# REPORT

On the

# YMEP Target Evaluation Program 23-004

# On the

# Carmacks Copper Project

Near Carmacks, Yukon, CANADA

**Located Within:**

NTS Sheet: 115I07

Whitehorse Mining District

Latitude 62°20' North by Longitude 136°42' West

**Current Operator:**


Granite Creek Copper

409 – 904 Granville St

Vancouver, BC, Canada V6C 1T2


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**PERIOD OF WORK**: June 4 to August 13, 2022

REPORT DATE: January 31, 2024

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# 1 Summary

Between June 4 and August 13, 2022 TruePoint Exploration carried a work program on the Carmacks Copper Project. The work was funded by Granite Creek Copper with assistance from YMEP. A total of 520 soil samples were collected for MIG analysis over 20 days of field work and 40 person days. The program cost $44,650.66 based on YMEP rate guidelines.

The Carmacks Copper deposit is located within the composite Early Jurassic Granite Mountain batholith (Figure 6.1). The Granite Mountain batholith is the southern extent of a series of Early Jurassic plutons, including the Minto and Yukon River plutons that form part of a single large batholith, ~120 km long by 15 to 25 km wide, segmented by Upper Cretaceous and younger volcanic cover. The eastern Granite Mountain batholith is assigned to the Minto suite and its western part belongs to the Long Lake suite (Figure 6.1). The Granite Mountain batholith intrudes and obscures the contact between mid-Paleozoic rocks of the Yukon-Tanana terrane and Upper Triassic Stikinia arc rocks east of the Granite Mountain batholith belonging to the Upper Triassic Povoas Formation of the Lewes River Group. The Povoas Formation in southern Yukon is characterized by variably deformed and sub greenschist to locally amphibolite facies augite porphyritic basalt, volcaniclastic rocks, and hornblende gabbro. These Stikinia units and the Granite Mountain batholith are in fault contact along the dextral-normal oblique-slip Hoocheekoo fault. The Granite Mountain batholith contains inliers of variably deformed and metamorphosed mafic to intermediate rocks that host the Cu-Au-Ag mineralization at the Carmacks Copper deposit, Minto mine, and Stu prospect.

The first reported copper discovery in this region was made by Dr. G.M. Dawson in 1887 at Hoocheekoo Bluff, on the Yukon River, 12 km north of the Property. In 1898, the first claims were staked to cover copper showings located northwest of Carmacks Copper deposits. Small scale mining on copper-bearing veins went on until 1920. After this exploration was quiet until the staking rush of the 1960s which followed the discovery of the Casino deposit. In this burst of exploration in the 1970s Carmacks Copper (then Williams creek) and Minto were discovered. The focus of mineral exploration from 1970's onwards has largely been limited to areas with significant known outcrop exposures, primarily near the Carmacks Copper deposit.

In 2020, Granite Creek acquired 100% of the Carmacks Project through its acquisition of Copper North and in subsequent years has concentrated efforts around resource expansion drilling in 2021 and 2022 leading to an updated mineral resource (SGS Geological Services, 2022). This led to an update of the Preliminary Economic Assessment (SGS Geological Services, 2023) which simplified the metallurgical process.

The lack of outcrop over the Carmacks Copper project increases the importance of soils as a consistent layer of information over the property. The complex Quaternary history of the area includes at least six periods of glaciation from two distinct sectors of the Cordilleran Ice Sheet and significant changes in fluvial drainage patterns in the region (Huscroft et al., 2004).

Granite Creek is developing an exploration process to uncover more mineralized inliers within the GMB. IP surveys have worked well to detect the present of mafic inliers but as yet cannot determine if the inlier is mineralized. MIG sampling shows promise as a method for detecting buried mineralization prior to disturbing the ground with trenching or for inliers to deeply buried to trench.

The relatively shallow depth (average 20cm) of MIG samples compared to traditional Yukon bedrock interface soil samples (50 to 100 cm) makes the samples faster and easier to collect. However, the larger hole and the

requirement for more information to be collected, and the need for shovels or trowels to dig versus a soil auger makes the collection process slower. MIG samples also cost approximately twice the amount of a regular soil sample. This suggests that MIG samples should be used where regular soil samples are not suitable and not as the default sampling method over an entire project.

Granite Creek Copper should continue with soil sampling lines or grids to cover all IP anomalies and extend grids that show anomalous copper response ratios along the edges. Prime areas for extension of grids are:

1. the Gap Zone Target,
2. continue eastward along IP survey line 1N towards Zone 12
3. extend east and south in Zone 9

The original main goal of this program, to acquire LiDAR data and complete a detailed surface geology map remains a high priority and is the next step in project wide exploration. If LiDAR is not acquired for the entire property, then it should be acquired for the southern section over the Carmacks deposit.

# 2 Introduction

## 2.1 Program

Between June 4 and August 13, 2022 TruePoint Exploration carried a work program on the Carmacks Copper Project. The collection of MIG soil samples was part of a program consisting of an IP Geophysics survey, trenching and mapping and trench reclamation program. The work was funded by Granite Creek Copper with assistance from YMEP. A total of 520 soil samples were collected for MIG analysis over 20 days of field work and 40 person days. The program cost $44,650.66 based on YMEP rate guidelines.

The program was a victim of a soft stock market in 2023. Originally a larger program was planned, based on a property wide LiDAR survey, followed by surficial geology mapping and further MIG sampling. However, Granite Creek Copper were not able to raise funds on the financial markets, so the planned 2023 part of the field program and the LiDAR survey did not happen. MIG soil sampling was given a thorough test in 2022 and the results are presented in this report.

This report was prepared to satisfy requirements for the Final Technical Report as required by the Yukon Mineral Exploration Program. Digital files accompany the report.

## 2.2 Geographic Terms

The following geographic areas and features are briefly described for orientation with respect to the text, tables, and figures.

Dawson Range – a range of subdued mountains running northwest from Carmacks to Dawson City. Hosts numerous mineral deposits and occurrences and at times has been a mining district for promotional purposes.

Minto Copper Belt – a mining district trending northwest from Carmacks to past the Minto mine containing a cluster of copper (+/- gold, silver, molybdenum) mineral occurrences and deposits. Depending on the year and the user, the area is variable in size, but is anchored by the Minto and Carmacks Copper deposits. Variations on the name include Carmacks Copper Belt and Carmacks (Minto) Copper-Gold Belt.

Carmacks Copper Deposit – originally called Williams Creek, recently called Carmacks (Copper) Project.

# 3 Project Description and Location

## 3.1 Location

The Granite Creek Copper claims are located approximately 200 km by road north of Whitehorse and 45 km by road northwest of the town of Carmacks. The main deposit is centered on 62°20'N Latitude, 136°42'W Longitude on NTS map sheet 115/I07 in the Whitehorse Mining District. The Carmacks Project site is currently accessible by way of the Freegold Road that leads northwest of Carmacks for 34 km then by the Carmacks Project access road for 13 km to the Property (**Figure 3-1**). There exists an extensive network of roads, and trails which provide access to areas of interest.

The Yukon Government has settled land claims with First Nations in the area, Little Salmon-Carmacks and Selkirk.

## 3.2 Ownership and Permits

Exploration activities in 2022 were carried out under Class 1 permits Q2021-0259 and Q2022-0091 from Mining Land Use, Government of Yukon. All activities were allowable under the Class 1 permit.

The claims are registered in the name of Granite Creek Copper Ltd. and 838232 Yukon Inc. and are in good standing as of time of writing. See table 3-1 below for the list of claims.

*Table 3-1: Carmacks mineral tenures.*

| | |
|---|---|
| AC # 2-3 *(838232 Yukon Inc. - 100%)* | KOO 1-58 *(Granite Creek Copper Ltd. - 100%)* |
| BEE 1-25 *(838232 Yukon Inc. - 100%)* | REM 1-14, 19-30, 32-35*(838232 Yukon Inc. - 100%)* |
| BOY 20,22,24, 51-58, 83-85 *(838232 Yukon Inc. - 100%)* | STU 1-272, 281-369 *(Granite Creek Copper Ltd. - 100%)* |
| CHE 1-30 *(Granite Creek Copper Ltd. - 100%)* | TT 1-2 *(838232 Yukon Inc. - 100%)* |
| CRM 1-21 *(838232 Yukon Inc. - 100%)* | VW 11, 13, 17-21, 23, 25, 27-28, 40-50, 60&61 *(838232 Yukon Inc. - 100%)* |
| DUN 1-3 *(838232 Yukon Inc. - 100%)* | W 1-53, 55, 57, 91-93, 95 *(Granite Creek Copper Ltd. - 100%)* |
| GAP 1-5 *(838232 Yukon Inc. - 100%)* | WAR 22-50 *(838232 Yukon Inc. - 100%)* |
| HIP 1-27 *(838232 Yukon Inc. - 100%)* | WASP 1-89 *(838232 Yukon Inc. - 100%)* |
| HOO 1-46 *(Granite Creek Copper Ltd. - 100%)* | WC 1-72 *(Granite Creek Copper Ltd. - 100%)* |
| JIM 1-30 *(838232 Yukon Inc. - 100%)* | WCC 10-19, 21,23,24, 27-37 *(838232 Yukon Inc. - 100%)* |
| JIM F 26, 27 *(838232 Yukon Inc. - 100%)* | WCC FR. 1-9, 20, 22, 25, 26, 38-40 *(838232 Yukon Inc. - 100%)* |
| KING 3-14, 18*(838232 Yukon Inc. - 100%)* | WCF 1-11 *(Granite Creek Copper Ltd. - 100%)* |
| KING F 1-2, 15-17 *(838232 Yukon Inc. - 100%)* | X 3-7 *(838232 Yukon Inc. - 100%)* |

