ARCHER, CATHRO & ASSOCIATES (1981) LIMITED
1016 – 510 West Hastings Street
Vancouver, B.C. V6B 1L8
Telephone: 604-688-2568 Fax: 604-688-2578

ASSESSMENT REPORT

describing

GEOPHYSICAL SURVEY INTERPRETATION

at the

HOPPER PROPERTY

Hopper 1-20	YC41091-YC41110
21-162	YC47017-YC47158
163-168	YC65915-YC65920
170	YC47159
171-266	YD123011-YD123106
267-342	YF28607-YD28682
Gal 1-8	YC65907-YC65914
Guy 1-16	YC19466-YC19481

NTS 115H/02 & 115H/07
Latitude 61°16´N; Longitude 136°52´W

Processing and Interpretation done December 2012

located in the

Whitehorse Mining District
Yukon Territory

prepared by

Archer, Cathro & Associates (1981) Limited

for

STRATEGIC METALS LTD.

by
H. Burrell B.Sc., P.Geo.
May 2013

CONTENTS

INTRODUCTION	1
PROPERTY LOCATION, CLAIM DATA AND ACCESS	1
HISTORY AND PREVIOUS WORK	1
GEOMORPHOLOGY	5
REGIONAL GEOLOGY	6
PROPERTY GEOLOGY	7
PROPERTY MINERALIZATION	8
MINERALIZATION	9
SOIL GEOCHEMISTRY	11
DIAMOND DRILLING	13
REVERSE CIRCULATION PERCUSSION DRILLING	17
GEOPHYSICAL SURVEYS	21
DISCUSSION AND CONCLUSIONS	22
REFERENCES	24

APPENDICES

I STATEMENT OF QUALIFICATIONS

II STATEMENT OF EXPENDITURES

II REPORT ON PROCESSING AND INTERPRETATION OF VTEM ELECTROMAGNETIC AND MAGNETIC SURVEY DATA

TABLES

No.	Description	Page
I	Exploration History of the Hopper Property	2
II	Lithological Units	6
III	Significant Historical Rock and Chip Sample Results (Hopkins North Zone)	10
IV	Significant 2011 Rock and Chip Sample Results (Hopkins North Zone)	10
V	Geochemical Data for Soil Samples	11
VI	Historical Diamond Drill Hole Data and Visual Results	13
VII	Historical Diamond Drilling Assay Highlights	14
VIII	2011 Diamond Drill Hole Data	15
IX	2011 Diamond Drilling Assay Highlights	16
X	1980 Percussion Hole Data and Results	17
XI	2011 Percussion Drill Hole Data	18
XII	2011 Percussion Drilling Assay Highlights	20

FIGURES

No.	Description	Follows Page
1	Property Location	1
2	Claim Locations	1
3	Historical Workings	In pocket
4	Tectonic Setting	6
5	Geology	6
6	Detailed Geology – Map Area A	6
7	Detailed Geology – Map Area B	7
8	Sample Locations	In pocket
9	Copper Geochemistry	11
10	Gold Geochemistry	11
11	Silver Geochemistry	11
12	Molybdenum Geochemistry	11
13	Drill Section A - A’	In pocket
14	Drill Section B - B’	In pocket
15	Drill Section C - C’	In pocket
16	Percussion Drill Sections	In pocket
17	Total Magnetic Intensity Compilation	In pocket
18	Electromagnetic Compilation	In pocket

INTRODUCTION

The Hopper property covers numerous copper-gold-silver bearing, skarn- and porphyry-style targets. The property is located in southwestern Yukon and is owned 100% by Strategic Metals Ltd.

This report describes processing and interpretation of data from versatile time-domain electromagnetic (VTEM) and magnetic helicopter-borne geophysical surveys that were flown in 2007 and 2011. The processing and interpretation were done by Condor Consulting., Inc. of Lakewood, Colorado on behalf of Strategic Metals. The author compiled Condor Consulting's interpretations with previous geological and geochemical data from the property, and her Statement of Qualifications appears in Appendix I. The work was conducted at a cost of $29,984.50 as shown on the Statement of Expenditures in Appendix II.

PROPERTY LOCATION, CLAIM DATA AND ACCESS

The Hopper property is located in southwestern Yukon at latitude 61º16'N and longitude 136º52'W on NTS map sheets 115H/02 and 115H/07 (Figure 1). It comprises 365 contiguous quartz claims that cover an area of about 7400 (74 km^2). All of the claims are registered with the Whitehorse Mining Recorder in the name of Archer Cathro, which holds them in trust for Strategic Metals. Specifics concerning claim registration are tabulated below, while the locations of individual claims are shown on Figure 2.

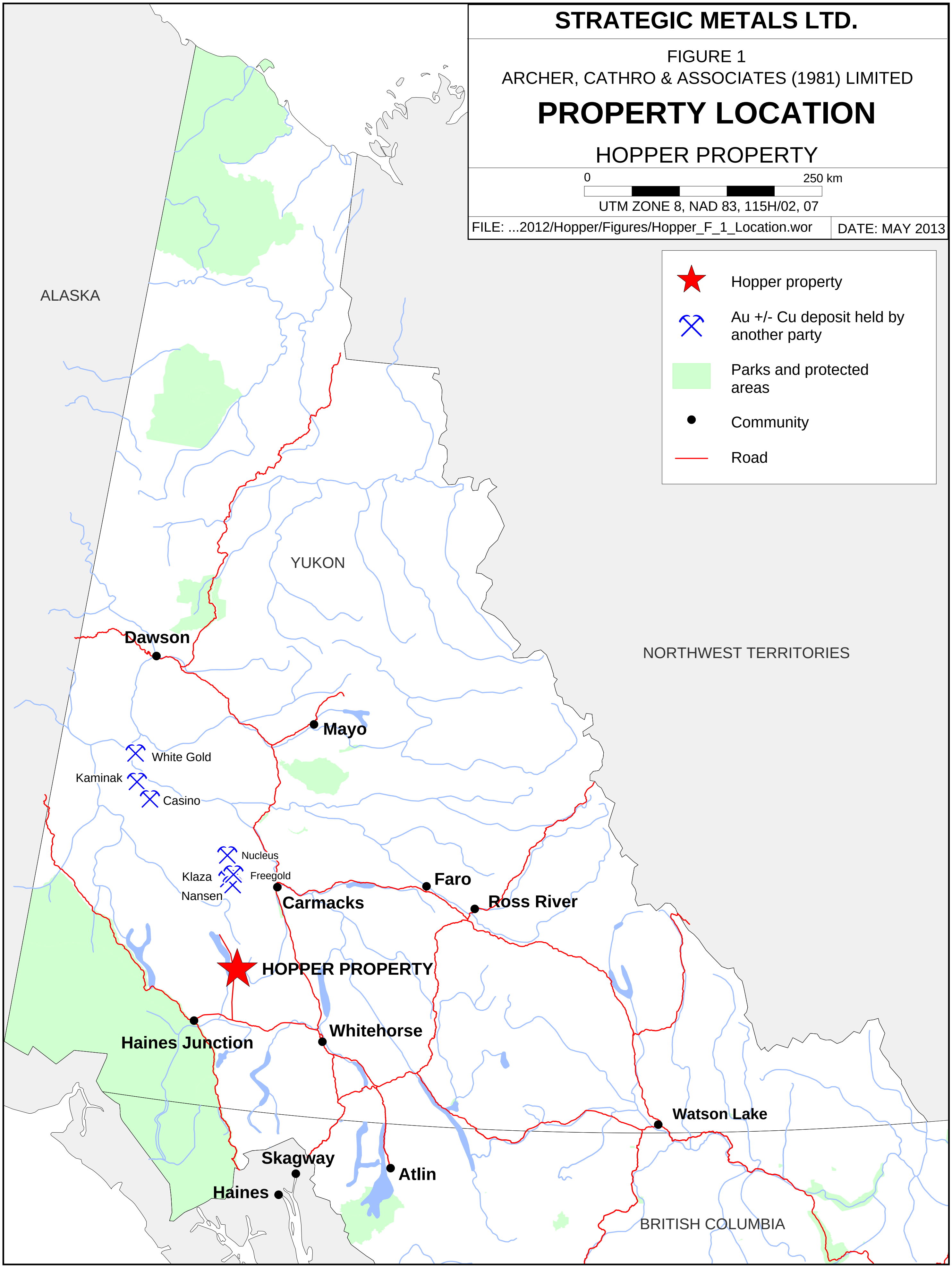
Claim Name	Grant Number	Expiry Date*
Hopper 1-20	YC41091-YC41110	February 15, 2020
21-162	YC47017-YC47158	February 15, 2018
163-168	YC65915-YC65920	February 15, 2020
170	YC47159	February 15, 2018
171-266	YD123011-YD123106	February 15, 2018
267-342	YF28607-YD28682	February 15, 2018
Gal 1-8	YC65907-YC65914	February 15, 2020
Guy 1-16	YC19466-YC19481	February 15, 2020

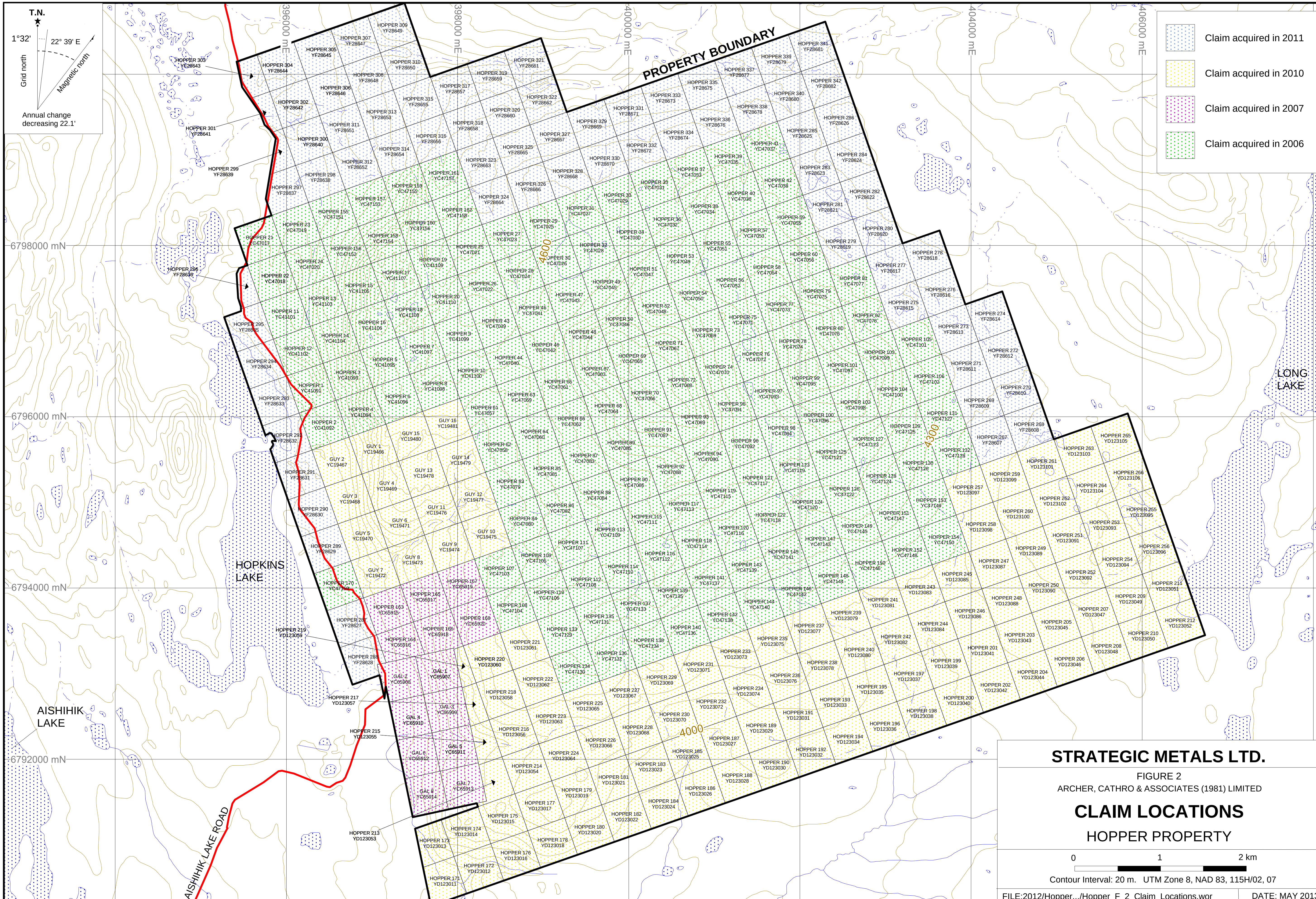
*Expiry dates include 2012 work which has been filed for assessment credit but not yet accepted.

The property lies along the Aishihik Lake Road, 52 km north of the Otter Falls cut-off at Km 1602 on the Alaska Highway. A system of bush roads and bulldozer trails extends from the Aishihik Lake Road onto the property. The Alaska Highway is usable in all seasons by two wheel drive vehicles. Whitehorse lies 120 km southeast of the Hopper property and is the nearest, major supply centre. The community at Haines Junction lies approximately 35 km west of the Otter Falls cut-off.

HISTORY AND PREVIOUS WORK

From 1907 to 1967, intermittent, poorly documented, cursory exploration was performed within the area now covered by the Hopper property. Since then, several better documented exploration


STRATEGIC METALS LTD.
FIGURE 1
ARCHER, CATHRO & ASSOCIATES (1981) LIMITED
PROPERTY LOCATION
HOPPER PROPERTY
0
250 km
UTM ZONE 8, NAD 83, 115H/02, 07
FILE: ...2012/Hopper/Figures/Hopper_F_1_Location.wor
DATE: MAY 2013
Hopper property
Au +/- Cu deposit held by another party
Parks and protected areas
Community
Road
ALASKA
YUKON
NORTHWEST TERRITORIES
BRITISH COLUMBIA
Dawson
Mayo
White Gold
Kaminak
Casino
Nucleus
Klaza
Freegold
Nansen
Carmacks
Faro
Ross River
HOPPER PROPERTY
Haines Junction
Whitehorse
Watson Lake
Skagway
Atlin
Haines

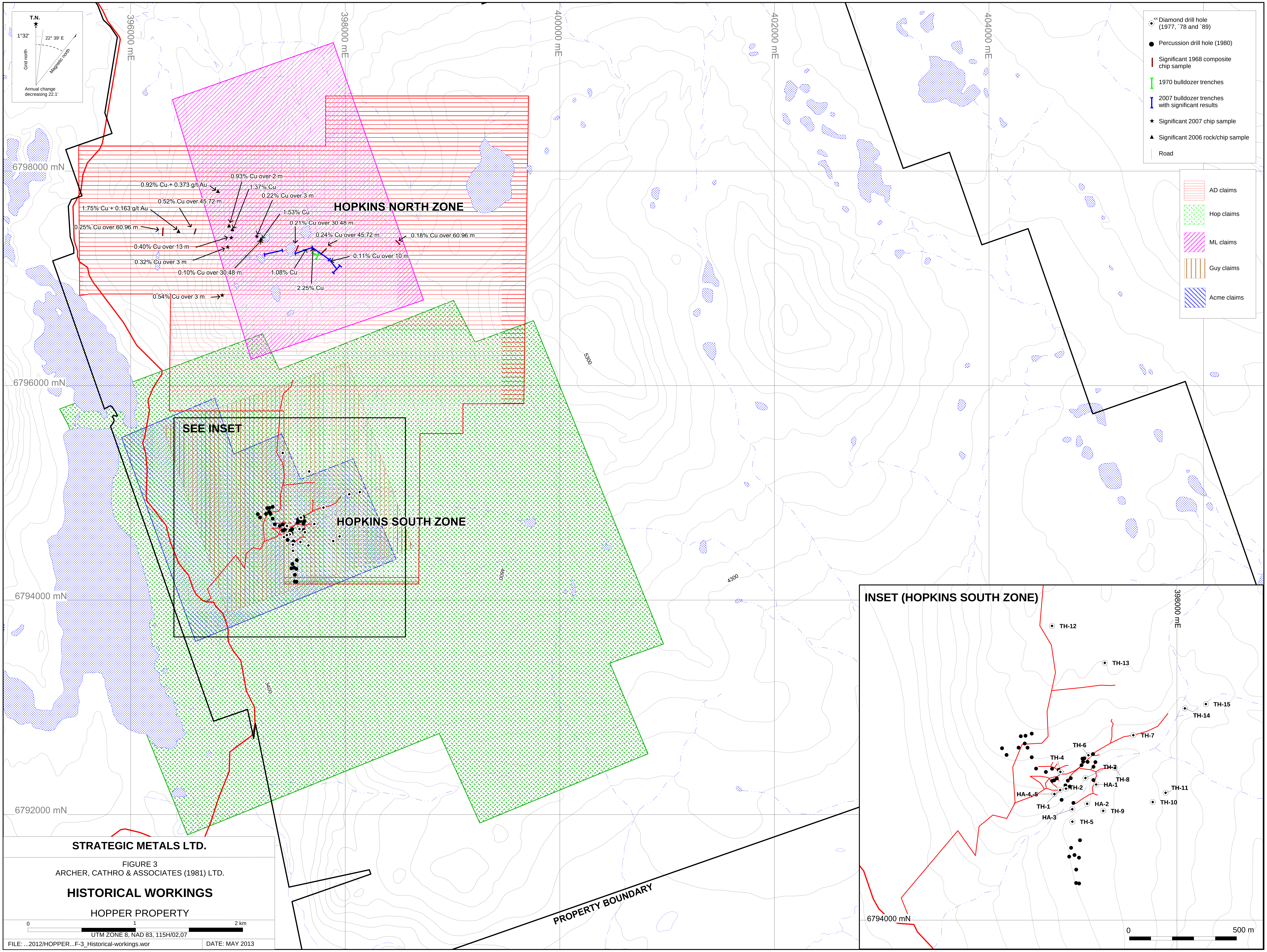


T.N.
1°32'
22° 39' E
Grid north
Magnetic north
Annual change
decreasing 22.1'
396000 mE
398000 mE
400000 mE
404000 mE
406000 mE
6798000 mN
6796000 mN
6794000 mN
6792000 mN
PROPERTY BOUNDARY
HOPKINS
LAKE
AISHIHIK
LAKE
AISHIHIK LAKE ROAD
LONG
LAKE
4600
4300
4000
Claim acquired in 2011
Claim acquired in 2010
Claim acquired in 2007
Claim acquired in 2006
STRATEGIC METALS LTD.
FIGURE 2
ARCHER, CATHRO & ASSOCIATES (1981) LIMITED
CLAIM LOCATIONS
HOPPER PROPERTY
0
1
2 km
Contour Interval: 20 m. UTM Zone 8, NAD 83, 115H/02, 07
FILE:2012/Hopper.../Hopper_F_2_Claim_Locations.wor
DATE: MAY 2013

programs were carried out over various parts of the current property by different operators (Figure 3). Table I summarizes work performed and results obtained by exploration programs conducted since 1967.

Table I – Exploration History of the Hopper Property

Year of Work (Report)	Owner/ Operator	Claims	Work Performed	Results
1968 (019089)	Mitsubishi Metal Corporation	AD	Geophysical survey, geological mapping, soil sampling, composite chip sampling	Identified strong Cu-in-soil values and 0.52% Cu over 45.72 m from a composite chip sample.
1970 (060993)	Mitsubishi Metal Corporation	ML	IP survey	Identified a large magnetic anomaly and a widespread area of polarized material likely due to pyrite, chalcopyrite and magnetite.
1976 (090147)	Mitsubishi Metal Corporation	ML	Mapping and prospecting	Rock sample with 0.124% U_3O_8. Follow up work returned <0.001% U_3O_8.
1977 (091325 and 092027)	Whitehorse Copper Mines Ltd.	Hop and Acme	Diamond drilling (1089.1 m in 11 holes)	Significant Cu, Au and Ag results from drilling, including 1.94% Cu, 0.87 g/t Au, 14.6 g/t Ag over 18.6 m.
1978 (092038)	Whitehorse Copper Mines Ltd.	Hop and Acme	Ground magnetic survey, test IP, geological mapping and diamond drilling (697.7 m in 4 holes)	Best drill intersection: 2.42% Cu, 3.051 g/t Au, 16.11 g/t Ag over 0.21 m.
1980 (work reported in 062147)	New Ridge Resources Ltd.	Hop and Acme	EM-16 and magnetometer surveys, percussion drilling (2490.2 m in 46 holes)	Percussion holes were analyzed for Cu only and not all holes were analyzed. Best intervals: 1.52% Cu over 18.3 m.
1981 (062147)	New Ridge Resources Ltd.	Hop and Acme	Review of historical work and recommendation for future work	Recommended two vertical drill holes to test the mineralized horizon.
1989 (092776)	Casau Exploration Limited	Hop and Acme	Diamond drilling (376.12 m in 5 holes)	Best intersections: 1.98% Cu, 0.67 g/t Au, 14.4 g/t Ag over 7.8 m.
2002	Private Group	Guy	No reported work	n/a
2006	Strategic Metals Ltd.	Hopper	Geological mapping, prospecting and soil geochemistry	Soil sampling outlined a 2300 by 400 m area of strong Cu-in-soil geochemistry (up to 1275 ppm). Rock sample values from 0.11 to 1.53% Cu with



STRATEGIC METALS LTD.

FIGURE 3
ARCHER, CATHRO & ASSOCIATES (1981) LTD.

HISTORICAL WORKINGS

HOPPER PROPERTY

0 1 2 km
UTM ZONE 8, NAD 83, 115H/02,07

FILE: ...2012/HOPPER...F-3_Historical-workings.wor | DATE: MAY 2013

				up to 11.6 g/t Ag.
2007	Strategic Metals Ltd.	Hopper and Gal	Excavator trenching, soil geochemistry and helicopter-borne VTEM & magnetic survey	Soil sampling returned up to 2810 ppm Cu and 95 ppm Mo. Best chip sampling result was 0.4% Cu over 13 m. Geophysical surveys identified strong mag signature over pluton and four conductors (best over skarn zone within Guy claims).
2010	Strategic Metals Ltd.	Hopper and Gal	Soil sampling	Soil sampling yielded subdued response in vicinity of drill holes on Guy claims; locally elevated Au, Cu and Mo values elsewhere on those claims.
2011	Bonaparte Resources Inc. (Strategic Metals Ltd.)	Hopper, Guy and Gal	Geochemical sampling, prospecting, geological mapping, RC drilling, diamond drilling and geophysical surveying	Geochemical sampling returned up to 2730 ppm Cu, 244 ppb Au and 83 ppm Mo. RC and diamond drilling identified numerous zones of porphyry- and skarn-type mineralization. The best RC drilling porphyry result was 0.7% Cu, 0.195 g/t Au, 4.10 g/t Ag over 10.66 m. Diamond drilling at the Hopkins South Zone returned 1.62% Cu, 0.54 g/t Au and 9.30 g/t Ag over 8.50 m.

The exploration programs and highlight results are summarized in the following paragraphs, while more detailed descriptions of results are provided in the appropriate sections to follow.

In 1968, Mitsubishi Metal Corporation staked the AD claims to cover a copper showing (Hopkins North Zone) that was identified in the early 1900s (Kikuchi, 1968). The work program comprised airborne geophysical surveys, geological mapping and rock and soil geochemical sampling. Airborne electromagnetic and magnetometer surveys identified a few conductors and areas of strong magnetic response. No detailed explanation of the geophysical features was reported. A number of composite chip samples were taken from bedrock and/or sub-crop across widths of 30.48 to 60.69 m (Figure 3). Values from these chip samples ranged from 0.18 to 0.52% copper. Soil sampling identified copper values up to 2250 ppm that reportedly coincide with the geophysical anomalies. The AD claims lapsed following this work. An Induced Polarization (IP) survey and bulldozer trenching were recommended as follow-up work.

In 1970, Mitsubishi restaked part of the AD claims as the ML property. Although the assessment report for this work only reports an IP survey, a small bulldozer trenching program is thought to have been attempted in the vicinity of the 1968 work (Figure 3). Results from the IP survey showed a widespread area of polarized material likely due to pyrite, chalcopyrite and magnetite (Norgaard, 1970). The bulldozer trenches did not reach bedrock and there is no record of samples taken.

In 1976, Mitsubishi performed mapping and prospecting on the ML property. The focus of this work was intrusive-hosted uranium. A specimen sample reportedly returned 0.124% U_3O_8, but follow up work returned values less than 0.001% U_3O_8. The ML claims were allowed to lapse (Shimizu and Kashiwagi, 1976).

In 1977, Whitehorse Copper Mines Ltd. optioned the Acme claims from two independent prospectors and immediately staked the Hop claims to surround them. Diamond drilling (1089.1 m in 11 holes) was performed to test a pyrrhotite and chalcopyrite rich calc-silicate skarn horizon (Hopkins South Zone). Drilling successfully identified the skarn horizon at depth and yielded 1.94% copper, 0.87 g/t gold and 14.6 g/t silver over 18.6 m between 23.5 and 42.1 m (Tenney, 1977).

In 1978, Whitehorse Copper returned to the property to perform ground magnetic and IP surveys, geological mapping and follow up diamond drilling (697.7 in four holes) at the Hopkins South Zone. The magnetic survey confirmed that areas underlain by the main intrusion or dykes have a higher magnetic background than those underlain by schist. Strong magnetic highs were identified in the vicinity of magnetite skarns. The IP survey returned low chargeability readings over the intrusive body, but four or five times higher values over the schist country rock. Whitehorse Copper thought that the high chargeability background over the schist likely prevented detection of sulphide mineralization at depth. The diamond drilling program was designed to determine whether a large tonnage copper target could extend from mineralization detected in 1977. The best drill intersection was 0.36% copper over 1.3 m between 170.1 and 171.4 m (Ashton, 1981).

In 1980, New Ridge Resources Ltd. performed EM-16 and magnetometer geophysical surveys and percussion drilling (2490.2 m in 46 holes) within Hopkins South Zone (Ashton, 1981). The most significant interval returned 1.52% copper over 18.3 m between 21.3 and 39.6 m (only analyzed for copper).

In 1989, Casau Exploration Limited performed 376.12 m of diamond drilling in five holes within Hopkins South Zone (Stephen and Feulgen, 1989). The best intersection yielded 1.98% copper, 0.67 g/t gold and 14.4 g/t silver over 7.8 m between 23.1 and 30.9 m.

In 2002, a private group staked the Guy claims to cover the drilled skarn horizon in Hopkins South Zone. No work was reported.

In 2006, Strategic Metals staked the Hopper claims around the Guy property and conducted soil sampling, geological mapping and prospecting in the vicinity of Hopkins North Zone. Soil sampling identified numerous anomalies as discussed in the Soil Geochemistry section. Eight specimens of weakly magnetic granodiorite and diorite yielded between 0.11% and 1.53%

copper with an average of 0.65%. Accompanying silver values ranged up to 11.6 g/t silver (Wengzynowski and Smith, 2007). Strategic Metals expanded the claim block in June 2006.

In 2007, Strategic Metals once again expanded the claim block, this time adding the Gal and four more Hopper claims to the south of the Guy property (Figure 3). Work performed in 2007 included soil geochemical sampling, chip and channel sampling, excavator trenching and helicopter-borne versatile time domain electromagnetic (VTEM) and magnetic surveys (Jessen, 2008). Soil sampling better defined and expanded the known anomalies. Chip and sawn channel samples collected from outcrops within Hopkins North Zone returned variable results, the best of which was 0.40% copper over 13 m. Specimen rock sampling within the excavator trenches returned values up to 2.25% copper, but most samples yielded less than 1%. The most significant trench chip sample returned 0.11% copper over 10 m (Figure 3). Results of the VTEM and magnetic surveys are summarized in the Geophysical Surveys section. In addition to the work performed by Strategic Metals, a masters student from the University of Waterloo performed whole rock and sulphur isotope analyses on intrusive rocks collected from the Hopper Pluton in the northwestern part of the property. These analyses returned Late Cretaceous ages between 76.0 ±1.1 and 83.7±1.9 Ma (Blumenthal, 2010).

In 2008, Monster Mining Corp. acquired the Guy claims.

In 2010, Strategic Metals acquired the Guy claims by way of a joint venture agreement with Monster Mining Corp and added more claims to the south of the Hopper property. That year, Strategic Metals performed grid soil sampling in the vicinity of skarn mineralization outlined by percussion and diamond drilling within Hopkins South Zone (Smith, 2011). Results from this work were variable, with samples ranging from 1 to 109 ppb gold, 10 to 913 ppm copper and 1 to 27 ppm molybdenum. Analyses for other elements yielded background to moderately anomalous values. Soil response near the drill holes was subdued.

In 2011, Bonaparte Resources Inc. optioned the Hopper property from Strategic Metals and performed a comprehensive exploration program comprising soil sampling, reverse circulation (RC) drilling and diamond drilling (Eaton, 2012). Results from the soil sampling program are discussed in the Soil Geochemistry section below. A total of 1730 m in 58 holes of RC and 1309 m in six holes of diamond drilling were done on the property. Complete results from this drilling are described in the appropriate sections below.

In early December 2012, Strategic Metals purchased Monster Mining's interests in the joint venture.

In early 2013, Bonaparte terminated its option on the property.

GEOMORPHOLOGY

The Hopper property is located within the Kluane Plateau physiographic region. The claim block lies between Hopkins Lake to the west and Long Lake to the east. Aishihik Lake is located four kilometres west of the property. The property is drained by creeks that flow into Hopkins and Aishihik lakes, which connect to the Pacific Ocean via the Aishihik, Dezadeash and

Alsek rivers, and by creeks that flow into Long Lake, which ultimately connects to the Pacific Ocean via the Nordenskiold and Yukon rivers.

The Kluane Plateau was glaciated during the Late Pleistocene. Glacial movement arced from south to north-northwest in the Aishihik Lake area (Duk-Rodkin, 1999). Local elevations range from 1000 to 1645 m above sea level. The lowest areas are located near the Aishihik Lake Road and exhibit glacial features such as small eskers, kames, kettles and assorted till deposits. These areas are densely forested with spruce, willow, poplar and birch. The uplands begin approximately 800 m east of the road and consist of a broad, grass and buckbrush covered plateau featuring gently undulating knolls, swamps and small lakes. The upland plateau is separated from the lowlands by a steep (30°), moderately vegetated hillside. Treeline is at about 1500 m. Outcrop is most common on the steep hillside and atop glacially scoured knolls in the uplands.

Although the Hopper area is arid and many creeks only flow during seasonal runoff, small lakes and the larger creeks provide sufficient water for camp and drilling purposes throughout summer and fall.

REGIONAL GEOLOGY

The Hopper property is located within Yukon-Tanana Terrane (Figure 4), which represents a continental arc that developed along the ancient Pacific margin of North America from Late Devonian to Permian. The segment of Yukon-Tanana Terrane containing the property is bordered by the Tintina Fault, 200 km to the northeast, and the Denali-Shakwak Fault, 50 km to the southwest. Both faults are steeply dipping transcurrent structures that have seen hundreds of kilometres of dextral strike-slip offset.

In 1997, the area around the Hopper property (NTS map sheet 115H/07) was mapped at 1:50,000 scale by Johnston and Timmerman of the Yukon Geological Survey (YGS). Gordey and Makepeace (2003) later completed a Yukon-wide geological compilation, which updated the lithological unit names in the area. Figure 5 illustrates geology as mapped by Johnson and Timmerman and compiled by Gordey and Makepeace. Rock units assigned during 1997 mapping have been re-assigned to equivalent map units from the current YGS geological compilation (YGS, 2013). The main lithological map suites in the vicinity of the property are described in Table II.

Table II – Lithological Units (*YGS, 2013*)

Map Suite	Age	Map Unit	Description
Quaternary	Quaternary	Q	Unconsolidated glacial, glaciofluvial and glaciolacustrine deposits; fluviatile silt, sand and gravel; and local volcanic ash, in part with cover of soil and organic deposits.
Skukum Assemblage	Eocene	IES2	North trending, felsic volcanic dykes, plugs, domes, laccoliths and flows.
Ruby Range	Early Tertiary	ETgN	Biotite-hornblende granodiorite, quartz

STRATEGIC METALS LTD.

FIGURE 4

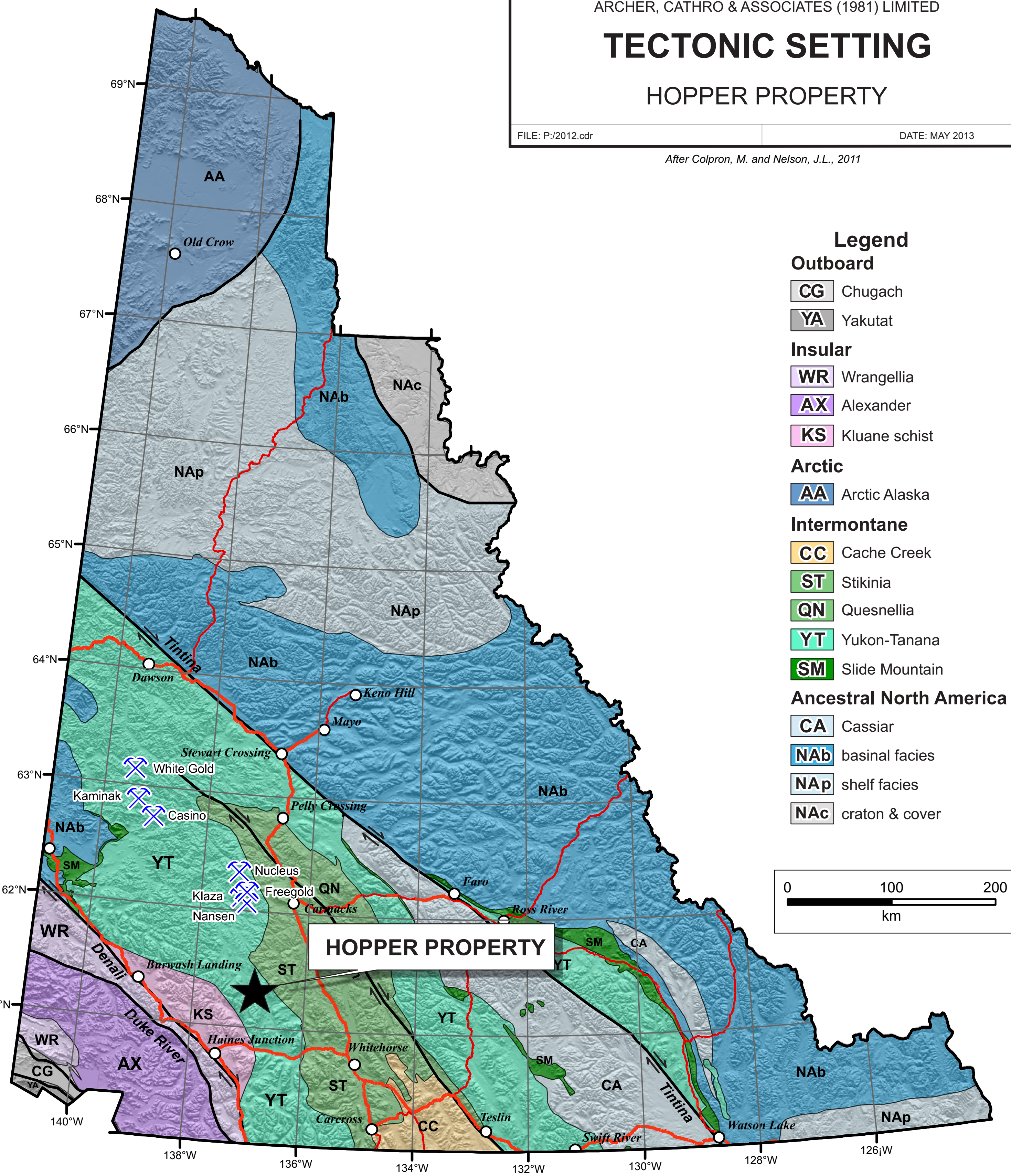
ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

