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#### ASSESSMENT REPORT

describing

#### VTEM AND MAGNETIC SURVEY

at the

#### ANTIMONY MOUNTAIN PROPERTY

Jan 1-12	YC25889 - YC25900
Jan 13-44	YC30201 - YC30232
Jan 45-56	YC34383 - YC34394

NTS 116B/8 Latitude 64°17'N; Longitude 138°13'W

in the

Dawson Mining District Yukon Territory

prepared by

Archer, Cathro & Associates (1981) Limited

for

### STRATEGIC METALS LTD.

by

H. Smith, B.Sc. Geology, GIT March 2009

# **TABLE OF CONTENTS**

INTRODUCTION	1
PROPERTY LOCATION, CLAIM DATA AND ACCESS	1
HISTORY	1
GEOMORPHOLOGY	3
REGIONAL GEOLOGY	3
PROPERTY GEOLOGY	4
REGIONAL MINERALIZATION	5
PROPERTY MINERALIZATION	6
SOIL GEOCHEMISTRY	8
AIRBORNE GEOPHYSICS	9
DISCUSSION AND CONCLUSIONS	9

# **APPENDICES**

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

# **FIGURES**

<u>NO.</u>	DESCRIPTION	FOLLOWS PAGE
1	Property Location	1
2	Claim Locations	1
3	Tectonic Setting	1
4	Regional Geology	4
5	Property Geology	4
6	Tintina Gold Belt	5
7	Intrusion-Related Gold Model	6
8	Gold Rock and Silt Geochemistry	7
9	Copper Rock and Silt Geochemistry	7
10	Gold Soil Geochemistry	8
11	Copper Soil Geochemistry	8
12	Bismuth Soil Geochemistry	8
13	Arsenic Soil Geochemistry	8
14	Silver Soil Geochemistry	8
15	Geophysical Compilation	9
16	Idealized Cross Section	10
	TABLES	

<u>NO.</u>	DESCRIPTION	PAGE
Ι	Regional Lithological Units	4

# **INTRODUCTION**

The Antimony Mountain property covers gold-copper porphyry, skarn and vein targets. The property is located in the Tintina Gold Belt of central Yukon and is owned by Strategic Metals Ltd.

This report describes helicopter-borne versatile time domain electromagnetic (VTEM) geophysical surveys conducted on May 31, 2008 by Geotech Ltd. on behalf of Strategic Metals. The author compiled results from these surveys together with previously obtained geological and geochemical data. Her Statement of Qualifications appears in Appendix I.

### PROPERTY LOCATION, CLAIM DATA AND ACCESS

The Antimony Mountain property consists of 56 contiguous mineral claims located in central Yukon at 64°17′ N and 13°13′ W on NTS map sheet 116B/08, approximately 70 km northeast of Dawson City (Figure 1). The claims are registered with the Dawson Mining Recorder in the name of Archer, Cathro & Associates (1981) Limited, which holds them in trust for Strategic Metals. Claim registration data are summarized below and the locations of individual claims are shown on Figure 2.

Claim Name	Grant Number	Expiry Date*
Jan 1-12	YC25889-YC25900	March 18, 2018
13-44	YC30201-YC30232	March 18, 2018
45-56	YC34383-YC34394	March 18, 2018

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

The property lies about 10 km east of Km 40 on the Dempster Highway, which extends from the Dawson City area to Inuvik in the Northwest Territories.

The 2008 VTEM survey was flown from the all-weather airstrip at Dawson City with intraday refueling at a road accessible site near the former Brewery Creek gold mine, located 40 km south of the property.

# **HISTORY**

Work began in the area in 1916, when W. Walker staked four claims over stibnite veins in an aplite dyke within the Antimony Mountain Stock (AMS). In 1918, Walker performed hand trenching and drove a 5.5 m long adit into the veins. The stibnite veins are currently covered by the Walker 1-4 claims, which lie 300 m south of the property and are held by S. Burkhard (Figure 2).

Since Walker's discovery, eight gold-bearing vein showings have been found in the area. Work performed on the various veins is briefly described in the following paragraphs. Only three of the veins (TT, MW and CC) are located on the Antimony Mountain property. The others are all

covered by claims owned by S. Ryan. From the mid 2000s until 2008, Ryan's claims were under option to Logan Resources Corporation.

The AJ Showing lies 800 m east of the property and hosts semi-massive arsenopyrite in quartz gangue. This vein has received the most work of any showing in the area, including mapping, prospecting, trenching, geophysical surveys and diamond drilling. Various parties conducted work programs in 1966, 1975, 1977, 1980, 1982, 1983, 1984, 1988, 1996 and 2005 (Deklerk and Traynor, 2005 and George, 2006). The best value from drilling was 28.46 g/t gold over 2.83 m. A 2005 grab sample assayed 77.7 g/t gold (George, 2006). Mineralization appears to be contained in discontinuous, high grade shoots (Holcapek, 1975).

The Rainbow, JC and TK showings are located slightly northwest of the property. Work performed includes mapping, soil sampling, hand trenching, geophysical surveys and diamond drilling. Exploration was conducted in 1968, 1979, 1980, 1988, 1989, 1994, 1995 and 2005 (Deklerk and Traynor, 2005 and George, 2006). The best reported values from each vein are 6.51 g/t gold (Rainbow), 14.13 g/t gold (JC) and 5.14 g/t gold (TK). All of these showings are described as narrow, east trending fault-controlled polymetallic veins with local high grade sections (Pelletier and Basnett, 1990).

The Toby Showing was discovered in 1989 by Total Energold Corporation. This vein is located 600 m northeast of the property and is exposed in two trenches positioned 15 m apart. Only low gold values were reported (Pelletier and Tucker, 1989).

The TT Showing was also discovered in 1989 by Total Energold. It lies in the northwestern part of the property. The showing is described as a 25 to 35 cm wide and 200 m long, east trending arsenopyrite-pyrite-quartz-tourmaline-calcite vein. Grab samples of this material returned values of 1.85 and 1.61 g/t gold (Pelletier and Tucker, 1989).

The MW and CC showings were discovered by Kennecott Canada Exploration Inc. in 1998, when it performed mapping, prospecting and geochemical sampling over the area covered by the current property. The MW Showing is located on a ridge that trends southeast from the peak of Mount Walker. The showing comprises an east trending fault zone with arsenopyrite and chalcopyrite, from which a grab sample returned 4.44 g/t gold. The CC Showing lies slightly west of Mount Walker in an area that is mostly covered by thick talus and glacial till. The showing consists of a 500 by 300 m float train that is composed of quartz-tourmaline-sulphide veins hosted in sedimentary rock (Anderson and Hulstein, 1998).