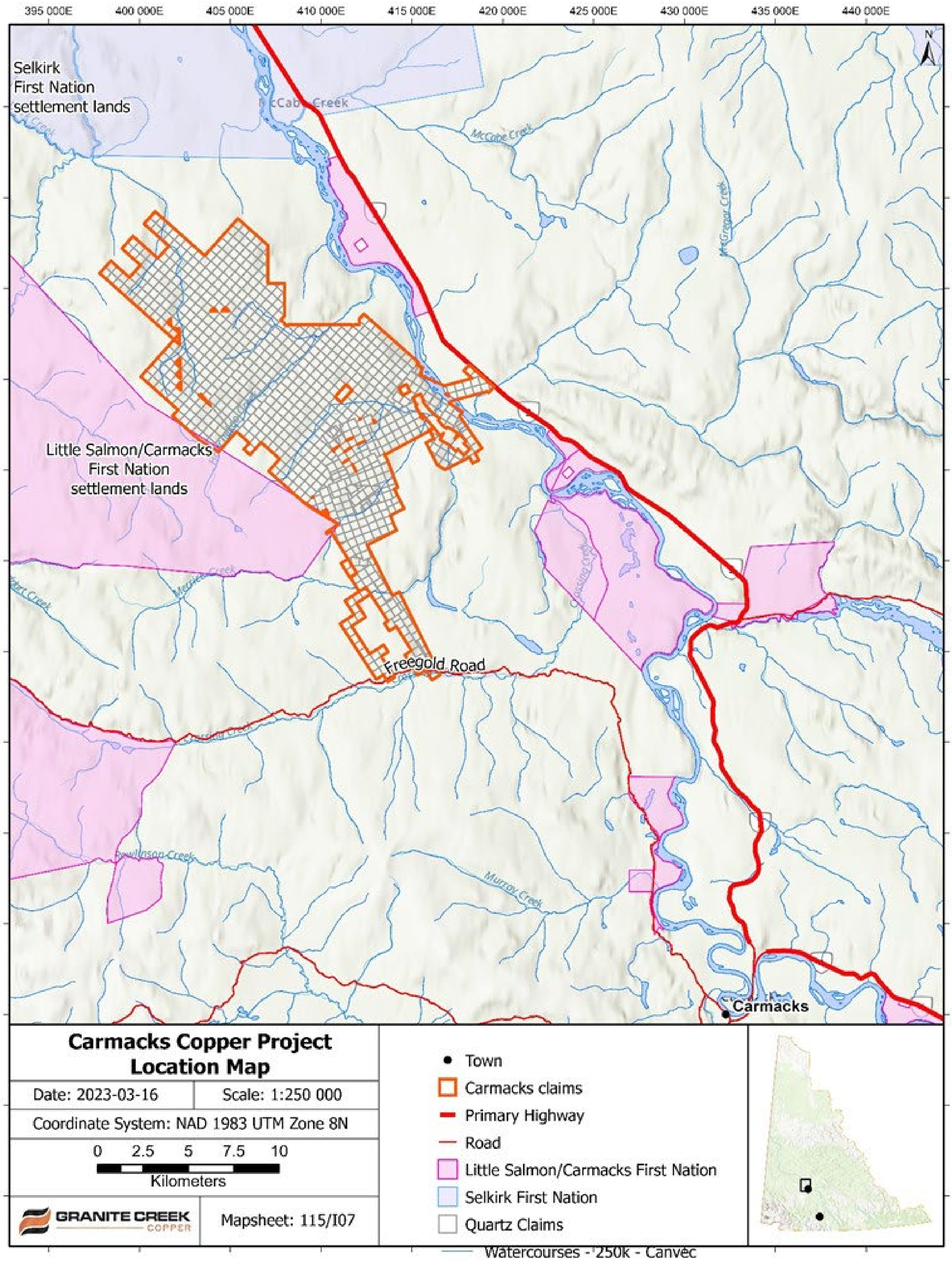



*Figure 3-1: Location and claim map of the Carmacks Copper Project.*

# 4 Project Description

## 4.1 Accessibility

The Carmacks Copper Project is accessible by the Freegold Road that leads northwest into the Dawson Range from Carmacks. The Freegold Road is maintained by the Yukon Government and is open seasonally between April and October. At the 34 km mark, an access road to the Carmacks project branches off for 13 km to a trailer camp. The road is narrow, winding and steep in places, requiring 4X4 access under wet or snowy conditions. Beyond the camp, user-maintained dirt roads and ATV trails provide access to the area. The site can also be accessed by a 15-minute helicopter flight from the airport in Carmacks.

The Freegold Road branches off Highway 2 at the village of Carmacks, which is a 1.75-hour drive along paved public highways from Whitehorse.

## 4.2 Climate

The Carmacks area has a northern interior climate with warm summers (+20º C), long cold winters (-20º C) and low to moderate precipitation (25-30 cm), most of which falls in summer. Mean annual temperatures are near -4ºC. The dry climate leads to frequent forest fires. Snow cover remains from mid-October to mid-April at lower elevations and a month longer at higher elevations. The typical exploration season is from April to October.

Historically, average daily temperatures at the Williams Creek Station on the Carmacks Project site range from -30°C in January to 12°C in July. Precipitation is light with moderate snowfall, the heaviest precipitation being in the summer months. The average annual precipitation is approximately 346.5 mm (water equivalent) with about 30% falling as snow.

## 4.3 Physiography

The property is part of the Yukon Plateau-Central Ecoregion which is characterized by a dry climate and extensive grasslands and open deciduous forests on south aspect slopes. The west boundary of the ecoregion is the limit of Cordilleran Pleistocene glaciation and glacial deposits. Glacial cover was partial, valley glaciers extended along major valleys and tributaries depositing glacial drift on lower slopes and valley bottoms. Colluvium blankets steep slopes and uplands.

Outcrop is uncommon because of the subdued topography and recent glaciation. The major portion of the claim block lying north of Williams Creek is unglaciated above the 760 m elevation line. The claim block area south of the Williams Creek valley and peripheral portions of the claim block, especially to the east, are covered by a veneer of ablation and lodgment boulder till with a sandy to silty matrix, generally less than 1 m thick. Valley bottoms and north-facing slopes have moderate to thick surficial cover that include far travelled sediments such as till, loess and glaciolacustrine sand. Valley bottoms contain thick Quaternary fill.

Topography at the property area is subdued with a relief for the entire property of 550 m. Elevations range from 460 m at the Yukon River to 1,030 m on the western edge of the claim block. Permafrost is discontinuous and scattered as the mean annual ground temperatures exceed -5°C. The permafrost is encountered at depths of 40 to 50 cm on most north-facing slopes where glacial till or colluvium is present.

## 4.4 Infrastructure

### 4.4.1 Regional Infrastructure

The nearest community to the project area is Carmacks, 60 km by road or 47 km directly. Carmacks is incorporated as a village and covers 37 square kilometres. The economic base is government and services. There is seasonal work in mining and exploration, tourism, firefighting and construction. The population is not large enough to provide a workforce for mine construction and development, requiring workers to be brought from Whitehorse and further afield.

Carmacks has a population of 503 people, an increase of 78 people since 2006. The age group distribution is: 0-14, 125 people, 14-64, 345 people and over 65, 35 people. There are 195 private households, 100 of them are married or common law families, and 35 are lone parent families. English is the dominant language with a few aboriginal speakers and some French. (All information from Statistics Canada. 2012. GeoSearch 2012).

The nearest electrical power supply is a Yukon Energy Corp. (YEC) transmission line 12 km to the northeast on the east side of the Yukon River. The Yukon powergrid is a large hydro-based grid and is not connected to the rest of North America, so is required to be self-sufficient for power.

### 4.4.2 Local Infrastructure

There is a full service, road accessible trailer camp on the Carmacks property on Williams Creek. The camp facilities are owned by Kluane Drilling and were rented by TruePoint Exploration for the program.

# 5 History

The first reported copper discovery in this region was made by Dr. G.M. Dawson in 1887 at Hoochekoo Bluff, on the Yukon River, 12 km north of the Property. In 1898, the first claims were staked to cover copper showings located northwest of Carmacks Copper deposits. Small scale mining on copper-bearing veins went on until 1920. After this exploration was quiet until the staking rush of the 1960s which followed the discovery of the Casino deposit. In this burst of exploration in the 1970s Carmacks Copper (then Williams creek) and Minto were discovered.

The Dawson Range Joint Venture optioned the property in 1970 and contracted Archer, Cathro and Associates to conduct reconnaissance prospecting and geochemical soil sampling. During this and subsequent programs the zones of significant copper mineralization were discovered in areas with high percentage of outcrop exposure-essentially all known mineralisation has been identified along ridges with the exception of Zone 2000S, which was detected through the indirect induced polarisation survey in the Williams Creek. The focus of mineral exploration from 1970’s onwards has largely been limited to areas with significant known outcrop exposures, primarily near the Carmacks Copper deposit.

In 2020, Granite Creek acquired 100% of the Carmacks Project through its acquisition of Copper North and in subsequent years has concentrated efforts around resource expansion drilling in 2021 and 2022 leading to an updated mineral resource (SGS Geological Services, 2022). This led to an update of the Preliminary Economic Assessment (SGS Geological Services, 2023) which simplified the metallurgical process.

# 6 Regional and Property Geology

The following description regarding the Carmacks Project Geology has been extracted from a paper written by Kovacs et.al., 2020 (and references therein), titled "Carmacks Copper Cu-Au-Ag Deposit: Mineralization and Postore Migmatization of a Stikine Arc Porphyry Copper System in Yukon, Canada", which includes information extracted from a 2018 M.Sc. thesis by Nikolett Kovacs (Kovacs, 2018) titled "Genesis and Post-ore Modification of the Migmatized Carmacks Copper Cu-Au-Ag Porphyry Deposit, Yukon, Canada".