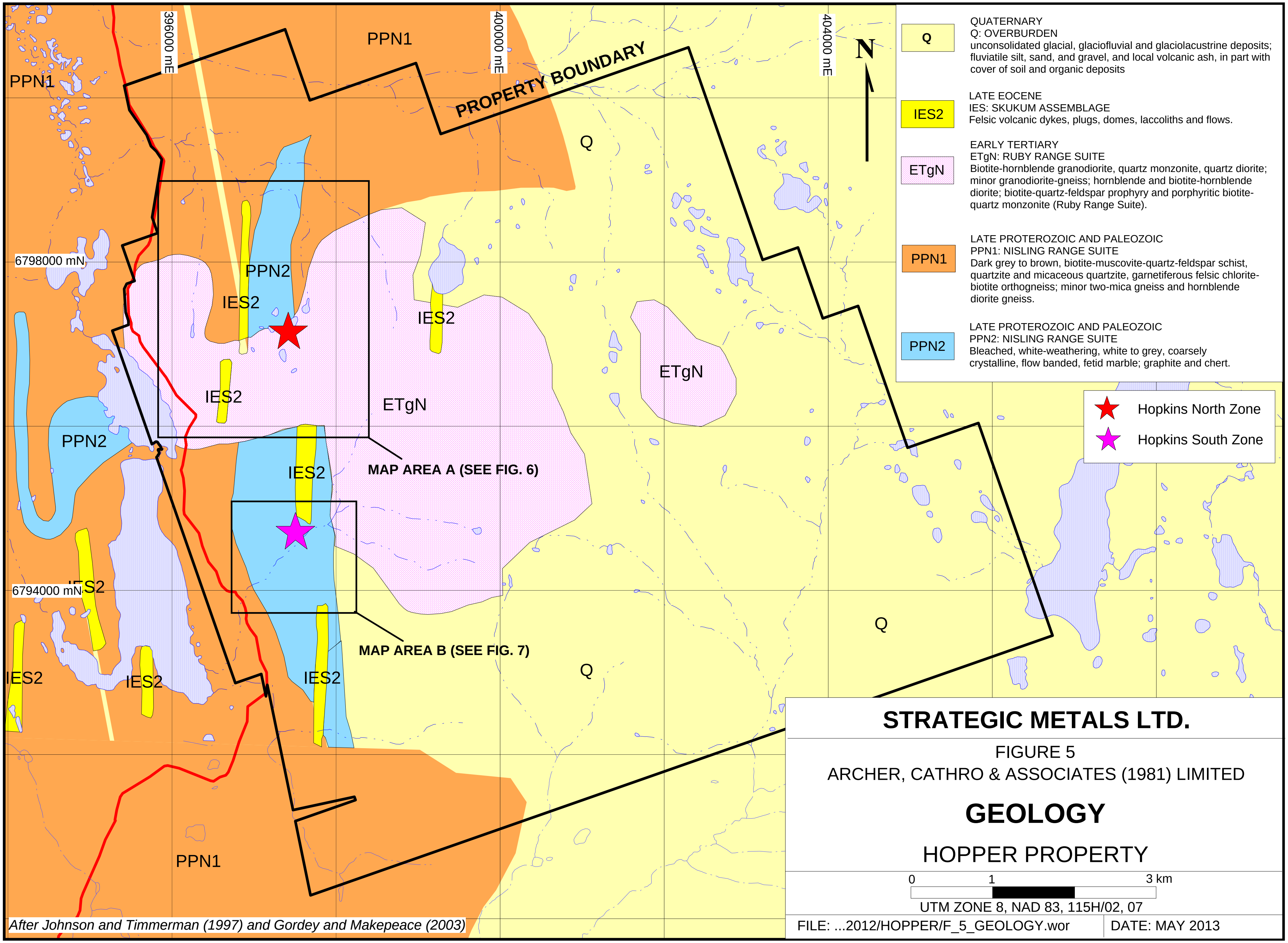
TECTONIC SETTING

HOPPER PROPERTY

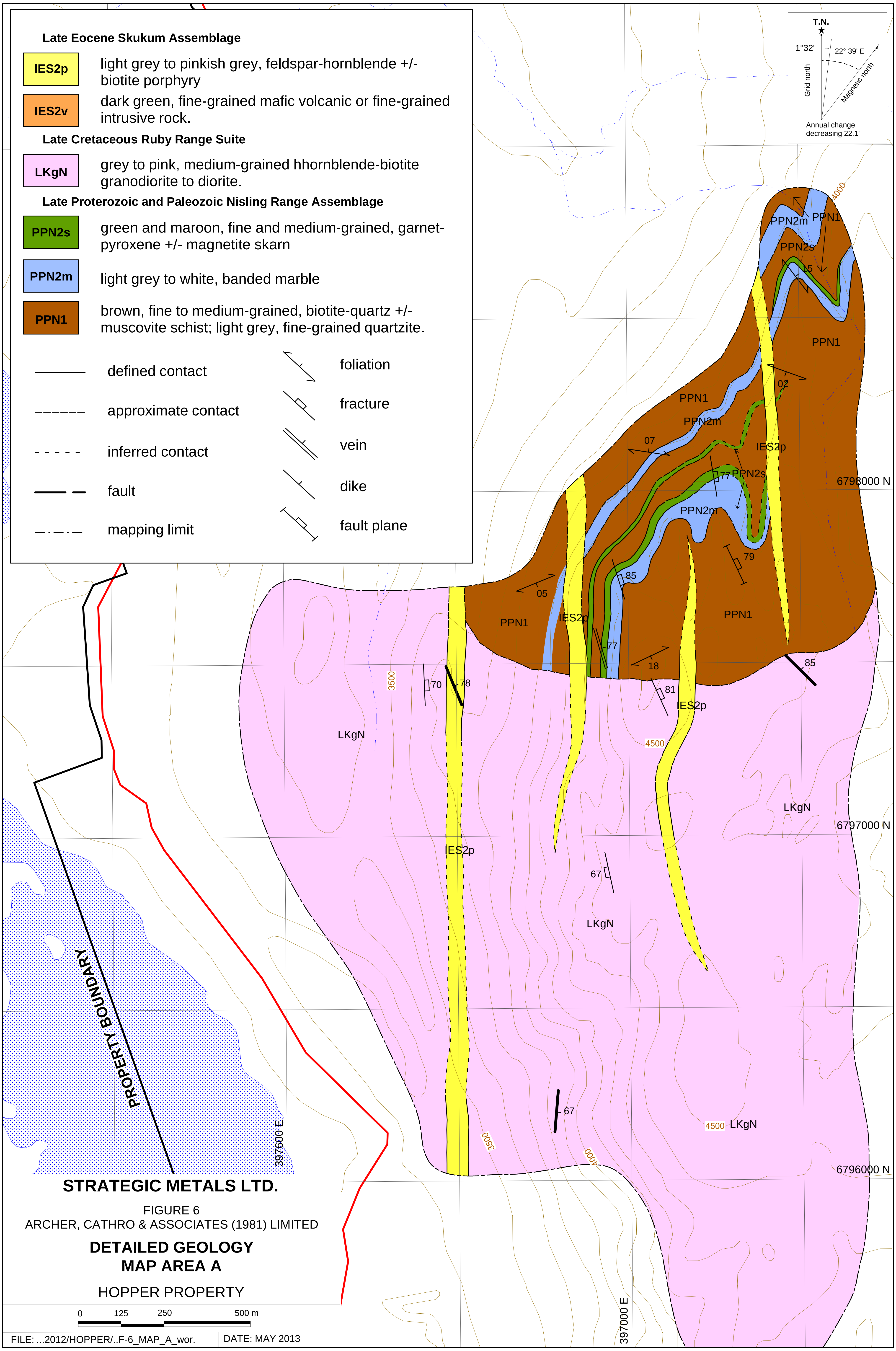
FILE: P:/2012.cdr	DATE: MAY 2013

After Colpron, M. and Nelson, J.L., 2011





396000 mE
400000 mE
404000 mE
6798000 mN
6794000 mN
N
PROPERTY BOUNDARY
PPN1
PPN2
IES2
ETgN
Q
MAP AREA A (SEE FIG. 6)
MAP AREA B (SEE FIG. 7)
Q
QUATERNARY
Q: OVERBURDEN
unconsolidated glacial, glaciofluvial and glaciolacustrine deposits; fluviatile silt, sand, and gravel, and local volcanic ash, in part with cover of soil and organic deposits
IES2
LATE EOCENE
IES: SKUKUM ASSEMBLAGE
Felsic volcanic dykes, plugs, domes, laccoliths and flows.
ETgN
EARLY TERTIARY
ETgN: RUBY RANGE SUITE
Biotite-hornblende granodiorite, quartz monzonite, quartz diorite; minor granodiorite-gneiss; hornblende and biotite-hornblende diorite; biotite-quartz-feldspar prophyry and porphyritic biotite-quartz monzonite (Ruby Range Suite).
PPN1
LATE PROTEROZOIC AND PALEOZOIC
PPN1: NISLING RANGE SUITE
Dark grey to brown, biotite-muscovite-quartz-feldspar schist, quartzite and micaceous quartzite, garnetiferous felsic chlorite-biotite orthogneiss; minor two-mica gneiss and hornblende diorite gneiss.
PPN2
LATE PROTEROZOIC AND PALEOZOIC
PPN2: NISLING RANGE SUITE
Bleached, white-weathering, white to grey, coarsely crystalline, flow banded, fetid marble; graphite and chert.
Hopkins North Zone
Hopkins South Zone
STRATEGIC METALS LTD.
FIGURE 5
ARCHER, CATHRO & ASSOCIATES (1981) LIMITED
GEOLOGY
HOPPER PROPERTY
0
1
3 km
UTM ZONE 8, NAD 83, 115H/02, 07
FILE: ...2012/HOPPER/F_5_GEOLOGY.wor
DATE: MAY 2013
After Johnson and Timmerman (1997) and Gordey and Makepeace (2003)


Late Eocene Skukum Assemblage
IES2p light grey to pinkish grey, feldspar-hornblende +/- biotite porphyry
IES2v dark green, fine-grained mafic volcanic or fine-grained intrusive rock.
Late Cretaceous Ruby Range Suite
LKgN grey to pink, medium-grained hhornblende-biotite granodiorite to diorite.
Late Proterozoic and Paleozoic Nisling Range Assemblage
PPN2s green and maroon, fine and medium-grained, garnet-pyroxene +/- magnetite skarn
PPN2m light grey to white, banded marble
PPN1 brown, fine to medium-grained, biotite-quartz +/- muscovite schist; light grey, fine-grained quartzite.
defined contact
approximate contact
inferred contact
fault
mapping limit
foliation
fracture
vein
dike
fault plane
T.N.
1°32'
22° 39' E
Grid north
Magnetic north
Annual change decreasing 22.1'
6798000 N
6797000 N
6796000 N
397600 E
397000 E
PROPERTY BOUNDARY
STRATEGIC METALS LTD.
FIGURE 6
ARCHER, CATHRO & ASSOCIATES (1981) LIMITED
DETAILED GEOLOGY
MAP AREA A
HOPPER PROPERTY
0 125 250 500 m
FILE: ...2012/HOPPER/..F-6_MAP_A_wor.
DATE: MAY 2013

Suite			monzonite, quartz diorite; minor granodiorite-gneiss; hornblende and biotite-hornblende diorite; biotite-quartz-feldspar porphyry and porphyritic biotite-quartz monzonite.
Aishihik Metamorphic Suite	Early Jurassic	EJgA	Medium to coarse grained, foliated biotite-hornblende granodiorite; biotite-rich screens and gneiss schliern; foliated hornblende diorite to monzodiorite with local potassium feldspar megacrysts.
Nisling Range Suite	Late Proterozoic and Paleozoic	PPN1	Dark grey to brown, biotite-muscovite-quartz-feldspar schist, quartzite and micaceous quartzite, garnetiferous felsic chlorite-biotite orthogneiss; minor two-mica gneiss and hornblende-diorite gneiss.
		PPN2	Bleached white-weathering, white to grey, coarsely crystalline, flow banded, fetid marble; graphite and chert.

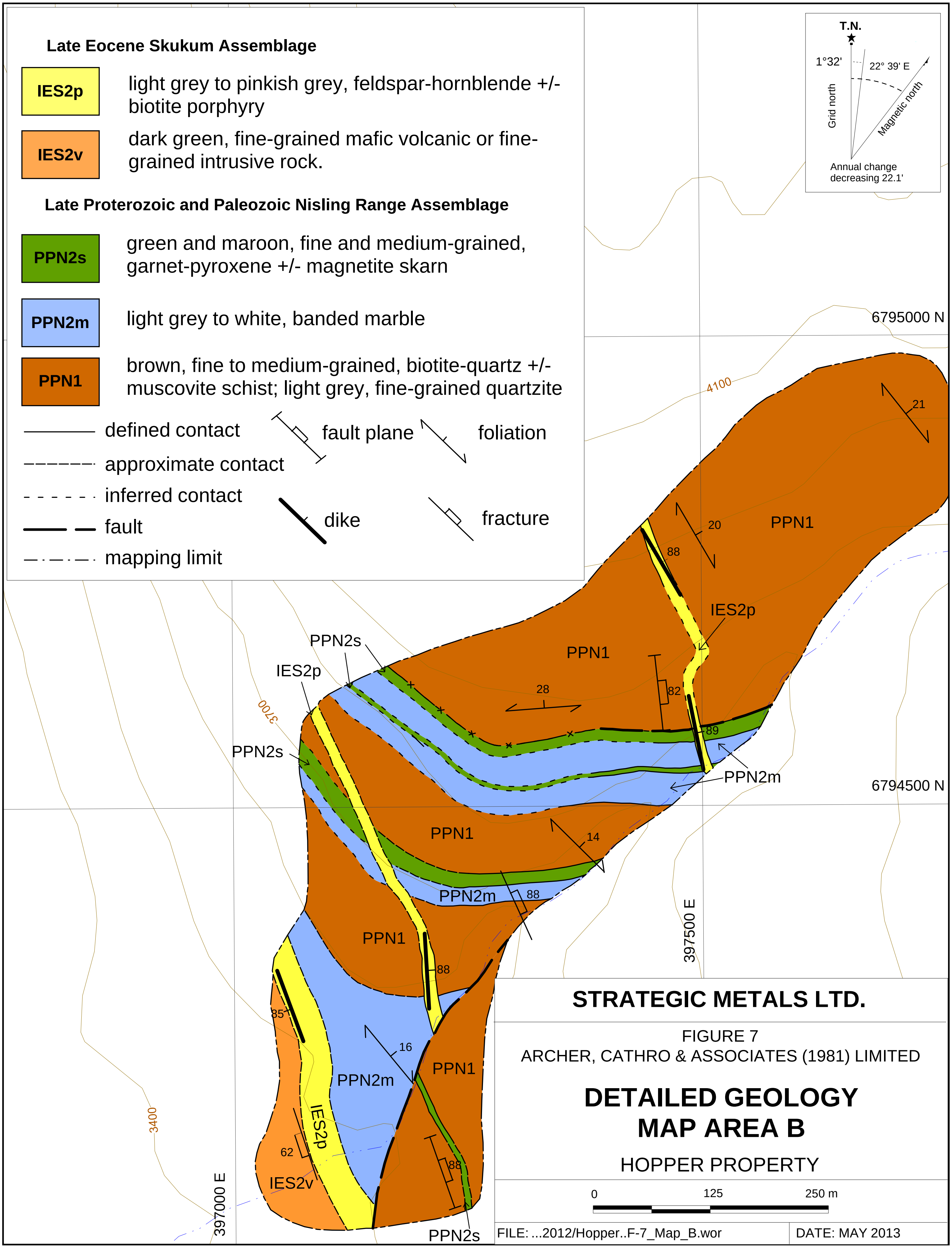
PROPERTY GEOLOGY

The geology of the property as shown on the YGS website is illustrated on Figure 5.
In 2006 and 2011, geological mapping at a 1:10,000 scale was performed within an approximately 3000 by 2000 m area (Map Area A, Figure 6) in the northwest corner of the property. This map area is roughly centered on porphyry-style copper-gold-silver±molybdenum mineralization (Hopkins North Zone) that was previously explored by Mitsubishi and Strategic Metals (Figure 3). In 2011, mapping was also completed at a 1:5,000 scale within a 1000 by 500 m area (Map Area B, Figure 7) in the vicinity of skarn mineralization comprising Hopkins South Zone. Thick glacial overburden restricted detailed mapping over much of the remainder of the property. The following descriptions are based primarily on the 2011 observations.

The oldest rocks in the area comprise schist, quartzite and marble of the Late Proterozoic and Paleozoic Nisling Range Assemblage. This package of rocks is intruded by a Late Cretaceous pluton (76.0 +/- 1.1 and 83.7 +/- 1.9 Ma; Blumenthal, 2010) that has been assigned to the Ruby Range Suite, although it appears to be older. This pluton is informally called the Hopper Pluton.

Brown to grey, fine to medium grained quartz-biotite +/- muscovite schist dominates the Nisling Range Assemblage in this area (PPN1). Light grey to white, banded marble (PPN2m) and beige, fine-grained biotite-bearing quartzite (PPN1) are intercalated with the schist.

The Nisling Range Assemblage is intruded by a medium-grained, hornblende-biotite granodiorite and lesser diorite pluton that has been historically referred to as the Hopper Pluton (LKgN). The northern contact with the schist is irregular and is further complicated by the presence of large (at least tens of metres in width) xenoliths. Locally, the granodiorite exhibits weak to moderate argillic and propylitic alteration. The southern contact is covered by



Late Eocene Skukum Assemblage
IES2p
light grey to pinkish grey, feldspar-hornblende +/- biotite porphyry
IES2v
dark green, fine-grained mafic volcanic or fine-grained intrusive rock.
Late Proterozoic and Paleozoic Nisling Range Assemblage
PPN2s
green and maroon, fine and medium-grained, garnet-pyroxene +/- magnetite skarn
PPN2m
light grey to white, banded marble
PPN1
brown, fine to medium-grained, biotite-quartz +/- muscovite schist; light grey, fine-grained quartzite
defined contact
approximate contact
inferred contact
fault
mapping limit
fault plane
foliation
dike
fracture
T.N.
1°32'
22° 39' E
Grid north
Magnetic north
Annual change
decreasing 22.1'
6795000 N
6794500 N
397500 E
397000 E
4100
3700
3400
PPN1
IES2p
PPN2s
PPN2m
IES2v
21
20
88
82
89
28
14
88
88
85
16
62
88
STRATEGIC METALS LTD.
FIGURE 7
ARCHER, CATHRO & ASSOCIATES (1981) LIMITED
DETAILED GEOLOGY
MAP AREA B
HOPPER PROPERTY
0
125
250 m
FILE: ...2012/Hopper..F-7_Map_B.wor
DATE: MAY 2013

overburden. A felsic to intermediate, feldspar-rich, mega-porphyritic body is reportedly exposed on a glacially scoured knob in the east-central part of the property (Stroshein, 2011). This exposure is surrounded by overburden and it is not known whether it is a separate body or part of the Hopper Pluton.
Dominantly north-striking and steeply dipping, light grey to pinkish-grey, feldspar-hornblende +/- biotite porphyritic dykes (IES2p) ranging in thickness from 0.5 to 30 metres cut all units. Minor, dark green, fine grained, mafic to intermediate dykes and possibly volcanic equivalents have also been observed. These dykes are assigned to the Late Eocene Skukum Assemblage.

Discontinuous skarn horizons are present in close proximity to the Hopper Pluton. They dominantly comprise fine and medium grained actinolite, diopside and garnet and are locally very magnetite rich (PPN2s). Skarn horizons are developed in the metasedimentary units near both the northern and southern contacts of the pluton. Near the southern contact, a creek exposure of a calc-silicate altered marble horizon exhibited radial wollastonite crystals up to 50 cm in diameter.

Layering within the Nisling Range Assemblage is usually sub-horizontal to shallowly east dipping. Structure is dominated by north to north-northeast trending brittle faults and fractures. Locally, quartz-carbonate veins with hydrothermal textures occur adjacent to north striking porphyry dykes.

PROPERTY MINERALIZATION

The Hopper property lies at the southern end of the Dawson Range Gold Belt (DRGB). The DRGB encompases several significant precious metal enriched, porphyry and vein occurrences (including Casino, Kaminak and Mt. Nansen), which are situated along a 250 km long curvilinear trend in southwestern Yukon.

Age dating of the Hopper Pluton performed by Blumenthal (2010) returned Late Cretaceous ages between 76.0 ±1.1 and 83.7±1.9 Ma, which places it in the same metallogenic episode as the Patton Porphyry at the Casino deposit, 190 km to the north-northwest.

The Casino gold-copper-molybdenum porphyry deposit is owned by Western Copper and Gold Corporation. It comprises a measured and indicated mineral reserve of 946 million tonnes (with a copper equivalent cut-off of 0.30%) of 0.21% copper, 0.25 g/t gold, 0.024% molybdenum and 1.77 g/t silver (Corman, 2010). Geology on the Casino property features granitic rocks of the Mid Cretaceous Whitehorse Suite, which has been intruded by a Late Cretaceous stock called the Patton Porphyry. The Patton Porphyry has been assigned by the YGS to the Prospector Mountain Suite (LKgP) and is reportedly the main mineralizing event. Mineralization occurs in fractures and breccia pipes. The Casino Deposit is unglaciated and deeply weathered. Ore grade values are reported within leached cap, supergene oxide, supergene sulphide and hypogene zones.

Kaminak Gold Corporation's Coffee property covers nine known gold zones, of which eight are hosted in metasedimentary units and one (Kona Zone) is in the Middle to Late Cretaceous granitic Coffee Creek Batholith. Gold mineralization on the Coffee property can generally be subdivided into two distinct styles. The highest grades (5 to 60 g/t gold) are associated with hydrothermal breccias exhibiting evidence for several episodes of brecciation. Matrix compositions range from incompetent limonite-clay material to strongly silicified material. The lower grade gold mineralization (2 to 10 g/t) is associated with pervasive hydrothermal alteration. The hydrothermal alteration is characterized by an overall removal of potassium and aluminum with the addition of sulphide and silica (Chartier, 2011). At the Kona Zone, gold is hosted in near-vertical brittle structures within the granite. Mineralization primarily occurs as disseminated pyrite and pyrite veinlets in fractures and shears. High grade gold corresponds with sulphide-matrix fault breccias. In 2010, Kaminak reported significant drill results from the Kona Zone including 2.2 g/t gold over 57 m and 1.9 g/t gold over 23 m. The best drill results from the Kona Zone in 2011 were 5.2 g/t gold over 10.7 m, 2.5 g/t gold over 16.7 m and 4.5 g/t gold over 9.1 m (Carpenter, 2011).

The Mount Nansen Gold Camp has been explored by various operators for more than 100 years. It hosts placer gold workings and more than 30 hard rock mineral occurrences related to epithermal and porphyry systems. The most noteworthy example is the Brown-McDade deposit, which had a pre-production drill-indicated reserve of 600,000 tonnes at 6.1 g/t gold and 55.5 g/t silver. Production from a 500 m long open pit at the Brown-McDade deposit in 1996 and 1997 yielded 16,000 ounces gold and 83,000 ounces silver from 124,000 tonnes of ore (Hart and Langdon, 1997). Two types of mineralization were mined at the Brown-McDade deposit. The first type is a quartz vein system hosted by a feldspar-porphyry dyke, which intruded along a contact between igneous (Mid-Cretaceous granodiorite of Dawson Range Batholith) and metamorphic rocks (Nasina Assemblage). The second type comprises a pipe-like breccia body within the metamorphic rocks (Stroshein, 1998). Mineralization in the Mount Nansen Gold Camp is believed to have been deposited by a large hydrothermal system centred on a complex of Prospector Mountain Suite intrusions.

MINERALIZATION

Three types of mineralization have been observed at the Hopper property: 1) intrusive-hosted, disseminated sulphide; 2) sulphide-oxide bearing skarn; and 3) epigenetic veins with sulphide. The mineralization discovered to date is concentrated in two main zones (Hopkins North and Hopkins South), which are located approximately 2000 m apart in the western part of the property.

HOPKINS NORTH ZONE

Hopkins North Zone is situated within Map Area A (Figure 6) and is primarily defined by porphyry-type intrusion-hosted sulphide within a 650 by 2000 m area at the western edge of the Hopper Pluton. Mineralized skarn horizons and veins have also been observed and sampled within this zone. None of the showings in Hopkins North Zone were drill tested prior to 2011.

Granodiorite in the western part of the pluton often hosts trace to moderately abundant chalcopyrite, pyrite, pyrrhotite, magnetite and/or molybdenite, which occur as fine interstitial disseminations and clots. Minor fracture-hosted mineralization is also present and comprises chalcopyrite within hairline to one centimetre wide fractures that are often healed with clear to white quartz. Hydrothermal alteration along vein selvages is minimal. Intense surface oxidation and leaching seen in some porphyry systems elsewhere in Yukon is not evident at the Hopper property.

Epigenetic mineralization in the form of quartz-carbonate veining occurs mostly within the intrusion. Quartz-carbonate veins typically parallel the dominant north-trending fracture orientation. The quartz is clear to white to smoky and sometimes exhibits weak banding, drusy cavities and brecciation. The carbonate weathers orange-brown and consists of amorphous to white crystalline calcite. The veins are commonly mineralized with isolated coarse blebs and clots of chalcopyrite and molybdenite. The veins are typically 1 to 10 cm wide.

Skarn horizons and lenses are developed near the contact between the pluton and surrounding metasediments within Hopkins North Zone. Where observed, individual skarn horizons range from two to five metres thick and are composed of either actinolite-diopside or magnetite-garnet. Sulphide mineralization consists of patchy chalcopyrite with lesser pyrite and molybdenite.

Feldspar porphyry dykes and mafic to intermediate dykes are locally mineralized where they are cut by north-striking faults and fractures.

In 1968, Mitsubishi chip sampled 25 mineralized intrusive bedrock exposures. The sampled outcrops returned generally encouraging results, which were better than nearby soil samples. In 2006 and 2007, Strategic Metals collected numerous specimen, chip and channel samples of variably mineralized granodiorite, skarn, dyke and quartz-carbonate vein material within the vicinity of the Mitsubishi samples. The locations of the most anomalous historical samples from Hopkins North Zone are shown on Figure 3, while their results are listed in Table III.

Table III – Significant Historical Rock and Chip Sample Results (Hopkins North Zone)

Rock Type	Year	Sample No.	Sample Type	Cu (%)	Au (g/t)	Ag (g/t)	Mo (ppm)
Granodiorite	1968	4	Chip (30.48 m)	0.10	NA	NA	30
Granodiorite	1968	7	Chip (45.72 m)	0.52	NA	NA	170
Granodiorite	1968	8	Chip (60.96 m)	0.25	NA	NA	200
Granodiorite	1968	10	Chip (60.96 m)	0.18	NA	NA	30
Granodiorite	1968	12	Chip (45.72 m)	0.24	NA	NA	160
Granodiorite	1968	13	Chip (30.48 m)	0.21	NA	NA	270
Granodiorite	2006	C103407	Specimen	1.37	0.084	11.3	99
Granodiorite	2006	C103411	Specimen	1.53	0.61	11.6	27
Skarn	2006	C103416	Chip (2 m)	0.93	0.096	15.1	155
Dyke	2006	C103404	Specimen	1.75	0.163	7.4	109
Dyke	2006	C103417	Specimen	0.92	0.373	12.2	6
Granodiorite	2007	B376020-023	Chip (13 m)	0.40	0.055	1.9	47
Granodiorite	2007	B376027	Chip (3 m)	0.22	0.010	1.6	5
Granodiorite	2007	B376056	Chip (3 m)	0.32	0.004	1.2	21
Granodiorite	2007	B376058	Chip (3 m)	0.54	0.005	1.1	32

NA = Not analyzed

In 2011, five specimen and five chip samples were collected within Hopkins North Zone. Sample locations are plotted on Figure 8, while results for copper, gold, silver and molybdenum are illustrated thematically on Figures 9 to 12, respectively. Rock geochemical sample sites on the property were marked with orange flagging tape labelled with the sample number. The location of each sample was determined using a handheld GPS unit. Sample preparation and multi-element analyses for rock samples were carried out at ALS Minerals in Whitehorse, Yukon and North Vancouver, B.C. Each sample was dried, fine crushed to better than 70% passing -2mm and a 250 g split was pulverized to better than 85% passing 75 micron. The fine fraction was then analyzed for gold using fire assay followed by inductively coupled plasma-atomic emission spectroscopy analysis (Au-AA24) and for 35 other elements using an aqua regia digestion and inductively coupled plasma-atomic emission spectroscopy analysis (ME-ICP41).

The 2011 samples comprise variably mineralized granodiorite, intermediate-mafic dykes and fault gouge. The best results are listed in Table IV, while the remaining samples yielded low values, up to 365 ppm copper, 0.019 g/t gold, 0.4 g/t silver and 7 ppm molybdenum.

Table IV –Significant 2011 Rock and Chip Sample Results (Hopkins North Zone)

Rock Type	Sample No.	Sample Type	Cu (%)	Au (g/t)	Ag (g/t)	Mo (ppm)
Veined granodiorite	K270701	Specimen	0.91	0.010	3.2	57
Granodiorite	K270702	Specimen	0.10	<0.005	0.9	7
Granodiorite	K270703	Specimen	1.12	0.039	4.7	22
Granodiorite	K270704	Specimen	0.08	1.06	0.7	<1
Gouge	J981401	Chip (5 m)	0.10	0.006	0.5	6

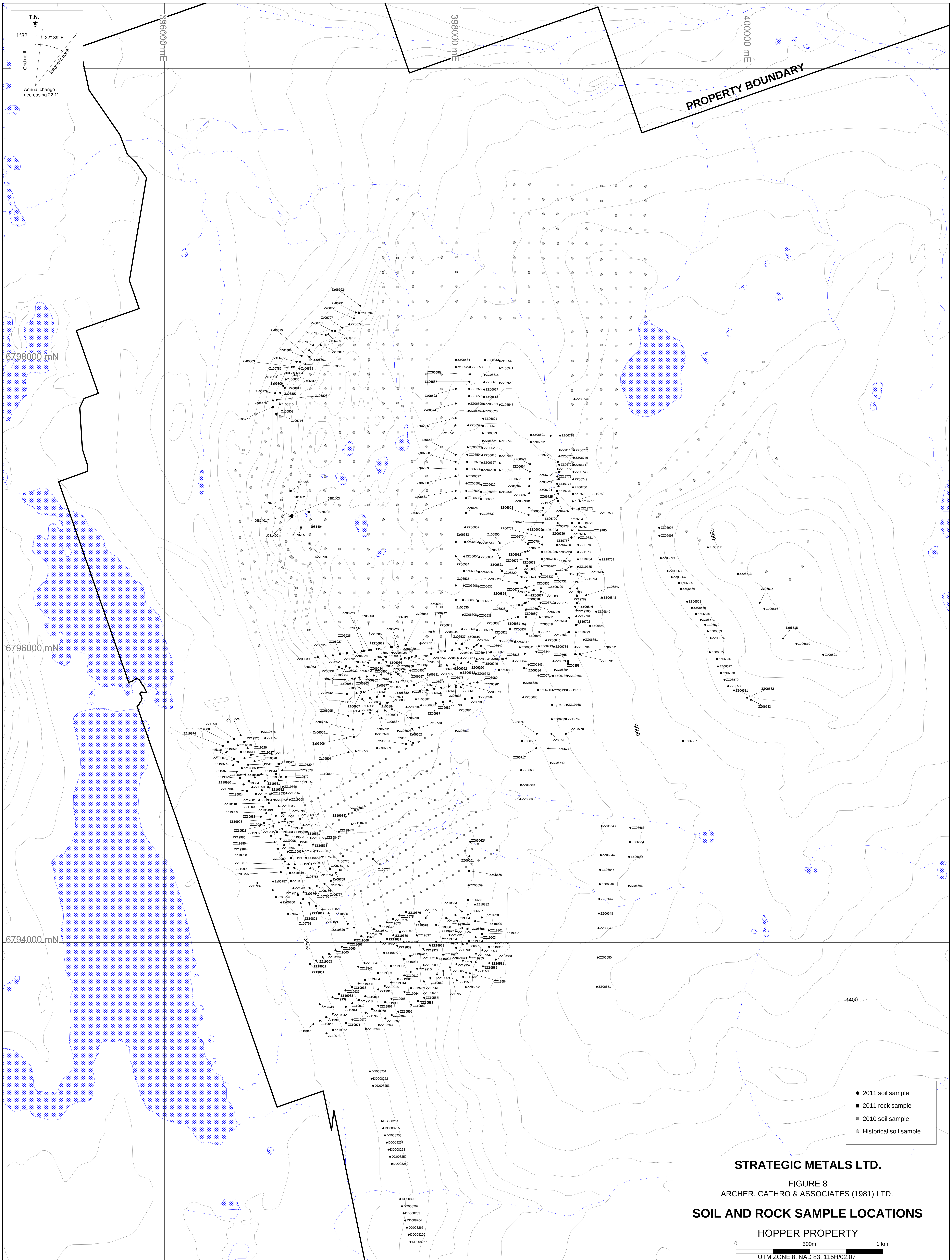
HOPKINS SOUTH ZONE

Limited surface exploration has been conducted at Hopkins South Zone because it lies in a heavily vegetated area. The discovery outcrop is an isolated exposure in a creek canyon. This zone comprises skarn mineralization, which dominantly consists of stacked skarn horizons hosting disseminated to semi-massive magnetite and chalcopyrite. The mineralogy of this zone is described in more detail in the Diamond Drilling section.

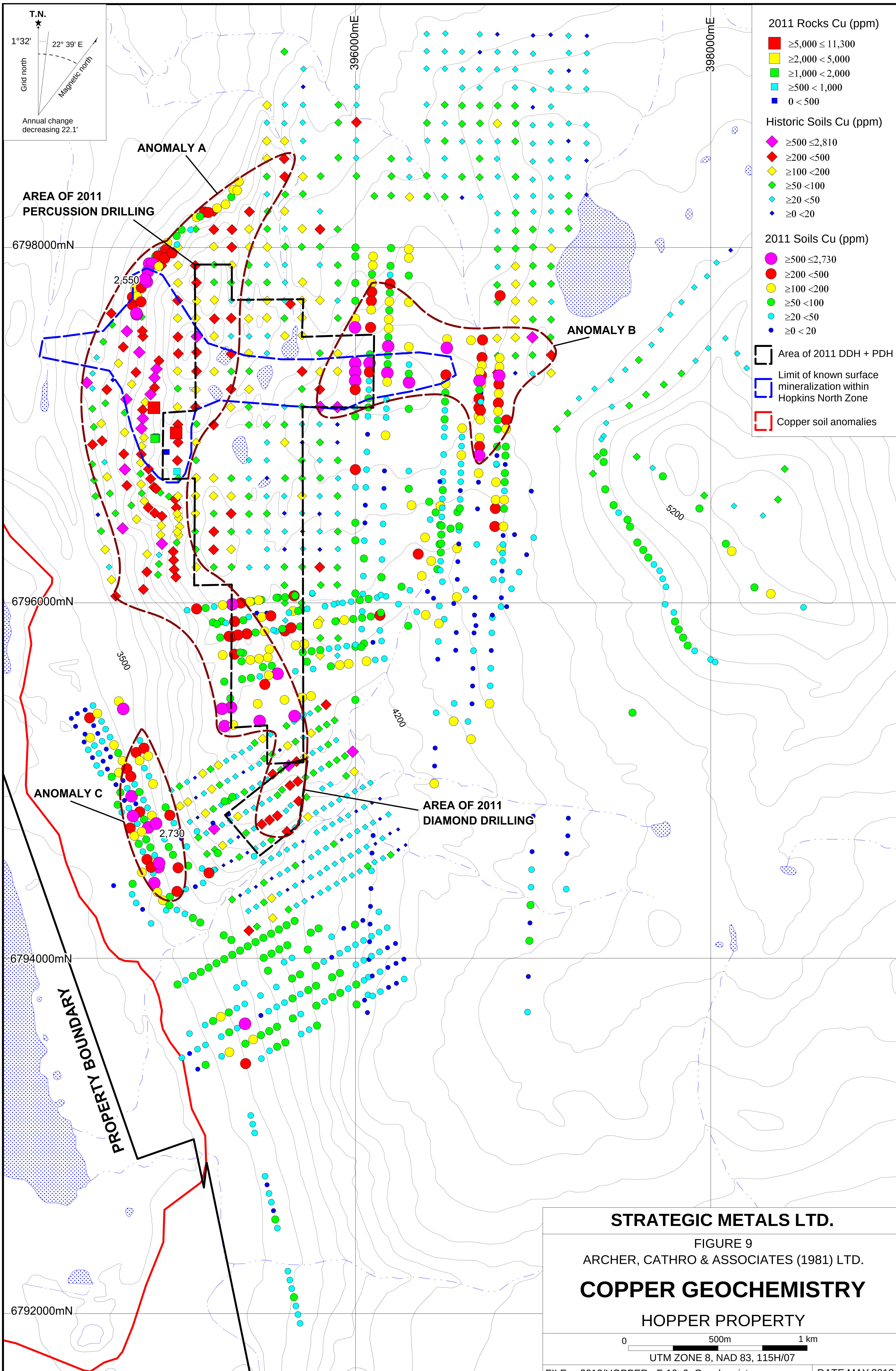
SOIL GEOCHEMISTRY

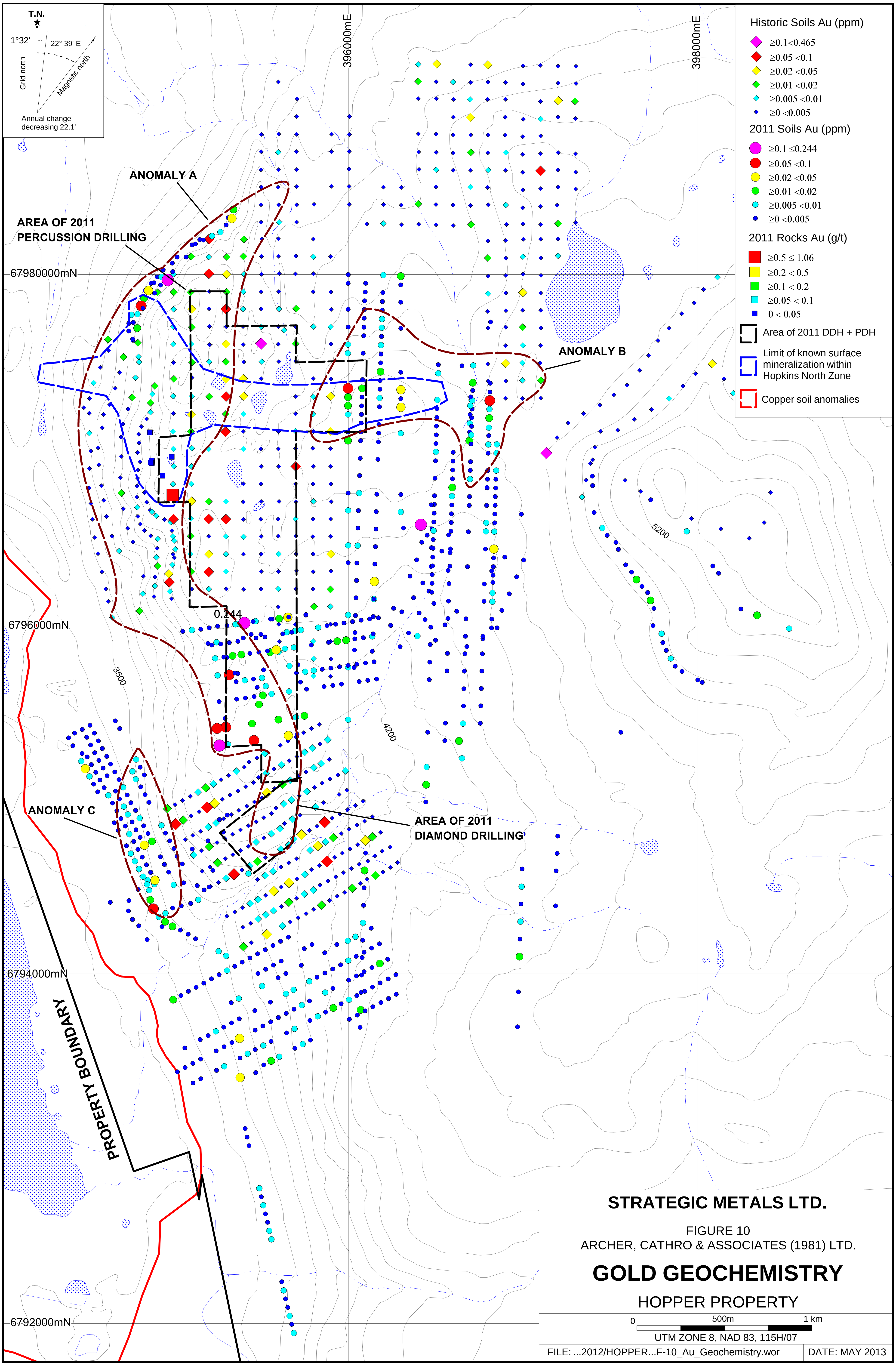
In 1985, the Geological Survey of Canada performed regional stream sediment sampling across the Aishihik Lake Map Sheet (Hornbrook, et al., 1985). Three samples taken from creeks draining the Hopper property returned moderately anomalous copper and lead values to peaks of 51 ppm and 68 ppm respectively, which are in the 95^{th} percentile for the survey area. Results for other elements did not exceed regional background values.