In 2004, Strategic Metals staked the Jan claims and formed a 50-50 joint venture with War Eagle Mining Company Inc. A two phase program was conducted that summer. The first phase included soil geochemical sampling, geological mapping and prospecting, and the second phase consisted of additional geological mapping and a total of 831.8 m of diamond drilling in four holes. The drilling targeted weak, disseminated and fracture-controlled gold-copper mineralization that appeared to be the source of the main soil geochemical anomalies. The drilling was done in late fall and was hindered by steep topography and freezing conditions. The holes did not adequately explain the elevated soil values. The best results were obtained near the top of the holes, suggesting that vertical zoning may be present (Eaton, 2005).







Both industry and government funded silt sampling programs have been conducted in creeks draining the current property. Peak values from compiled data include 245 ppb gold, 1310 ppm copper, 36 ppm silver and 3180 ppm arsenic (Anderson and Hulstein, 1998 and Hornbrook et al., 1977). These values are highly anomalous when compared to regional backgrounds. The elevated values have not yet been explained by a bedrock source.

# **GEOMORPHOLOGY**

The property lies within the Tombstone Range of the Ogilvie Mountains. It is drained by three main creeks, all belonging to the Yukon River watershed.

The geomorphological setting is gentle to rugged, sub-alpine to alpine terrain with local elevations ranging from about 1350 to 2000 m atop Mount Walker (Figure 2). The property features blocky talus slopes and castellated ridge crests at higher elevations and broad U-shaped glacial valleys at lower elevations. Glacial features include cirques, tarn lakes, rock glaciers and moraines. Mountaintops are bare and most slopes are sparsely vegetated. Vegetation on the property is restricted to scattered slide alder, willow and grass on valley floors giving way to lichen covered hillsides. The property is generally snow free from mid-June to early September.

The Tombstone Range was covered by the Cordilleran Ice Sheet during the Quaternary Period. The ice sheet advanced at least four times between 2.5 Ma (million years ago) and 11 Ka (thousand years ago). The McConnell Glaciation (25 to 12 Ka) affected the property and may have obliterated evidence of earlier glacial advances (Pyle et al., 2007).

# **REGIONAL GEOLOGY**

The Antimony Mountain property is located 50 km northeast of the Tintina Fault and 10 km southeast of the Robert Service Thrust Fault. It lies along the southwest margin of Selwyn Basin, a tectonic element composed of deep water basinal sediments deposited on the western margin of ancestral North America during Neoproterozoic to Paleozoic times. The main stratified units of Selwyn Basin in the vicinity of the property belong to the Hyland Group, Gull Lake Formation and Rabbitkettle Formation.

Hyland Group (PCH4) is the oldest exposed unit of Selwyn Basin in the vicinity of the Antimony Mountain property. PCH4 is predominantly overlain by Paleozoic calcareous and noncalcareous clastic sedimentary rocks of the Gull Lake (lCG1) and Rabbitkettle (COR1) formations. lCG1 is transitional with the underlying PCH4 strata. Both PHC4 and lCG1 are unconformably overlain by quiet, shallow water sediments belonging to COR1. The sedimentary sequences are variably deformed and exhibit weak burial metamorphism. Strata in the area were dismembered by a series of large-scale thrust faults prior to intrusion of the Mid-Cretaceous Tombstone Suite.

The Tombstone Suite (mKyT) forms a belt of batholiths, stocks, plugs, dykes and sills that extends across central Yukon and Alaska. They have not been affected by folding or thrusting. The property lies on the northern edge of the AMS, which belongs to the Tombstone Suite. The AMS is 3.5 km wide and 7 km long. According to Pyle et al., (2007) over three kilometres of

vertical erosion have occurred since the emplacement of the Tombstone Suite plutons. Figure 4 illustrates regional geology, after Gordey and Makepeace (1999). Lithological descriptions of these main units are summarized in the following table.

UNIT NAME	MAP NAME	AGE	DESCRIPTION	
Tombstone Suite	mKyT	Mid-	Medium to coarse grained biotite-	
		Cretaceous	hornblende-clinopyroxene syenite;	
			hornblende-biotite alkali-feldspar syenite;	
			hornblende-biotite monzonite	
Rabbitkettle	COR1	Upper	Thin bedded, wavy banded, silty	
Formation		Cambrian to	limestone and grey calcareous phyllite;	
		Ordovician	limestone interclast breccia and	
			conglomerate; massive to laminated, grey	
			quartzose siltstone and chert and rare	
			black slate	
Gull Lake	lCG1	Late	Shale, siltstone and mudstone, locally	
Formation		Cambrian	bioturbated, with minor quartz sandstone;	
			rare green-grey chert; local basal	
			limestone and limestone conglomerate	
Hyland Group	PCH4	Upper	Quartzose clastic rocks, fine to coarse	
		Proterozoic to	grained quartz-rich sandstone, grit and	
		Lower	quartz-pebble conglomerate, minor	
		Cambrian	argillaceous limestone	

 Table I- Lithological Units (After Gordey and Makepeace, 1999)

# **PROPERTY GEOLOGY**

The most thorough mapping that has been done on the property was completed in 1998 by Anderson and Hulstein (Figure 5). The following descriptions are based primarily on their work.

Unit mKyT underlies approximately 80% of the property. It is composed of medium grained, porphyritic syenite, monzonite and quartz monzonite. Alkali feldspar phenocrysts comprise 25 to 40% of the rock. Fine grained diorite forms a fringe a few hundred metres thick on the margins of the intrusion. In 1998, a magnetic susceptibility study documented a dramatic change in Kappametre readings within mKyT. Monzonite in the northern part of the stock is essentially nonmagnetic, and is therefore assumed to be of a reduced nature. This signature is characteristic of Tombstone Suite intrusions. Hornblende-biotite rich monzonite to diorite in the southern portion of the property yielded magnetic values over an order of magnitude greater than those of the northern monzonite. Magnetite is presumed to be the magnetic mineral indicating that a second, non-reduced, pulse or phase of the intrusion (Anderson and Hulstein, 1998).

Unit PCH4 outcrops on the north side of the AMS, including a small area in the northwestern corner of the property. The most common lithology is light grey to orange weathering, fine to medium grained quartzite, which forms thin to medium beds. A less abundant siltstone sequence ranges from light grey to dark brown weathering. These rocks are generally soft (relative to the





quartzite) and thinly laminated. Occasional rusty weathering, gritty quartzite and quartz pebble conglomerate beds were also mapped. Bedding measurements within PCH4 are highly variable and show local reverses in orientations. Argillaceous limestone beds, which occur regionally within PCH4, have not been recognized on the property.