## 6.1 Regional Geology and Tectonic Setting

The Late Triassic to Early Jurassic magmatism in Yukon resulted from building of a Late Triassic island arc (Lewes River Group and Stikine plutonic suite) and subsequent arc-continent collision, syn-collisional magmatism, and exhumation (Kovacs et.al., 2020). Volcanic rocks of the Lewes River Group terminate in central Yukon, however their plutonic equivalents, represented by the Stikine and Pyroxene Mountain suites, extend farther northwest into east-central Alaska. The Stikine suite (217–214 Ma) is represented by a series of small plutons that intrude Upper Triassic arc volcanic rocks of Stikinia and Paleozoic metasedimentary and meta-igneous rocks of the Yukon-Tanana terrane in south-central Yukon. The Minto suite (205–194 Ma) occurs as a series of large plutons that intrude the Lewes River Group and the Yukon-Tanana terrane that are interpreted to represent syncollisional magmatism at the onset of arc accretion. The younger Long Lake (188–183 Ma) and Bennett-Bryde (178–168 Ma) plutonic suites represent ongoing syn-collisional magmatism.

The Carmacks Copper deposit is located within the composite Early Jurassic Granite Mountain batholith (Figure 6.1). The Granite Mountain batholith is the southern extent of a series of Early Jurassic plutons, including the Minto and Yukon River plutons that form part of a single large batholith, ~120 km long by 15 to 25 km wide, segmented by Upper Cretaceous and younger volcanic cover. The eastern Granite Mountain batholith is assigned to the Minto suite and its western part belongs to the Long Lake suite (Figure 6.1). The Granite Mountain batholith intrudes and obscures the contact between mid-Paleozoic rocks of the Yukon-Tanana terrane and Upper Triassic rocks of Stikinia. The Yukon-Tanana terrane west of the Granite Mountain batholith is represented mainly by orthogneiss of the Early Mississippian Simpson Range plutonic suite. Stikinia arc rocks east of the Granite Mountain batholith include volcanic and sedimentary rocks and subvolcanic intrusions of the Upper Triassic Povoas Formation of the Lewes River Group. The Povoas Formation in southern Yukon is characterized by variably deformed and subgreenschist to locally amphibolite facies augite porphyritic basalt, volcaniclastic rocks, and hornblende gabbro. These Stikinia units and the Granite Mountain batholith are in fault contact along the dextral-normal oblique-slip Hoocheekoo fault. The Granite Mountain batholith contains inliers of variably deformed and metamorphosed mafic to intermediate rocks that host the Cu-Au-Ag mineralization at the Carmacks Copper deposit, Minto mine, and Stu prospect.

Late Triassic to Early Jurassic batholiths were emplaced into crust that was being exhumed in the Early to Middle Jurassic to form the flanks of the subsiding marine basin of the Whitehourse trough. Exhumation is recorded by regional Early Jurassic metamorphic cooling ages, Al-in-hornblende barometry of Mesozoic plutons, and the Early to Middle Jurassic sedimentologic and detrital zircon record. Exhumation was essentially complete by the mid-Cretaceous, as indicated by the unconformably overlying volcanic rocks of the Mount Nansen Group, which are exposed 40 km to the southwest of the Carmacks Copper deposit (Sack et al. 2020). Volcanic rocks of the Upper Cretaceous Carmacks Group are preserved as extensive blankets north and south of the Granite Mountain batholith, and as isolated erosional remnants within the batholith. Paleoweathering profiles that contain copper oxide minerals at the deposit are locally capped by Carmacks

Group volcanic rocks, indicating that at least part of the oxidation history is Late Cretaceous or older. The Granite Mountain batholith is separated from the Minto pluton to the north, host of the Minto Cu-Ag-Au mine, by a veneer of the Carmacks Group volcanics.

The Carmacks Copper deposit area is located near the northwestern limit of Pleistocene glaciation, such that glacial erosion was restricted to subalpine areas and that bedrock below discontinuous till preserves a deep oxidative weathering profile. The region has a complex Quaternary history that includes at least six periods of glaciation from two distinct sectors of the Cordilleran Ice Sheet. Glaciations occurred contemporaneously with volcanism in the Fort Selkirk volcanic field (Jackson et al., 1996, 2012) and both processes contributed to significant changes in fluvial drainage patterns in the region (Huscroft et al., 2004). This complex Quaternary history hinders target evaluation as it adds a layer of complexity owing to the effect of mechanical dispersion.

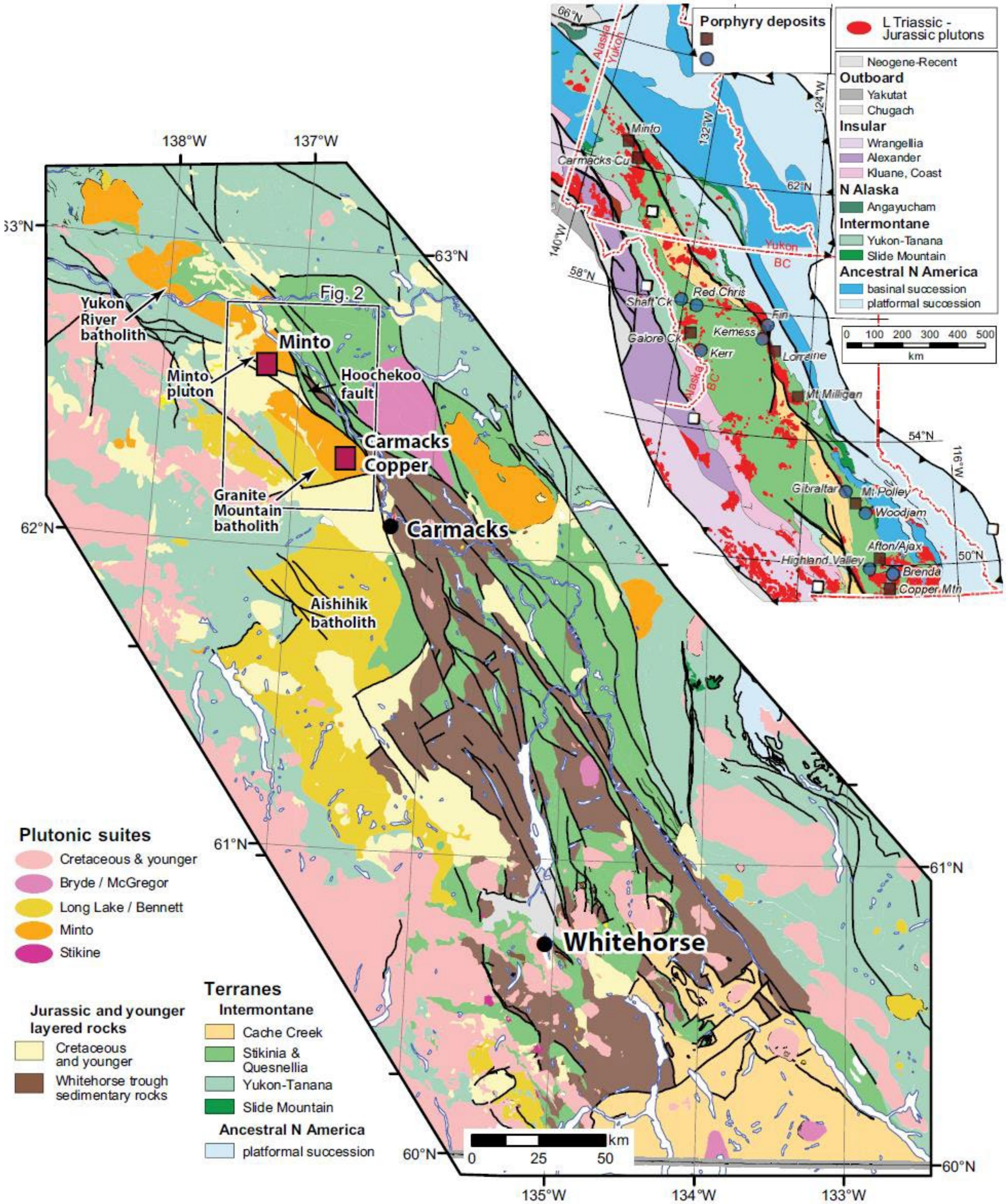



*Figure 6-1: Simplified geologic map of south-central Yukon, showing distribution of Late Triassic-Early Jurassic plutons and locations of the Carmacks and Minto deposits (from Kovacs, 2020).*

## 6.2 Mineralization

### 6.2.1 Deposit Type

The Minto and Carmacks deposits are the same type, informally classified as “Minto-type” alkalic porphyries that formed at deep (~20km) crustal levels. Recent work on the Minto and Carmacks Copper deposits classifies the host rocks of the hypogene copper mineralization as metamorphic rocks. Kovacs’ recent work on the Carmack Copper deposit suggests that mineralization is hosted in foliated, folded and variably migmatitic metamorphic inliers (Kovacs et al., 2017) derived from previously mineralized Povoas Formation slabs torn up during emplacement of the GMB (Kovacs, pers. comm).

The Minto mine is located 34 km north of the Carmacks deposit. It is currently nonoperational but has been mined since February 2006 as an open pit operation and later underground operation.

A mineral resource estimate for the Carmacks deposit is provided in Table 6-1.

Mineral assessment over most of the current claims is hampered by the limits of outcrop exposure and the potential challenges of mechanical dispersion resulting from the complex glaciation that covers the area. Traditional soil sampling has been used with variable spacing throughout the claims. This method analyses the overburden and not always the underlying bedrock. The results of the traditional soil sampling may yield an offset of the geochemical anomalies, which may be dispersed or weakened as the distance from the source of the mineralized zone increases. This is attributed to the mechanical dispersion processes that occurs during glaciation.

