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Via Email: cbeveridge@alvarezandmarsal.com

Attention: Callum Beveridge (Alvarez & Marsal)
Sam Kennedy (Crown-Indigenous Relations and Northern Affairs Canada)

Subject: Terrain and Borrow Source Assessment, Cantung Mine NWT

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained by Alvarez & Marsal Canada Inc. (Alvarez & Marsal), as court-appointed monitor of North American Tungsten Corporation (NATC), to conduct various assessments of the Cantung Mine site to assist with closure planning. Mapping surficial geology and locating and investigating borrow sources for mine closure and reclamation materials is included as part of this assessment. This report summarizes the results of terrain and borrow source assessment activities completed in 2017, 2018, and 2019.

A review of existing information identified that mapping of surficial geology in the mine area was required to identify materials that could be of use for reclamation activities, such as the capping of mine waste (e.g., tailings, waste rock), and other site construction purposes. Tetra Tech has determined some preliminary estimates for borrow volumes that would be required for reclamation purposes. The total volume would range from 700,000 m³ to 1,000,000 m³ of screened (removal of cobbles and boulders) granular material that would be used for cover material. Some fine texture material may also be required to support possible revegetation activities.

The Cantung area is located in the Logan Mountains Ecoregion, within a zone of discontinuous widespread permafrost characterized by rugged terrain and perpetual snow fields at higher elevations (Ecosystem Classification Group 2010). The region has been largely glaciated by one or more glaciations (Smith et al. 2004), which deposited large volumes of glacial till and glaciofluvial material on the floor and lower slopes of the Flat River valley. The ecoregion is generally underlain by sedimentary rocks, mostly shale, slate, conglomerate, limestone, dolomite, siltstone and sandstone that are intruded by massive bodies of granodiorite and quartz diorite.

2.0 SOIL REQUIREMENTS FOR REHABILITATION/RECLAMATION

Soils with distinct textures (mostly granular in nature) are required for mine reclamation projects such as topsoil to support revegetation, rock and overburden piles, tailings impoundments, landfills and other contaminated waste sites. Granular material is required for free-draining cover and general fill; and fine-textured soils (silt) and organics can be required for cover to support revegetation; sand is used for liner protection and as bedding for infrastructure (e.g., pipelines).

3.0 SURFICIAL GEOLOGY AND BORROW SOURCE INVESTIGATIONS

3.1 Purpose of Surficial Geology Field Investigations

Following the review of existing information, it was identified that mapping of surficial materials in the mine area was required to help locate materials that would be useful for reclamation activities, such as the capping of mine wastes (tailings, waste rock), and other purposes. In 2014, Stantec Consulting completed a desk-top terrain mapping study, but field-checking to verify the mapping was not completed. In early September 2017, Tetra Tech completed a review of the previous terrain mapping conducted by Stantec (2014) and conducted stereographic air photograph interpretation to explore for soil units with potential fine-textured material.

A field program was completed in September 2017 by Jack Dennett, P.Geo. (BC) to field check the previous terrain mapping conducted by Stantec (2014) and to locate potential borrow sources. The objectives of the fieldwork were to delineate and describe distinct native soil deposits, to collect soil texture data to confirm or revise the desk-top terrain mapping, and to identify potential borrow and rock sources. In conjunction with the surficial geology mapping, air photograph interpretation aided the exploration for potential borrow sources of unconsolidated material needed for mine reclamation.

3.2 Surficial Sampling and Preliminary Assessment

The following summarizes the surficial sampling and preliminary assessment completed during the 2017 field investigation program:

- Completed an overall visual inspection of the terrain in the study area.
- Guided by the terrain mapping, field stations were established in select terrain polygons to record terrain data and map soils exposed on road cut slopes, borrow pit walls, natural escarpments, and excavated in hand dug soil pits. Representative samples were collected from terrain field stations and potential borrow or quarry sites for particle size and other analysis in Tetra Tech's Geotechnical lab. Samples from potential borrow sources were also submitted for geochemical testing.
- Over 100 GPS located digital photographs of terrain mapping field stations and potential borrow sites were recorded.
- Bedrock samples were collected in an area identified as a suitable rock quarry for production of rip rap. Rip rap may be required to stabilize tailings piles located close to the banks of the Flat River as well as for possible in-stream bank stabilization. Rock samples were submitted for geotechnical and geochemical testing for rip rap suitability.
- Subsequent to the fieldwork, air photos were reviewed to revise the desktop interpretation of terrain and soil genesis based on the results of terrain ground-truthing.

3.3 Terrain Field Checking

In 2017 previous terrain mapping (Stantec 2014) and air photo interpretation was reviewed to understand the soil genesis of the Cantung area and to locate ground-truthing targets for the fieldwork program as shown on Figures 1 a-d. During the terrain mapping field work, field stations were recorded in select terrain polygons to collect

terrain data and map soils exposed in hand pits or from existing exposures on road cut slopes, borrow pit walls, and natural escarpments. A total of 56 field stations were visited and representative soil samples were selected for geotechnical and geochemical analysis.

Terrain mapping (Stantec 2014) indicated that glaciofluvial material was a dominant native soil, followed closely by glacial till and colluvium. In mountainous areas, such as the Logan Mountain Ecoregion, glacial till and glaciofluvial material can be deposited relatively close to the source from which they were derived. Short transport distances of basal and lateral moraine result in reduced glacial contact time with less opportunity to develop fine-textured soil. Field observations and soil sampling confirmed the general absence of units with a significant fine-textured matrix. One source of soil with a significant fine-textured (silt) matrix (Station 9-16-JD-50, Figure 1d) was identified but may require screening of coarse granular particles prior to use as cover material. Further sub-surface testing was planned for the 2018 field season to delineate textural consistency and the spatial and vertical extent of this deposit.

In montane glaciation, where glacial tills are typically deposited relatively close to their source, soil texture can be coarse-grained and differentiation of till and glaciofluvial material is less distinct. Some areas mapped as glaciofluvial material (Stantec 2014) may arguably be till, and some areas mapped as till or glaciofluvial were observed to be colluvium, originating from eroded upslope bedrock. These distinctions are further delineated on the final terrain map, based on the Stantec mapping, revised with 2017 field-checking data.

Five native soil types are dominant: colluvium, glacial till, glaciofluvial, fluvial, and organic. A significant proportion of the surficial material on middle to upper valley slopes is bedrock. Terrain mapping (originally by Stantec 2014 and refined by Tetra Tech) indicates that glaciofluvial material is a dominant native soil, followed closely by glacial till and colluvium.

The texture of colluvium is strongly influenced by upslope sources. Much of the colluvium is ultimately developed from bedrock and is loose, granular material with angular boulder/cobble/gravel fragments in a sand matrix with trace silt. The new borrow pit developed across the Flat River from the town of Tungsten exploits a large colluvial fan (Figure 1c, polygon 115).

Glacial till, deposited under or proximal to glacial ice, is typically present on lower to mid-valley slopes. Much of the till observed is somewhat indistinct from glaciofluvial material and some may have been redeposited or redistributed by water during deglaciation. This is evident in the soil texture of many areas of till characterized by a low silt content.

Large deposits of glaciofluvial material are common and provide a good source of loose, granular material suitable for construction and fill. Quaternary (post-glacial) fluvial material, mostly along the Flat River, consists of rounded to sub-rounded washed gravel, cobbles, and boulders, and can be a local source of fill.

Organic soil deposits have developed on floodplains of the Flat River. Due to their proximity to the Flat River riparian area, no organic deposits have been identified as suitable borrow sources. It is expected that stockpiles of organic-rich topsoil stripped during development of new borrow sources and other infrastructure will be used for cover, particularly where revegetation is prescribed (Figure 2a, Area 18C).

The composition of granular material in terms of the gravel, sand, and fines content was well documented for shallow surface deposits. Uniformity of texture with depth was less understood but was better defined by results of the 2018 and 2019 test-pitting programs.

3.4 Borrow Source Preliminary Assessment

In 2017 for the preliminary assessment, nine potential borrow sources were identified (listed in Table 3-1 and shown on Figures 1b, 1c and 1d). Most of the borrow sources were thought to provide granular material; however, samples from one potential borrow source identified till with a fine-textured matrix that could be a source of fine textured material. The selected borrow sites provide numerous options for granular material located close to areas requiring reclamation.

A potential rock quarry for rip rap was located at the upper boundary of the town site (Figure 1c, Area E). Rip rap may be required to stabilize tailings piles located close to the banks of the Flat River and for possible in-stream bank stabilization. The potential quarry in benign granitic bedrock is situated at a large area of gently sloped terrain next to an existing road. Two samples of rock were collected for geotechnical and geochemical assessment.

Samples from potential borrow sources were collected for particle size and geochemical testing. Geochemical evaluation of the waste rock stockpiled near the main portal has also been undertaken to determine its suitability as a source of rip rap.

Table 3-1: Borrow Source Assessment

Borrow Source	Location	Sample Number	Particle Size (%)			Soil Texture	Prospective Volume (m³)	Comments
			Silt	Sand	Gravel			
A	Beside highway, 3 km NW of town site.	9-16-JD18	-	-	-	GRAVEL , sandy, loose, shale matrix, some cobbles and boulders, some oversize.	150,000	Site may be expanded: large volume of granular material available. Suitable for general fill.
B	Beside highway, 1.5 km NW of town site.	9-16-JD17	9	66	25	SAND , some gravel, some cobble, some boulder, trace silt.	180,000	Site may be expanded: large volume of granular material.
		9-16-JD56	7	41	53	Sandy GRAVEL , some cobble, some boulder, trace silt.		Suitable for general fill with the removal of the boulders.
C (Ski Hill Borrow)	Colluvial fan NE side of Flat River across from town site.	9-16-JD13	25	42	33	SAND , gravelly, silty, some cobbles, some boulders.	180,000	Expand existing borrow in colluvial fan. Suitable for general fill.
D (Ski Hill Borrow)	Colluvial fan NE side of Flat River across from town site.	9-16-JD10	14	44	42	SAND and GRAVEL , cobbly, boulder, trace silt.	180,000	Expand existing borrow in colluvial fan. Suitable for general fill.
		9-16-JD11	-	-	-	SAND and GRAVEL , cobbly, boulder, trace silt.		
		9-16-JD51	-	-	-	SAND and GRAVEL , cobbly, boulder, trace silt.		
E	Beside upper Tailings Pond access road at south edge of town.	9-16-JD26	-	-	-	Barren Granodiorite Bedrock.	525,000	Site may be expanded into hillside to increase volume of available rock for rip rap.
		9-16-JD52	-	-	-	Barren Granodiorite Bedrock.		
		9-16-JD53	-	-	-	Barren Granodiorite Bedrock.		
F (Landfill)	0.8 km SE of town at landfill on NE side of Flat River.	9-16-JD50	34	42	25	SAND , silty, gravelly, some cobble, trace boulder.	158,400	Potential source of fine-textured material: screening of coarse fraction may be required.
G (Landfill)	0.8 km SE of town at landfill on NE side of Flat River.	9-16-JD04	12	45	43	SAND and GRAVEL , some cobble, some bolder, trace silt.	120,000	Suitable for general fill.

3.5 Borrow Source Investigation - 2018 Testpitting

From the preliminary assessment, Tetra Tech determined that two areas of interest would benefit from further investigation through a testpitting program: the Ski Hill Borrow site (shown as Areas 18B to 18D on Figure 2a) and northwest of the Existing Landfill (shown as Area 18A on Figure 2b). While defining the areas to be investigated and what NATCL site equipment would be available to complete the testpitting program, NATCL site personnel informed Tetra Tech that they no longer had quarry development permits for the Existing Landfill and Ski Hill Borrow sites. As a result, the clearing of vegetation and excavation of testpits were not permitted beyond the limits of the disturbed areas. Based on these limitations Tetra Tech developed a testpitting program that would assess within and up to the boundary perimeters for the two areas of interest. Tetra Tech also came equipped with a small gas power hand auger to complete shallow (up to 1.5 m) testholes beyond the limits of the previous developed borrow sites.

During the testpitting program, NATC provided a CAT rubber-tired backhoe and Hitachi steel tracked excavator. Both pieces of equipment were used to complete a total of 33 testpits. Testpit locations are shown on Figures 2a and 2b; testpit logs are provided in Appendix B. Upon completion, each testpit excavation was backfilled with the excavated material and mounded to allow for some future settlement.

The backhoe was used to complete Testpits BS-18TP01 through BS-18TP14 that were associated with the Existing Landfill site and an old access trail that ran along the eastern side of the Flat River. The majority of the old access road was accessible from the Existing Landfill site to the Old Landfill site that was east of Tailings Pond (TP) 4. The backhoe was also used to complete Testpit BS-18TP15 in the south eastern portion of the Ski Hill Borrow, an area where construction material for TP5 was recently sourced from.

The excavator was used to complete Testpits BS-18TP16 through BS-18TP33 that were located along the north-western perimeter of the Ski Hill Borrow site. The purpose of assessing this area was to confirm the placement of stockpiled stripping and reclamation material and to determine if the source material to the northeast along the hillside consisted of a glacial till deposit that might provide a soil with a fine-textured (silt/clay) matrix.

The gas power hand auger was used to drill 10 testholes in the undisturbed vegetated area northwest of the Ski Hill Borrow site along the hill side to assess the possibility of till soils containing fine textured materials. Testhole BS-18AH-01 through BS-18AH10 locations are shown on Figure 2a and the testhole logs are provided in Appendix B.

Soil samples were collected from each testpit at approximate 1.0 m intervals or when there was a noticeable change in stratigraphy. Soils samples were then selected for particle size analysis (sieve/hydrometer) which were completed at Tetra Tech's Whitehorse laboratory. The particle size results are attached to the corresponding testpit and testhole logs in Appendix B.

3.6 Borrow Source Investigation - 2019 Testpitting

From the results of the 2018 borrow source investigation Tetra Tech designed a program to conduct a more detailed investigation beyond the limitation of the existing disturbed areas and access trails. The two areas of interest remained the southeast edge of the Ski Hill Borrow (Area 18B on Figure 2a) and the northeast side of the Flat River northwest along an old access northwest of the Existing Landfill site (shown as Area 18A on Figure 2b).

Work was completed in accordance with Type A Land Use Permit MV2019S0009. To complete the subsurface investigation and better define the subsurface soil condition, including updating estimated material quantities from the 2018 borrow source investigation, NATCL provided a Hitachi steel tracked excavator with operator to complete

the additional testpits. The excavator was used to complete a total of 19 testpits (BS-19TP01 through BS-19TP19). Testpit locations are shown on Figures 2a and 2b and the testpit logs with particle size results are presented in Appendix C. Upon completion, each testpit excavation was backfilled with the excavated material and mounded to allow for some future settlement.

Soil samples were collected from each testpit at approximate 1.0 m intervals or when there was a noticeable change in stratigraphy. Soils samples were then selected for particle size analysis (sieve/hydrometer) which were completed at Tetra Tech's Whitehorse laboratory. The particle size results are attached to the corresponding 2019 testpit logs in Appendix C.

3.7 Borrow Source Investigation – Results

3.7.1 Overview

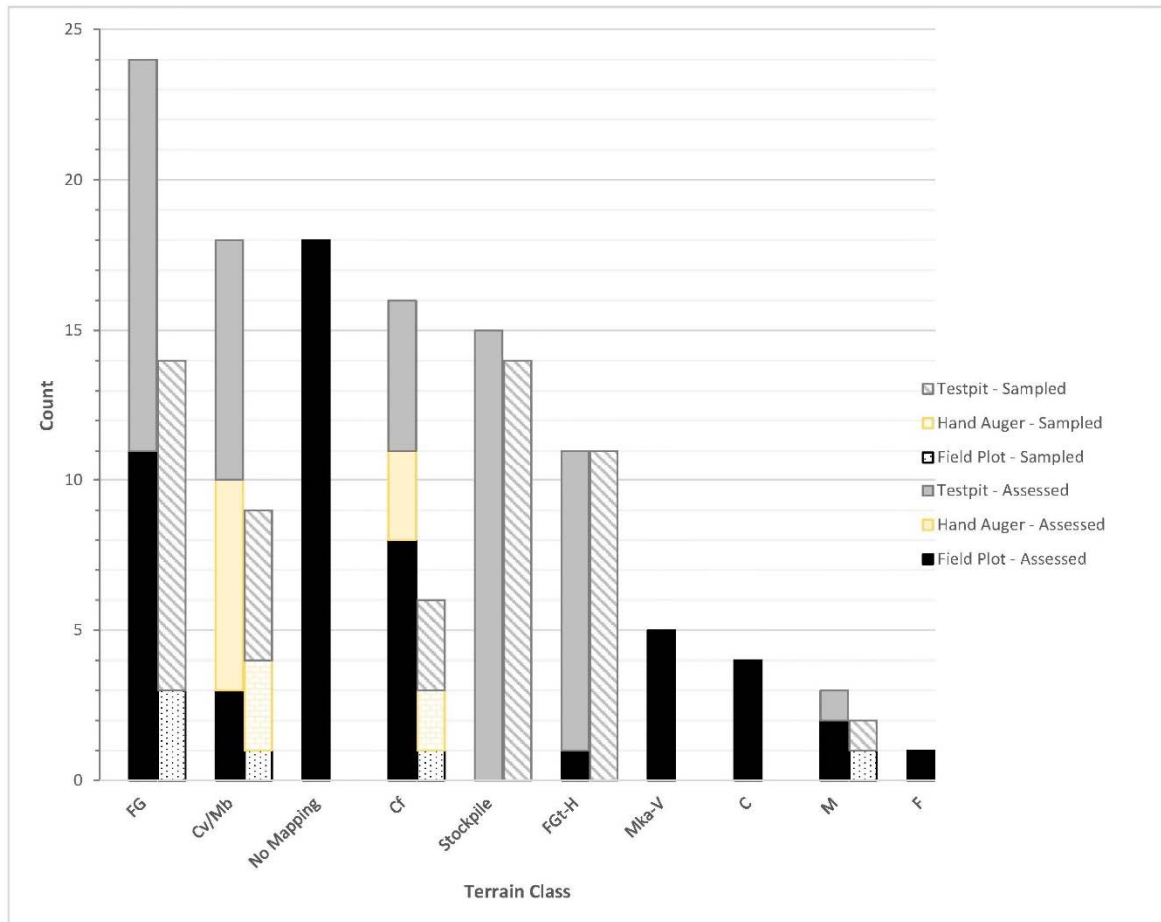
Between 2017 and 2019, a total of 120 sites were assessed using a combination of shovel-dug soil pits, hand augers, and excavator-supported testpitting. From these locations, a total of 55 samples were collected for analysis (Figure 3-1). The majority of assessment locations and samples were collected from glaciofluvial material (FG, FGt-H) as well as from reject material that was stockpiled adjacent the Ski Hill Borrow site ("Stockpile"). This stockpiled material was targeted for its potential to produce finer-textured material (e.g., silt and/or clay).

All 55 samples provided information on the distribution of gravel and sand within the sample, as well as a combination of silt and clay. Several samples (11 in total, Figure 3-2) from the stockpiled reject material (9 samples located in area 18C on Figure 2a) and two other samples located in areas adjacent (BS-18AH05 located just northwest of area 18C and BS-18TP15 located in area 18B, as shown on Figure 2a) contained a sufficient amount of clay that results could be obtained for the clay fraction specifically (instead of being combined with the silt fraction, as was the case for the majority of samples tested). The average amount of clay identified from the stockpiled reject material was approximately 11% (Figure 3-3). The yields from the other two samples were slightly higher; 12% from the colluvial fan class (Cf) located in area 18B and 15% from the colluvium veneer overlying moraine (till) blanket class (Cv/Mb) located to the northwest of area 18C. These results, however, are only based on a single sample from each of these terrain classes. Additional samples collected from testpits excavated in area 18B in 2019, which encompasses the same colluvial fan initially sampled in 2018 plus the Cv/Mb unit to the northeast (Figure 2a) contained silt/clay contents ranging from 11-15%.

With the exception of the stockpiled reject material and till (M) classes, the average amount of gravel within the remaining terrain classes sampled was approximately 40%; the stockpiled reject material and till (M) classes averaged much lower amounts of gravel at 23% (Figure 3-3). Similarly, with the exception of the till (M) unit, all of the terrain classes sampled contained a similar amount of sand that averaged 35%. The till (M) unit averaged the highest amount of sand at 59%, however this result is only based on two samples. The average amount of silt/clay identified in each terrain class was quite variable, ranging from as low as 16% (glaciofluvial terrace with kettle depressions [FGt-H]) to as high as 36% (stockpiled reject material). In undisturbed terrain units however, the highest average amount of silt/clay identified was 28% (Cf; Figure 3-3).

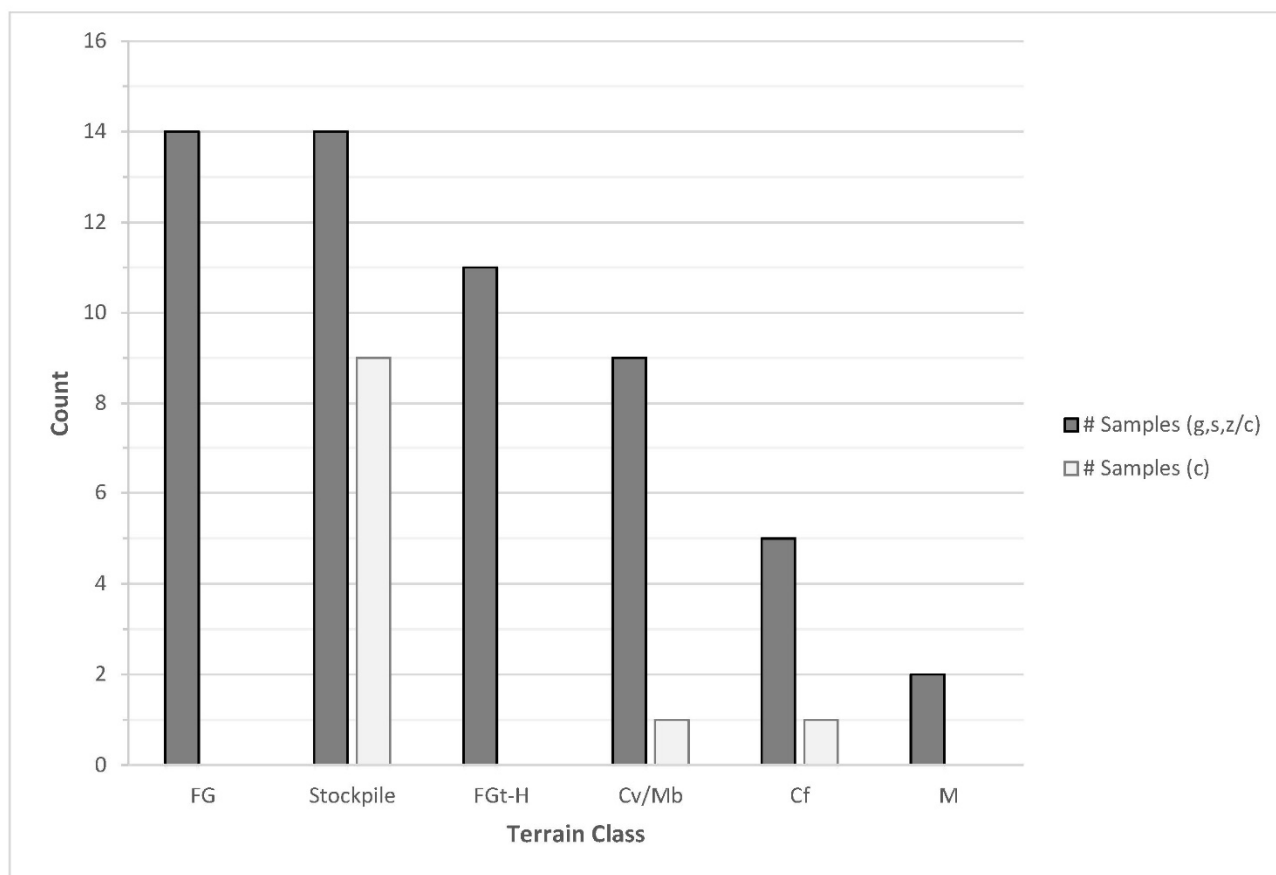
These results suggest the amount of fine-textured material (specifically clay) is not particularly abundant in the vicinity of the mine or necessarily tied to a particular terrain class. Only two samples were identified from undisturbed terrain units (Cv/Mb and Cf) that produced a discernable clay fraction. Silt mixed with clay was identified in all 55 samples, however the relative proportion was not particularly high (e.g., less than 30% on average). Coarser-textured materials (e.g., sands and gravels), however, are relatively abundant. Should the investigated borrow

source areas (as described in more detail below) run short in terms of the anticipated volumes needed for reclamation activities, other similar terrain classes (particularly glaciofluvial and colluvium) have been identified near the mine and should be able to provide additional, suitable material (Figures 1a-d).



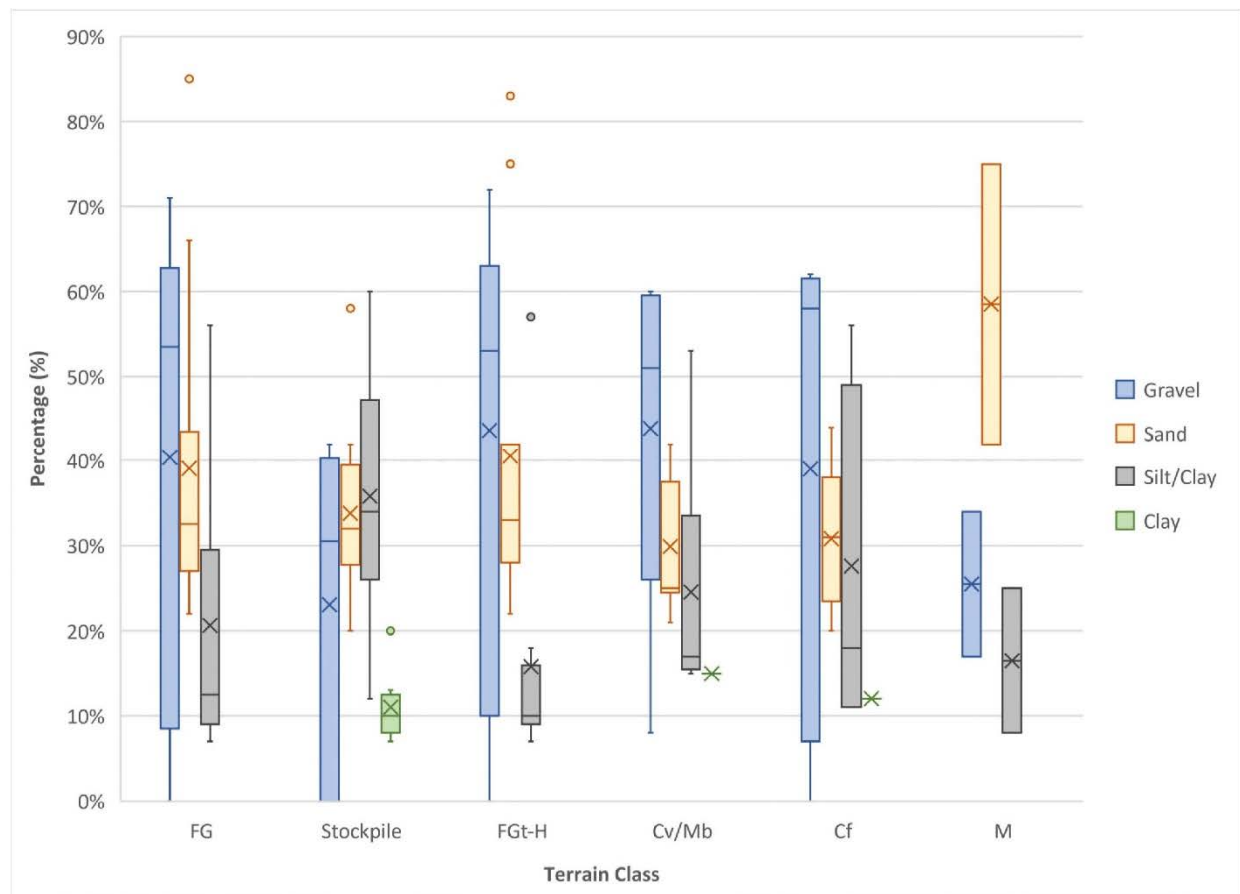
Notes: FG – Glaciofluvial; Cv/Mb – Colluvium veneer overlying moraine (till) blanket; Cf – Colluvial fan; FGt-H – Glaciofluvial terrace with kettle depressions; Mka-V – Moderate to moderately steep slope, gullied till; C – Colluvium; M – Moraine (till); F – Fluvial; Stockpile – Stockpiled reject material. Terrain unit terms follow Howes and Kenk (1997).

Figure 3-1. Field Sampling Summary.



Notes: FG – Glaciofluvial; Cv/Mb – Colluvium veneer overlying moraine (till) blanket; Cf – Colluvial fan; FGt-H – Glaciofluvial terrace with kettle depressions; Mka-V – Moderate to moderately steep slope, gullied till; C – Colluvium; M – Moraine (till); F – Fluvial; g – gravel; s – sand; z/c – silt/clay; c – clay (clay samples are a subset of the g,s,z/c count); Stockpile – Stockpiled reject material. Terrain unit terms follow Howes and Kenk (1997).

Figure 3-2. Sample Size Summary.



Notes: FG – Glaciofluvial; Cv/Mb – Colluvium veneer overlying moraine (till) blanket; Cf – Colluvial fan; FGt-H – Glaciofluvial terrace with kettle depressions; Mka-V – Moderate to moderately steep slope, gullied till; C – Colluvium; M – Moraine (till); F – Fluvial; Stockpile – Stockpiled reject material. Terrain unit terms follow Howes and Kenk (1997).

Box and Whisker Plot Notation:

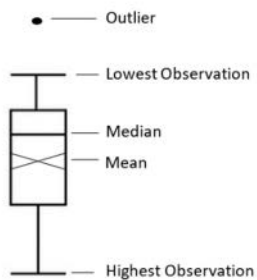


Figure 3-3. Distribution of Particle Sizes by Terrain Class.

3.7.2 Existing Landfill Site

In 2018, Testpits BS-18TP01 through BS-18TP04 were completed along the northeastern perimeter of the Existing Landfill site (Area 18A; Figure 2b). Except for BS-18TP01 where the subsurface soil consisted of sand with some gravel and trace amounts of silt/clay, the remaining Testpits BS-18TP02 through BS-18TP04 consisted mostly of sand and gravel, with trace to some silt/clay, indicating that this area is mostly associated with a glaciofluvial deposit. To produce a fine textured sand and silt/clay soil there could up to 65% reject of oversize material (gravel, cobble and boulders) that could possibly be used for other reclamation purposes that may require additional screening/processing. Most testpits had a completion depth of about 4.0 m. Groundwater, bedrock, and permafrost were not encountered in any of the testpits.

3.7.3 Old Access Road

In 2018 Testpits BS-18TP05 through BS-18TP14 were completed along the access road along the northeastern side of the Flat River between the Existing Landfill and Old Landfill sites (Area 18A; Figure 2b). Except for Testpit BS-18TP07 where the subsurface soil between 1.7 m and the testpit completion depth of 3.0 m consisted of sand with some gravel and silt/clay, the remaining Testpits BS-18TP05, BS-18TP06 and BS-18TP08 through BS-18TP14 consisted mostly of sand and gravel, with trace to some silt/clay indicating that this area is mostly associated with a glaciofluvial deposit. To produce a fine textured sand and silt/clay soil there could up to 65% reject of oversize material (gravel, cobble and boulders) that could possibly be used for other reclamation purposes that may require additional screening/processing. Most testpits had a completion depth of about 4.0 m. Groundwater, bedrock, and permafrost were not encountered in any of the testpits.

In 2019 Testpits BS-19TP01 through BS-19TP16 were completed along the access road along the northeastern side of the Flat River between the Existing Landfill and Old Landfill sites (Area 18A; Figure 2b). Except for Testpits BS-19TP01, BS-19TP02, and BS-19TP12 where sand with some gravel and trace silt/clay was encountered at varying depths and had varying thicknesses, the remaining Testpits through Area 18A (Figure 2b) consisted mostly of sandy gravel, with trace to some silt/clay. This confirms the findings from 2018 that this area is mostly associated with a glaciofluvial deposit. As stated in 2018, to produce a fine textured sand and silt/clay soil there could up to 65% reject of oversize material (gravel, cobble and boulders) that could possibly be used for other reclamation purposes that may require additional screening/processing. Most testpits had a completion depth of about 4.0 m. Groundwater, bedrock, and permafrost were not encountered in any of the testpits.

3.7.4 Ski Hill Borrow Site

3.7.4.1 Southeastern Portion

The location of Testpit BS-18TP15 is on a mound of stripping that is situated in a previous developed area (Area 18B; Figure 2a). The subsurface soil consisted of a thin layer of gravel with sandy and silty material over lying silt, as well as sand that was underlain by sand and gravel. Trace to some silt was also observed to a completion depth of 4.0 m. Previous developments of this borrow source identified it as a colluvium deposit. Similar to the glaciofluvial deposits found in Area 18A, the production of a fine textured sand and silt/clay soil could require up to 70% reject of oversize material (gravel, cobble and boulders) that could possibly be used for other reclamation purposes. Groundwater, bedrock, and permafrost were not encountered in this testpit.

In 2019 Testpits BS-19TP17 through BS-19TP19 (shown on Figure 2a) were completed just beyond the southern and eastern perimeters of the existing Ski Hill Borrow boundary. The subsurface soil consisted of a thin organic layer overlying thin layer of silt with some sand underlain by sandy gravel with a trace to some silt to a completion

depth 4.0 m. The production of a fine textured sand and silt/clay soil again could require up to 70% reject of oversize material (gravel, cobble and boulders) that could possibly be used for other reclamation purposes. Groundwater, bedrock, and permafrost were not encountered in these testpits.

3.7.4.2 Northwestern Portion

During the 2018 testpitting program, both testpits and testholes were completed throughout Areas 18C and 18D (shown in the inset of Figure 2a). Area 18C encompasses an area of stockpiled reject material from previous stages of development for the Ski Hill Borrow site (Photo 1). Testpits BS-18TP19 through BS-18TP28 along with BS-18TP33, were excavated to completion depths ranging from 1.9 m to 6.0 m throughout this area. Grainsize results indicate that the material varied from gravel – sandy, with some silt/clay to a silt – sandy composition. For the most part, the reject material consisted of a fine textured material and could still require up to 30% reject of oversize material (gravel, cobble and boulders). Testpits BS-18TP29 through BS-18TP32 were completed in a low-lying area along the northwestern edge of the stockpiled reject material. Except for Testpit BS-18TP30, the subsurface soil conditions for the remaining three testpits consisted of silt, with some sand to sandy material, which is considered to be indicative of a fluvial deposit. Bedrock and permafrost were not encountered in these testpits but during the completion of Testpits BS-18TP29, BS-18TP31, and BS-18TP32, the groundwater table was noted at a depth ranging from 1.5 to 2.0 m.



Photo 1: Location of Areas 18C and 18D at the Ski Hill Borrow site, looking northeast.

Also shown in the inset of Figure 2a is Area 18D, located up the slope from Area 18C. Testpits BS-18TP16 through BS-18TP18 were excavated to completion depths ranging from 3.0 m to 4.0 m along the north edge of the clearing (Photo 1). The grainsize results indicate that the material varied from gravel – sandy, silty to sandy – gravelly, and sandy. Groundwater, bedrock, and permafrost were not encountered in the testpits.

In Area 18D, Tetra Tech also completed 8 testholes (BS-18AH01 through BS-18AH10) with a gas power hand auger that could reach a depth of about 1.2 m in most areas. Testholes BS-18AH04 and BS-18AH06 were completed in areas beyond the proposed Area 18D boundary and the subsurface soil conditions consisted of gravel – sandy, some cobble, with trace silt. With the exception of BS-18AH05, BS-18AH09, and BS-18AH10, the remaining testholes (BS-18AH01, BS-18AH02, BS-18AH03, BS-18AH07, and BS-18AH08) had grainsize results that consisted of gravel – sandy, with trace to some silt. Testhole BS-18AH05 had grainsize results indicating silt – sandy, with a trace of gravel. Testhole BS-18AH09 was all organics and Testhole BS-18AH10 consisted of

sand – silty. To produce a fine textured sand and silt/clay soil there could up to 65% reject of oversize material (gravel, cobble and boulders). Groundwater, bedrock, and permafrost were not encountered in the testpits and testholes.

There were no additional testpits and/or testholes completed in this area in 2019.

3.8 Borrow Source Investigation – Conclusions

Both 2018 and 2019 testpitting programs have identified available granular and fine-grained materials that can be used for reclamation purposes. These materials are dependent on the required end use and acceptable grainsize. For example, if the preferred soil type for a cover material is to be a fine textured soil (e.g., sand and silt) then processing of the potential borrow materials would be required. Processing such as mechanical screening would allow for the separation of granular material (coarse sand, gravels, cobbles and boulders) resulting in a fine textured soil. Table 3-2 below shows potential quantities of fine textured materials that could be separated at each of the Areas 18A, 18B, 18C and 18D after processing. There will be some volume loss during production, but it is expected to be minimal. The remaining granular material (coarse sand, gravels, cobbles and boulders) is also suitable for other reclamation purposes throughout the site that may require additional production (i.e., crushing and/or screening) of various material types.

Table 3-2P Potential Quantities of Fine Textured Soil

Borrow Source	Location	Area (m2)	Average Thickness (m)	Volume (m3)	Granular Material (%)*	Coarse Soil Volume (m3)	Fine Soil Volume (m3)
F	18A	187,056	4.0	748,224	65	486,346	261,878
D	18B	66,022	4.0	264,088	70	184,862	79,226
C	18C	16,914	2.0	33,828	30	10,148	23,680
C	18D	19,523	3.0	58,569	65	38,070	20,499
Total						719,426	385,283

*The overview presented in Section 3.7.1 above along with the summary tables shown on Figures 2a and 2b present additional detail with respect to the % of granular material.

Note: These values are only estimates and there could be some loss during production (expected to be minimal).

4.0 ARD/ML RESULTS AND DISCUSSION

4.1 Geochemical Characterization

A sub-set of samples collected as part of the borrow source investigation was submitted for geochemical characterization and assessment of acid rock drainage (ARD) and metal leaching (ML) potential. Six samples of potential granular borrow source material were submitted for analysis. These six samples are representative of the observed variability of glaciofluvial, fluvial, till, and colluvium materials. Two bedrock samples from a potential rip-rap source were also submitted for analysis.

A list of the submitted samples for static test analyses including acid-base accounting, trace element, and shake flask extraction, is provided in Table 4.1. Samples were tested at ALS Laboratories in North Vancouver and Burnaby, BC. In addition, two samples underwent quantitative XRD analysis for mineral characterization.

Table 4.1: Samples submitted for ARD/ML Geochemical Characterization

Sample ID	General Location	Genesis	Analysis Completed			
			Acid-Base Accounting (ABA)	Analysis Trace Element Analysis by ICP-MS	Shake Flask Extraction (SFE)	Analysis Quantitative XRD Analysis
ENW-03039-JD-04	Southwestern edge of Landfill	cgsFGt	x	x	x	
ENW-03039-JD-05	Southern edge of Landfill	cgsFGt	x	x		
ENW-03039-JD-17	1.5 km MW of Mine Site along access road	bgsFa	x	x		
ENW-03039-JD-10	Central location of Ski Hill Borrow	baCf-Rd	x	x	x	
ENW-03039-JD-13	Northern perimeter of Ski Hill Borrow	zgsCf	x	x		x
ENW-03039-JD-50	Northeastern edge of Landfill	zgsMb	x	x	x	x
ENW-03039-JD-52	Rock slope along western side TP4	bedrock	x	x	x	
ENW-03039-JD-53	Rock slope along western side TP4	bedrock	x	x		

Note: cgs - SAND with gravel and cobble, bgs - SAND with gravel and boulders, ba - gravelly talus with boulders, zgs - SAND with gravel and silt, FGt – Glaciofluvial terrace, F – Fluvial moderate slope, Cf-Rd – Colluvial fan landslide, Mb – Till blanket, Cf – Colluvial fan.

Geochemical characterization methods, analysis, interpretation and material classification follow the best practice guidelines presented in Price (2009).

The risks associated with ARD/ML will depend on the final excavated and placed material volumes, construction uses, and location of placement. Larger volumes of disturbed rock materials may translate to increased metal loading. The risks to aquatic life associated with metal leaching and acid rock drainage are increased when the disturbed rock materials are placed proximal to surface water receptors. ARD/ML risks can be mitigated by placing construction materials sub-aqueously to limit the reactions and weathering which produce ARD/ML.

The geochemistry testing laboratory certificates are presented in Appendix D. Lab data summary tables, along with comparison criteria and data statistics, are presented in the attached Tables section.

4.1.1 Quantitative XRD Analysis Results

Sample JD-13 (colluvium) and JD-50 (till) were submitted for Quantitative X-Ray Diffraction (XRD) analysis to evaluate mineral composition of the material.

The major phases identified in the material are quartz and muscovite, and the moderate phases are orthoclase and dolomite. Minor phases identified are albite, clinocllore, phlogopite, and calcite. The colluvium sample is higher in dolomite, albite and orthoclase, while the till sample is higher in muscovite content. Table 4-2 provides the modal percentages of the identified phases.