In 2011, a total of 714 grid and contour soil samples were collected in the western part of the property. Sample locations are plotted on Figure 8, while results for copper, gold, silver and molybdenum are illustrated thematically on Figures 9 to 12. All 2011 soil sample locations were recorded using hand-held GPS units. Sample sites are marked by aluminum tags inscribed with the sample numbers and affixed to 0.5 m wooden lath that were driven into the ground. Soil

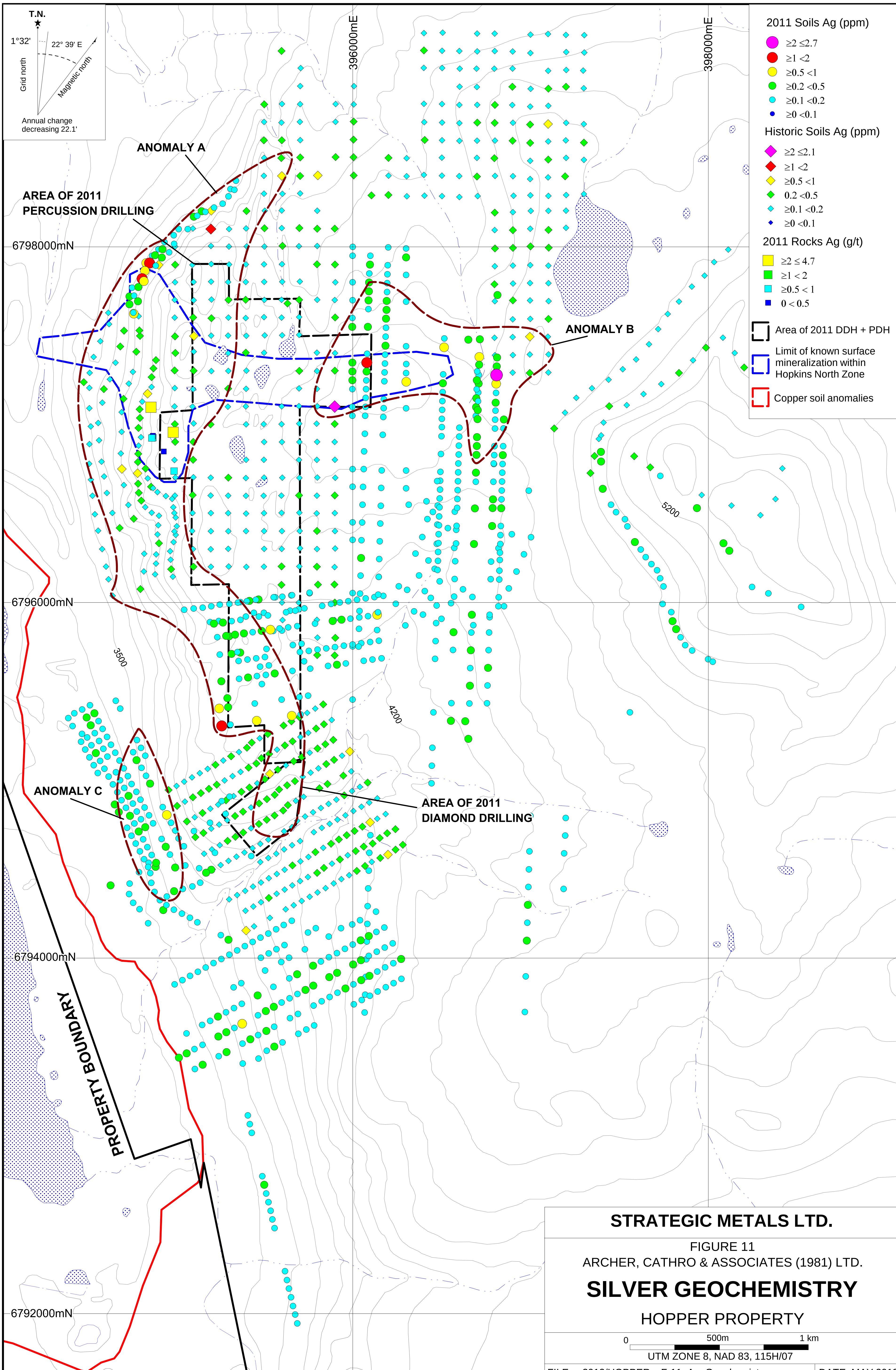


T.N.
1°32'
22° 39' E
Grid north
Magnetic north
Annual change decreasing 22.1'
396000 mE
398000 mE
400000 mE
6798000 mN
6796000 mN
6794000 mN
PROPERTY BOUNDARY
5300
4600
3400
4400
2011 soil sample
2011 rock sample
2010 soil sample
Historical soil sample
STRATEGIC METALS LTD.
FIGURE 8
ARCHER, CATHRO & ASSOCIATES (1981) LTD.
SOIL AND ROCK SAMPLE LOCATIONS
HOPPER PROPERTY
0
500m
1 km
UTM ZONE 8, NAD 83, 115H/02,07
FILE: ...2012/HOPPER...F-8_Sample_Locations.wor
DATE: MAY 2013


T.N.
1°32'
22° 39' E
Grid north
Magnetic north
Annual change decreasing 22.1'
396000mE
398000mE
6798000mN
6796000mN
6794000mN
6792000mN
ANOMALY A
AREA OF 2011 PERCUSSION DRILLING
ANOMALY B
ANOMALY C
AREA OF 2011 DIAMOND DRILLING
PROPERTY BOUNDARY
2,550
2,730
3500
4200
5200
2011 Rocks Cu (ppm)
≥5,000 ≤ 11,300
≥2,000 < 5,000
≥1,000 < 2,000
≥500 < 1,000
0 < 500
Historic Soils Cu (ppm)
≥500 ≤2,810
≥200 <500
≥100 <200
≥50 <100
≥20 <50
≥0 <20
2011 Soils Cu (ppm)
≥500 ≤2,730
≥200 <500
≥100 <200
≥50 <100
≥20 <50
≥0 < 20
Area of 2011 DDH + PDH
Limit of known surface mineralization within Hopkins North Zone
Copper soil anomalies
STRATEGIC METALS LTD.
FIGURE 9
ARCHER, CATHRO & ASSOCIATES (1981) LTD.
COPPER GEOCHEMISTRY
HOPPER PROPERTY
0
500m
1 km
UTM ZONE 8, NAD 83, 115H/07
FILE: ...2012/HOPPER...F-10_9_Geochemistry.wor
DATE:MAY 2013



T.N.
1°32'
22° 39' E
Grid north
Magnetic north
Annual change decreasing 22.1'
396000mE
398000mE
Historic Soils Au (ppm)
≥0.1<0.465
≥0.05 <0.1
≥0.02 <0.05
≥0.01 <0.02
≥0.005 <0.01
≥0 <0.005
2011 Soils Au (ppm)
≥0.1 ≤0.244
≥0.05 <0.1
≥0.02 <0.05
≥0.01 <0.02
≥0.005 <0.01
≥0 <0.005
2011 Rocks Au (g/t)
≥0.5 ≤ 1.06
≥0.2 < 0.5
≥0.1 < 0.2
≥0.05 < 0.1
0 < 0.05
Area of 2011 DDH + PDH
Limit of known surface mineralization within Hopkins North Zone
Copper soil anomalies
ANOMALY A
AREA OF 2011 PERCUSSION DRILLING
ANOMALY B
ANOMALY C
AREA OF 2011 DIAMOND DRILLING
6798000mN
6796000mN
6794000mN
6792000mN
0.244
3500
4200
5200
PROPERTY BOUNDARY
STRATEGIC METALS LTD.
FIGURE 10
ARCHER, CATHRO & ASSOCIATES (1981) LTD.
GOLD GEOCHEMISTRY
HOPPER PROPERTY
0
500m
1 km
UTM ZONE 8, NAD 83, 115H/07
FILE: ...2012/HOPPER...F-10_Au_Geochemistry.wor
DATE: MAY 2013



STRATEGIC METALS LTD.

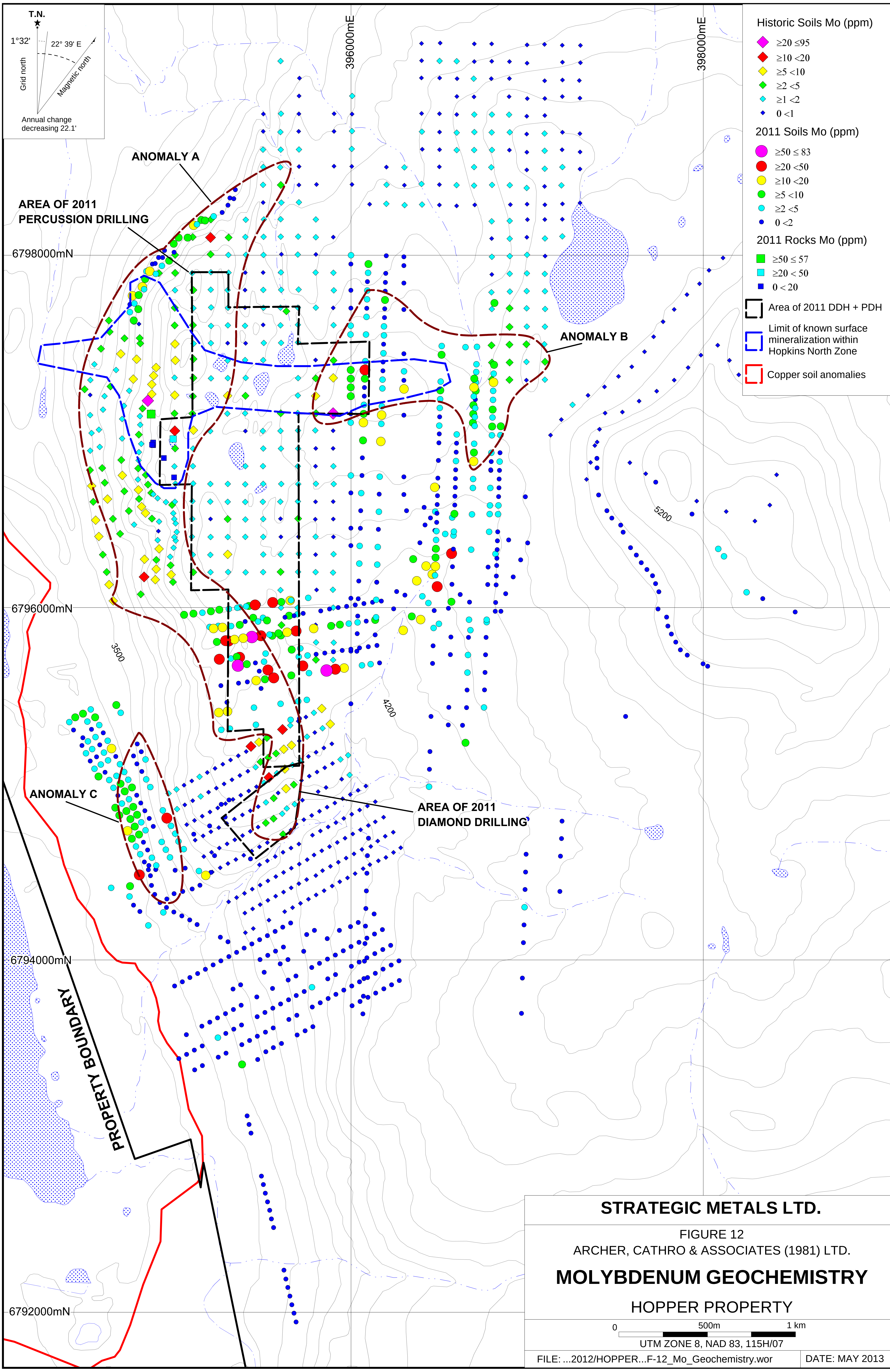
FIGURE 11

ARCHER, CATHRO & ASSOCIATES (1981) LTD.

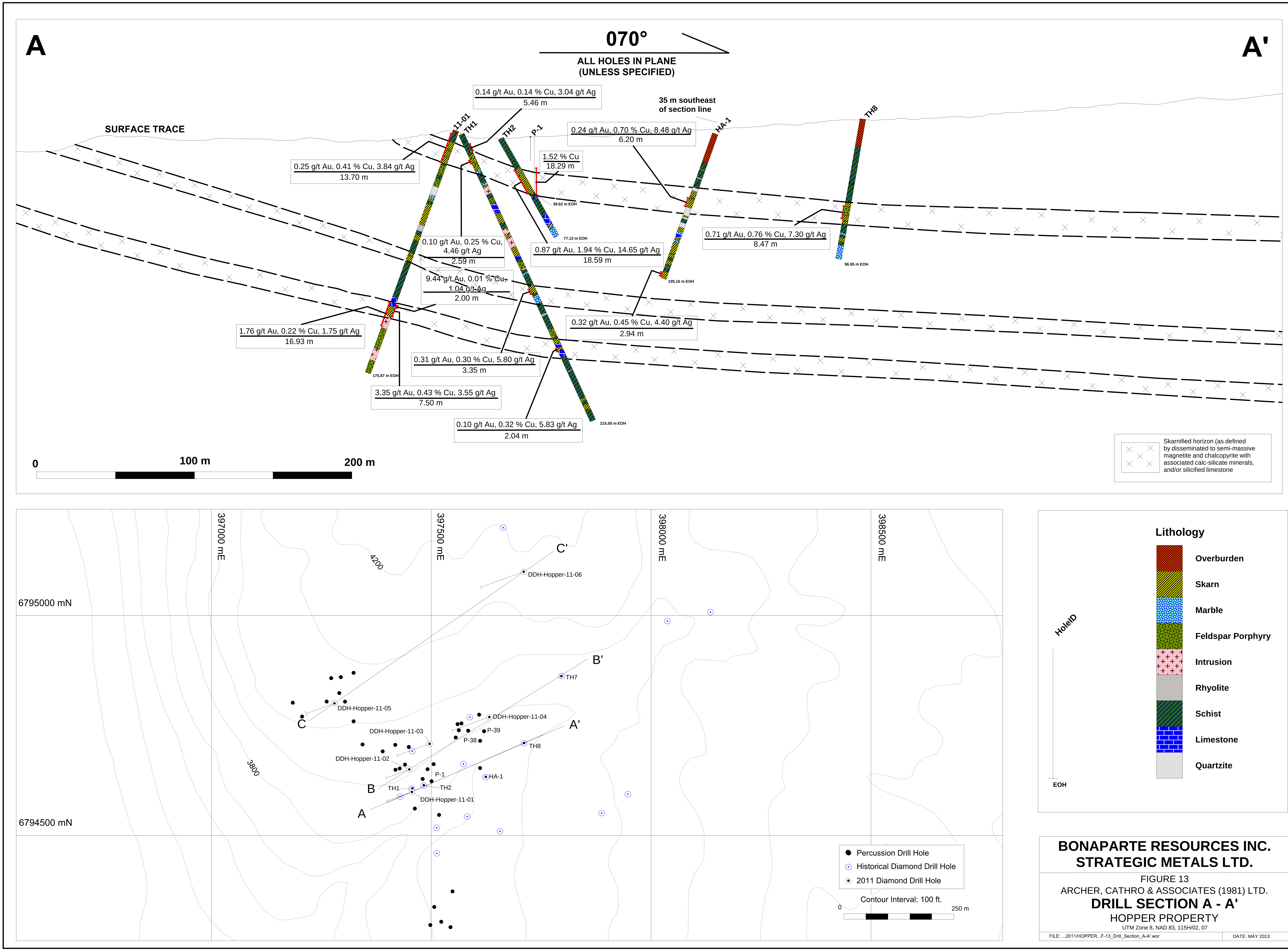
SILVER GEOCHEMISTRY

HOPPER PROPERTY

FILE: ...2012/HOPPER... F-11_Ag_Geochemistry.wor | DATE: MAY 2013



T.N.
1°32'
22° 39' E
Grid north
Magnetic north
Annual change decreasing 22.1'
396000mE
398000mE
6798000mN
6796000mN
6794000mN
6792000mN
ANOMALY A
AREA OF 2011 PERCUSSION DRILLING
ANOMALY B
ANOMALY C
AREA OF 2011 DIAMOND DRILLING
PROPERTY BOUNDARY
3500
4200
5200
Historic Soils Mo (ppm)
≥20 ≤95
≥10 <20
≥5 <10
≥2 <5
≥1 <2
0 <1
2011 Soils Mo (ppm)
≥50 ≤ 83
≥20 <50
≥10 <20
≥5 <10
≥2 <5
0 <2
2011 Rocks Mo (ppm)
≥50 ≤ 57
≥20 < 50
0 < 20
Area of 2011 DDH + PDH
Limit of known surface mineralization within Hopkins North Zone
Copper soil anomalies
STRATEGIC METALS LTD.
FIGURE 12
ARCHER, CATHRO & ASSOCIATES (1981) LTD.
MOLYBDENUM GEOCHEMISTRY
HOPPER PROPERTY
0
500m
1 km
UTM ZONE 8, NAD 83, 115H/07
FILE: ...2012/HOPPER...F-12_Mo_Geochemistry.wor
DATE: MAY 2013



BONAPARTE RESOURCES INC.
STRATEGIC METALS LTD.

FIGURE 13

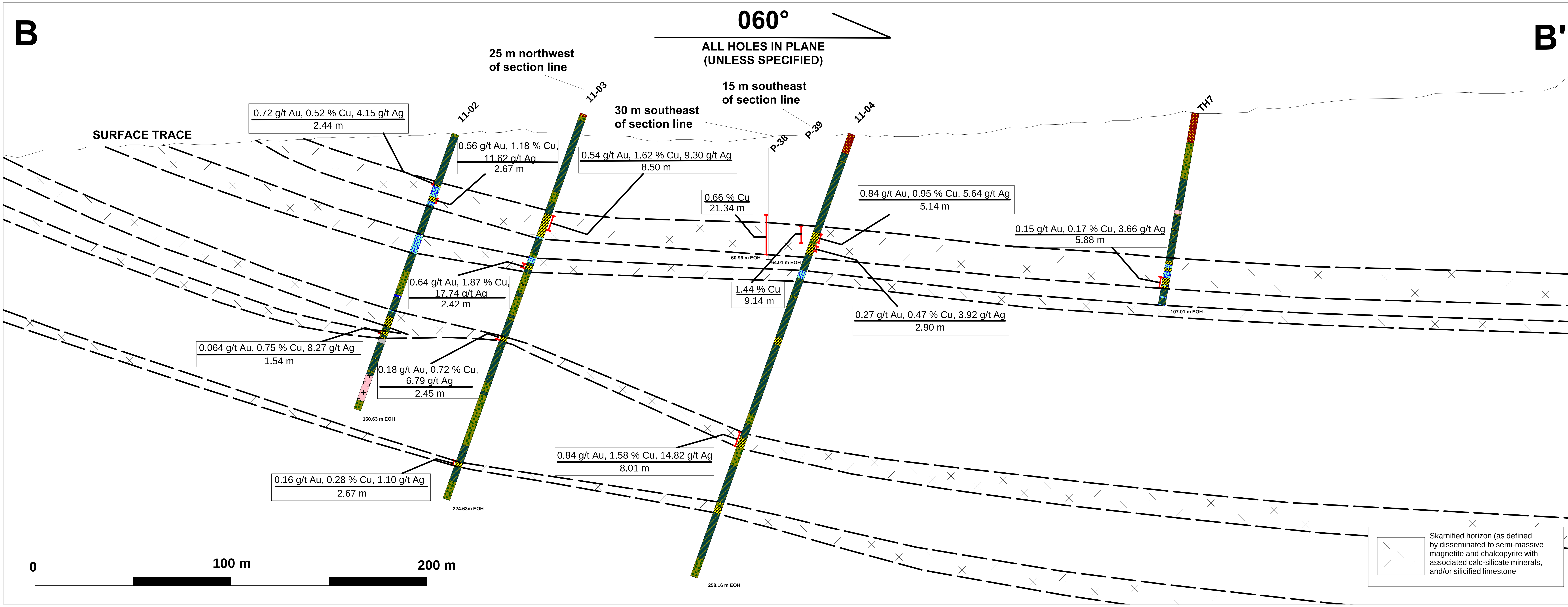
ARCHER, CATHRO & ASSOCIATES (1981) LTD.

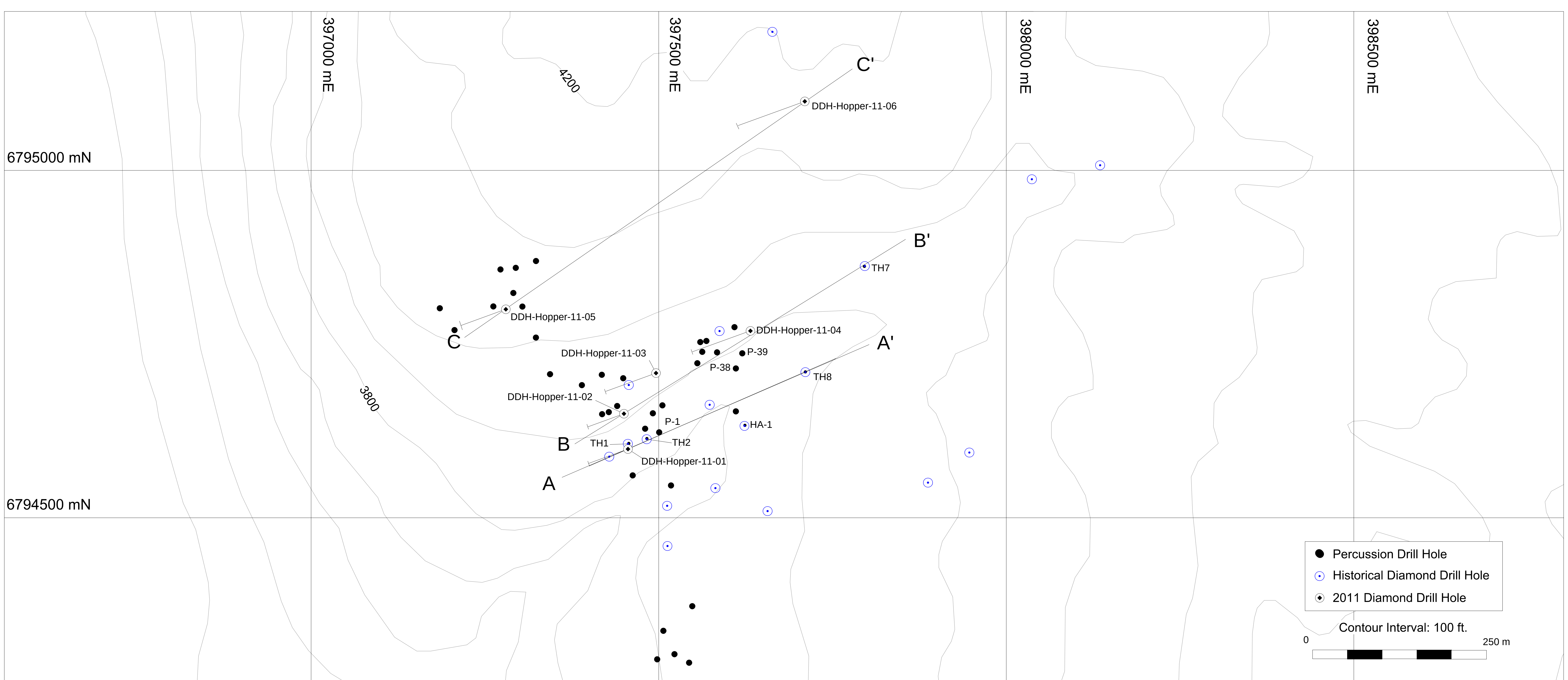
DRILL SECTION A - A'

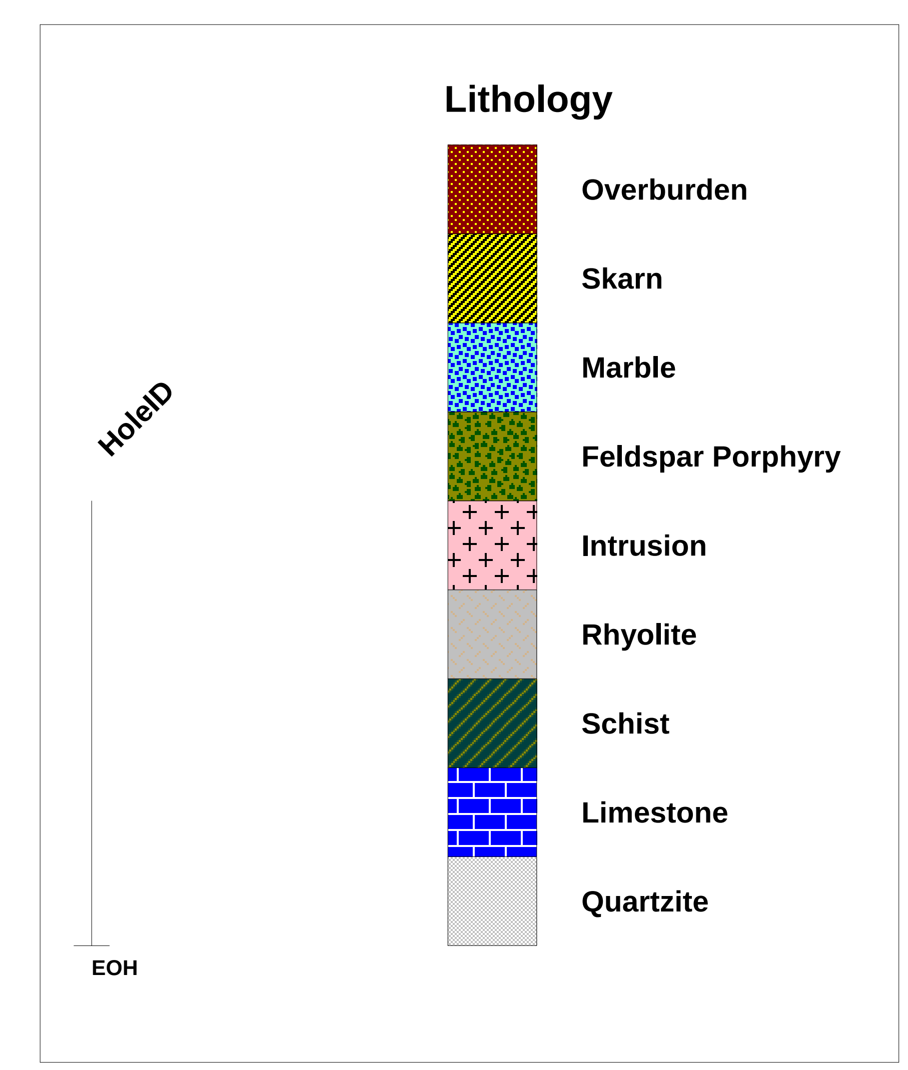
HOPPER PROPERTY

UTM Zone 8, NAD 83, 115H/02, 07

FILE: ...2011/HOPPER...F-13_Drill_Section_A-A'.wor DATE: MAY 2013







BONAPARTE RESOURCES INC.
STRATEGIC METALS LTD.

FIGURE 14

ARCHER, CATHRO & ASSOCIATES (1981) LTD.

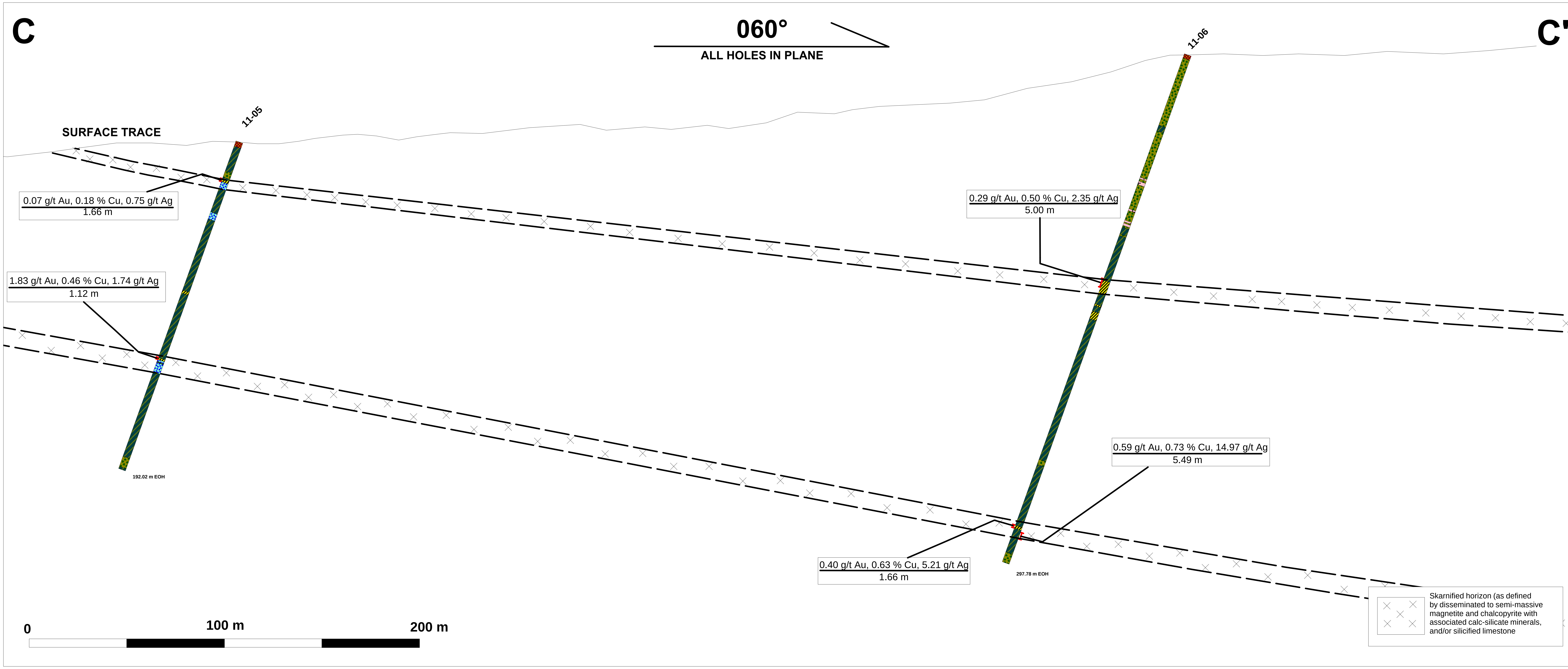
DRILL SECTION B - B'

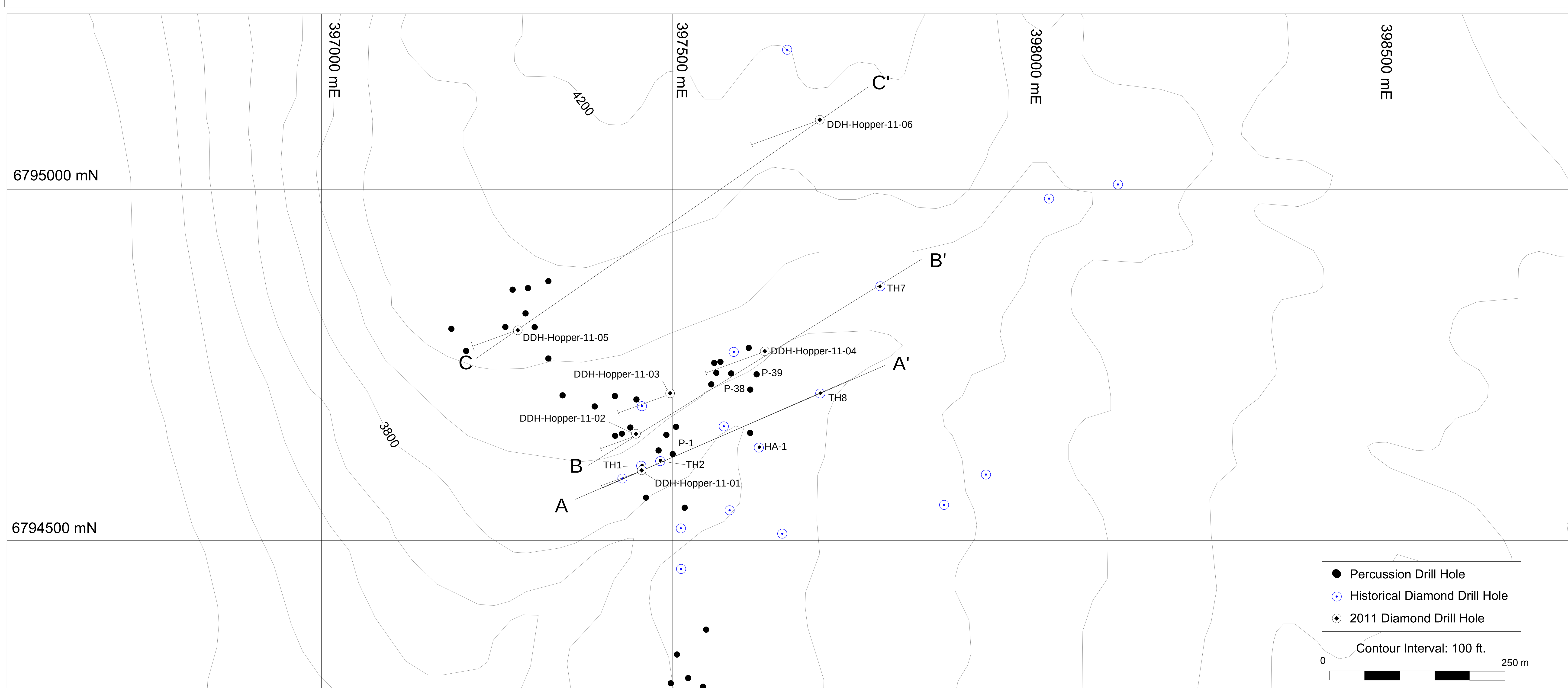
HOPPER PROPERTY

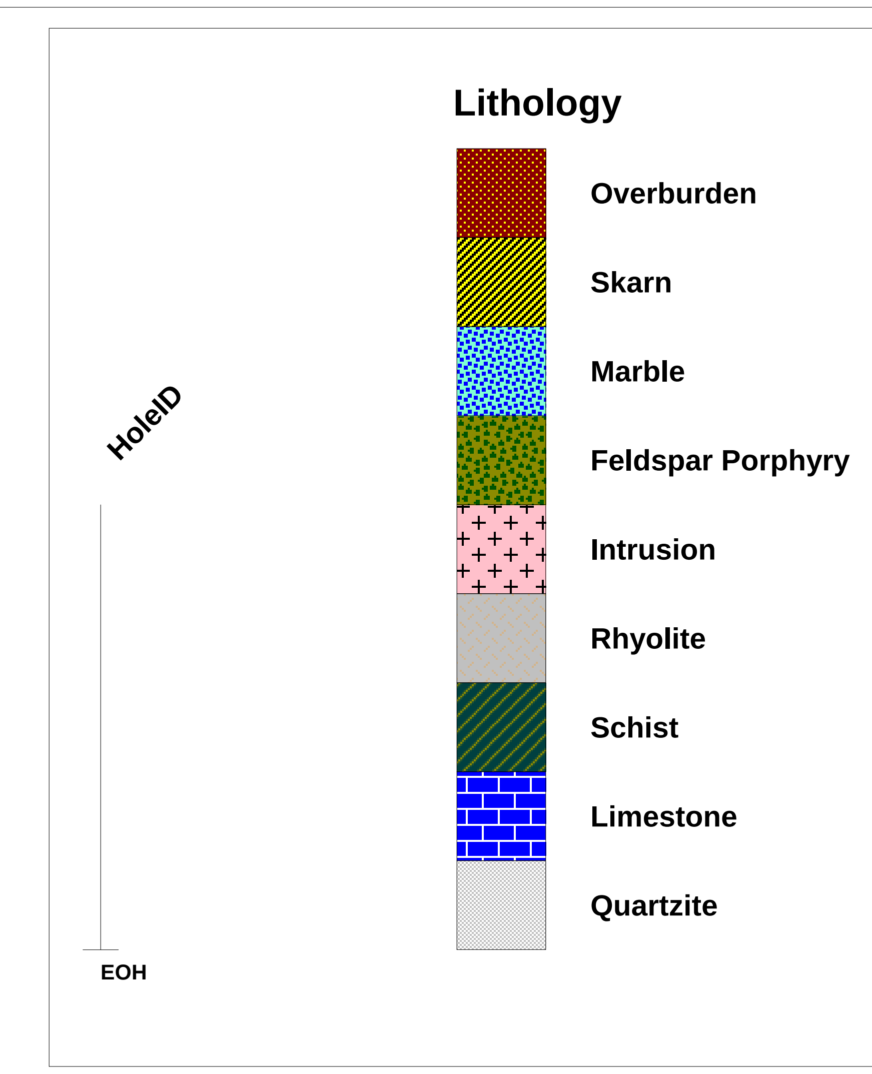
UTM Zone 8, NAD 83, 115H/02, 07

FILE: ...2011/HOPPER...F-14_Drill_Section_B-B'.wor

DATE: MAY 2013







BONAPARTE RESOURCES INC.
STRATEGIC METALS LTD.

FIGURE 15

ARCHER, CATHRO & ASSOCIATES (1981) LTD.

DRILL SECTION C - C'

HOPPER PROPERTY

UTM Zone 8, NAD 83, 115H/02, 07

FILE: ...2011/HOPPER...F-15_Drill_Section_C-C'.wor | DATE: MAY 2013

SECTIONS LOOKING WEST

STRATEGIC METALS LTD.

FIGURE 16

ARCHER, CATHRO AND ASSOCIATES (1981) LTD.

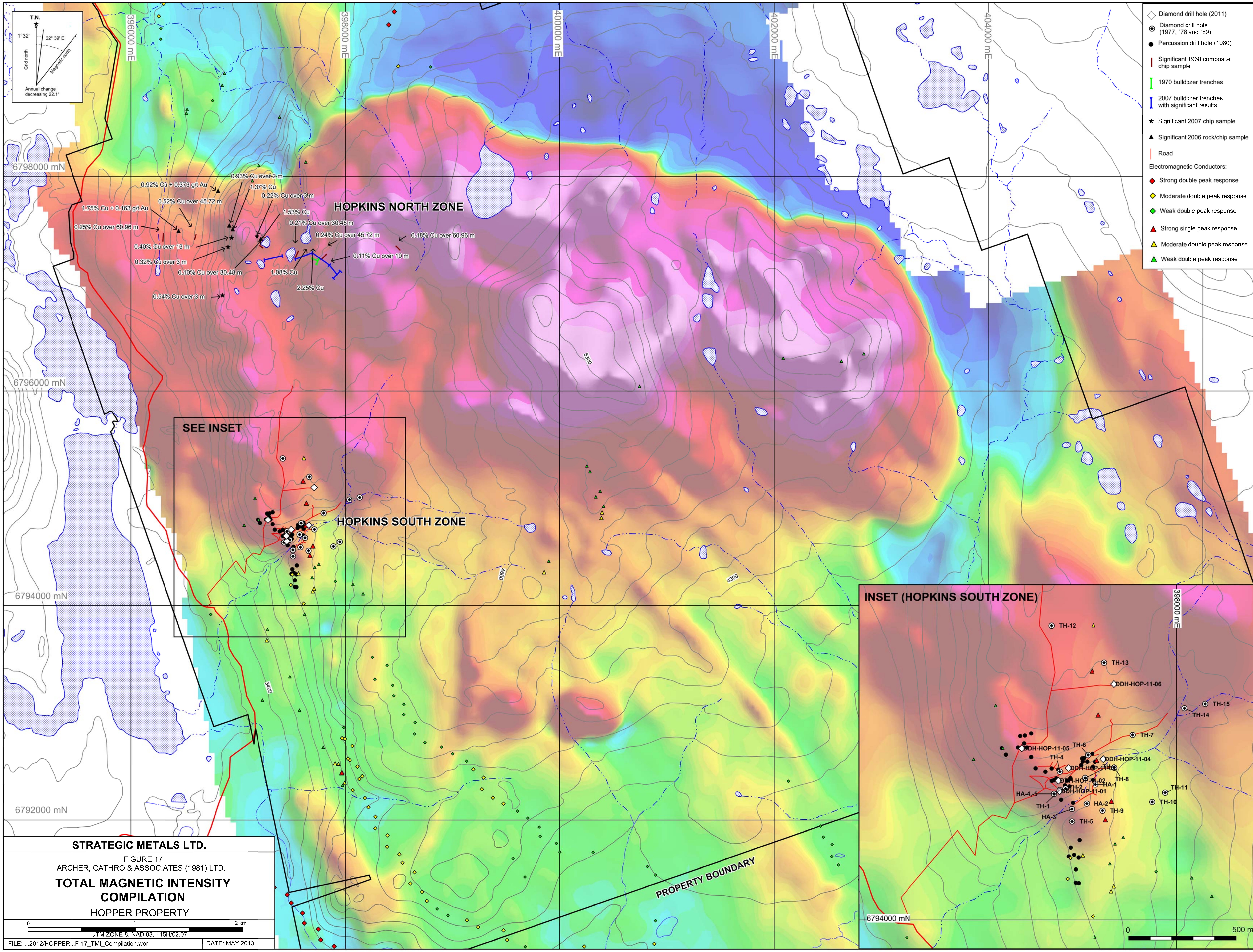
PERCUSSION DRILL SECTIONS

HOPPER PROPERTY

0 200m

UTM ZONE 8, NAD 83, 115H/07

FILE: ...2012/HOPPER/Basemaps/Sections | DATE: MAY 2013



STRATEGIC METALS LTD.