*Figure 6-2: Simplified diagram of deep-seated Minto-type porphyry model (Revised from Hood, 2012)*

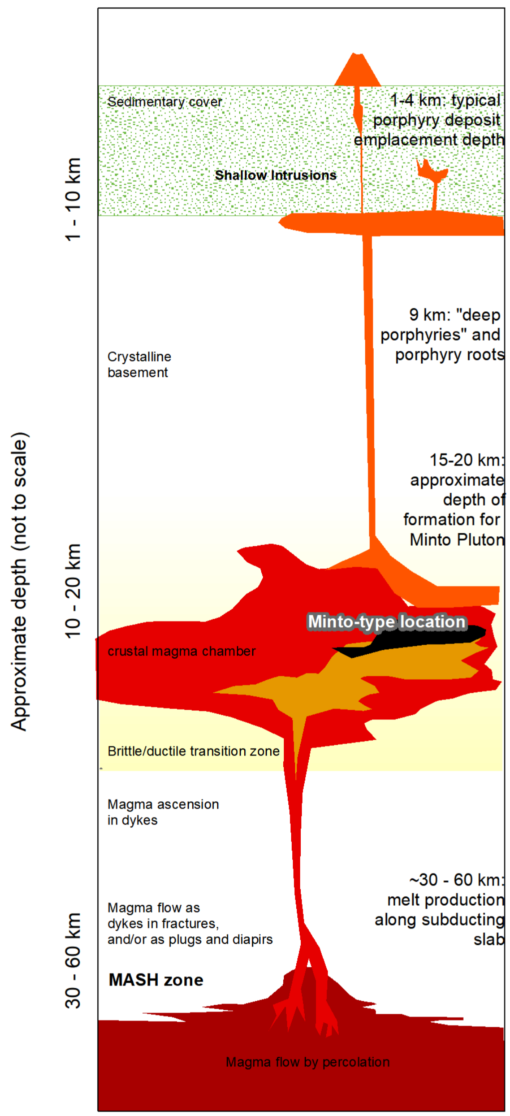


*Table 6-1: Mineral resource estimate for the Carmacks Copper Project.*

| CATEGORY | Cut -Off Cu (%) | Quantity (Mt) | Grade | | | | | Contained Metal | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cu Total (%) | Au (g/t) | Ag (g/t) | Mo (%) | CuEq Total (%) | Cu (Mlbs) | Au (koz) | Ag (koz) | Mo (klbs) | CuEq (Mlbs) |
| **IN PIT OXIDE** | | | | | | | | | | | | |
| Measured | 0.30 | 11.361 | 0.96 | 0.40 | 4.11 | 0.006 | 1.30 | 239.327 | 145 | 1,501 | 1,530 | 324.93 |
| Indicated | 0.30 | 4.330 | 0.91 | 0.28 | 3.37 | 0.007 | 1.16 | 86.846 | 39 | 469 | 621 | 110.99 |
| **Measured + Indicated** | **0.30** | **15.691** | **0.94** | **0.36** | **3.91** | **0.006** | **1.26** | **326.173** | **184** | **1,971** | **2,150** | **435.93** |
| Inferred | 0.30 | 0.216 | 0.52 | 0.09 | 2.44 | 0.006 | 0.63 | 2.473 | 1 | 17 | 31 | 3.01 |
| **IN PIT SULPHIDE** | | | | | | | | | | | | |
| Measured | 0.30 | 5.705 | 0.68 | 0.16 | 2.54 | 0.016 | 0.88 | 86.046 | 28 | 467 | 2,002 | 110.53 |
| Indicated | 0.30 | 13.486 | 0.72 | 0.19 | 2.83 | 0.013 | 0.93 | 214.323 | 82 | 1,226 | 3,999 | 277.23 |
| **Measured + Indicated** | **0.30** | **19.191** | **0.71** | **0.18** | **2.74** | **0.014** | **0.92** | **300.369** | **110** | **1,693** | **6,001** | **387.76** |
| Inferred | 0.30 | 1.675 | 0.51 | 0.13 | 2.24 | 0.020 | 0.70 | 18.918 | 7 | 121 | 732 | 25.95 |
| **TOTAL IN PIT CONTAINED METAL** | | | | | | | | | | | | |
| **Total Measured + Indicated** | | | | | | | | **626.542** | **294.301** | **3,663.454** | **8,151.463** | **823.692** |
| **Total Inferred** | | | | | | | | 21.392 | 7.724 | 137.864 | 762.516 | 28.954 |

*Source: www.gcxcopper.com/projects/resources. Released on March 15, 2022.*

# 7 Exploration Program

## 7.1 Introduction

Between June 4 and August 13, 2022 TruePoint Exploration carried a work program on the Carmacks Copper Project. The collection of MIG soil samples was part of a program consisting of an IP Geophysics survey, trenching and mapping and trench reclamation program. The work was funded by Granite Creek Copper with assistance from YMEP. A total of 520 soil samples were collected for MIG analysis over 20 days of field work and 40 person days. The program cost $44,650.66 based on YMEP rate guidelines.

The program was a victim of a soft stock market for base metal projects in 2023. Originally a larger program was planned, based on a property wide LiDAR survey, followed by surficial geology mapping and further MIG sampling. However, Granite Creek Copper were not able to raise funds on the financial markets so planned the 2023 field program and the LiDAR survey did not happen. MIG soil sampling was given a thorough test in 2022 and the results are presented in this report.

## 7.2 Objective

The main goal of the YMEP program was to test a selective leach process on soil samples in areas that had not responded well to traditional B/C soil horizon samples where the entire sample is dissolved and analysed. Selective leach analyses are often proprietary, with MMI (Mobile Metal Ion) being the most widely recognized. MIG (Mobile Ion Geochemistry) is a similar analysis method developed by Actlabs. A selective leach isolates the chemically active metal ions which were loosely adsorbed to soil particles. It is a weak leach that uses a solution of organic and inorganic compounds to extract target elements, and then analyzed them by ICP-MS. The main benefits to using selective leach for soil geochemistry are:

1. Fewer false anomalies
2. Focused, sharp anomalies
3. Excellent repeatability
4. Definition of metal zones and associations
5. Detection of deeply buried mineralization
6. Low background values (low noise)
7. Low limits of detection

A further goal was to complete more multi-element sampling over the project area. Much of the soil coverage is Cu only as this was common practice in the 1970s when the large soil grids were carried out. Additionally testing of the volcanic ash was proposed, though only a few samples were actually collected.

## 7.3 MIG Soil Sampling Methodology

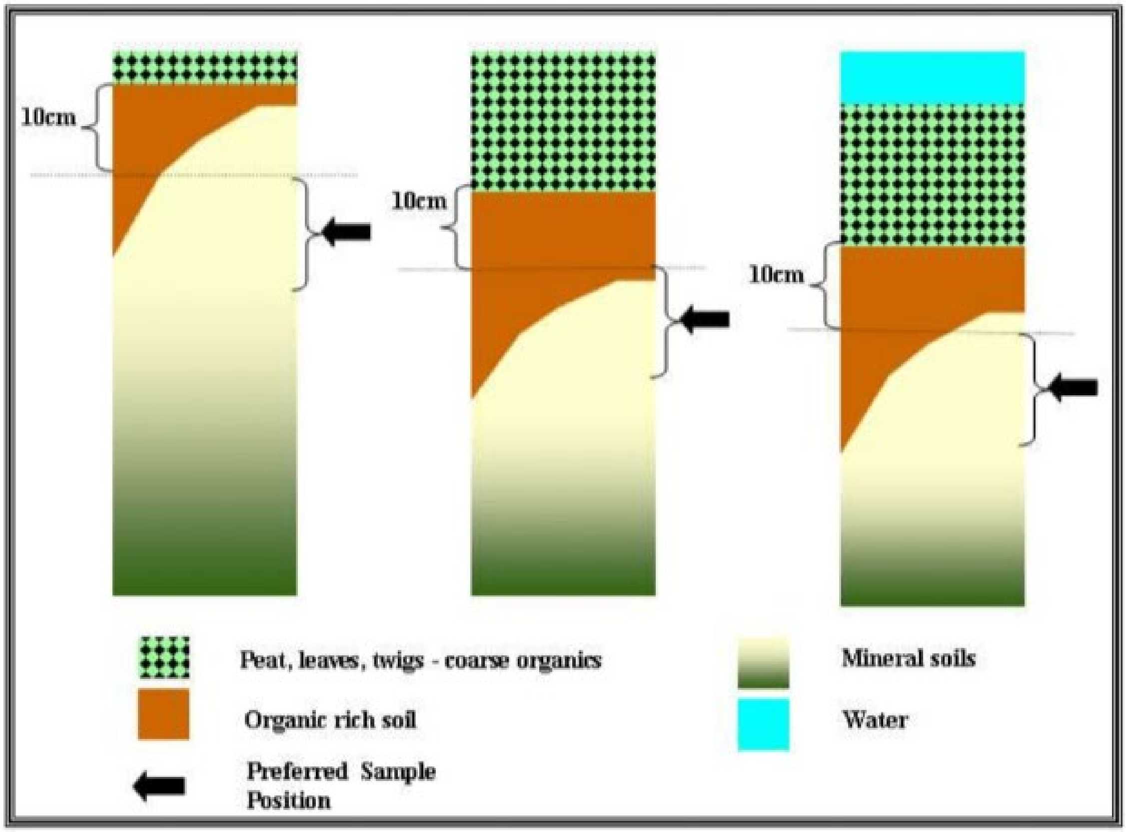



*Figure 7-1: Determining the ideal sample depth (from a guide produced by SGS on MMI sampling)*

Sample spacing ranged from 12.5 to 25m along lines with lines spaced 25-50m apart. Sampling lines were laid out using GIS software and the ideal sample locations points were preloaded into a GPS. Samples were collected as close to the ideal location as possible with the actual location recorded. If a sample could not be collected another location close by was used. Samplers worked in pairs along lines and either singly or in pairs on closely spaced grids. Locally, sample lines followed lines cut and flagged for an IP survey. This was done to compare results with IP anomalies and had the added benefit of easier traversing. Following collection, the samples were shipped to Actlabs in Ontario for analysis. No QAQC samples were included in the shipments.