Table 4-2: Quantitative XRD Results, modal wt%

Mineral	Sample	Sample
	ENW-03039-JD-13	ENW-03039-JD-50
Quartz	40.5	53.9
Albite	9.0	0.0
Orthoclase	14.7	0.0
Clinochlore	0.0	3.9
Muscovite	0.0	31.9
Phlogopite	4.0	0.0
Calcite	7.0	3.9
Dolomite	24.9	6.4

4.1.2 Acid-Base Accounting (ABA) Analysis Results

Acid-Base Accounting (ABA) analysis was conducted to assess the potential for ARD to be produced from the sampled rock. ABA analysis includes whole rock paste pH, total sulphur and inorganic carbon by LECO furnace analysis, sulphate sulphur by HCl leach, neutralization potential (NP) by Standard Sobek method, and fizz rating. Maximum potential acidity is determined based on the total sulphur content. The Sobek neutralization potential ratio (Sobek NPR) is the ratio of neutralization potential to the maximum potential acidity (Sobek NP:MPA). Sobek NP considers contribution of silicate and carbonate minerals. Carbonate NP was calculated from the measured inorganic carbon content to determine the neutralization potential provided by carbonate minerals alone. ABA results are presented in the attached Table 4-3 in the Tables Section of this report.

All six granular material samples analyzed are classified as Non-Potentially Acid-Generating (non-PAG) based on Sobek NPR values of greater than 2 (Price 2009). There is a compositional difference between the glaciofluvial and fluvial samples, as compared to the colluvium and till samples. NPR values for the glaciofluvial and fluvial samples range from 15.36 to 30.4. NPR values for the colluvium and till samples range from 146 to 478.

Total sulphur content is relatively homogenous amongst all granular sample types, ranging from 0.02 to 0.07 S%. Maximum potential acidity values, calculated from total sulphur, range from 0.6 to 2.2 tCaCO₃/1Kt. Sulphide sulphur ranges from <0.01 to 0.03 %. Sulphate sulphur content is less than detection limit (<0.01 S%) in all samples. The sulphur balance indicates that elemental or organic sulphur may also be present and accounted for in the total sulphur value.

The colluvium samples have the highest neutralization potential values due to the presence of carbonate minerals (dominantly dolomite), as represented by inorganic carbon values of 13.1 to 19.5 CO₂%. Sobek neutralization potential values for colluvium samples are 340 and 478 tCaCO₃/1Kt. The till sample has moderate carbonate content at 5.8 CO₂%. Sobek neutralization potential for the till sample is 146 tCaCO₃/Kt. Glaciofluvial and fluvial samples have lower inorganic carbon content (0.7 to 1.4 CO₂%) and lower associated Sobek neutralization potential values (22 to 37 tCaCO₃/1Kt). A comparison of the carbonate neutralization potential, calculated from measured inorganic carbon content, to the Sobek neutralization potential, indicate that carbonate minerals are the dominant source of neutralization potential in the samples.

Both bedrock samples are classified as Non-PAG based on Sobek NPR values of 44.8 and 57.6, respectively.

Bedrock samples have low total sulphur and sulphide sulphur, at or below the detection limit of testing at 0.01 S%. Inorganic carbon content is low, also at or less than the detection limit of testing of 0.2 CO₂%. This translates to low

values of maximum potential acidity (<0.3 tCaCO₃/1Kt) and Sobek neutralization potential values of 7 and 9 tCaCO₃/Kt. Carbonate NP values range from 2.3 to 4.5 tCaCO₃/Kt, based on a calculation using the inorganic carbon content of 0.1 to 0.2 CO₂%. When compared to the Sobek NP values, this indicates that the dominant form of neutralization potential in the bedrock samples is from silicate minerals.

4.1.3 Trace Element Analysis by ICP-MS Results

The results of the trace elemental analysis were compared against average crustal abundance values as a reference point for chemical composition of the materials. Elemental concentrations exceeding the average crustal abundance values by an order of magnitude or more are flagged for further consideration. Elevated metal concentrations do not in themselves indicate a potential for metal leaching, but in the event of metal leaching the elevated metal concentrations may increase the metal loadings in leachate generation.

There are multiple elements exceeding the average crustal abundance in all samples. Fluvial and glaciofluvial samples show the highest number of elevated metal concentrations.

A summary of concentrations exceeding the average crustal abundance value by an order of magnitude or more are presented in Table 4-4. A complete summary of elemental concentrations relative to average crustal abundance is provided in the attached Table 4-5 in the Tables Section of this report.

Table 4-4: Summary of Elevated Trace Element Concentrations

Sample ID	Genesis	Trace Element Concentrations Greater than Average Crustal Abundance by an Order of Magnitude
ENW-03039-JD-04	cgsFGt	Arsenic (As), Barium (Ba), Cadmium (Cd), Antimony (Sb), Selenium (Se)
ENW-03039-JD-05	cgsFGt	Arsenic (As), Barium (Ba), Cadmium (Cd), Antimony (Sb), Selenium (Se), Tellurium (Te)
ENW-03039-JD-17	bgsFa	Arsenic (As), Barium (Ba), Cadmium (Cd), Antimony (Sb), Selenium (Se), Tellurium (Te)
ENW-03039-JD-10	baCf-Rd	Selenium (Se)
ENW-03039-JD-13	zgsCf	None
ENW-03039-JD-50	zgsMb	Arsenic (As), Barium (Ba), Cadmium (Cd), Antimony (Sb), Selenium (Se), Tellurium (Te)
ENW-03039-JD-52	bedrock	None
ENW-03039-JD-53	bedrock	None
ENW-03039-JD-04	cgsFGt	Arsenic (As), Barium (Ba), Cadmium (Cd), Antimony (Sb), Selenium (Se)

Note: cgs - SAND with gravel and cobble, bgs - SAND with gravel and boulders, ba - gravelly talus with boulders, zgs - SAND with gravel and silt, FGt - Glaciofluvial terrace, F - Fluvial moderate slope, Cf-Rd - Colluvial fan landslide, Mb - Till blanket, Cf - Colluvial fan.

4.1.4 Shake Flask Extraction (SFE) Leachable Metals Analysis Results

Metal leaching was evaluated based on the results of extractive leach testing, namely shake flask extraction (SFE) analysis. The SFE analysis is a short-term leachate analysis method used to determine the dissolved parameters of readily soluble components in the rock samples.

Results of the extractive leach testing were compared to the most stringent of the following regulatory guidelines:

- Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CEQG), for the protection of freshwater aquatic life (PAL) (CCME 1999).

- Federal Contaminated Sites Action Plan (FCSAP) Guidance Document on Federal Interim Groundwater Quality Guidelines (FIGWQG) for Federal Contaminated Sites Tier 1 and 2 Guidelines for Residential / Parkland Land Use – Coarse-Grained Soils (FCSAP 2012).

The regulatory guidelines provide a reference point for dissolved concentrations in the leachate from the test samples. Elevated concentrations of dissolved metals in the SFE analysis do not necessarily translate to elevated constituents in a field setting. However, they can be used to identify which leachable constituents may be of future concern. Extractive leach testing analysis does not take into account the water chemistry, dilution volumes or long-term metal dissolution for evaluating the impact of metal leaching potential on surface water receptors.

A complete summary of shake flask extraction analyses results, with comparisons against the guideline values, is provided in the attached Table 4-6 in the Tables Section of this report.

Leachable metal, anion and nutrient concentrations in the SFE analysis are typically below guideline values for all samples. Multiple metals report below the detection limit of testing. Elevated concentrations of arsenic, cadmium, antimony, and selenium noted in the trace element analysis did not translate to elevated dissolved concentrations in the leachate analysis, and all remain below guideline values. Selenium and cadmium concentrations are less than the detection limit of testing in all four samples. Barium also noted in the trace element analysis was above the guideline in one sample. No concentrations were noted at levels greater than an order of magnitude above the guideline. Concentrations exceeding the guideline value are noted below.

Dissolved aluminum concentrations range from 0.084-0.657 mg/L and represent a slight exceedance above the guideline value of 0.1 mg/L in three samples. Dissolved chromium in sample JD-04 (0.00103 mg/L) and JD-50 (0.0017 mg/L) are slightly above the CCME guideline value of 0.001 mg/L and below the other two guideline values. Dissolved copper in JD-52 (bedrock) at 0.003mg/L is slightly above the 0.002 mg/L guideline. Dissolved copper in the three granular samples is reported at less than detection limit of testing. Dissolved barium in JD-04 at 0.570mg/L is slightly above the strictest guideline value of 0.5 mg/L. Fluoride is slightly elevated in JD-04 and JD-50.

4.1.5 Geochemical Analysis Conclusions and Recommendations

The measured neutralization potential is the primary driver in classifying the granular materials as non-PAG. There is sufficient neutralization potential to buffer against acid production from oxidation of the sulphides observed in the granular samples. Neutralization potential in the granular samples is dominantly in the form of carbonate minerals which are readily available and fast reacting. There is not a concern for ARD from the potential granular borrow source material based on the samples tested.

Bedrock samples have lower neutralization potential, but also have low sulphur content, and are both classified as non-PAG based on the analysis. Neutralization potential in the bedrock samples is dominantly provided by silicate minerals, which are less reactive and do not provide as readily available neutralization potential when compared to carbonate minerals. Acid buffering may be slower in the bedrock material, however limited acid production is anticipated in the bedrock material due to the very low sulphur content, and therefore ARD potential is anticipated to be limited in the potential quarry bedrock materials.

The concentrations of dissolved metals in the shake flask extraction leachate are generally low and below guideline values. Metal leaching is not a concern from the borrow and quarry source materials based on the samples tested.

5.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Alvarez & Marsal Canada Inc., as court-appointed monitor of North American Tungsten Corporation and their agents. Tetra Tech Canada Inc. (operating as Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Alvarez & Marsal Canada Inc., as court-appointed monitor of North American Tungsten Corporation, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this document is subject to the Limitations on the Use of this Document attached in Appendix A or Contractual Terms and Conditions executed by both parties.

6.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.



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FILE: 704-ENW.WENW03039-04
FILE: 704-ENW.WENW03039-04

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FIGURES

Figure 1a – Terrain Mapping

Figure 1b – Terrain Mapping

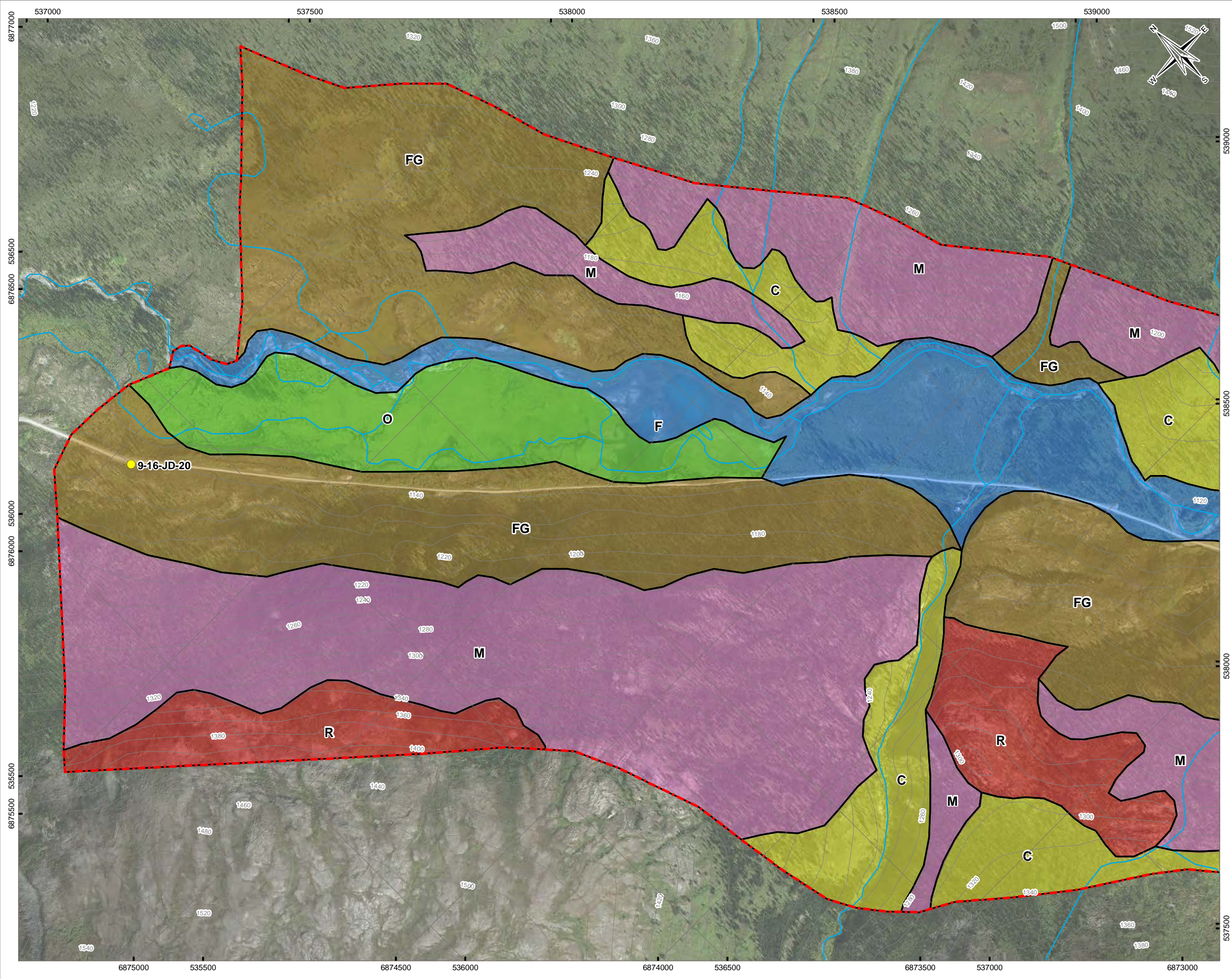
Figure 1c – Terrain Mapping

Figure 1d – Terrain Mapping

Figure 2a – Testpitting and Hand Augering Program

Figure 2b – Testpitting and Hand Augering Program

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LEGEND

- Terrain Mapping Field Site
- Extent of Terrain Mapping (Stantec)
- Terrain Class**
 - C - Colluvium
 - F - Fluvial
 - FG - Glaciofluvial
 - M - Glacial Till
 - R - Bedrock
 - O - Organic
- Contour (20 m)
- Watercourse
- Waterbody

5 2.5 0 5
Kilometres

NOTES

Stantec terrain mapping based on Stantec Report: Cantung Mine, NWT - Preliminary Terrain Mapping (November 2014, File #123311654).
Base data source: CanVec 1:50,000
High resolution imagery from ESRI/DigitalGlobe (2012) and INAC (2013)
Low resolution imagery from Terracolor Landsat

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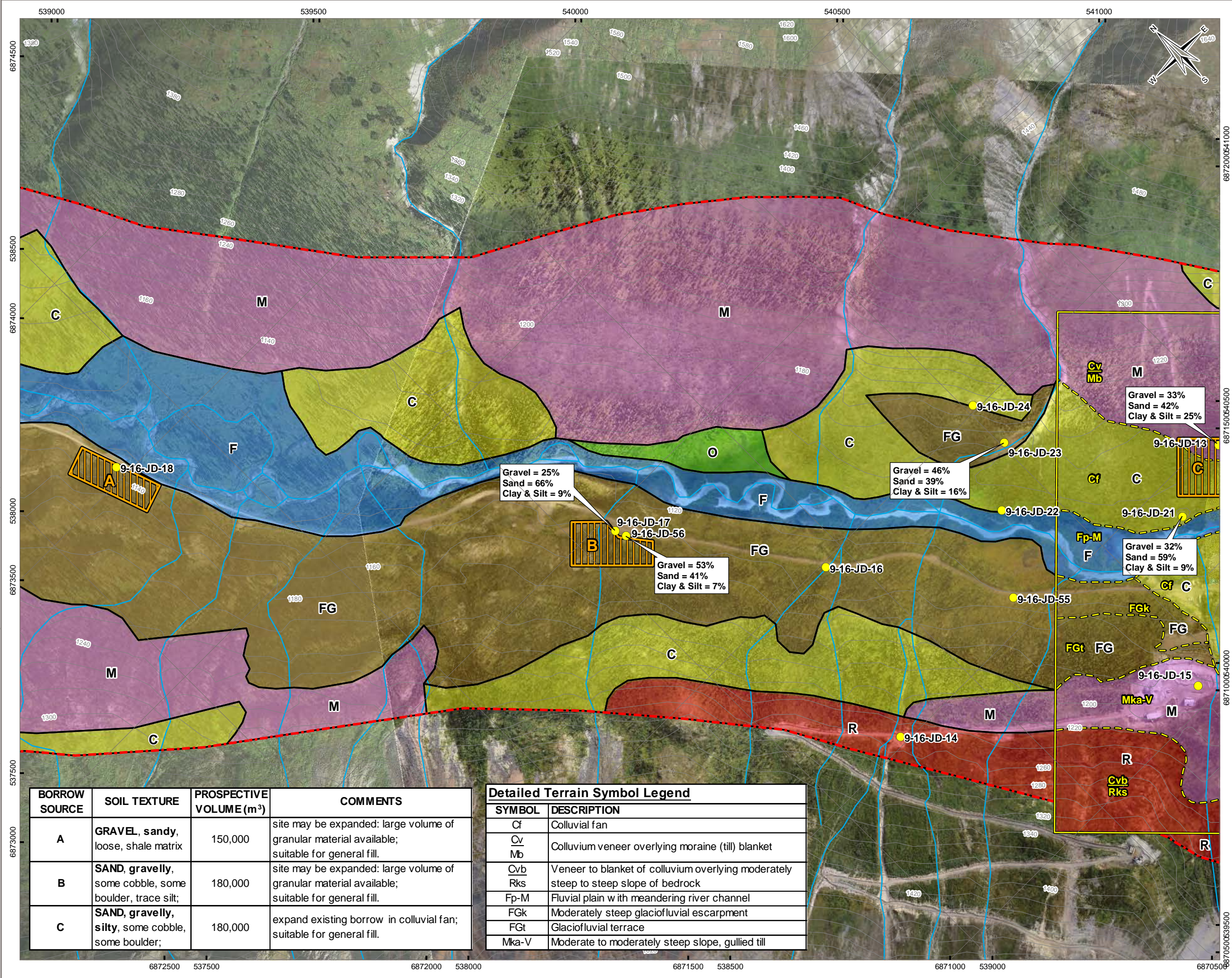
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CANTUNG MINE

Terrain Mapping

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BORROW SOURCE	SOIL TEXTURE	PROSPECTIVE VOLUME (m ³)	COMMENTS
A	GRAVEL, sandy, loose, shale matrix	150,000	site may be expanded: large volume of granular material available; suitable for general fill.
B	SAND, gravelly, some cobble, some boulder, trace silt;	180,000	site may be expanded: large volume of granular material available; suitable for general fill.
C	SAND, gravelly, silty, some cobble, some boulder;	180,000	expand existing borrow in colluvial fan; suitable for general fill.

Detailed Terrain Symbol Legend	
SYMBOL	DESCRIPTION
Cf	Colluvial fan
Cv Mb	Colluvium veneer overlying moraine (till) blanket
Cvb Rks	Veneer to blanket of colluvium overlying moderately steep to steep slope of bedrock
Fp-M	Fluvial plain w ith meandering river channel
FGk	Moderately steep glaciofluvial escarpment
FGt	Glaciofluvial terrace
Mka-V	Moderate to moderately steep slope, gullied till

LEGEND

- Terrain Mapping Field Site
- Extent of Detailed Terrain Mapping (Tetra Tech)
- Approximate Terrain Boundary (Tetra Tech)
- Extent of Terrain Mapping (Stantec)
- Terrain Class**
 - C - Colluvium
 - F - Fluvial
 - FG - Glaciofluvial
 - M - Glacial Till
 - R - Bedrock
 - O - Organic
- Potential Borrow Source
- Contour (20 m)
- Watercourse

5 2.5 0 5
Kilometres

NOTES

Stantec terrain mapping based on Stantec Report: Cantung Mine, NWT - Preliminary Terrain Mapping (November 2014, File #123311654).
Base data source: CanVec 1:50,000
High resolution imagery from ESRI/DigitalGlobe (2012) and INAC (2013)
Low resolution imagery from Terracolor Landsat

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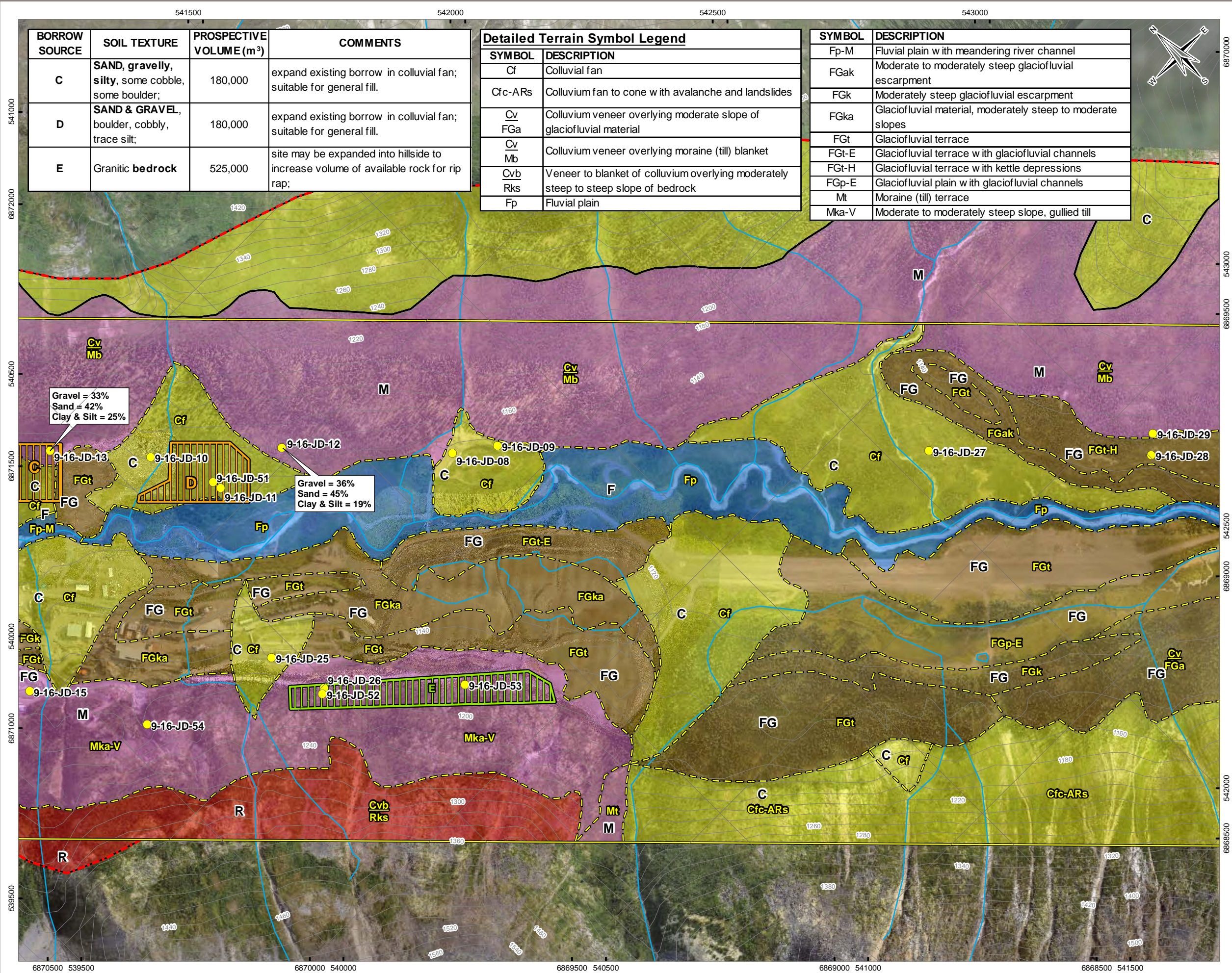
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CANTUNG MINE

Terrain Mapping

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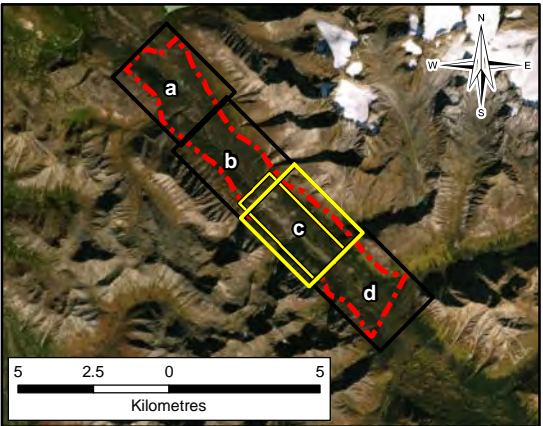
LEGEND

- Terrain Mapping Field Site
- Extent of Detailed Terrain Mapping (Tetra Tech)
- Approximate Terrain Boundary (Tetra Tech)
- Extent of Terrain Mapping (Stantec)

Terrain Class

- C - Colluvium
- F - Fluvial
- FG - Glaciofluvial
- M - Glacial Till
- R - Bedrock

- Potential Borrow Source
- Rock Quarry Site
- Contour (20 m)
- Watercourse
- Waterbody



NOTES
Stantec terrain mapping based on Stantec Report: Cantung Mine, NWT - Preliminary Terrain Mapping (November 2014, File #123311654).
Base data source: CanVec 1:50,000
High resolution imagery from ESRI/DigitalGlobe (2012) and INAC (2013)
Low resolution imagery from Terracolor Landsat

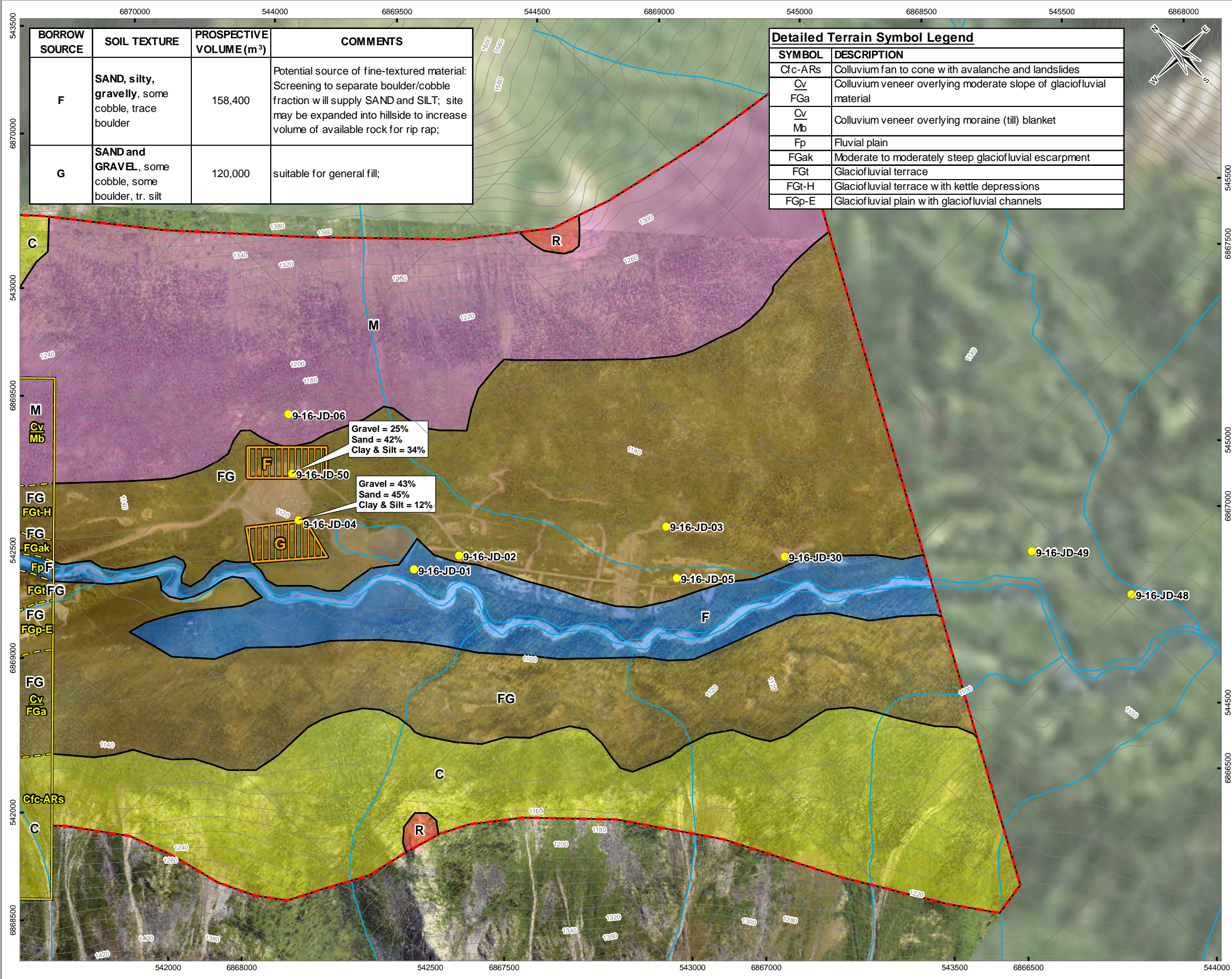
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CANTUNG MINE

Terrain Mapping

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Detailed Terrain Symbol Legend	
SYMBOL	DESCRIPTION
Cfc-ARs	Colluvium fan to cone w ith avalanche and landslides
Cv FGa	Colluvium veneer overlying moderate slope of glaciofluvial material
Cv Mb	Colluvium veneer overlying moraine (till) blanket
Fp	Fluvial plain
FGak	Moderate to moderately steep glaciofluvial escarpment
FGt	Glaciofluvial terrace
FGt-H	Glaciofluvial terrace w ith kettle depressions
FGp-E	Glaciofluvial plain w ith glaciofluvial channels

LEGEND

Terrain Mapping Field Site

Extent of Detailed Terrain Mapping (Tetra Tech)

Approximate Terrain Boundary (Tetra Tech)

Extent of Terrain Mapping (Stantec)

Terrain Class

C - Colluvium

F - Fluvial

FG - Glaciofluvial

M - Glacial Till

R - Bedrock

Potential Borrow Source

Contour (20 m)

Watercourse

Waterbody

NOTES

Stantec terrain mapping based on Stantec Report: Cantung Mine, NWT - Preliminary Terrain Mapping (November 2014, File #123311654).
Base data source: CanVec 1:50,000
High resolution imagery from ESRI/DigitalGlobe (2012) and INAC (2013)
Low resolution imagery from Terracolor Landsat

STATUS

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Terrain Mapping

PROJECTION

UTM Zone 9

DATUM

NAD83

CLIENT

NORTH AMERICAN

TUNGSTEN

CORPORATION LTD

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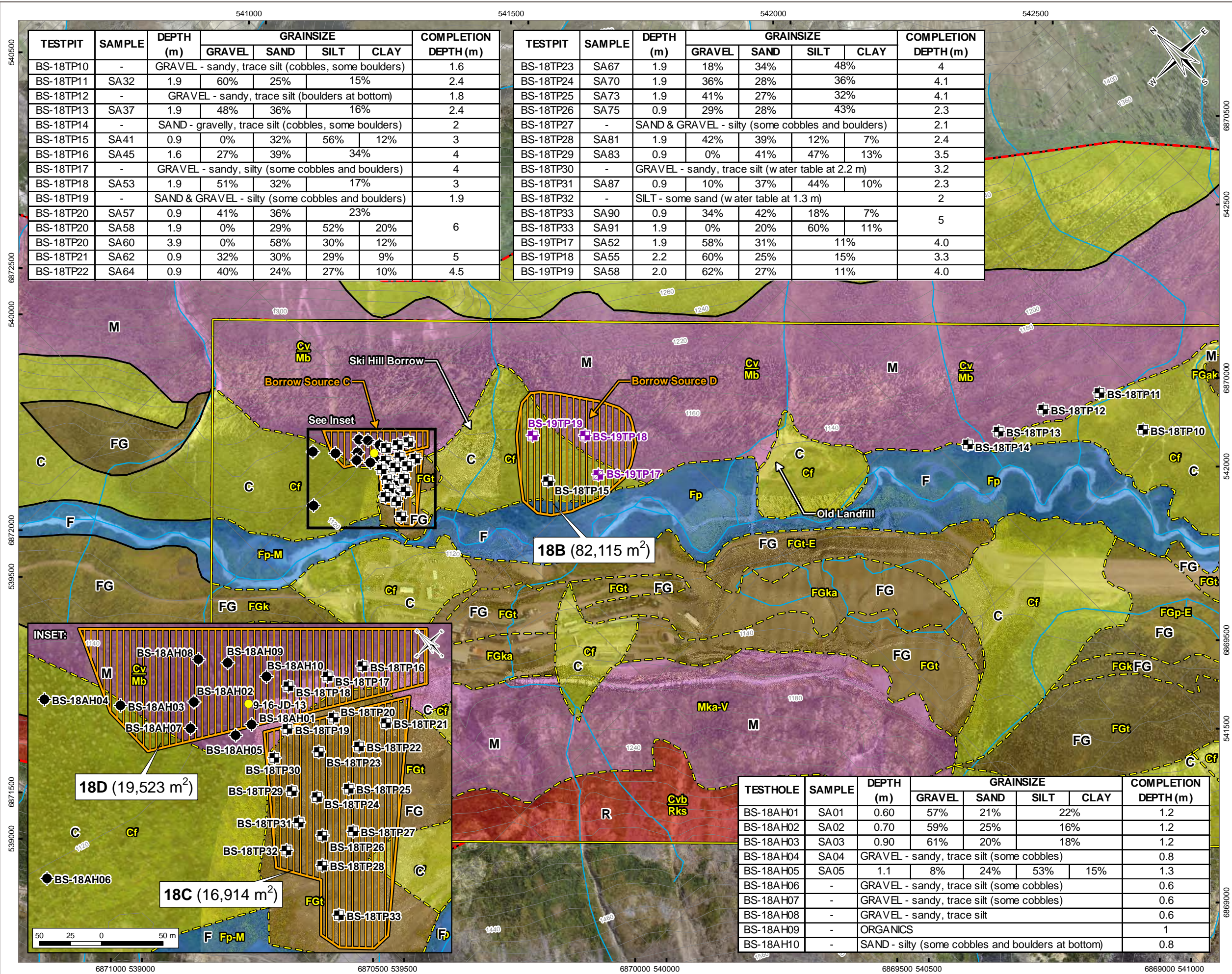
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Figure 1d

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LEGEND

- 2019 Testpit
- 2018 Testpit
- 2018 Hand Auger
- Terrain Mapping Field Site
- Borrow Source Area
- Extent of Detailed Terrain Mapping (Tetra Tech)
- Approximate Terrain Boundary (Tetra Tech)
- Extent of Terrain Mapping (Stantec)

Terrain Class

- C - Colluvium
- F - Fluvial
- FG - Glaciofluvial
- M - Glacial Till
- R - Bedrock
- Contour (20 m)
- Watercourse
- Waterbody

Detailed Terrain Symbol Legend

SYMBOL	DESCRIPTION
Cf	Colluvial fan
Cfc-ARs	Colluvium fan to cone with avalanche and landslides
Cv Mb	Colluvium veneer overlying moraine (till) blanket
Cvb Rks	Veneer to blanket of colluvium overlying moderately steep to steep slope of bedrock
Fp	Fluvial plain
Fp-M	Fluvial plain with meandering river channel
FGak	Moderate to moderately steep glaciofluvial escarpment
FGk	Moderately steep glaciofluvial escarpment
FGka	Glaciofluvial material, moderately steep to moderate slopes
FGt	Glaciofluvial terrace
FGt-E	Glaciofluvial terrace with glaciofluvial channels
FGp-E	Glaciofluvial plain with glaciofluvial channels
Mt	Moraine (till) terrace
Mka-V	Moderate to moderately steep slope, gullied till

NOTES
Stantec terrain mapping based on Stantec Report: Cantung Mine, NWT - Preliminary Terrain Mapping (November 2014, File #123311654).
Base data source: CanVec 1:50,000
High resolution imagery from ESRI/DigitalGlobe (2012) and INAC (2013)
Low resolution imagery from Terracolor Landsat

STATUS
ISSUED FOR REVIEW

CANTUNG MINE

Testpitting and Hand Augering Program

PROJECTION
UTM Zone 9

DATUM
NAD83

CLIENT
NORTH AMERICAN TUNGSTEN CORPORATION LTD.

Scale: 1:10,000

200 100 0 200 Metres

FILE NO.
WENW03039-04_008_Figure02a_Borrows.mxd

OFFICE
TL-VANC

DATE
April 21, 2020

DWN
SL

CKD
YL

APVD
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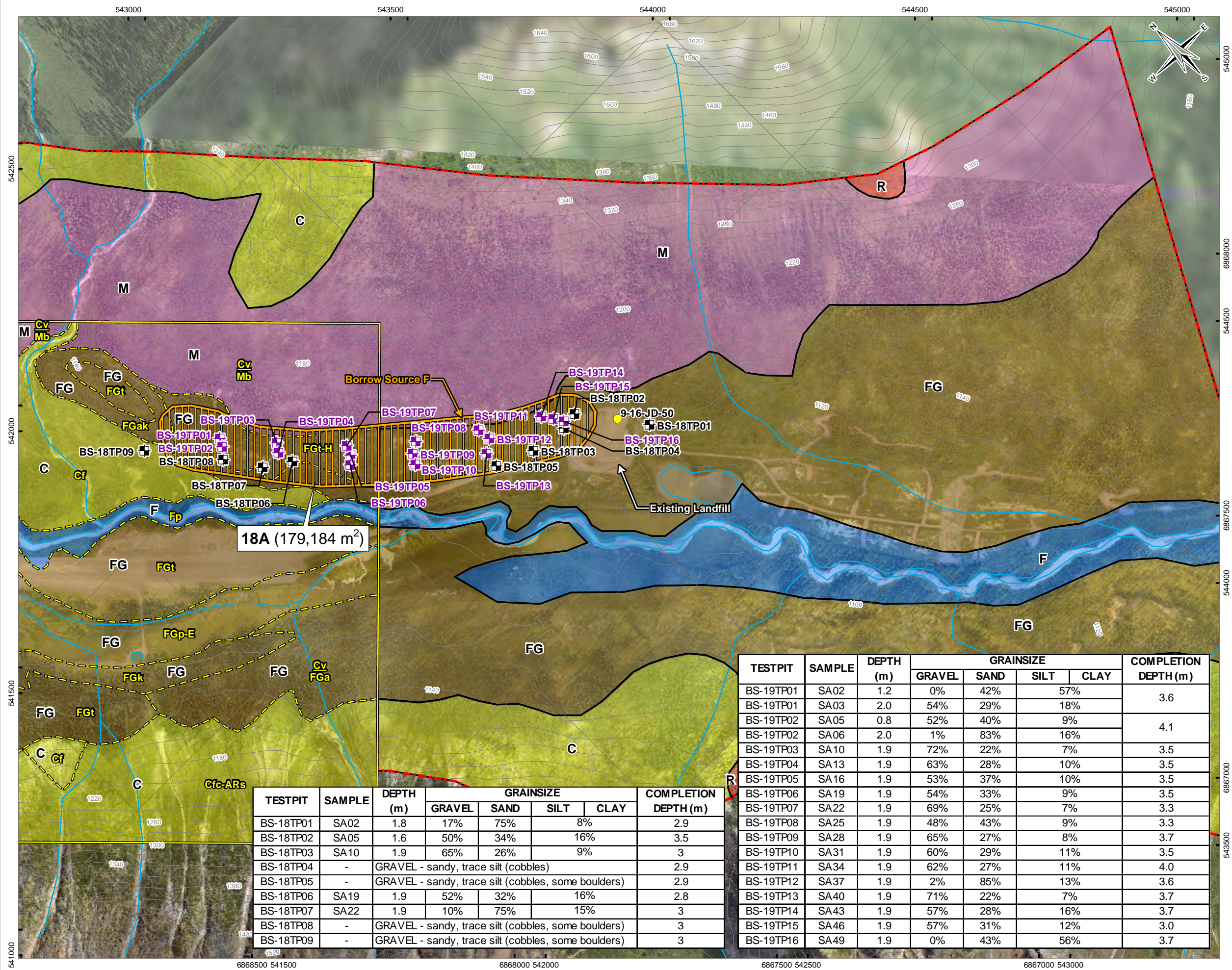
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PROJECT NO.
ENW.WENW03039-04.008

TETRA TECH

Figure 2a

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LEGEND

2019 Testpit

2018 Testpit

Terrain Mapping Field Site

Borrow Source Area

Extent of Detailed Terrain Mapping (Tetra Tech)

Approximate Terrain Boundary (Tetra Tech)

Extent of Terrain Mapping (Stantec)

Terrain Class

C - Colluvium

F - Fluvial

FG - Glaciofluvial

M - Glacial Till

R - Bedrock

Contour (20 m)

Watercourse

Waterbody

Detailed Terrain Symbol Legend

SYMBOL	DESCRIPTION
Cf	Colluvial fan
Cfc-ARs	Colluvium fan to cone with avalanche and landslides
Cv FGa	Colluvium veneer overlying moderate slope of glaciofluvial material
Cv Mb	Colluvium veneer overlying moraine (till) blanket
Fp	Fluvial plain
FGak	Moderate to moderately steep glaciofluvial escarpment
FGk	Moderately steep glaciofluvial escarpment
FGt	Glaciofluvial terrace
FGt-H	Glaciofluvial terrace with kettle depressions
FGp-E	Glaciofluvial plain with glaciofluvial channels

NOTES

Stantec terrain mapping based on Stantec Report: Cantung Mine, NWT - Preliminary Terrain Mapping (November 2014, File #123311654). Base data source: CanVec 1:50,000 High resolution imagery from ESRI/DigitalGlobe (2012) and INAC (2013) Low resolution imagery from Terracolor Landsat

STATUS

ISSUED FOR REVIEW

CANTUNG MINE

Testpitting and Hand Augering Program

PROJECTION

UTM Zone 9

DATUM

NAD83

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

TETRA TECH

FILE NO.