FIGURE 17

ARCHER, CATHRO & ASSOCIATES (1981) LTD.

TOTAL MAGNETIC INTENSITY COMPILATION

HOPPER PROPERTY

0 1 2 km

UTM ZONE 8, NAD 83, 115H/02,07

FILE: ...2012/HOPPER...F-17_TMI_Compilation.wor | DATE: MAY 2013

T.N.
Diamond drill hole (2011)
Diamond drill hole (1977, `78 and `89)
Percussion drill hole (1980)
Significant 1968 composite chip sample
1970 bulldozer trenches
2007 bulldozer trenches with significant results
Significant 2007 chip sample
Significant 2006 rock/chip sample
Road
Electromagnetic Conductors:
Strong double peak response
Moderate double peak response
Weak double peak response
Strong single peak response
Moderate double peak response
Weak double peak response
396000 mE
398000 mE
400000 mE
402000 mE
404000 mE
6798000 mN
6796000 mN
6794000 mN
6792000 mN
HOPKINS NORTH ZONE
INSET (HOPKINS SOUTH ZONE)
SEE INSET
HOPKINS SOUTH ZONE
PROPERTY BOUNDARY
500 m
TH-12
TH-13
DDH-HOP-11-06
TH-14
TH-15
TH-7
DDH-HOP-11-05
DDH-HOP-11-04
DDH-HOP-11-01
TH-11
TH-10
TH-9
TH-5
TH-1
HA-3
HA-2
HA-1
TH-8
STRATEGIC METALS LTD.
FIGURE 18
ARCHER, CATHRO & ASSOCIATES (1981) LTD.
ELECTROMAGNETIC COMPILATION
HOPPER PROPERTY
0 1 2 km
UTM ZONE 8, NAD 83, 115H/02,07
FILE: ...2012/HOPPER...F-3_Historical-workings.wor
DATE: MAY 2013

samples were collected from 20 to 50 cm deep holes using hand-held augers. They were placed into individually pre-numbered Kraft paper bags. The soil samples were sent to ALS Minerals in Whitehorse where they were dried, screened to -180 microns, dissolved in aqua regia and then to North Vancouver where they were analyzed for 35 elements using the inductively coupled plasma-atomic emission spectroscopy technique (ME-ICP41). An additional 30 g charge was further analyzed for gold by fire assay with inductively coupled plasma-atomic emission spectroscopy finish (Au-ICP21).

Soil geochemical surveys conducted on the Hopper property prior to 2011 include grid and contour sampling at varying sample spacing's. Prior to 2006, soil samples were only analyzed for copper, but since then they have also been analyzed for gold and a number of other elements. Historical sample results for copper, gold, silver and molybdenum are illustrated thematically along with the 2011 results on Figures 9 to 12. Anomalous thresholds and peak values for all soil samples are listed in Table V.

Table V – Geochemical Data for Soil Samples

Element	Weakly Anomalous	Moderately Anomalous	Strongly Anomalous	Very Strong	Historical Peak	2011 Peak
Copper (ppm)	≥ 50 < 100	≥ 100 < 200	≥ 200 < 500	≥ 500	2810	2730
Gold (ppb)	≥ 10 < 20	≥ 20 < 50	≥ 50 < 100	≥ 100	465	244
Silver (ppm)	≥ 0.2 < 0.5	≥ 0.5 < 1	≥ 1 < 2	≥ 2	2.1	2.7
Molybdenum (ppm)	≥ 5 < 10	≥ 10 < 20	≥ 20 < 50	≥ 50	95	83

Three primary clusters of moderately to very strongly anomalous copper values have been recognized on the property. They are known as Anomalies A, B and C (outlined by red dashed lines on Figures 9 to 12).

Anomaly A is a 3800 m long, 500 m wide band that is mostly confined to a moderately to steeply west-facing slope. The anomaly is open to the west and north. Although copper best defines the anomaly, scattered to locally clustered, moderately to strongly elevated gold, silver and molybdenum values are also present within it. This anomaly encompasses Hopkins South Zone and the western part of Hopkins North Zone. It covers metasedimentary units at both ends and the Hopper Pluton in the middle.

An 800 by 500 m cluster of moderately to strongly anomalous molybdenum values partially overlaps with the southern end of Anomaly A and extends to the east (Figure 12). This is the strongest and most concentrated molybdenum-in-soil anomaly on the property.

Anomaly B lies 600 m east of Anomaly A on the relatively flat, upland plateau. Anomaly B covers an approximately 1000 by 500 m area that includes the eastern portion of Hopkins North Zone. It is partially open to the east and north. Four samples within this copper anomaly also yielded coincident, moderately to strongly elevated gold, silver and molybdenum values. This anomaly likely lies entirely within the Hopper Pluton.

Anomaly C is located 500 m southwest of Anomaly A. It is a 1200 by 250 m area of moderately to very strongly elevated copper with rare, elevated gold and molybdenum. The anomaly is open

to the north and locally to the west. It lies within a heavily vegetated area that is downhill from Hopkins South Zone and along strike to the north of skarn and marble horizons that were discovered in 2011.
Soil geochemistry also identified several other isolated, strong copper, silver and molybdenum values within the western part of the property.

DIAMOND DRILLING

HISTORICAL DIAMOND DRILLING

Between 1977 and 1989, a total of 2162.9 m of diamond drilling was completed in 20 holes within Hopkins South Zone. The holes were designed to test magnetic anomalies and skarn mineralization at depth. Only visibly mineralized drill intervals were sampled. Approximate drill hole locations are shown on Figure 3 (re-surveying the holes is not possible due to heavy vegetation and lack of collar markers). Drill hole data and types of mineralization found within the holes are listed in Table VI.

Table VI – Historical Diamond Drill Hole Data and Visual Results

Hole	Year	Azimuth (º)	Dip Angle (º)	Length (m)	Comments and/or Mineralization Type
TH-1	1977	060	-65	215.5	Actinolite-tremolite-diopside-garnet skarn with chalcopyrite ± pyrite ± pyrrhotite.
TH-2	1977	060	-60	77.1	Actinolite-diopside ± magnetite ± tremolite skarn with chalcopyrite + pyrrhotite.
TH-3	1977	240	-70	62.8	Dyke, hole stopped.
TH-4	1977	060	-70	77.1	Actinolite-tremolite-magnetite skarn with chalcopyrite + pyrrhotite.
TH-5	1977	060	-80	46.3	Hole lost due to fault.
TH-6	1977	240	-80	97.5	Tremolite-magnetite ± actinolite-diopside skarn with chalcopyrite + pyrrhotite.
TH-7	1977	240	-80	107.0	Actinolite-tremolite skarn pyrite + pyrrhotite + chalcopyrite.
TH-8	1977	240	-80	96.9	Tremolite-actinolite-diopside(?) skarn with pyrrhotite + magnetite + chalcopyrite.
TH-9	1977	240	-80	88.4	Carbonate-altered dyke with minor chalcopyrite.
TH-10	1977	240	-80	32.3	Dyke, hold stopped.
TH-11	1977	240	-80	188.1	Schist with minor Cu mineralization.
TH-12	1978	-	-90	194.5	Minor Cu at schist-marble contact.
TH-13	1978	-	-90	206.3	Barren magnetite, chalcopyrite + pyrite bearing skarn.
TH-14	1978	-	-90	21.9	Dyke, hole stopped.
TH-15	1978	-	-90	274.9	Schist with minor Cu mineralization.
HA-1	1989	240	-70	105.16	Diopside and actinolite skarn with chalcopyrite ± pyrrhotite.

HA-2	1989	240	-70	72.54	Magnetite ± tremolite skarn with chalcopyrite + pyrrhotite.
HA-3	1989	240	-70	65.22	Diopside and actinolite skarn with chalcopyrite ± pyrrhotite ± malachite.
HA-4	1989	240	-60	72.24	Diopside, actinolite and magnetite skarn with chalcopyrite + pyrrhotite.
HA-5	1989	-	-90	60.96	Actinolite-diopside skarn with chalcopyrite + pyrite.

Most of the holes intersected stacked, variably mineralized skarn horizons of different widths. The primary gangue skarn minerals include actinolite, diopside, tremolite and rare garnet, while ore minerals comprise magnetite, pyrrhotite, chalcopyrite, pyrite and minor sphalerite and bornite. Disseminated to massive magnetite and pyrrhotite are the most abundant of the ore minerals. Disseminated to blebby chalcopyrite and pyrite are less profuse and are typically associated with the magnetite and pyrrhotite. Sphalerite and bornite are relatively rare and are associated with chalcopyrite. A paragenetic study carried out in 1978 (Hureau) determined that magnetite and pyrite formed first, followed by pyrrhotite, then chalcopyrite and sphalerite, and finally bornite.

Mineralized and unmineralized skarn horizons are interbedded with metasedimentary units including schist, quartzite, limestone and marble. All of these units are cut by post-mineralization feldspar porphyry and/or aphanitic, intermediate to mafic dykes. The dykes appear to strike northerly and dip steeply, while bedding strikes northerly and dips shallowly to the east.

The best intervals from the historical holes are listed in Table VII.

Table VII – Historical Diamond Drilling Assay Highlights

Hole	From (m)	To (m)	Interval (m)	Copper (%)	Gold (g/t)	Silver (g/t)
TH-1	15.54	21.00	5.46	0.14	0.14	3.0
TH-1	115.82	119.18	3.35	0.30	0.30	2.3
TH-2	23.53	42.12	18.59	1.94	0.87	14.6
TH-4	54.89	65.32	10.43	1.25	0.65	9.7
TH-6	57.36	70.10	12.74	1.05	NR	NR
TH-7	91.84	97.72	5.88	0.17	0.15	3.7
TH-8	60.81	69.28	8.47	0.76	0.71	7.3
including	62.79	67.09	4.30	1.27	0.81	10.6
TH-9	53.34	66.96	13.62	0.42	0.30	4.8
including	64.07	65.01	0.94	3.06	0.86	20.2
TH-12	143.65	143.86	0.21	2.42	3.0	16.1
TH-12	169.62	170.08	0.46	1.38	1.8	0.8
TH-13	170.08	171.36	1.28	0.36	0.08	NR
TH-15	111.80	114.79	2.99	0.20	0.19	3.4
HA-1	52.38	53.69	1.31	2.70	0.86	35.7

HA-1	59.61	60.71	1.10	3.72	0.80	18.7
HA-1	101.24	104.18	2.94	0.45	0.32	4.4
HA-2	23.09	30.88	7.79	1.98	0.67	14.4
HA-3	14.63	17.51	2.88	0.56	0.20	7.0
HA-4	19.28	20.61	2.29	1.29	0.35	10.5
HA-4	24.95	29.96	5.01	0.62	0.33	13.6
HA-5	22.97	25.08	2.11	0.54	0.23	4.7

NR – not reported

Holes TH-3 and TH-10 were drilled entirely in dykes and Holes TH-4 and TH-9 cut dykes where mineralization was expected (Tenney, 1977). Hole TH-5 was lost prematurely in a fault zone. Weak chalcopyrite was observed in schist and skarn in Holes TH-11 and TH-14, but no significant results were obtained.

2011 DIAMOND DRILLING

In 2011, a six hole diamond drill program was completed in the vicinity of the historical diamond drill holes at Hopkins South Zone. This program was primarily designed to confirm the nature and extent of the known skarn mineralization. The work was contracted to Elite Drilling Inc. of Vernon, B.C., and was done with a skid-mounted, diesel-powered JKS-300 drill using BTW equipment. A total of 1309.09 m of diamond drilling was completed.

Figures 13 to 15 illustrate historical and 2011 drill collar locations and cross-sections showing lithologies and results. Key data concerning the 2011 drill holes are listed in Table VIII.

Table VIII – 2011 Diamond Drill Hole Data

Hole	Easting (m)	Northing (m)	Elevation (m)	Azimuth (º)	Dip Angle (º)	Length (m)
DDH-11-01	397455	6794600	1179	250	-70	175.87
DDH-11-02	397450	6794650	1189	250	-70	160.63
DDH-11-03	397497	6794708	1200	250	-70	224.63
DDH-11-04	397660	6794750	1189	250	-70	258.16
DDH-11-05	397280	6794800	1222	250	-70	192.02
DDH-11-06	397710	6795100	1270	250	-70	297.78

The 2011 holes were selectively sampled, based on visible mineralization. Drill core samples were processed in 36 sample batches with each batch including two standard and two blank samples. Analytical work was done by ALS Minerals with sample preparation in Whitehorse and assays and geochemical analyses in North Vancouver. All samples were initially analyzed for gold by fire assay followed by atomic absorption (Au-AA24) and 35 other elements by aqua regia digestion and mass spectrometry (ME-MS41). Over limit copper values were determined using aqua regia digestion with inductively coupled plasma and either atomic emission spectroscopy or atomic absorption spectroscopy (Cu-OG46).

All of the 2011 holes were drilled west-southwesterly at fairly steep angles to test the shallowly, easterly-dipping skarn horizons and associated geophysical anomalies. All holes intersected stacked mineralized skarn horizons. There appears to be at least four main stacked horizons, which were traced over a 500 by 300 m area and to a depth of 250 m. The horizons remain open in all directions. The upper horizon on Section C-C' was likely not intersected by any of the holes on Sections A-A' and B-B'. The deeper of the two horizons on Section C-C' may correspond to the upper horizon on the other sections. If that is the case, the holes on Section C-C' did not test the lower stacked horizons that were intersected on the other section lines.

The holes intersected metasedimentary units (schist, marble, limestone, quartzite), intrusive dykes (feldspar porphyry, intermediate to mafic dykes) and skarn horizons (tremolite-actinolite-diopside ± magnetite ± garnet). Observations regarding sulphide/oxide mineralogy confirmed the historical descriptions (see Historical Diamond Drilling sub-section). The best 2011 drill intersections are provided in Table IX.

Table IX – 2011 Diamond Drilling Assay Highlights

Hole	From (m)	To (m)	Interval* (m)	Copper (%)	Gold (g/t)	Silver (g/t)
DDH-11-01	2.95	16.65	13.70	0.41	0.25	3.84
Including	9.69	12.02	2.33	1.24	0.87	12.95
	125.67	142.60	16.93	0.22	1.76	1.75
Including	125.67	133.17	7.50	0.43	3.35	3.55
Including	125.67	127.67	2.00	0.01	9.44	1.04
DDH-11-02	28.01	30.45	2.44	0.52	0.72	4.15
	36.58	39.25	2.67	1.18	0.56	11.62
DDH-11-03	58.28	66.78	8.50	1.62	0.54	9.30
	88.28	90.70	2.42	1.87	0.64	17.74
	130.00	132.45	2.45	0.72	0.18	6.79
DDH-11-04	57.39	62.53	5.15	0.95	0.84	5.64
	174.86	182.87	8.01	1.58	0.84	14.82
DDH-11-05	126.93	128.05	1.12	0.46	1.83	1.74
DDH-11-06	131.80	136.80	5.00	0.50	0.29	2.35
	276.35	278.01	1.66	0.63	0.40	5.21
	279.10	282.93	5.49	0.73	0.59	14.97

* Interval represents the downhole intersection length and true widths are estimated to be approximately 80-90% of the interval.

The highest gold assay (9.44 g/t over 2.00 m) came from a sulphide-deficient, quartz-rich band that directly overlies a sulphide-rich skarn horizon in DDH-11-01. The quartz in this band mostly occurred as microscopic replacement of limestone.

In most skarn horizons, magnetite was wholly or partially replaced by sulphide minerals, but some horizons, particularly in DDH-11-06, were composed of semi-massive, coarse grained, unaltered magnetite.

REVERSE CIRCULATION PERCUSSION DRILLING

HISTORICAL PERCUSSION DRILLING

In 1980, a total of 2490.2 m of percussion drilling was performed in 46 vertical holes. The percussion holes were drilled all within Hopkins South Zone, in the same general areas as the historical diamond drill holes (Figure 3 – locations are approximate due to the poor quality of historical maps). The percussion holes were only analyzed for copper.

Of the 46 holes that were drilled, only parts of 20 holes were sampled. Of these, all but five of yielded at least one interval with elevated copper values. Nine of the 46 holes were drilled entirely within dyke material and were not sampled. Old reports did not explain why the remaining 17 holes were not sampled, but some appear to have been abandoned and redrilled. Drill hole data and the best intervals from this work are provided in Table X (Ashton, 1981).

Table X – 1980 Percussion Hole Data and Results

Hole	Azimuth (º)	Dip Angle (º)	Depth (m)	Significant Results
PH-1	-	-90	40	1.52% Cu over 18.3 m from 21.3 to 39.6 m
PH-1a	-	-90	15	NA
PH-2	-	-90	18	Dyke, NA
PH-3	-	-90	52	Dyke, NA
PH-4	-	-90	37	Dyke, NA
PH-5	-	-90	61	0.23% Cu over 3.0 m from 42.7 to 45.7 m
PH-6	-	-90	9	NA
PH-6a	-	-90	76	< 0.1% Cu
PH-7	-	-90	12	< 0.1% Cu
PH-7a	-	-90	76	NA
PH-8	-	-90	61	< 0.1% Cu
PH-9	-	-90	61	< 0.1% Cu
PH-10	-	-90	61	0.16% Cu over 3.0 m from 12.2 to 15.2 m 0.24% Cu over 15.2 m from 21.3 to 36.6 m
PH-11	-	-90	82	NA
PH-12	-	-90	82	NA
PH-13	-	-90	85	NA
PH-14	-	-90	55	NA
PH-15	-	-90	40	NA
PH-16	-	-90	82	Dyke, NA
PH-17	-	-90	61	0.61% Cu over 15.3 m from 33.5 to 48.8 m
PH-18	-	-90	82	0.73% Cu over 21.3 m from 48.8 to 70.1 m
PH-18a	-	-90	15	Dyke, NA
PH-18b	-	-90	15	Dyke, NA
PH-19	-	-90	85	NA
PH-20	-	-90	15	Dyke, NA

PH-21	-	-90	15	Dyke, NA
PH-22	-	-90	27	NA
PH-23	-	-90	15	Dyke, NA
PH-24	-	-90	73	0.60% Cu over 6.1 m from 45.7 to 51.8 m
PH-25	-	-90	64	0.29% Cu over 3.0 m from 51.8 to 54.8 m
PH-26	-	-90	61	NA
PH-27	-	-90	67	0.21% Cu over 6.1 m from 39.6 to 45.7 m
PH-28	-	-90	85	< 0.1% Cu
PH-29	-	-90	85	NA
PH-30	-	-90	79	NA
PH-31	-	-90	58	0.10% Cu over 3.1 m from 27.4 to 30.5
PH-32	-	-90	76	0.61% Cu over 9.2 m from 39.6 to 48.8 m
PH-33	-	-90	52	NA
PH-34	-	-90	67	0.20% Cu over 6.1 m from 42.7 to 48.8 m
PH-35	-	-90	73	NA
PH-36a	-	-90	49	1.49% Cu over 3.0 m from 42.7 to 45.7 m
PH-37	-	-90	27	NA
PH-38	-	-90	61	0.66% Cu over 21.3 m from 36.6 to 57.9 m
PH-39	-	-90	61	1.44% Cu over 9.2 m from 45.7 to 54.9 m
PH-40	-	-90	64	0.84% Cu over 6.1 m from 57.9 to 64.0 m
PH-41	-	-90	49	NA

NA = Not analyzed

2011 PERCUSSION DRILLING

The 2011 percussion drill program was designed to identify areas with potential for copper-gold porphyry mineralization within and adjacent to Hopkins North Zone. Surface showings and geochemical anomalies were discovered in this area by previous operators, but they were never drill tested. A total of 1729.74 m was drilled in 58 vertical holes, which were mostly spaced 200 m apart and typically tested to depths between 30 to 61 m below surface. The holes are located along seven, parallel, north-south oriented section lines (Figure 16). The work was contracted to Thorman Drilling Ltd. of Nelson, B.C., and was done with a self-propelled, track mounted reverse circulation drill. The drill was operated by a three person crew on a single 12 hour per day shift.

All holes were sampled continuously from top to bottom. Pulverized cuttings from the holes were automatically split at the collar, resulting in samples containing 12.5% of the cuttings from each 1.52 m interval. The entire sample was sent for analysis, and representative chips from intervals were collected for logging purposes. Drill collar locations and cross-sections showing 2011 drill holes are illustrated on Figure 16. Key data concerning the 2011 drill holes are listed in Table XI.

Table XI – 2011 Percussion Drill Hole Data

Hole	Easting (m)	Northing (m)	Elevation (m)	Azimuth (º)	Dip Angle (º)	Length (m)
PDH-11-01	397303	6795300	1280	-	-90	30.48
PDH-11-02	397301	6795501	1312	-	-90	32.00
PDH-11-03	397299	6795700	1308	-	-90	30.48
PDH-11-04	397298	6795899	1325	-	-90	19.81
PDH-11-05	397303	6796101	1356	-	-90	22.86
PDH-11-06	397302	6796301	1374	-	-90	16.76
PDH-11-07	397312	6796496	1371	-	-90	30.48
PDH-11-08	397301	6796701	1366	-	-90	15.24
PDH-11-09	397298	6796900	1358	-	-90	16.76
PDH-11-10	397297	6797099	1357	-	-90	25.91
PDH-11-11	397299	6797301	1355	-	-90	30.48
PDH-11-12	397304	6797502	1350	-	-90	39.62
PDH-11-13	397298	6797699	1341	-	-90	36.58
PDH-11-14	397302	6797900	1329	-	-90	30.48
PDH-11-15	397102	6797905	1330	-	-90	50.29
PDH-11-16	397101	6797699	1341	-	-90	35.05
PDH-11-17	397132	6797503	1386	-	-90	38.10
PDH-11-18	397099	6797290	1374	-	-90	42.67
PDH-11-19	397094	6797103	1371	-	-90	33.53
PDH-11-20	397104	6796898	1353	-	-90	41.15
PDH-11-21	396912	6796695	1335	-	-90	48.77
PDH-11-22	396937	6796905	1341	-	-90	60.96
PDH-11-23	396922	6797063	1332	-	-90	60.96
PDH-11-24	397098	6796698	1343	-	-90	24.38
PDH-11-25	397097	6796501	1342	-	-90	19.81
PDH-11-26	397097	6796298	1352	-	-90	21.34
PDH-11-27	397105	6796097	1338	-	-90	28.96
PDH-11-28	397502	6795099	1280	-	-90	24.38
PDH-11-29	397503	6795301	1289	-	-90	24.38
PDH-11-30	397498	6795502	1301	-	-90	18.29
PDH-11-31	397502	6795699	1313	-	-90	21.34
PDH-11-32	397498	6795904	1314	-	-90	19.81
PDH-11-33	397500	6796104	1342	-	-90	18.29
PDH-11-34	397498	6796302	1365	-	-90	21.34
PDH-11-35	397502	6796504	1371	-	-90	18.29
PDH-11-36	397501	6796703	1365	-	-90	21.34
PDH-11-37	397502	6796901	1353	-	-90	18.29
PDH-11-38	397504	6797102	1341	-	-90	30.48
PDH-11-39	397502	6797304	1345	-	-90	39.62
PDH-11-40	397501	6797503	1347	-	-90	30.48
PDH-11-41	397499	6797702	1340	-	-90	22.86

PDH-11-42	397702	6797704	1338	-	-90	30.48
PDH-11-43	397699	6797502	1341	-	-90	30.48
PDH-11-44	397902	6797504	1371	-	-90	30.48
PDH-11-45	398102	6797501	1402	-	-90	30.48
PDH-11-46	398099	6797302	1435	-	-90	30.48
PDH-11-47	398102	6797101	1432	-	-90	30.48
PDH-11-48	397703	6797104	1389	-	-90	30.48
PDH-11-49	397699	6796903	1400	-	-90	30.48
PDH-11-50	397702	6796704	1375	-	-90	30.48
PDH-11-51	397699	6796500	1347	-	-90	30.48
PDH-11-52	397698	6796302	1356	-	-90	30.48
PDH-11-53	397703	6796102	1347	-	-90	30.48
PDH-11-54	397702	6795901	1325	-	-90	30.48
PDH-11-55	397701	6795702	1303	-	-90	30.48
PDH-11-56	397698	6795499	1310	-	-90	30.48
PDH-11-57	397701	6795302	1295	-	-90	30.48
PDH-11-58	397702	6795104	1278	-	-90	30.48

Chip samples from all of the 2011 percussion drill holes were examined under a hand lens and later an optical microscope. The chips comprise metasedimentary units (primarily quartz-biotite schist and phyllitic quartzite), skarn horizons (including diopside, epidote and actinolite with trace to minor pyrite and chalcopyrite) and intrusive units (weakly to moderately argillic and propylitic altered, magnetic granodiorite and minor diorite). The observed lithologies within the percussion holes generally support the 2011 surface geological mapping.

Most of the holes returned background values or sporadic, short intervals of weakly elevated copper, gold and/or silver values. Six holes in the northern part of the percussion drill area yielded moderately to strongly anomalous intervals (Figure 16). These holes largely fall within the area of known surface mineralization that defines Hopkins North Zone. The elevated values were obtained from weakly mineralized phyllitic quartzite (PDH-11-13 and -17); weakly magnetite-, pyrite- and chalcopyrite-bearing skarn (PDH-11-17); and weakly altered granodiorite with trace pyrite ± chalcopyrite (PDH-11-19, -23, -39 and -47). The best intervals from these holes are provided in Table XII.

Table XII – 2011 Percussion Drilling Assay Highlights

Hole	From (m)	To (m)	Interval (m)	Copper (%)	Gold (g/t)	Silver (g/t)
PDH-11-13	33.53	EOH	3.05	0.54	0.278	3.85
PDH-11-17	21.34	EOH	16.76	0.16	0.009	1.27
PDH-11-19	19.81	28.96	9.15	0.36	0.007	2.32
PDH-11-23	42.67	44.20	1.53	0.33	0.005	0.70
PDH-11-39	0	EOH	39.62	0.24	0.055	1.37
Including	28.96	EOH	10.66	0.70	0.195	4.10
PDH-11-47	0	7.62	7.62	0.18	0.018	2.04

*Interval represents the downhole intersection length and true widths are unknown at this time.

Four of the holes listed in Table XII bottomed in mineralization. Two additional holes (PDH-11-45 and -46) in the northern part of the drill area bottomed in weak mineralization (0.10% Cu over 1.52 m in both holes, with background gold and silver).

One or more samples from all percussion holes drilled within the molybdenum-in-soil anomaly at the southern end of Anomaly A (PDH-11-02, -03, -31, -32 and -55) yielded elevated molybdenum values compared to the surrounding holes. The best interval averaged 93.6 ppm molybdenum over 10.67 m between 15.24 and 25.91 m in PDH-11-03.

GEOPHYSICAL SURVEYS

In 2007, Strategic Metals contracted Geotech Ltd. of Aurora, Ontario to fly VTEM and magnetic surveys across a 6000 by 6000 m grid in the central part of the current Hopper property, and in late 2011 Bonaparte contracted Geotech Ltd. to expand the VTEM and magnetic surveys by an additional 951.5 line km. Combined, the 2007 and 2011 surveys cover a 110 km^2 area. In December 2012, Condor Consulting., Inc. was commissioned to perform detailed processing, interpretation and analysis of the entire data set.

The magnetic data from both surveys was reduced to pole and filtered in preparation of interpretation. Figure 17 illustrates Total Magnetic Intensity (TMI). The EM data was more difficult for Condor to interpret due to the fact that different transmitter pulse lengths and channels were used during the 2007 and 2011 surveys. This discrepancy meant that the data sets could not be directly merged; however, Condor was able to find 'medium-late' channels from both surveys (1151 µs and 1161 µs) that averaged 1156 µs and were considered close enough to merge (Irvine and Woodhead, 2013). Figure 18 shows the electromagnetic response.

The TMI data roughly outlined the Hopper Pluton as a 3000 by 6000 m, west-northwesterly oriented very strong magnetic high. Immediately north of the pluton the magnetic signature is subdued with the exception of two small moderately anomalous features, which may represent buried plugs. South of the pluton the magnetic signature is more complex. The Hopkins South Zone appears to have a strong magnetic signature that blends into the main Hopper Pluton magnetic anomaly. Southeast of the Hopkins South Zone, there are two small circular magnetic highs that are thought to be intrusive plugs. A number of linear northwesterly-trending moderate magnetic highs lie south of the pluton. These features likely represent magnetite-rich horizons within the metasedimentary package.

The Hopper Pluton exhibits a low EM response and is flanked by a number of well-defined north-northwesterly-trending large-scale strong EM conductors. In most cases these large-scale features are associated with single and/or double peak responses identified by Condor and are thought to be related to stratigraphy and not mineralization. Three irregularly shaped strong EM conductors lie peripheral to the south side of the Hopper pluton. The drilled area at the Hopper South Zone underlies one of these conductors, which has a strong double peak response signature and numerous weaker single and double peak response features. The other two irregularly shaped EM conductors lie two and four kilometres east of the Hopkins South Zone and exhibit similar signatures as it.

About two kilometres south of the Hopkins South Zone, there is a strong linear EM anomaly with a subtle moderate EM conductor immediately to the west. This smaller anomaly is highly prospective for skarn mineralization because it is the only other occurrence of a strong double peak conductor on the property.

DISCUSSION AND CONCLUSIONS

The Hopper property covers two known zones of copper±gold±silver mineralization, which are favourably situated in an area with excellent infrastructure at the southern end of the Dawson Range Gold Belt. Isotopic dating of the Hopper Pluton indicates that the mineralization is the same age as most other intrusion-related deposits elsewhere within this belt.

The comprehensive 2011 exploration program successfully: confirmed grade and extent of historical skarn mineralization; recognized specific areas with porphyry potential within the Hopper Pluton; and identified new drill targets where geology, geochemical response and geophysical signatures resemble those at the known skarn showings.

Diamond drilling within Hopkins South Zone identified at least four stacked, mineralized skarn horizons. None of the 2011 holes tested across all four of the prospective horizons, and all of the horizons are open to extension along strike and down dip. In addition to the expected copper-gold mineralization, one of the 2011 holes cut an interval of high grade gold (9.44 g/t over 2.00 m) within a sulphide-deficient, quartz-rich band that overlies one of the sulphide-rich skarn horizons. This may represent an important new type of mineralization that has been overlooked to date on the property.

Widely spaced, shallow percussion drilling returned highly encouraging porphyry grade-grade intervals within Hopkins North Zone, with several of the holes bottoming in mineralization. This zone has never been previously drill tested and is completely open to depth.

A multi-faceted exploration program should be conducted on the Hopper property to follow up positive drill results at Hopkins North and South zones and to determine the source of the magnetic and EM anomalies identified during the geophysical interpretation. The program should include:

1 Detailed geological mapping. This should focus on the western part of the property between the Hopkins North and South zones and along strike in both directions;

2 Soil sampling. Contour and grid soil sampling should be completed along the western side of the property in previously untested areas to look for soil evidence of multiple skarn horizons. Additional sampling should also be completed south and east of the Hopkins South Zone to follow up areas of interest identified using magnetic and EM data;

3 Prospecting. Systematic prospecting should be conducted to the north of the Hopkins North Zone, along strike from known skarn horizons and within newly identified geochemical and geophysical anomalies. Particular attention should be paid to chalcedonic quartz material, which was intersected during drilling and is known to host significant gold values;

4 Follow up of geophysical surveys. The two strong irregularly shaped EM conductors that lie east of the Hopkins South Zone should be prospected for any evidence of skarn mineralization or limestone. Additionally, the subtle moderate EM anomaly with coincident strong double peak response signature that lies two kilometres south of the zone should also be followed up;

5 Diamond drilling. Undrilled EM conductors with coincident soil geochemical anomalies should be followed up by mapping and prospecting and then holes should be drilled to test the targets. At least two deep holes should be drilled below the best percussion drill holes in Hopkins North Zone to test its porphyry potential and at least two additional holes should evaluate skarn targets north of the Hopper Pluton. Systematic drilling should be done within Hopkins South Zone to better understand grade continuity and lateral extent of the stacked skarn horizons. Additional drill targets may be generated from detailed mapping and prospecting programs;

6 Percussion drilling. Percussion drilling should be completed within other parts of Anomaly B to further assess its porphyry potential. If new soil anomalies are identified in other areas with limited bedrock exposure, percussion drilling should be used to identify buried mineralization; and,

7 Metallurgical work. A metallurgical study should be conducted to determine if gold and silver will report to a copper concentrate and if magnetite is easily separated from sulphides and other skarn minerals. Iron from magnetite may be an economic co-product if the recovery and shipping costs are low.

Respectfully submitted,

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

H. Burrell, B.Sc., P.Geo.

REFERENCES

Ashton, A.S.
1981 Report on the Hop-Acme Claims; report prepared for New Ridge Resources Ltd.; Assessment Report #062147.

Blumenthal, V.H.
2010 A Geochemical study of the Mineralization at the Hopper Property, Yukon: A case study of an atypical copper occurrence; Strategic Metals Ltd. in conjunction with University of Waterloo.

Carpenter, R.
2011 Kaminak Gold Corporation's website: www.kaminak.com. Project pipeline: http://www.kaminak.com/projects/core_projects/yukon_gold/

Chartier, D.
2011 Independent Technical Report for the Coffee Gold Project, Yukon, Canada; Report Prepared for Kaminak Gold Corp. by SRK Consulting (Canada) Inc.

Corman, F.D.
2010 Western Copper Corporation announces significant Resource Estimate increase at Casino Property, Yukon Territory (www.westerncoppercorp.com).

Duk-Rodkin, A.
1999 Glacial limits map of Yukon Territory; Geological Survey of Canada Geoscience Map 1999-2.

Eaton, S.
2012 Geochemical sampling, prospecting, geological mapping, RC drilling, diamond drilling and geophysical surveying at the Hopper property; Report prepared for Bonaparte Resources Inc. and Strategic Metals Ltd.

Gordey, S.P. and Makepeace, A.J.
2003 Yukon Digital Geology, version 2.0, S.P. Gordey and A.J. Makepeace (comp); Geological Survey of Canada, Open File 1749 and Yukon Geological Survey, Open File 2003-9 (D).

Hart, C.J.R. and Langdon, M.
1997 Geology and mineral deposits of the Mount Nansen camp, Yukon; In Yukon Exploration and Geology 1997, p.129-138.

Hureau, A.
1978 Report on ground magnetic survey, test IP survey, geological mapping and diamond drilling on the Hop claims, Aishihik mapsheet 115H/7; Assessment Report #090238.

Hornbrook, E.H.W., Friske, P.W.B., Lynch, J.J., Schmitt, H.R., Lund, N.G, Elliot, B.E., Yelle, J.
1985 Regional stream sediment and water geochemical reconnaissance data; GSC Open File 1219.

Irvine, R. and Woodhead, J.,
2013 Report on Processing and Interpretation of VTEM Electromagnetic and Magnetic Surveys at the Hopper Property, Yukon, Canada; Report prepared for Strategic Metals Ltd.

Jessen, K.
2008 Assessment report describing excavator trenching, soil geochemical sampling and geophysical surveys at the Hopper property, Whitehorse Mining District; Report prepared for Strategic Metals Ltd. by Archer, Cathro & Associates (1981) Limited.

Johnston, S. and Timmerman, J.
1997 EGSD Geoscience Map 1997-9; Geology of Hopkins Lake Map Area, Yukon, NTS 115 H/7, 1:50,000 map.

Kikuchi, T.
1968 Geological, geochemical and airborne geophysical report as representation work on the AD claim group (1-64 inclusive); Assessment Report #019089.

Norgaard, P.
1970 Report on Induced Polarization surveys for Mitsubishi Metal Mining Company; Assessment Report #060993.

Shimizu, H and Kashiwagi, T.
1976 Report on the Geological Survey for Mitsubishi Metal Corporation on ML Claims, Hopkins Lake Area, Yukon; Assessment Report #090147.

Smith, H.
2011 Assessment report describing soil geochemistry at the Hopper property, Whitehorse Mining District; Report prepared for Strategic Metals Ltd. by Archer, Cathro & Associates (1981) Limited.

Stephen, J.C. and Feulgen, S.
1989 Report on diamond drilling on the Hop-Acme claims; Report prepared for Casau Explorations Ltd.; Assessment Report #092776.

Stroshein, R.
1998 A summary report on the geology of the Brown-McDade gold-silver deposit, Mount Nansen mine area, Yukon; In Yukon Exploration and Geology 1998, p.231-236.

2011 Technical report using British Columbia securities commission national instrument 43-101 guidelines on the geology, mineralization and geochemical surveys on the Hopper property, Yukon Territory; Report prepared for Bonaparte Resources Inc. by Protore Geological Services.

Tenney, D.
1977 Report on Diamond Drilling on the Hop claims; Reports for Whitehorse Copper Mines Ltd.; Assessment Reports #091325 and #092027.

Wengzynowski, W.A. and Smith, H.
2007 Assessment report describing prospecting, geological mapping and soil geochemistry at the Hopper property; Report prepared for Strategic Metals Ltd. by Archer, Cathro & Associates (1981) Limited.

APPENDIX I

STATEMENT OF QUALIFICATIONS

STATEMENT OF QUALIFICATIONS

I, Heather Burrell (née Smith), geologist, with business addresses in Vancouver and Squamish, British Columbia and Whitehorse, Yukon Territory and residential address in Squamish, British Columbia, do hereby certify that:

1. I graduated from the University of British Columbia in 2006 with a B. Sc in Geological 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 Professional Geoscientist (P. Geo.) with the Association of Professional Engineers and Geoscientists of British Columbia (Member Number 34689).