Unit COR1 lies along the west side of the AMS and is the dominant stratigraphic unit on the property. It is composed of non-calcareous and calcareous siltstone interbedded with phyllite, argillite, oolitic limestone and rare conglomerate/breccia. This sequence typically displays well developed, thinly laminated wavy banding. Bedding measurements for COR1 stratigraphy generally strike easterly to northerly and dip shallowly to moderately toward the south or east.

### **Alteration**

Contact metamorphic rocks are common in the western part of the property. Hornfelsing can be found up to one kilometre from the margin of the intrusion. Intense silicification and dark hornfelsed argillaceous rocks are common in the metamorphic aureole. The silicification is associated with varying degrees of pyritization while the hornfelsed rocks host pervasive pyrrhotite-pyrite as fine to medium grained disseminations and micro-fracture fillings. Weathering of hornfelsed rocks often results in prominent rusty surfaces due to sulphide content. Calc-silicate and skarn alteration have been noted in limey sections of PCH4, just northeast of the property boundary. Phyllic alteration also occurs locally adjacent to the intrusion. Some planes within sediments are replaced by fine grained sericite and chlorite.

Potassic alteration is indicated where diorite and monzonite of the AMS are overprinted by finer grained secondary biotite and where plagioclase feldspars are intensely sericitized and overprinted by potassium feldspar (Pelletier and Tucker, 1989).

#### **Structure**

The dominant fault and vein orientation is east to northeasterly with steep dips. No regionalscale structures have been mapped on the property.

# **REGIONAL MINERALIZATION**

The Tintina Gold Belt is a 1600 km long up to 300 km wide metallogenic district that extends across Yukon and Alaska (Figure 6). It hosts a broad range of gold and silver deposits related to Mid- and Late Cretaceous granitic intrusions.

The Tombstone Gold Belt (TGB) forms an 800 km long by 50 km wide band within the Tintina Gold Belt. It is distinguishable as a separate entity because it is particularly prolific and deposits are associated with reduced plutons of the Mid-Cretaceous Tombstone Suite (Figure 6). The TGB stretches from western Northwest Territories to Dawson City in western Yukon, where it is offset to the Fairbanks District of Alaska by about 400 km of post-intrusion displacement along the Tintina Fault (Gabrielse, 1985 and Lang et al., 2000).



A simplified model has been prepared by Hart et al., (2000) to illustrate different types of gold bearing mineral deposits associated with Tombstone Suite intrusions (Figure 7). The following paragraphs briefly characterize the types of mineralization that might be expected to occur on the Antimony Mountain property and offer examples of deposits hosting similar types of mineralization elsewhere in the TGB.

Intrusion-hosted mineralization comprises: 1) arrays of sheeted, low sulphide, quartz±carbonate veins; or 2) disseminations of gold and accompanying sulphide minerals in weakly altered zones within the intrusions. The veins may be pegmatitic in part and they are generally concentrated in the roof or margin zones of the pluton. The best example of intrusion-hosted sheeted vein mineralization is the Fort Knox Deposit in the Fairbanks District of Alaska. Production from 1996 through 2002 was 91,200 kg of gold from 90.4 million tonnes of ore (Miller and Wilton, 2003). A noteworthy Yukon example of sheeted vein type mineralization is the Eagle Zone of the Dublin Gulch Deposit. This zone contains 55.2 million tonnes of indicated mineral resource at a grade of 0.93 g/t gold and 17.3 million tonnes of inferred mineral resource grading 0.73 g/t gold (Goodwin and Burns, 2004). The best documented Yukon example of disseminated intrusion-hosted type mineralization are some of the zones that comprise the recently decommissioned Brewery Creek Mine, which lies 40 km south of the Antimony Mountain property. At the Brewery Creek Mine a total of 9.46 million tonnes of ore at an average grade of 1.53 g/t gold were heap leached from 1996 through 2000 (Diment and Simpson, 2003).

Proximal country-rock hosted mineralization includes skarns, replacements and disseminations in thermally metamorphosed and metasomatized aureoles that surround Tombstone Suite plutons. Gold bearing skarns are locally developed with limey units and consist of coarse grained silicate assemblages dominated by pyroxene and garnet with lesser wollastonite, tremolite, and axinite. Sulphide assemblages are pyrrhotite and chalcopyrite with late pyrite, bismuthinite and gold or argentinian gold overprints. The Marn, Horn and Mike Lake coppergold skarn occurrences are the best documented Yukon examples of proximal skarns. Respectively, they are located 34 km to the west, 28 km to the west and 10 km to the east of the Antimony Mountain property. Tungsten is a potential by-product in some skarns at Mike Lake and is the dominant economic mineral at the Ray Gulch skarn deposit near Dublin Gulch. Gold is not a significant component of the Ray Gulch Deposit, even though it is genetically liked to a large auriferous hydrothermal system. Replacement and disseminated gold mineralization has been reported in reactive sedimentary rocks within hornfelsed aureoles of several Tombstone Suite intrusions but there are few well explored examples. Mineralogy within hornfels is typified by coarse grained pyrrhotite, arsenopyrite and pyrite as irregular blebs and replacements.

Discrete quartz-sulphide veins are found within plutons, in proximal country rocks and in distal units. Mineralogy is dominated by quartz and late stage sulphide assemblages with varying amounts of pyrite, arsenopyrite, stibnite, galena and sphalerite. Although they can host high grade sections, grades are typically sporadic in veins and their tonnage potential is limited.

#### PROPERTY MINERALIZATION

Mineralization at the Antimony Mountain property appears to be genetically and temporally related to hydrothermal fluids associated with mKyT plutonism. Most exploration effort has



been dedicated to veins, vein breccias and porphyry-style mineralization; however, proximal disseminated mineralization has been noted. Mineralization is primarily hosted in quartz±carbonate±tourmaline veins, quartz-carbonate vein breccias and poorly defined zones within the mKyT intrusive. Only a small number of mineralized rock samples have been collected from the property. All 2004 and 1998 rock samples were sent to ALS Chemex Labs in North Vancouver. In 2004, the techniques used were ME-ICP41 and Au-AA23 with special instruction to assay for copper if the upper detection limit was exceeded. In 1998, rock samples were analyzed for gold using fire assay and for 32 other elements by induced coupled plasma-atomic absorption technique (Anderson and Hulstein, 1998). Figures 8 and 9 illustrate historical gold and copper results for rock and silt samples.

**Quartz±carbonate±tourmaline vein** style mineralization is hosted in all units and is typically associated with steeply dipping faults and shear zones. Mineralization within the unweathered veins consists of weak to moderate bornite, chalcopyrite, pyrrhotite, pyrite and arsenopyrite occurring as fine disseminations, blebs, pods and stringers. Most veins exhibit drusy textures and have local pale green alteration envelopes composed of chloritized hornblende and sausseritized feldspar. Individual showings hosting vein mineralization are described below.