WENW03039-04_008_Figure02b_Borrows.mxd

OFFICE

TL-VANC

DWN

SL

CKD

YL

APVD

CC

REV

0

DATE

April 21, 2020

PROJECT NO.

ENW.WENW03039-03.008

Scale: 1:10,000

200 100 0 200

Metres

Figure 2b

TESTPIT	SAMPLE	DEPTH (m)	GRAINSIZE				COMPLETION DEPTH (m)
			GRAVEL	SAND	SILT	CLAY	
BS-18TP01	SA02	1.8	17%	75%	8%		2.9
BS-18TP02	SA05	1.6	50%	34%	16%		3.5
BS-18TP03	SA10	1.9	65%	26%	9%		3
BS-18TP04	-	GRAVEL - sandy, trace silt (cobbles)					2.9
BS-18TP05	-	GRAVEL - sandy, trace silt (cobbles, some boulders)					2.9
BS-18TP06	SA19	1.9	52%	32%	16%		2.8
BS-18TP07	SA22	1.9	10%	75%	15%		3
BS-18TP08	-	GRAVEL - sandy, trace silt (cobbles, some boulders)					3
BS-18TP09	-	GRAVEL - sandy, trace silt (cobbles, some boulders)					3

TESTPIT	SAMPLE	DEPTH (m)	GRAINSIZE				COMPLETION DEPTH (m)
			GRAVEL	SAND	SILT	CLAY	
BS-19TP01	SA02	1.2	0%	42%	57%		3.6
BS-19TP01	SA03	2.0	54%	29%	18%		
BS-19TP02	SA05	0.8	52%	40%	9%		4.1
BS-19TP02	SA06	2.0	1%	83%	16%		
BS-19TP03	SA10	1.9	72%	22%	7%		3.5
BS-19TP04	SA13	1.9	63%	28%	10%		3.5
BS-19TP05	SA16	1.9	53%	37%	10%		3.5
BS-19TP06	SA19	1.9	54%	33%	9%		3.5
BS-19TP07	SA22	1.9	69%	25%	7%		3.3
BS-19TP08	SA25	1.9	48%	43%	9%		3.3
BS-19TP09	SA28	1.9	65%	27%	8%		3.7
BS-19TP10	SA31	1.9	60%	29%	11%		3.5
BS-19TP11	SA34	1.9	62%	27%	11%		4.0
BS-19TP12	SA37	1.9	2%	85%	13%		3.6
BS-19TP13	SA40	1.9	71%	22%	7%		3.7
BS-19TP14	SA43	1.9	57%	28%	16%		3.7
BS-19TP15	SA46	1.9	57%	31%	12%		3.0
BS-19TP16	SA49	1.9	0%	43%	56%		3.7

TABLES

Table 4-3	Acid-Base Accounting Analysis Results
Table 4-5	Trace Element Analysis by ICP-MS Results Comparison to Average Crustal Abundance
Table 4-6	Shake Flask Extraction Analysis Results Comparison to Guideline Values

Table 4-3: Acid-Base Accounting Analysis Results

Sample ID	Type	Fizz Rating	Maximum Potential Acidity (MPA)	Net Neutralization Potential (NNP)	Sobek Neutralization Potential (SNP)	Neutralization Potential Ratio, NPR (SNP:MPA)	Paste pH	Total Sulphur	Sulphide Sulphur	Sulphate Sulphur (HCl Leachable)	Inorganic Carbon, C	Inorganic Carbon, CO ₂	Carbonate Neutralization Potential (CNP) ¹	Carbonate Neutralization Potential Ratio, NPR (CNP:MPA) ¹
		Unity	tCaCO ₃ /1Kt	tCaCO ₃ /1Kt	tCaCO ₃ /1Kt	Unity	Unity	%	%	%	%	%	tCaCO ₃ /1Kt	Unity
9-16-JD-04	FG	2	1.3	34	35	28	8.2	0.04	0.02	<0.01	0.33	1.2	27.3	21.0
9-16-JD-05	FG	2	1.3	37	38	30.4	8	0.04	0.03	<0.01	0.38	1.4	31.8	24.5
9-16-JD-17	F	2	1.6	22	24	15.36	7.9	0.05	0.02	<0.01	0.19	0.7	15.9	9.9
9-16-JD-10	C	4	0.6	477	478	764.8	8.6	0.02	<0.01	<0.01	5.31	19.5	443.5	739.1
9-16-JD-13	C	4	0.9	339	340	362.7	8.4	0.03	<0.01	<0.01	3.57	13.1	297.9	331.0
9-16-JD-50	M	3	2.2	144	146	66.74	8.2	0.07	0.02	<0.01	1.59	5.8	131.9	60.0
SA09	FG	1	1.9	6	8	4.27	7.2	0.06	0.04	<0.01	<0.05	<0.2	2.3	1.2
SA49	C	3	6.3	236	242	38.72	8.6	0.2	0.19	<0.01	2.57	9.4	213.8	33.9
SA52	C	3	1.3	329	330	264	8.7	0.04	0.04	<0.01	3.57	13.1	297.9	229.2
SA55	C	3	2.2	105	107	48.91	8.5	0.07	0.07	<0.01	1.04	3.8	86.4	39.3
SA69	FG	3	0.6	349	350	560	8.2	0.02	0.01	<0.01	3.93	14.4	327.5	545.8
Minimum		1	0.6	6	8	4.27	7.2	0.02	0.01	<0.01	0.19	0.7	2.3	1.2
Maximum		4	6.3	477	478	764.8	8.7	0.20	0.19	<0.01	5.31	19.5	443.5	739.1
Mean		2.7	1.8	188.9	190.7	198.5	8.2	0.06	0.05	<0.01	2.2	8.2	170.6	185.0
Median		3.0	1.3	144.0	146.0	48.9	8.2	0.04	0.03	<0.01	2.1	7.6	131.9	39.3
10th Percentile		2	0.6	22	24	15.36	7.9	0.02	0.018	<0.01	0.316	1.15	15.9	9.9
90th Percentile		4	2.2	349	350	560	8.6	0.07	0.094	<0.01	4.068	14.91	327.5	545.8
9-16-JD-52	BR	1	<0.3	7	7	44.8	8.5	<0.01	0.01	0.01	<0.05	<0.2	2.3	15.2
9-16-JD-53	BR	1	<0.3	9	9	57.6	9.1	<0.01	0.01	<0.01	<0.05	0.2	4.5	30.3
Minimum		1	<0.3	7	7	44.8	8.5	<0.01	0.01	<0.01	<0.05	<0.2	2.3	15.2
Maximum		1	<0.3	9	9	57.6	9.1	<0.01	0.01	0.01	<0.05	0.2	4.5	30.3
Mean		1	<0.3	8	8	51.2	8.8	<0.01	0.01	0.0075	<0.05	0.15	3.4	22.8
Median		1	<0.3	8	8	51.2	8.8	<0.01	0.01	0.0075	<0.05	0.15	3.4	22.7
10th Percentile		1	<0.3	7.2	7.2	46.08	8.56	<0.01	0.01	<0.01	<0.05	<0.2	2.5	16.7
90th Percentile		1	<0.3	8.8	8.8	56.32	9.04	<0.01	0.01	0.01	<0.05	0.2	4.3	28.8
18TP1A_0-1A	Cover	3	27.2	279	306	11.26	7.5	0.87	0.69	0.2	3.13	11.5	261.5	9.6
18TP1A_0-1B	Cover	3	26.9	286	313	11.65	7.5	0.86	0.68	0.18	3.16	11.6	263.8	9.8
18TP1A-2.1	Cover	3	6.6	287	294	44.8	7.3	0.21	0.15	0.05	2.92	10.7	243.3	36.9
18TP2A_0-0.3	Cover	3	103.8	95	199	1.92	6.5	3.32	2.75	0.38	1.8	6.6	150.1	1.4
18TP2A_0.3-0.6	Cover	4	5.9	483	489	82.36	7.5	0.19	0.16	0.05	4.95	18.1	411.6	69.8
18TP2A_1.2-1.6	Cover	4	14.1	397	411	29.23	7.5	0.45	0.29	0.14	3.97	14.6	332.0	23.5
Minimum		3	5.9	95	199	1.92	6.5	0.19	0.15	0.05	1.80	6.60	150.1	1.4
Maximum		4	103.8	483	489	82.36	7.5	3.32	2.75	0.38	4.95	18.10	411.6	69.8
Mean		3	31	305	335	30	7	0.98	0.79	0.17	3.32	12.18	277.1	25.2
Median		3	20.5	287	310	20.44	7.5	0.66	0.49	0.16	3.15	11.55	262.7	16.7
10th Percentile		3	6.25	187	247	6.59	6.9	0.20	0.16	0.05	2.36	8.65	196.7	5.5
90th Percentile		3	6.25	187	247	6.59	6.9	0.20	0.16	0.05	2.36	8.65	196.7	5.5

FG-Glaciofluvial

M - Till

C - Colluvium

F - Fluvial

BR - Bedrock

A value of one half of the detection limit of testing is used for summary statistics

¹ Calculated based on lab measured inorganic carbon (CO₂%)

Table 4-5: Trace Element Analysis by ICP-MS Results Comparison to Average Crustal Abundance

Sample ID		9-16-JD-04	9-16-JD-05	9-16-JD-17	9-16-JD-10	9-16-JD-13	9-16-JD-50	9-16-JD-52	9-16-JD-53	SA09	SA49	SA52	SA55	SA69	18TP1 A_0-1A	18TP1 A_0-1B	18TP1 A-2.1	18TP2 A_0-0.3	18TP2 A_0.3-0.6	18TP2 A_1.2-1.6	Average Crustal Abundance	10x Average Crustal Abundance
Ag	ppm	0.28	0.25	0.31	0.08	0.04	0.27	0.02	0.02	0.61	0.05	0.03	0.22	0.17	0.48	0.43	0.43	0.84	0.15	0.23	0.075	0.75
Al	%	6.27	6.16	7.71	3.53	4.6	6.59	7.55	7.55	6.1	4.04	5.49	5.69	4.1	4.87	4.79	5.37	5.03	3.81	4.21	8.23	82.3
As	ppm	19.3	19	22.4	5.9	8.4	20.2	0.7	0.8	29.7	5.8	3.8	19.4	12.4	21.1	18.5	37.5	10.9	16.4	16.3	1.8	18
Ba	ppm	5940	5830	8170	1220	840	4330	650	630	6530	1160	1370	3780	2170	820	750	1430	340	790	760	425	4250
Be	ppm	1.77	1.75	2.22	1.33	2.01	1.88	4.08	5.53	1.89	1.46	2.93	1.46	1.41	3.41	3.57	2.14	5.11	1.58	2.99	2.8	28
Bi	ppm	0.23	0.41	0.29	0.81	0.6	0.3	0.42	1.05	0.21	0.28	0.3	0.26	0.4	122	111.5	16.95	206	16.6	46.2	-	-
Ca	%	1.24	1.42	0.86	17.2	10.1	4.66	1.44	1.04	0.33	8.63	11.2	3.33	10.85	9.78	9.59	7.69	6.88	13.75	11.7	4.15	41.5
Cd	ppm	2.25	2.31	2.55	0.73	0.1	2.22	0.04	0.04	4.2	0.28	0.09	2.06	1.39	1.86	1.57	1.66	3.6	0.58	0.67	0.15	1.5
Ce	ppm	72.7	66.1	82	57.3	60.2	79.4	79.8	79.3	71.2	49.3	70.4	74.6	60	70	57.8	61.8	57.7	58.5	54.1	66.5	665
Co	ppm	12.2	10.5	15.4	4.9	5.2	12.1	3.5	3.4	12.5	5.6	6.3	10.2	9.2	17	16	17.7	22.1	11.4	13.3	25	250
Cr	ppm	63	65	76	24	27	66	11	12	72	34	27	57	44	46	43	63	38	35	42	102	1020
Cs	ppm	4.05	4	5.33	3.64	4.56	10.75	10.9	7.96	4.45	4.05	8.57	4.47	5.27	13.2	12.95	10	13.9	9.47	7.01	3	30
Cu	ppm	33.5	30.3	40.1	11.8	7.8	30.7	2.6	2.8	40.2	9	7.6	24.9	22.5	464	419	117	1065	98.7	224	60	600
Fe	%	3.6	3.48	4	1.54	1.8	3.35	1.88	1.7	3.5	1.67	2.14	2.9	2.28	5.64	5.52	4.14	8.94	2.84	3.85	5.63	56.3
Ga	ppm	15.15	15.1	19.05	8.3	10.15	18	19	18.65	15.55	9.4	13.05	13.75	10.1	15.95	15.8	14.65	17.35	10.05	12	19	190
Ge	ppm	0.14	0.14	0.14	0.11	0.13	0.15	0.15	0.14	0.14	0.14	0.14	0.14	0.11	0.13	0.13	0.12	0.14	0.11	0.1	1.5	15
Hf	ppm	2.5	2.2	2.6	1.4	1.4	2.6	1.6	1.7	2.4	1.6	1.9	2.3	1.7	1.6	1.5	2.1	1.5	1.6	1.7	3	30
In	ppm	0.047	0.04	0.057	0.028	0.028	0.044	0.036	0.018	0.054	0.03	0.045	0.048	0.036	0.403	0.377	0.139	0.687	0.099	0.211	0.16	1.6
K	%	2.39	2.2	2.73	1.9	2.36	2.4	3.78	3.7	2.31	2.13	2.83	2.29	1.61	1.85	1.83	1.86	1.9	1.59	1.62	2.09	20.9
La	ppm	35.7	32.8	41	27.3	29.6	40.6	39.9	39.3	37.3	25.8	36.5	38.3	31.3	33.7	29.7	30.4	27.1	26.9	25.3	39	390
Li	ppm	45.6	43.4	51.9	31.6	39.2	47.8	133	100.5	41.4	30.3	44.1	33.5	33.1	52	50.2	44.6	56.6	30.8	34.5	20	200
Mg	%	0.74	0.72	0.79	4.62	4.24	1.54	0.43	0.42	0.68	2.8	2.56	1.18	4.67	4.36	4.29	5.33	2.78	4.49	4.61	2.33	23.3
Mn	ppm	353	312	367	357	367	402	395	293	373	297	605	343	493	1140	1160	675	1510	519	1000	950	9500
Mo	ppm	5.21	5.69	5.76	0.52	0.41	5.48	2.49	0.8	8.09	1.11	0.75	5.43	2.04	3.31	3.56	3.84	6.63	2.15	1.47	1.2	12
Na	%	0.24	0.23	0.22	0.3	0.57	0.25	2.26	2.25	0.22	0.47	0.67	0.24	0.27	0.41	0.41	0.23	0.55	0.17	0.2	2.36	23.6
Nb	ppm	9.8	9.3	10.7	7.3	8.7	11.2	11.8	10.1	10.2	7.8	12.3	10	9.1	12.5	12.4	11.8	12	8.1	9.4	20	200
Ni	ppm	51.7	46.8	66.3	12.2	11.8	48.4	3.1	2.8	66.2	13.8	12.5	36	27.4	28	26.2	47.4	24.5	24.8	26.8	84	840
P	ppm	930	950	1020	690	560	990	540	580	1240	600	650	870	780	770	760	890	840	1040	620	1050	10500
Pb	ppm	18.5	17.9	22.6	13.3	13.4	21.5	40.4	39.4	38.3	10.4	14.1	17.5	18.1	30.6	29.9	33.2	23.8	12.6	14.8	14	140
Rb	ppm	115	110	140.5	76.2	101.5	120	220	200	109.5	87.1	126.5	105	70.9	107.5	106	84.5	129.5	70.7	78.4	90	900
Re	ppm	0.004	0.008	0.006	<0.002	0.002	0.004	<0.002	<0.002	0.004	<0.002	<0.002	0.004	<0.002	0.015	0.013	0.002	0.029	0.003	0.004	0.0015	0.015
S	%	0.05	0.05	0.06	0.01	0.03	0.07	0.01	0.01	0.07	0.21	0.05	0.07	0.02	0.86	0.83	0.21	2.82	0.21	0.46	0.35	3.5
Sb	ppm	4.08	3.76	4.53	0.43	0.31	3.87	0.14	0.11	8.52	0.41	0.21	2.92	1.51	1	0.89	1.99	1.86	0.74	0.79	0.2	2
Sc	ppm	10.7	10.5	14	5.2	5.5	10.9	5.6	5.2	11.7	6.8	7.4	8.6	6.7	8.1	7.7	9.5	7	6.7	7.7	22	220
Se	ppm	2	1	1	1	<1	1	<1	<1	3	1	<1	1	1	2	1	1	4	<1	1	0.05	0.5
Sn	ppm	1.7	1.9	2.2	1.8	2.2	2	4.4	2.9	1.9	2	3.3	2	1.7	10.1	10.2	6	11.1	3.2	6.1	2.3	23
Sr	ppm	76	85.5	81.6	193.5	157	114	238	221	53.9	131.5	172.5	88.8	136.5	180.5	182	117	164	225	191	370	3700
Ta	ppm	0.73	0.67	0.77	0.54	0.7	0.81	1.33	1.14	0.72	0.58	1.02	0.73	0.62	0.83	0.82	0.78	0.77	0.56	0.64	2	20
Te	ppm	<0.05	0.06	0.06	<0.05	<0.05	0.05	<0.05	<0.05	0.05	<0.05	<0.05	0.05	<0.05	0.45	0.45	0.12	1.19	0.11	0.22	0.001	0.01
Th	ppm	12.15	10.75	12.75	8.2	11.85	12.5	18.55	18.8	11.5	8.71	12.3	11.75	8.84	9.49	9.7	10	9.42	8.63	9.04	9.6	96
Ti	%	0.325	0.313	0.38	0.167	0.195	0.351	0.213	0.202	0.298	0.205	0.227	0.284	0.216	0.264	0.26	0.311	0.21	0.223	0.249	0.565	5.65
Tl	ppm	1	0.95	1.22	0.41	0.56	0.99	1.21	1	1.15	0.59	0.77	0.85	0.63	0.8	0.76	0.82	1.06	0.46	0.53	0.6	6
U	ppm	3.6	3.5	3.9	1.8	2.3	3.9	3.4	5.5	4.3	1.7	2.5	3.5	2.2	3.5	3.5	3.9	3.4	2.1	2.6	2.7	27
V	ppm	290	259	316	39	42	370	29	28	393	67	47	241	105	80	75	159	104	68	72	120	1200
W	ppm	1.2	5.4	1.4	2.5	9.7	11.5	3.8	8.1	1.2	2.1	2.1	1.5	2.7	1910	1620	297	3390	338	340	1.25	12.5
Y	ppm	15.6	14.3	17.1	10.2	10.8	18.2	8.5	9.1	18.6	11.9	16.1	15.3	14.1	14.6	14.1	17.2	13.9	12.8	13.6	33	330
Zn	ppm	278	273	334	49	35	263	43	32	361	42	38	175	132	225	205	212	431	103	119	70	700
Zr	ppm	88.2	76.9	88.5	47	50.7	91.2	46.2	48.3	89.5	47.1	58.9	77.8	58.9	57	51	75.4	47.1	55.1	66.6	165	1650

Average crustal abundance values for all rock types. Multiple sources as compiled at https://en.wikipedia.org/wiki/Abundance_of_elements_in_Earth's_crust

Metal concentrations exceeding the average crustal abundance are **bold**

Metal concentrations exceeding 10 times the average crustal abundance are **bold shaded**

Table 4-6: Shake Flask Extraction Analysis Results with Comparison to Guideline Values

Client Sample ID	Lowest Detection Limit	Units	9-16-JD-52	9-16-JD-04	9-16-JD-10	9-16-JD-50	CCME - AW (Freshwater) ⁰	Federal Interim Guideline - Res Park Coarse ¹	Federal Interim Guideline - Agriculture Coarse ²
ALS Sample ID			L2028191-1	L2028191-2	L2028191-3	L2028191-4	mg/L	mg/L	mg/L
Physical Tests									
Hardness (as CaCO ₃)	0.5	mg/L	2.15	40	26.9	43.2	NG	NG	NG
Moisture	0.25	%	<0.25	<0.25	<0.25	<0.25	NG	NG	NG
Leachable Anions & Nutrients									
Acidity (as CaCO ₃)	4.0	mg/L	<4.0	<4.0	<4.0	<4.0	NG	NG	NG
Alkalinity, Total (as CaCO ₃)	1.0	mg/L	4.7	37.3	27.8	38.6	NG	NG	NG
Ammonia, Total Leachable (as N)	0.0050	mg/L	0.0151	0.0375	0.0245	0.0495	1.04	1.54	1.54
Bromide (Br)	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	NG	NG	NG
Chloride (Cl)	0.50	mg/L	<0.50	<0.50	<0.50	<0.50	120	120	120
Conductivity	2.0	uS/cm	28	82.9	58.4	93.3	NG	NG	NG
Fluoride (F)	0.020	mg/L	0.071	0.175	0.045	0.522	0.12	0.12	0.12
Nitrate (as N)	0.0050	mg/L	0.0075	0.1050	0.0762	0.0408	13	13	13
Nitrite (as N)	0.0010	mg/L	<0.0010	0.0110	0.0052	0.0137	0.06	0.06	0.06
pH	0.10	pH	7.32	8.45	9.18	8.66	6.5-9.0	6.5-9.0	6.5-9.0
Sulfate (SO ₄)	0.50	mg/L	2.4	4.67	2.14	6.0	NG	100	100
Leachable Metals									
Aluminum (Al)-Leachable	0.0050	mg/L	0.657	0.179	0.594	0.084	0.1 ³	0.1 ³	0.1 ³
Antimony (Sb)-Leachable	0.00010	mg/L	<0.00010	0.00118	0.00018	0.00152	NG	2	2
Arsenic (As)-Leachable	0.0010	mg/L	<0.0010	<0.0010	0.002	0.001	0.005	0.005	0.005
Barium (Ba)-Leachable	0.0010	mg/L	0.007	0.570	0.078	0.196	NG	0.5	2.9
Beryllium (Be)-Leachable	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	NG	0.0053	0.0053
Bismuth (Bi)-Leachable	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	1	NG	NG
Boron (B)-Leachable	0.010	mg/L	0.011	<0.010	<0.010	0.015	1.5	5	NG
Cadmium (Cd)-Leachable	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.001	0.000017	0.000017
Calcium (Ca)-Leachable	0.10	mg/L	0.55	14.80	9.55	14.90	NG	NG	NG
Chromium (Cr)-Leachable	0.00050	mg/L	<0.00050	0.00103	<0.00050	0.00117	0.001	0.0089	0.0089
Cobalt (Co)-Leachable	0.00010	mg/L	0.0002	<0.00010	<0.00010	<0.00010	0.0025	NG	NG
Copper (Cu)-Leachable	0.0010	mg/L	0.003	<0.0010	<0.0010	<0.0010	0.002 ⁴	0.002 ⁴	0.002 ⁴
Iron (Fe)-Leachable	0.030	mg/L	0.250	0.036	<0.030	0.047	0.3	0.3	0.3
Lead (Pb)-Leachable	0.00010	mg/L	0.00082	<0.00010	<0.00010	<0.00010	0.001 ⁴	0.001 ⁴	0.001 ⁴
Lithium (Li)-Leachable	0.0050	mg/L	<0.0050	<0.0050	<0.0050	0.014	NG	NG	NG
Magnesium (Mg)-Leachable	0.050	mg/L	0.188	0.715	0.742	1.460	NG	NG	NG
Manganese (Mn)-Leachable	0.00050	mg/L	0.0191	0.00122	<0.00050	0.00099	NG	NG	NG
Mercury (Hg)-Leachable	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.000026	0.000026	0.000026
Molybdenum (Mo)-Leachable	0.00010	mg/L	0.00104	0.00314	0.00054	0.00749	0.073	0.073	0.073
Nickel (Ni)-Leachable	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.025 ⁴	0.025 ⁴	0.025 ⁴
Phosphorus (P)-Leachable	0.30	mg/L	<0.30	<0.30	<0.30	<0.30	0.004 - 0.010 ⁵	NG	NG
Potassium (K)-Leachable	0.050	mg/L	4.620	1.810	2.100	1.880	NG	NG	NG
Selenium (Se)-Leachable	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.001	0.001	0.001
Silicon (Si)-Leachable	0.050	mg/L	3.8	1.730	1.510	2.470	NG	NG	NG
Silver (Ag)-Leachable	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.00025	0.0001	0.0001
Sodium (Na)-Leachable	0.050	mg/L	2.340	0.546	0.187	0.578	NG	NG	NG
Strontium (Sr)-Leachable	0.00050	mg/L	0.003	0.034	0.013	0.031	NG	NG	NG
Thallium (Tl)-Leachable	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.0008	0.0008	0.0008
Tin (Sn)-Leachable	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	NG	NG	NG
Titanium (Ti)-Leachable	0.010	mg/L	0.014	<0.010	<0.010	<0.010	NG	0.1	0.1
Uranium (U)-Leachable	0.000010	mg/L	0.00628	0.00045	0.00027	0.00060	0.015	0.015	0.015
Vanadium (V)-Leachable	0.0010	mg/L	0.001	0.002	0.001	0.002	NG	NG	NG
Zinc (Zn)-Leachable	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	0.03	0.03	0.03

0. Canadian Council of Ministers of the Environment (CCME) Environmental Quality Guidelines (CEQG), for the protection of freshwater aquatic life.

1. Federal Contaminated Sites Action Plan (FCSAP) Guidance Document on Federal Interim Groundwater Quality Guidelines (FIGWQG)

for Federal Contaminated Sites Tier 1 and 2 Guidelines for Residential / Parkland Land Use - coarse- grained soils.

2. FFCSP Guidance Document on FIGWQG for Federal Contaminated Sites Tier 1 and 2 Guidelines for Agricultural Land Use - coarse-grained soils.

3. Guideline is dependent upon the pH value.

4. Guideline is based on the Hardness value.

5. Guideline shown is based on the typical range of total phosphorous concentrations of a oligotrophic water body.

NG - No guideline

BOLD Black - Concentration exceeds the most stringent guideline

BOLD Black and Shaded - Concentration exceeds the most stringent guideline by an order of magnitude

APPENDIX A

TETRA TECH'S LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

GEOTECHNICAL

1.1 USE OF DOCUMENT AND OWNERSHIP

This document pertains to a specific site, a specific development, and a specific scope of work. The document may include plans, drawings, profiles and other supporting documents that collectively constitute the document (the "Professional Document").

The Professional Document is intended for the sole use of TETRA TECH's Client (the "Client") as specifically identified in the TETRA TECH Services Agreement or other Contractual Agreement entered into with the Client (either of which is termed the "Contract" herein). TETRA TECH does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Professional Document when it is used or relied upon by any party other than the Client, unless authorized in writing by TETRA TECH.

Any unauthorized use of the Professional Document is at the sole risk of the user. TETRA TECH accepts no responsibility whatsoever for any loss or damage where such loss or damage is alleged to be or, in fact, caused by the unauthorized use of the Professional Document.

Where TETRA TECH has expressly authorized the use of the Professional Document by a third party (an "Authorized Party"), consideration for such authorization is the Authorized Party's acceptance of these Limitations on Use of this Document as well as any limitations on liability contained in the Contract with the Client (all of which is collectively termed the "Limitations on Liability"). The Authorized Party should carefully review both these Limitations on Use of this Document and the Contract prior to making any use of the Professional Document. Any use made of the Professional Document by an Authorized Party constitutes the Authorized Party's express acceptance of, and agreement to, the Limitations on Liability.

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Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH's Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by third parties other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

1.6 GENERAL LIMITATIONS OF DOCUMENT

This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this document, at or on the development proposed as of the date of the Professional Document requires a supplementary exploration, investigation, and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

1.7 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, TETRA TECH has not been retained to explore, address or consider and has not explored, addressed or considered any environmental or regulatory issues associated with development on the subject site.

1.8 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems, methods and standards employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. TETRA TECH does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

1.9 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

1.10 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historical environment. TETRA TECH does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional exploration and review may be necessary.

1.11 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

1.12 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

1.13 INFLUENCE OF CONSTRUCTION ACTIVITY

Construction activity can impact structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques, and construction sequence are known.

1.14 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, and the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

1.15 DRAINAGE SYSTEMS

Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function. Where temporary or permanent drainage systems are installed within or around a structure, these systems must protect the structure from loss of ground due to mechanisms such as internal erosion and must be designed so as to assure continued satisfactory performance of the drains. Specific design details regarding the geotechnical aspects of such systems (e.g. bedding material, surrounding soil, soil cover, geotextile type) should be reviewed by the geotechnical engineer to confirm the performance of the system is consistent with the conditions used in the geotechnical design.

1.16 DESIGN PARAMETERS

Bearing capacities for Limit States or Allowable Stress Design, strength/stiffness properties and similar geotechnical design parameters quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition used in this report. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions considered in this report in fact exist at the site.

1.17 SAMPLES

TETRA TECH will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

1.18 APPLICABLE CODES, STANDARDS, GUIDELINES & BEST PRACTICE

This document has been prepared based on the applicable codes, standards, guidelines or best practice as identified in the report. Some mandated codes, standards and guidelines (such as ASTM, AASHTO Bridge Design/Construction Codes, Canadian Highway Bridge Design Code, National/Provincial Building Codes) are routinely updated and corrections made. TETRA TECH cannot predict nor be held liable for any such future changes, amendments, errors or omissions in these documents that may have a bearing on the assessment, design or analyses included in this report.

APPENDIX B

TETRA TECH'S 2018 TESTPIT AND TESTHOLE LOGS AND PARTICLE SIZE RESULTS

TERMS USED ON BOREHOLE LOGS

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on 0.075mm sieve): Includes (1) clean gravels and sands, and (2) silty or clayey gravels and sands. Condition is rated according to relative density, as inferred from laboratory or in situ tests.

DESCRIPTIVE TERM	RELATIVE DENSITY	N (blows per 0.3m)
Very Loose	0 TO 20%	0 to 4
Loose	20 TO 40%	4 to 10
Compact	40 TO 75%	10 to 30
Dense	75 TO 90%	30 to 50
Very Dense	90 TO 100%	greater than 50

The number of blows, N, on a 51mm O.D. split spoon sampler of a 63.5kg weight falling 0.76m, required to drive the sampler a distance of 0.3m from 0.15m to 0.45m.

FINE GRAINED SOILS (major portion passing 0.075mm sieve): Includes (1) inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as estimated from laboratory or in situ tests.

DESCRIPTIVE TERM	UNCONFINED COMPRESSIVE STRENGTH (KPA)
Very Soft	Less than 25
Soft	25 to 50
Firm	50 to 100
Stiff	100 to 200
Very Stiff	200 to 400
Hard	Greater than 400

NOTE: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above, because of planes of weakness or cracks in the soil.

GENERAL DESCRIPTIVE TERMS

Slickensided - having inclined planes of weakness that are slick and glossy in appearance.

Fissured - containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.

Laminated - composed of thin layers of varying colour and texture.

Interbedded - composed of alternate layers of different soil types.

Calcareous - containing appreciable quantities of calcium carbonate.;

Well graded - having wide range in grain sizes and substantial amounts of intermediate particle sizes.

Poorly graded - predominantly of one grain size, or having a range of sizes with some intermediate size missing.

MODIFIED UNIFIED SOIL CLASSIFICATION

MAJOR DIVISION			GROUP SYMBOL	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA			
COARSE - GRAINED SOILS More than 50% retained on No. 75 µm sieve*	GRAVELS 50% or more of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines	Classification on basis of percentage of fines GW, GP, SW, SP GM, GC, SM, SC Borderline classification requiring use of dual symbols	$C_u = D_{60} / D_{10}$ Greater than 4 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3		
			GP	Poorly-graded gravels and gravel-sand mixtures, little or no fines		Not meeting both criteria for GW		
		GRAVELS WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures		Atterberg limits plot below 'A' line or plasticity index less than 4	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols	
			GC	Clayey gravels, gravel-sand-clay mixtures		Atterberg limits plot above 'A' line and plasticity index greater than 7		
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS	SW	Well-graded sands and gravelly sands, little or no fines		$C_u = D_{60} / D_{10}$ Greater than 6 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3		
			SP	Poorly-graded sands and gravelly sands, little or no fines		Not meeting both criteria for SW		
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures		Atterberg limits plot above 'A' line and plasticity index less than 4	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols	
			SC	Clayey sands, sand-clay mixtures		Atterberg limits plot above 'A' line and plasticity index greater than 7		

FINE-GRAINED SOILS (by behavior) 50% or more passes 75 µm sieve*	SILTS	Liquid limit	<50	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands of slight plasticity	<div>60 50 40 30 20 10 4 0</div> <div>PLASTICITY CHART For classification of fine-grained soils and fine fraction of coarse-grained soils Equation of 'A' line: $PI = 0.73(LL - 20)$</div> <div>0 10 20 30 40 50 60 70 80 90 100</div> <div>LIQUID LIMIT</div>
			>50	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts	
	CLAYS	Above "A" line on plasticity chart negligible organic content	<30	CL	Inorganic clays of low plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			30-50	CI	Inorganic clay of medium plasticity, silty clays	
			>50	CH	Inorganic clay of high plasticity, fat clays	
	ORGANIC SILTS AND CLAYS	Liquid limit	<50	OL	Organic silts and organic silty clays of low plasticity	
			>50	OH	Organic clays of medium to high plasticity	

HIGHLY ORGANIC SOILS	PT	Peat, muck and other highly organic soils	<div>* Based on the material passing the 75 mm sieve</div> <div>† ASTM Designation D 2487, for identification procedure see D 2488 USC as modified by PFRA</div>
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* Based on the material passing the 75 mm sieve

† ASTM Designation D 2487, for identification procedure see D 2488 USC as modified by PFRA

GROUND ICE DESCRIPTION

ICE NOT VISIBLE

GROUP SYMBOL	SYMBOL	SUBGROUP DESCRIPTION	
N	Nf	Poorly-bonded or friable	
	Nbn	No excess ice, well-bonded	
	Nbe	Excess ice, well-bonded	

NOTES:

- Dual symbols are used to indicate borderline or mixed ice classifications.
- Visual estimates of ice contents indicated on borehole logs $\pm 5\%$
- This system of ground ice description has been modified from NRC Technical Memo 79, Guide to the Field Description of Permafrost for Engineering Purposes.

LEGEND:

Soil Ice

VISIBLE ICE LESS THAN 50% BY VOLUME

GROUP SYMBOL	SYMBOL	SUBGROUP DESCRIPTION	
V	Vx	Individual ice crystals or inclusions	
	Vc	Ice coatings on particles	
	Vr	Random or irregularly oriented ice formations	
	Vs	Stratified or distinctly oriented ice formations	

VISIBLE ICE GREATER THAN 50% BY VOLUME

ICE	ICE + Soil Type	Ice with soil inclusions	
	ICE	Ice without soil inclusions (greater than 25 mm thick)	

BOREHOLE KEYSHEET

Water Level Measurement



Measured in standpipe,
piezometer or well



Inferred

Sample Types



A-Casing



Core



Disturbed, Bag,
Grab



HQ Core



Jar



Jar and Bag



75 mm SPT



No Recovery



Split Spoon/SPT



Tube



CRREL Core

Backfill Materials



Asphalt



Bentonite



Cement/
Grout



Drill Cuttings



Grout



Gravel



Sand



Slough



Topsoil Backfill

Lithology - Graphical Legend¹



Asphalt



Bedrock



Cobbles/Boulders



Clay



Coal



Concrete



Fill



Gravel



Limestone



Mudstone



Organics



Peat



Sand



Sandstone



Shale



Silt



Siltstone



Conglomerate




Topsoil



Till

1. The graphical legend is an approximation and for visual representation only. Soil strata may comprise a combination of the basic symbols shown above. Particle sizes are not drawn to scale

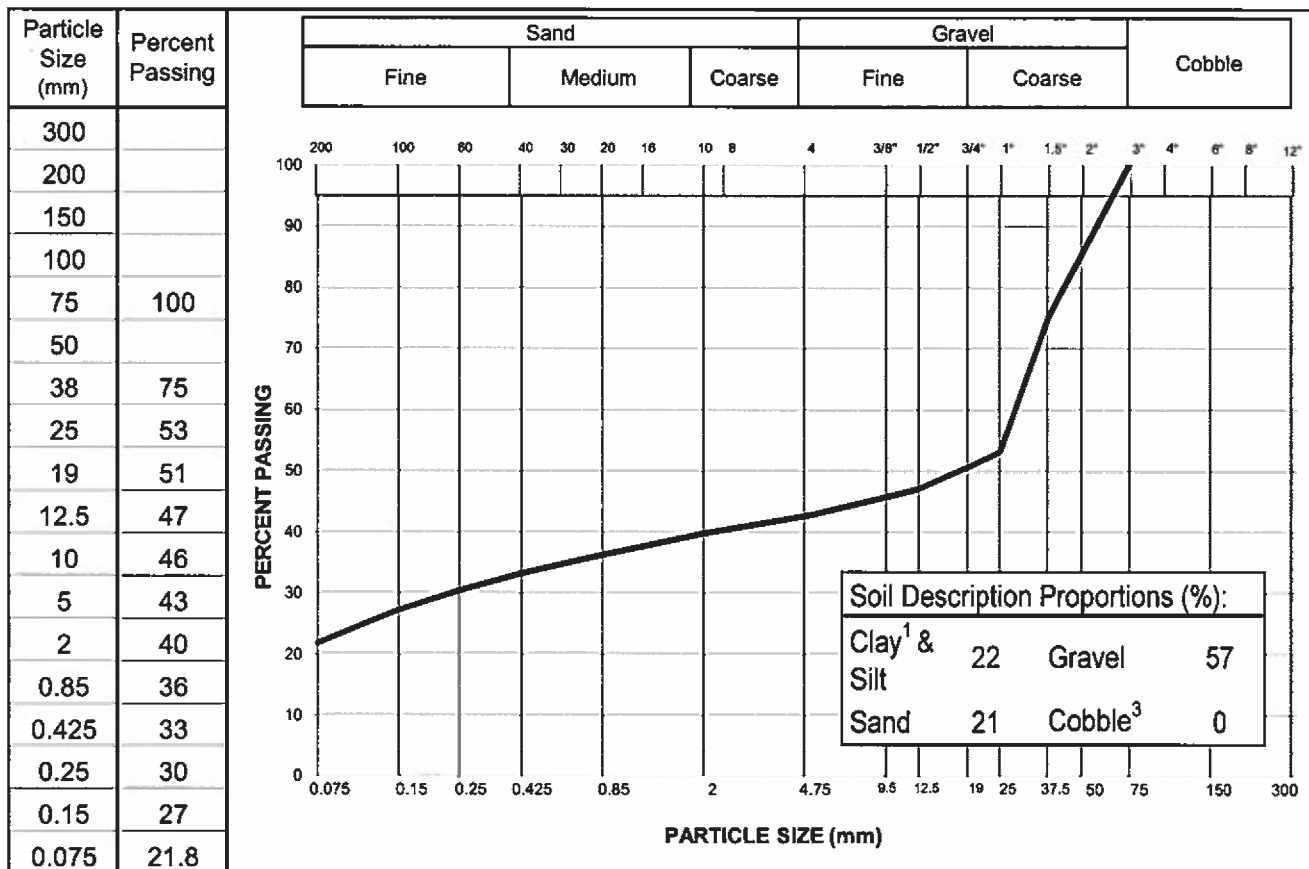
North American Tungsten Corporation Ltd.		Testhole No: BS-18AH01						
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007			
		Location: Cantung Mine						
		Cantung, Northwest Territories			UTM: 540386 E; 6871473 N; Z 9			
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv) 200 400 600 800		Notes and Comments	Depth (ft)
0	Hand augered	ORGANICS - roots, moss, moist, dark brown, (200 mm thick)		SA01				0
		GRAVEL (TILL) - silty, sandy, damp to moist, compact, brownish grey, subangular gravel						1
		- (Gravel - 57%; Sand - 21%; Silt & Clay - 22%)						2
1								3
		END OF TESTHOLE (1.2 metres)						4
								5
								6
								7
								8
								9
								10
								11
								12
								13
								14
								15
								16
								17
								18
								19
								20
								21
								22
								23
								24
7.5								
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 1.2 m			
		Drilling Rig Type: Hand auger			Start Date: 2018 September 24			
		Logged By: CPC			Completion Date: 2018 September 24			
		Reviewed By: TP			Page 1 of 1			

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project:	Borrow Source Investigation	Sample No.:	AH01
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA01
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	0.6 - 0.8 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	October 31, 2018	By:	GK
Date Tested:	October 31, 2018	Date Sampled:	September 24, 2018
Soil Description ² :	GRAVEL - some silt, some sand	Sampled By:	CPC
		USC Classification:	-
		Cu:	#N/A
		Cc:	#N/A

Moisture Content: 8.4%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual

² The description is visually based & subject to Tt WM4400 description protocols

³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75


Specification: _____

Remarks: _____

Reviewed By: P.Eng.