4. I have compiled Condor's geophysical interpretations with previous geological and geochemical data.

H. Burrell, B.Sc., P.Geo.

APPENDIX II

STATEMENT OF EXPENDITURES

Statement of Expenditures
Hopper 171-342 Mineral Claims
January 17, 2013

Expenses (including management fee)

Condor Consulting, Inc.	$29,984.50

APPENDIX III

REPORT ON PROCESSING AND INTERPRETATION OF VTEM ELECTROMAGNETIC AND MAGNETIC SURVEY DATA

REPORT ON PROCESSING AND INTERPRETATION

OF

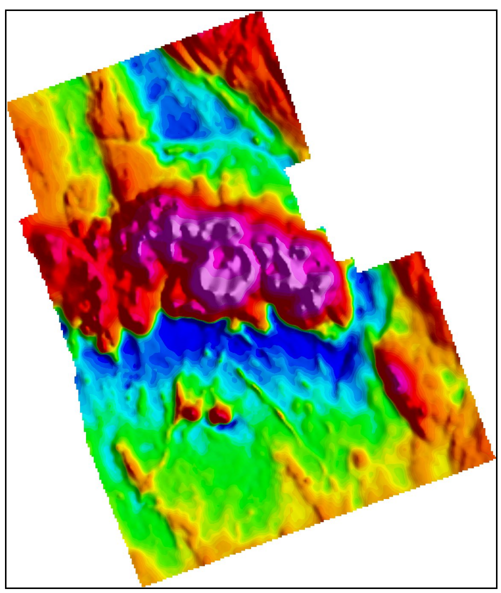
VTEM EM & MAGNETIC SURVEYS

HOPPER PROPERTY

YUKON, CANADA

STRATEGIC METALS LIMITED

JANUARY 2013



Condor Consulting
Lakewood, CO
USA

CONTENTS

1. SUMMARY 1

2. INTRODUCTION 2

3. GEOLOGY 5

4. PROCESSING AND ANALYSIS TECHNIQUES 9
- DATA QUALITY 9
- PROCESSING 9
  - Time Constant: AdTau 9
  - Layered-Earth Inversion 9
  - Magnetics 10
  - UBC MAG3D Inversion 10
- ANALYSIS TECHNIQUES AND ISSUES 11
  - Anomaly Shapes 11
  - Merging of data from the two surveys 12
  - Picking 12
  - Target Zones 12

5. MAGNETIC INTERPRETATION 13

6. UBC MAG3D INVERSION 22

7. EM INTERPRETATION 24
- Table 7-2: Listing of TZ for Hopper VTEM. 31

8. HOPKINS DETAIL AREA 34

9. PRODUCTS 41
- Table 9-1 Survey Products 41

10. CONCLUSIONS AND RECOMMENDATIONS 43

11. REFERENCES 45

12. APPENDICES 47
- APPENDIX A: DETAILS OF EM PROCESSING 48
- APPENDIX B: ARCHIVE DVD 50

1. SUMMARY

This report describes the processing and analysis of two VTEM airborne electromagnetic and magnetic surveys carried out by Geotech Ltd. (Geotech) over the Hopper Property, located near Haines Junction, Yukon, Canada.

The first survey was conducted for Strategic Metals Ltd. (Strategic) in July 2007. The second survey was carried out for Bonaparte Resources Inc. (Bonaparte) in November-December 2011. The two surveys are contiguous. Archer, Cathro & Associates (1981) Ltd. (Archer Cathro) conducts exploration work on the property, on behalf of Strategic and Bonaparte.

The object of the survey was to explore for copper-gold porphyry and copper-gold-silver skarn mineralization.

Condor Consulting Inc. (Condor) was commissioned by Archer Cathro on behalf of Strategic to carry out comprehensive processing, analysis and interpretation of the EM and magnetic data from the two VTEM surveys.

This assessment has identified a number of conductors, some of which appear to have been targeted by previous drilling. However, many good conductors are untested and represent attractive targets for follow up and drill testing.

2. INTRODUCTION

Two VTEM surveys were carried out by Geotech Ltd. (Geotech) over the Hopper area, located in Yukon, Canada. The location is shown in Figure 1.

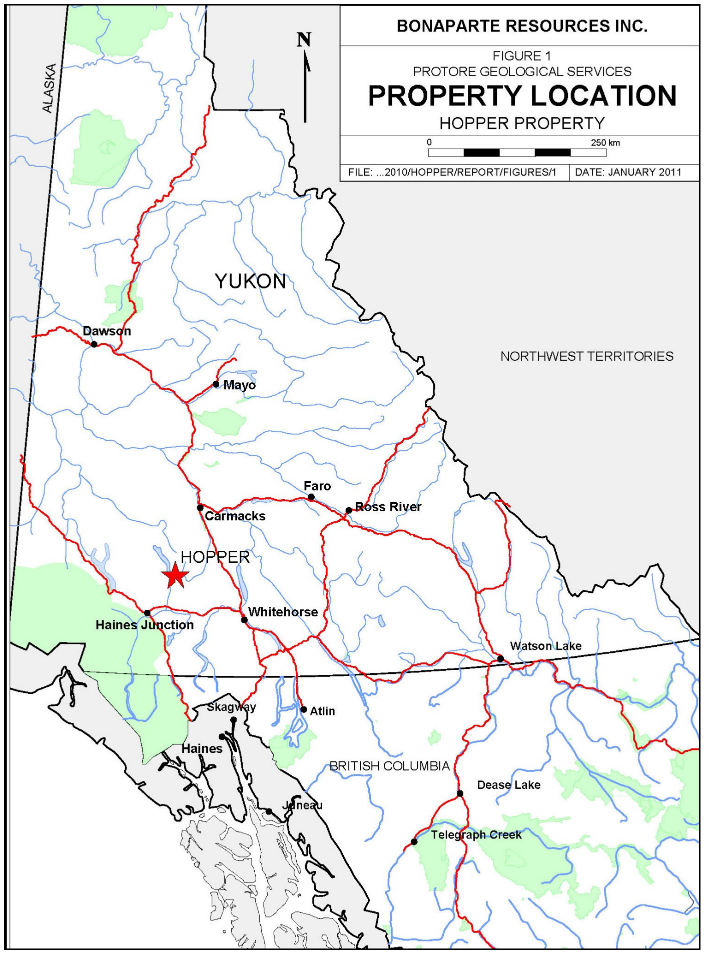


Figure 1: Location of Hopper VTEM survey area.

The first survey was conducted for Strategic Metals Ltd. (Strategic) from July 23-24, 2007 and comprised 231 line km. The flight line spacing was 200 m in direction N70E. The second survey was carried out for Bonaparte Resources Inc. (Bonaparte) from December 14-20, 2011 and comprised 1239 line km. The flight line spacing was 100 m in direction N70E (same as previous survey). The two surveys are contiguous, as shown in Figure 2 and there is considerable overlap in the flight paths.

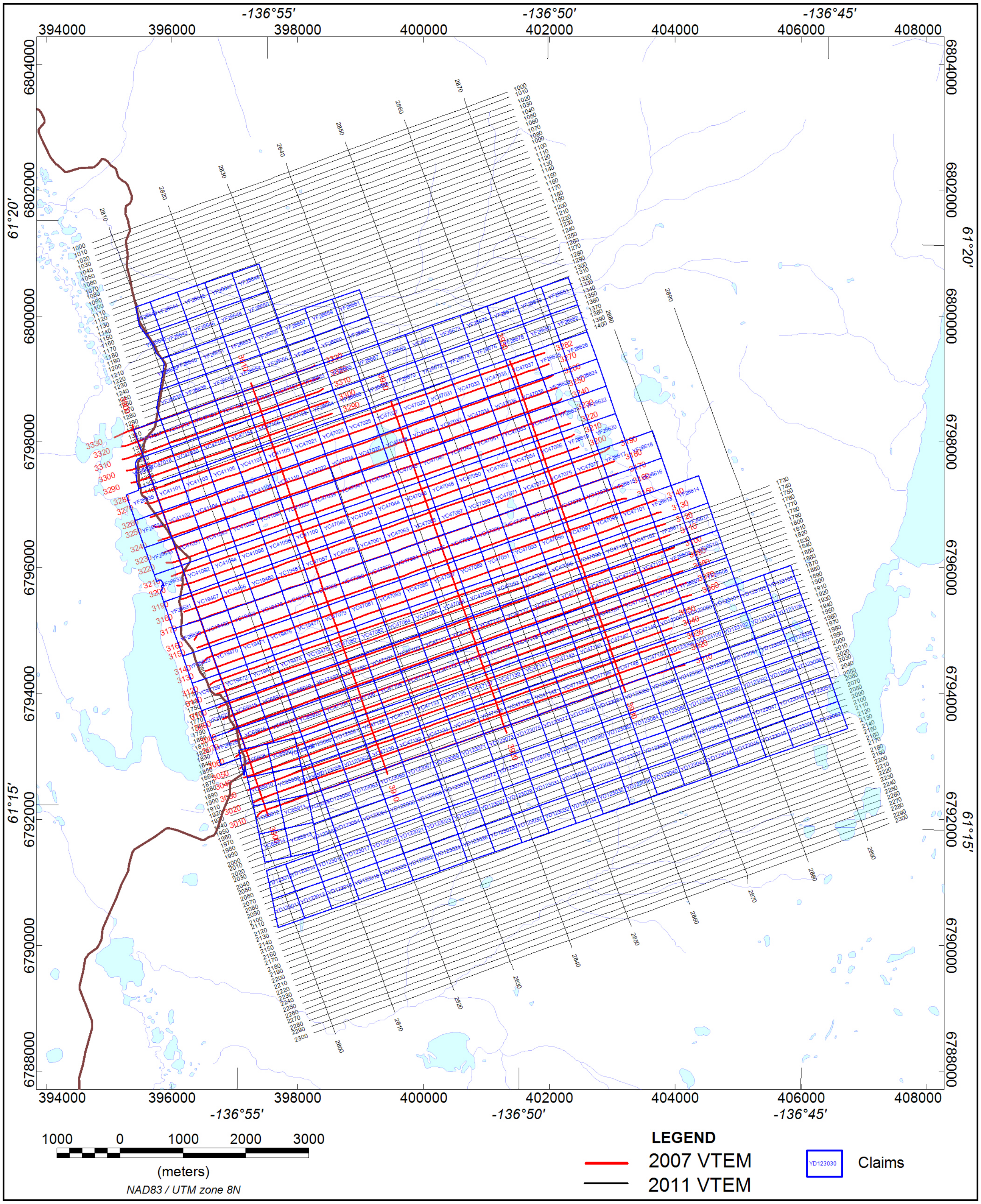


Figure 2: Hopper VTEM 2007 and 2011 flight paths, showing claims.

The Geotech Logistics Reports for the two surveys (Venter 2007 and Schein et al 2012) provide specific details of the VTEM instrumentation and survey specifications (included on the DVD, Appendix B).

In both surveys both dBdT and B-Field data were collected but only Z component data was acquired.

The magnetic data from the two surveys was merged to form one contiguous image.

Different transmitter pulse lengths and channel times were used for the two surveys, so that it was not possible to directly merge the two data sets. Conductor picking was carried out separately for the two surveys and then merged for the interpretation and definition of Target Zones. Decay time constants were calculated for each survey and then merged into a single image. A late-time channel amplitude grid was generated using channels with similar delay times for each survey.

3. GEOLOGY

Figure 3 shows the Hopper VTEM survey area overlain on Yukon government geology (Gordey and Makepeace 1999).

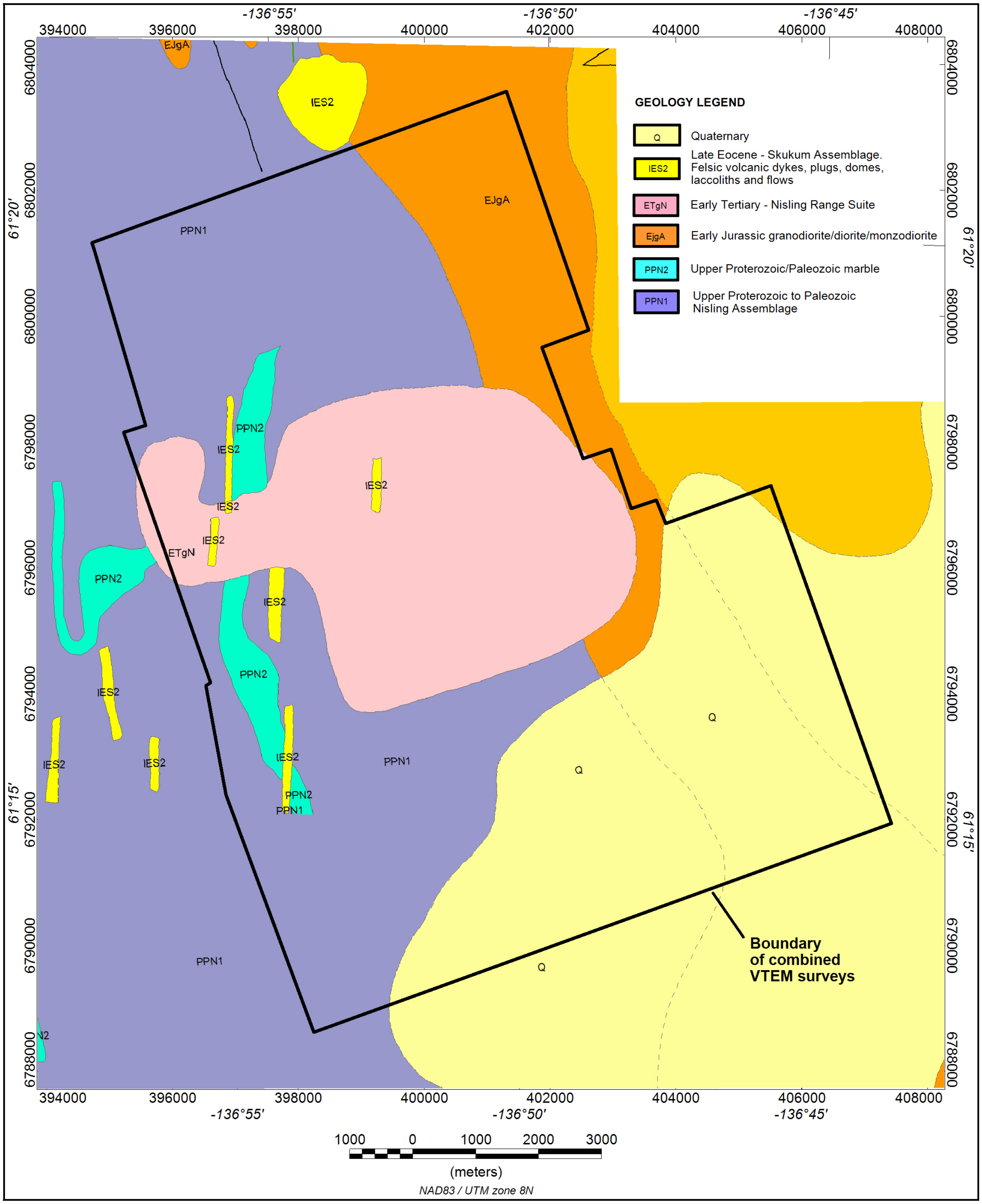


Figure 3: Geology map – Yukon government geology (Gordey and Makepeace 1999).

Figure 4 shows the geology of the Hopper property *per se* (after Stroshein 2011). Note that different colors are used for the geological units in each map.

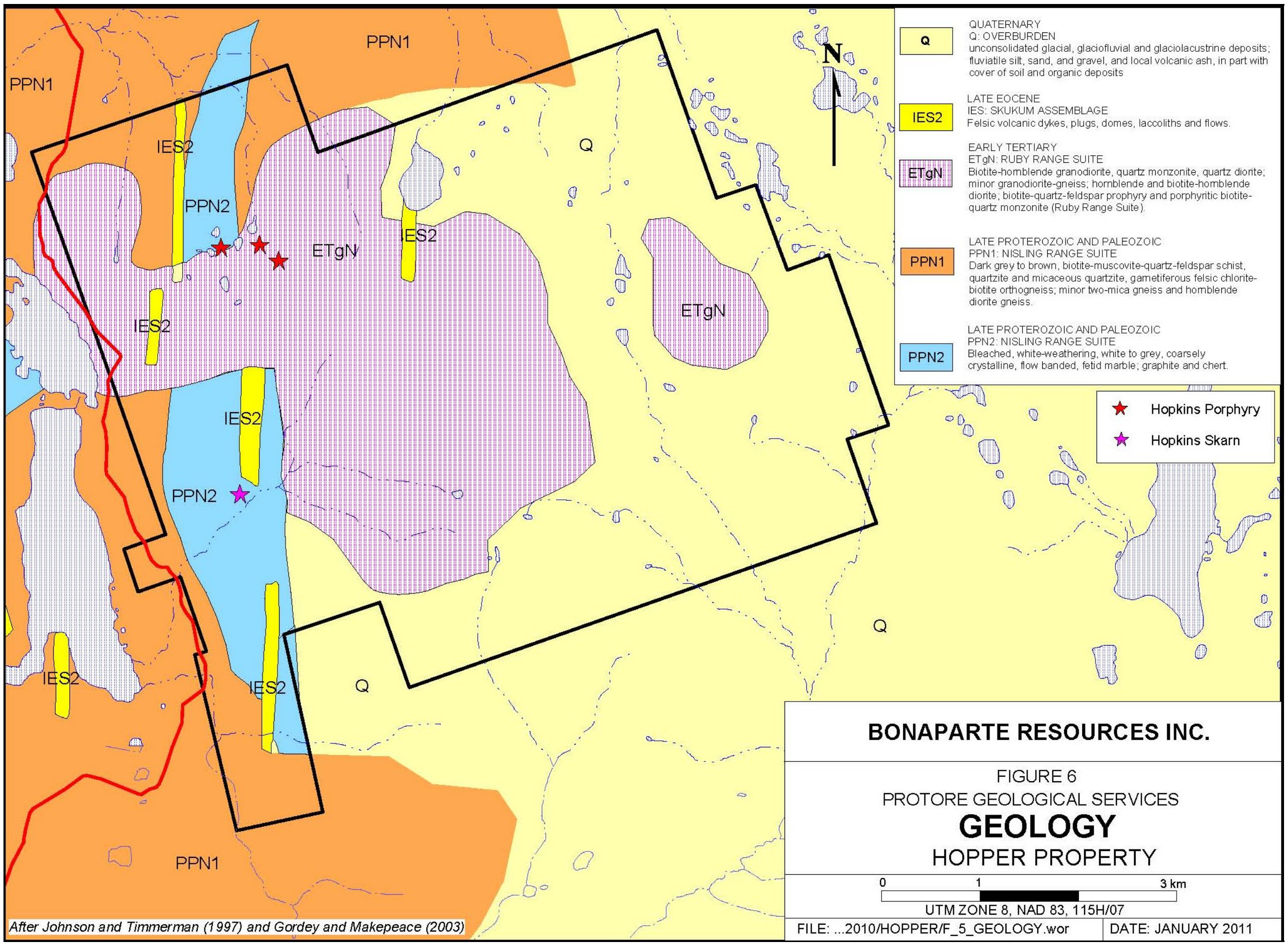


Figure 4: Geological map of Hopper Property (after Stroshein 2011).

The following description of the geology and mineralization is extracted from Stroshein (2011).

Property geology.

Geological mapping has been conducted on the Hopper property at 1: 50 000 scale by Johnston and Timmerman (1997) of the YGS and at 1:10 000 scale by Strategic Metals Ltd. during the 2006 exploration program. Thick glacial overburden on the property restricted detailed mapping.

Basement rocks belonging to the Nisling Range Suite have been mapped in the western part of the property. They comprise a gently southeast dipping package of quartz-mica schist, phyllite and quartz grit with narrow inter-bands of thinly bedded, dirty limestone and calcareous meta-sediments.

The Nisling Range Suite has been intruded by an irregularly shaped stock and a satellite plug, belonging to the Ruby Range Suite. The stock has been mapped in the western and central parts of the property as a continuous body with two lobes. The western smaller lobe is connected to the main lobe of the pluton by an isthmus of the pluton. The Hopkins Porphyry occurrence composed *of disseminated sulphides of chalcopyrite and pyrite is erratically exposed with abundant float is associated with the area of the isthmus. A well developed embayment of Nisling Range Suite rocks occurs north of the isthmus and a two-sided embayment occurs south of the isthmus.*

The plug is exposed in the eastern part of the property on a glacially scoured knoll. The intrusions are felsic to intermediate in composition and comprise a feldspar-rich megaphorphyritic body. The stock is crudely zoned by texture and composition, with a margin of aphanitic metabasite and a core of coarse grained quartz-biotite-hornblende diorite. Very fine grained magnetite is noted in both phases. The intrusions appear to be relatively unaltered, aside from a few small zones featuring weak clay alteration of feldspar on weathered surfaces.

A series of north-trending porphyry dykes assigned to the Skukum Assemblage cut all units and are prominent through the Nisling Range Suite embayments. Weak to moderate pervasive calc-silicate alteration and skarn horizons are locally developed in limey horizons within the Nisling Range Suite near the contact of the stock. The skarns are dark green to black with varying amounts of actinolite, diopside, anhydrite, garnet, and magnetite. The mineralization is developed within the southern embayment of the Early Teritary Ruby Range Suite pluton near the western side of the Property. The occurrence is indicated on the Figure 4, Geology Map Hopper Property.

Structure is dominated by north trending, steeply east- or west-dipping fault and fracture zones. These zones commonly contain felsic to mafic porphyry dykes and quartz-carbonate veinlets, veins and breccias. A secondary, roughly orthogonal fracture set trends northeasterly and is healed with quartz and/or carbonate veinlets and veins.

Deposit Types

Skarn deposits are metasomatic deposits formed in limestone or other calcareous rocks at or near the contact of plutonic rocks. The best developed skarn deposits occur within embayments of the pluton where heat and fluid sources can circulate mineralizing solutions through the sedimentary rocks over extended periods.

The Whitehorse Copper belt hosts multiple copper-gold skarn deposits that produced 267 500 000 pounds of copper, 225 000 ounces of gold and 2 838 000 ounces of silver through the last century with production ceasing in 1981.

The age dating of the stock at Hopper performed by Blumenthal (2010) returned a Late Cretaceous age between 76.0 ±1.1 and 83.7±1.9 Ma, that places it in the same metallogenic episode as the Patton Porphyry at the Casino deposit, 190 kilometres to the north-northwest.

The Casino gold-copper-molybdenum porphyry deposit is owned by Western Copper Corporation. It comprises a measured and indicated mineral reserve of 946 million tonnes (with a copper equivalent cutoff of 0.30%) of 0.21% copper, 0.25 g/t gold, 0.024% molybdenum and 1.77 g/t silver (Corman, 2010). Geology on the Casino property features granitic rocks of the Mid Cretaceous Whitehorse Suite that has been intruded by a Late Cretaceous stock called the Patton Porphyry. The Patton Porphyry has been assigned by the YGS to the Prospector Mountain Suite (LKgP) and is reportedly the main mineralizing event. Mineralization occurs in breccia pipes, plugs and dykes. The Casino Deposit is unglaciated and deeply weathered. Ore grade values are reported within leached cap, supergene oxide, supergene sulphide and hypogene zones.

Copper-gold skarn and copper-gold-molybdenum porphyry mineralization has been located on the Hopper Property. The results from drilling on the skarn mineralization yielded up to 3.72 % copper, 0.800 g/t gold and 18.66 g/t silver over 1.01 metres in a 1979 drill hole. Samples of porphyry min-

eralization had typical grades averaging 0.65% copper and up to 11.6 g/t silver with trace amounts of molybdenum. Historic drill holes were only assayed for copper.

Although the Author makes general comparisons to the above mentioned deposit types, the reader is cautioned that the Author cannot verify that these deposits are directly comparable with the mineralization at the Hopper property.

Mineralization

Three types of mineralization have been observed at the Hopper Property. They are sulphide-oxide bearing skarn, intrusive hosted disseminated sulphide and vein- or fracture-hosted sulphide.

The most common style of mineralization is disseminated sulphide within the intrusive rocks. Surface samples from the western part of the stock often exhibit chalcopyrite, pyrite, pyrrohtite, magnetite and molybdenite that occur as fine interstitial disseminations and coarse clots. Minor fracture hosted mineralization is also present consisting of chalcopyrite along hairline to one (1) centimetre fractures healed with quartz. Hydrothermal alteration is sparse along vein selvages.

Eight (8) samples of representative mineralized porphyry material yielded assays between 0.11% and 1.53% copper with up to 11.6 g/t silver. The average of the samples is 0.65% copper. The host rocks were magnetic diorite or granodiorite.

Skarn mineralization is developed near the contact in Nisling Range suite carbonate rocks and the Early Tertiary Ruby Range Suite pluton in the western area of the property at the Hopkins occurrence. Skarn beds range from two (2) to five (5) metres thick. Strike lengths are undetermined as the mineralization does not appear to be continuous through the existing drill holes. The skarns are composed of actinolitediopside or magnetite-garnet. Sulphide mineralization consists of patchy chalcopyrite with lesser pyrite and molybdenite. A surface sample assayed 0.83% copper, 0.096 g/t gold, 15.1 g/t silver and 155 ppm molybdenum.

Epigentic mineralization in the form of quartz-carbonate veining occurs within the intrusive. Quartzcarbonate veins typically parallel the dominant north trending fracture orientation. The quartz is clear to white to smokey and occasionally exhibits weak banding, drusy cavities and brecciation. The veins are commonly mineralized with isolated coarse blebs and cots of chalcopyrite and molybdenite. Assay results from samples collected of these veins were low in copper and precious metals.

4. PROCESSING AND ANALYSIS TECHNIQUES

DATA QUALITY

Both dBdT and calculated B-Field EM data were acquired, in addition to magnetic data. The data quality is deemed acceptable.

PROCESSING

Time Constant: AdTau

The AdTau program calculates the decay time constant (tau) from time domain decay data. The program is termed *AdTau* since rather than using a fixed suite of channels as commonly done, the user sets a noise level and depending on the local characteristics of the data, the program will then select the set of five channels above this noise level. In resistive areas, the earlier channels will tend to be used, whereas in conductive terrains the latest channels available can generally be used. A typical decay fit; in this case the last five channels, are shown to the right in Figure 5. AdTau was calculated for both the dBdT and B-Field data.

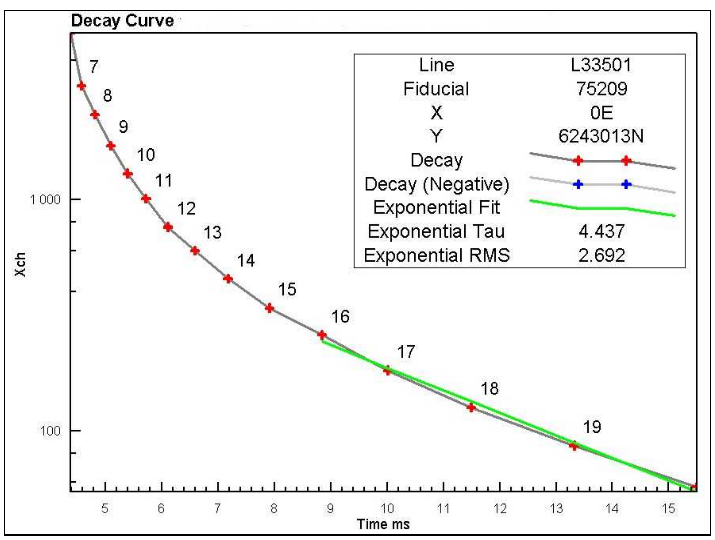


Figure 5: Typical Decay Curve.

Layered-Earth Inversion

The layered-earth inversion (LEI) algorithm models the EM data with a 28-layer earth model (Farquharson and Oldenburg 1993, Ellis 1998), increasing in thickness from the surface to depth in an approximately logarithmic fashion. The first layer was 5 m thick while the deepest was 232 m thick.

A starting model of 1 000 ohm-m (0.001 S/m) was used, with a reference model of 5 000 ohm-m (0.0002 S/m). The reference model is used in the smallness and smoothness portion of the objective function which determines the complexity of the model. Effectively, it is what the program defaults to (at depth) when there is no longer enough information to further refine the inversion outcome.

The results of the inversion are presented in the form of a conductivity depth section (CDS).

Magnetics

In addition to the normal filters available in the Geosoft application, additional processing was done using the Encom PA[1] software and algorithms described by Shi and Butt (2004) – this paper is included in Appendix B (DVD). A variety of enhancements were produced, but one is deemed to be particularly useful in the present study, termed Tilt Angle (Verduzco et al, 2004). This grid is provided as one of the TargetMaps (see Table 9-1 Survey Products).

UBC MAG3D Inversion

The University of British Columbia 3D magnetic data inversion program MAG3DINV, version 4.0, was used for the inversions (Li and Oldenburg, 1996). This is a smooth-model inversion, minimizing an objective function that is a measure of the roughness and intensity of the modeled rock property. It was run with no constraints apart from the observed data and an increased length weight in the vertical direction to assist in creating a geologically accurate model.

Two inversions were run, the first with a starting and reference susceptibility of 0.0 SI. The model from the first inversion was sharpened, then used as the reference for the second inversion.

The UBC 3D inversion produces a density block model, consisting of rectilinear voxels that can be queried by commercially available programs, including Geosoft and Encom PA. Small features in the model below the depth of 1 km are not considered to be meaningful. Only wide features in the original data will produce deep model features.

[1] Encom PA is a product of PbEncom, a unit of Pitney Bowes Software

In general, shallow depth slices mimics the high frequency content of the magnetic data. At deeper depths the susceptibility features appear increasingly larger, typical of smooth objective-function based unconstrained inversions due to the decrease in resolution with depth. As the inversion is a smooth-model inversion, highs and lows are subdued, being spread out over a larger diffuse volume than what may actually be the volume of rock responsible for the anomaly. This suggests that the peak susceptibility values seen in the voxels is an underestimate of the true susceptibility of the rock in those locations.

ANALYSIS TECHNIQUES AND ISSUES

Anomaly Shapes

For discrete plate-like targets, the VTEM system produces two main types of responses; those termed inductively thin or double-peaked responses (DPR) and those termed inductively thick or single-peak responses (SPR). These basic shapes are shown in profile form in Figure 6. No specific economic significance is attached to whether a specific anomaly responds as either one style or another. However, it is possible to better estimate the dip of the conductor with DPR anomalies.

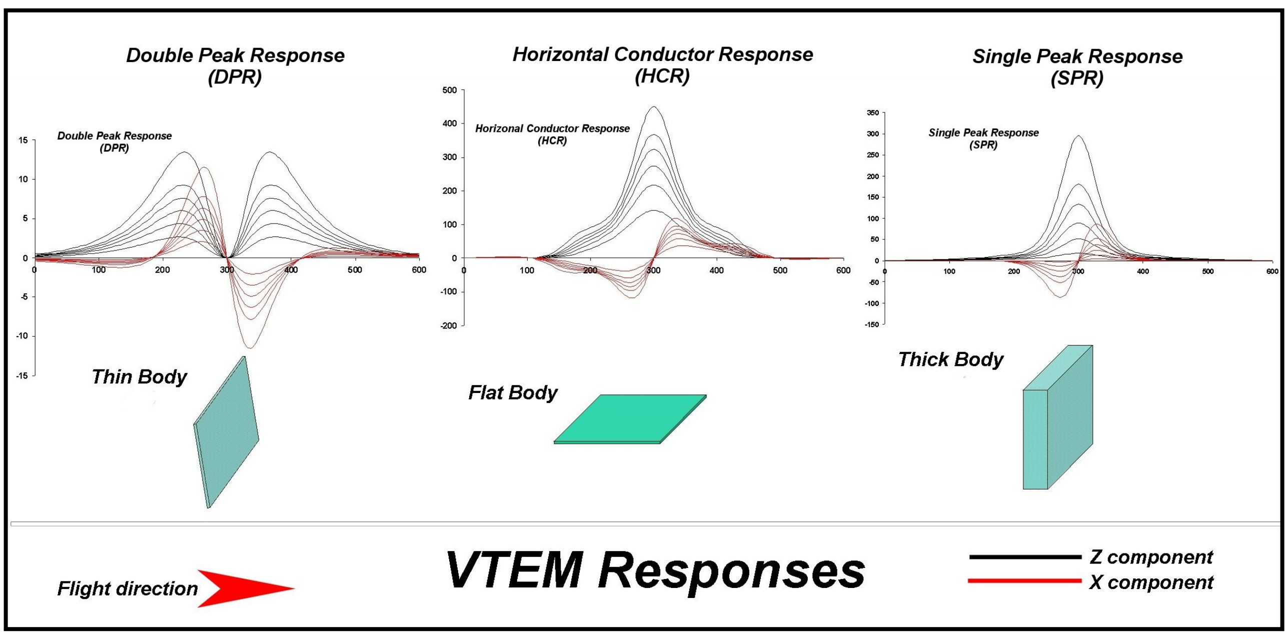


Figure 6: Modeled VTEM Responses.

Merging of data from the two surveys

The 2007 and 2011 VTEM surveys had different transmitter pulse lengths and channel times (see Appendix A), so that it was not possible to simply merge the EM data. AdTau values were calculated separately for each survey and then merged. In general, the channel times were significantly different, but at medium-late times 2007 channel [23] at 1151 µs and 2011 channel [32] at 1161 µs were close enough to directly merge. This merged channel is designated as channel 1156 µs.

Picking

The MultiPlot™ media was the primary means to examine, identify and then rank the anomalies. This overall process is termed anomaly picking and was on a line-by-line basis, with several passes being required to finalize the process.

The discrete VTEM conductors have been categorized as DPR and SPR (as per Figure 6) and subjectively divided into strong, medium and weak based on the amplitudes of the channel responses and AdTau. In some areas, the profiles and LEI show either multiple, close-spaced conductors (or possibly flat-lying conductors) where it has not been possible to differentiate individual conductors – these have been defined as Wide Zones (WZ).

Shallow conductors interpreted to arise from surficial material have also been interpreted. Where the lateral extent is clear these have been categorized as Surficlal conductors. In other cases, the profiles define one edge only and this edge is categorized as an "Edge of surficial conductor".

Target Zones

Groupings of conductors are termed Target Zones or TZ. A TZ is deemed to be a logical grouping of conductors within a data set and is based on an assessment of the distribution of individual conductor picks, plus the magnetic association and any other available geoscience data. The TZ have been prioritized according to their assessed potential to be associated with economic mineralization (Priority 1 highest, Priority 3 lowest).

5. MAGNETIC INTERPRETATION

The TMI data for the Hopper VTEM survey area is shown in Figure 7, with the regional TMI data in the background.

To assist interpretation, the magnetic data was reduced to the pole (RTP) and a number of high-pass filters were applied to remove regional gradients and enhance subtle near-surface features.

The magnetic interpretation is shown in Figure 8. The line work from this map is overlain on images of the RTP, Tilt, Channel 1156 µs, AdTau and published geology in Figures 9 to 13 respectively.

The geophysical responses over the Hopper survey area are relatively poorly correlated with published geology (after Johnson and Timmerman, 1997; and Gordey and Makepeace, 1999) but nevertheless allow for confident extrapolation of some important features of the local geology.

The survey area is reportedly underlain by the late Proterozoic to Paleozoic, Nisling Range Suite comprising undifferentiated schists, quartzites and felsic to intermediate orthogneisses. An assemblage described as marble, graphite and chert underlies a small part of the western area whilst Quaternary overburden covers most of the eastern part. The central area is underlain by the early Tertiary Ruby Range Suite, locally comprising intrusive rocks of diorite to quartz monzonite composition. A series of volcanics dykes, plugs and domes of Eocene age are mapped as the Skukum Assemblage.

The geophysical data allows subdivision of the Nisling Range Suite into three distinct domains, namely the western, central and eastern domain. The western domain underlies the southwest corner of the survey area and is characterized by a subdued magnetic response and relatively strong conductivity. In contrast, the eastern domain is characterized by an elevated magnetic response and resistive signature. The central domain, which underlies the majority of the survey area, consists of a series of NNW-trending sub-domains of more variable magnetic and electromagnetic signature. A relatively shallow ENE dip is indicated by inversion (CDS) models of the EM data and is consistent with a westward-verging assemblage.

A strong magnetic anomaly and coincident resistor in the center of the area corresponds to the Ruby Range intrusive suite. The near surface extent of this intrusion is well defined over an area of about 6 km by 3 km. However, at depth the body appears to extend towards the west, well beyond the confines of the survey boundary. On the basis of more subtle magnetic anomalies, a number of smaller bodies are interpreted to the west and south. These are magnetically distinct and probably represent a separate intrusive and volcanic phase (the late Eocene Skukum assemblage?), potentially representing the shallower parts of the same parent body. Such a setting would favor porphyry-associated mineralization rather than the deeper levels exposed towards the east. Contact metamorphism (and metasomatism) of the country rock within the contact aureole of the main intrusion is suggested by a series of elevated magnetic responses that broadly correspond to the strike of the Nisling Range Suite. These are most pronounced to the west and south of the main intrusion and are suggested as the most favorable sites for skarnification. The Hopkins skarn broadly coincides with a series of discrete conductors and an elevated magnetic response in an area to the SW of the main intrusion. This domain is clearly discordant to the trend of the underlying intrusion.

Faults are interpreted largely on the basis of magnetic discontinuities in the data but are locally supported by abrupt terminations in conductor trends. Most have a NE to NNE trend, normal to the strike of the Nisling Range Suite. The timing of these structures is likely to be synchronous with, or pre-date, the main intrusion and latest-phase of regional shortening. All tend to be confined to the central domain and show limited offsets. A higher density of faults is interpreted near the Hopkins skarn, some of which may extend eastward into the main intrusive body. Such structures potentially played an important role in the focusing of mineralizing fluids during formation of the Hopkins skarn.

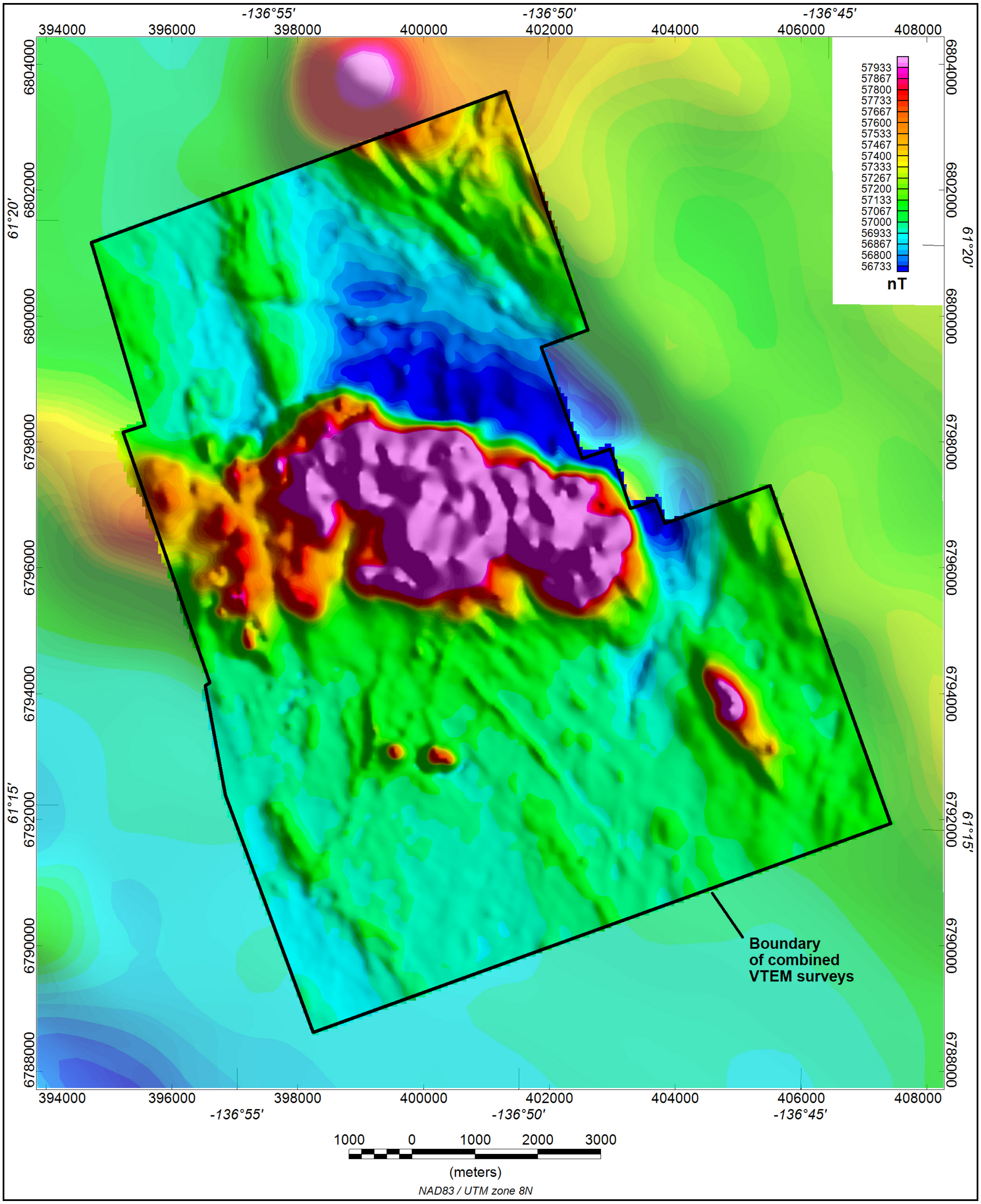


Figure 7: Composite TMI image of both surveys, with regional magnetic image in background.