The MIG sampling protocol developed to assist in consistent samples:

1. Dig a small pit with a clean shovel or trowel.
2. Identify the zero datum where the organics start to decompose into soils.
3. Measure 10 cm below this datum and take a channel sample along the pit wall between 10-25 cm depth (Figure 7.1).
4. Avoid the ash layer by sampling above or below it (Figure 7-3).
5. Collect a generous sample, as a minimum of 200g of sample is needed for analysis, into a plastic Ziploc bag with the tag already inserted and the sample number written on the bag. MIG samples should be kept moist and not allowed to dry out, hence the use of plastic bags.

6. Information recorded: sample depth, colour of soil, percent organics, moisture content, percent fragments, weather, slope, aspect, horizon, ground cover, tree cover and sample texture. Photos were taken of each sample.
7. At the start of the season in June some of the sample sites were frozen. The procedure in this case was to dig a hole and leave it to thaw. The site was revisted and the sample collected at a later date.


*Figure 7-2: Sample photograph. To help in consistent collection, the blue "Datum" ribbon is placed at the base of the organic layer and the sample is collected at least 10cm below the datum. The sample tag is included in the photograph for reference.*

## 7.4 MIG Soil Sampling Results

520 soil samples were collected from depths between 10 cm and 40 cm from the base of the organic layer. The average sample depth was 22 cm and the bulk of the samples where from 20 to 25cm below the organic layer (Table 7-1). Digital files in appendix 3 include assay certificates and a spreadsheet with combined and cleaned results. Refer to figure 7-4 for the sample locations.

The results for each element of interest were normalized by calculating a background value using the average of the lowest quartile (0-25%) values. Then a peak to background ratio known as a Response Ratio was calculated for each element by dividing each result by the background value for that element. The numbers were then rounded to whole number greater than or equal to 1. Samples with a response ration lower than 2 are considered background samples. Samples with response ratios from 2 to 5 are considered weakly anomalous and response ratios values greater than 5 are considered anomalous. The benefits of displaying results using a response ratio is to reduce the effects of lab variables between batches, allow different data batches to be merged, reduce the effects of different regolith types under the sample and produce sharper anomalies for interpretation.

| Depth in m | Number of samples |
|---|---|
| 0.1 | 6 |
| 0.14 | 1 |
| 0.15 | 15 |
| 0.2 | 357 |
| 0.22 | 1 |
| 0.25 | 105 |
| 0.3 | 31 |
| 0.35 | 3 |
| 0.4 | 1 |
| **Total** | **520** |

*Table 7-1: Sample depths.*


*Figure 7-3: Example of a sample with a thick layer of volcanic ash. In these conditions the sample would be collected immediately below the base of the ash layer.*

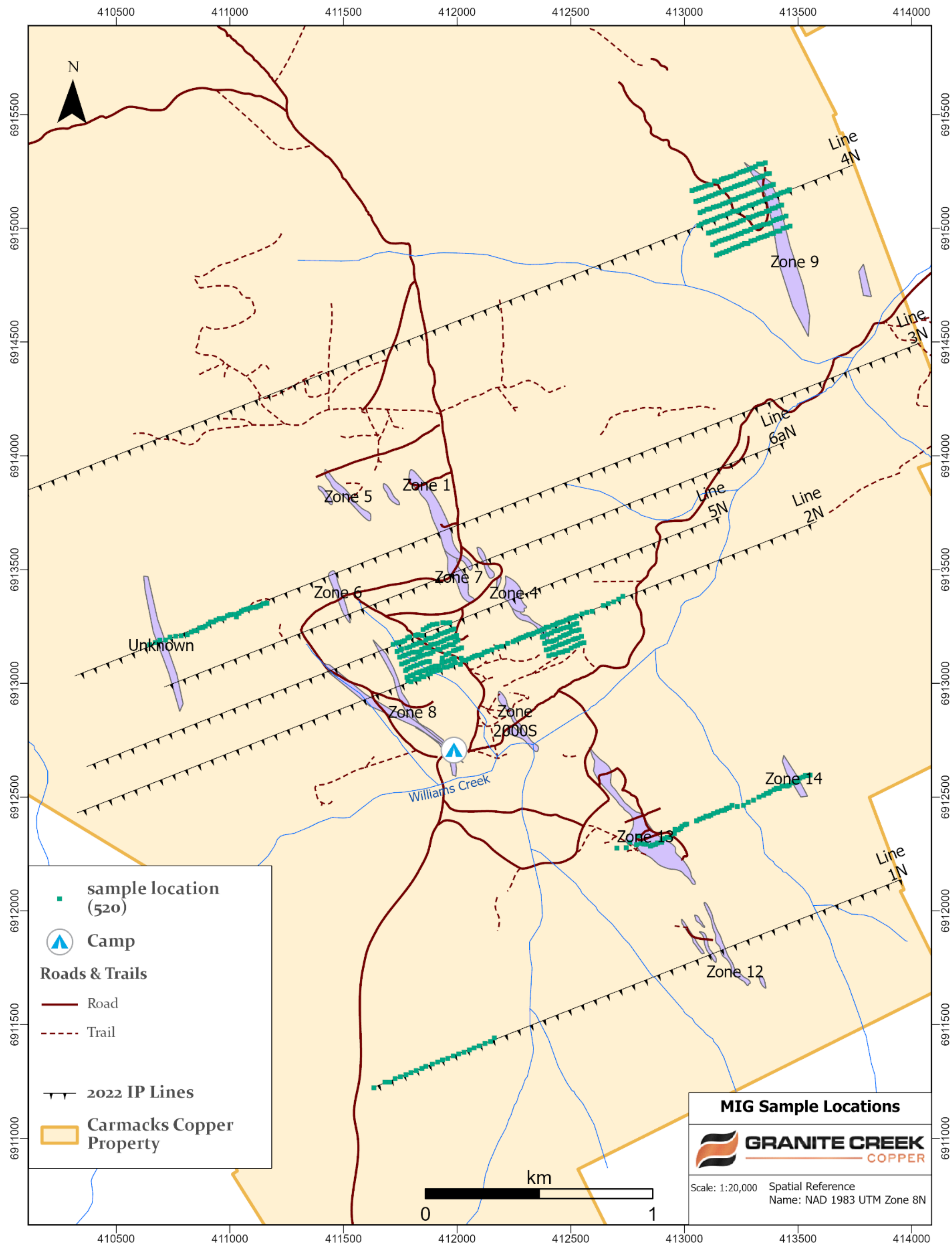



*Figure 7-4: MIG sample locations*

### 7.4.1 Zones 13 & 14 – Orientation Line

Sixty samples were collected across known mineralization in the widest part of Zone 13 and continuing east to cover Zone 14. The portion of the line that crossed Zone 13 was the orientation survey, conducted to test the MIG sampling method. The samples showed a well-defined anomaly over Zone 13, with values dropping sharply on both sides. This is the expected result over mineralization and gave confidence in the methodology.

East of Zone 13 the ground dips down into a 200 m wide wetland that is difficult to sample using regular methods before rising again to outlying Zone 14 which has seen limited exploration. Traditional soil sampling south of Zone 14 produced clusters of anomalous values but was hampered by permafrost, inferior quality samples and wet samples containing only organic material. Sampling was continued to cover this area and a series of anomalies were uncovered which will be targets of further investigation.