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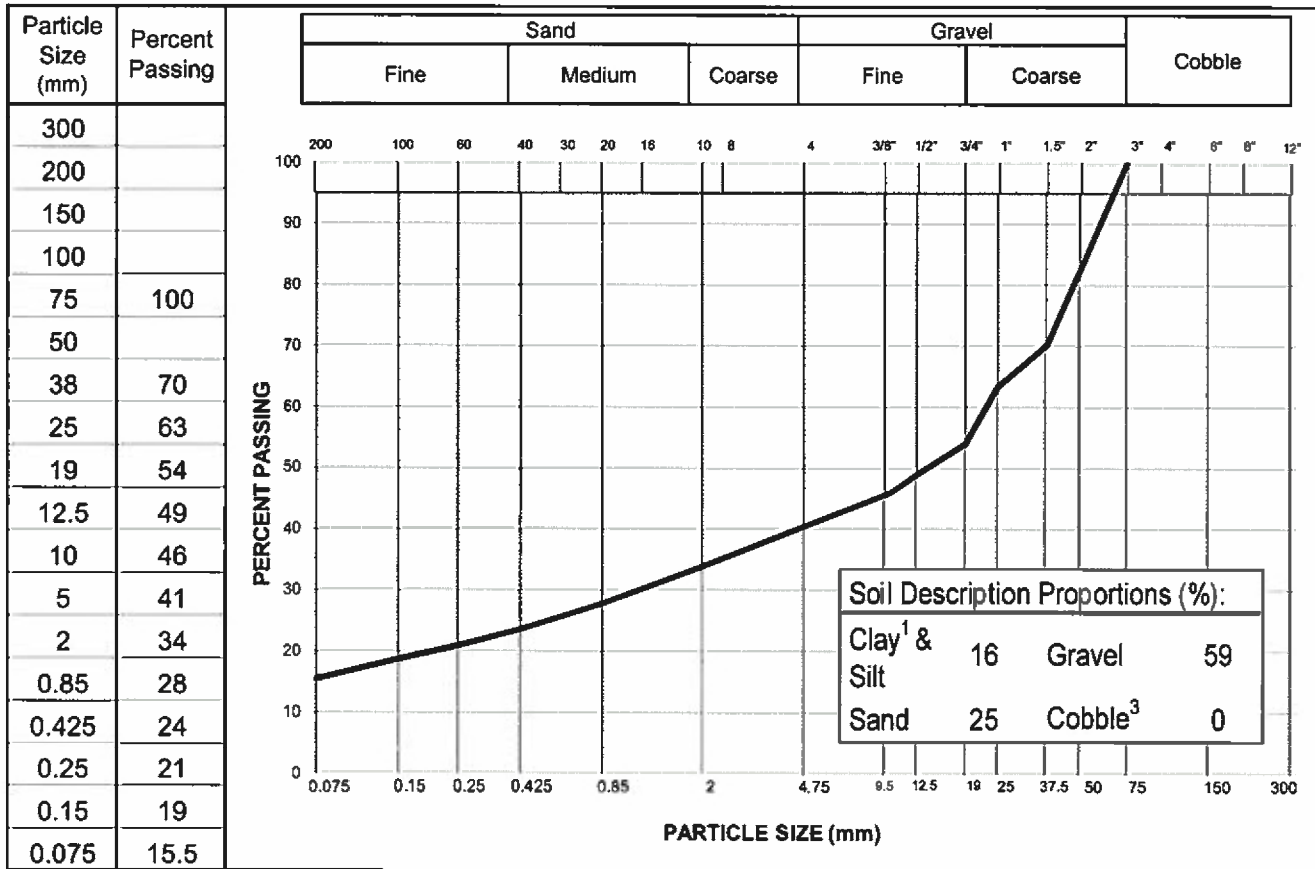
North American Tungsten Corporation Ltd.		Testhole No: BS-18AH02						
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007			
		Location: Cantung Mine						
		Cantung, Northwest Territories			UTM: 540366 E; 6871519 N; Z 9			
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)		Notes and Comments	Depth (ft)
					200	400 600 800		
0	Hand augered	ORGANICS - roots, moss, moist, dark brown, (200 mm thick)	SA02					0
		GRAVEL (TILL) - sandy, some silt, some cobbles, damp to moist, compact, brownish grey, subangular gravel						1
		- (Gravel - 59%; Sand - 25%; Silt & Clay - 16%)						2
1								3
		END OF TESTHOLE (1.2 metres)						4
								5
								6
2								7
								8
								9
								10
3								11
								12
								13
4								14
								15
								16
5								17
								18
								19
6								20
								21
								22
7								23
								24
7.5								
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 1.2 m			
		Drilling Rig Type: Hand auger			Start Date: 2018 September 24			
		Logged By: CPC			Completion Date: 2018 September 24			
		Reviewed By: TP			Page 1 of 1			

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: Borrow Source Investigation	Sample No.: AH02
Project No.: ENW.WENW03039-03 (Task 007)	Material Type: -
Site: Cantung Mine, NT	Sample Loc.: SA02
Client: North American Tungsten Corp. Ltd.	Sample Depth: 0.7 - 0.8 m
Client Rep.: Callum Beveridge	Sampling Method: Grab
Date Tested: October 31, 2018 By: GK	Date Sampled: September 24, 2018
Soil Description ² : GRAVEL - sandy, some silt	Sampled By: CPC
	USC Classification: - Cu: #N/A
	Cc: #N/A

Moisture Content: 8.4%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75


Specification: _____

Remarks: _____

Reviewed By: P.Eng.

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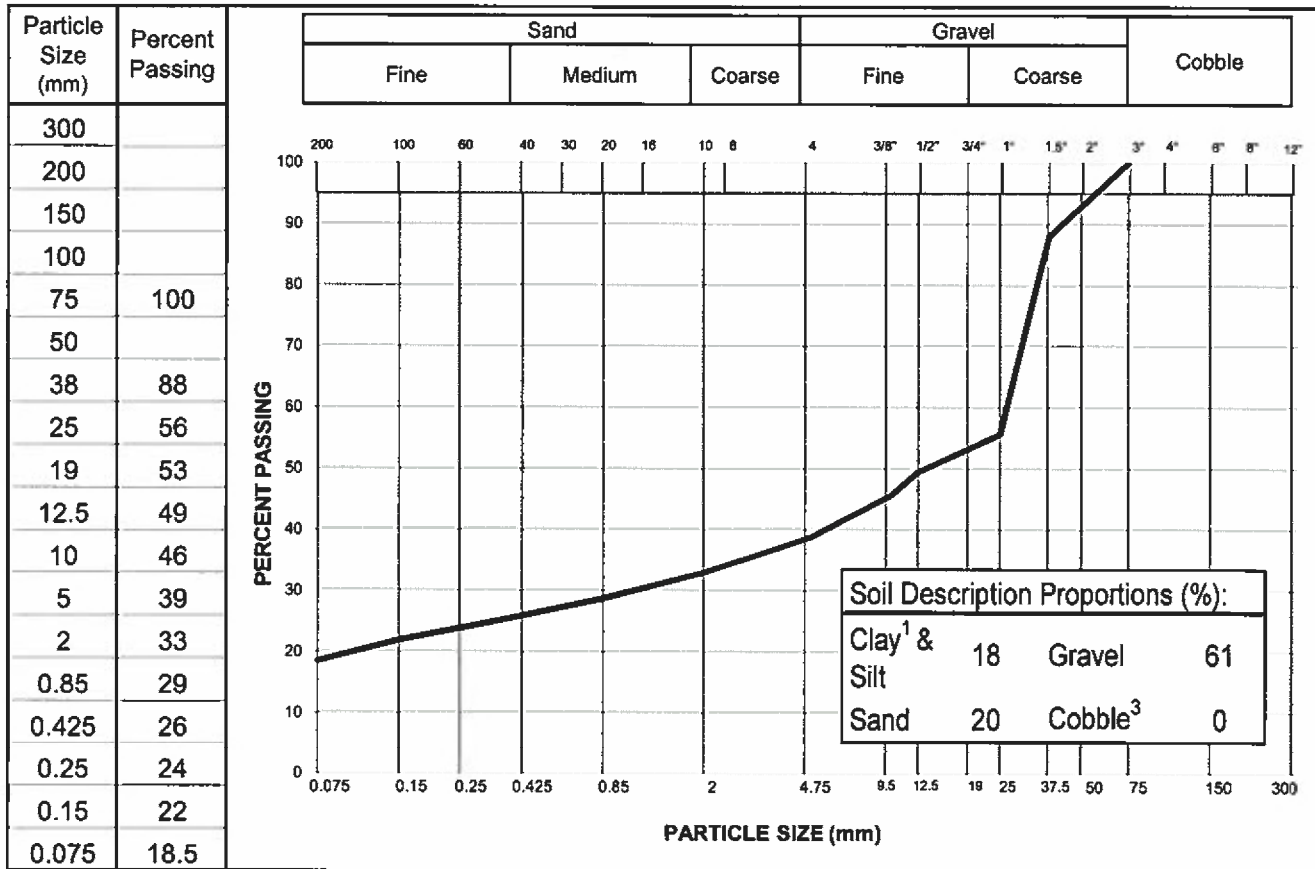
North American Tungsten Corporation Ltd.		Testhole No: BS-18AH03					
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007		
		Location: Cantung Mine					
		Cantung, Northwest Territories			UTM: 540322 E; 6871559 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv) 200 400 600 800	Notes and Comments	Depth (ft)
0	Hand augered	ORGANICS - roots, moss, moist, dark brown, (200 mm thick)					0
		GRAVEL (TILL) - sandy, some silt, some cobbles, damp to moist, compact, brownish grey, subangular gravel					1
1		- (Gravel - 61%; Sand - 20%; Silt & Clay - 18%)	SA03				2
		END OF TESTHOLE (1.2 metres)					3
							4
							5
							6
							7
							8
							9
							10
							11
							12
							13
							14
							15
							16
							17
							18
							19
							20
							21
							22
							23
							24
7.5							
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 1.2 m		
		Drilling Rig Type: Hand auger			Start Date: 2018 September 24		
		Logged By: CPC			Completion Date: 2018 September 24		
		Reviewed By: TP			Page 1 of 1		

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project:	Borrow Source Investigation	Sample No.:	AH03
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA03
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	0.8 - 0.9 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	October 31, 2018	By:	GK
Date Tested:	October 31, 2018	Date Sampled:	September 24, 2018
Soil Description ² :	GRAVEL - some sand, some silt	Sampled By:	CPC
		USC Classification:	-
		Cu:	#N/A
		Cc:	#N/A

Moisture Content: 9.9%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification: _____


Remarks: _____


Reviewed By: *me* P.Eng.

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TETRA TECH

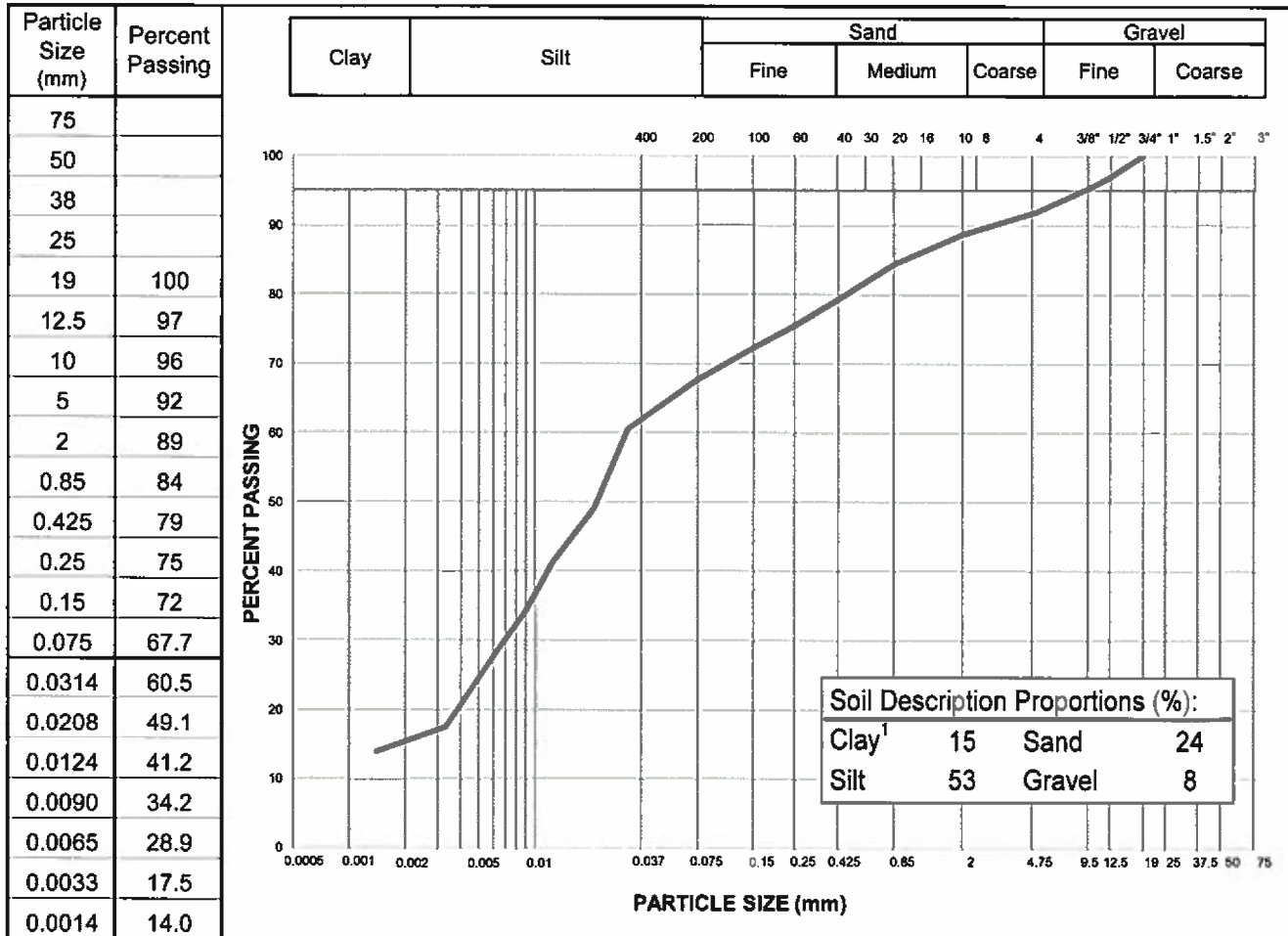
North American Tungsten Corporation Ltd.		Testhole No: BS-18AH04								
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007					
		Location: Cantung Mine								
		Cantung, Northwest Territories			UTM: 540282 E; 6871606 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)				Notes and Comments	Depth (ft)
					200	400	600	800		
0	Hand augered	ORGANICS - roots, moss, moist, dark brown, (200 mm thick)	SA04							0
GRAVEL - sandy, some cobbles, trace silt, damp to moist, compact, brownish grey, subrounded gravel									1	
END OF TESTHOLE (0.8 metres)									2	
1										3
										4
										5
										6
2										7
										8
										9
3										10
										11
										12
										13
4										14
										15
										16
5										17
										18
										19
6										20
										21
										22
7										23
										24
7.5										
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 0.8 m					
		Drilling Rig Type: Hand auger			Start Date: 2018 September 24					
		Logged By: CPC			Completion Date: 2018 September 24					
		Reviewed By: TP			Page 1 of 1					

North American Tungsten Corporation Ltd.		Testhole No: BS-18AH05								
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007					
		Location: Cantung Mine								
		Cantung, Northwest Territories			UTM: 540371 E; 6871476 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)				Notes and Comments	Depth (ft)
					200	400	600	800		
0	Hand augered	ORGANICS - roots, moss, moist, dark brown, (300 mm thick)								0
		SILT - sandy, trace gravel, damp to moist, firm, brownish grey, fine sand								1
1		- (Gravel - 8%; Sand - 24%; Silt -53%; Clay - 15%)	SA05							2
		SAND (TILL) - silty, gravelly, some cobbles, damp to most, compact, brownish grey, subangular gravel								3
		END OF TESTHOLE (1.3 metres)								4
										5
										6
2										7
										8
										9
3										10
										11
										12
										13
4										14
										15
										16
5										17
										18
										19
6										20
										21
										22
7										23
										24
7.5										
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 1.3 m					
		Drilling Rig Type: Hand auger			Start Date: 2018 September 24					
		Logged By: CPC			Completion Date: 2018 September 24					
		Reviewed By: TP			Page 1 of 1					

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: Borrow Source Investigation	Sample No.: AH05
Project No.: ENW.WENW03039-03 (Task 007)	Material Type: -
Site: Cantung Mine, NT	Sample Loc.: SA05
Client: North American Tungsten Corp. Ltd.	Sample Depth: 1.1 - 1.2 m
Client Rep.: Callum Beveridge	Sampling Method: Grab
Date Tested: October 28, 2018 By: AT	Date Sampled: September 24, 2018
Soil Description ² : SILT - sandy, some clay, trace gravel	Sampled By: CPC
Moisture Content: 70.8%	USC Classification: - Cu: #N/A Cc: #N/A



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual

² The description is visually based & subject to Tetra Tech description protocols


Specification: _____


Remarks: _____


Reviewed By: *[Signature]* P.Eng.


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North American Tungsten Corporation Ltd.		Testhole No: BS-18AH06				
		Project: Borrow Source Investigation		Project No: ENW.WENW03039-03.007		
		Location: Cantung Mine				
		Cantung, Northwest Territories		UTM: 540181 E; 6871502 N; Z 9		
Depth (m)	Method	Soil Description	Vapour readings (ppmv) 200 400 600 800		Notes and Comments	Depth (ft)
0	Hand augered	ORGANICS - roots, moss, moist, dark brown, (200 mm thick)				0
		SILT - sandy, damp to moist, brownish grey, fine sand, (100 mm thick)				1
		GRAVEL - sandy, some cobbles, trace silt, damp to moist, compact, grey, subangular gravel				2
		END OF TESTHOLE (0.6 metres)				
1						3
						4
						5
						6
2						7
						8
						9
						10
3						11
						12
						13
4						14
						15
						16
5						17
						18
						19
6						20
						21
						22
7						23
						24
7.5						
 TETRA TECH		Contractor: North American Tungsten		Completion Depth: 0.6 m		
		Drilling Rig Type: Hand auger		Start Date: 2018 September 24		
		Logged By: CPC		Completion Date: 2018 September 24		
		Reviewed By: TP		Page 1 of 1		

North American Tungsten Corporation Ltd.		Testhole No: BS-18AH07				
		Project: Borrow Source Investigation		Project No: ENW.WENW03039-03.007		
		Location: Cantung Mine				
		Cantung, Northwest Territories		UTM: 540349 E; 6871506 N; Z 9		
Depth (m)	Method	Soil Description	Vapour readings (ppmv) 200 400 600 800		Notes and Comments	Depth (ft)
0	Hand augered	ORGANICS - roots, moss, moist, dark brown, (200 mm thick)				0
		GRAVEL - sandy, some cobbles, trace silt, damp to moist, grey				1
		END OF TESTHOLE (0.6 metres)				2
1						3
						4
						5
2						6
						7
						8
3						9
						10
						11
						12
4						13
						14
						15
5						16
						17
						18
6						19
						20
						21
7						22
						23
7.5						24
 TETRA TECH		Contractor: North American Tungsten		Completion Depth: 0.6 m		
		Drilling Rig Type: Hand auger		Start Date: 2018 September 24		
		Logged By: CPC		Completion Date: 2018 September 24		
		Reviewed By: TP		Page 1 of 1		

North American Tungsten Corporation Ltd.		Testhole No: BS-18AH08				
		Project: Borrow Source Investigation		Project No: ENW.WENW03039-03.007		
		Location: Cantung Mine				
		Cantung, Northwest Territories		UTM: 540393 E; 6871541 N; Z 9		
Depth (m)	Method	Soil Description	Vapour readings (ppmv) 200 400 600 800		Notes and Comments	Depth (ft)
0	Hand augered	ORGANICS - roots, moss, moist, dark brown, (200 mm thick)				0
		GRAVEL - sandy, trace silt, damp to moist, compact, grey, subrounded gravel				1
		END OF TESTHOLE (0.6 metres)				2
1						3
						4
						5
2						6
						7
						8
3						9
						10
						11
						12
4						13
						14
						15
5						16
						17
						18
6						19
						20
						21
7						22
						23
7.5						24
 TETRA TECH		Contractor: North American Tungsten		Completion Depth: 0.6 m		
		Drilling Rig Type: Hand auger		Start Date: 2018 September 24		
		Logged By: CPC		Completion Date: 2018 September 24		
		Reviewed By: TP		Page 1 of 1		

North American Tungsten Corporation Ltd.		Testhole No: BS-18AH09						
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007			
		Location: Cantung Mine						
		Cantung, Northwest Territories			UTM: 540408 E; 6871522 N; Z 9			
Depth (m)	Method	Soil Description	Vapour readings (ppmv) 200 400 600 800				Notes and Comments	Depth (ft)
0	Hand augered	ORGANICS - roots, moss, moist, dark brown, (200 mm thick)						0
		GRAVEL - sandy, trace silt, damp to moist, compact, grey, subrounded gravel, (200 mm thick)						1
		ORGANICS - moist						2
1		END OF TESTHOLE (1.0 metre)						3
								4
								5
								6
								7
								8
								9
								10
								11
								12
								13
								14
								15
								16
								17
								18
								19
								20
								21
							22	
							23	
							24	
7.5								
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 1 m			
		Drilling Rig Type: Hand auger			Start Date: 2018 September 24			
		Logged By: CPC			Completion Date: 2018 September 24			
		Reviewed By: TP			Page 1 of 1			

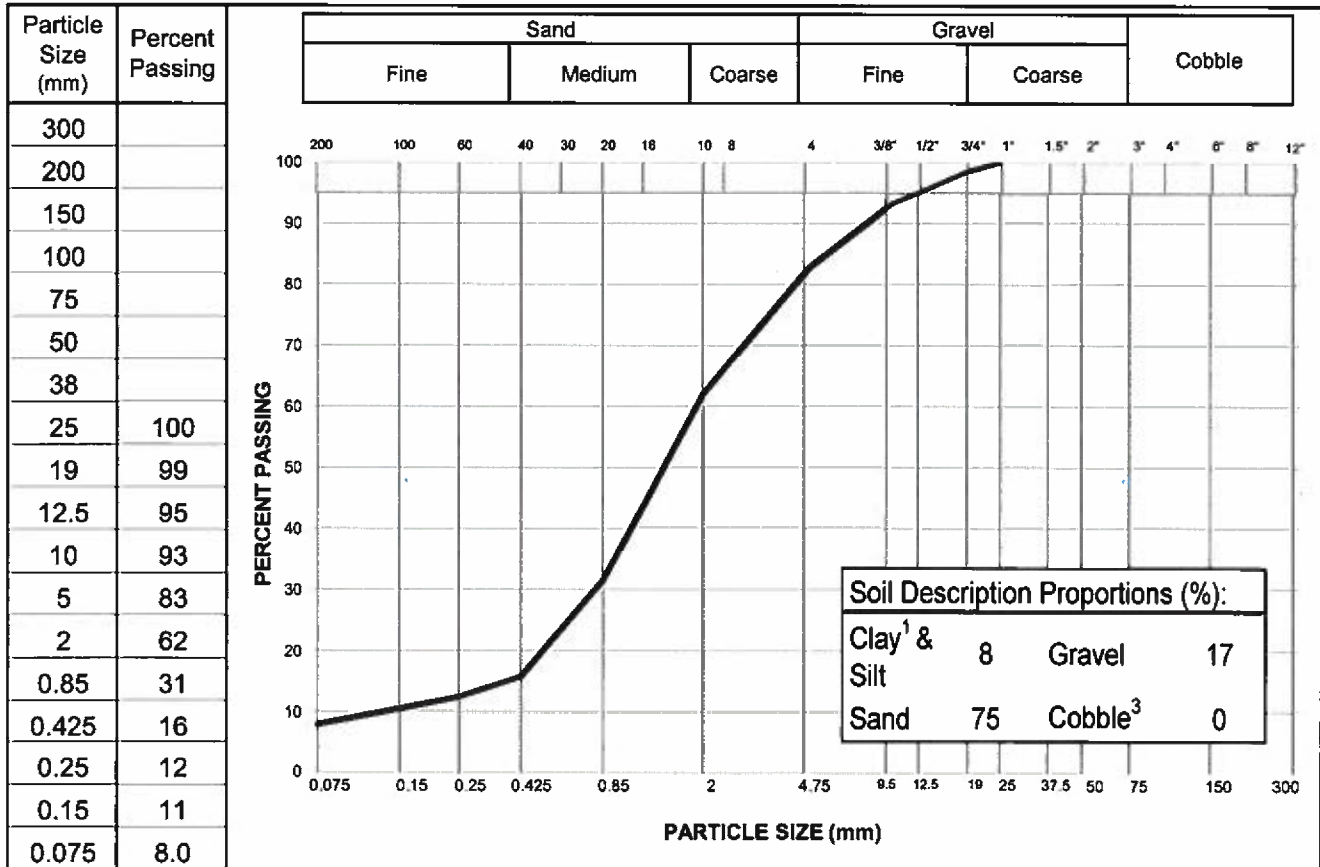
North American Tungsten Corporation Ltd.		Testhole No: BS-18AH10				
		Project: Borrow Source Investigation		Project No: ENW.WENW03039-03.007		
		Location: Cantung Mine				
		Cantung, Northwest Territories		UTM: 540422 E; 6871492 N; Z 9		
Depth (m)	Method	Soil Description	Vapour readings (ppmv) 200 400 600 800		Notes and Comments	Depth (ft)
0	Hand augered	ORGANICS - roots, moss, moist, dark brown				0
		SAND - silty, moist, brownish grey, fine sand				1
		- cobbles or boulders				2
1		END OF TESTHOLE (0.8 metres)				3
						4
						5
						6
2						7
						8
						9
3						10
						11
						12
						13
4						14
						15
						16
5						17
						18
						19
6						20
						21
						22
7						23
						24
7.5						
 TETRA TECH		Contractor: North American Tungsten		Completion Depth: 0.8 m		
		Drilling Rig Type: Hand auger		Start Date: 2018 September 24		
		Logged By: CPC		Completion Date: 2018 September 24		
		Reviewed By: TP		Page 1 of 1		

North American Tungsten Corporation Ltd.		Testpit No: BS-18TP01					
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007		
		Location: Cantung Mine					
		Cantung, Northwest Territories			UTM: 543216 E; 6868760 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv) 200 400 600 800	Notes and Comments	Depth (ft)
0		SAND AND GRAVEL (FILL) - trace silt, damp to moist, brownish grey, subrounded gravel, (300 mm thick)					0
	Excavated	SAND - some gravel, trace silt, damp to moist, compact, brownish grey, subrounded gravel					1
							2
1							3
		- (Gravel - 17%; Sand - 75%; Silt & Clay - 8%)		SA01			4
							5
							6
2				SA02			7
							8
							9
3		END OF TESTPIT (2.9 metres) water - 2.6 metres		SA03			10
							11
							12
							13
							14
							15
							16
							17
							18
							19
							20
							21
							22
							23
							24
7.5							
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 2.9 m		
		Drilling Rig Type: Cat Backhoe			Start Date: 2018 September 20		
		Logged By: CPC			Completion Date: 2018 September 20		
		Reviewed By: TP			Page 1 of 1		

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project:	Borrow Source Investigation	Sample No.:	TP01
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA02
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	1.8 - 1.9 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	November 1, 2018	By:	GK
Date Tested:	November 1, 2018	Date Sampled:	September 20, 2018
Soil Description ² :	SAND - some gravel, trace silt	Sampled By:	CPC
		USC Classification:	-
		Cu:	14.3
Moisture Content:	8.9%	Cc:	2.5



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75


Specification: _____

Remarks: _____

Reviewed By: *CPC* P.Eng.

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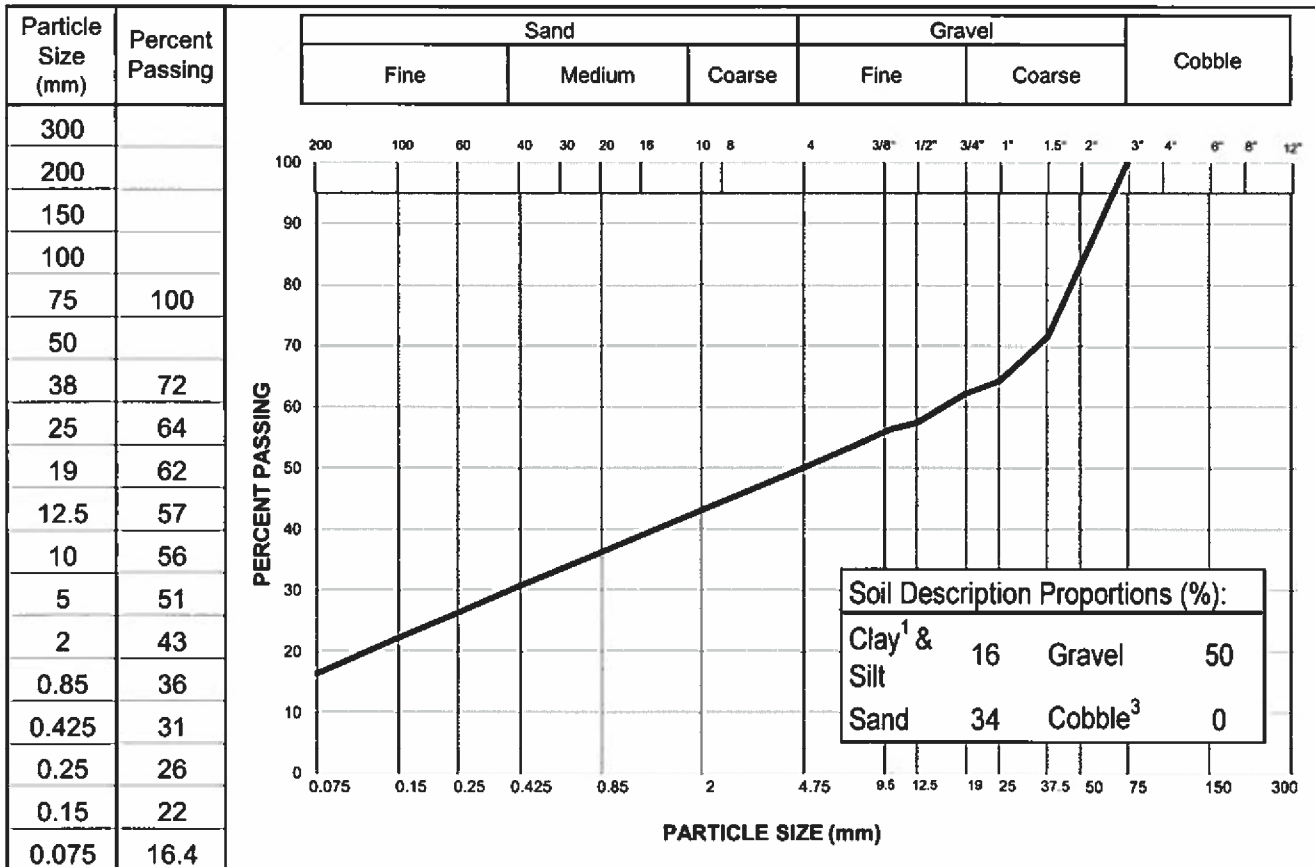


North American Tungsten Corporation Ltd.		Testpit No: BS-18TP02								
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007					
		Location: Cantung Mine								
		Cantung, Northwest Territories			UTM: 543093 E; 6868923 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)				Notes and Comments	Depth (ft)
					200	400	600	800		
0	Excavated	SAND AND GRAVEL (FILL) - trace silt, moist, brown, subrounded gravel, (200 mm thick)								0
		SILT - trace sand, moist, brown, (200 mm thick)								1
		ASH - moist, light grey, (100 mm thick)								2
		GRAVEL - sandy, some silt, damp to moist, stiff, orangey brown, cobbles, subangular gravel and cobbles								3
1				SA04						4
										5
			- cobbles and boulders		SA05					6
			- (Gravel - 50%; Sand - 34%; Silt & Clay - 16%)							7
2			SILT - some sand, damp, firm, brown		SA06					8
										9
3		- moist		SA07					10	
		SAND - gravelly, trace silt, damp, compact, brownish grey, subrounded gravel							11	
		END OF TESTPIT (3.5 metres)							12	
4									13	
									14	
									15	
5									16	
									17	
									18	
									19	
6									20	
									21	
									22	
7									23	
									24	
7.5										
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 3.5 m					
		Drilling Rig Type: Cat Backhoe			Start Date: 2018 September 20					
		Logged By: CPC			Completion Date: 2018 September 20					
		Reviewed By: TP			Page 1 of 1					

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136


Project: Borrow Source Investigation	Sample No.: TP02
Project No.: ENW.WENW03039-03 (Task 007)	Material Type: -
Site: Cantung Mine, NT	Sample Loc.: SA05
Client: North American Tungsten Corp. Ltd.	Sample Depth: 1.5 - 1.6 m
Client Rep.: Callum Beveridge	Sampling Method: Grab
Date Tested: October 31, 2018 By: GK	Date Sampled: September 20, 2018
Soil Description ² : GRAVEL - sandy, some silt	Sampled By: CPC
	USC Classification: - Cu: #N/A Cc: #N/A
Moisture Content: 6.6%	



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification: _____
 Remarks: _____

Reviewed By: *[Signature]* P.Eng.

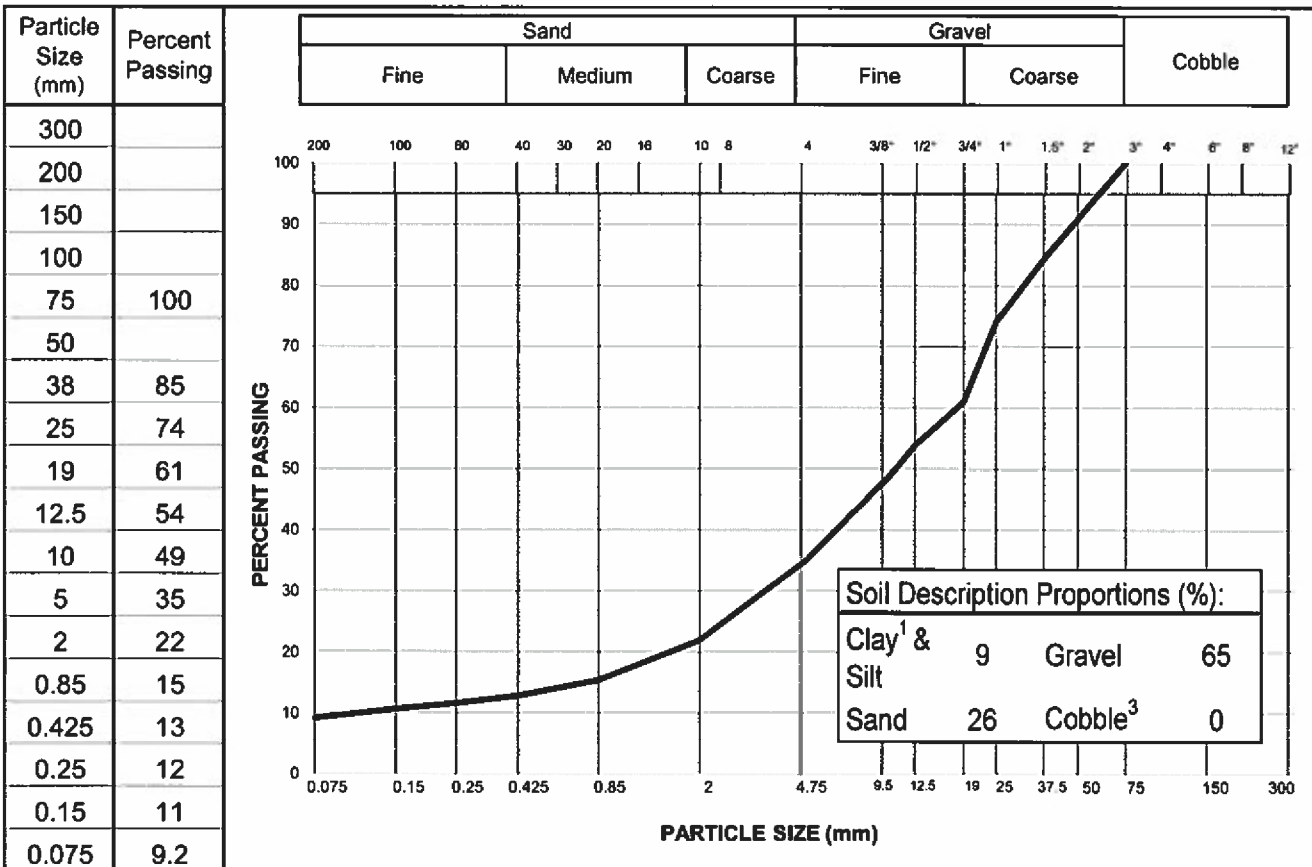
North American Tungsten Corporation Ltd.		Testpit No: BS-18TP03								
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007					
		Location: Cantung Mine								
		Cantung, Northwest Territories			UTM: 542945 E; 6868932 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)				Notes and Comments	Depth (ft)
					200	400	600	800		
0		ORGANICS - roots, moss, moist, dark brown, (100 mm thick) GRAVEL - sandy, trace silt, occasional cobble, damp, orangey brown, subrounded gravel								0
1	Excavated	- boulders, brownish grey - (Gravel - 65%; Sand - 26%; Silt & Clay - 9%)		SA09						1
										2
										3
2				SA10						4
										5
										6
3				SA11						7
										8
										9
4										10
										11
										12
5										13
										14
										15
6										16
										17
										18
7										19
										20
										21
7.5										22
										23
										24
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 3 m					
		Drilling Rig Type: Cat Backhoe			Start Date: 2018 September 20					
		Logged By: CPC			Completion Date: 2018 September 20					
		Reviewed By: TP			Page 1 of 1					

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: Borrow Source Investigation	Sample No.: TP03
Project No.: ENW.WENW03039-03 (Task 007)	Material Type: -
Site: Cantung Mine, NT	Sample Loc.: SA10
Client: North American Tungsten Corp. Ltd.	Sample Depth: 1.9 - 2.0 m
Client Rep.: Callum Beveridge	Sampling Method: Grab
Date Tested: November 2, 2018 By: GK	Date Sampled: September 20, 2018
Soil Description ² : GRAVEL - sandy, trace silt	Sampled By: CPC
	USC Classification: - Cu: 157.5
	Cc: 7.1

Moisture Content: 8.1%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification: _____


Remarks: _____


Reviewed By: *[Signature]* P.Eng.