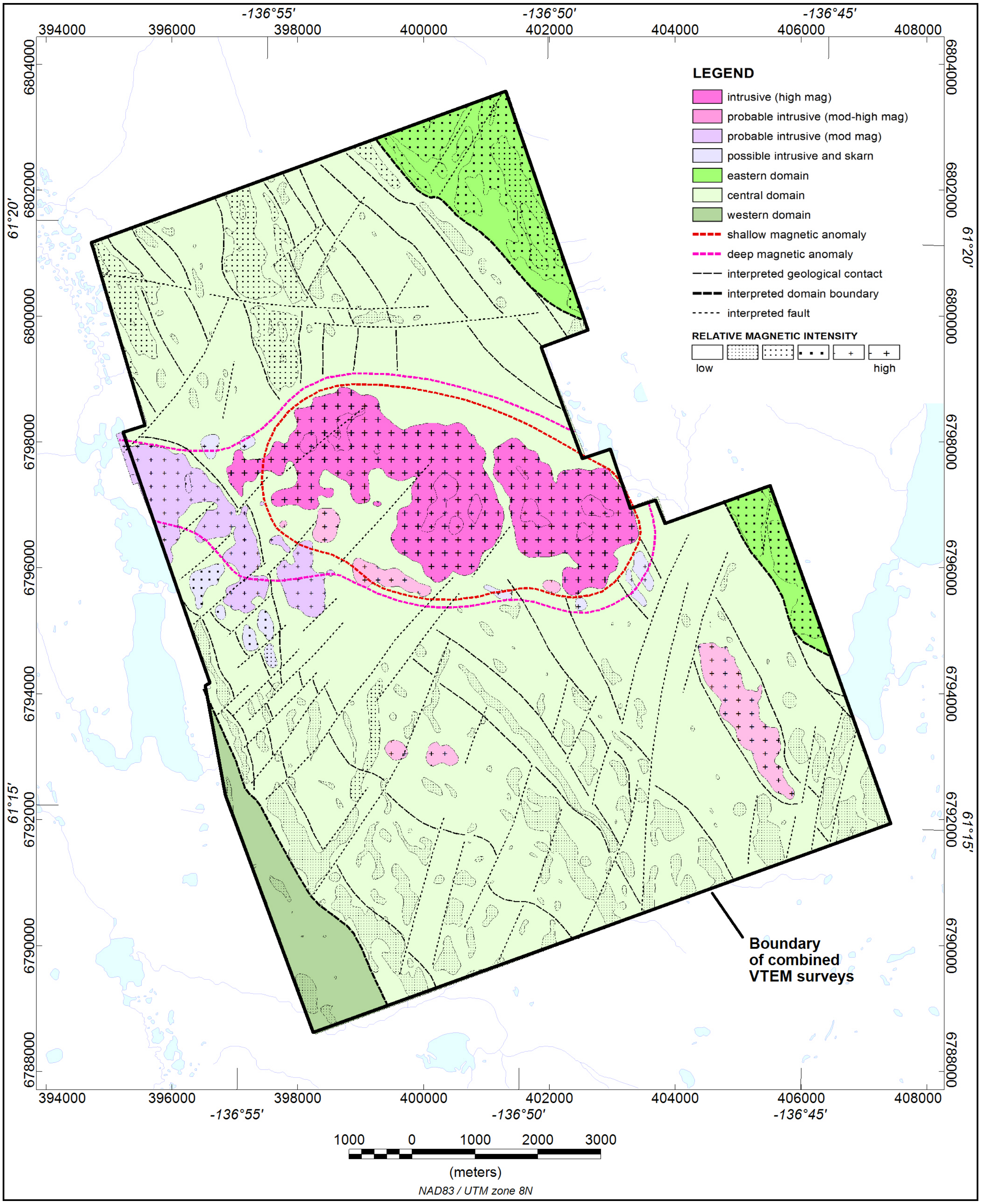


Figure 8: Hopper magnetic interpretation.

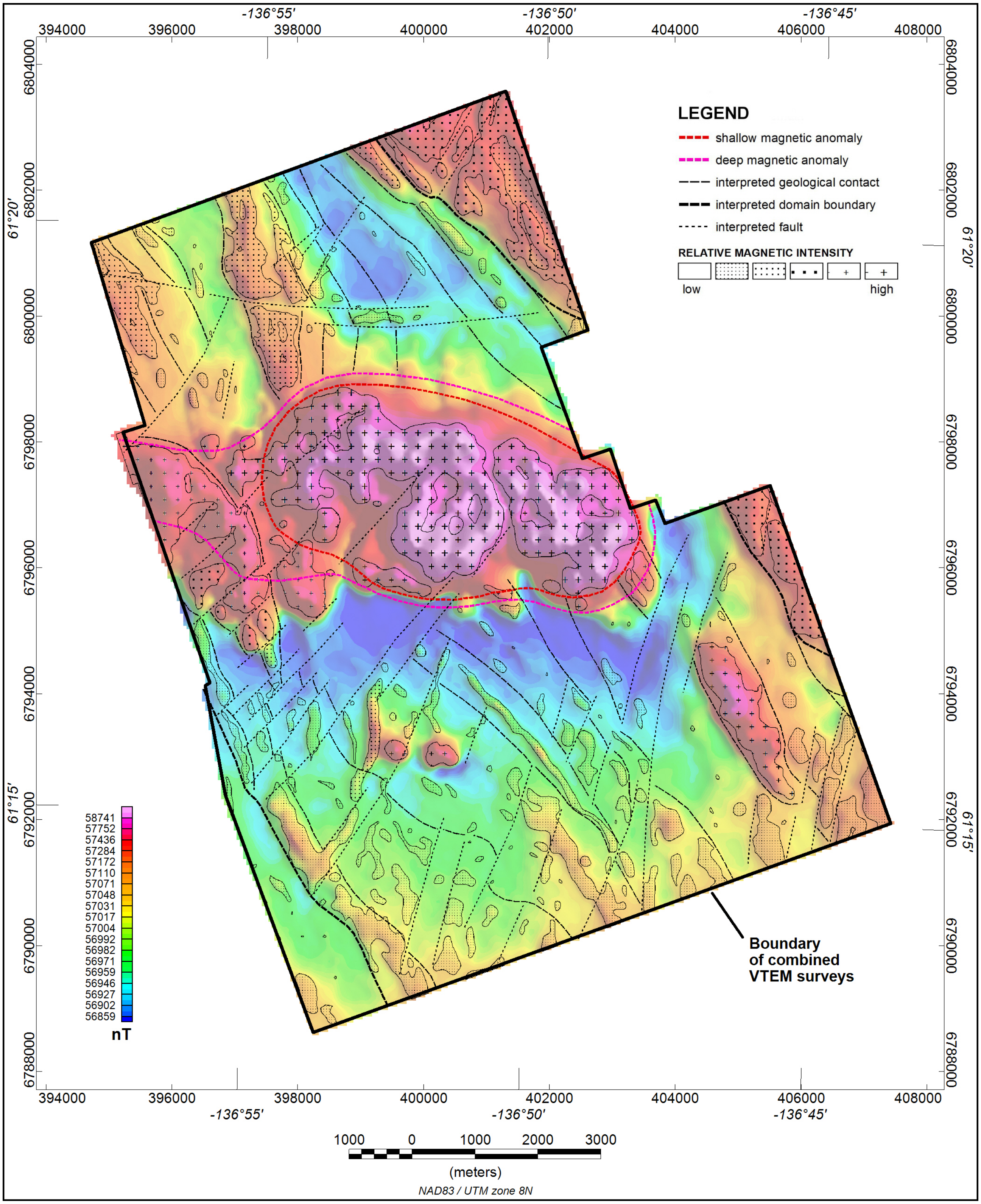


Figure 9: Hopper magnetic interpretation, overlain on RTP image.

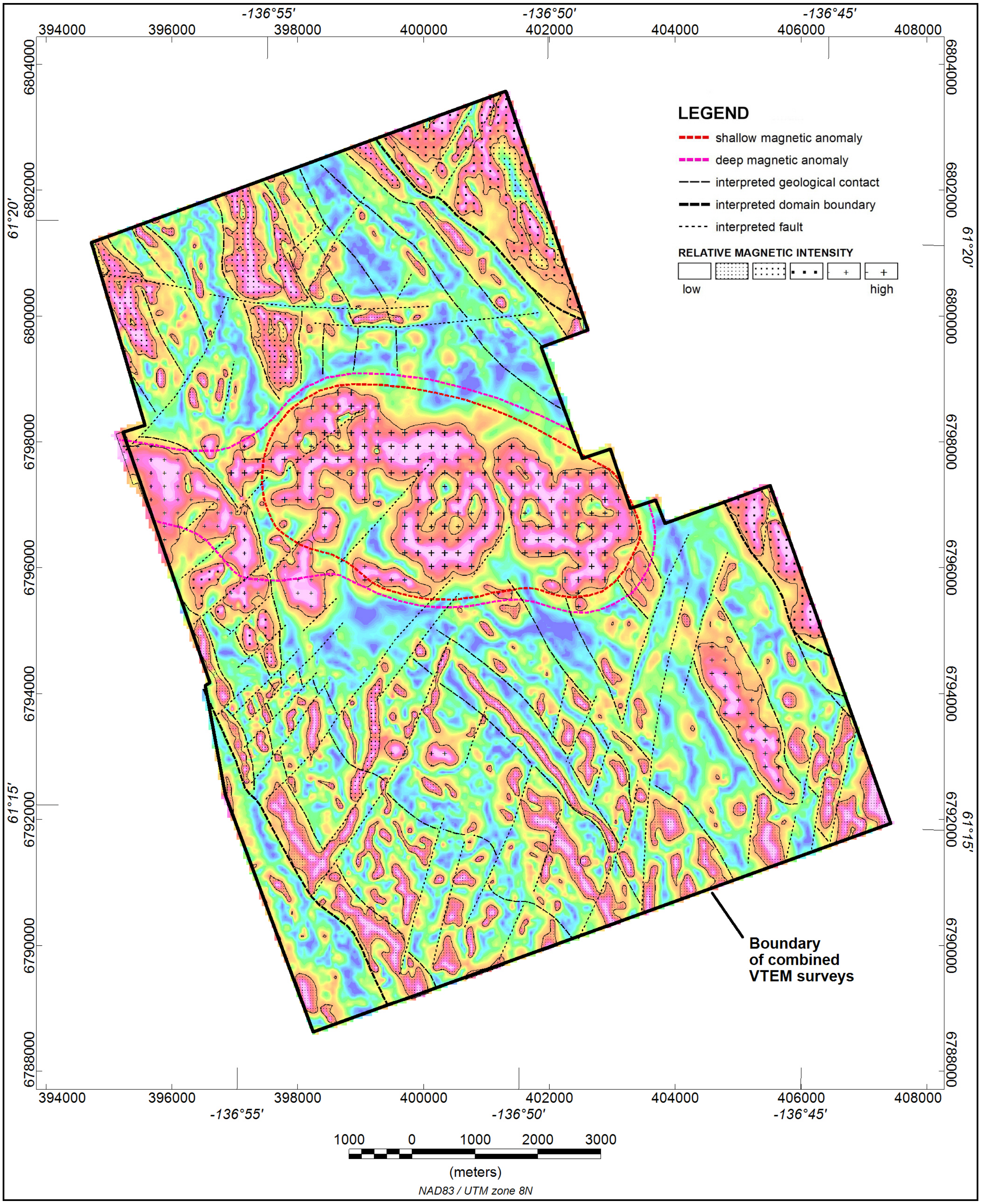


Figure 10: Hopper magnetic interpretation, overlain on Tilt image.

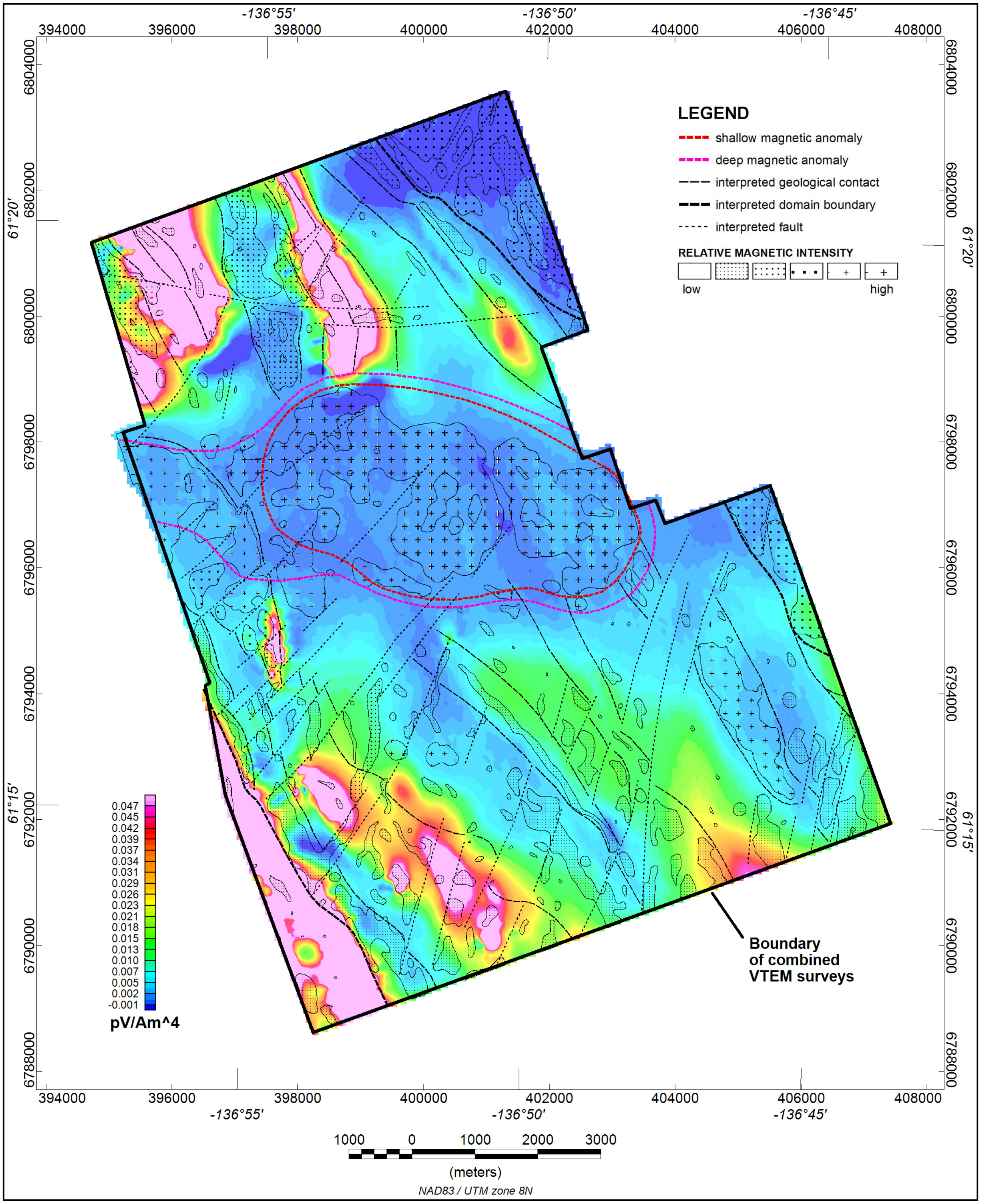


Figure 11: Hopper magnetic interpretation, overlain on dBdT Channel 1156 μs image.

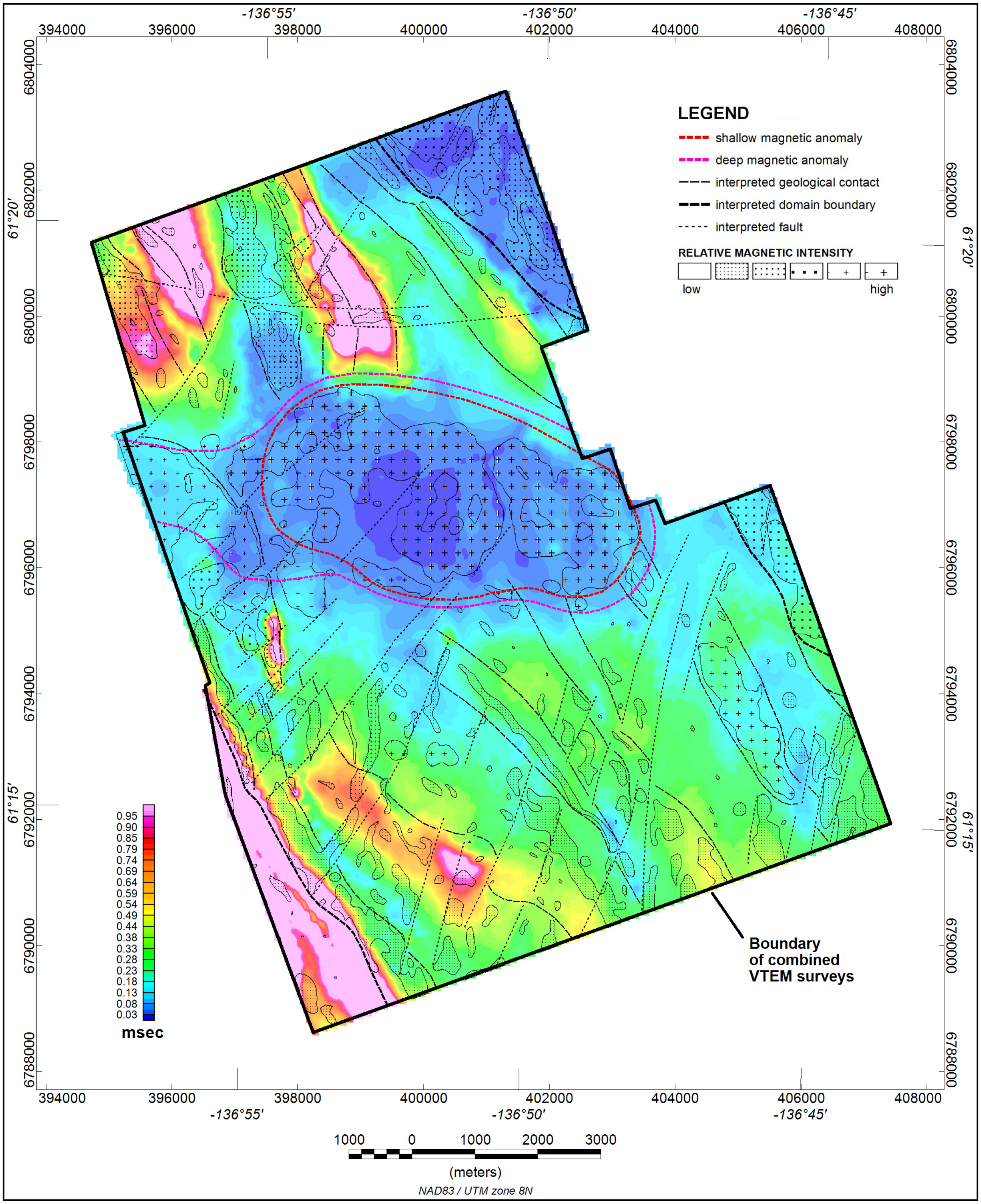


Figure 12: Hopper magnetic interpretation, overlain on AdTau image (generated using SFz).

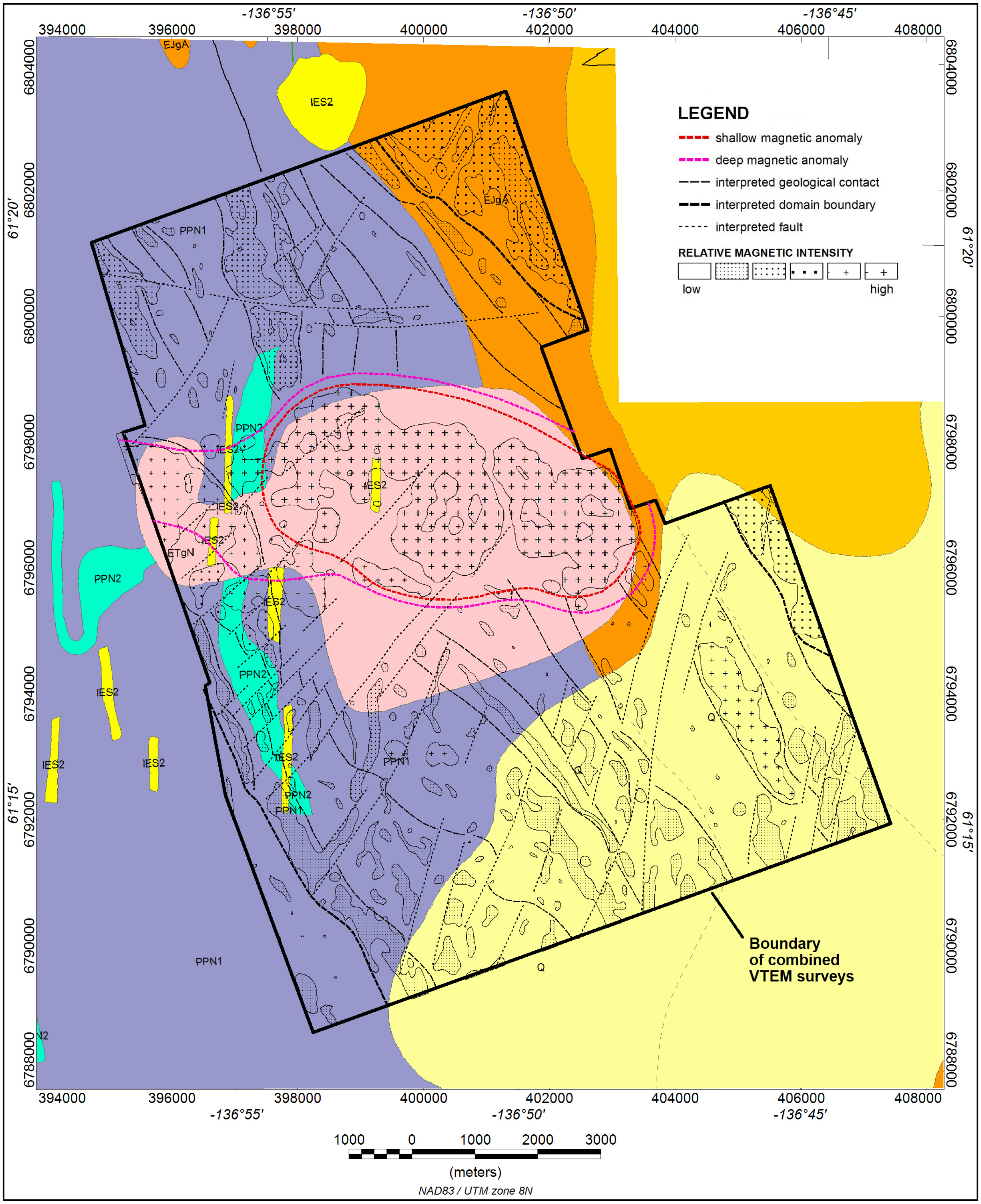


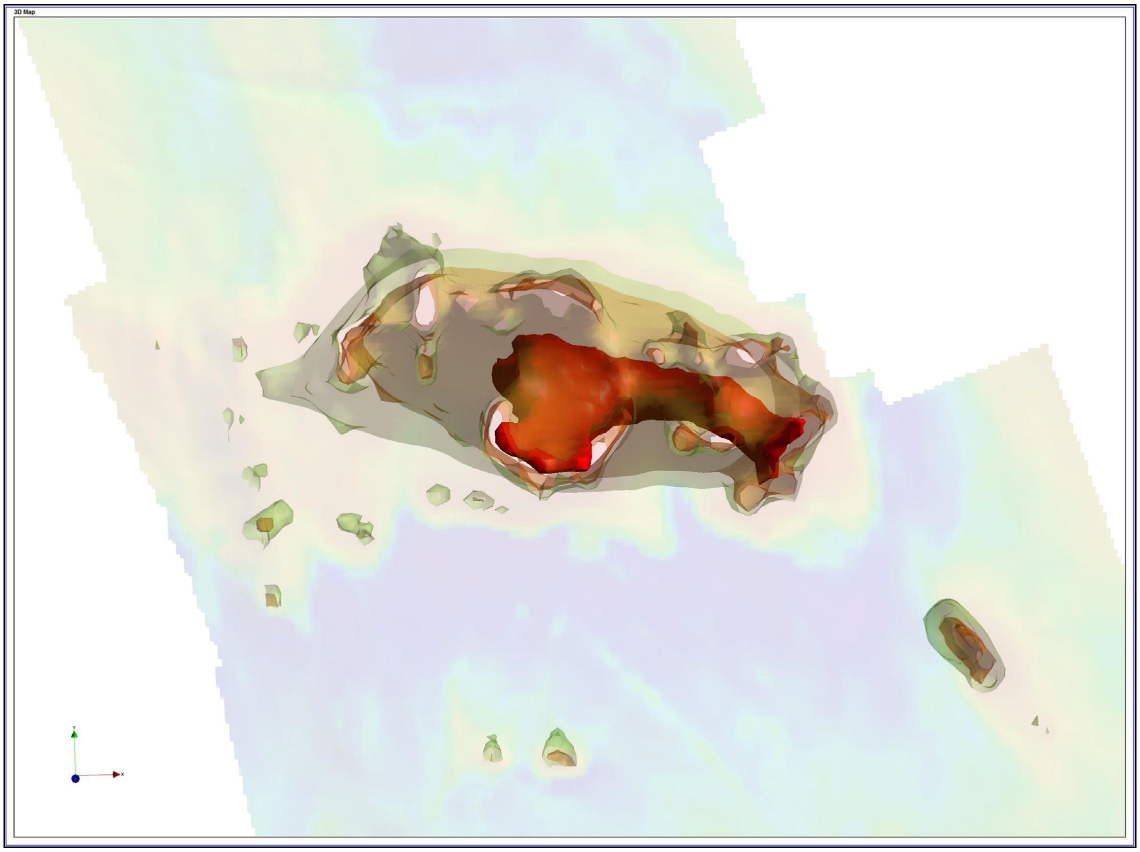
Figure 13: Geology (Gordey and Makepeace 1999) with magnetic interpretation.

6. UBC MAG3D INVERSION

The voxel inversion was run using 100 x 100 x 50 m (XYZ) voxels.

The resulting voxel model is best viewed using a 3D viewer so that spatial relationships can be better appreciated. Two static views are shown in Figure 14, looking down and looking oblique northeast respectively. Three susceptibility thresholds are shown: the non-transparent red surface corresponds to 0.20 SI, the semi-transparent surface to 0.06 SI and the almost transparent surface to 0.03 SI.

Voxel inversions generally provide useful information on the depth and spatial distribution of the shallow magnetic material, but dips generally appear steep regardless of the geology and so are not reliable.



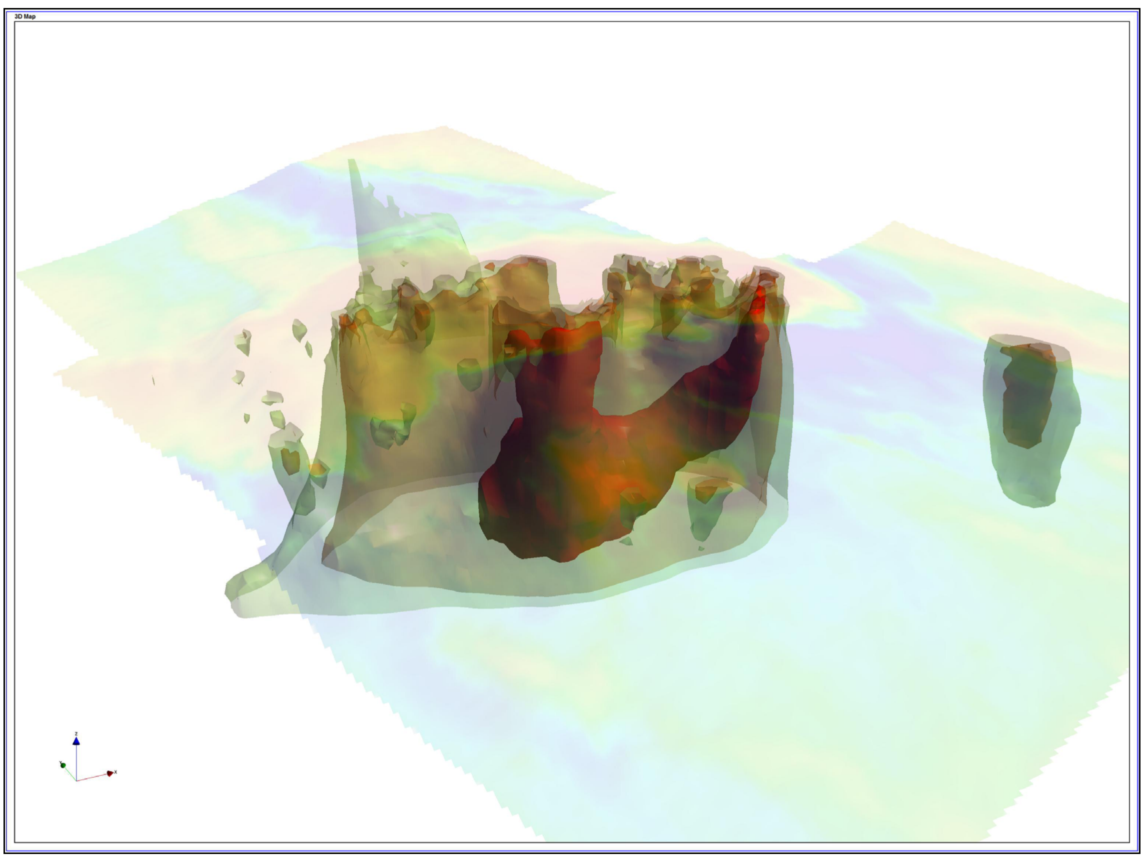


Figure 14: MAG3D voxel model: Top – looking down. Bottom – looking NE.

7. EM INTERPRETATION

All the picked conductors and defined Target Zones (TZ) are shown overlain on the following images:

- Lakes, rivers and claims (Figure 15)
- RTP (Figure 16)
- RTP Tilt (Figure 17)
- Channel 1156 µs amplitude (Figure 18)
- AdTau (generated using SFz) (Figure 19)
- Geology (Figure 20)

In this area, TZ have been defined as having geophysical characteristics similar to those observed in the vicinity of the Hopper skarns, viz. weak-strong conductors, possibly correlating with a narrow, weak magnetic anomaly, close to a magnetic contact between intrusives and metasediments, particularly marble.

Some of the conductors picked as surficial correlate with lakes and topographic lows, and may be due to conductive lake bottom sediments. Others occur on topographic highs and may possibly be due to thicker patches of glacial sediments.

The primary characteristics of the TZ are listed in Table 7-2. Twenty-seven TZ have been defined, designated A-ZZ. Of these, four have been rated as Priority 1 (high priority), ten as Priority 2 and thirteen as Priority 3 (low priority). The higher priority TZ comprise conductors within or close to mapped marble, underlain or close to interpreted magnetic intrusives, which could be skarns. Other conductors well away from the intrusives may be intra-sedimentary conductors.

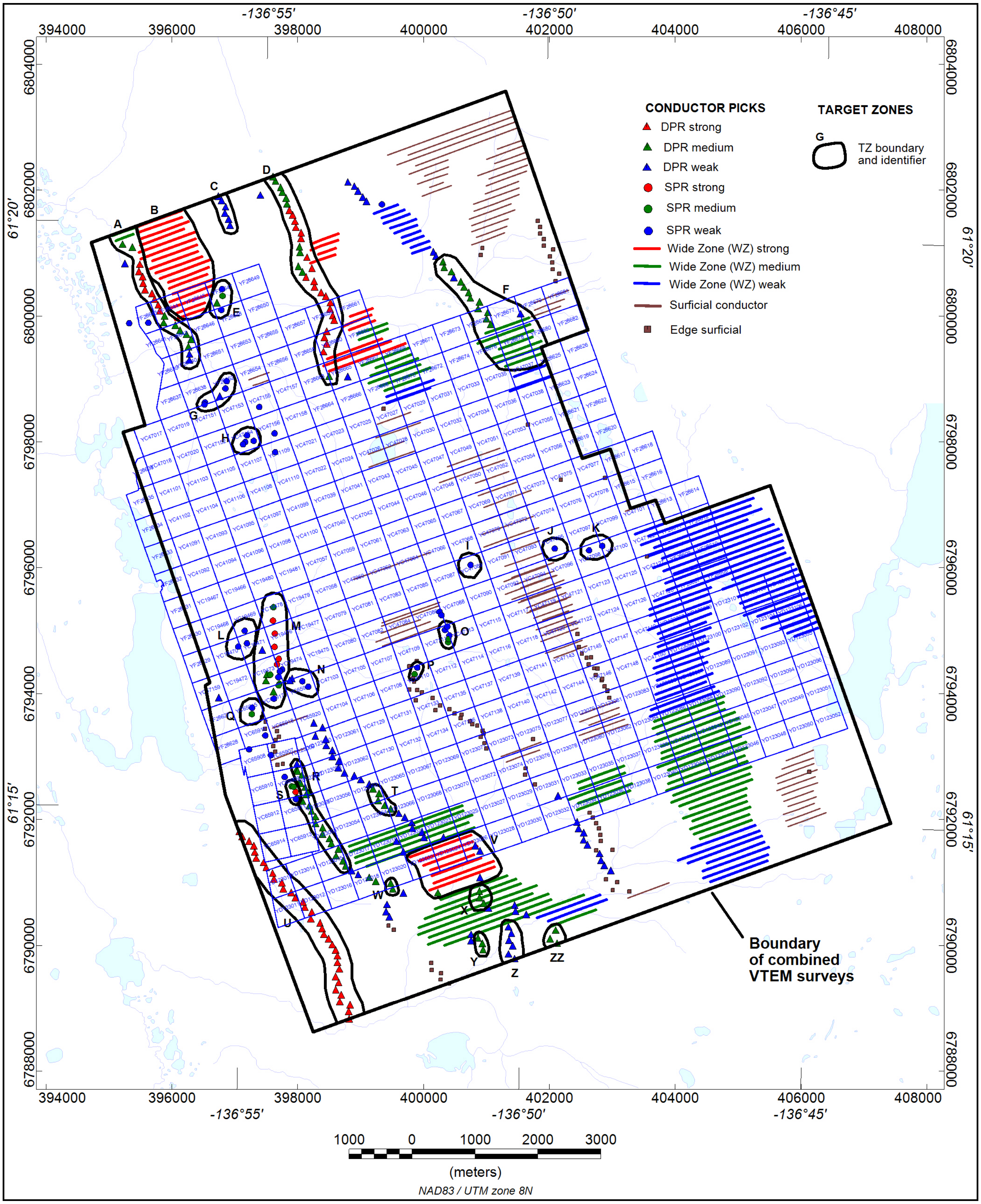


Figure 15: Conductor picks and TZ, overlain on lakes and rivers, with claims.

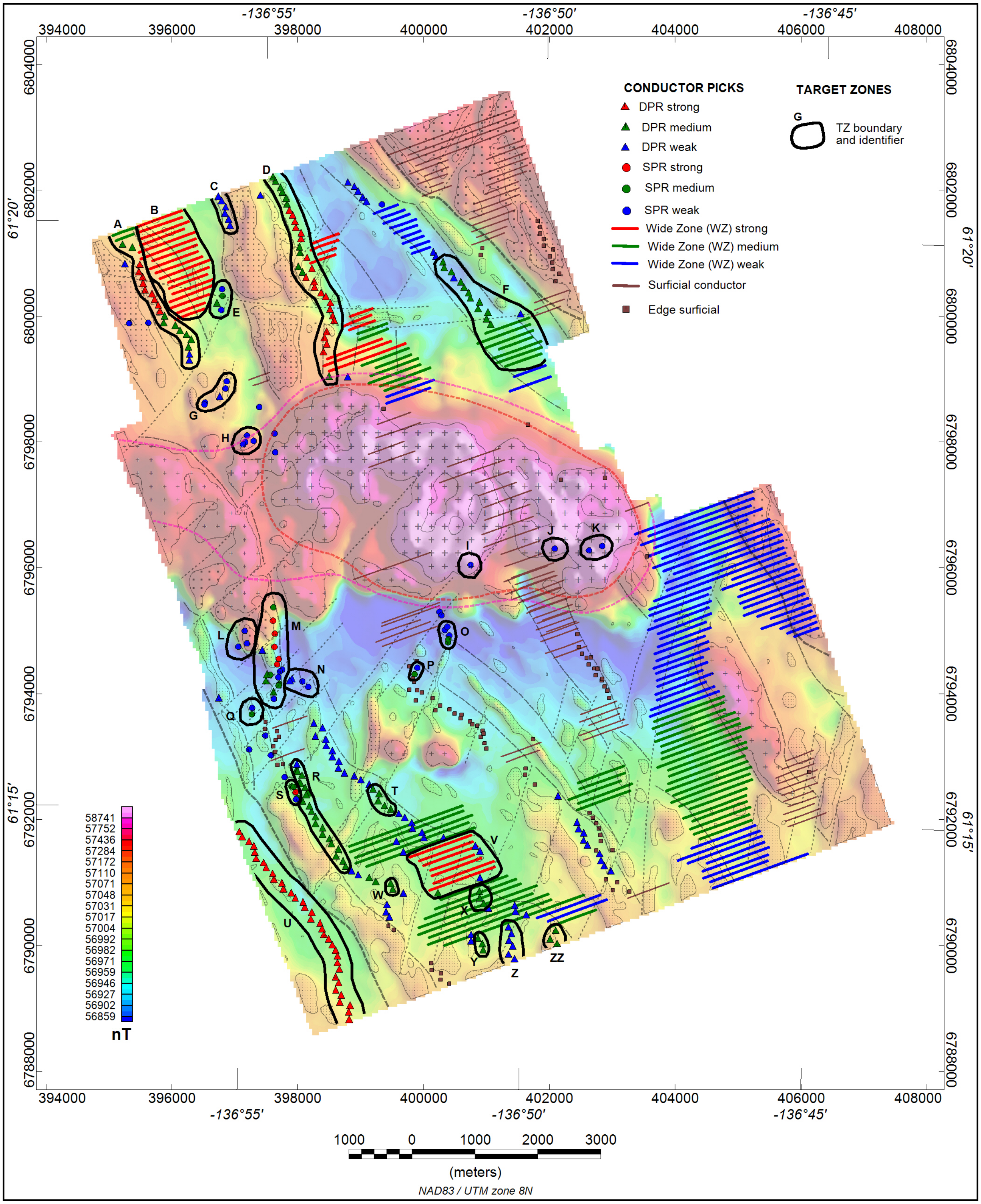


Figure 16: Conductor picks and TZ, overlain on RTP image.