At the CC Showing, veins occur near the COR1-mKyT contact in an intensely hornfelsed package of calcareous sedimentary rocks. Veins host moderate bornite, chalcopyrite and pyrrhotite in blebs and small lenses. In 2004, two rock samples of this material yielded 0.30% and 6.71% copper. Three hundred metres northwest of the CC Showing, a rock sample of drusy quartz-tournaline vein with up to two centimetre pods of arsenopyrite yielded 5.69 g/t gold and minor copper.

At the TT Showing, veins occur within mKyT near its contact with PCH4. This showing comprises numerous parallel, fault-controlled veins with blebby arsenopyrite and pyrite. The largest documented vein is 25 to 35 cm wide and has been traced for 200 m. Rock samples of vein material returned 1.85 g/t and 1.61 g/t gold (Pelletier and Tucker, 1989).

At the MW Showing, veins are hosted within mKyT. All of the veins are associated with distinct east trending faults and shear zones. Numerous samples of this material have been analyzed. The two most noteworthy samples comprised disseminated chalcopyrite, pyrite and arsenopyrite within five millimetre wide quartz-calcite veins. Those samples returned 1820 ppm copper with low gold and 0.730 g/t gold with low copper.

**Vein breccias** are developed in silicified sedimentary rocks and exhibit quartz-calcite matrix with limonite and minor malachite. Two rock samples of vein breccia with centimetre-sized fragments of hornfelsed COR1, intense limonite and minor malachite were collected in an area south of the Rainbow Showing. One of those samples returned 3.33% copper and 0.383 g/t gold while the other returned 0.10% copper and 0.179 g/t gold.

**Porphyry-style mineralization** is developed within the mKyT pluton. It comprises minor pyrite and chalcopyrite hosted in narrow chloritized stringers and as disseminations with chloritized hornblende. Rock samples of weakly mineralized intrusive have returned 0.004 to 0.137%





copper and 0.020 to 0.285 g/t gold (Heah, 1995). The best drill intercept of this type of mineralization assayed 0.085% copper with 0.386 g/t gold over 3.05 m (Eaton, 2005).

**Proximal disseminated mineralization** occurs within intensely hornfelsed sedimentary rocks belonging to COR1 and PCH4. Distinctive rusty gossans mark surface exposures of hornfelsed areas. Mineralization comprises coarse, blebby grains of disseminated pyrrhotite, arsenopyrite and pyrite. This style of mineralization has been documented near the CC Showing, north of the TT Showing and south of the Rainbow Showing. No samples of this material have been sent for assay.

# SOIL GEOCHEMISTRY

Two soil sampling programs have been completed on the property. All samples were shipped to ALS Chemex in North Vancouver. In 2004, Strategic Metals collected grid and contour soil samples from B horizon soil (20 and 30 cm below surface) and elsewhere from C horizon talus fines. Samples were analyzed by Au-ICP21 and ME-ICP41 (Eaton, 2005). In 1998, Kennecott collected a number of samples on contour lines. These samples were analyzed by taking a 150 um portion for analysis by 30 g fire assay for gold and ICP (G32 package) for 32 other elements (Andersen and Hulstein, 1998). Soil surveys returned many anomalous values for gold, copper, bismuth, arsenic and silver and spot highs for other elements such as antimony, uranium and tungsten. Anomalous thresholds for gold and copper have been set at roughly the same level as those used at the nearby Mike Lake occurrence (Dynamite Resources Ltd., 2009). Figures 10 through 14 illustrate thematic gold-, copper-, bismuth-, arsenic- and silver-in-soil values.

Soil sampling was mostly done in two general areas. Area 1 received closely spaced sampling on the northeast side of Mount Walker plus two contour lines along the southern slope of Mount Walker and a single contour line on its northwestern side. Area 2 is located in the western part of the property and was tested by grid soil sampling.

Area 1 contains three primary zones with moderate to strong gold-copper±arsenic soil response. The first zone is approximately 500 m wide by 1000 m long. It lies on the eastern side of Mount Walker. Gold values within this zone range up to 861 ppb, while copper values reach 772 ppm and arsenic 1955 ppm. Bismuth and silver response is relatively subdued. The second zone in Area 1 comprises three samples on the northwestern side of Mount Walker. These samples returned up to 1195 ppb gold and 768 ppm copper. One of the samples is strongly anomalous for silver (2 ppm) and two are weakly anomalous for bismuth. The third zone is on the south side of Mount Walker. Samples in this area were only analyzed for gold and copper. They returned moderately to strongly anomalous values up to 440 ppb gold and 160 ppm copper. Silt samples taken down stream from this zone returned consistently high gold results. Soil samples from Area 1 also yielded a number of moderate and strong uranium values, up to 100 ppm. Most high uranium values are point anomalies; however, there is a 600 by 200 m cluster on a south-facing slope in the headwaters of Jan Creek, north of Mount Walker. There are no elevated tungsten values in Area 1.

Area 2 generally has a weaker geochemical signature than Area 1, with over 80% of the soils returning less than 50 ppb gold and less than 200 ppm copper. There are two small clusters of











strongly anomalous soil samples located near known showings. The first cluster lies immediately south of the TT Showing. Peak values in this cluster are 1083 ppb gold, 427 ppm copper, 154 ppm bismuth, greater than 10,000 ppm arsenic and 5.6 ppm silver. The second cluster lies 300 m south of the Rainbow Showing. It hosts strong copper response, including the highest reported copper-in-soil on the property (1850 ppm), with spotty gold, arsenic, bismuth and silver values. Area 2 also contains three widely scattered samples that returned weakly elevated tungsten values of 20 ppm. Two of these samples are located downslope of known showings (TT and CC) and the third lies slightly up-slope from a very anomalous copper stream sediment sample.

# **AIRBORNE GEOPHYSICS**

Helicopter-borne VTEM and magnetic surveys were conducted on May 31, 2008 by Geotech Ltd. of Aurora, Ontario, using an Astar B3 helicopter operated by TRK Helicopters Ltd. Survey equipment and techniques are described in a report contained in Appendix II. Magnetic data are compiled with various geochemical results on Figures 8 through 14 and with key electromagnetic data on Figure 15. Digital geophysical data is available on a CD attached to Geotech's report.