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North American Tungsten Corporation Ltd.		Testpit No: BS-18TP04						
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007			
		Location: Cantung Mine						
		Cantung, Northwest Territories			UTM: 543045 E; 6868916 N; Z 9			
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv) 200 400 600 800		Notes and Comments	Depth (ft)
0	Excavated	SAND - gravelly, some silt to silty, some cobbles and boulders, damp, compact, orangey brown, subangular gravel						0
1		SILT - trace sand, damp, brown	SA12					1
		GRAVEL - sandy, trace silt, cobbles, damp, compact, dark brown, subangular gravel	SA13					2
2			SA14					3
3		END OF TESTPIT (2.9 metres)						4
4								5
5								6
6								7
7								8
7.5								9
		Contractor: North American Tungsten			Completion Depth: 2.9 m			
		Drilling Rig Type: Cat Backhoe			Start Date: 2018 September 20			
		Logged By: CPC			Completion Date: 2018 September 20			
		Reviewed By: TP			Page 1 of 1			

North American Tungsten Corporation Ltd.		Testpit No: BS-18TP05						
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007			
		Location: Cantung Mine						
		Cantung, Northwest Territories			UTM: 542845 E; 6868974 N; Z 9			
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv) 200 400 600 800		Notes and Comments	Depth (ft)
0		GRAVEL - sandy, trace silt, cobbles, damp, compact, orangey brown, subangular gravel						0
1	Excavated	- some boulders		SA15				1
2				SA16				2
3				SA17				3
4		END OF TESTPIT (2.9 metres)						4
5								5
6								6
7								7
7.5								7.5
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 2.9 m			
		Drilling Rig Type: Cat Backhoe			Start Date: 2018 September 20			
		Logged By: CPC			Completion Date: 2018 September 20			
		Reviewed By: TP			Page 1 of 1			

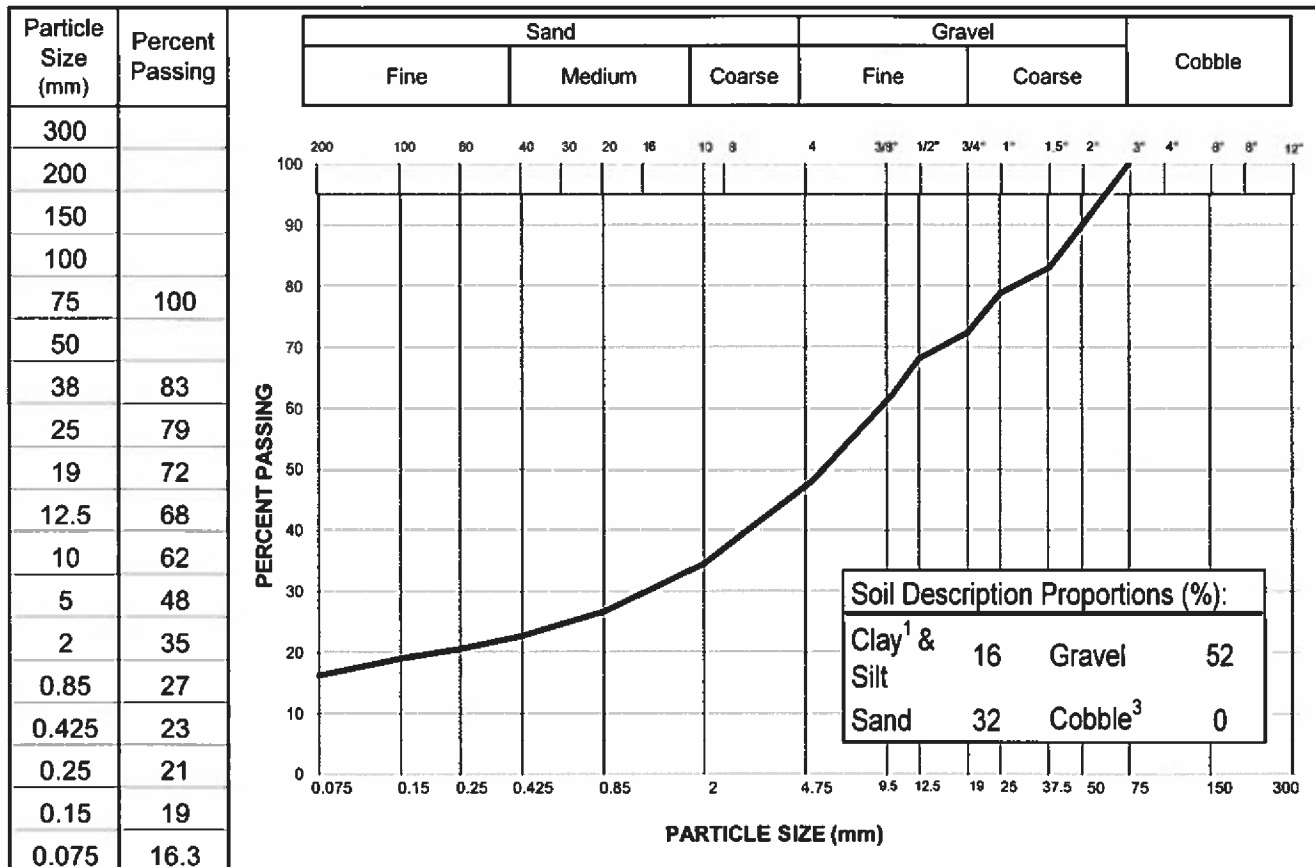
North American Tungsten Corporation Ltd.		Testpit No: BS-18TP06								
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007					
		Location: Cantung Mine								
		Cantung, Northwest Territories			UTM: 542465 E; 6869371 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)				Notes and Comments	Depth (ft)
					200	400	600	800		
0	Excavated	ORGANICS - roots, moss, moist, dark brown, (100 mm thick)								0
		ASH - damp, light grey, (100 mm thick)								1
		GRAVEL - sandy, some silt, cobbles, boulders, damp, compact, orangey brown, subrounded gravel								2
		- brown								3
1		- very large boulder		SA18						4
										5
										6
2		- (Gravel - 52%; Sand - 32%; Silt & Clay - 16%)		SA19						7
										8
										9
				SA20						10
3		END OF TESTPIT (2.8 metres)								11
										12
										13
										14
4										15
										16
										17
5										18
										19
										20
6										21
										22
										23
7										24
7.5										
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 2.8 m					
		Drilling Rig Type: Cat Backhoe			Start Date: 2018 September 20					
		Logged By: CPC			Completion Date: 2018 September 20					
		Reviewed By: TP			Page 1 of 1					

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: Borrow Source Investigation	Sample No.: TP06
Project No.: ENW.WENW03039-03 (Task 007)	Material Type: -
Site: Cantung Mine, NT	Sample Loc.: SA19
Client: North American Tungsten Corp. Ltd.	Sample Depth: 1.9 - 2.0 m
Client Rep.: Callum Beveridge	Sampling Method: Grab
Date Tested: October 31, 2018 By: GK	Date Sampled: September 20, 2018
Soil Description ² : GRAVEL - sandy, some silt	Sampled By: CPC
	USC Classification: - Cu: #N/A Cc: #N/A

Moisture Content: 15.5%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75


Specification: _____

Remarks: _____

Reviewed By: P.Eng.

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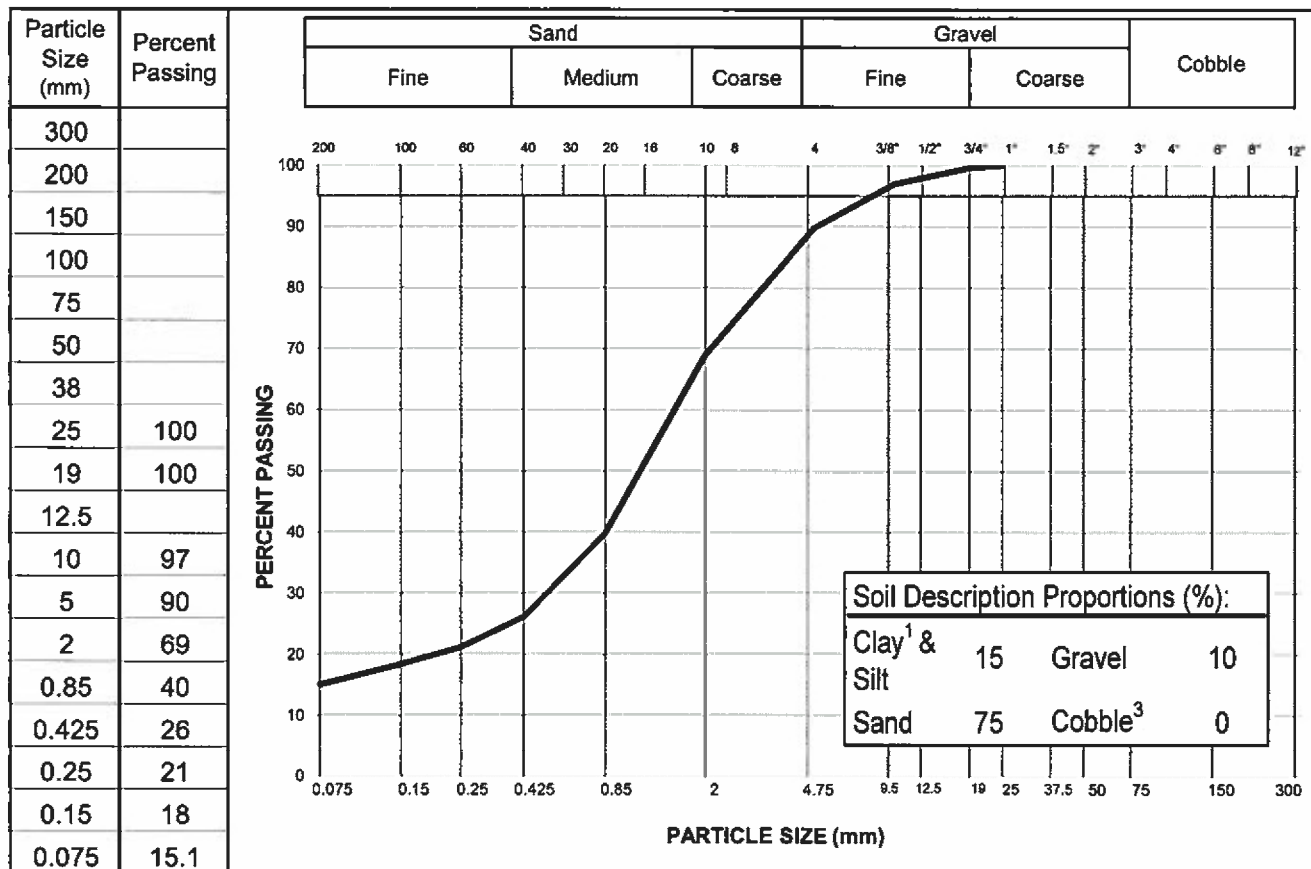
North American Tungsten Corporation Ltd.		Testpit No: BS-18TP07								
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007					
		Location: Cantung Mine								
		Cantung, Northwest Territories			UTM: 542397 E; 6869416 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)				Notes and Comments	Depth (ft)
					200	400	600	800		
0										0
1	Excavated	ORGANICS - roots, moss, moist, dark brown, (100 mm thick)								1
		ASH - damp, light grey, (100 mm thick)								2
		GRAVEL - sandy, trace silt, cobbles, boulders, damp, compact, orangey brown, subrounded gravel - brownish grey	SA21							3
2		SAND - some gravel, some silt, damp, compact, grey, subrounded gravel - (Gravel - 10%; Sand - 75%; Silt & Clay - 15%) - trace gravel		SA22						4
3		- (Gravel - 2%; Sand - 89%; Silt & Clay - 9%)		SA23						5
		END OF TESTPIT (3.0 metres)								6
										7
										8
										9
										10
										11
										12
										13
										14
										15
										16
										17
										18
										19
										20
										21
										22
										23
										24
7.5										
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 3 m					
		Drilling Rig Type: Cat Backhoe			Start Date: 2018 September 21					
		Logged By: CPC			Completion Date: 2018 September 21					
		Reviewed By: TP			Page 1 of 1					

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: Borrow Source Investigation	Sample No.: TP07
Project No.: ENW.WENW03039-03 (Task 007)	Material Type: -
Site: Cantung Mine, NT	Sample Loc.: SA22
Client: North American Tungsten Corp. Ltd.	Sample Depth: 1.9 - 2.0 m
Client Rep.: Callum Beveridge	Sampling Method: Grab
Date Tested: November 1, 2018 By: GK	Date Sampled: September 21, 2018
Soil Description ² : SAND - some silt, trace gravel	Sampled By: CPC
	USC Classification: - Cu: #N/A
	Cc: #N/A

Moisture Content: 13.9%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification: _____

Remarks: _____

Reviewed By: *apl* P.Eng.

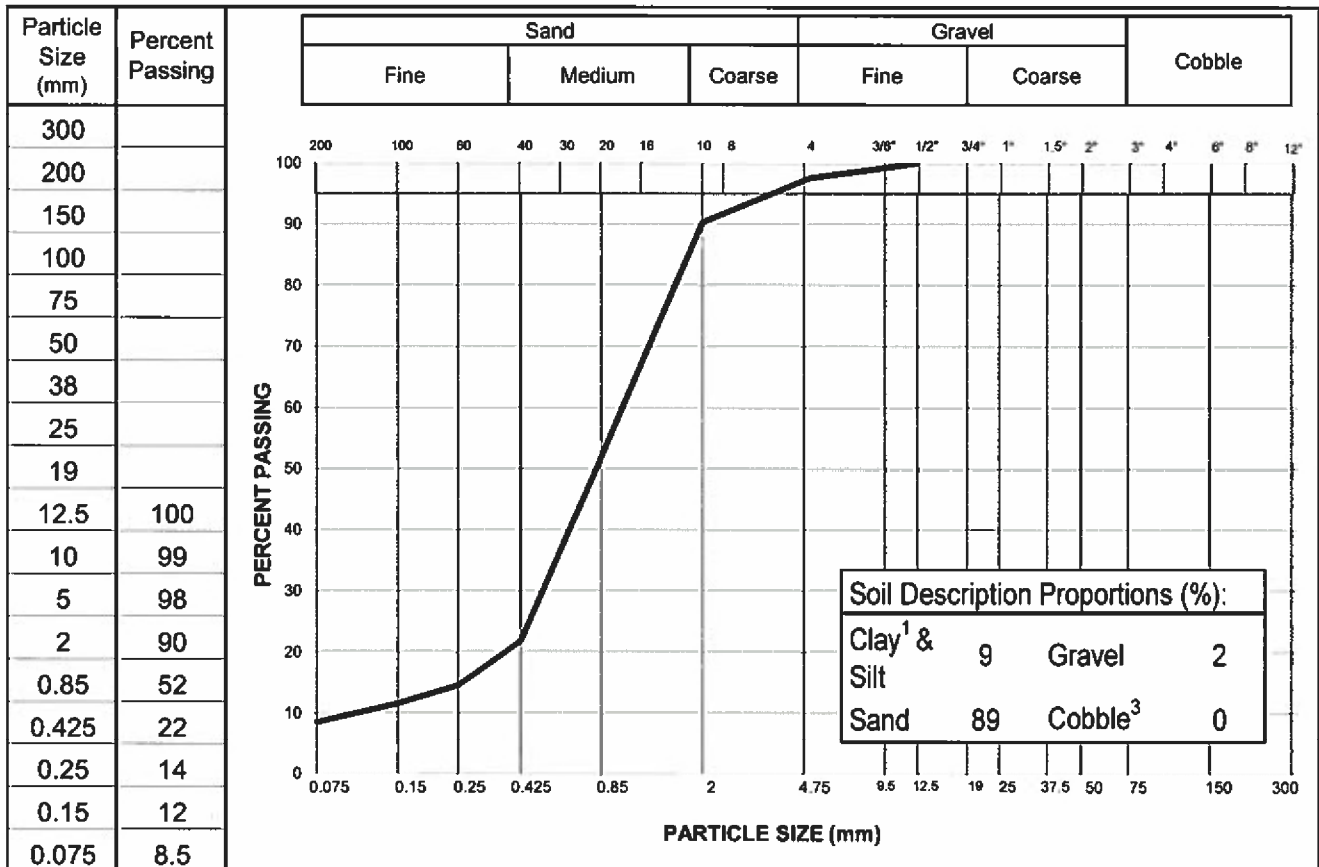
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PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136


Project:	Borrow Source Investigation	Sample No.:	TP07
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA23
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	2.9 - 3.0 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	November 1, 2018	By:	GK
Date Tested:	November 1, 2018	Date Sampled:	September 21, 2018
Soil Description ² :	SAND - trace silt, trace gravel	Sampled By:	CPC
		USC Classification:	-
		Cu:	9.8
Moisture Content:	8.7%	Cc:	2.4





Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification: _____
 Remarks: _____

Reviewed By: *[Signature]* P.Eng.

North American Tungsten Corporation Ltd.		Testpit No: BS-18TP08								
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007					
		Location: Cantung Mine								
		Cantung, Northwest Territories			UTM: 542336 E; 6869506 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv) 200 400 600 800				Notes and Comments	Depth (ft)
0										0
1	Excavated	ORGANICS - roots, moss, moist, dark brown, (100 mm thick)								1
		ASH - moist, light grey, (100 mm thick)								2
		GRAVEL - sandy, some cobbles, trace silt, damp, compact, orangey brown, subrounded gravel								3
		- brownish grey								4
2										5
3										6
										7
										8
										9
										10
										11
										12
										13
										14
										15
										16
										17
										18
										19
										20
										21
										22
										23
										24
7.5										
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 3 m					
		Drilling Rig Type: Cat Backhoe			Start Date: 2018 September 21					
		Logged By: CPC			Completion Date: 2018 September 21					
		Reviewed By: TP			Page 1 of 1					

North American Tungsten Corporation Ltd.			Testpit No: BS-18TP09							
			Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007				
			Location: Cantung Mine							
			Cantung, Northwest Territories			UTM: 542203 E; 6869674 N; Z 9				
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv) 200 400 600 800				Notes and Comments	Depth (ft)
0	Excavated	ORGANICS - roots, moss, moist, dark brown, (100 mm thick)								0
		ASH - moist, light grey, (100 mm thick)								1
		SILT - trace to some sand, damp, firm, brown, (300 mm thick)								2
		GRAVEL - sandy, some cobbles, trace silt, damp, compact, brownish grey, subrounded gravel								3
1				SA27						4
										5
										6
2		SAND - trace silt, moist to wet, compact, light brown, fine to medium sand		SA28						7
		GRAVEL - sandy, trace silt, moist, compact, brownish grey, subrounded gravel								8
										9
3				SA29						10
		END OF TESTPIT (3.0 metres)								11
										12
										13
4										14
										15
										16
5										17
										18
										19
6										20
										21
										22
7										23
										24
7.5										
 TETRA TECH			Contractor: North American Tungsten			Completion Depth: 3 m				
			Drilling Rig Type: Cat Backhoe			Start Date: 2018 September 21				
			Logged By: CPC			Completion Date: 2018 September 21				
			Reviewed By: TP			Page 1 of 1				

North American Tungsten Corporation Ltd.		Testpit No: BS-18TP10						
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007			
		Location: Cantung Mine						
		Cantung, Northwest Territories			UTM: 541924 E; 6870047 N; Z 9			
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)		Notes and Comments	Depth (ft)
					200	400 600 800		
0	Excavated	ORGANICS - roots, moss, moist, dark brown, (200 mm thick)	SA30					0
		GRAVEL - sandy, trace silt, cobbles, boulders,, moist, compact, dark brown, subangular gravel						1
1								2
								3
								4
								5
								6
								7
								8
								9
								10
								11
								12
								13
								14
								15
								16
								17
								18
								19
								20
								21
								22
								23
								24
7.5								
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 1.6 m			
		Drilling Rig Type: Cat Backhoe			Start Date: 2018 September 21			
		Logged By: CPC			Completion Date: 2018 September 21			
		Reviewed By: TP			Page 1 of 1			

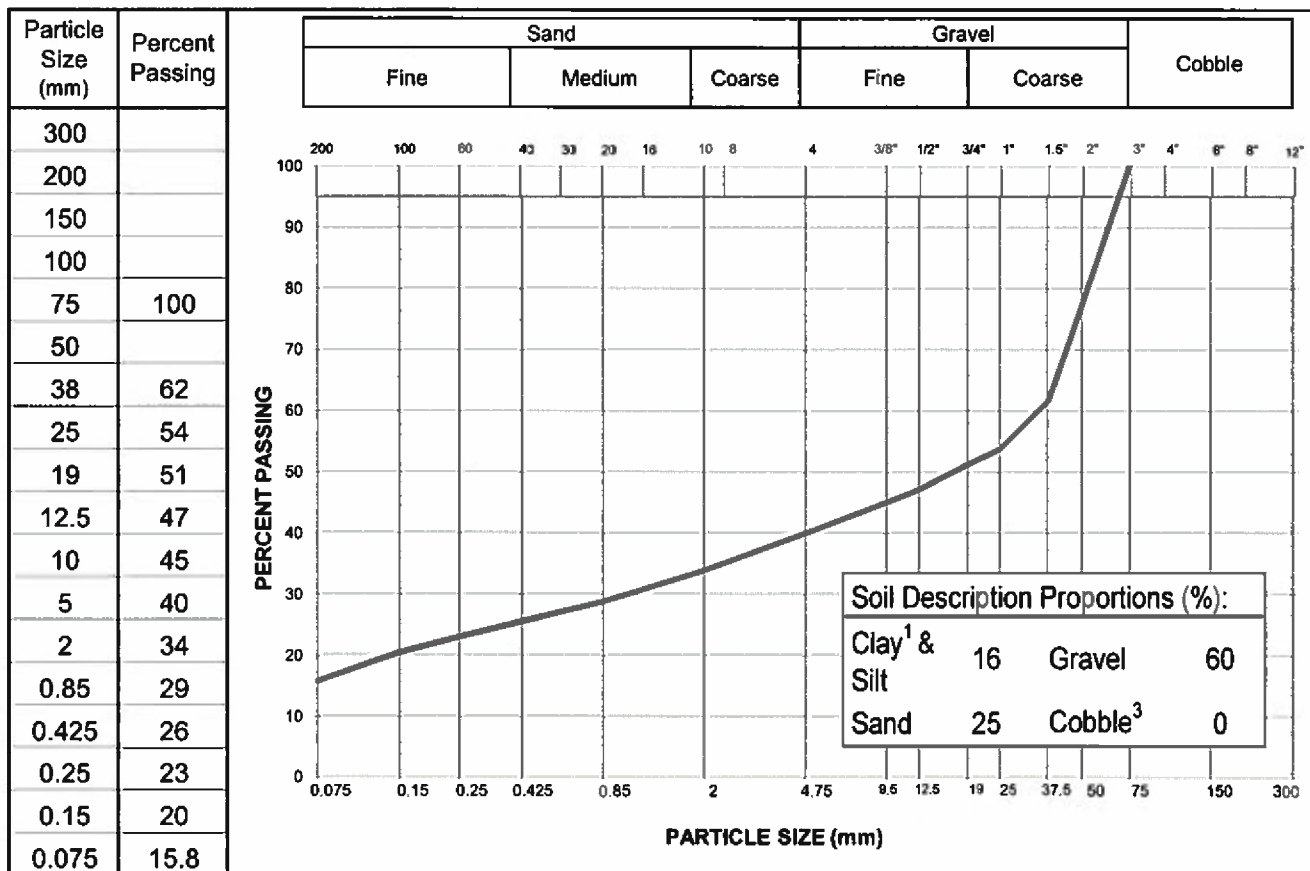
North American Tungsten Corporation Ltd.		Testpit No: BS-18TP11								
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007					
		Location: Cantung Mine								
		Cantung, Northwest Territories			UTM: 541911 E; 6870200 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)				Notes and Comments	Depth (ft)
					200	400	600	800		
0	Excavated	ORGANICS - roots, moss, moist, dark brown, (100 mm thick)								0
		SILT - trace to some sand, damp, firm, light brown, (200 mm thick)								1
		GRAVEL - sandy, some silt, cobbles, boulders, damp, compact, brownish grey, subangular gravel								2
1				SA31						3
2		- (Gravel - 60%; Sand - 25%; Silt & Clay - 16%)		SA32						4
				SA33						5
		END OF TESTPIT (2.4 metres)								6
3										7
4										8
5										9
6										10
7										11
7.5										12
		Contractor: North American Tungsten			Completion Depth: 2.4 m					
		Drilling Rig Type: Cat Backhoe			Start Date: 2018 September 21					
		Logged By: CPC			Completion Date: 2018 September 21					
		Reviewed By: TP			Page 1 of 1					

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: Borrow Source Investigation	Sample No.: TP11
Project No.: ENW.WENW03039-03 (Task 007)	Material Type: -
Site: Cantung Mine, NT	Sample Loc.: SA32
Client: North American Tungsten Corp. Ltd.	Sample Depth: 1.9 - 2.0 m
Client Rep.: Callum Beveridge	Sampling Method: Grab
Date Tested: November 2, 2018 By: GK	Date Sampled: September 21, 2018
Soil Description ² : GRAVEL - sandy, some silt	Sampled By: CPC
	USC Classification: - Cu: #N/A Cc: #N/A

Moisture Content: 4.8%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75


Specification: _____


Remarks: _____

Reviewed By: *[Signature]* P.Eng.

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North American Tungsten Corporation Ltd.		Testpit No: BS-18TP12					
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007		
		Location: Cantung Mine					
		Cantung, Northwest Territories			UTM: 541773 E; 6870276 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv) 200 400 600 800	Notes and Comments	Depth (ft)
0		ORGANICS - roots, moss, moist, dark brown, (200 mm thick)					0
	Excavated	GRAVEL - sandy, trace silt, damp, compact, orangey brown, subangular gravel					1
1				SA34			2
							3
							4
							5
							6
							7
							8
							9
							10
							11
							12
							13
							14
							15
							16
							17
							18
							19
							20
							21
							22
							23
							24
7.5							
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 1.8 m		
		Drilling Rig Type: Cat Backhoe			Start Date: 2018 September 21		
		Logged By: CPC			Completion Date: 2018 September 21		
		Reviewed By: TP			Page 1 of 1		

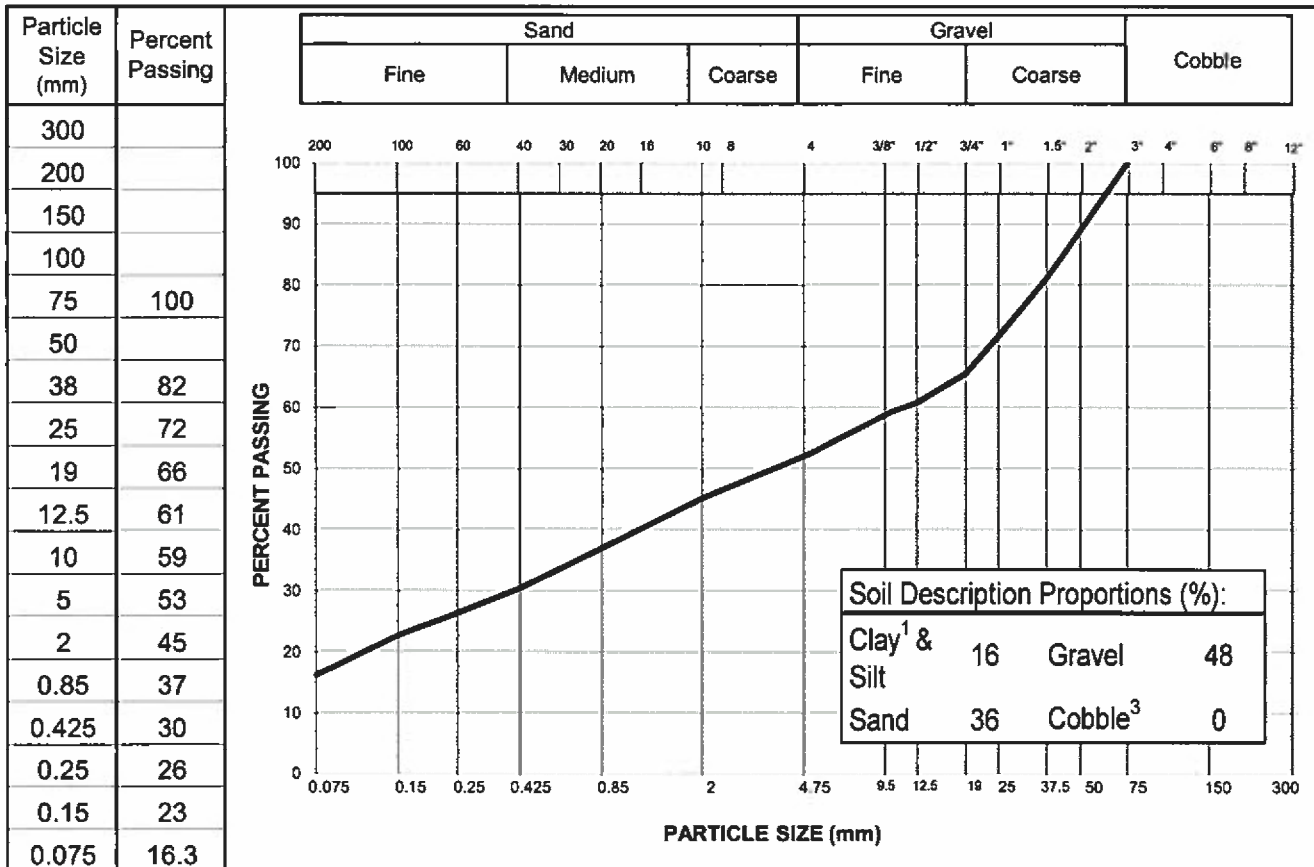
North American Tungsten Corporation Ltd.		Testpit No: BS-18TP13								
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007					
		Location: Cantung Mine								
		Cantung, Northwest Territories			UTM: 541646 E; 6870319 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)				Notes and Comments	Depth (ft)
					200	400	600	800		
0		ORGANICS - roots, moss, moist, dark brown, (200 mm thick)								0
	Excavated	GRAVEL - sandy, some silt, cobbles, boulders, damp, compact, orangey brown, subangular gravel								1
										2
1		- brownish grey	SA36							3
										4
										5
										6
2		- (Gravel - 48%; Sand - 36%; Silt & Clay - 16%)	SA37							7
										8
			SA28							9
		END OF TESTPIT (2.4 metres)								10
										11
										12
										13
										14
										15
										16
										17
										18
										19
										20
										21
										22
										23
										24
7.5										
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 2.4 m					
		Drilling Rig Type: Cat Backhoe			Start Date: 2018 September 21					
		Logged By: CPC			Completion Date: 2018 September 21					
		Reviewed By: TP			Page 1 of 1					

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: Borrow Source Investigation	Sample No.: TP13
Project No.: ENW.WENW03039-03 (Task 007)	Material Type: -
Site: Cantung Mine, NT	Sample Loc.: SA37
Client: North American Tungsten Corp. Ltd.	Sample Depth: 1.9 - 2.0 m
Client Rep.: Callum Beveridge	Sampling Method: Grab
Date Tested: November 1, 2018 By: GK	Date Sampled: September 21, 2018
Soil Description ² : GRAVEL and SAND - some silt	Sampled By: CPC
	USC Classification: - Cu: #N/A
	Cc: #N/A

Moisture Content: 5.5%




Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75


Specification: _____
 Remarks: _____

Reviewed By: *[Signature]* P.Eng.

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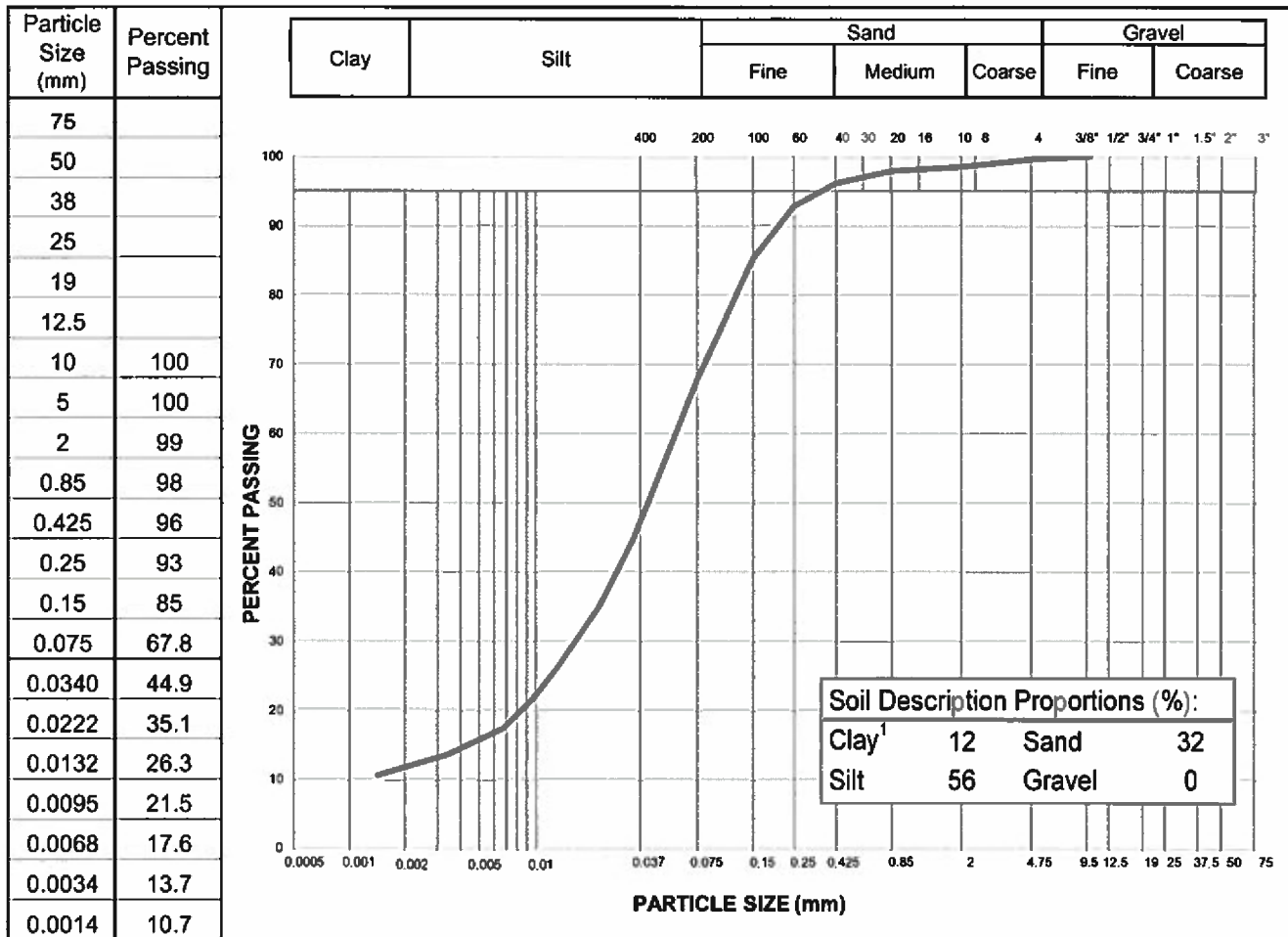
North American Tungsten Corporation Ltd.		Testpit No: BS-18TP14								
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007					
		Location: Cantung Mine								
		Cantung, Northwest Territories			UTM: 541562 E; 6870353 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)				Notes and Comments	Depth (ft)
					200	400	600	800		
0		ORGANICS - roots moss, moist, dark brown, (100 mm thick) SAND - gravelly, trace silt, damp, compact, grey, subangular gravel								0
1	Excavated	- cobbles and boulders		SA39						1
2				SA40						2
3		END OF TESTPIT (2.0 metres)								3
4										4
5										5
6										6
7										7
7.5										7.5
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 2 m					
		Drilling Rig Type: Cat Backhoe			Start Date: 2018 September 21					
		Logged By: CPC			Completion Date: 2018 September 21					
		Reviewed By: TP			Page 1 of 1					

North American Tungsten Corporation Ltd.		Testpit No: BS-18TP15								
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007					
		Location: Cantung Mine								
		Cantung, Northwest Territories			UTM: 540692 E; 6871084 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)				Notes and Comments	Depth (ft)
					200	400	600	800		
0	Excavated	GRAVEL (FILL) - sandy, silty, damp, compact, brownish grey, subrounded gravel, (300 mm thick)								0
		SILT - sandy, damp, firm, brown								1
										2
1			- (Gravel - 0%; Sand - 32%; Silt -56%; Clay - 12%)	SA41						3
			SAND - some gravel, some silt, damp, compact, brownish grey, subrounded gravel							4
										5
2			SA42							6
										7
		GRAVEL - sandy, trace silt, damp, compact, grey, subrounded gravel								8
										9
3			SA43							10
										11
		END OF TESTPIT (3.0 metres)								12
										13
										14
										15
										16
										17
										18
										19
										20
										21
										22
										23
7.5										24
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 3 m					
		Drilling Rig Type: Cat Backhoe			Start Date: 2018 September 21					
		Logged By: CPC			Completion Date: 2018 September 21					
		Reviewed By: TP			Page 1 of 1					

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project:	Borrow Source Investigation	Sample No.:	TP15
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA41
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	0.9 - 1.0 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	October 28, 2018	By:	AT
Date Tested:	October 28, 2018	Date Sampled:	September 21, 2018
Soil Description ² :	SILT - sandy, some clay	Sampled By:	CPC
		USC Classification:	-
		Cu:	#N/A
Moisture Content:	25.6%	Cc:	#N/A



Notes: ¹ The upper clay size of 2 µm, per the Canadian Foundation Engineering Manual

² The description is visually based & subject to Tetra Tech description protocols

Specification: _____

Remarks: _____

Reviewed By: _____


[Signature]

P.Eng.

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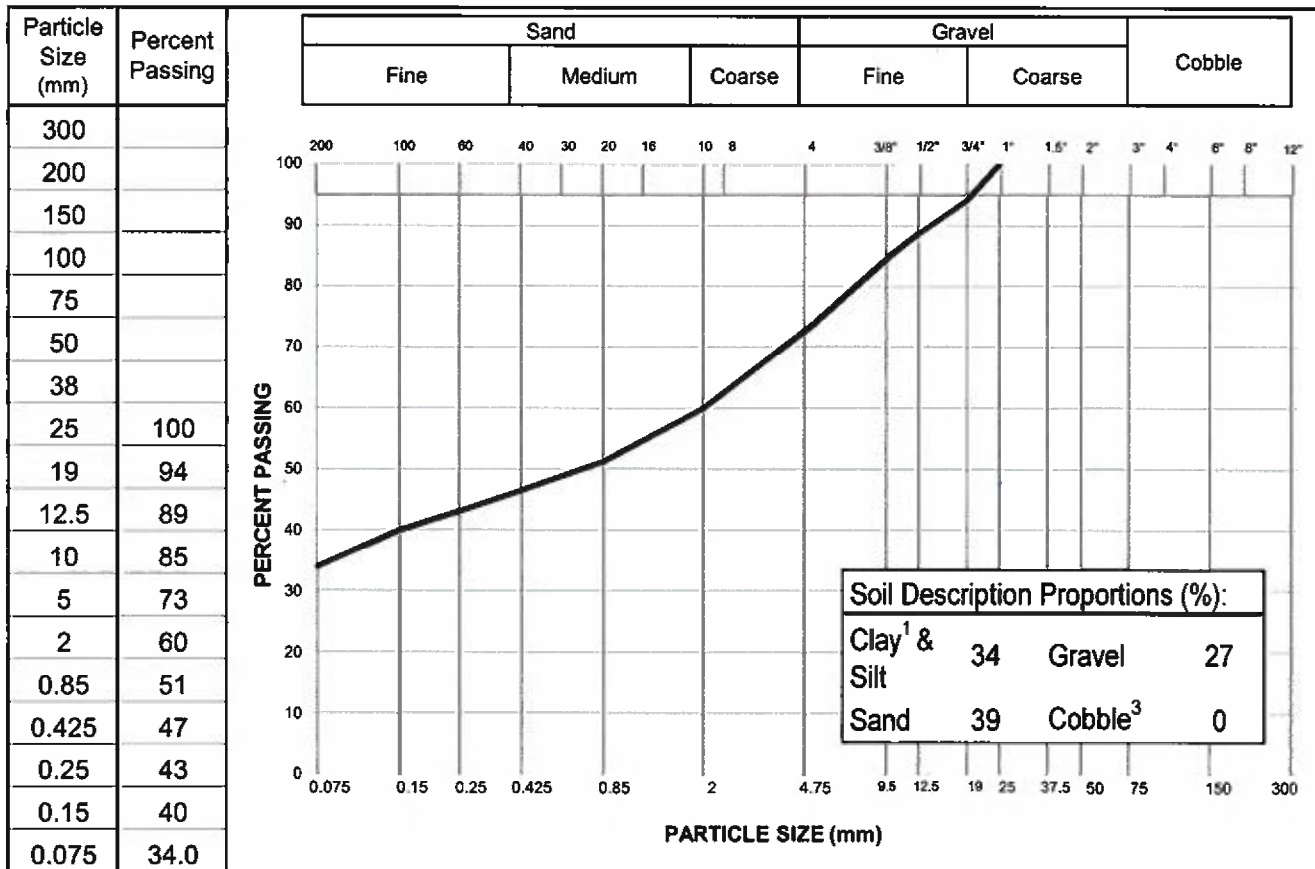
TETRA TECH

North American Tungsten Corporation Ltd.		Testpit No: BS-18TP16								
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007					
		Location: Cantung Mine								
		Cantung, Northwest Territories			UTM: 540483 E; 6871443 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)				Notes and Comments	Depth (ft)
					200	400	600	800		
0	Excavated	GRAVEL (FILL) - sandy, silty, damp, compact, brownish grey, subangular gravel								0
1		ORGANICS - roots, moss, moist	SA44							1
		ASH - moist, light grey								2
		SAND - gravelly, silty, damp to moist, compact, grey, subangular gravel - (Gravel - 27%; Sand - 39%; Silt & Clay - 34%)	SA45							3
2		- cobbles and boulders								4
3			SA46							5
		- boulders								6
4		END OF TESTPIT (4.0 metres)	SA47							7
										8
										9
										10
										11
										12
										13
										14
										15
										16
										17
										18
										19
										20
										21
										22
										23
7.5										24
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 4 m					
		Drilling Rig Type: Hitachi 200			Start Date: 2018 September 22					
		Logged By: CPC			Completion Date: 2018 September 22					
		Reviewed By: TP			Page 1 of 1					

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project:	Borrow Source Investigation	Sample No.:	TP16
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA45
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	1.6 - 1.7 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	November 2, 2018	By:	GK
		Date Sampled:	September 22, 2018
Soil Description ² :	SAND - silty, gravelly	Sampled By:	CPC
		USC Classification:	-
		Cu:	#N/A
Moisture Content:	19.3%	Cc:	#N/A



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75


Specification: _____


Remarks: _____

Reviewed By: *CPC* P.Eng.