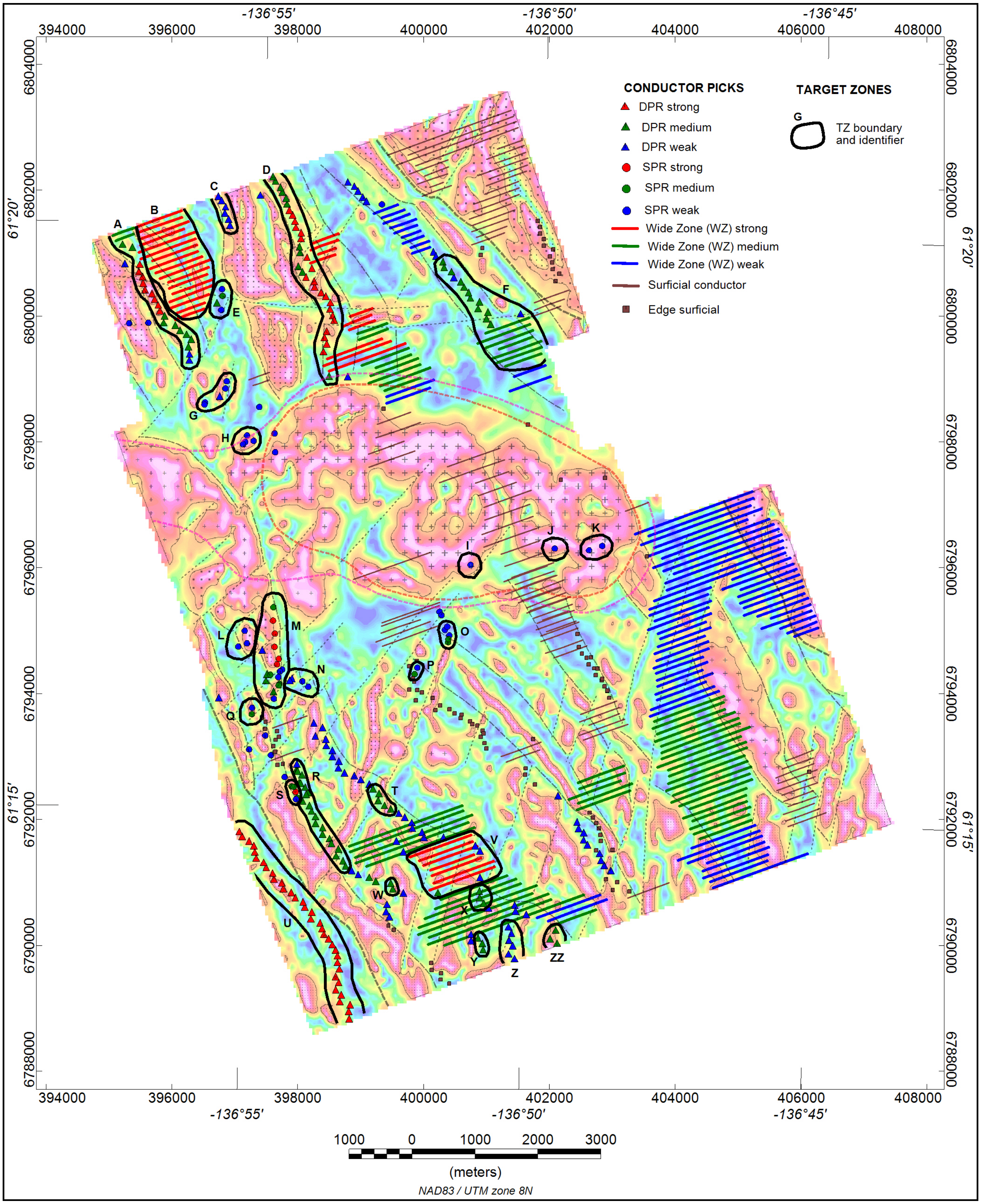


Figure 17: Conductor picks and TZ, overlain on RTP Tilt image.

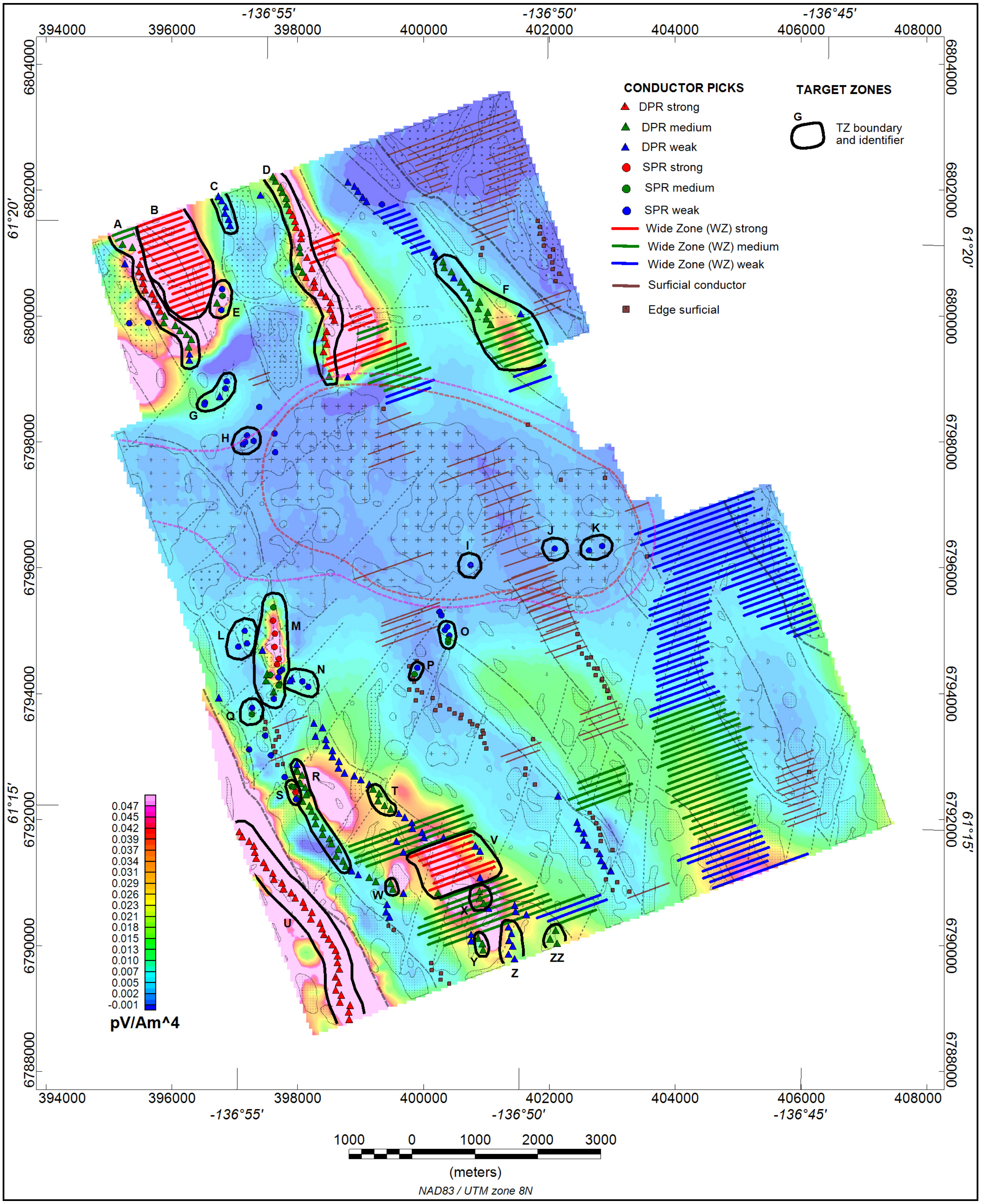


Figure 18: Conductor picks and TZ, overlain on dBdT Channel 1156 μs image.

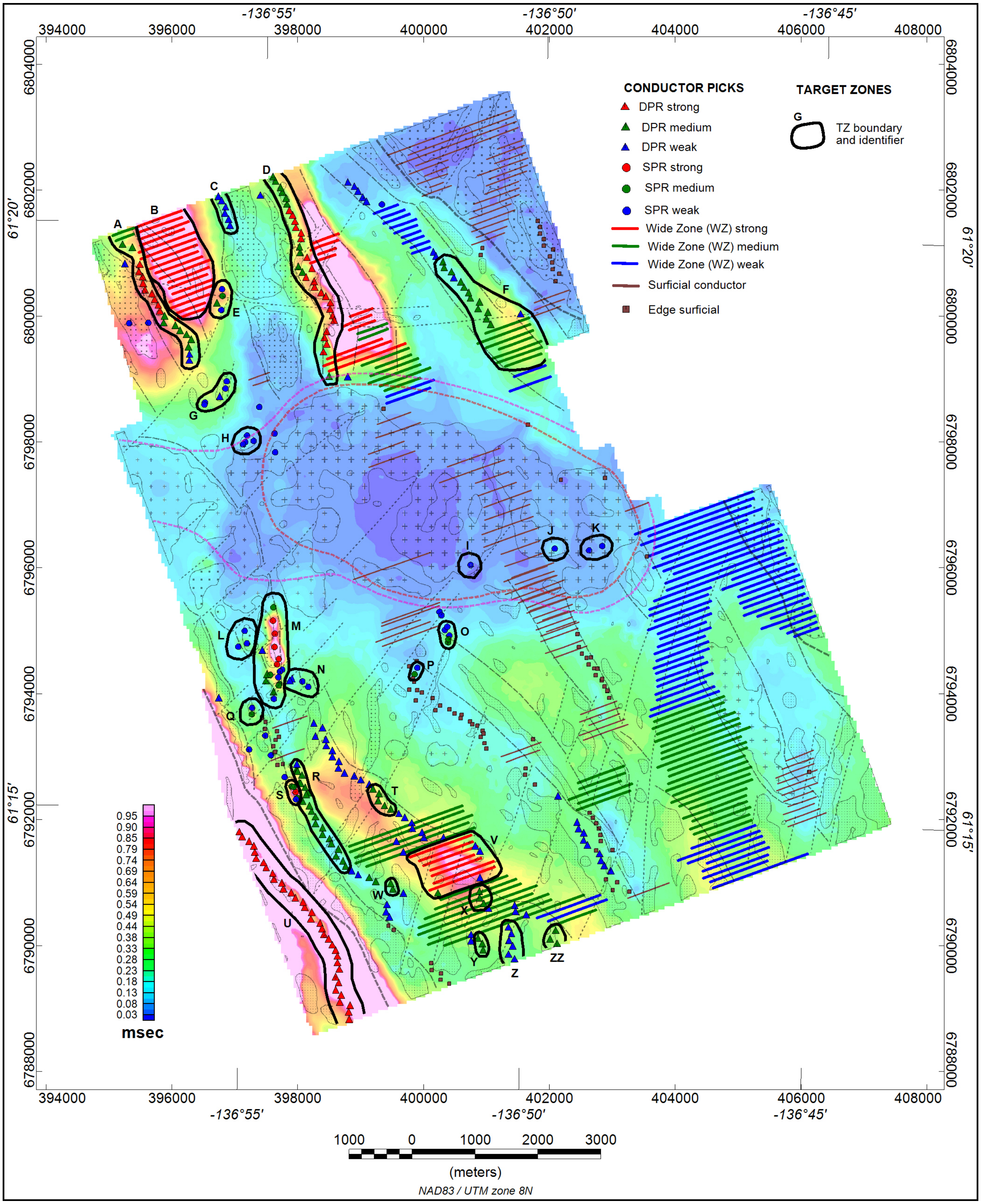


Figure 19: Conductor picks and TZ, overlain on AdTau image (generated using SFz).

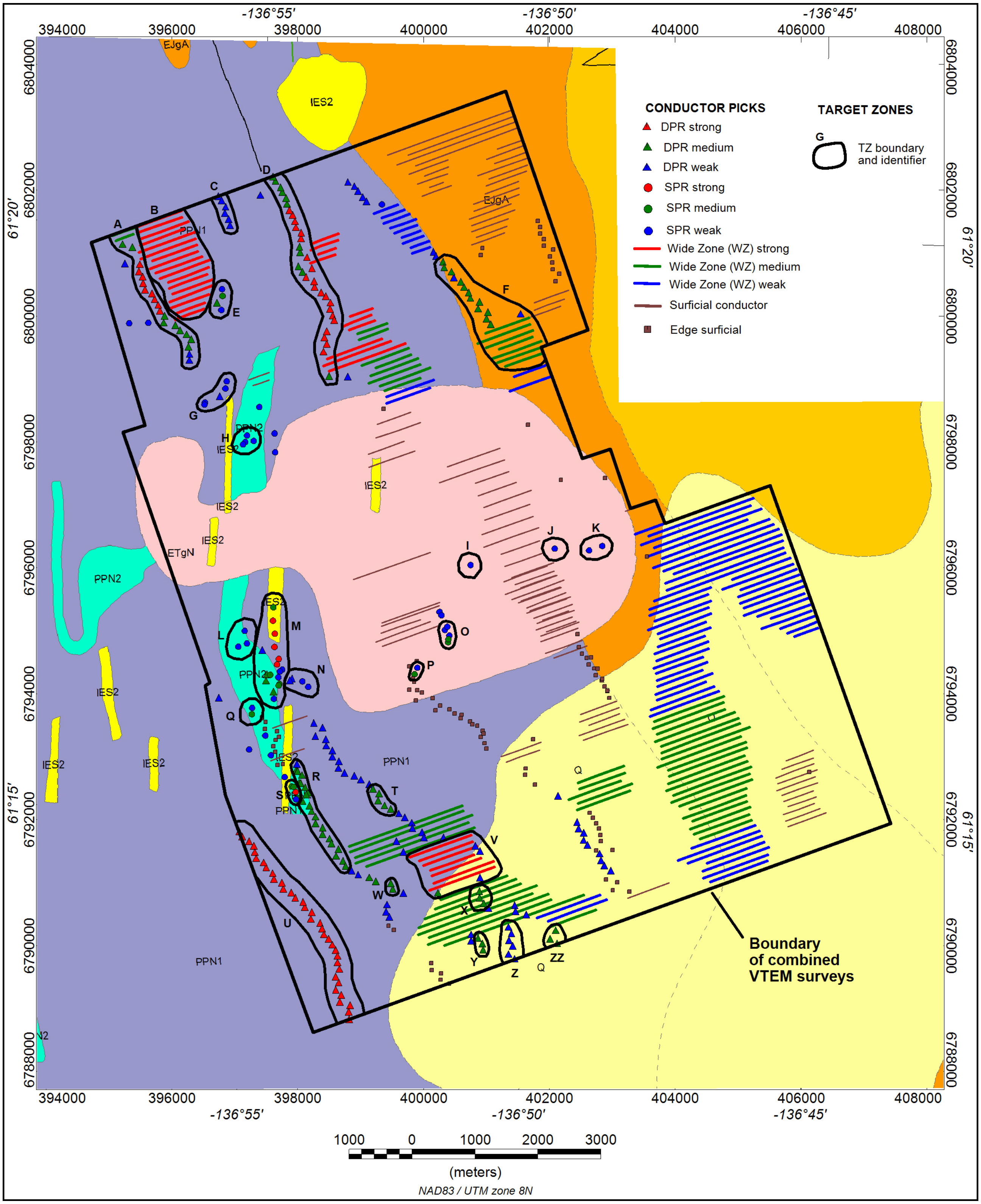


Figure 20: Conductor picks and TZ, superimposed on geology.

Table 7-2: Listing of TZ for Hopper VTEM.

TZ	Priority	Conductors	General dip	Mag correlation	Geology	Comments
A	2	Mostly strong-weak DPR, over strike length of 2500 m.	Shallow dip to east.	Semi-concordant with magnetic trends.	PPN1. Upper Proterozoic to Paleozoic Nisling Assemblage.	Conductor open to north, beyond survey boundary. Long strike length and shallow dip suggests that this conductor is a unit within metasediments.
B	3	Strong WZ conductors, over strike length exceding 1600 m.	Appears to be shallow to the east.	Semi-concordant with magnetic trends.	PPN1. Upper Proterozoic to Paleozoic Nisling Assemblage.	Conductor open to north, beyond survey boundary. Long strike length and shallow dip suggests that this conductor is a unit within metasediments.
C	3	Weak DPR, over strike length of 600 m.	Probably shallow to west.	On west flank of magnetic high.	PPN1. Upper Proterozoic to Paleozoic Nisling Assemblage.	Conductor open to north, beyond survey boundary. Relatively weak. Probably a unit within metasediments.
D	3	Strong-medium DPR, over strike length of 3300 m.	Steep - shallow east.	Mostly on east flank of magnetic high. South end of conductor lies close to intrusive contact.	PPN1. Upper Proterozoic to Paleozoic Nisling Assemblage.	Conductor open to north, beyond survey boundary. Relatively strong conductors. Probably a unit within metasediments.
E	2	1 medium DPR, 1 medium SPR and 2 weak SPR.	Probably steep.	Magnetic low.	PPN1. Upper Proterozoic to Paleozoic Nisling Assemblage.	Short strike length conductor on east flank of TZ B (broad conductive zone).
F	3	Medium-weak DPR at north end and medium WZ at south end.	Appears steep to east in the north and shallow-dipping in the south.	Correlates with magnetic low in the north and a weak, broad magnetic high in the south.	EjgA. Early Jurassic granodiorite / diorite / monzodiorite. In north, close to contact with PPN1. In south, close to contact with ETgN.	Overall strike length of 2200 m.
G	3	3 weak SPR and 1 weak DPR.	Appears steep.	Appears to correlate with local magnetic low, within broader mag high.	PPN1. Upper Proterozoic to Paleozoic Nisling Assemblage.	Very weak conductor.
H	1	2 weak SPR on each of 2007 and 2011 VTEM surveys.	Appears steep.	On edge of strong magnetic high, interpreted to be buried intrusive.	PPN2. Upper Proterozoic/Paleozoic marble.	Weak conductors, but correlates with anomalous Au, Cu and Mo geochemistry. Lies within marble, close to intrusive contact and thus is possible skarn.Therefore upgraded.
I	3	1 weak SPR.	Probably steep.	Within strong magnetic high, interpreted to be subcropping or buried intrusive.	ETgN. Early Tertiary - Nisling Range Suite	Very weak. No geochemical samples in this vicinity.

TZ	Priority	Conductors	General dip	Mag correlation	Geology	Comments
J	3	1 weak SPR.	Probably steep.	Within strong magnetic high, interpreted to be subcropping or buried intrusive.	ETgN. Early Tertiary - Nisling Range Suite.	Very weak. No geochemical samples in this vicinity.
K	3	2 weak SPR. Very narow, so must be at surface.	Probably steep.	Within strong magnetic high, interpreted to be subcropping or buried intrusive. Correlate with narrow, discrete magnetic highs and may be cultural.	ETgN. Early Tertiary - Nisling Range Suite.	Probably cultural (buildings etc.).
L	2	3 weak SPR.	Probably steep.	On edge of strong magnetic high, interpreted to be subcropping or buried intrusive.	PPN2. Upper Prote-rozoic/Paleozoic marble.	Basically one line conductor. Eastern conductor on Line 3140 possibly tested by Drill hole D-11-05. Au, Cu and weak Mo geochemical anoma-lies in vicinity.
M	1	Mostly strong-weak SPR, over strike length of 1500 m.	Probably steep.	On edge of strong magnetic high, interpreted to be subcropping or buried intrusive.	North end in IES2 (Late Eocene - Skukum Assemblage, felsic volcanic dykes, plugs, domes, lacco-liths and flows). Central section in PPN1 and south in PPN2.	Encompasses Hopkins skarn. Conductor trend correlates with weak Au. Stronger con-ductors at northern end corre-late with stronger Cu and Mo geochemistry. Conductors in central portion of TZ may have been drill tested, but most holes appear to have been collared too far west. Good conductors in north and south remain untested.
N	2	2 weak DPR and 2 weak SPR.	Indeterminate.	No obvious direct mag correlation. The TZ lies close to southern boundary of intrusive.	PPN1. Upper Prote-rozoic to Paleozoic Nisling Assemblage.	Weak, but discrete conductor on east side of TZ
O	2	2 medium and 3 weak SPR.	Probably steep.	Possible weak mag response. Close to edge of strong magnetic high, interpreted to be subcropping or buried intrusive.	ETgN. Early Tertiary - Nisling Range Suite	Weak conductors, but in favorable geological environ-ment.
P	2	1 medium and 1 weak SPR.	Probably steep.	No obvious direct mag correlation. The TZ lies close to southern boundary of intrusive.	ETgN. Early Tertiary - Nisling Range Suite	Weak conductors, but in favorable geological environ-ment.
Q	2	1 medium and 1 weak SPR.	Probably steep.	Correlates with linear mag high.	PPN2. Upper Prote-rozoic/Paleozoic marble.	Short strike length, but mag-netic - so higher priority.
R	1	Mostly medium DPR, over strike length of 2000 m.	Shallow-dipping to east.	Magnetic low.	Northern end corre-lates with contact between PPN1 and PPN2 (marble). Southern end lies within PPN1.	This conductor has similar characteristics and lies in similar geological environment as TZ M, which has been extensively drilled. Therefore high priority.

TZ	Priority	Conductors	General dip	Mag correlation	Geology	Comments
S	1	1 high, 3 medium and 1 weak SPR.	Probably steep.	Flat magnetics.	Within PPN2 (marble) close to contact with IES2.	This conductor has similar characteristics and lies in similar geological environment as TZ M, which has been extensively drilled. Therefore high priority.
T	3	5 medium DPR.	Shallow-dipping to east.	No clear magnetic signature.	PPN1.	More conductive section of longer conductor. May be stratigraphic conductor within metasediments.
U	3	Strong DPR over strike length of 3500 m (open at both ends).	Shallow to steep east.	Conforms with magnetic trends, but no clear magnetic signature. Sections correlate with weak magnetic highs.	PPN1.	Probably stratigraphic conductor within metasediments.
V	3	Strong WZ, over strike length of 800 m.	Probably shallow to east.	Flat magnetics.	PPN1 (southern section covered by Quaternary.	More conductive, broad section within longer conductive trend. Probably more conductive lithology within metasediments.
W	2	2 medium DPR.	Shallow-dipping to east.	Mag low.	PPN1.	Locally stronger and well-defined conductor, on same conductive trend as TZ R and TZ S.
X	2	3 medium DPR.	Shallow-dipping to east.	Mag low.	Quaternary, probably covering PPN1.	Locally stronger and well-defined conductor, on same conductive trend as TZ V and TZ T. Possibly more conductive lithology within metasediments.
Y	2	4 medium DPR.	Shallow-dipping to east.	Mag low.	Quaternary, probably covering PPN1.	Discrete conductor within overall conductive zone.
Z	3	6 weak DPR (open to south).	Shallow-dipping to east.	Mag low.	Quaternary, probably covering PPN1.	Discrete conductor within overall conductive zone.
ZZ	3	3 medium DPR (open to south).	Shallow-dipping to east.	East side of linear mag high.	Quaternary, probably covering PPN1.	Discrete conductor within overall conductive zone.

8. HOPKINS DETAIL AREA

A map of the Hopkins area (after Stroshein 2011) showing gold soil geochemical results is shown in Figure 21. Figure 22 shows conductor picks, TZ and magnetic interpretation overlain on the previous figure. Similar pairs of figures for copper and molybdenum soil geochemistry are shown in Figures 23 to 26.

The following correlations between the soil geochemistry and the geophysics have been observed:

- TZ M correlates with the Hopkins area, where a number of historic diamond and percussion drill holes have tested skarn mineralization. The conductors extend over a strike length of almost 1500 m and it appears that the drill holes have not fully tested the conductors. Copper geochemical anomalies correlate with the central portion of the conductors, but gold geochemical anomalies are weak and peripheral. Relatively strong molybdenum anomalies correlate with the northern end of the TZ, north of most of the drill holes.
- TZ L lies immediately west of TZM, but has shorter strike length of 500 m. Weak-moderate gold and copper geochemical anomalies correlate with these conductors, but molybdenum anomalies are lacking.
- TZ H lies at the northern end of a relatively large area of copper anomalies, approximately 2500 m in length north-south. Several gold and weak molybdenum anomalies also occur in this area. However, the conductors are weak and have overall strike length of only 250 m.
- Significant gold, copper and molybdenum geochemical anomalies extending over the area approximately 2000 m south of TZ H do not have any significant conductors.
- The soil geochemistry coverage is limited and does not cover most of the other TZ.
- Weak gold and copper anomalies correlate with the southern end of TZ D.
- A line of copper geochemistry crosses TZ G, but no significant anomalies are evident (no gold or molybdenum assays were run).
- No gold or molybdenum geochemistry is available in the areas of TZ I, J, K, N, O, P, Q, R, S or T.
- Single lines of copper geochemistry traverse, or lie close to, TZ N, O, P, Q and R, but no significant anomalies correlate with the conductors.

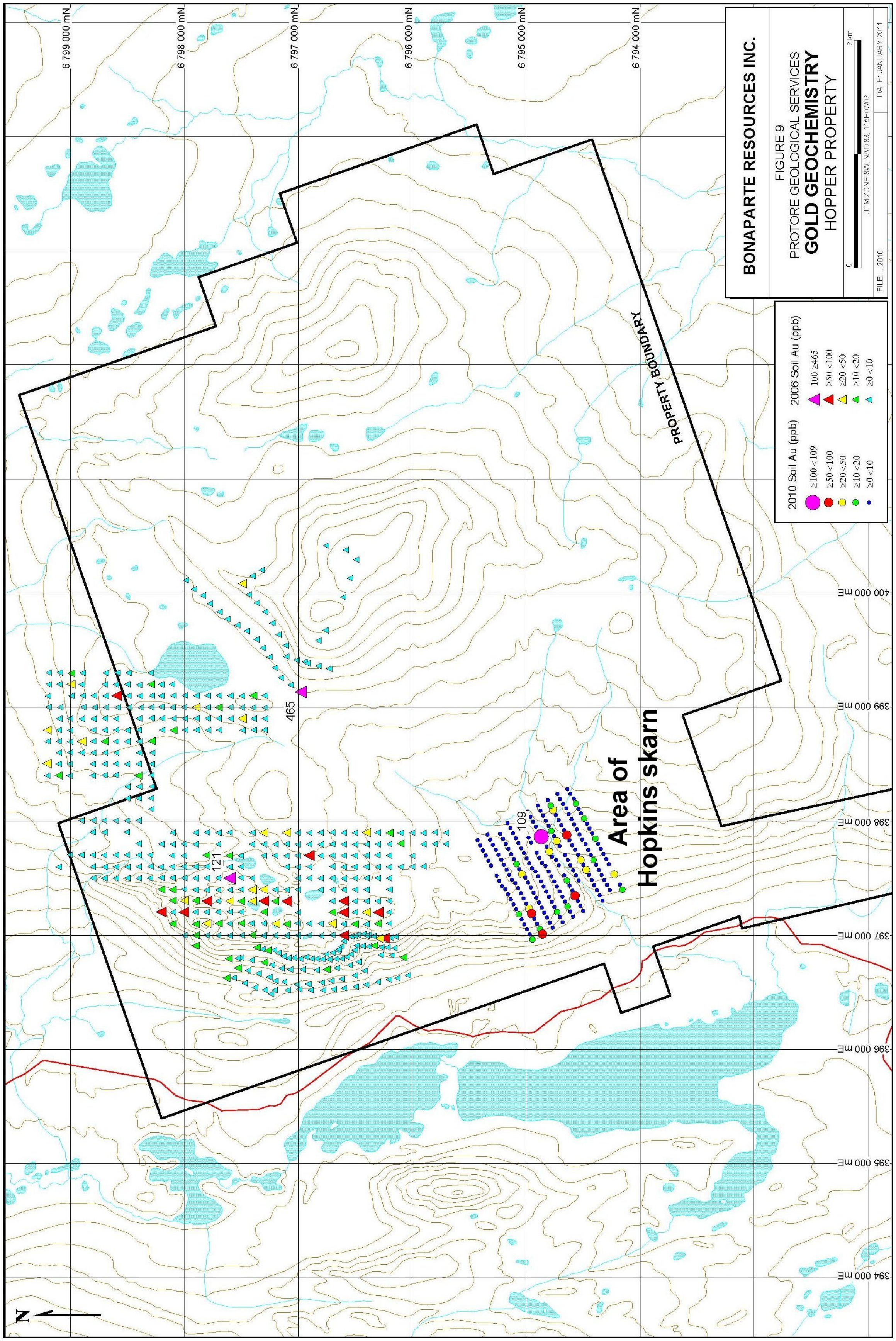


Figure 21: Hopkins Area – Gold geochemistry (after Stroshein 2011).

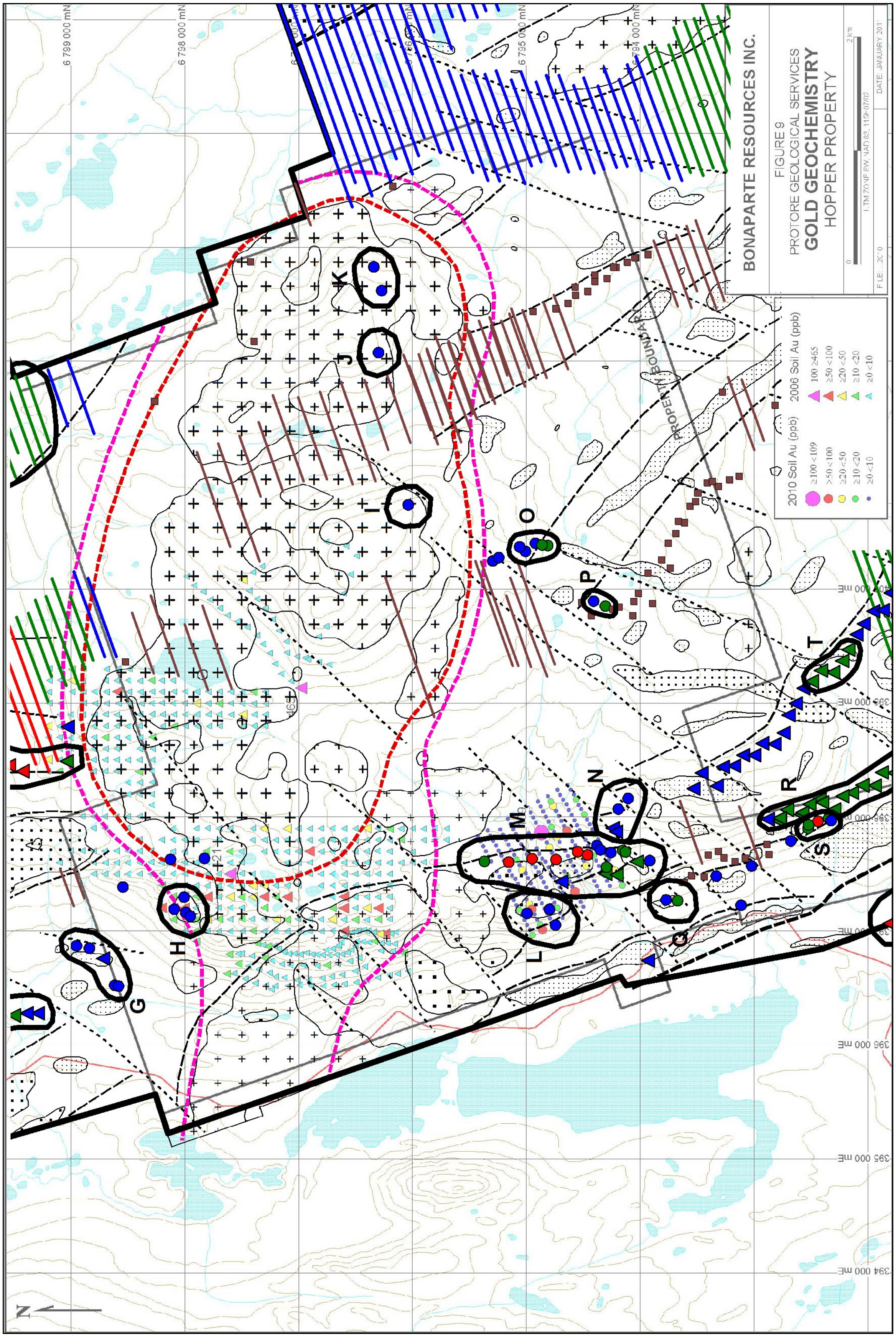


Figure 22: Hopkins Area – conductor picks, TZ and magnetic interpretation overlain on gold geochemistry.

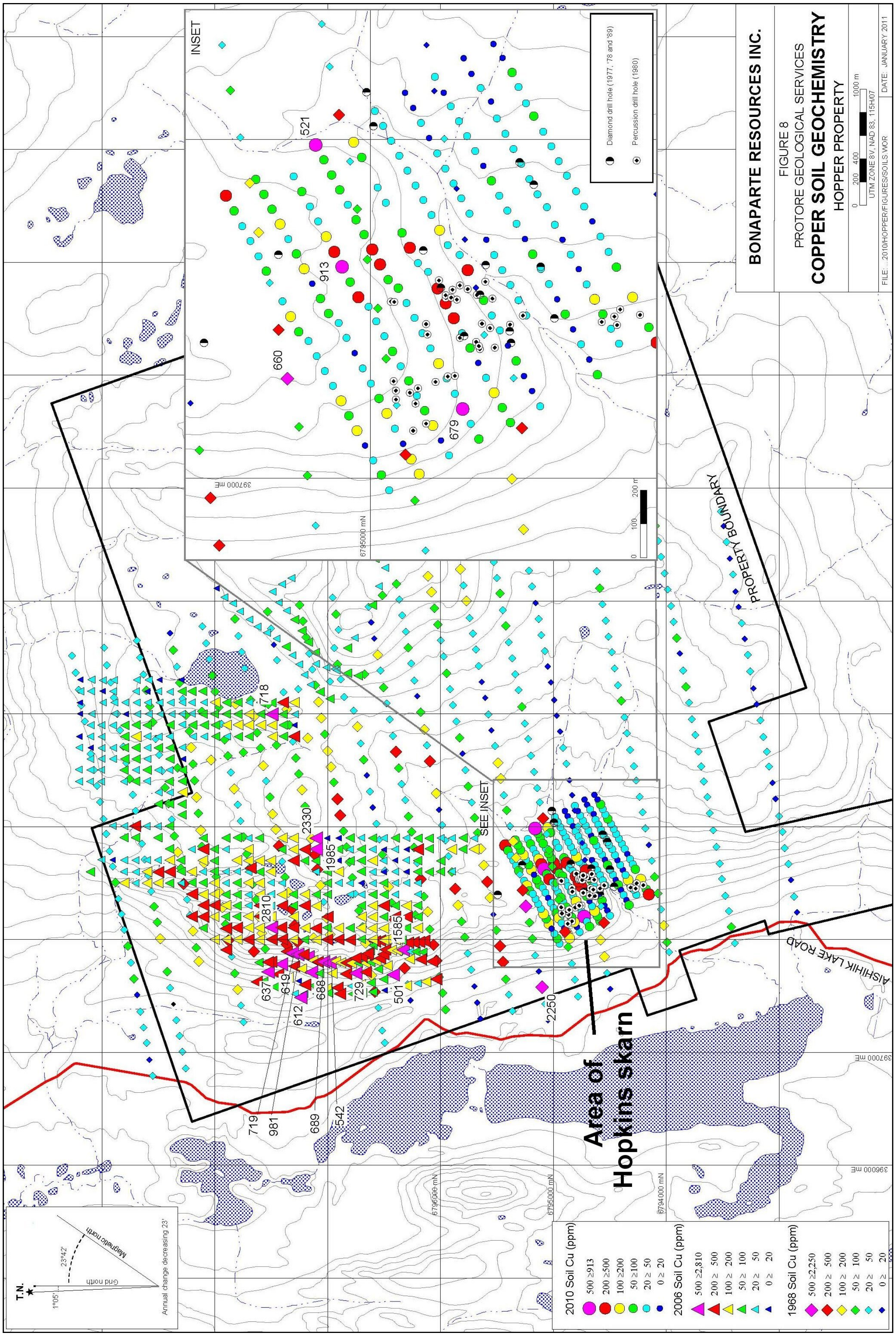


Figure 23: Hopkins Area – Copper geochemistry (after Stroshein 2011).

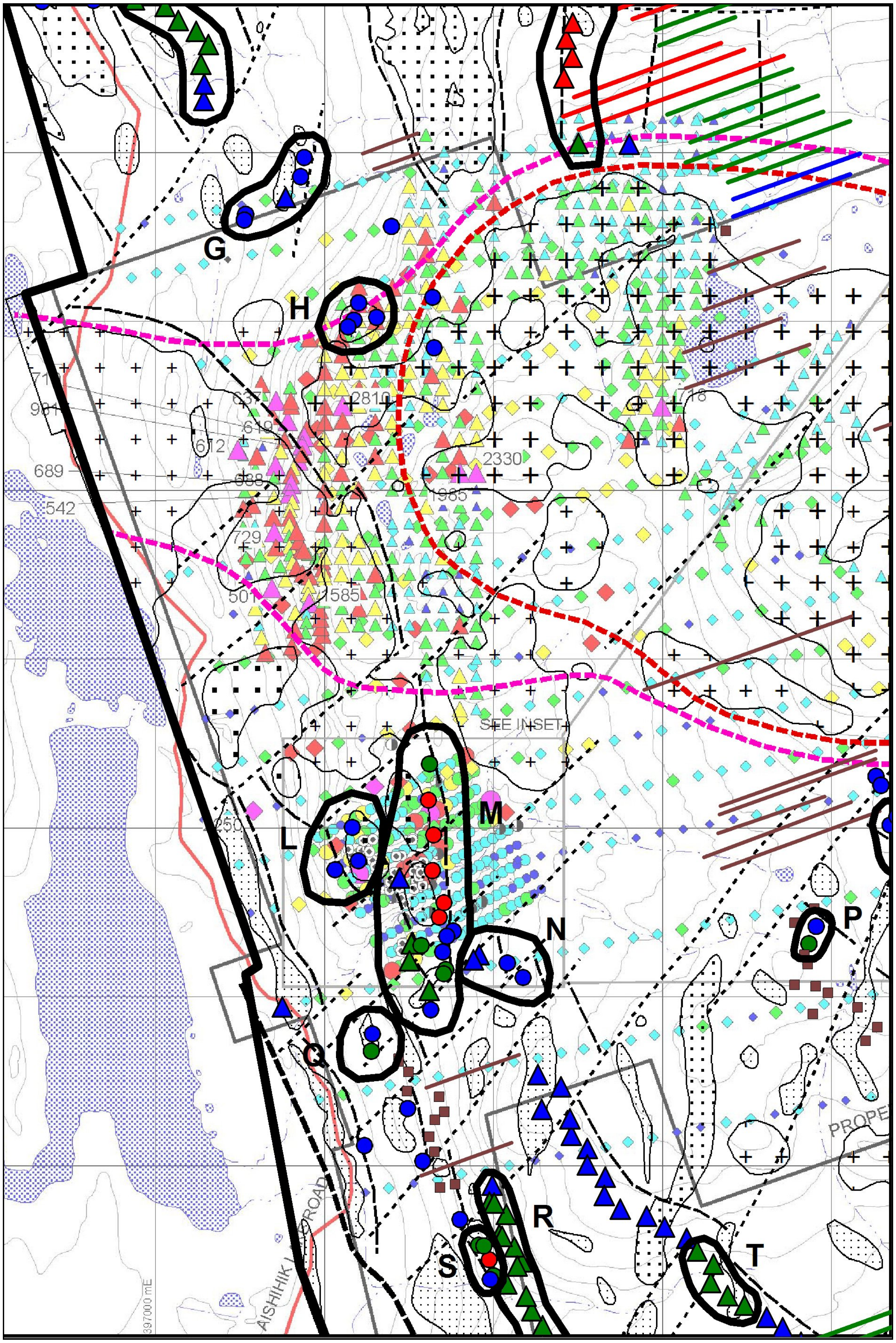


Figure 24: Hopkins Area – conductor picks, TZ and magnetic interpretation overlain on copper geochemistry.