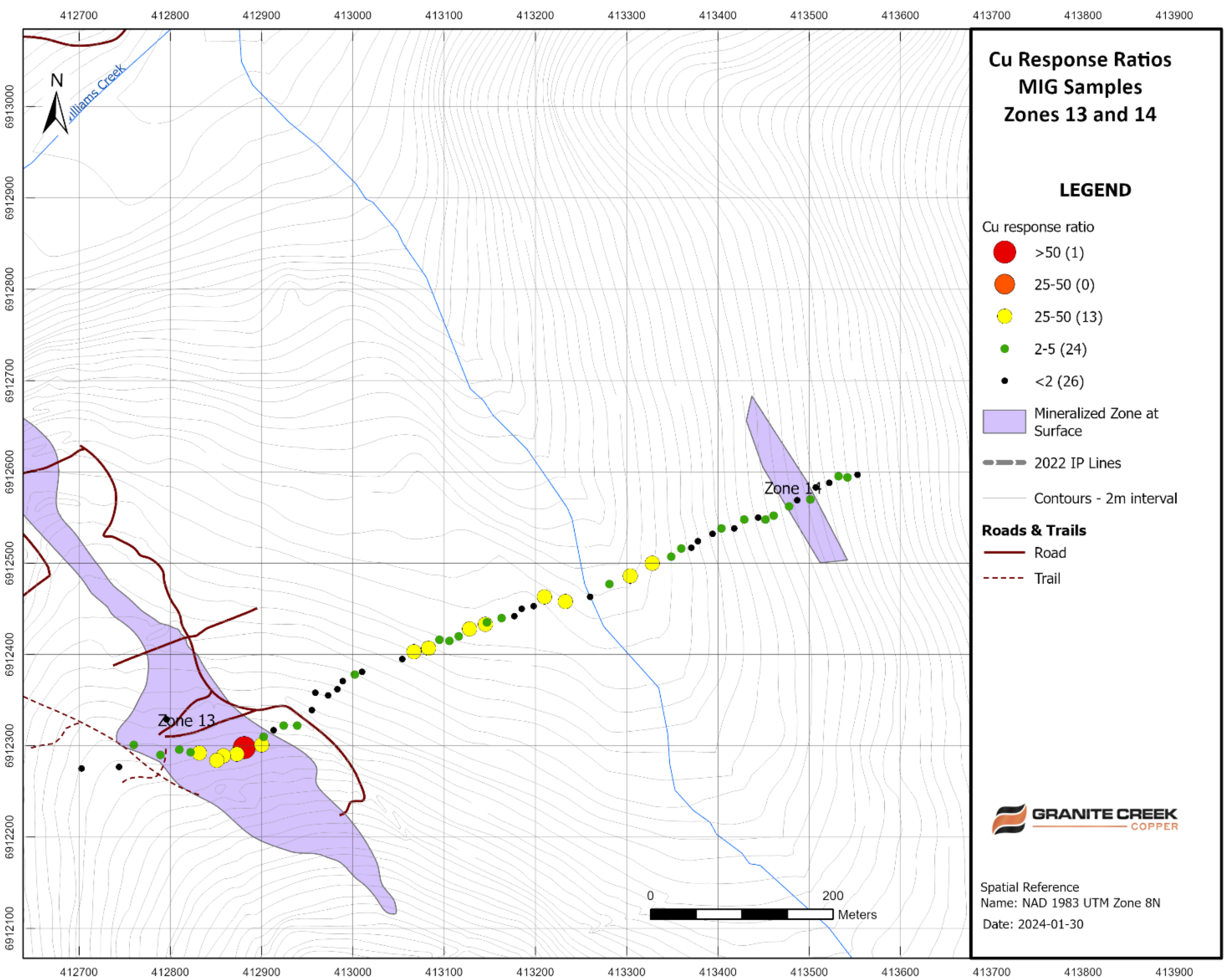



*Figure 7-5: Cu results from the orientation line across Zone 13 and its extension to Zone 14.*

### 7.4.2 Sourtoe Zone

Thirty-nine samples were collected across the Sourtoe Zone. The western part of the zone is a northwest ridge hosting foliated and weakly migmatized granodiorite. The eastern part is a recent discovery found during the 2022 IP survey. It has been trenched and narrow, weakly mineralized lenses of migmatite were uncovered.

The results of the MIG soil sampling reflect the values found in the surface trenches. The eastern side of the zone has the highest values, but in general values are background to weakly anomalous.

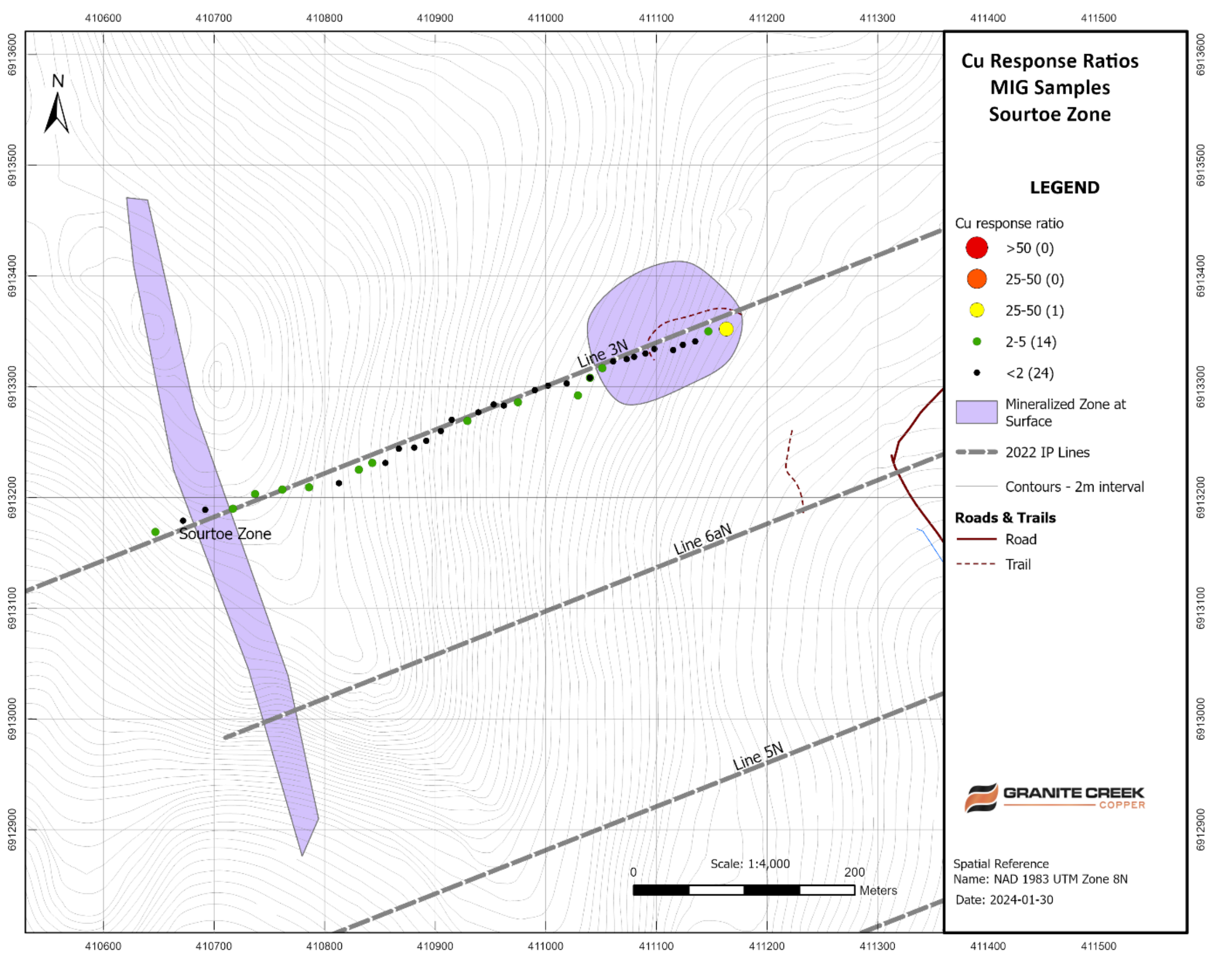



*Figure 7-6: Results from Sourtoe Zone*

### 7.4.3 Gap Zone Target

The Gap Zone Target is the hypothetical continuation of mineralization between Zones 147 to the north and Zone 2000S to the south that is the current focus of Granite Creek's work on the Carmacks Deposit. This area has been trenched by previous owners but only lightly drilled. Trenches indicate narrow mineralization at surface and faults crosscut the areas. The 2022 IP survey highlighted anomalies south and west of Zone 7.

Sampling in this area was a victim of limited funds. The west side of the target area was well tested, but the east side was not sampled. Copper results show anomalous values on the east edge of the sample grid and a single spot high along IP Line 2N. This area is a prime target for further work.