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North American Tungsten Corporation Ltd.		Testpit No: BS-18TP17								
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007					
		Location: Cantung Mine								
		Cantung, Northwest Territories			UTM: 540457 E; 6871457 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)				Notes and Comments	Depth (ft)
					200	400	600	800		
0	Excavated	GRAVEL (FILL) - sandy, silty, damp, compact, brownish grey, subangular gravel								0
		ORGANICS - roots, moss, most								1
		ASH - moist, light grey								2
1		GRAVEL - sandy, silty, some cobbles, damp to moist, compact, grey, subangular gravel	SA48							3
										4
										5
2		- boulders	SA49							6
										7
										8
										9
3			SA50						10	
									11	
									12	
4		SAND AND GRAVEL - trace silt, moist, grey, subrounded gravel	SA51						13	
		END OF TESTPIT (4.0 metres)							14	
									15	
									16	
5									17	
									18	
									19	
6									20	
									21	
									22	
7									23	
									24	
7.5										
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 4 m					
		Drilling Rig Type: Hitachi 200			Start Date: 2018 September 22					
		Logged By: CPC			Completion Date: 2018 September 22					
		Reviewed By: TP			Page 1 of 1					

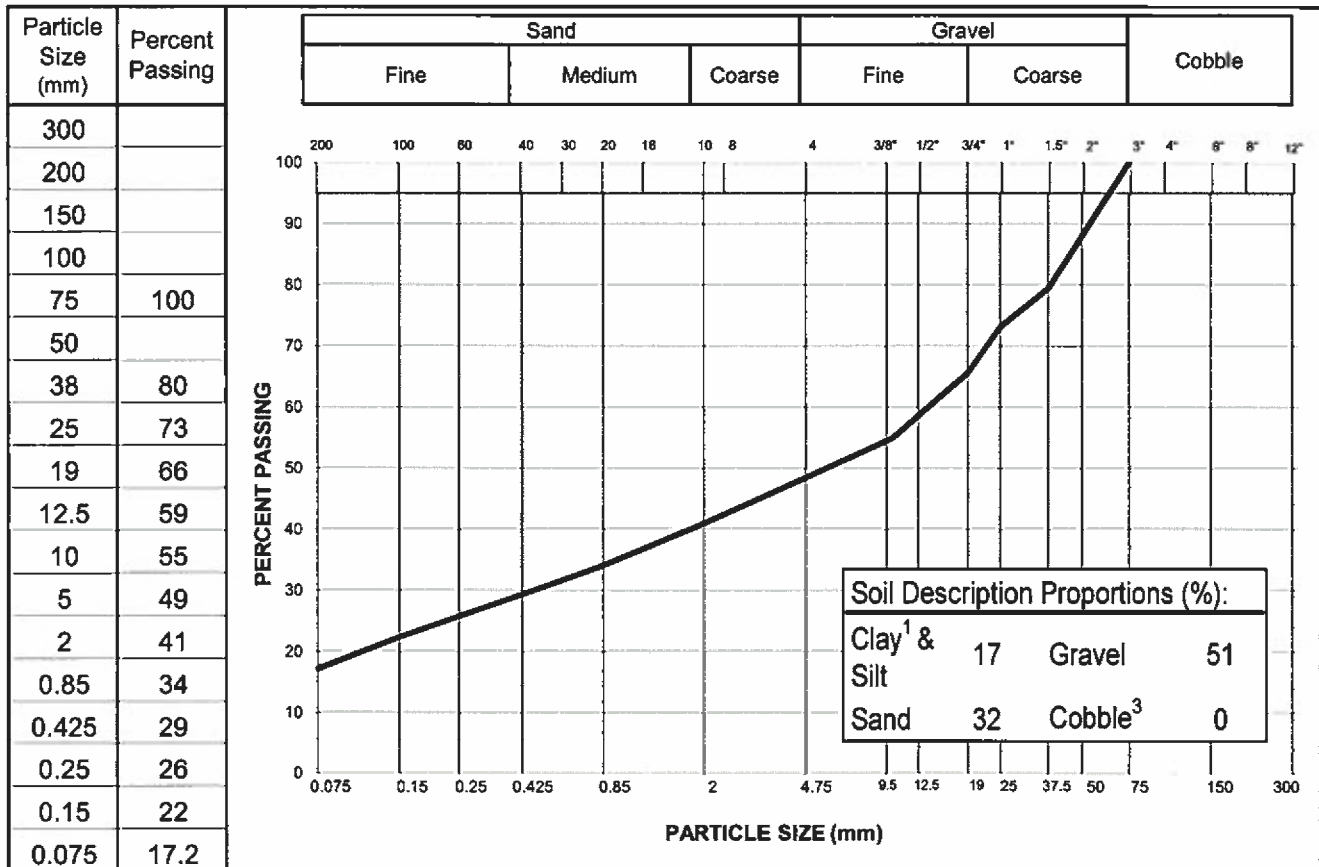
North American Tungsten Corporation Ltd.			Testpit No: BS-18TP18							
			Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007				
			Location: Cantung Mine							
			Cantung, Northwest Territories			UTM: 540429 E; 6871474 N; Z 9				
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)				Notes and Comments	Depth (ft)
					200	400	600	800		
0	Excavated	ORGANICS - roots, moss, moist, dark brown, (200 mm thick)								0
		ASH - moist, light grey, (100 mm thick)								1
		GRAVEL - sandy, some silt, damp, compact, light brownish grey, subangular gravel								2
1		- cobbles	SA52							3
2		- (Gravel - 51%; Sand - 32%; Silt & Clay - 17%) - boulders	SA53							4
3			SA54							5
		END OF TESTPIT (3.0 metres)								6
										7
										8
										9
										10
										11
										12
										13
										14
										15
										16
										17
										18
										19
										20
										21
										22
										23
										24
7.5										
 TETRA TECH			Contractor: North American Tungsten			Completion Depth: 3 m				
			Drilling Rig Type: Hitachi 200			Start Date: 2018 September 22				
			Logged By: CPC			Completion Date: 2018 September 22				
			Reviewed By: TP			Page 1 of 1				

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: Borrow Source Investigation	Sample No.: TP18
Project No.: ENW.WENW03039-03 (Task 007)	Material Type: -
Site: Cantung Mine, NT	Sample Loc.: SA53
Client: North American Tungsten Corp. Ltd.	Sample Depth: 2.0 - 2.1 m
Client Rep.: Callum Beveridge	Sampling Method: Grab
Date Tested: October 31, 2018 By: GK	Date Sampled: September 22, 2018
Soil Description ² : GRAVEL - sandy, some silt	Sampled By: CPC
	USC Classification: - Cu: #N/A
	Cc: #N/A

Moisture Content: 6.7%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification: _____
 Remarks: _____

Reviewed By: P.Eng.

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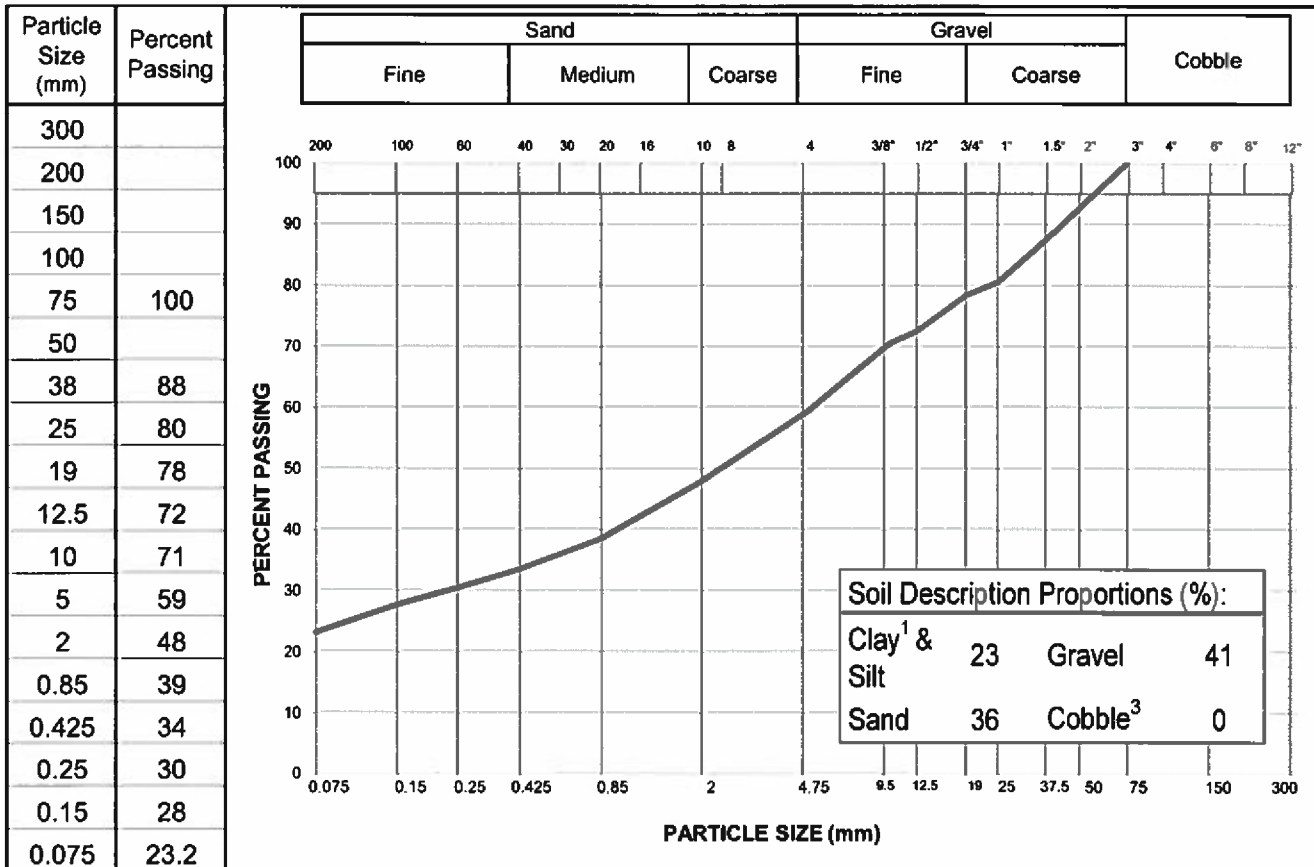


North American Tungsten Corporation Ltd.		Testpit No: BS-18TP19					
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007		
		Location: Cantung Mine					
		Cantung, Northwest Territories			UTM: 540404 E; 6871450 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv) 200 400 600 800	Notes and Comments	Depth (ft)
0	Excavated	SAND - gravelly, silty, damp, compact, brownish grey, subangular sand					0
1		SAND AND GRAVEL - silty, some cobbles and boulders, damp to moist, compact, grey, subangular gravel	SA55				1
2		GRAVEL - sandy, trace silt, damp, compact, subangular gravel	SA56				2
2		END OF TESTPIT (1.9 metres)					3
3							4
4							5
5							6
6							7
7							8
7.5							9
		Contractor: North American Tungsten			Completion Depth: 1.9 m		
		Drilling Rig Type: Hitachi 200			Start Date: 2018 September 22		
		Logged By: CPC			Completion Date: 2018 September 22		
		Reviewed By: TP			Page 1 of 1		

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project:	Borrow Source Investigation	Sample No.:	TP20
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA57
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	0.9 - 1.0 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	November 1, 2018	By:	GK
Date Tested:	November 1, 2018	Date Sampled:	September 22, 2018
Soil Description ² :	GRAVEL and SAND - silty	Sampled By:	CPC
		USC Classification:	-
		Cu:	#N/A
Moisture Content:	11.0%	Cc:	#N/A



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification: _____

Remarks: _____

Reviewed By: P.Eng.

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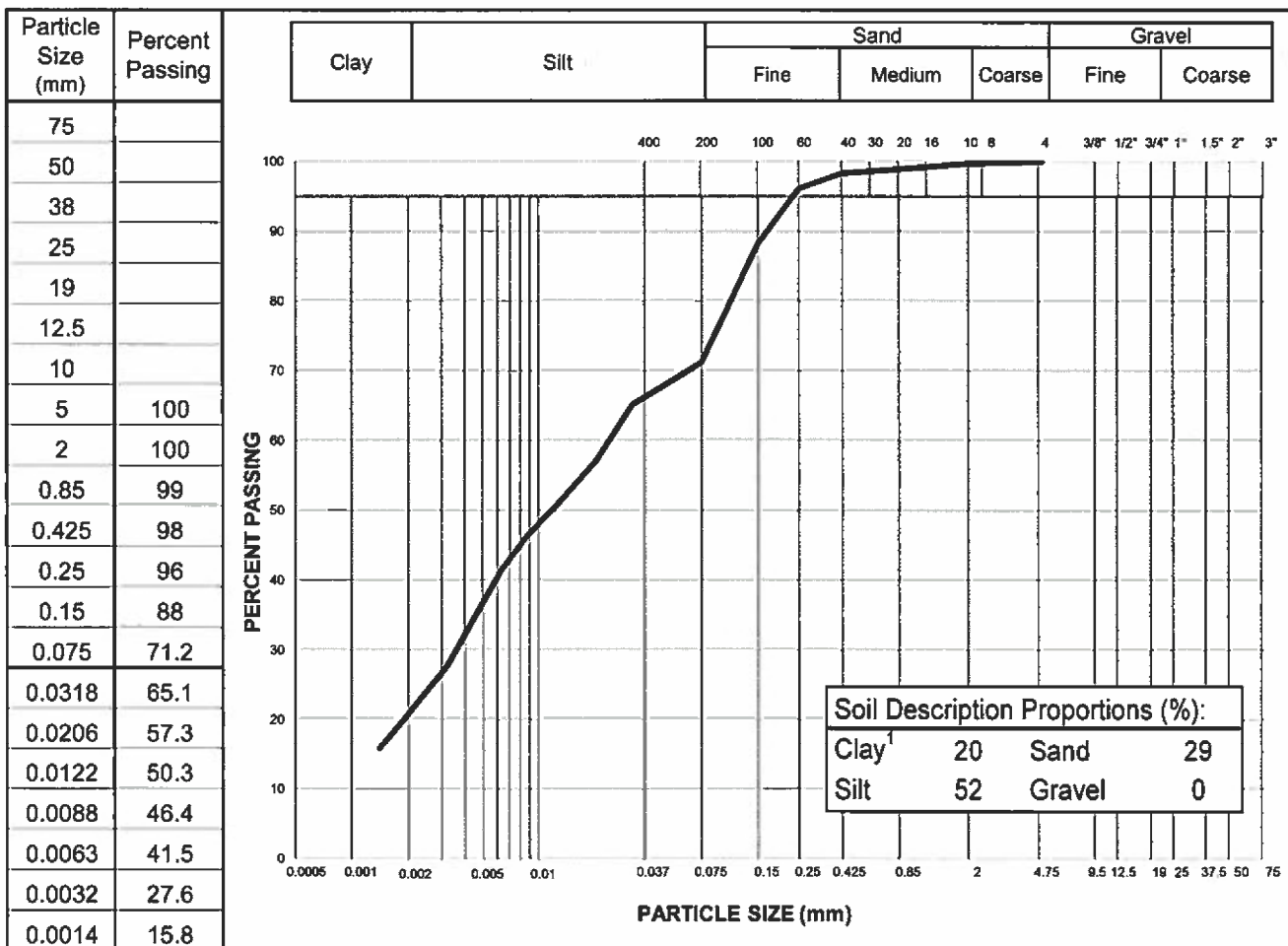


PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project:	Borrow Source Investigation	Sample No.:	TP20
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA58
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	1.8 - 1.9 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	October 28, 2018	By:	AT
Date Tested:	October 28, 2018	Date Sampled:	September 22, 2018
Soil Description ² :	SILT - sandy, some clay	Sampled By:	CPC
		USC Classification:	-
		Cu:	#N/A
		Cc:	#N/A

Moisture Content: 22.9%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual

² The description is visually based & subject to Tetra Tech description protocols

Specification: _____

Remarks: _____

Reviewed By: _____

P.Eng.

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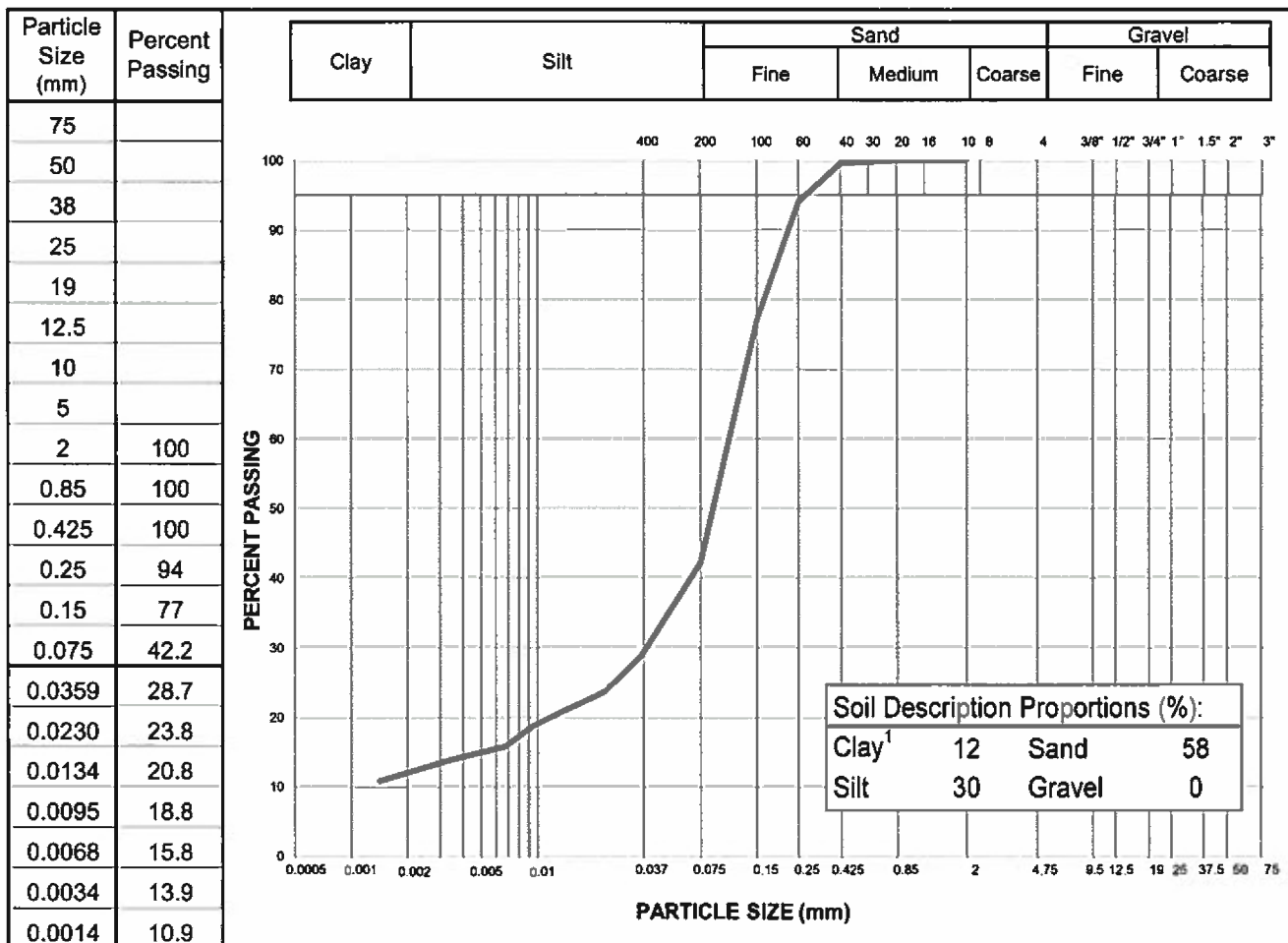
TETRA TECH

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project:	Borrow Source Investigation	Sample No.:	TP20
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA60
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	3.9 - 4.0 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	October 28, 2018	By:	AT
Date Tested:	October 28, 2018	Date Sampled:	September 22, 2018
Soil Description ² :	SAND - silty, some clay	Sampled By:	CPC
		USC Classification:	-
		Cu:	#N/A
		Cc:	#N/A

Moisture Content: 13.4%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual

² The description is visually based & subject to Tetra Tech description protocols

Specification: _____

Remarks: _____

Reviewed By: P.Eng.

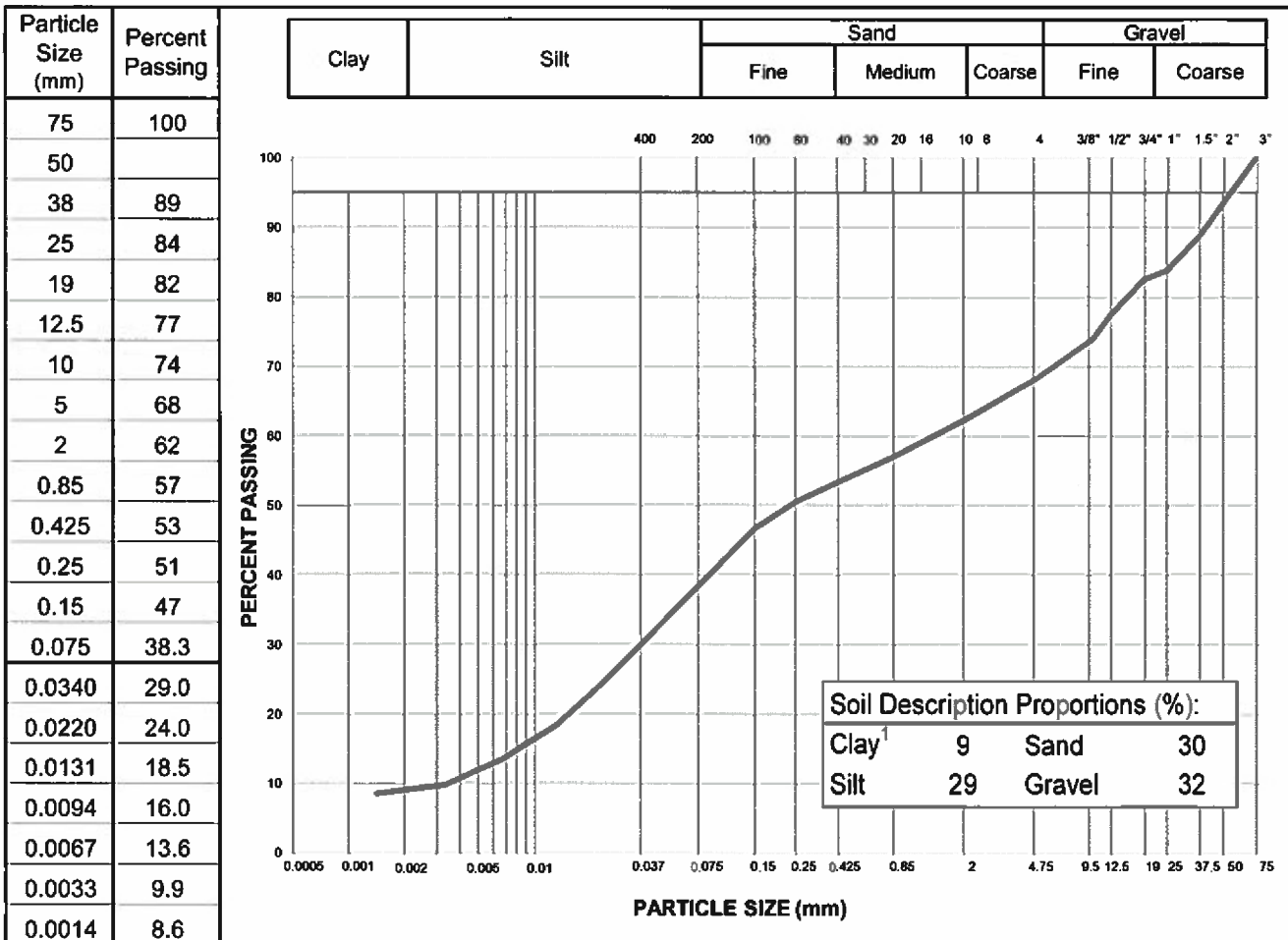
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PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project:	Borrow Source Investigation	Sample No.:	TP21
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA62
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	0.9 - 1.0 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	October 28, 2018	By:	AT
Date Tested:	October 28, 2018	Date Sampled:	September 22, 2018
Soil Description ² :	GRAVEL - sandy, silty, trace clay	Sampled By:	CPC
		USC Classification:	-
		Cu:	435.8
Moisture Content:	11.3%	Cc:	0.3



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual

² The description is visually based & subject to Tetra Tech description protocols


Specification: _____

Remarks: _____

Reviewed By: *[Signature]* P.Eng.

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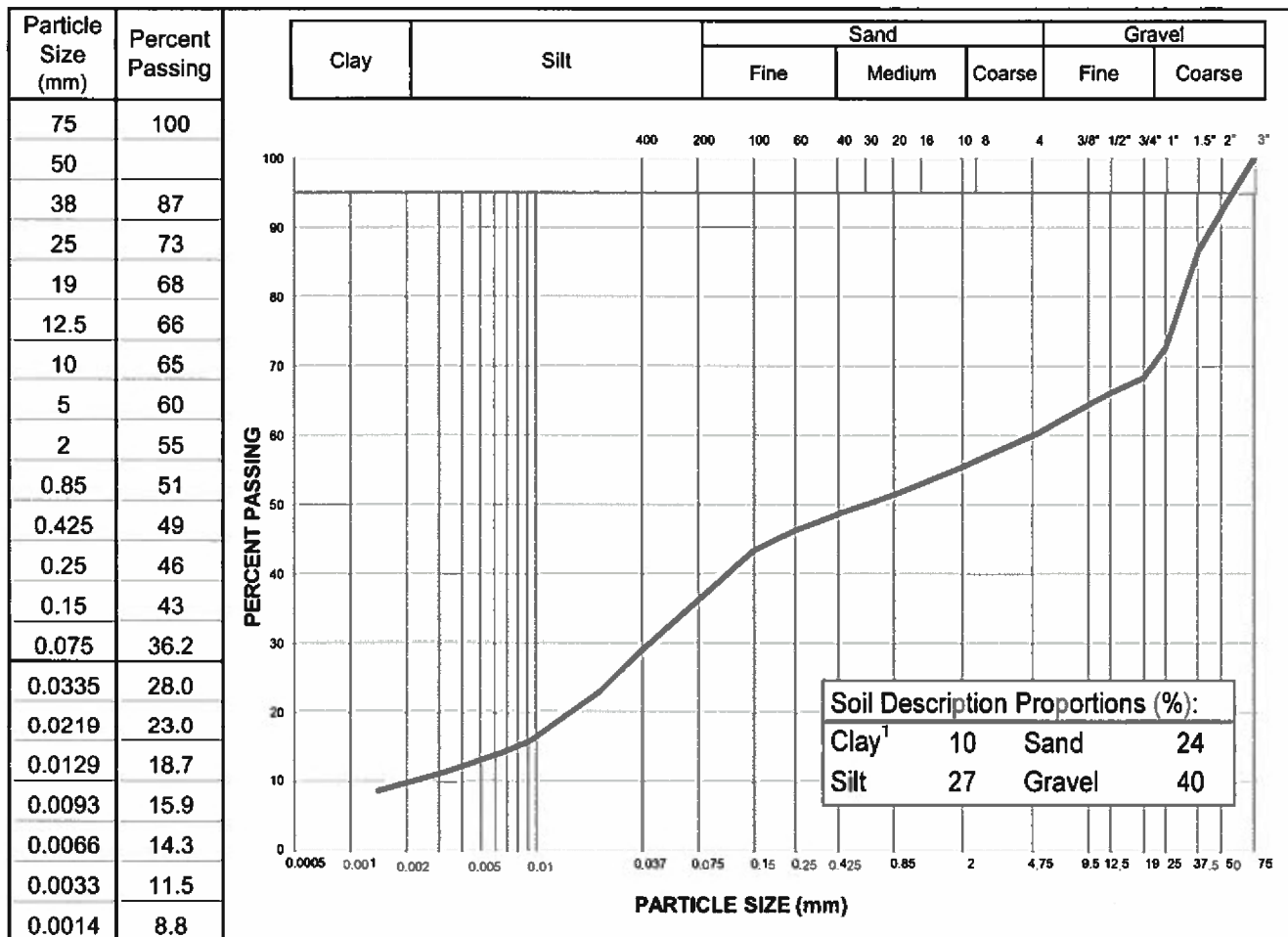


North American Tungsten Corporation Ltd.			Testpit No: BS-18TP22							
			Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007				
			Location: Cantung Mine							
			Cantung, Northwest Territories			UTM: 540435 E; 6871399 N; Z 9				
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)				Notes and Comments	Depth (ft)
					200	400	600	800		
0	Excavated	GRAVEL (FILL) - sandy, silty, some cobbles, damp to moist, compact, brownish grey, subangular gravel								0
1		- (Gravel - 40%; Sand - 24%; Silt -27%; Clay - 10%)	SA64							1
2		GRAVEL - some sand to sandy, trace silt, damp, compact, brownish grey, subrounded gravel								2
3										3
4		SAND - some silt, moist, compact, brown, fine sand	SA65							4
5		END OF TESTPIT (4.5 metres)								5
6										6
7										7
7.5										7.5
 TETRA TECH			Contractor: North American Tungsten			Completion Depth: 4.5 m				
			Drilling Rig Type: Hitachi 200			Start Date: 2018 September 22				
			Logged By: CPC			Completion Date: 2018 September 22				
			Reviewed By: TP			Page 1 of 1				

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project:	Borrow Source Investigation	Sample No.:	TP22
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA64
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	0.9 - 1.0 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	October 28, 2018	By:	AT
Date Tested:	October 28, 2018	Date Sampled:	September 22, 2018
Soil Description ² :	GRAVEL - silty, sandy, trace clay	Sampled By:	CPC
		USC Classification:	-
		Cu:	2158.7
Moisture Content:	10.9%	Cc:	0.2



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual

² The description is visually based & subject to Tetra Tech description protocols


Specification: _____

Remarks: _____

Reviewed By: *QAL* P.Eng.

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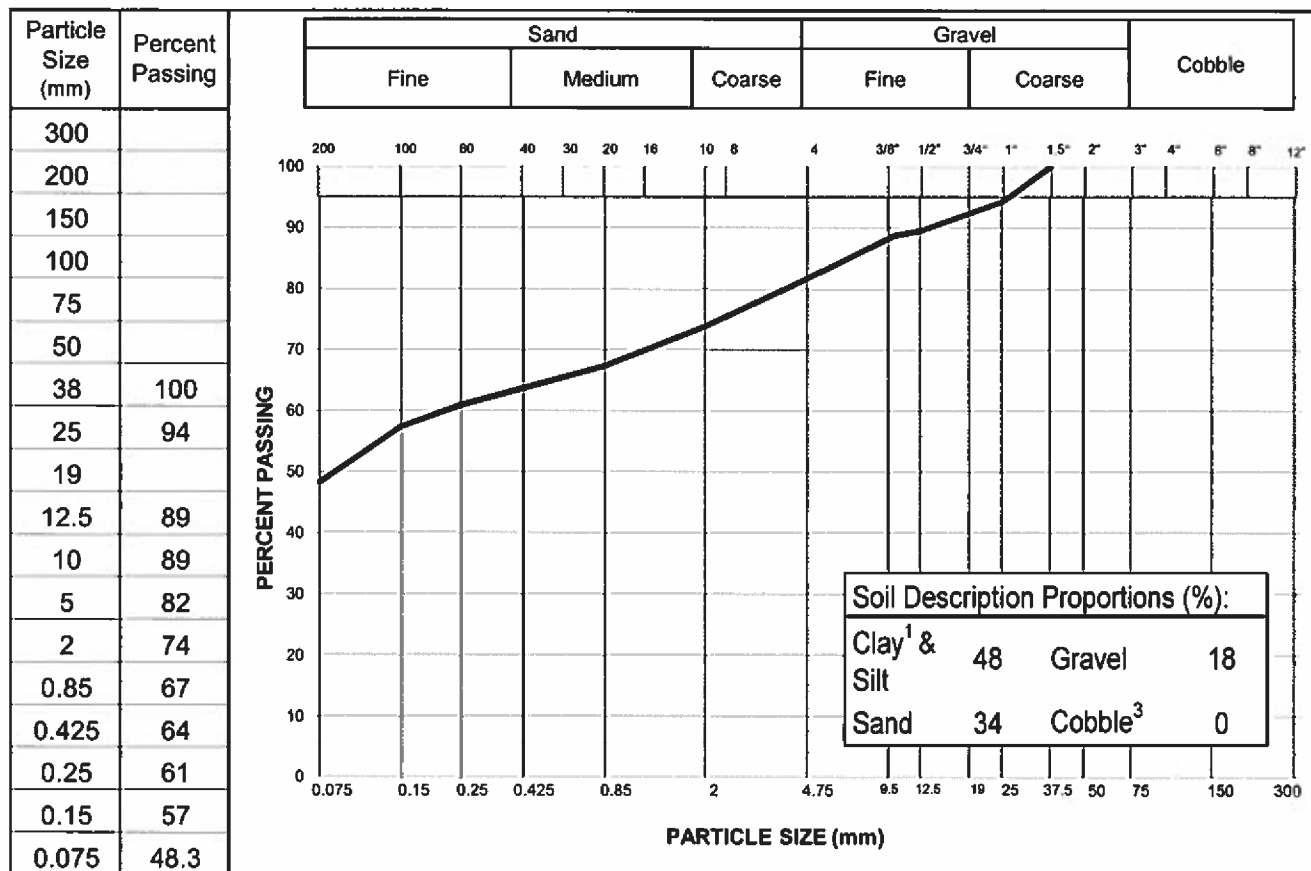
North American Tungsten Corporation Ltd.		Testpit No: BS-18TP23						
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007			
		Location: Cantung Mine						
		Cantung, Northwest Territories			UTM: 540409 E; 6871419 N; Z 9			
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv) 200 400 600 800		Notes and Comments	Depth (ft)
0	Excavated	SILT (FILL) - sandy, some gravel, trace organics, damp, compact, brownish grey, subangular gravel						0
1		- (Gravel - 18%; Sand - 34%; Silt & Clay - 48%)	SA66					1
2			SA67					2
3			SA68					3
4		SILT - trace to some sand, damp, firm, light brown						4
		GRAVEL - sandy, trace silt, cobbles, damp, compact, grey, subrounded gravel						5
		END OF TESTPIT (4.0 metres)						6
								7
								8
								9
								10
								11
								12
								13
								14
								15
								16
								17
								18
								19
								20
								21
								22
								23
								24
7.5								
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 4 m			
		Drilling Rig Type: Hitachi 200			Start Date: 2018 September 22			
		Logged By: CPC			Completion Date: 2018 September 22			
		Reviewed By: TP			Page 1 of 1			

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: Borrow Source Investigation	Sample No.: TP23
Project No.: ENW.WENW03039-03 (Task 007)	Material Type: -
Site: Cantung Mine, NT	Sample Loc.: SA67
Client: North American Tungsten Corp. Ltd.	Sample Depth: 1.9 - 2.0 m
Client Rep.: Callum Beveridge	Sampling Method: Grab
Date Tested: November 2, 2018 By: GK	Date Sampled: September 22, 2018
Soil Description ² : SILT - sandy, some gravel	Sampled By: CPC
	USC Classification: - Cu: #N/A
	Cc: #N/A

Moisture Content: 17.9%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification: _____

Remarks: _____

Reviewed By: P.Eng.

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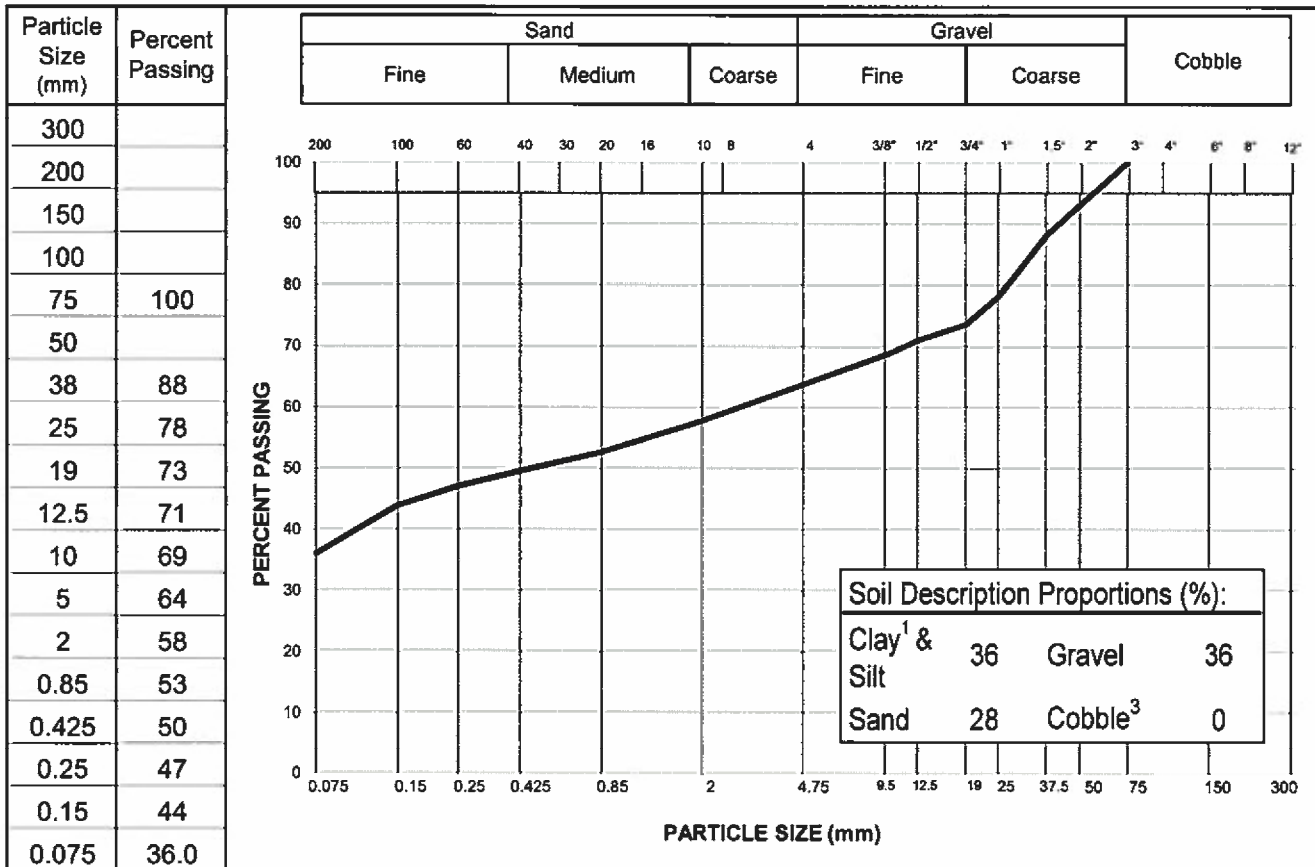
North American Tungsten Corporation Ltd.		Testpit No: BS-18TP24					
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007		
		Location: Cantung Mine					
		Cantung, Northwest Territories			UTM: 540382 E; 6871394 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv) 200 400 600 800	Notes and Comments	Depth (ft)
0	Excavated	GRAVEL AND SILT (FILL) - sandy, trace organics, trace cobbles, damp, compact, brownish grey, subangular gravel					0
1				SA69			1
2		- (Gravel - 36%; Sand - 28%; Silt & Clay - 36%)		SA70			2
3				SA71			3
4		GRAVEL - sandy, trace silt, cobbles, damp, compact, grey, subrounded gravel					4
5		END OF TESTPIT (4.1 metres)					5
6							6
7							7
7.5							7.5
		Contractor: North American Tungsten			Completion Depth: 4.1 m		
		Drilling Rig Type: Hitachi 200			Start Date: 2018 September 22		
		Logged By: CPC			Completion Date: 2018 September 22		
		Reviewed By: TP			Page 1 of 1		

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project:	Borrow Source Investigation	Sample No.:	TP24
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA70
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	1.9 - 2.0 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	October 31, 2018	By:	GK
Date Tested:	October 31, 2018	Date Sampled:	September 22, 2018
Soil Description ² :	GRAVEL and SILT - sandy	Sampled By:	CPC
		USC Classification:	-
		Cu:	#N/A
		Cc:	#N/A

Moisture Content: 15.0%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75


Specification: _____

Remarks: _____

Reviewed By: P.Eng.