The geophysical data have not yet been fully interpreted; however, preliminary analysis of magnetic results indicates a modification of the classic Tombstone Suite intrusive signature, which features a magnetic low core surrounded by a moderate to high magnetic aureole. The low normally coincides with the pluton and the high marks the thermally metamorphosed wallrocks. The survey at the Antimony Mountain property only covered the north margin of the pluton. Results show the expected low over the reduced boarder phase of the pluton and fringing high over the hornfelsed sediments, but they also show an unusual magnetic high over the oxidized core of the pluton.

Electromagnetic dB/dt profiles illustrate relatively flat response over most of the survey area with the exception of the southwest corner of the property. Approximately 200 m west of the CC Showing, a distinct but relatively broad conductor occurs within COR1. The size and shape of this conductor suggests it could be related to a shallowly dipping source. This conductor could be due to a buried skarn.

# **DISCUSSION AND CONCLUSIONS**

The Antimony Mountain property lies within the Tombstone Gold Belt, a highly productive mineral district that contains a number of gold, copper and tungsten deposits. Previous exploration programs on the property have identified a large mineralized system with potential to host a gold-copper porphyry, skarn and/or vein deposit.

Thick layers of talus and glacial overburden cover bedrock in most parts of the property. Thus, areas where mineralized float is discovered or soil geochemical anomalies are identified will likely have to be tested by mechanized trenching or diamond drilling.



Surface exploration has identified a number of gold and copper soil and stream sediment anomalies, which are mostly unexplained. Diamond drilling has tested a few near surface areas in the reduced boarder phase of AMS but it returned relatively low values. Many of the anomalous copper and gold soil samples within Area 1 were collected upslope from the 2004 drill collars, and therefore the drilling could have missed the main zone of mineralization. The source of these anomalies may lie in the untested, oxidized phase of the pluton.

There is also good potential for other styles of mineralization at the Antimony Mountain property. Figure 16 illustrates an idealized cross section of property geology highlighting areas that could host buried skarn and replacement style mineralization. All COR1 and PCH4 bedding orientations dip towards the mKyT intrusion. Based on these orientations, there is potential for buried contact skarn development. Regionally, both COR1 and PCH4 have significant calcareous components, which host numerous mineral occurrences including the Ray Gulch Deposit in the Dublin Gulch area and the Java Zone (hosted in PCH4) and Skarn Ridge (hosted in COR1) at the Mike Lake occurrence (Dynamite Resources, 2009).

The Antimony Mountain property definitely warrants additional exploration. The most prospective targets lie at or near the intrusive contact with PCH4 and COR1 in areas with faults and shear zones or within an unrecognized zone within the AMS. Future work should consist of: 1) detailed mapping and prospecting with a focus on identifying alteration zones and structure within the contact metamorphic aureole; 2) power-auger soil sampling on the floor of the Camp Creek Valley, particularly in the vicinity of elevated gold or copper values; and 3) a widely spaced chip sampling program on exposed mKyT bedrock at various locations around Mount Walker.

Although IP geophysical studies are often used to identifying porphyry deposits, conducting this type of survey at the Antimony Mountain property would be impractical due to steep slopes and thick talus cover.

Respectfully submitted,

Archer, Cathro & Associates (1981) Limited

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# **APPENDIX I**

# STATEMENT OF QUALIFICATIONS

# STATEMENT OF QUALIFICATIONS

I, Heather Smith, geologist, with business addresses in Vancouver, British Columbia and Whitehorse, Yukon Territory and residential address at #604-175 West 1 Street, North Vancouver, British Columbia, V7M 3N9 do hereby certify that:

- I graduated from the University of British Columbia in 2006 with a B. Sc. in Geological 1. Sciences.
- 2. From 2004 to present, I have been actively engaged in mineral exploration in the Yukon Territory, British Columbia and Northwest Territories.
- 3. I am a Geoscientist in Training (GIT) with the Association of Professional Engineers and Geoscientists of British Columbia (Member Number 150000).
- I have personally participated in the fieldwork reported herein and have interpreted all 4. data resulting from this work.

Heather Smith, B.Sc. Geology, GIT

4021050

# ARCHER, CATHRO & ASSOCIATES (1981) LIMITED 1016 – 510 West Hastings Street Vancouver, B.C. V6B 1L8

Telephone: 604-688-2568

Fax: 604-688-2578

#### <u>AFFIDAVIT</u>

I, Joan Mariacher, of Vancouver, B.C. make oath and say:

That to the best of my knowledge the attached Statement of Expenditures for exploration work on the Jan 1-56 mineral claims on Claim Sheet 116B/8 is accurate.

ban Mariacher



Sworn before me at Vancouver, B.C.

this 12th day of January 2009.

C.R.G

Notary Public, Yukon Territory

2001059

# Statement of Expenditures Antimony project – Jan 1-56 Mineral Claims January 5, 2009

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# Contract VTEM Survey

Geotech Ltd.

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<u>\$36,740.26</u>



2001059



# Geotech Ltd.

245 Industrial Parkway North, Aurora ON L4G 4C4

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Archer, Cathro & Associates (1981) Limite 1016-510 West Hastings Street Vancouver, BC Canada V6B 1L8 
 Date
 Invoice #

 4/30/2008
 991388

	Terms	Project
	Due on receipt	8077
Description		Amount
DescriptionHelicopter-borne time domain electromagnetic geophysical survey with VTEM systemInterm Billing - Fifty percent (50%) of the estimated total charge plus GST is payable on exectContract (Yukon aud northern BC.)For an estimated 2948 line km basic survey charge @\$70/km\$206,360.00Charges per bylock 15 blocks @\$2000/block\$30,000.00Charges per day for estimated 51 days @\$6000/day\$306,000,00Charges per day for estimated 150 hours @\$1800/hr\$220,000,00Contract (Yukon aud northern BC.)For an estimated 2948 line km basic survey charge @\$70/km\$206,360.00Charges per day for estimated 51 days @\$6000/day\$306,000,00Charges per day for estimated 150 hours @\$1800/hr\$220,000,00Crew and equipment mob/demob\$226,000,00Crew and equipment mob/demob\$226,000,00State: State: State	ntion of the appendix RECEIVED JAN 1 2 20 E = JAN 1 2 20 E	Amount 56700 433,180.00 09 17 17 17 17 17 17 17 17 17 17
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SS00 Highway #7 West, Suite 100, Concord, Ontario L4K 4M3 SWIFT:ROYCCAT2	GST	Can\$21,659.00
Account#1114834	Total	Can\$454,839.00

Tel: 905-841-5004 Fax: 905-841-0611 email: info@geotechairborne.com


# Geotech Ltd.

2001059

245 Industrial Parkway North, Aurora, ON L4G 4C4

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Tel: 905-841-5004 Fax: 905-841-0611 email: info@geotech.ca

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# Geotech Ltd.