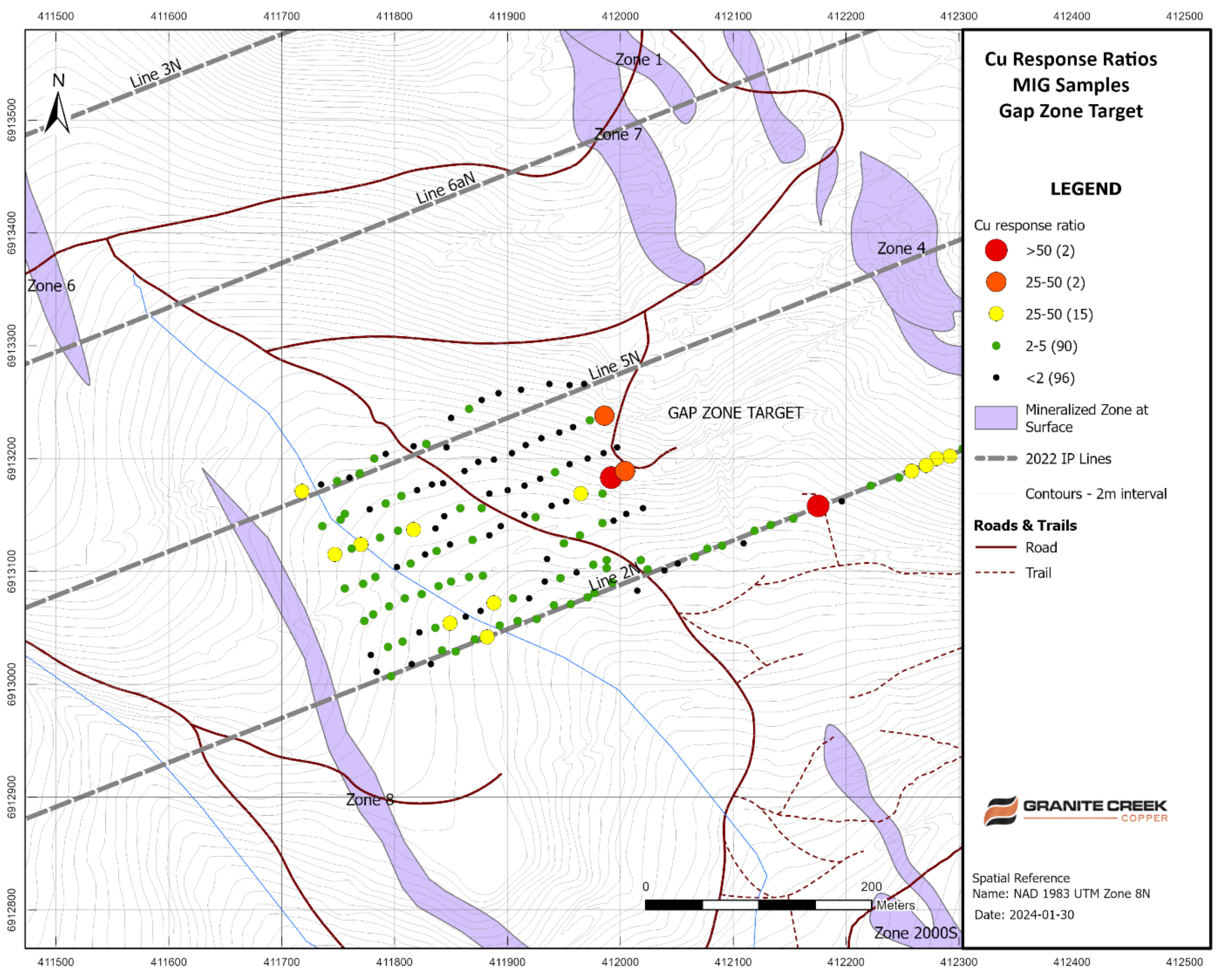



*Figure 7-7: Results from the Gap Zone target.*

### 7.4.4 South of Zone 4

Soil samples were collected from Zone 4 to test for a continuation of mineralization south of the current trenches, and to compare with IP results from Line 2N. Samples along IP Line 2N continue to othe west to cross the Gap Zone target discussed in 7.4.3.

Copper results show Zone 4 continues to the southeast 50m beyond the current surface mapping. There is also an anomalous cluster of 100m to the west of Zone 4 in a steep, open area that has not been trenched or drilled. This could be a branched or faulted offset of Zone 4 or part of the Gap Zone Target (see previous).

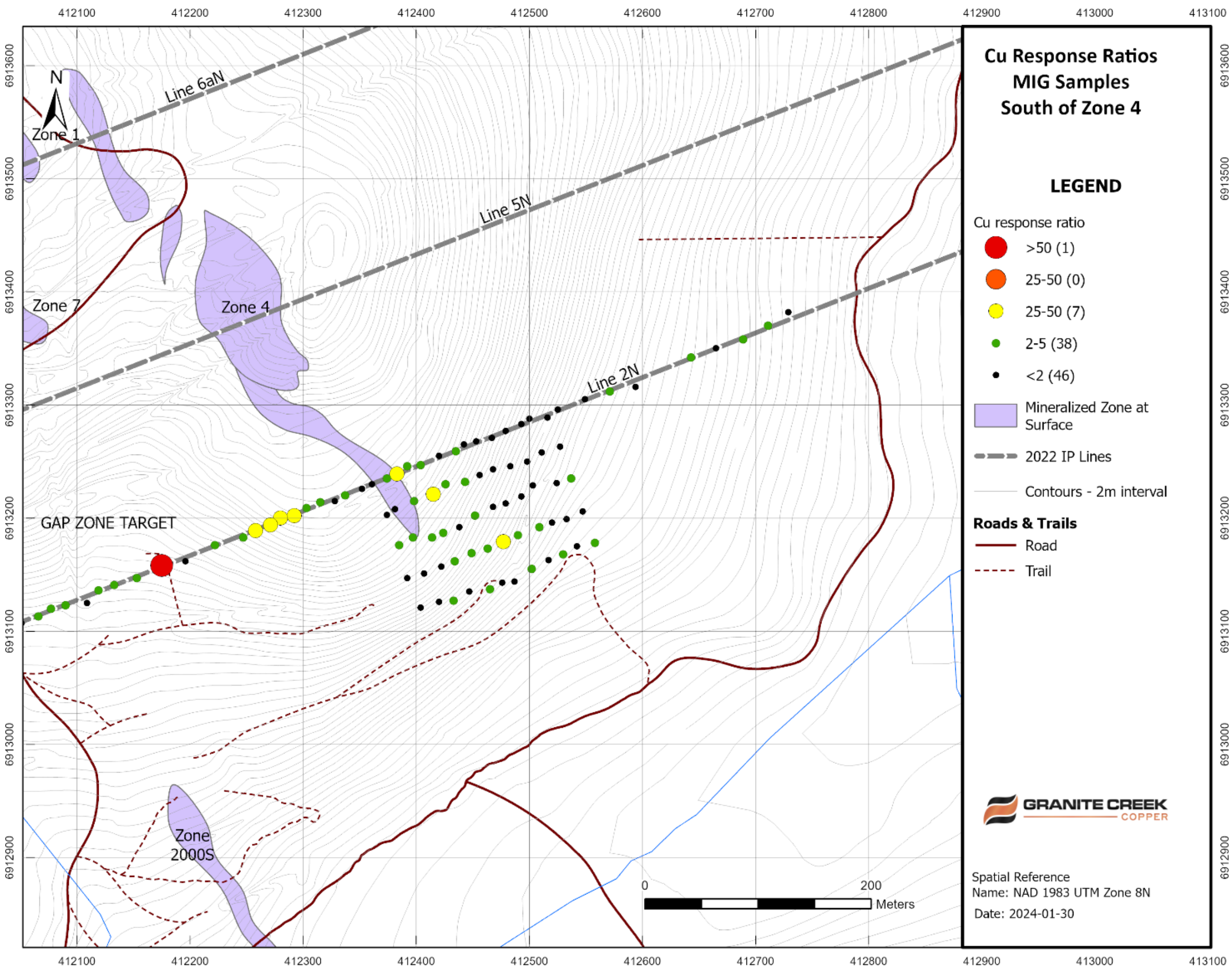



*Figure 7-8: Results from South of Zone 4.*

### 7.4.5 Zone 9

One hundred and seventy-four samples were collected from a grid across Zone 9. This outlying zone, north of the deposit has seen limited trenching and drilling, hence the surface trace of the zone is preliminary. The MIG samples show reasonable agreement with the north and south ends of the current surface outline but suggest offsets or parallel zones to the east and an extension to the south.