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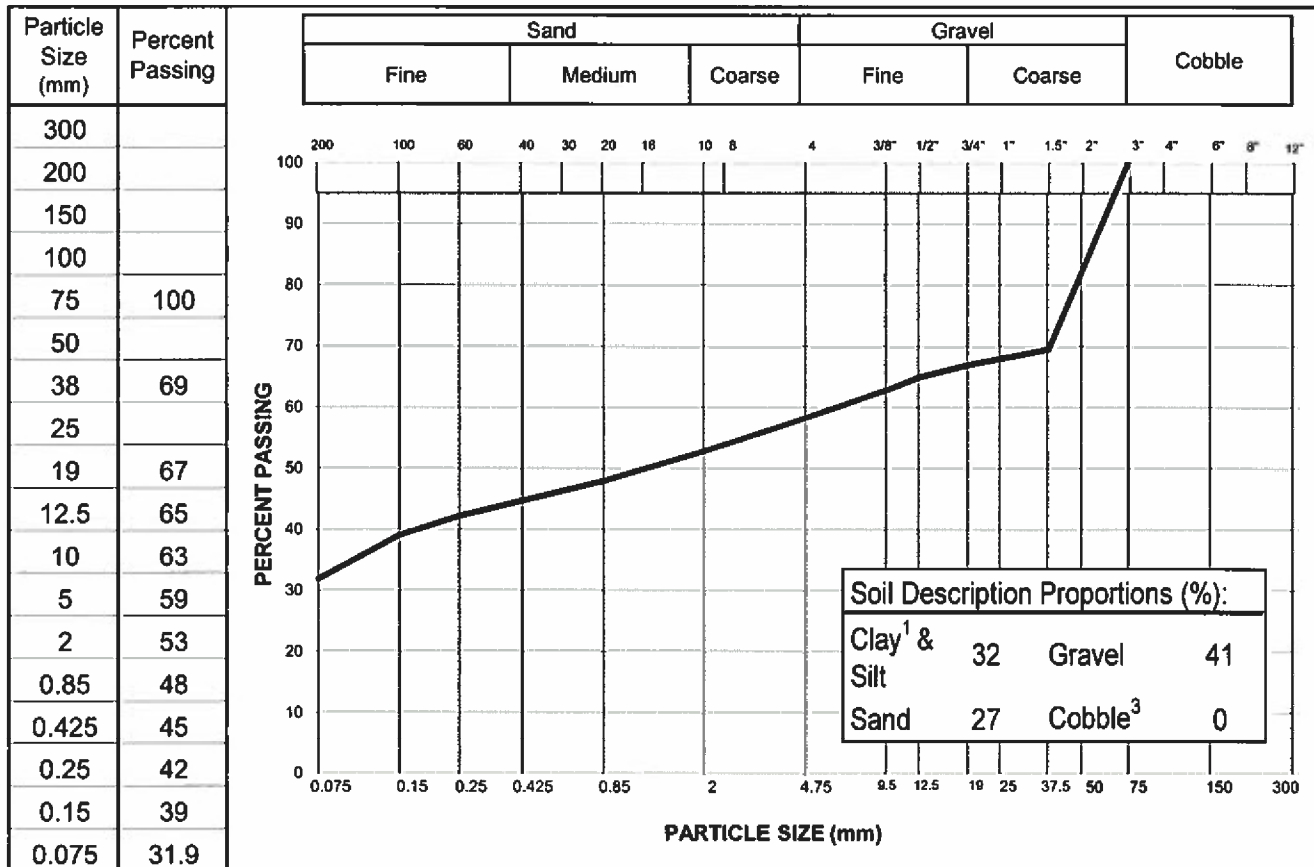
North American Tungsten Corporation Ltd.		Testpit No: BS-18TP25								
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007					
		Location: Cantung Mine								
		Cantung, Northwest Territories			UTM: 540405 E; 6871381 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)				Notes and Comments	Depth (ft)
					200	400	600	800		
0	Excavated	GRAVEL (FILL) - silty, some sand, damp to moist, compact, brownish grey, subangular gravel								0
1		- (Gravel - 41%; Sand - 27%; Silt & Clay - 32%)	SA72						1	
2			SA73						2	
3			SA74						3	
4		GRAVEL - sandy, trace silt, damp to moist, compact, brownish grey, subrounded gravel							4	
5		END OF TESTPIT (4.1 metres)							5	
6									6	
7									7	
7.5									7.5	
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 4.1 m					
		Drilling Rig Type: Hitachi 200			Start Date: 2018 September 22					
		Logged By: CPC			Completion Date: 2018 September 22					
		Reviewed By: TP			Page 1 of 1					

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project:	Borrow Source Investigation	Sample No.:	TP25
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA73
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	1.9 - 2.0 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	November 2, 2018	By:	GK
		Date Sampled:	September 22, 2018
Soil Description ² :	GRAVEL - silty, sandy	Sampled By:	CPC
		USC Classification:	-
		Cu:	#N/A
		Cc:	#N/A

Moisture Content: 9.8%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification: _____

Remarks: _____


Reviewed By: _____

P.Eng.

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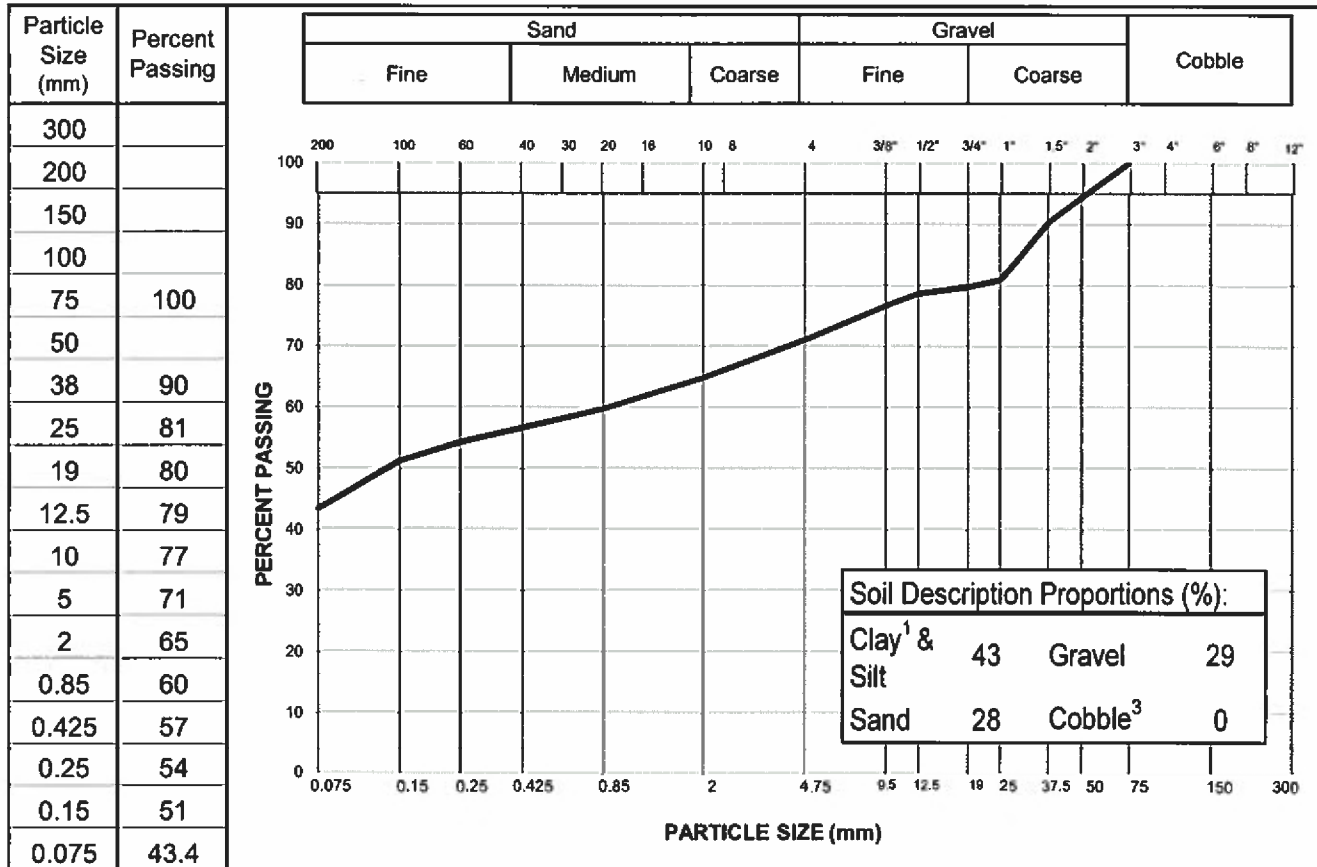
TETRA TECH

North American Tungsten Corporation Ltd.			Testpit No: BS-18TP26					
			Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007		
			Location: Cantung Mine					
			Cantung, Northwest Territories			UTM: 540363 E; 6871369 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv) 200 400 600 800		Notes and Comments	Depth (ft)
0	Excavated	SILT (FILL) - gravelly, sandy, damp to moist, compact, brownish grey, subangular gravel						0
1		- (Gravel - 29%; Sand - 28%; Silt & Clay - 43%)		SA75				1
								2
								3
								4
2		SILT - trace to some sand, damp to moist, firm, brown						5
		GRAVEL - sandy, trace silt, damp to moist, compact, brownish grey, subrounded gravel						6
				SA76				7
		END OF TESTPIT (2.3 metres)						8
								9
								10
								11
								12
								13
								14
								15
								16
								17
								18
								19
								20
								21
								22
								23
								24
7.5								
 TETRA TECH			Contractor: North American Tungsten			Completion Depth: 2.3 m		
			Drilling Rig Type: Hitachi 200			Start Date: 2018 September 22		
			Logged By: CPC			Completion Date: 2018 September 22		
			Reviewed By: TP			Page 1 of 1		

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136


Project:	Borrow Source Investigation	Sample No.:	TP26
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA75
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	0.9 - 1.0 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	October 31, 2018	By:	GK
Date Tested:	October 31, 2018	Date Sampled:	September 22, 2018
Soil Description ² :	SILT - gravelly, sandy	Sampled By:	CPC
		USC Classification:	-
		Cu:	#N/A
Moisture Content:	15.3%	Cc:	#N/A




Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification: _____
 Remarks: _____

Reviewed By: *[Signature]* P.Eng.

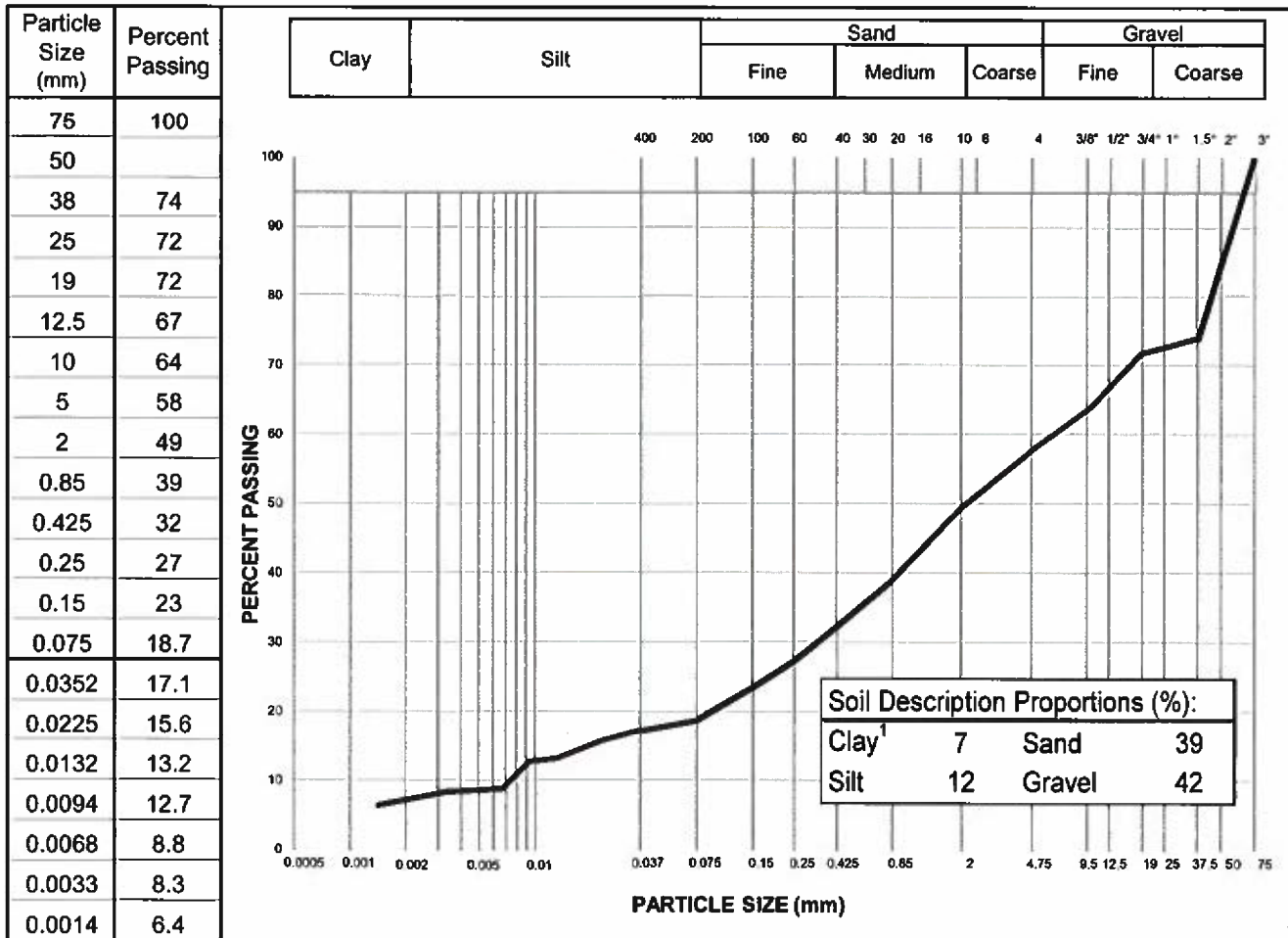
North American Tungsten Corporation Ltd.		Testpit No: BS-18TP27									
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007						
		Location: Cantung Mine									
		Cantung, Northwest Territories			UTM: 540383 E; 6871354 N; Z 9						
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv) 200 400 600 800				Notes and Comments	Depth (ft)	
0	Excavated	SAND (FILL) - gravelly, silty, damp, compact, brownish grey, subangular gravel								0	
			SA77							1	
1			GRAVEL - sandy, trace silt, damp, compact, grey, subrounded gravel		SA78						2
											3
2				SA79						4	
		END OF TESTPIT (2.1 metres)								5	
										6	
3										7	
										8	
4										9	
										10	
5										11	
										12	
6										13	
										14	
7										15	
										16	
7.5										17	
										18	
										19	
										20	
										21	
										22	
										23	
										24	
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 2.1 m						
		Drilling Rig Type: Hitachi 200			Start Date: 2018 September 22						
		Logged By: CPC			Completion Date: 2018 September 22						
		Reviewed By: TP			Page 1 of 1						

North American Tungsten Corporation Ltd.		Testpit No: BS-18TP28					
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007		
		Location: Cantung Mine					
		Cantung, Northwest Territories			UTM: 540346 E; 6871352 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv) 200 400 600 800	Notes and Comments	Depth (ft)
0	Excavated	SAND AND GRAVEL (FILL) - some silt, damp, compact, brownish grey, subangular gravel					0
1		- trace to some silt, no visible gravel		SA80			1
		- silty, gravelly					2
2		- (Gravel - 42%; Sand - 39%; Silt -12%; Clay - 7%)		SA81			3
		GRAVEL - sandy, trace silt, damp, compact, grey, subrounded gravel					4
				SA82			5
		END OF TESTPIT (2.4 metres)					6
							7
							8
							9
							10
							11
							12
							13
							14
							15
							16
							17
							18
							19
							20
							21
							22
							23
							24
7.5							
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 2.4 m		
		Drilling Rig Type: Hitachi 200			Start Date: 2018 September 22		
		Logged By: CPC			Completion Date: 2018 September 22		
		Reviewed By: TP			Page 1 of 1		

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project:	Borrow Source Investigation	Sample No.:	TP28
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA81
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	1.9 - 2.0 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	October 28, 2018	By:	AT
Date Tested:	October 28, 2018	Date Sampled:	September 22, 2018
Soil Description ² :	GRAVEL and SAND - some silt, trace clay	Sampled By:	CPC
Moisture Content:	13.6%	USC Classification:	-
		Cu:	880.7
		Cc:	2.4



Notes: ¹ The upper clay size of 2 µm, per the Canadian Foundation Engineering Manual

² The description is visually based & subject to Tetra Tech description protocols

Specification: _____

Remarks: _____


Reviewed By: _____

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TETRA TECH

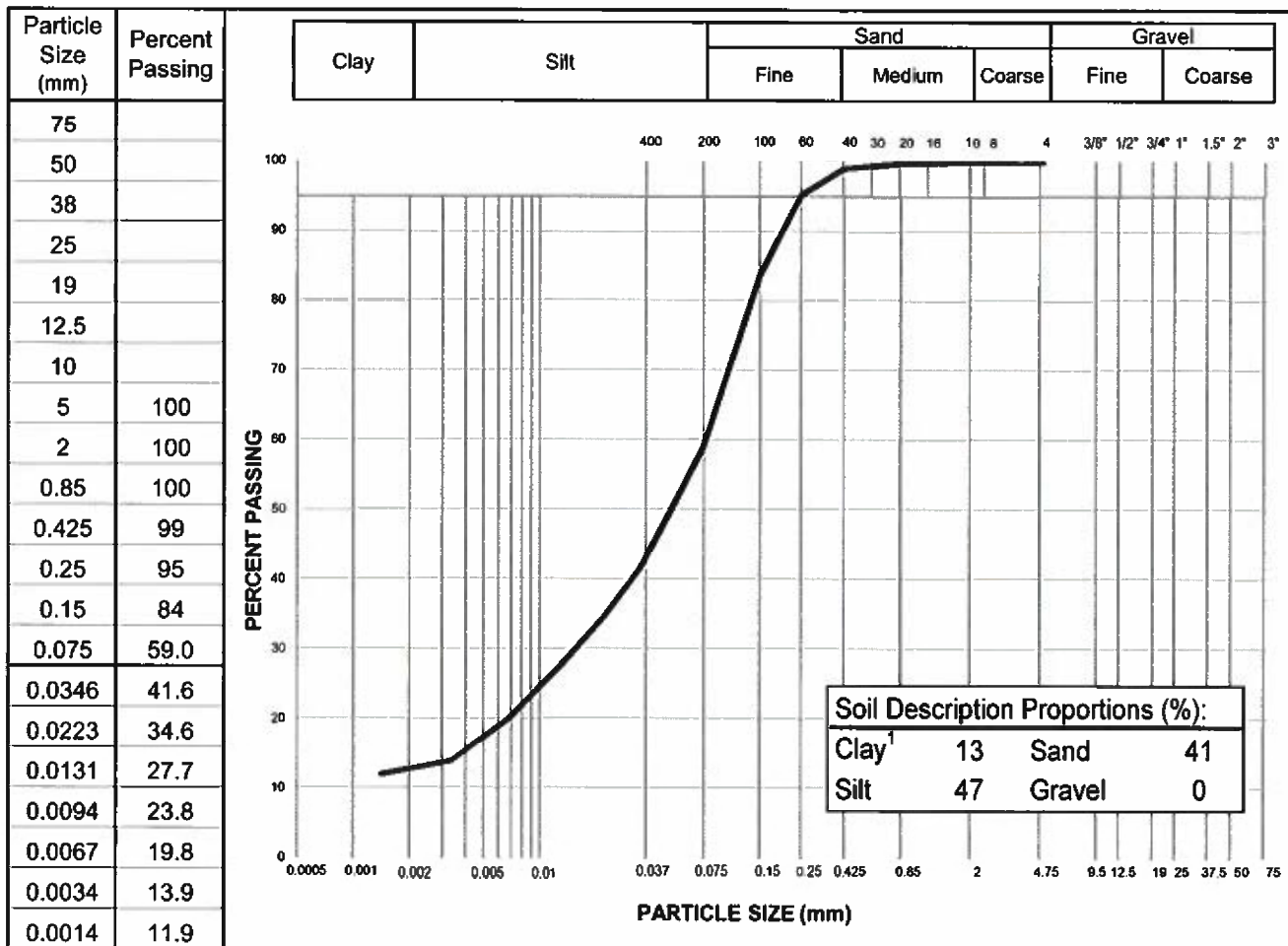
North American Tungsten Corporation Ltd.		Testpit No: BS-18TP29								
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007					
		Location: Cantung Mine								
		Cantung, Northwest Territories			UTM: 540371 E; 6871412 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv) 200 400 600 800				Notes and Comments	Depth (ft)
0		ORGANICS - roots, moss, moist, dark brown, (200 mm thick)								0
1	Excavated	SILT - sandy, moist, firm, dark brown								1
		- light brown								2
		- (Gravel - 0%; Sand - 41%; Silt - 47%; Clay - 13%)	SA83							3
2										4
										5
			SA84							6
3										7
										8
		- some water seepage, grey								9
4										10
										11
			SA85							12
5		END OF TESTPIT (3.5 metres)								13
										14
										15
6										16
										17
										18
7										19
										20
										21
7.5										22
										23
										24
 TETRA TECH			Contractor: North American Tungsten			Completion Depth: 3.5 m				
			Drilling Rig Type: Hitachi 200			Start Date: 2018 September 23				
			Logged By: CPC			Completion Date: 2018 September 23				
			Reviewed By: TP			Page 1 of 1				

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project:	Borrow Source Investigation	Sample No.:	TP29
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA83
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	0.9 - 1.0 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	October 28, 2018	By:	AT
Date Tested:	October 28, 2018	Date Sampled:	September 23, 2018
Soil Description ² :	SILT and SAND - some clay	Sampled By:	CPC
		USC Classification:	-
		Cu:	#N/A
		Cc:	#N/A

Moisture Content: 39.6%



Notes: ¹ The upper clay size of 2 μ m, per the Canadian Foundation Engineering Manual

² The description is visually based & subject to Tetra Tech description protocols

Specification: _____

Remarks: _____


Reviewed By: _____

P.Eng.

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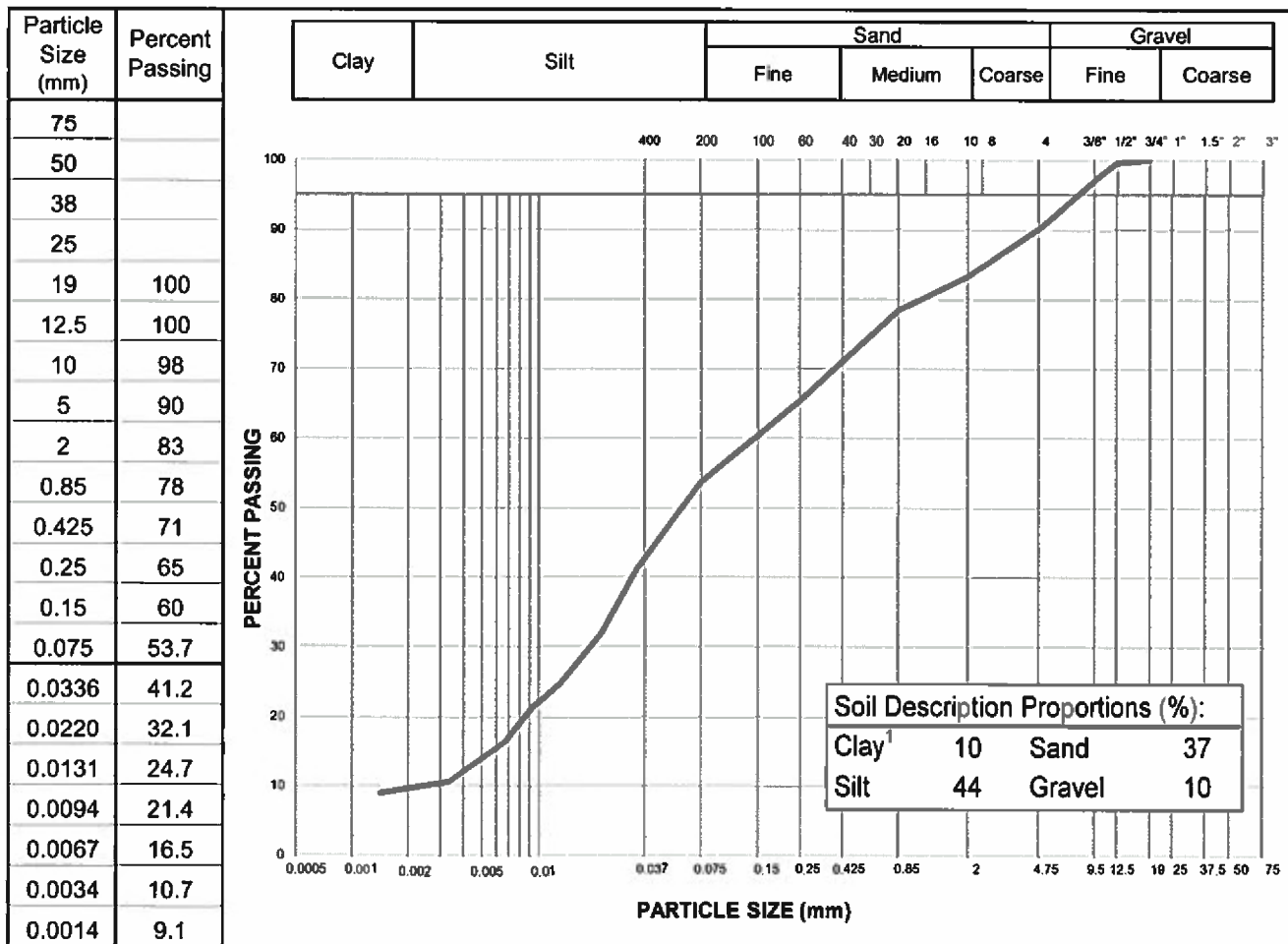
TETRA TECH

North American Tungsten Corporation Ltd.		Testpit No: BS-18TP30								
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007					
		Location: Cantung Mine								
		Cantung, Northwest Territories			UTM: 540380 E; 6871441 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv) 200 400 600 800				Notes and Comments	Depth (ft)
0	Excavated ▼	ORGANICS - roots, moss, moist, dark brown, (100 mm thick)	SA86						0	
		SAND (FILL) - trace gravel, damp, grey, (300 mm thick)							1	
		ORGANICS - roots, moist, (100 mm thick)							2	
		GRAVEL - sandy, trace silt, damp, compact, brownish grey, subrounded gravel							3	
1									4	
									5	
2									6	
									7	
									8	
									9	
3									10	
									11	
									12	
									13	
									14	
									15	
									16	
									17	
									18	
									19	
									20	
									21	
									22	
									23	
									24	
7.5										
 TETRA TECH		Contractor: North American Tungsten			Completion Depth: 3.2 m					
		Drilling Rig Type: Hitachi 200			Start Date: 2018 September 23					
		Logged By: CPC			Completion Date: 2018 September 23					
		Reviewed By: TP			Page 1 of 1					

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project:	Borrow Source Investigation	Sample No.:	TP31
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA87
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	0.9 - 1.0 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	October 28, 2018	By:	AT
Date Tested:	October 28, 2018	Date Sampled:	September 23, 2018
Soil Description ² :	SILT and SAND - trace gravel, trace clay	Sampled By:	CPC
Moisture Content:	34.2%	USC Classification:	-
		Cu:	57.5
		Cc:	1.0



Notes: ¹ The upper clay size of 2 μ m, per the Canadian Foundation Engineering Manual

² The description is visually based & subject to Tetra Tech description protocols

Specification: _____


Remarks: _____


Reviewed By: *[Signature]* P.Eng.

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TETRA TECH

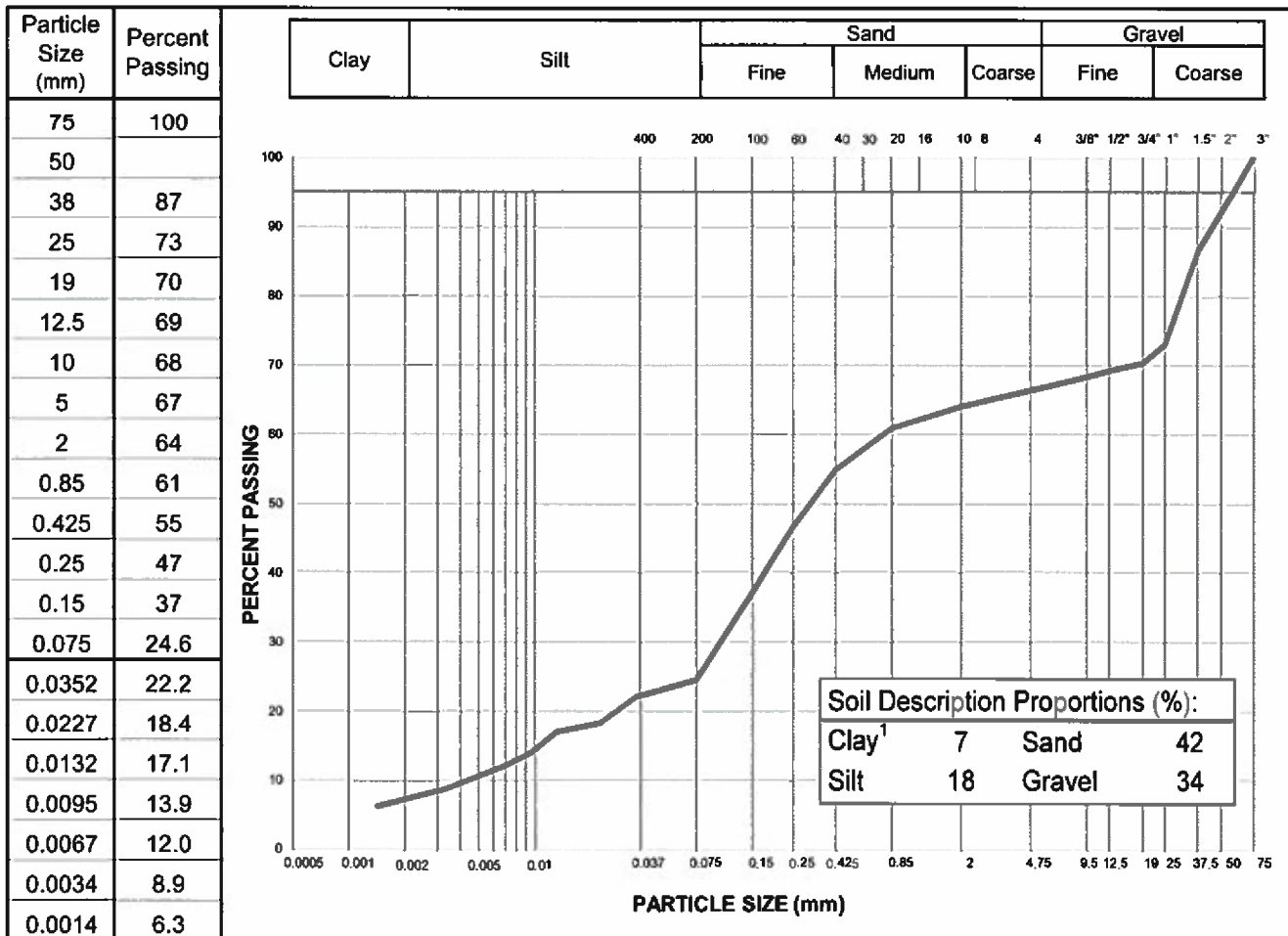
North American Tungsten Corporation Ltd.			Testpit No: BS-18TP32							
			Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007				
			Location: Cantung Mine							
			Cantung, Northwest Territories			UTM: 540334 E; 6871381 N; Z 9				
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv) 200 400 600 800				Notes and Comments	Depth (ft)
0		ORGANICS - roots, moss, moist, dark brown, (100 mm thick) SILT - some sand, moist, firm, light brown, sand lenses throughout								0
1	Excavated ▼	- wet		SA89						4
		- grey								
2		END OF TESTPIT (2.0 metres) water - 1.3 metres								7
3										10
4										13
5										16
6										19
7										22
7.5										24
 TETRA TECH			Contractor: North American Tungsten			Completion Depth: 2 m				
			Drilling Rig Type: Hitachi 200			Start Date: 2018 September 23				
			Logged By: CPC			Completion Date: 2018 September 23				
			Reviewed By: TP			Page 1 of 1				

North American Tungsten Corporation Ltd.		Testpit No: BS-18TP33								
		Project: Borrow Source Investigation			Project No: ENW.WENW03039-03.007					
		Location: Cantung Mine								
		Cantung, Northwest Territories			UTM: 540327 E; 6871314 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)				Notes and Comments	Depth (ft)
					200	400	600	800		
0		SAND (FILL) - gravelly, silty, some cobbles, damp, compact, brownish grey, subangular gravel								0
1	Excavated	- (Gravel - 34%; Sand - 42%; Silt - 18%; Clay - 7%)		SA90						1
										2
										3
2		SILT - some sand and gravel, damp to moist, firm, brownish grey, sand and gravel layers throughout		SA91						4
		- (Gravel - 0%; Sand - 20%; Silt - 60%; Clay - 11%)								5
										6
3		- wet		SA92						7
										8
										9
4										10
										11
										12
5		END OF TESTPIT (5.0 metres)								13
		water - 3.1 metres								14
										15
6										16
										17
										18
7										19
										20
										21
7.5										22
										23
										24
 TETRA TECH			Contractor: North American Tungsten			Completion Depth: 5 m				
			Drilling Rig Type: Hitachi 200			Start Date: 2018 September 23				
			Logged By: CPC			Completion Date: 2018 September 23				
			Reviewed By: TP			Page 1 of 1				

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project:	Borrow Source Investigation	Sample No.:	TP33
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA90
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	0.9 - 1.0 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	October 28, 2018	By:	AT
Date Tested:	October 28, 2018	Date Sampled:	September 23, 2018
Soil Description ² :	SAND - gravelly, some silt, trace clay	Sampled By:	CPC
		USC Classification:	-
		Cu:	172.0
Moisture Content:	10.9%	Cc:	3.2



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual

² The description is visually based & subject to Tetra Tech description protocols

Specification: _____

Remarks: _____

Reviewed By: P.Eng.

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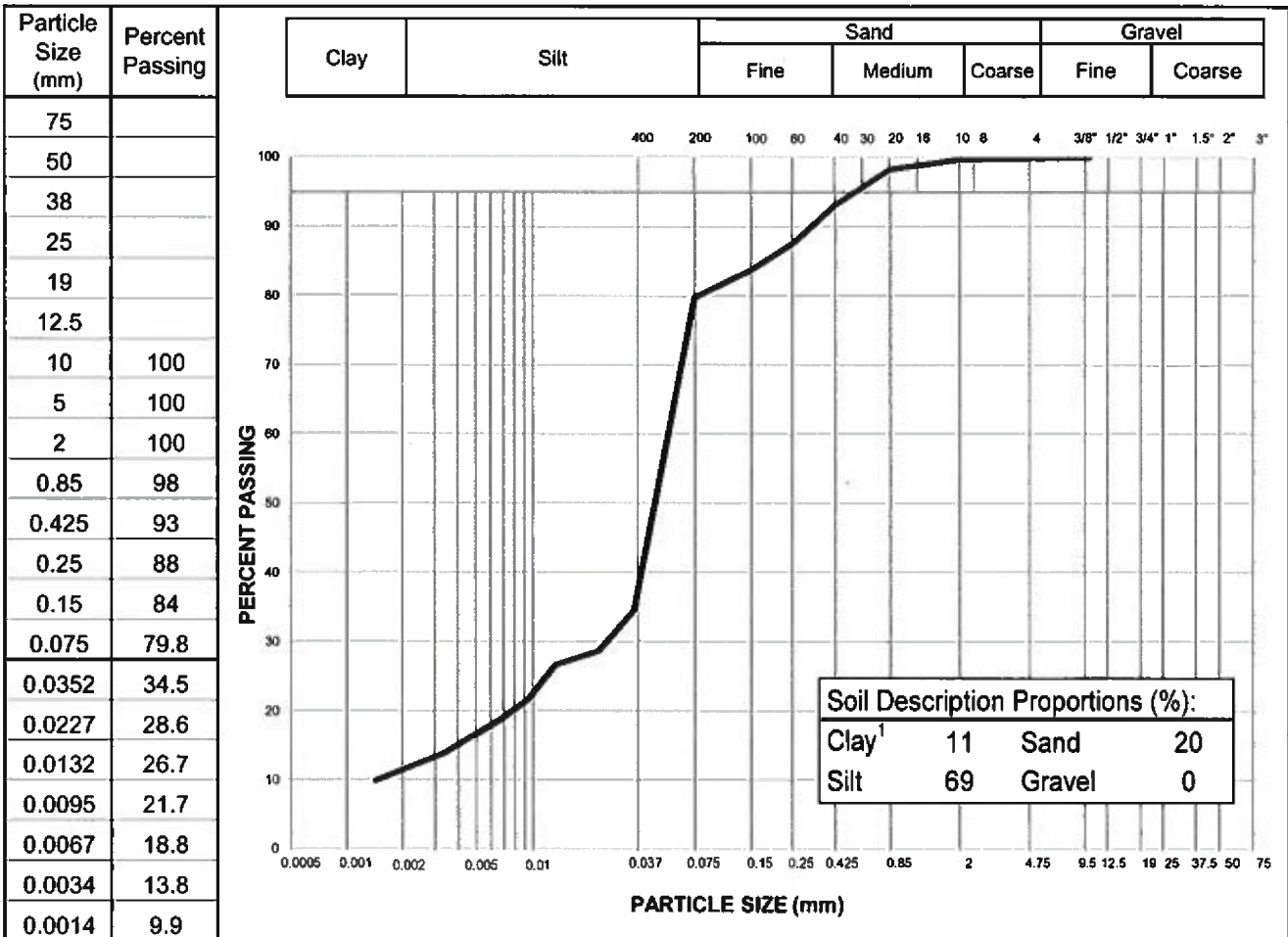


TETRA TECH

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project:	Borrow Source Investigation	Sample No.:	TP33
Project No.:	ENW.WENW03039-03 (Task 007)	Material Type:	-
Site:	Cantung Mine, NT	Sample Loc.:	SA91
Client:	North American Tungsten Corp. Ltd.	Sample Depth:	1.9 - 2.0 m
Client Rep.:	Callum Beveridge	Sampling Method:	Grab
Date Tested:	October 28, 2018	By:	AT
Date Tested:	October 28, 2018	Date Sampled:	September 23, 2018
Soil Description ² :	SILT - some sand, some clay	Sampled By:	CPC
		USC Classification:	-
		Cu:	38.6
Moisture Content:	27.1%	Cc:	7.6



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual

² The description is visually based & subject to Tetra Tech description protocols

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APPENDIX C

TETRA TECH'S 2019 TESTPIT AND TESTHOLE LOGS AND PARTICLE SIZE RESULTS

TERMS USED ON BOREHOLE LOGS

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on 0.075mm sieve): Includes (1) clean gravels and sands, and (2) silty or clayey gravels and sands. Condition is rated according to relative density, as inferred from laboratory or in situ tests.

DESCRIPTIVE TERM	RELATIVE DENSITY	N (blows per 0.3m)
Very Loose	0 TO 20%	0 to 4
Loose	20 TO 40%	4 to 10
Compact	40 TO 75%	10 to 30
Dense	75 TO 90%	30 to 50
Very Dense	90 TO 100%	greater than 50

The number of blows, N, on a 51mm O.D. split spoon sampler of a 63.5kg weight falling 0.76m, required to drive the sampler a distance of 0.3m from 0.15m to 0.45m.

FINE GRAINED SOILS (major portion passing 0.075mm sieve): Includes (1) inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as estimated from laboratory or in situ tests.

DESCRIPTIVE TERM	UNCONFINED COMPRESSIVE STRENGTH (KPA)
Very Soft	Less than 25
Soft	25 to 50
Firm	50 to 100
Stiff	100 to 200
Very Stiff	200 to 400
Hard	Greater than 400

NOTE: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above, because of planes of weakness or cracks in the soil.

GENERAL DESCRIPTIVE TERMS

Slickensided - having inclined planes of weakness that are slick and glossy in appearance.

Fissured - containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.

Laminated - composed of thin layers of varying colour and texture.

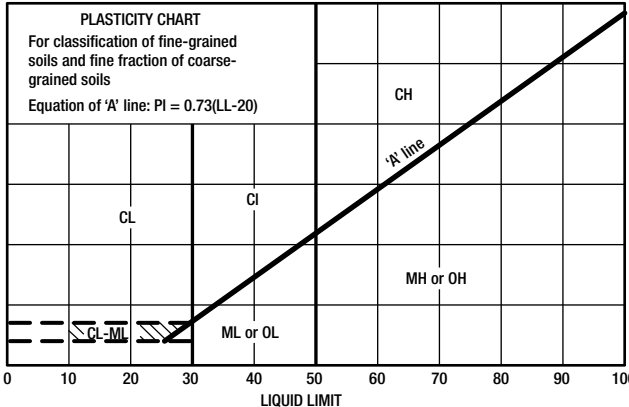
Interbedded - composed of alternate layers of different soil types.

Calcareous - containing appreciable quantities of calcium carbonate.;

Well graded - having wide range in grain sizes and substantial amounts of intermediate particle sizes.

Poorly graded - predominantly of one grain size, or having a range of sizes with some intermediate size missing.