2021059

245 Industrial Parkway North, Aurora, ON L4G 4C4

BILL TO:			DATE:	INVOICE:
Archer, Cathro & Associates (1981) Limite 1016-510 West Hastings Street Vancouver, BC Canada V6B 1L8	14	PM 1 2 3 4 3 A RECEIVED	7/30/2008	991575
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Tel: 905-841-5004 Fax: 905-841-0611 email: info@geotech.ca

#### **APPENDIX II**

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

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



#### **Antimony Mountain Project**

Yukon, Canada

For: ARCHER CATHRO & ASSOCIATES LTD.

By

Geotech Ltd. 245 Industrial Parkway North Aurora, Ont., CANADA, L4G 4C4 Tel: 1.905.841.5004 Fax: 1.905.841.0611

rax. 1.905.041.0011

www.geotech.ca

Email: info@geotech.ca

Survey flown during May, 2008

Project 8077

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January 2009

#### TABLE OF CONTENTS

Execut	tive Summary	3
1. IN	TRODUCTION	4
1.1	General Considerations	
1.2	Survey Location and Specifications	
1.3	Topographic Relief and Cultural Features	5
2 D4		6
21	Survey Area	6
22	Survey Operations	6
2.2	Flight Specifications	
2.0	Aircraft and Equipment	7
2.4	Alloran and Equipment	7
2	4.1 Survey Ancian	7
2	4.2 Liebitomagnetic System	/
2.4	4.5 All Dodor Altimator	11
2.4	4.4 Roudi Allineel	11
2.4	4.5 GPS Navigation System	11
2.4	4.6 Digital Acquisition System	11
2.4		12
3. PE		
4. DA	ATA PROCESSING AND PRESENTATION	
4.1	Flight Path	14
4.2	Electromagnetic Data	14
4.3	Magnetic Data	15
5. DE		16
5.1	Survey Report	16
5.2	Maps	16
5.3	Digital Data	16
6. CC	ONCLUSIONS AND RECOMMENDATIONS	20
6.1	Conclusions	20
6.2	Recommendations	20
LIST O	DF FIGURES	
Figure	1 - Property Location	4
Figure	2 - Google Earth Image with Flight Paths	5
Figure	3 - VTEM Configuration	8
Figure	4 - VTEM Waveform & Sample Times	8
Figure	5 - VTEM system configuration	10
LIST O	OF TABLES	
Table 1	1 - Survey blocks	6
Table 2	2 - Survey schedule	6
Table 3	3 – Decay Sampling Scheme	9
Table 4	4 – Acquisition Sampling Rates	11
Table 5	5 – Geosoft GDB Data Format	17
APPE	NDICES	
A. Surv	vey location maps	21
B. Surv	vey Block Coordinates	24
C. VTE	M Waveform	25
D. Geo	ophysical Maps	26
E. Mod	delling VTEM Data	



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

Antimony Mountain Project Yukon, Canada

#### **Executive Summary**

During May 31<sup>st</sup>, 2008 Geotech Ltd. carried out a helicopter-borne geophysical survey for Archer Cathro & Associates Ltd. over one (1) block of the Antimony Mountain Project situated near Dawson City, Yukon, Canada.

Principal geophysical sensors included a versatile time domain electromagnetic (VTEM) system, and a caesium magnetometer. Ancillary equipment included a GPS navigation system and a radar altimeter. A total of 145 line-kilometres were flown.

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

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

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

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



# 1. INTRODUCTION

#### 1.1 General Considerations

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

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

The geophysical surveys consisted of helicopter borne EM using the versatile time-domain electromagnetic (VTEM) system and aeromagnetics using a caesium magnetometer. A total of 145 line-km of geophysical data were acquired during the survey. The survey area is shown in Figure 2.

The crew was based out of Dawson City, Yukon for the acquisition phases of the survey. Survey flying started and was completed on May 31<sup>st</sup>, 2008.

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



Figure 1 - Property Location



#### 1.2 Survey Location and Specifications

The Antimony Mountain block (64°17'21.21"N, 138°13'27.18"W) is located approximately 64 kilometres north-east of Dawson City, Yukon, the base of operations for the survey.

The survey block was flown in a N 121° E direction with a traverse line spacing of 100 metres, as depicted in Figure 2. Tie lines were flown perpendicular to the traverse lines at a spacing of 1000 metres in the direction of N 31° E. For more detailed information on the flight spacing and direction see Table 1.

#### **1.3 Topographic Relief and Cultural Features**

Topographically, the property exhibits moderate relief, with elevations ranging from 1300 to 1910 metres above sea level (see Figure 2). There are a number of small rivers and streams located throughout the block. There are no roads leading to the block, making it accessible only by air. The survey block is covered by NTS (National Topographic Survey) of Canada sheets 116B08.



Figure 2 - Google Earth Image with Flight Paths



# 2. DATA ACQUISITION

#### 2.1 Survey Area

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

 Table 1 - Survey blocks

Survey block	Line spacing (m)	Area (km²)	Planned Line-km	Actual Line- km <sup>1</sup>	Flight direction	Line number
Ant. Mtn.	Traverse: 100	12.8	127	132	N 121°E	L1000 – L1280
	Tie: 1000		18	15	N 31°E	T1400 – T1450
Т	OTAL	12.8	145	147		

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

#### 2.2 Survey Operations

Survey operations were based out of Dawson City, Yukon on May 31<sup>st</sup>, 2008. The following table shows the timing of the flying.

Table	2 -	Survey	schedule
-------	-----	--------	----------

Date	Flight #	Flown km	Block	Crew location	Comments
28-May-08				Eldorado Hotel,	Mobilization – crew arrived
-				Dawson City, Yukon	
29-May-08				Dawson City, Yukon	System assembly
30-May-08				Dawson City, Yukon	Assembly complete, test flight
31-May-08	1, 2	145	ANTIMONY	Dawson City, Yukon	Production

<sup>&</sup>lt;sup>1</sup>NOTE: Actual line-km represents the total line-km contained in the final databases. These line-km normally exceed the Planned line-km, as outlined in the contract-proposal and defined in the survey NAV files.



#### 2.3 Flight Specifications

The helicopter was maintained at a mean height of 75 metres above the ground where possible (due to rugged terrain) with a nominal survey speed of 80 km/hour. This allowed for a nominal EM sensor terrain clearance of 40 metres and a magnetic sensor clearance of 62 metres. The data recording rates of the data acquisition was 0.1 second for electromagnetics, magnetometer and 0.2 second for altimeter and GPS. This translates to a geophysical reading about every 2 metres along flight track. Navigation was assisted by a CDGPS receiver and data acquisition system, which reports GPS co-ordinates as latitude/longitude and directs the pilot over a pre-programmed survey grid.