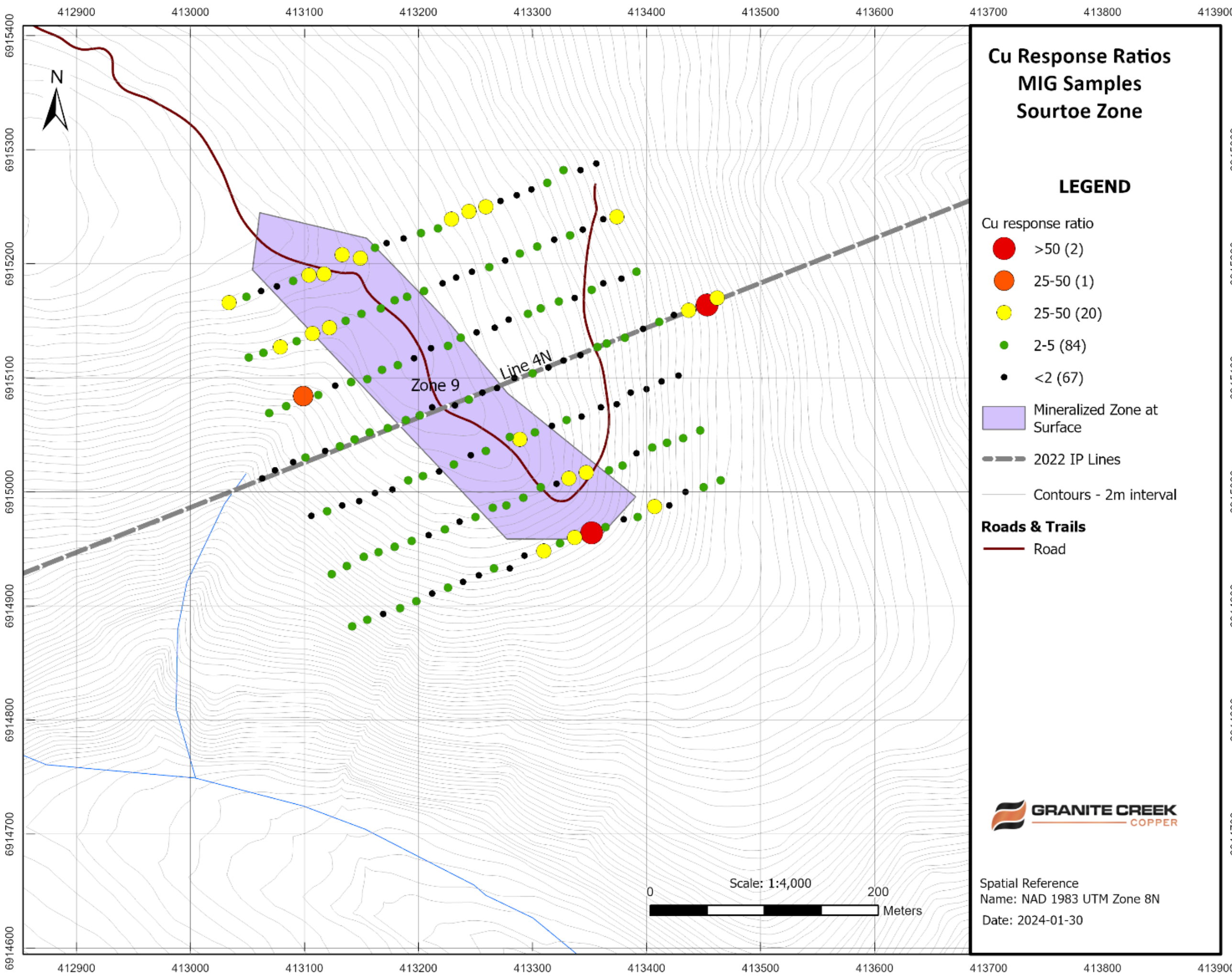
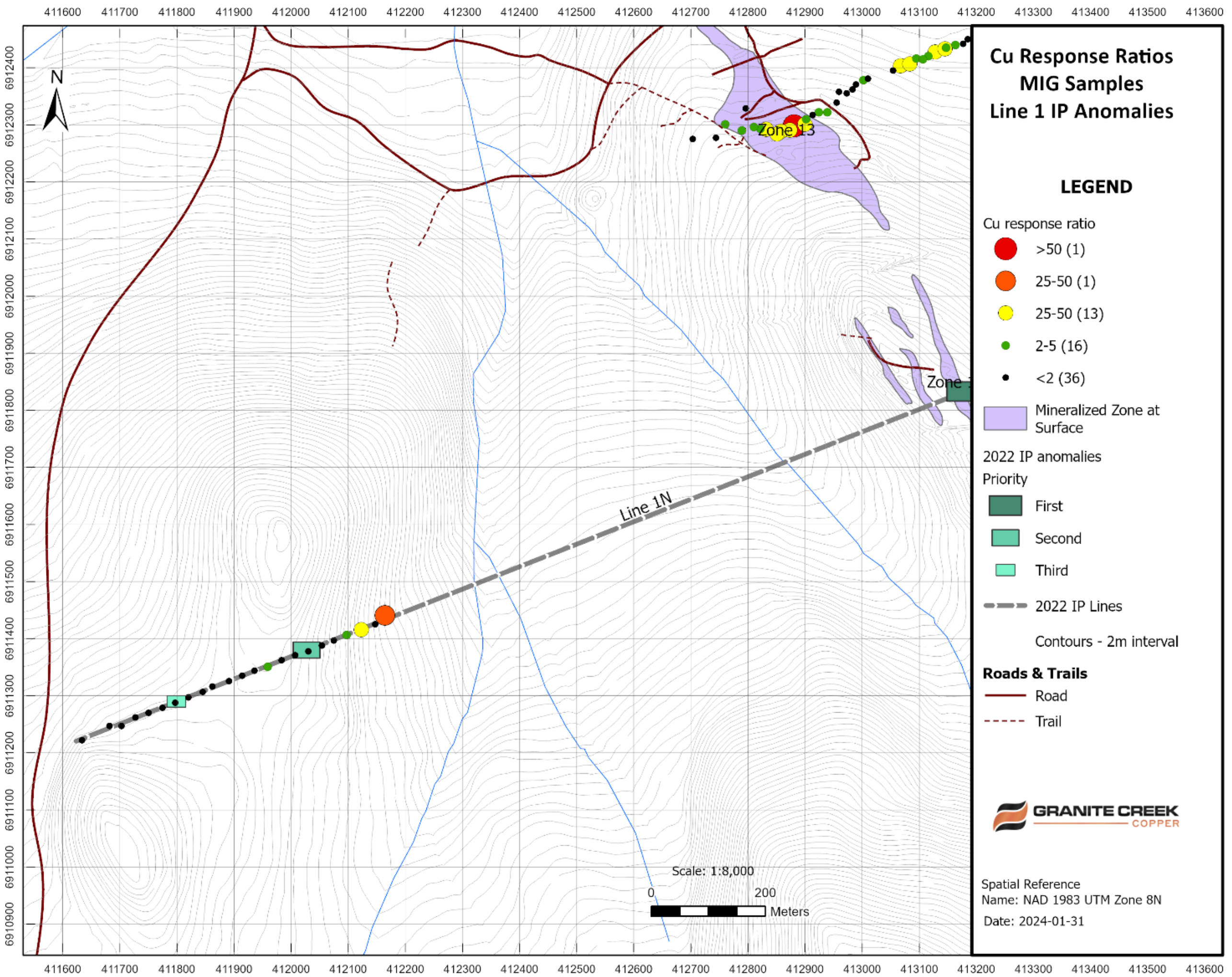



*Figure 7-9: Results from Zone 9.*

### 7.4.6 Line 1 IP Anomalies

Sixty-seven samples were collected along IP survey line 1N to test IP anomalies discovered in 2022 in an area with no known mineralization. The MIG samples show an anomaly at the end of the sample line, offset 100m to the east of the stronger IP anomaly.



# 8 Conclusions and Recommendations

## 8.1 Conclusions

The lack of outcrop over the Carmacks Copper project increases the importance of soils as a consistent layer of information over the property. The complex Quaternary history of the area includes at least six periods of glaciation from two distinct sectors of the Cordilleran Ice Sheet and significant changes in fluvial drainage patterns in the region (Huscroft et al., 2004).

Granite Creek is developing an exploration process to uncover more mineralized inliers within the GMB. IP surveys have worked well to detect the present of mafic inliers but as yet cannot determine if the inlier is mineralized. MIG sampling shows promise as a method for detecting buried mineralization prior to disturbing the ground with trenching or for inliers too deeply buried to trench.

The relatively shallow depth (average 20cm) of MIG samples compared to traditional Yukon bedrock interface soil samples (50 to 100 cm) makes the samples faster and easier to collect. However, the larger hole and the requirement for more information to be collected, and the need for shovels or trowels to dig versus a soil auger makes the collection process slower. MIG samples also cost approximately twice the amount of a regular soil sample. This suggests that MIG samples should be used where regular soil samples are not suitable and not as the default sampling method over an entire project.

## 8.2 Recommendations

Granite Creek Copper should continue with soil sampling lines or grids to cover all IP anomalies and extend grids that show anomalous copper response ratios along the edges. Prime areas for extension of grids are:

4. the Gap Zone Target,
5. continue eastward along IP survey line 1N towards Zone 12
6. extend east and south in Zone 9

The original main goal of this program, to acquire LiDAR data and complete a detailed surface geology map remains a high priority and is the next step in project wide exploration. If LiDAR is not acquired for the entire property, then it should be acquired for the southern section over the Carmacks deposit.

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# APPENDIX A: Date, Signature and Certificate of Author

I, Deborah Ann Rachel James of 11-3194 Gibbins Road, Duncan, British Columbia, do hereby certify the following:

- I am a Professional Geoscientist in good standing with the Association of Professional Engineers and Geoscientists of B.C.
- I graduated from the University of British Columbia with a B.Sc. degree in Geological Sciences in 1988
- I have been employed continuously in the mineral exploration and mining industry since 2006 and have been practising my profession as a geologist continuously since 2006.
- I have worked in the Yukon Territory in 1988-1989 and from 2006-present. During that time I have worked in the field on the Mt. Skukum Au-Ag vein deposit near Carcross, YT, the Nucleus and Revenue Cu-Au Porphyry deposits at the Freegold Mountain Property in the Dawson Range, Ni-Cu-PGE occurrences in the Kluane Ranges in southwest YT, Ag-Pb veins in the Keno Hill District, and the Carmacks deposit. I have participated in technical fieldtrips at the Minto mine and the Carmacks Copper Property led by company geologists.
- I supervised programs at the Carmacks Project in 2019-2022.
- I was a co-author for a Technical Report for Granite Creek Copper on the Stu Copper Property (November 15, 2018).

Deborah James (digital signature)

# APPENDIX B: Sample Descriptions and Analysis

See digital files

# APPENDIX C: Statement of Expenditures

See YMEP final expense claim and digital invoices.

| | | | | | |
|---|---|---|---|---|---|
| YMEP no: **23-004** | | project name: **Carmacks Copper** | | Expense Claim no: **1** | |
| **Granite Creek Copper Ltd**<br>*Applicant name* | | | module: | **Target Evaluation** | |
| **Suite 904-409 Granville St**<br>**Vancouver, BC V6C 1T2**<br>*address* | | | phone: | **604-970-7871** | |
| | | | email: | jlongridge@truepoint.com | |
| | | | date submitted: | **02-Nov-23** | |
| Start/ end dates of fieldwork for this claim: | | **June 4th, 22**<br>*start* | **Aug 14th, 22**<br>*end* | no of field days/ this claim: | **20** |
| **eligible expenses** | *Please refer to rate guidelines. Provide photocopy of receipts. Amounts to exclude GST* | | | | |
| item | | | unit/days | rate | total |
| daily field expenses | 20 days of sampling between June 4th and August 14th. | | 40 | $100/day | $4,000.00 |
| Personnel (with qualifications) | *Debbie James - Sr Geologist* | | 2 | $500.00 | $1,000.00 |
| | Nik Johnson - field Technician | | 10 | $350.00 | $3,500.00 |
| | Theo Johnson - Field Technician | | 13 | $350.00 | $4,550.00 |
| | Kayla Mintz - Field Technician | | 10 | $350.00 | $3,500.00 |
| | Jacob Longridge - geologist | | 2 | $500.00 | $1,000.00 |
| | Elias Carpenter - Field Technician | | 3 | $350.00 | $1,050.00 |
| equipment (rental) | | private or commercial | unit/days | rate | total |
| 4X4 truck | | | 15 | $50.00 | $750.00 |
| UTV | | | 20 | $50.00 | $1,000.00 |
| other | | *please provide details* | | | |
| Actlabs 7-MIG analysis | | Invoice A22-13424 | | | $1,658.67 |
| Actlabs 7-MIG analysis | | Invoice A22-09154 | | | $6,081.79 |
| Actlabs 7-MIG analysis | | Invoice A22-11786 | | | $14,460.20 |
| report writing | | | | | $2,100.00 |
| | | | | **Total this claim:** | $44,650.66 |