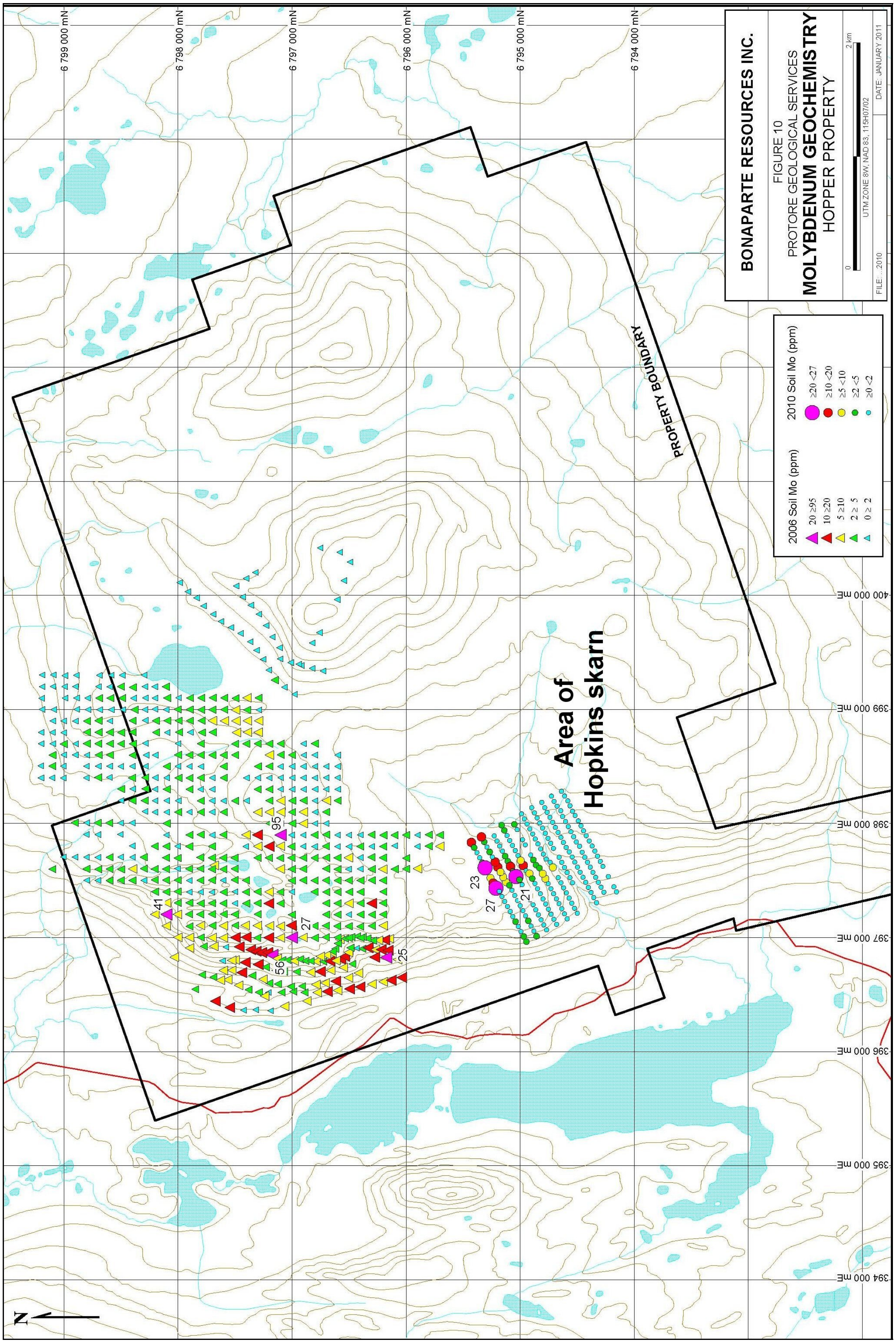


Figure 25: Hopkins Area – Molybdenum geochemistry (after Stroshein 2011).

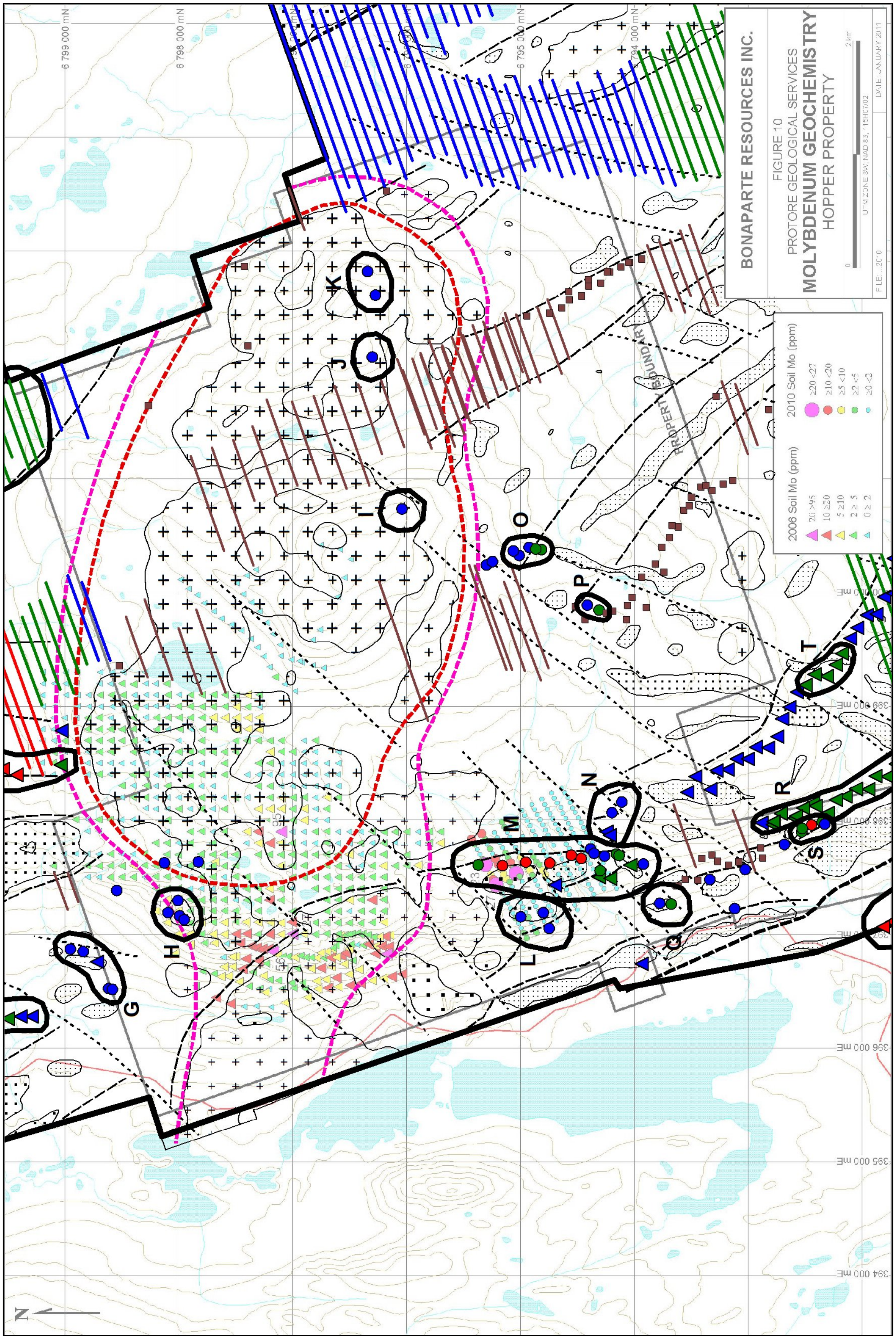


Figure 26: Hopkins Area – conductor picks, TZ and magnetic interpretation overlain on molybdenum geochemistry.

9. PRODUCTS

Table 9-1 lists the maps and products that are provided. Other products can be prepared from the existing dataset, if required.

Base Maps

All maps are created using the following projection and datum parameters:

Datum:	NAD83
Ellipsoid:	GRS 1980
Projection:	UTM (Zone: 8N)
Central Meridian:	135º W
False Northing:	0
False Easting:	500 000
Scale Factor:	0.9996

Table 9-1 Survey Products

The following TargetMaps have been produced, at a scale of 1: 20 000.

Each map includes picked anomalies and TZ.

- RTP (TMI-Reduced to Pole)
- Tilt Angle
- EM Z Stitch dBdT 1156 µs
- DTM
- AdTau Z Stitch dBdT (cutoff 0.02 pV/Am^4, smoothed)
- Geology
- EM and Magnetic interpretation
- Magnetic interpretation

MultiPlots™ @ 1:20 000 (as PDFs)

Mini-Plates™ (located at the top of each MultiPlot™) - RTP, Tilt Angle, EM Z dBdT Z (1156 µs), AdTau Z (dBdT, threshold 0.02 pV/Am^4), DTM

On each MultiPlot™ the picked anomalies are indicated along with the following:

- VTEM channels dBdT Z 10-33 (2007) or 14-45 (2011)
- VTEM channels B-Field Z 10-33 (2007) or 14-45 (2011)

- Profiles of AdTau dBdT (threshold 0.02 pV/Am^4 - smoothed), AdTau B-Field (threshold 0.05 pVms/Am^4 - smoothed), power line monitor.
- LEI CDS from dBdT Z + bird height + drill holes
- LEI CDS from B-Field Z + bird height + drill holes
- Profiles of TMI, Tilt Angle of RTP and 1VD
- UBC MAG3D susceptibility model + bird height + drill holes
- TrackMap: Satellite Image (Google Earth) + flight path + interpretation

Processing and Analysis Report (2 hard copies)

Archive DVD contains the following files:
-Databases of primary and derived geophysical data
-Digital grid archives in Geosoft format
-TargetMaps – Geosoft maps files and PDFs
-Encom PA session files for the MultiPlots™ (separate files for 2007 and 2011 surveys)
-ArcView shape files of picked anomalies
-ArcView tiff images of Geosoft grids
-UBC MAG3D voxel models
-Processing and analysis report (PDF)
-Geotech Field reports

Note: The original data delivered by Geotech has 40 channels (2007 survey) or 50 channels (2011 survey), signified by square brackets, e.g. [0] - [39] or [0] - [49]. In the 2007 survey, channels [0] - [9] and [34] - [39] are dummies, while in the 2011 survey [0] to [13] and [46] to [49] are dummies. Spreadsheet comparisons of channel numbers are included in Appendix A.

10. CONCLUSIONS AND RECOMMENDATIONS

The geophysical responses over the Hopper survey area are relatively poorly correlated with published geology, but nevertheless allow for confident extrapolation of some important features of the local geology.

A detailed analysis of the magnetic data was carried out, which has defined three distinct domains.

A strong magnetic anomaly and coincident resistor in the center of the area corresponds to the Ruby Range intrusive suite. The near surface extent of this intrusion is well defined over an area of about 6 km by 3 km - at depth the body appears to extend towards the west, well beyond the confines of the survey boundary. A number of smaller bodies are interpreted to the west and south, which are magnetically distinct and probably represent a separate intrusive and volcanic phase, potentially representing the shallower parts of the same parent body. Such a setting would favor porphyry-associated mineralization rather than the deeper levels exposed towards the east.

Contact metamorphism (and metasomatism) of the country rock within the contact aureole of the main intrusion is suggested by a series of elevated magnetic responses that broadly correspond to the strike of the Nisling Range Suite. These are most pronounced to the west and south of the main intrusion and are suggested as the most favorable sites for skarnification. The Hopkins skarn broadly coincides with a series of discrete conductors and an elevated magnetic response in an area to the SW of the main intrusion. This domain is clearly discordant to the trend of the underlying intrusion.

Faults are interpreted largely on the basis of magnetic discontinuities in the data but are locally supported by abrupt terminations in conductor trends. Most have a NE to NNE trend, normal to the strike of the Nisling Range Suite. A higher density of faults is interpreted near the Hopkins skarn, some of which may extend eastward into the main intrusive body. Such structures potentially played an important role in the focusing of mineralizing fluids during formation of the Hopkins skarn.

Potentially economic geophysical targets in this area are deemed to comprise poor-good conductors located close to the magnetic contact between intrusives and metasediments. Target Zones have been defined on this basis. The linear conductor trends within the metasediments (away from the intrusives) appear unlikely economic targets, but may still warrant some follow up.

Twenty-seven TZ have been defined, designated A-ZZ. Of these, four have been rated as Priority 1 (high priority), ten as Priority 2 and thirteen as Priority 3 (low priority). The higher priority TZ comprise conductors within or close to mapped marble, underlain or close to interpreted magnetic intrusives, which could be skarns. Other conductors well away from the intrusives may be intra-sedimentary conductors.

TZ M loosely correlates with the Hopkins Skarn, which has been extensively drill tested.

If drilling is contemplated, then Maxwell modeling of the anomalies is recommended to precisely locate the conductor in 3D space and assist in designing drill holes.

Respectfully submitted,

Richard Irvine

Jon Woodhead

CONDOR CONSULTING, Inc.
January 10, 2013

11. REFERENCES

Blumenthal, V.H. (2010) A Geochemical study of the Mineralization at the Hopper Property, Yukon: A case study of an atypical copper occurrence. Strategic Metals Ltd. In conjunction with University of Waterloo.

Corman, F.D. (2010) Western Copper Corporation announces significant Resource Estimate increase at Casino Property, Yukon (www.westerncoppercorp.com).

Ellis, R. G. (1998) Inversion of airborne electromagnetic data: Exploration Geophysics Vol 29, pp 121-127.

Farquharson, C.G. and Oldenburg, D.W. (1993) Inversion of time domain EM data for a horizontally layered earth, Geophysical Journal International, Vol. 114, pp 433-441.

Gordey, S.P. and Makepeace, A.J. (comp.) (1999) Yukon bedrock geology in Yukon digital geology, S.P. Gordey and A.J. Makepeace (comp.); Geological Survey of Canada Open File D3826 and Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, Open File 1999-1(D).

Johnston, S. and Timmerman, J. (1977) EGSD Geoscience Map 1997-9: Geology of Hopkins Lake Map Area, Yukon, NTS 115 H/7, 1:50,000 map.

Li, Y. and Oldenburg, D.W. (1996) 3-D inversion of magnetic data. Geophysics, Vol 61, no 2, 394-408.

Schein, E., Han, Z. and Prikhodko, A. (2012) Report on a helicopter-borne versatile time domain electromagnetic (VTEM) and aeromagnetic geophysical survey, Hopper and Hooch Properties, Haines Junction, Yukon for Bonaparte Resources Inc. Unpublished report by Geotech Ltd., dated January 2012.

Shi, Z and Butt, G. (2004) New enhancement filters for geological mapping, Preview, 111, 87-88, (2004).

Stroshein, R.W. (2011) Technical report using British Columbia Securities Commission National Instrument 43-101 guidelines on the geology, mineralization and geochemical surveys on the

Hopper Property, Yukon, Canada. Unpublished report prepared for Bonaparte Resources Inc. by Protore Geological Services, dated February 28, 2011.

Venter, N. (2007) Report on a helicopter-borne versatile time domain electromagnetic (VTEM) geophysical survey, Hopper property, Yukon, Canada for Strategic Metals Ltd. Unpublished report by Geotech Ltd., dated September, 2007.

Verduzco, B., Fairhead, J.D., Green, C.M. and MacKenzie, C. (2004) New insights into magnetic derivatives for structural mapping. The Leading Edge, 23 (2), 116-119.

12. APPENDICES

APPENDIX A: DETAILS OF EM PROCESSING

2007 VTEM CHANNEL DEFINITIONS

Hopper VTEM 30 Hz 24 Channels 7.20 ms pulse				
Geotech Channel	**Center µs**	**Start µs**	**End µs**	**Width µs**
[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

2011 VTEM CHANNEL DEFINITIONS

Hopper VTEM 30 Hz 32 Channels 3.40 ms pulse				
Geotech Channel	**Center µs**	**Start µs**	**End µs**	**Width µs**
[14]	96	90	103	13
[15]	110	103	118	15
[16]	126	118	136	18
[17]	145	136	156	20
[18]	167	156	179	23
[19]	192	179	206	27
[20]	220	206	236	30
[21]	253	236	271	35
[22]	290	271	312	40
[23]	333	312	358	46
[24]	383	358	411	53
[25]	440	411	472	61
[26]	505	472	543	70
[27]	580	543	623	81
[28]	667	623	716	93
[29]	766	716	823	107
[30]	880	823	945	122
[31]	1010	945	1086	141
[32]	1161	1086	1247	161
[33]	1333	1247	1432	185
[34]	1531	1432	1646	214
[35]	1760	1646	1891	245
[36]	2021	1891	2172	281
[37]	2323	2172	2495	323
[38]	2667	2495	2865	370
[39]	3063	2865	3292	427
[40]	3521	3292	3781	490
[41]	4042	3781	4341	560
[42]	4641	4341	4987	646
[43]	5333	4987	5729	742
[44]	6125	5729	6581	852
[45]	7036	6581	7560	979

APPENDIX B: ARCHIVE DVD

See Data Folder for

Digital Data

New enhancement filters for geological mapping

Zhiqun Shi*
Encom Technology Australia
zhiqun.shi@encom.com.au

Graham Butt
Encom Technology Australia
graham.butt@encom.com.au

SUMMARY

Two types of filters have been developed for the purpose of enhancing weak magnetic anomalies from near-surface sources while simultaneously enhancing low-amplitude, long-wavelength magnetic anomalies from deep-seated or regional sources. The Edge filter group highlights edges surrounding both shallow and deeper magnetic sources. The results are used to infer the location of the boundaries of magnetised lithologies. The Block filter group has the effect of transforming the data into "zones" which, similar to image classification systems, segregate anomalous zones into apparent lithological categories. Both filter groups change the textural character of a dataset and thereby facilitate interpretation of geological structures.

The effect of each filter is demonstrated using theoretical model studies. The models include both shallow and deep sources with a range of magnetisations. Comparative studies are made with traditional filters using the same theoretical models. In order to simulate real conditions, Gaussian noise has been added to the model response. Techniques for noise reduction and geological signature enhancement are discussed in the paper.

The new approaches are applied to actual magnetic survey data covering part of the Goulburn 1:100 000 scale map sheet area, New South Wales. Some new geological inferences revealed by this process are discussed

Key words: Enhancement filters, magnetic sources, geological mapping.

INTRODUCTION

High-resolution aeromagnetic survey data represent a rich source of detailed information for mapping surface geology as well as for mapping deep tectonic structure. Traditional enhancement techniques, such as first vertical and horizontal derivatives (1VD, 1HD), analytic signal (AS), and high-pass in-line or grid filters are used in enhancing magnetic anomalies from near-surface geology.

In recent years the potential field tilt filter has been introduced (Miller and Singh, 1994) and it has achieved recognition for its value in the analysis of potential field data for structural mapping and enhancement of both weak and strong magnetic anomalies (Verduzco *et al*, 2004). The total horizontal derivative of the TMI reduced to the pole is also widely used for detecting edges or boundaries of magnetic sources (Cordell and Grauch, 1985; Blakely and Simpson, 1986; Phillips, 1998).

Several disadvantages pertain to the use of these traditional filters. They often only diffusely identify source location and boundaries, particularly in colour image presentations. They usually emphasise short wavelength anomalies at the expense of signal from deeper magnetic sources and the range of amplitudes remaining in the filtered output may dominate the source boundary information being sought. In addition, some traditional filters emphasise noise with resultant impact on the interpretation of source boundaries.

This paper identifies new processes which have been developed to address these disadvantages and provide output which can improve map-based interpretations.

Unless otherwise stated, all filters have been operated on TMI data reduced to the pole (RTP).

METHOD AND RESULTS

Theoretical Model Testing

A theoretical 2D grid of total magnetic intensity (TMI) computed at the surface was created by forward 3D modelling of the TMI response from a set of theoretical magnetic sources having variable width, strike extent, depth, depth extent (DE), dip, magnetic susceptibility and strike azimuth. A list of these parameters is presented in Table 1. In two of the sources, remanence was simulated using negative magnetic susceptibility. The TMI of the theoretical models was computed at a geomagnetic inclination of -60 degrees using a notional east–west line spacing of 200 m and a grid cell size of 40 m. The TMI grid was then reduced to the pole (RTP) (Figure 1).

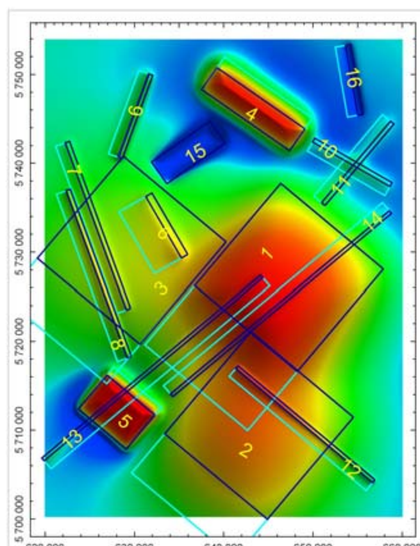


Figure 1. RTP image derived from multiple theoretical 3D magnetic sources, shown as wire frame outlines

A set of traditional filters was operated on the theoretical RTP grid. They include AS, 1VD, modulus of horizontal derivatives (MS) and Tilt and the results are presented in

Figure 2. The output grids variously show discontinuous trending (crossed sources in upper right of AS image), diffuse, weak edges (deep source in centre right of the MS image) and lack of precise source edge definition (1VD and Tilt).

Model Label	Depth (m)	Width (m)	DE (m)	Dip (deg)	Magnetic Susceptibility (SI)	Strike Length (m)	Azimuth (deg)
1	4000	15000	15000	120	0.010	15000	-050
2	6000	15000	10000	120	0.010	15000	-050
3	10000	15000	10000	120	0.010	15000	-050
4	1000	3000	4000	70	0.010	12000	-055
5	500	5000	2000	60	0.010	7000	-050
6	1000	800	2000	150	0.005	8000	-030
7	600	500	2000	120	0.001	20000	-020
8	200	500	2000	120	0.001	20000	-020
9	500	500	2000	120	0.003	10000	020
10	1000	500	2000	120	0.003	10000	-060
11	1000	500	2000	120	0.003	12000	040
12	200	400	2000	120	0.001	20000	-050
13	500	400	1000	40	0.002	32000	050
14	500	400	1000	140	0.001	32000	050
15	600	3000	4000	90	-0.002	8000	055
16	400	600	2000	120	-0.010	8000	-010

Table 1. List of parameters of theoretical magnetic sources

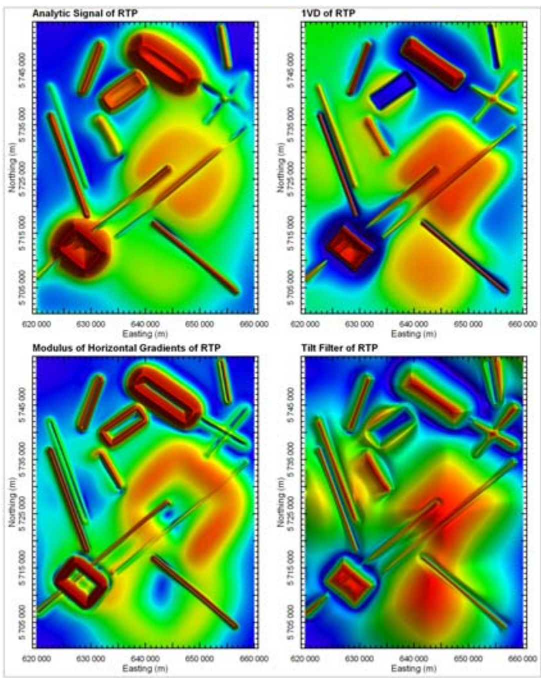


Figure 2. Comparison of enhancement filters of RTP: AS, 1VD, MS and Tilt filter. The models used are those depicted in Figure 1.

Edge Filters

The first avenue of development was to increase the sharpness of the anomalies used to map the edge of the magnetic sources. The MS grid yields anomaly peaks over the source edge locations, whereas these edges coincide with gradients in the 1VD, Tilt and AS filtered outputs. None of these filters produces easily interpreted edges in image form when the sources are weakly magnetised or are deep.

A new linear, derivative-based filter termed the ZS-Edgezone filter has been developed to improve edge detection in these situations. Its effect is shown in Figure 3 using the same theoretical models discussed earlier. The advantages of the filter are greatly increased anomaly sharpness over source edges and compression of the amplitude range so that differences in the original TMI amplitudes do not persist to dominate the edge interpretation. This has the ancillary effect that the method can be modified to provide automated edge conversion to vectors for use in GIS systems.

Although this filter significantly improves the precision of edge determination, it is subject to normal potential field limitations which determine that source edges cannot be resolved where the source is narrow relative to its depth. The filter also can produce a "halo" type artefact due to superposition of the response of a limited depth extent shallow source (Figure 1, Model 6) on that of deeper sources. A similar "halo" effect can be seen around the edges of remanently magnetised Model 15, also in Figure 1.

The ZS-Edge filter (Figure 4) has also been developed to map source edges. This filter differs from the ZS-Edgezone filter in that a greater contribution of the TMI anomaly amplitude over the source is retained, thereby improving anomaly characterisation at the expense of edge sharpness.

Both these filters produce edges which migrate down-dip towards the deepest edge of the source. This effect produces anomaly asymmetry that can assist interpretation of dip, although this effect is more pronounced for the ZS-Edge filter than for the ZS-Edgezone filter. Down-dip source extensions are depicted in cyan in Figure 1.

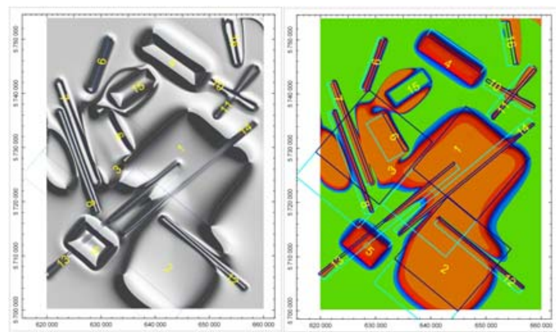


Figure 3. Anomaly edge and block enhancements using the ZS-Edgezone (left) and ZS-Block filters (right). Model positions are shown using wire frames.

Block Filters

In attempting to improve edge detection filters, an obvious progression is to highlight the magnetic regions whose edges have been mapped. To do this, a set of filters called "block" filters has been developed.

The Block filter group has the effect of transforming the potential field data into "zones" which, similar to image classification systems, segregate anomalous zones into apparent lithological categories. These filters can be imported for use in image classification systems or displayed in RGB space with other grids for empirical classification purposes.

The block filters, like the edge filters, are linear, derivative-based filters which use a combination of derivative and amplitude compression techniques to render the magnetic data into regions whose edges are sharply defined and whose amplitudes have a reduced range in comparison to the original TMI.

The ZS-Block filter (Figure 3) and the ZS-Plateau filter (Figure 4) depict the magnetic data as a 2D plan of apparent magnetic source distribution. Artefacts may occur as discussed for the edge filters.

The choice of ZS-Block, ZS-Plateau or ZS-Area filters will depend on the data characteristics of each magnetic survey and on the end-use requirement. The ZS-Plateau filter, for example, yields less variation in amplitude “texture” over a magnetic unit that either the ZS-Block or ZS-Area filters.

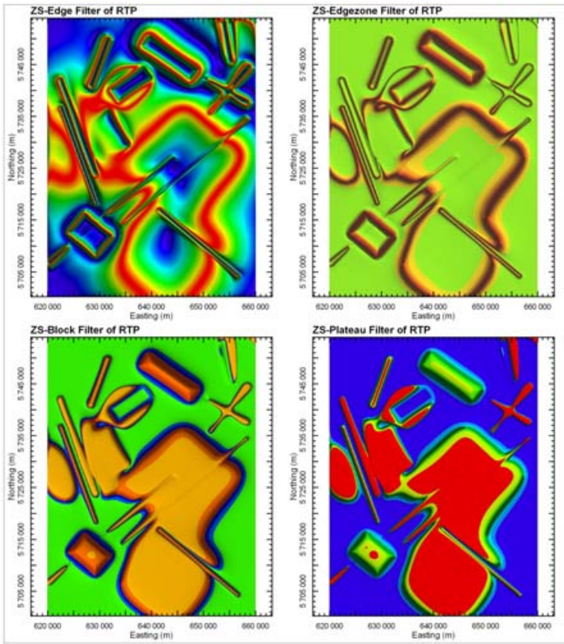


Figure 4. Comparison of ZS-Edge, ZS-Edgezone, ZS-Block and ZS-Plateau filtered outputs of RTP data

Effects of Noise

The influence of noise on the operation of these enhanced grids was tested by adding a large component of noise to the theoretical TMI profile data. This noise had a Gaussian distribution with a standard deviation equal to ten percent of the TMI standard deviation. The noise-modified TMI profile data were then de-spiked using a non-linear technique. Both the noise-affected and the de-spiked TMI data were then gridded and converted to RTP. The RTP data were then processed both with the traditional and newly developed filters.

Figure 5 shows the effect of the noise on the computations. The image of the noise-affected 1VD RTP data (top right) shows that weak and deep sources have been severely masked by the noise. Significant improvement can be achieved by using de-spiked data (lower left) or by low-pass grid filtering — for example, using an upward continuation filter (lower right).

Figure 6 shows that if real data with significant noise is encountered, a standard de-spiking or low-pass smoothing procedure may be used to achieve successful application of both the traditional and newly developed filters.

Figure 6 also depicts the use of enhanced outputs in RGB space to provide examples of how the combination of amplitude information (red colour) with edge information (green and blue colours) can be used to highlight source boundaries and remanence in a single image.

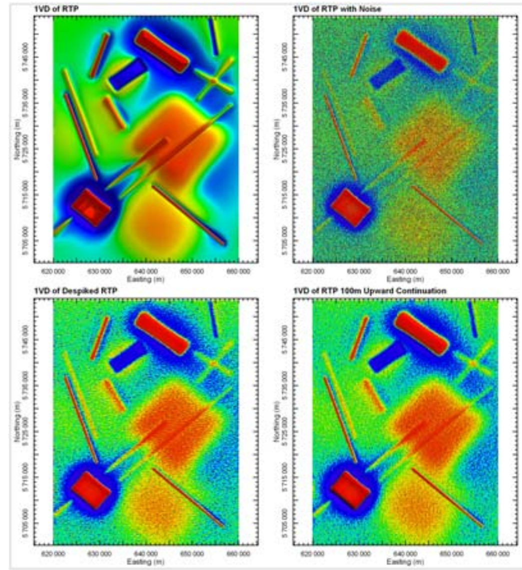


Figure 5. Comparison of 1VD of original model RTP data (top left) with noise-affected RTP data (top right) and noise-reduced RTP data (lower images)

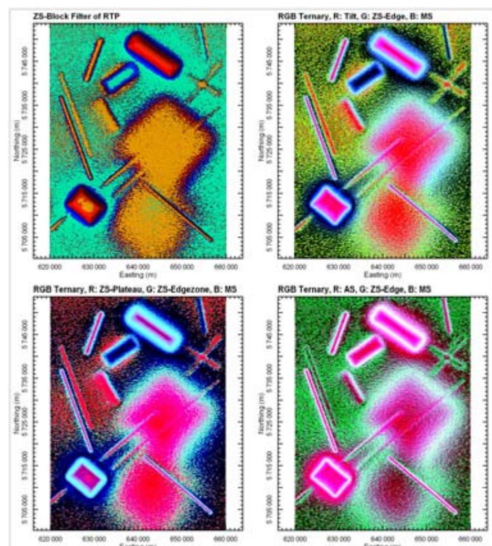


Figure 6. ZS-Block filter using noise-reduced RTP data (top left) and examples of filter combinations in RGB space using noise-reduced RTP data

Application to Field Data, Goulburn 1:100 000 Scale Map Sheet Area, New South Wales

Both the traditional and new enhancement filters were applied to test their suitability for geological definition to airborne magnetic survey data over the Goulburn 1:100 000 scale map sheet area (Johnson *et al,* 2003). These data were acquired as part of a joint program between the NSW Department of Mineral Resources and Geoscience Australia, with 250 m–spaced east–west flightlines. The magnetometer sensor occupied a nominal terrain clearance of 80 m. This dataset was selected since new detailed geological mapping had been recently completed. All the enhancements have been computed using TMI data reduced to the pole.

Figure 7 shows a comparison of part of the Goulburn 1:100 000 map sheet area surface geology with the ZS-Area filter output. In the area surrounding location C, the ZS-Area filter transforms the magnetic data into separate magnetic units, which comprise the Devonian Bindook Volcanic Complex. The magnetic regions correlate closely with mapped andesites (Dkqa–cream coloured unit in Figure 7) whilst the intervening less-magnetic units correlate with rhyolitic ignimbrites (Dkqy–red unit in Figure 7)

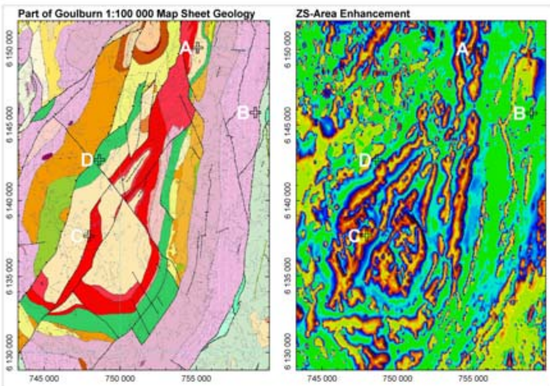


Figure 7. Comparison of geology and ZS-Area enhancement over the Bindook Volcanic Complex

Figure 8 displays some of the advantages of the edge detection filters. At location A, ambiguity concerning the continuity of Quialigo Formation units (cream and red units in Figure 7) is resolved by the ZS-Edgezone filter. At location B, a subtle lineament is confirmed, whilst at location D, the extent of the Bullamalita Conglomerate (green unit in Figure 7) is clearly mapped by the ZS-Edge filter. Structural breaks are often more easily interpreted using these transforms, for example, immediately southwest of location D.

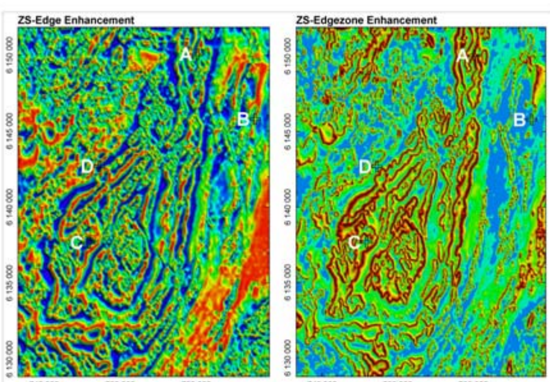


Figure 8. Comparison of ZS-Edge and ZS-Edgezone enhancements over the Bindook Volcanic Complex

Figure 9 shows standard RTP and Tilt transforms over the same area for reference.

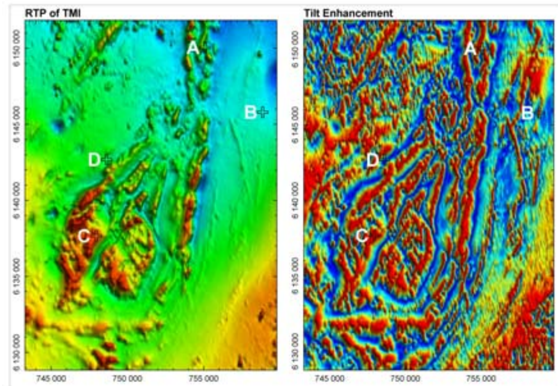


Figure 9. Comparison of RTP and Tilt filters over the Bindook Volcanic Complex

CONCLUSIONS

Traditional filters used to enhance magnetic data, including the more recently developed potential field tilt filter, are currently used to assist in determination of the location and extent of magnetic units.

Newly developed derivative-based filters may be used to improve the precision of source edge detection and, by extension, the determination of the spatial extent of magnetic units. These filters are demonstrated to perform successfully on both strongly magnetised features as well as on weakly magnetised or deep magnetic features. Artefacts may result particularly where anomaly superposition occurs.

The impact of noise in real data may be accommodated by these new methods provided noise-reduction techniques are employed.

The new filter outputs may be used as part of regional or detailed geological mapping projects, including in classification systems or in RGB space, to improve lithological discrimination and mapping.

The speed of magnetic unit mapping can be considerably increased through reliance on edge detection filters. Further improvements in mapping speed can be envisaged through automated conversion of edge anomalies to vector files.

ACKNOWLEDGMENTS

The authors would like to acknowledge the New South Wales Department of Mineral Resources for permission to use aeromagnetic and geological data from the Goulburn 1:100 000 map sheet area and helpful comments by David Robson during the project.

The authors wish to acknowledge Encom Technology for permission to publish the results of research into the proprietary filters used in this paper. The 3D modelling was carried out using Encom ModelVision Pro software, whilst processing and data visualisation were accomplished using Geosoft OASIS montaj and Encom Geoscape.

REFERENCES

Blakely, R. J. and Simpson, R. W., 1986, Locating edges of source bodies from magnetic or gravity anomalies, Geophysics, 51, 1494-1498.

Buckingham, A.J, Dentith, M.C., and List, R.D, 2003, Towards a system for content-based magnetic image retrieval: Exploration Geophysics, 34, 195-206.

Cordell, Lindrith, and Grauch, V.J.S., 1985, Mapping basement magnetization zones from aeromagnetic data in the San Juan Basin, New Mexico pp.181-197. In Hinze, W.J., ed,. The utility of regional gravity and magnetic maps: Society of Exploration Geophysicists,

Johnson A.J. *et al.*, 2003, Goulburn 1:100 000 Sheet 8828 Geology Map, New South Wales Department of Mineral Resources.

Miller, H.G., and Singh V., 1994, Potential field tilt — a new concept for location of potential field sources: Journal of Applied Geophysics, 32, 213-217.

Phillips, J.D., 1998, Processing and interpretation of aeromagnetic data for the Santa Cruz Basin–Patagonia Mountains Area, South-Central Arizona: United States Geological Survey Open-File Report 02-98.

Verduzco, B., Fairhead, J. D., Green, C. M., and MacKenzie, C., 2004, New insights into magnetic derivatives for structural mapping: The Leading Edge, 23 (2), 116-119.