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

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

#### 2.4 Aircraft and Equipment

#### 2.4.1 Survey Aircraft

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

#### 2.4.2 Electromagnetic System

The electromagnetic system was a Geotech Time Domain EM (VTEM) system. The configuration is as indicated in Figure 3 below.

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





Figure 3 - VTEM Configuration



Figure 4 – VTEM Short Pulse Waveform & Sample Times



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

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

 Table 3 – Decay Sampling Scheme

 $<sup>^{2}</sup>$  Note: Measurement time-delays are referenced to time-zero marking the end of the transmitter current turn-off, as illustrated in Figure 6 and Appendix C.



VTEM system parameters:

#### **Transmitter Section**

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

#### **Receiver Section**

- Receiver coil diameter: 1.2 m
- Number of turns: 100.
- Effective coil area: 113.04 m<sup>2</sup>
- Wave form shape: trapezoid
- Power Line Monitor: 60 Hz

#### Magnetometer

- Nominal terrain clearance: 62 m



Figure 5 - VTEM system configuration



#### 2.4.3 Airborne magnetometer

The magnetic sensor utilized for the survey was a Geometrics optically pumped caesium vapour magnetic field sensor, mounted in a separate bird, 13 metres below the helicopter, as shown in Figure 5. The sensitivity of the magnetic sensor is 0.02 nanoTesla (nT) at a sampling interval of 0.1 seconds. The magnetometer sends the measured magnetic field strength as nanoTesla to the data acquisition system via the RS-232 port.

#### 2.4.4 Radar Altimeter

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

#### 2.4.5 GPS Navigation System

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

#### 2.4.6 Digital Acquisition System

A Geotech data acquisition system recorded the digital survey data on an internal compact flash card. Data is displayed on an LCD screen as traces to allow the operator to monitor the integrity of the system. The data type and sampling interval as provided in Table 4.

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



#### 2.4.7 Base Station

A combined magnetometer/GPS base station was utilized on this project. A Geometrics Caesium vapour magnetometer was used as a magnetic sensor with a sensitivity of 0.001 nT. The base station was recording the magnetic field together with the GPS time at 1 Hz on a base station computer.

The base station magnetometer sensor was installed 100 metres behind the Trans North helipad, close to the riverbank, in Dawson City Yukon (64°03'02.8"N, 139°25'50.2"W), away from electric transmission lines and moving ferrous objects such as motor vehicles. The base station data were backed-up to the data processing computer at the end of each survey day.



## 3. PERSONNEL

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

Field:	
Project Managers:	Les Moschuk (office)
Data QC/QA:	Nick Venter (office)
Crew Chief:	Darren Tuck
System Operator:	Eric MacNeill

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

Pilot:	Roy Stevenson
Mechanical Engineer:	Chris Ward
Office:	
Preliminary Data Processing:	Nick Venter
Final Data Processing:	Neil Fiset
Mapping/Reporting:	Kyle Orlowski

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



# 4. DATA PROCESSING AND PRESENTATION

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

#### 4.1 Flight Path

The flight path, recorded by the acquisition program as WGS 84 latitude/longitude, was converted into the NAD83 Datum, UTM Zone 7 North coordinate system in Oasis Montaj.

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

#### 4.2 Electromagnetic Data

A three stage digital filtering process was used to reject major sferic events and to reduce system noise. Local sferic activity can produce sharp, large amplitude events that cannot be removed by conventional filtering procedures. Smoothing or stacking will reduce their amplitude but leave a broader residual response that can be confused with geological phenomena. To avoid this possibility, a computer algorithm searches out and rejects the major sferic events. The filter used was a 16 point non-linear filter.

The signal to noise ratio was further improved by the application of a low pass linear digital filter. This filter has zero phase shift which prevents any lag or peak displacement from occurring, and it suppresses only variations with a wavelength less than about 1 second or 15 metres. This filter is a symmetrical 1 sec linear filter.

The results are presented as stacked profiles of EM voltages for the time gates, in linear - logarithmic scale for both B-field and dB/dt response. B-field time channel recorded at 1.641 milliseconds after the termination of the impulse is also presented as contour colour image. A de-corrugation and micro levelling was applied to the B-field 1.641 millisecond grid to reduce the effects, due to varying radar clearance resulting from roughed terrain.

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

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



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

#### 4.3 Magnetic Data

The processing of the magnetic data involved the correction for diurnal variations by using the digitally recorded ground base station magnetic values. The base station magnetometer data was edited and merged into the Geosoft GDB database on a daily basis. The aeromagnetic data was corrected for diurnal variations by subtracting the observed magnetic base station deviations.

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

The corrected magnetic data was interpolated between survey lines using a random point gridding method to yield x-y grid values for a standard grid cell size of approximately 0.2 cm at the mapping scale. The Minimum Curvature algorithm was used to interpolate values onto a rectangular regular spaced grid.



## 5. DELIVERABLES

#### 5.1 Survey Report

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

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

#### 5.2 Maps

Final maps were produced at scale of 1:10,000. The coordinate/projection system used was NAD 83, UTM Zone 7 North. All maps show the flight path trace and topographic data; latitude and longitude are also noted on maps.

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

- VTEM B-field profiles, Time Gates 0.234 9.245 ms in linear logarithmic scale over total magnetic intensity colour grid and.
- VTEM dB/dt profiles, Time Gates 0.234 9.245 ms in linear logarithmic scale.
- VTEM B-field late time, Time Gate 1.641 ms colour image.
- Total magnetic intensity (TMI) colour image and contours.

#### 5.3 Digital Data

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

There are two (2) main directories;

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

format.

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



 Table 5 – Geosoft GDB Data Format.

