMS = 0.96
Apparent Resistivity
(meters)
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
Gridded In-Phase Total Divergence (180 Hz)
GEOTECH LTD.
10112 - COPPER RIDGE Explorations. - Babine Project, BC - ZTEM TIPPER AFMAG SURVEY
L1360 - 30-360Hz - Date: July, 2010

Line 1370


L1370 - COPPER RIDGE Explorations - Babine Project, BC - ZTEM Airborne AFMAG Survey
Profiles of Z/X measured response (In-Phase and Quadrature)
In-Phase 360Hz
In-Phase 180Hz
In-Phase 090Hz
In-Phase 045Hz
In-Phase 030Hz
Quadrature 360Hz
Quadrature 180Hz
Quadrature 090Hz
Quadrature 045Hz
Quadrature 030Hz
Profiles of Z/X calculated response (In-Phase and Quadrature)
Elevation (metres)
Easting, UTM WGS84, Zone 9N (metres)
VIEW LOOKING NORTHWEST
Convergence in 3 iterations
Fit tolerance - 1%
RMS = 0.82
(meters)
Apparent Resistivity
Ohm m
ZTEM Tipper AFMAG Survey
Zvert2d 2D Resistivity Inversion (30-360Hz)
Gridded In-Phase Total Divergence (180 Hz)
L1370
GEOTECH LTD.
10112 - COPPER RIDGE Explorations. - Babine Project, BC - ZTEM TIPPER AFMAG SURVEY
L1370 - 30-360Hz - Date: July, 2010