Channel Name	Description	
X:	X positional data (metres – NAD83, UTM zone 7 north)	
Y:	Y positional data (metres – NAD83, UTM zone 7 north)	
Z:	GPS antenna elevation (metres - ASL)	
Lon:	Longitude data (degree – NAD83)	
Lat:	Latitude data (degree – NAD83)	
Date:	Flight Date (DD/MM/YYYY)	
FltNo	Flight Number	
Radar:	Helicopter terrain clearance from radar altimeter (metres - AGL)	
RadarB:	EM Bird terrain clearance from radar altimeter (metres - AGL)	
DEM:	Digital elevation model (metres)	
Gtime:	GPS time (seconds of the day)	
Mag1:	Raw Total Magnetic field data (nT)	
Basemag:	Magnetic diurnal variation data (nT)	
Mag2	Total Magnetic field diurnal variation corrected data (nT)	
Mag3	Total Magnetic field final microlevelled data (nT)	
SF[10]:	dB/dt 120 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[11]:	dB/dt 141 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[12]:	dB/dt 167 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[13]:	dB/dt 198 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[14]:	dB/dt 234 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[15]:	dB/dt 281 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[16]:	dB/dt 339 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[17]:	dB/dt 406 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[18]:	dB/dt 484 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[19]:	dB/dt 573 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[20]:	dB/dt 682 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[21]:	dB/dt 818 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[22]:	dB/dt 974 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[23]:	dB/dt 1151 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[24]:	dB/dt 1370 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[25]:	dB/dt 1641 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[26]:	dB/dt 1953 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[27]:	dB/dt 2307 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[28]:	dB/dt 2745 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[29]:	dB/dt 3286 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[30]:	dB/dt 3911 microsecond time channel pV/(A*m <sup>4</sup> )	
SF[31]:	dB/dt 4620 microsecond time channel pV/(A*m <sup>4</sup> )	



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

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



18

• Database of the VTEM Waveform "VTEM\_waveform.gdb" in Geosoft GDB format, containing the following channels:

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

• Grids in Geosoft GRD format, as follows:

BF25\_AntMount:B-Field Channel 25 (Time Gate 1.641 ms)Mag3\_AntMount:Total magnetic intensity (nT)

A Geosoft .GRD file has a .GI metadata file associated with it, containing grid projection information. A grid cell size of 25 metres was used.

• Maps at 1:10,000 in Geosoft MAP format, as follows:

8077_Bfield_AntMountain:	B-field profiles, Time Gates 0.234 – 9.245 ms in
	linear logarithmic scale over TMI.
8077_dBdt_AntMountain:	dB/dt profiles, Time Gates 0.234 – 9.245 ms in linear
	logarithmic scale.
8077_BF25_AntMountain:	B-field Time Gate 1.641 ms colour image.
8077_TMI_AntMountain:	Total magnetic intensity colour image and contours.

Maps are also presented in PDF and MapInfo format.

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

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



# 6. CONCLUSIONS AND RECOMMENDATIONS

#### 6.1 Conclusions

A helicopter-borne versatile time domain electromagnetic (VTEM) geophysical survey has been completed over the Antimony Mountain Project in the Yukon Territory, Canada.

The total area coverage is  $12.8 \text{ km}^2$ . Total survey line coverage is 145 line kilometres. The principal sensors included a Time Domain EM system and a magnetometer. Results have been presented as stacked profiles and contour colour images at a scale of 1:10,000. No formal interpretation is included in this report.

#### 6.2 Recommendations

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

Respectfully submitted<sup>6</sup>,

Kyle Orlowski Geotech Ltd. Jean Legault, P. Geo, P. Eng Geotech Ltd.

Neil Fiset Geotech Ltd.

January 2009

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



#### **APPENDIX A**

#### SURVEY BLOCK LOCATION MAPS



Google Earth Image: Antimony Mountain Project





**Google Earth Image: Antimony Mountain Block** 





Mining Claims Map: Antimony Mountain Project

#### **APPENDIX B**

#### SURVEY BLOCK COORDINATES

(NAD83, UTM Zone 7 North)

Antimony Mtn.			
Х	Y		
633272	7134516		
637721	7131853		
637156	7130950		
636326	7131434		
635874	7130733		
635455	7130975		
634971	7130169		
631834	7132087		



#### **APPENDIX C**



#### **VTEM WAVEFORM**



#### APPENDIX D

### **GEOPHYSICAL MAPS<sup>1</sup>**



Antimony Mountain Property: Total Magnetic Intensity (TMI)

<sup>&</sup>lt;sup>1</sup> Note: Present maps are a selection of the final geophysical maps. Full size geophysical maps are also available in PDF format on the final DVD.





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





Antimony Mountain Property: VTEM dB/dt Profiles - Time Gates 0.234 to 9.245 ms





Antimony Mountain Property: VTEM B-Field Contours - Time Gate 1.641 ms



#### APPENDIX E

#### GENERALIZED MODELING RESULTS OF THE VTEM SYSTEM

#### Introduction

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

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

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

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

#### **General Modeling Concepts**

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

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



- As the plate is positioned at an increasing depth to the top, the shoulders of the **M** shaped response, have a greater separation distance.
- When faced with choosing between a flat lying plate and a prism model to represent the target (broad response) some ambiguity is present and caution should be exercised.
- With the concentric loop system and Z-component receiver coil, virtually all types of conductors and most geometries are most always well coupled and a response is generated. Only concentric loop systems can succefully map this type great variety of targets.

#### Variation of Plate Depth

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

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

#### Variation of Plate Dip

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

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



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

#### Variation of Prism Dip

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

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



#### I. THIN PLATE



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



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



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



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




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



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



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



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



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



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



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



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



### **II. THICK PLATE**



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



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



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



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



#### **III. MULTIPLE THIN PLATES**



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



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



# **General Interpretation Principals**

## <u>Magnetics</u>

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

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

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

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

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



## Concentric Loop EM Systems

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

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

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

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

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



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

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

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

Roger Barlow **Consultant** 

Nasreddine Bournas, P. Geo. Geotech Ltd.

December 2008









ogarithmic above 0.5 (pV/A/m^4)	
	0.234 ms
	0.281 ms
	0.339 ms
	0.406 ms
	0.484 ms
	0.573 ms
	0.682 ms
	0.818 ms
	0.974 ms
	1.151 ms
	1.370 ms
	1.641 ms
	1.953 ms
	2.307 ms
	2.745 ms
	3.286 ms
	3.911 ms
	4.620 ms
	4.020 ms
	6 578 ms
	0.0701115





Profiles scale 1 mm = 0.05 (pV*ms)/(A*m^4)		
(Linear between +/- 0.5 (pV*ms)/(A*m^4) logarithmic above 0.5 (pV*ms)/(A*m^4)		
0.2	234 ms (B-field)	
0.2	81 ms (B-field)	
0.3	39 ms (B-field)	
0.4	06 ms (B-field)	
0.4	84 ms (B-field)	
0.5	73 ms (B-field)	
0.6	82 ms (B-field)	
	318 ms (B-field)	
0.9	974 ms (B-field)	
1.1	51 ms (B-field)	
1.3	70 ms (B-field)	
1.6	641 ms (B-field)	
1.9	953 ms (B-field)	
2.3	07 ms (B-field)	
2.7	′45 ms (B-field)	
3.2	286 ms (B-field)	
3.9	11 ms (B-field)	
4.6	20 ms (B-field)	
5.4	l95 ms (B-field)	
6.5	78 ms (B-field)	
7.0	20 ma (D field)	

Mineral Exploration Licences & Mining Claims are derived from the Government of Yukon Geomatics Branch