MODIFIED UNIFIED SOIL CLASSIFICATION

MAJOR DIVISION			GROUP SYMBOL	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA					
COARSE - GRAINED SOILS More than 50% retained on No. 75 µm sieve*	GRAVELS 50% or more of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines	Classification on basis of percentage of fines GW, GP, SW, SP GM, GC, SM, SC Borderline classification requiring use of dual symbols	$C_u = D_{60} / D_{10}$ Greater than 4 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3				
			GP	Poorly-graded gravels and gravel-sand mixtures, little or no fines		Not meeting both criteria for GW				
		GRAVELS WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures		Atterberg limits plot below 'A' line or plasticity index less than 4	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols			
			GC	Clayey gravels, gravel-sand-clay mixtures		Atterberg limits plot above 'A' line and plasticity index greater than 7				
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS	SW	Well-graded sands and gravelly sands, little or no fines		$C_u = D_{60} / D_{10}$ Greater than 6 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3				
			SP	Poorly-graded sands and gravelly sands, little or no fines		Not meeting both criteria for SW				
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures		Atterberg limits plot above 'A' line and plasticity index less than 4	Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols			
			SC	Clayey sands, sand-clay mixtures		Atterberg limits plot above 'A' line and plasticity index greater than 7				
		FINE-GRAINED SOILS (by behavior) 50% or more passes 75 µm sieve*	SILTS	Liquid limit		<50	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands of slight plasticity	<div>60</div> <div>50</div> <div>40</div> <div>30</div> <div>20</div> <div>10</div> <div>7</div> <div>4</div> <div>0</div> <div>PLASTICITY CHART</div> <div>For classification of fine-grained soils and fine fraction of coarse-grained soils</div> <div>Equation of 'A' line: $PI = 0.73(LL - 20)$</div> <div></div> <div>0</div> <div>10</div> <div>20</div> <div>30</div> <div>40</div> <div>50</div> <div>60</div> <div>70</div> <div>80</div> <div>90</div> <div>100</div> <div>LIQUID LIMIT</div>	
						>50	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts		
CLAYS	Above "A" line on plasticity chart negligible organic content		Liquid limit	<30	CL	Inorganic clays of low plasticity, gravelly clays, sandy clays, silty clays, lean clays				
				30-50	CI	Inorganic clay of medium plasticity, silty clays				
				>50	CH	Inorganic clay of high plasticity, fat clays				
ORGANIC SILTS AND CLAYS	Liquid limit		<50	OL	Organic silts and organic silty clays of low plasticity					
			>50	OH	Organic clays of medium to high plasticity					
HIGHLY ORGANIC SOILS			PT	Peat, muck and other highly organic soils	* Based on the material passing the 75 mm sieve † ASTM Designation D 2487, for identification procedure see D 2488 USC as modified by PFRA					

GROUND ICE DESCRIPTION

ICE NOT VISIBLE				VISIBLE ICE LESS THAN 50% BY VOLUME			
GROUP SYMBOL	SYMBOL	SUBGROUP DESCRIPTION		GROUP SYMBOL	SYMBOL	SUBGROUP DESCRIPTION	
N	Nf	Poorly-bonded or friable		V	Vx	Individual ice crystals or inclusions	
	Nbn	No excess ice, well-bonded			Vc	Ice coatings on particles	
	Nbe	Excess ice, well-bonded			Vr	Random or irregularly oriented ice formations	
					Vs	Stratified or distinctly oriented ice formations	
NOTES: 1. Dual symbols are used to indicate borderline or mixed ice classifications. 2. Visual estimates of ice contents indicated on borehole logs ± 5% 3. This system of ground ice description has been modified from NRC Technical Memo 79, Guide to the Field Description of Permafrost for Engineering Purposes.				VISIBLE ICE GREATER THAN 50% BY VOLUME			
ICE		ICE + Soil Type	Ice with soil inclusions	ICE		ICE	Ice without soil inclusions (greater than 25 mm thick)
LEGEND:		Soil				Ice	

BOREHOLE KEYSHEET

Water Level Measurement



Measured in standpipe,
piezometer or well



Inferred

Sample Types



A-Casing



Core



Disturbed, Bag,
Grab



HQ Core



Jar



Jar and Bag



75 mm SPT



No Recovery



Split Spoon/SPT



Tube



CRREL Core

Backfill Materials



Asphalt



Bentonite



Cement/
Grout



Drill Cuttings



Grout



Gravel



Sand



Slough



Topsoil Backfill

Lithology - Graphical Legend¹



Asphalt



Bedrock



Cobbles/Boulders



Clay



Coal



Concrete



Fill



Gravel



Limestone



Mudstone



Organics



Peat



Sand



Sandstone



Shale



Silt



Siltstone



Conglomerate




Topsoil



Till

1. The graphical legend is an approximation and for visual representation only. Soil strata may comprise a combination of the basic symbols shown above. Particle sizes are not drawn to scale

			Testpit No: BS-19TP01							
			Project: 2019 Borrow Source Investigation		Project No: ENW.WENW03039-04.008					
			Location: Cantung Mine		Ground Elev: 1120.28 m					
			Tungsten, Northwest Territories		UTM: 542370 E; 6869553 N; Z 9					
Depth (m)	Method	Soil Description	Ground Ice Description	Sample Type	Sample Number	Moisture Content (%)	<div>Plastic Limit Moisture Content Liquid Limit</div> <div>20 40 60 80</div>			Elevation (m)
0	Excavation	ORGANICS - moss, peat, ash, roots, moist, dark brown, (200 mm thick)	Unfrozen							
		SAND - some gravel, some silt, cobbles, moist, compact, grey, subrounded gravel								1120-
1		SILT AND SAND - moist, firm, brownish grey, fine sand								
		- (Gravel - 0%; Sand - 43%; Silt & Clay - 57%)								1119-
2		GRAVEL - sandy, some cobbles, trace to some silt, damp, compact, brownish grey, subrounded gravel								
		- (Gravel - 54%; Sand - 28%; Silt & Clay - 18%)								1118-
3										
										1117-
4		END OF TESTPIT (3.6 metres)								
										1116-
5										

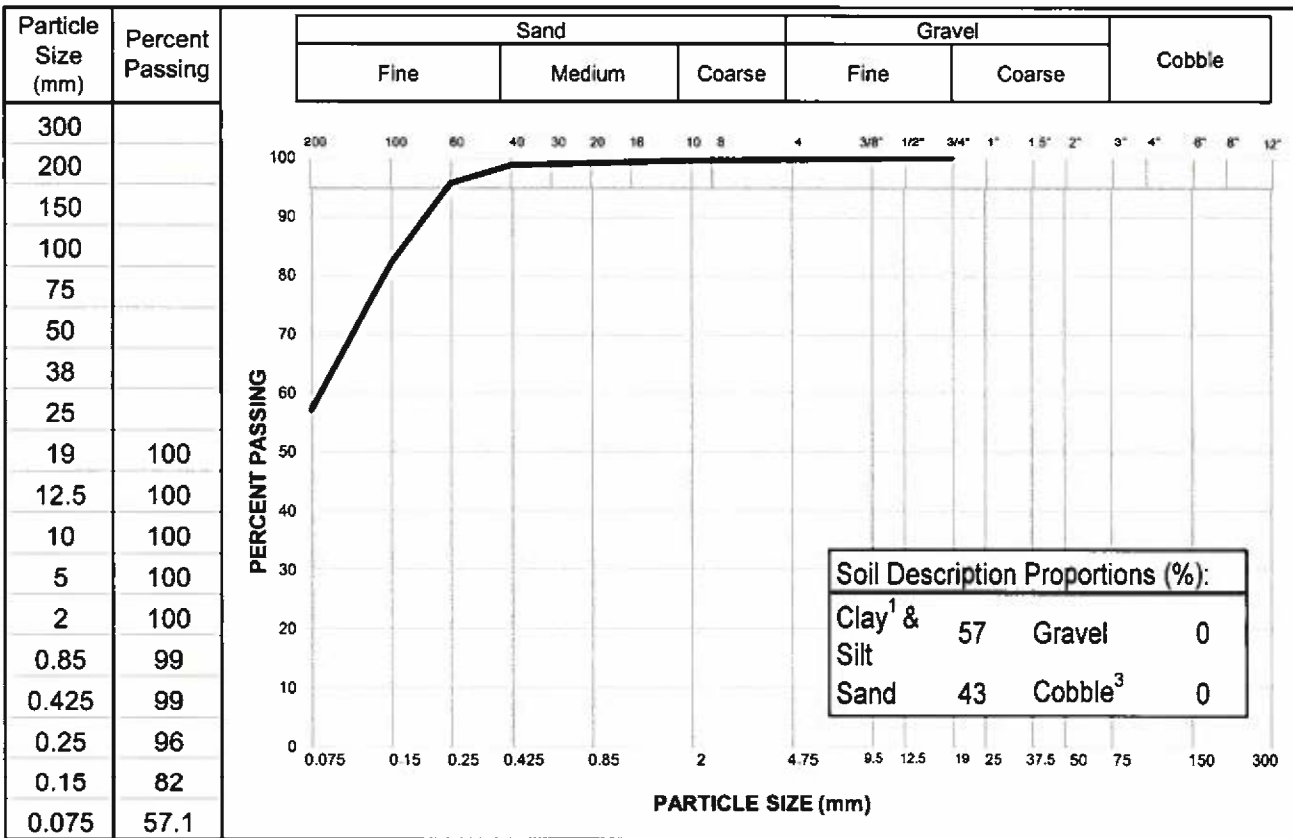
 TETRA TECH	Contractor: North American Tungsten Corporation Ltd.		Completion Depth: 3.6 m	
	Drilling Rig Type: Hitachi 200		Start Date: October 3, 2019	
	Logged By: CPC		Completion Date: October 3, 2019	
	Reviewed By: TP		Page 1 of 1	

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project:	2019 Borrow Source Investigation	Sample No.:	SA02 (02)
Project No.:	ENW.WENW03039-04.008	Material Type:	
Site:	Cantung Mine NT	Sample Loc.:	BS-19TP01
Client:	NATCL	Sample Depth:	1.2 - 1.3
Client Rep.:		Sampling Method:	Grab
Date Tested:	October 9, 2019	By:	SM
Date Tested:	October 9, 2019	Date Sampled:	October 3, 2019
Soil Description ² :	SILT - SAND	Sampled By:	CC
		USC Classification:	Cu: #N/A
			Cc: #N/A

Moisture Content: 16.5%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification: _____

Remarks: _____

Reviewed By: P.Eng.

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PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: 2019 Borrow Source Investigation

Sample No.: SA03 (3)

Project No.: ENW.WENW03039-04.008

Material Type:

Site: Cantung Mine NT

Sample Loc.: BS-19TP01

Client: NATCL

Sample Depth: 2.0 - 2.1

Client Rep.:

Sampling Method: Grab

Date Tested: October 9, 2019 By: SM

Date Sampled: October 3, 2019

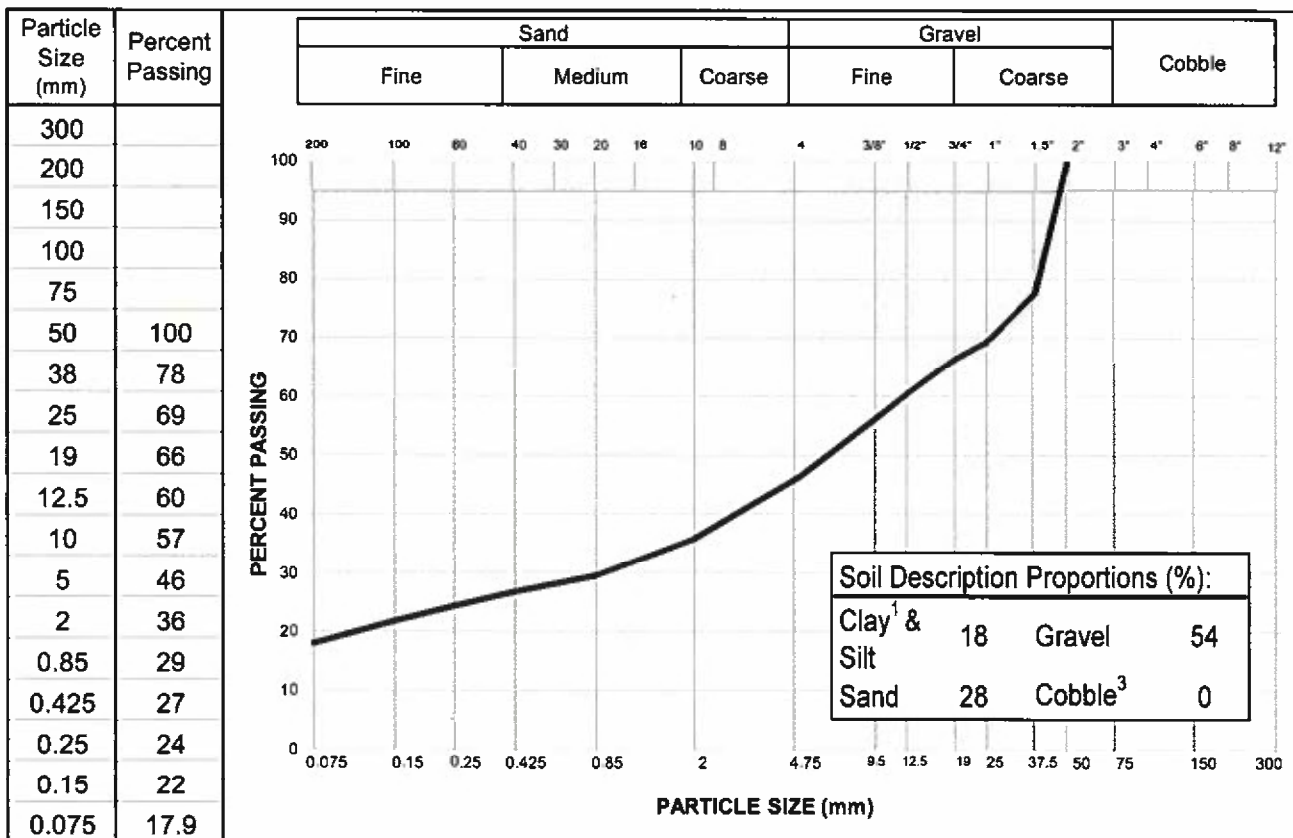
Soil Description²: GRAVEL - sandy, some silt

Sampled By: CC

USC Classification: Cu: #N/A

Moisture Content: 9.8%

Cc: #N/A



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual

² The description is visually based & subject to Tt WM4400 description protocols

³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification:


Remarks:

Reviewed By: P.Eng.

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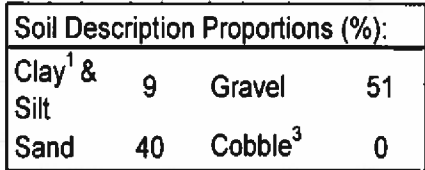


			Testpit No: BS-19TP02								
			Project: 2019 Borrow Source Investigation			Project No: ENW.WENW03039-04.008					
			Location: Cantung Mine			Ground Elev: 1119.29 m					
			Tungsten, Northwest Territories			UTM: 542360 E; 6869531 N; Z 9					
Depth (m)	Method	Soil Description	Ground Ice Description	Sample Type	Sample Number	Moisture Content (%)	<div>Plastic Limit Moisture Content Liquid Limit</div> <div>20 40 60 80</div>			Elevation (m)	
0		ORGANICS - moss, peat, ash, roots, moist, dark brown, (100 mm thick)	Unfrozen							1119-	
		SAND AND GRAVEL - some cobbles, trace to some silt, moist, compact, grey, subrounded gravel									
1	Excavation	- (Gravel - 52%; Sand - 39%; Silt & Clay - 9%)			SA05	9.9	●				1118-
2		SAND - trace to some silt, moist, compact, grey - (Gravel - 1%; Sand - 83%; Silt & Clay - 16%)			SA06	15.3	●				1117-
3		- some gravel to gravelly		SA07	4.6	●				1116-	
4		- trace to some gravel		SA08	8.7	●					
		END OF TESTPIT (4.1 metres)								1115-	
5											

 TETRA TECH	Contractor: North American Tungsten Corporation Ltd.		Completion Depth: 4.1 m	
	Drilling Rig Type: Hitachi 200		Start Date: October 3, 2019	
	Logged By: CPC		Completion Date: October 3, 2019	
	Reviewed By: TP		Page 1 of 1	

ASTM D7928 & C136

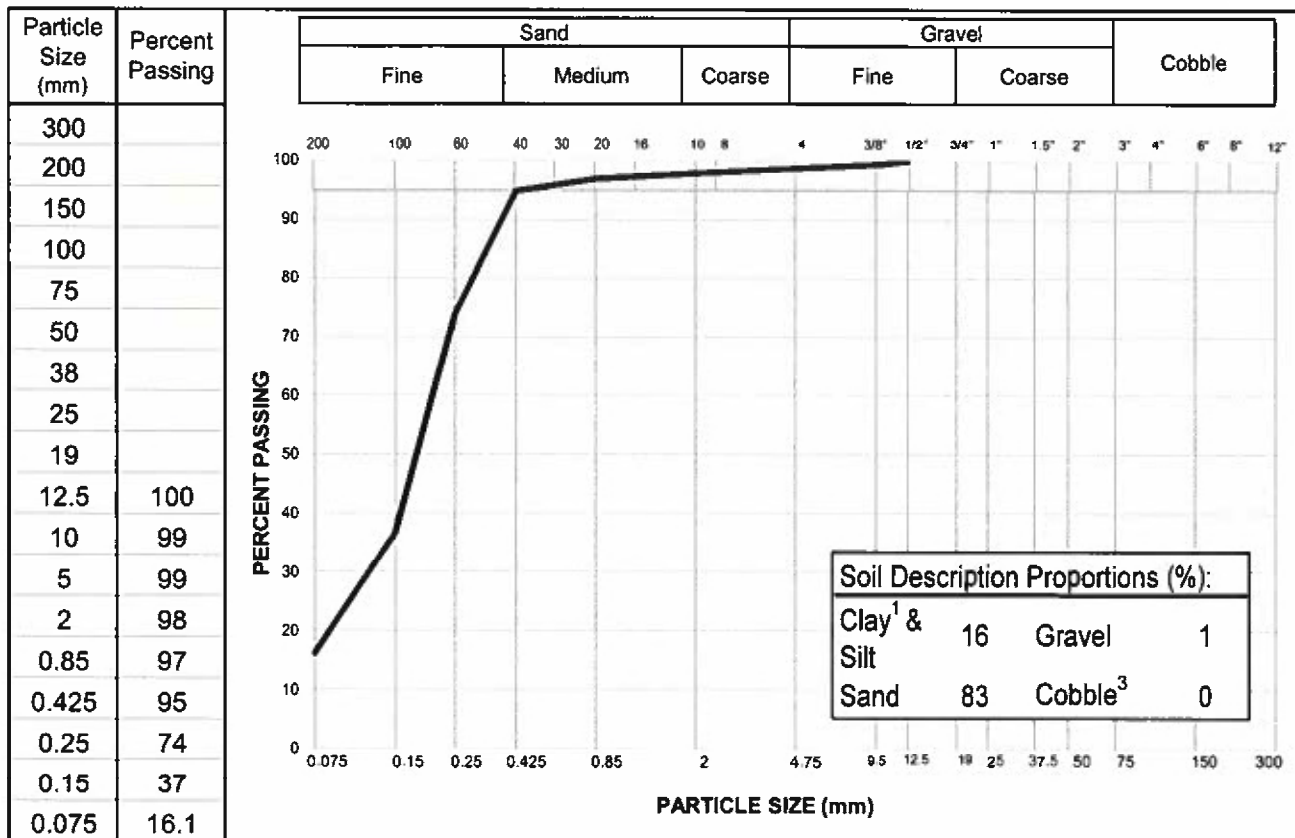
Cc: 2.6



TETRA TECH

ASTM D7928 & C136


Cc: #N/A



Reviewed By:  **P.Eng.**

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			Testpit No: BS-19TP03				
			Project: 2019 Borrow Source Investigation		Project No: ENW.WENW03039-04.008		
			Location: Cantung Mine		Ground Elev: 1120 m		
			Tungsten, Northwest Territories		UTM: 542472 E; 6869432 N; Z 9		
Depth (m)	Method	Soil Description	Ground Ice Description	Sample Type	Sample Number	Moisture Content (%)	Elevation (m)
0		ORGANICS - moss, peat, ash, roots, moist, dark brown, (100 mm thick)	Unfrozen				1120
		GRAVEL - sandy, trace of silt, trace of cobbles and boulders near surface, moist, compact, greyish brown, subrounded gravel					
1	Excavation	- cobble and boulder layer		SA09	10.3	●	1119
2		- (Gravel - 72%; Sand - 21%; Silt & Clay - 7%)		SA10	9.4	●	1118
3				SA11	8.2	●	1117
4		END OF TESTPIT (3.5 metres)					1116
5							1115
 TETRA TECH			Contractor: North American Tungsten Corporation Ltd.		Completion Depth: 3.5 m		
			Drilling Rig Type: Hitachi 200		Start Date: October 3, 2019		
			Logged By: CPC		Completion Date: October 3, 2019		
			Reviewed By: TP		Page 1 of 1		

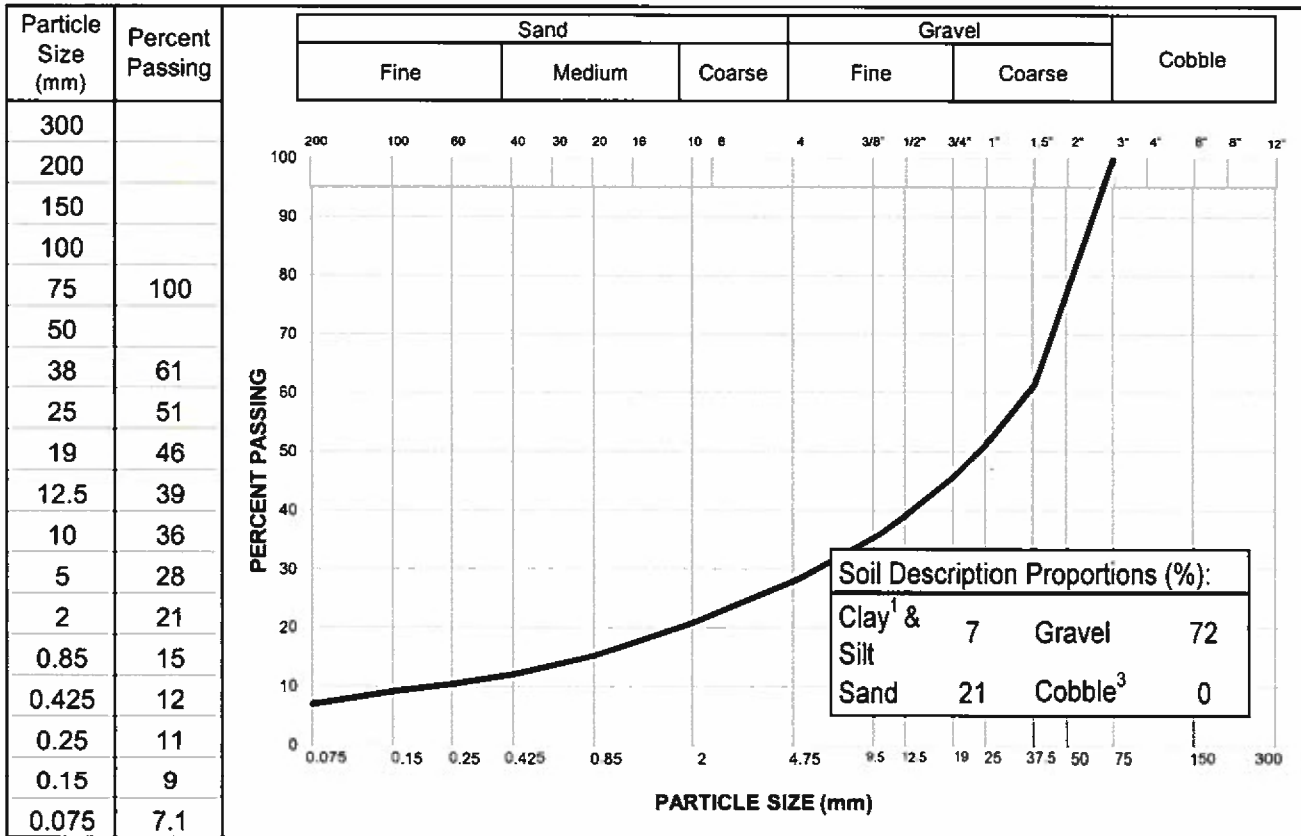
PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: 2019 Borrow Source Investigation
 Project No.: ENW.WENW03039-04.008
 Site: Cantung Mine NT
 Client: NATCL
 Client Rep.:
 Date Tested: October 9, 2019 By: SM
 Soil Description²: GRAVEL - sandy, trace silt

Sample No.: SA02 (10)
 Material Type:
 Sample Loc.: BS-19TP03
 Sample Depth: 1.9 - 2.0
 Sampling Method: Grab
 Date Sampled: October 3, 2019
 Sampled By: CC
 USC Classification: Cu: 173.0
 Cc: 4.8

Moisture Content: 9.4%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification: _____

Remarks: _____

Reviewed By: P.Eng.

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		Testpit No: BS-19TP04					
		Project: 2019 Borrow Source Investigation			Project No: ENW.WENW03039-04.008		
		Location: Cantung Mine			Ground Elev: 1119.29 m		
		Tungsten, Northwest Territories			UTM: 542454 E; 6869409 N; Z 9		
Depth (m)	Method	Soil Description	Ground Ice Description	Sample Type	Sample Number	Moisture Content (%)	Elevation (m)
0						<div> <div>Plastic Limit</div> <div>Moisture Content</div> <div>Liquid Limit</div> </div> <div> <div>20</div> <div>40</div> <div>60</div> <div>80</div> </div>	
		ORGANICS - moss, peat, roots, moist, dark brown, (100 mm thick)	Unfrozen				1119
		GRAVEL - sandy, trace silt, cobbles throughout, occasional boulder, moist, compact, greyish brown, subrounded gravel					
1	Excavation						1118
2		- (Gravel - 63%; Sand - 28%; Silt & Clay - 10%)		SA12	8	●	
							1117
				SA13	8.3	●	
3							
				SA14	6.5	●	1116
		END OF TESTPIT (3.5 metres)					
4							1115
5							



TETRA TECH

Contractor: North American Tungsten Corporation Ltd.

Drilling Rig Type: Hitachi 200

Logged By: CPC

Reviewed By: TP

Completion Depth: 3.5 m

Start Date: October 3, 2019

Completion Date: October 3, 2019

Page 1 of 1

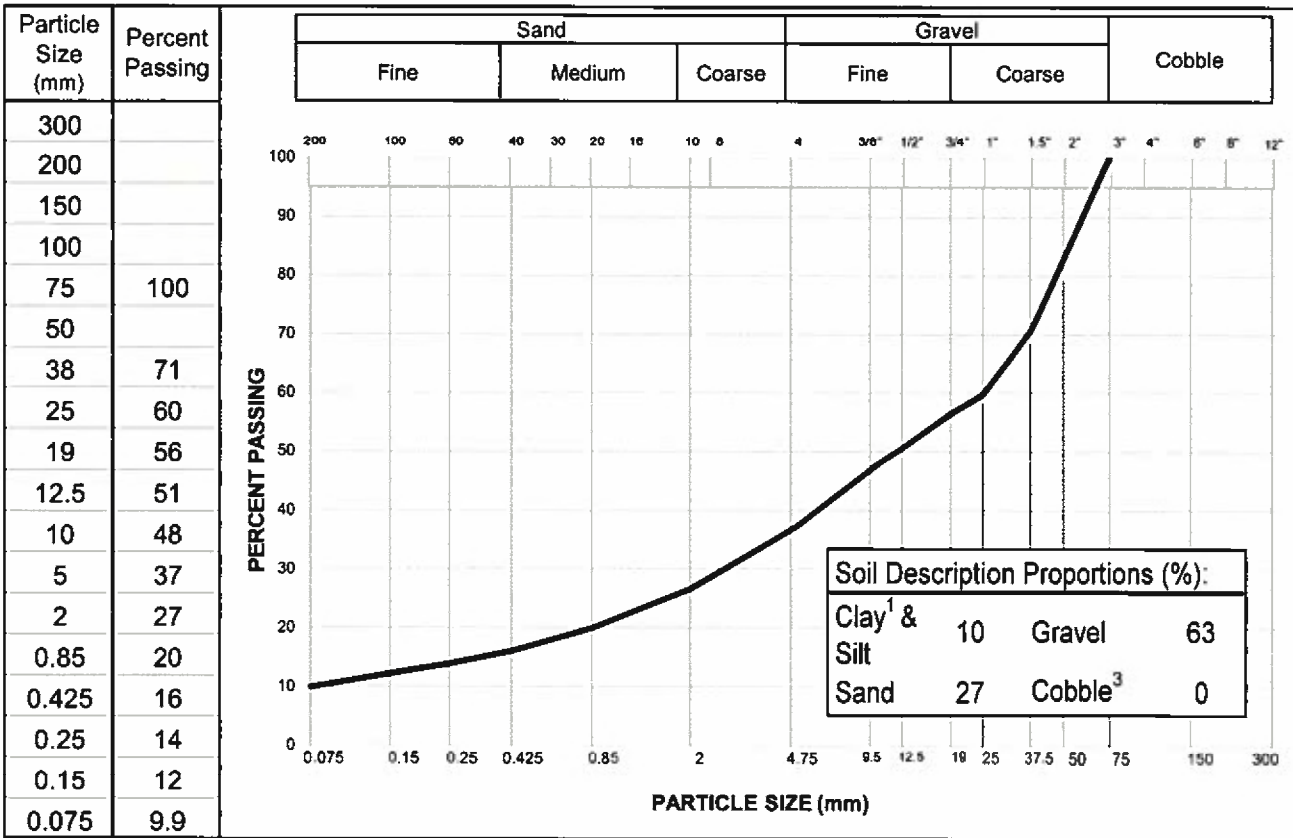
PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: 2019 Borrow Source Investigation
 Project No.: ENW.WENW03039-04.008
 Site: Cantung Mine NT
 Client: NATCL
 Client Rep.:
 Date Tested: October 10, 2019 By: BW
 Soil Description²: GRAVEL - sandy, trace silt

Sample No.: SA02 (13)
 Material Type:
 Sample Loc.: BS-19TP04
 Sample Depth: 1.9 - 2.0
 Sampling Method: Grab
 Date Sampled: October 3, 2019
 Sampled By: CC
 USC Classification: Cu: 319.6
 Cc: 4.3

Moisture Content: 8.3%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75


Specification: _____

Remarks: _____

Reviewed By: P.Eng.

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			Testpit No: BS-19TP05				
			Project: 2019 Borrow Source Investigation		Project No: ENW.WENW03039-04.008		
			Location: Cantung Mine		Ground Elev: 1118.23 m		
			Tungsten, Northwest Territories		UTM: 542588 E; 6869272 N; Z 9		
Depth (m)	Method	Soil Description	Ground Ice Description	Sample Type	Sample Number	Moisture Content (%)	Elevation (m)
0						<div> <div>Plastic Limit</div> <div>Moisture Content</div> <div>Liquid Limit</div> </div> <div> <div>20</div> <div>40</div> <div>60</div> <div>80</div> </div>	
		ORGANICS - moss, peat, ash, roots, moist, dark brown, (100 mm thick)	Unfrozen				1118
		GRAVEL - sandy, trace silt, trace cobbles, trace boulders, moist, compact, greyish brown, subrounded gravel					
1	Excavation						1117
2		- (Gravel - 53%; Sand - 37%; Silt & Clay - 10%)		SA15	8.7	●	
				SA16	9.5	●	1116
3				SA17	7.5	●	1115
		END OF TESTPIT (3.5 metres)					
4							1114
5							
 TETRA TECH			Contractor: North American Tungsten Corporation Ltd.		Completion Depth: 3.5 m		
			Drilling Rig Type: Hitachi 200		Start Date: October 3, 2019		
			Logged By: CPC		Completion Date: October 3, 2019		
			Reviewed By: TP		Page 1 of 1		

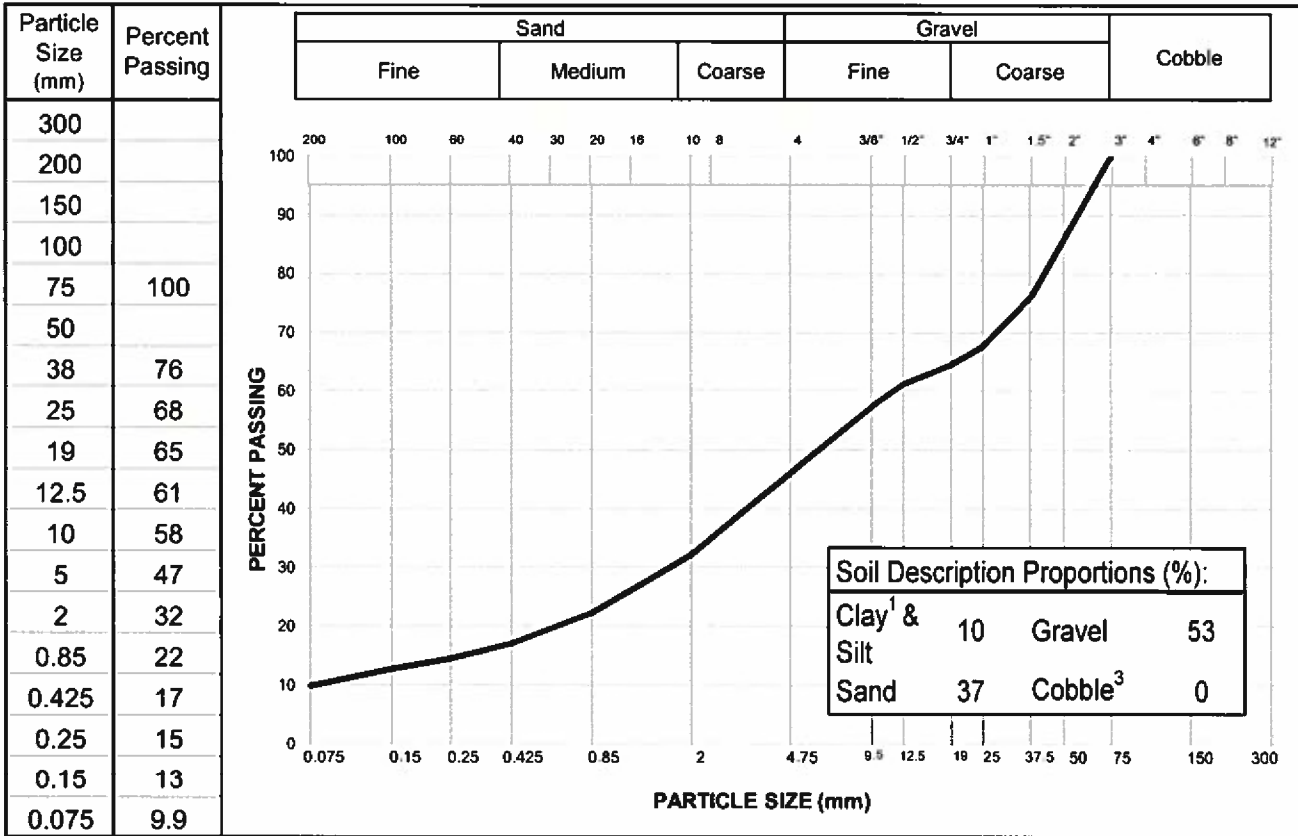
PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: 2019 Borrow Source Investigation
 Project No.: ENW.WENW03039-04.008
 Site: Cantung Mine NT
 Client: NATCL
 Client Rep.:
 Date Tested: October 10, 2019 By: BW
 Soil Description²: GRAVEL - SAND - trace silt

Sample No.: SA02 (16)
 Material Type:
 Sample Loc.: BS-19TP05
 Sample Depth: 1.9 - 2.0
 Sampling Method: Grab
 Date Sampled: October 3, 2019
 Sampled By: CC
 USC Classification: Cu: 147.1
 Cc: 3.4

Moisture Content: 9.5%



Notes: ¹ The upper clay size of 2 μ m, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75


Specification: _____

Remarks: _____

Reviewed By: P.Eng.

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			Testpit No: BS-19TP06				
			Project: 2019 Borrow Source Investigation		Project No: ENW.WENW03039-04.008		
			Location: Cantung Mine		Ground Elev: 1118.82 m		
			Tungsten, Northwest Territories		UTM: 542569 E; 6869254 N; Z 9		
Depth (m)	Method	Soil Description	Ground Ice Description	Sample Type	Sample Number	Moisture Content (%)	Elevation (m)
0						<div> <div>Plastic Limit</div> <div>Moisture Content</div> <div>Liquid Limit</div> </div> <div> <div>20</div> <div>40</div> <div>60</div> <div>80</div> </div>	
		ORGANICS - moss, peat, ash, roots, moist, dark brown, (100 mm thick)	Unfrozen				
		GRAVEL - sandy, trace silt, trace cobbles, trace boulders, moist, compact, greyish brown, subrounded gravel					
1	Excavation						1118
2		- orangey brown - (Gravel - 58%; Sand - 33%; Silt & Clay - 9%)		SA18	8.2	●	1117
3				SA19	9.9	●	1116
				SA20	9.4	●	1115
4		END OF TESTPIT (3.5 metres)					1114
5							
 TETRA TECH			Contractor: North American Tungsten Corporation Ltd.		Completion Depth: 3.5 m		
			Drilling Rig Type: Hitachi 200		Start Date: October 3, 2019		
			Logged By: CPC		Completion Date: October 3, 2019		
			Reviewed By: TP		Page 1 of 1		

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: 2019 Borrow Source Investigation

Sample No.: SA02 (19)

Project No.: ENW.WENW03039-04.008

Material Type:

Site: Cantung Mine NT

Sample Loc.: BS-19TP06

Client: NATCL

Sample Depth: 1.9 - 2.0

Client Rep.:

Sampling Method: Grab

Date Tested: October 10, 2019 By: BW

Date Sampled: October 3, 2019

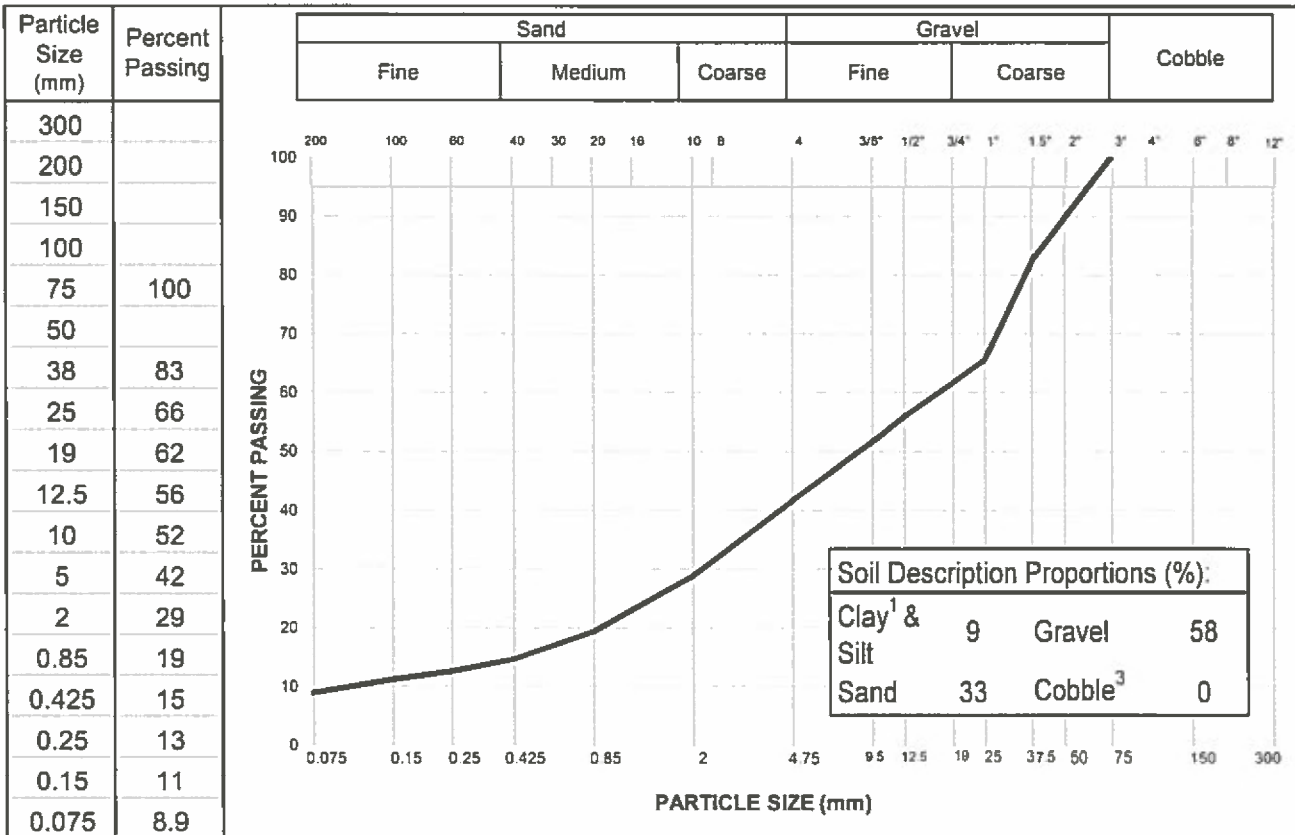
Soil Description²: GRAVEL - sandy, trace silt

Sampled By: CC

USC Classification: Cu: 155.3

Moisture Content: 9.9%

Cc: 2.7



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual

² The description is visually based & subject to Tt WM4400 description protocols

³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification: _____

Remarks: _____

Reviewed By: P.Eng.

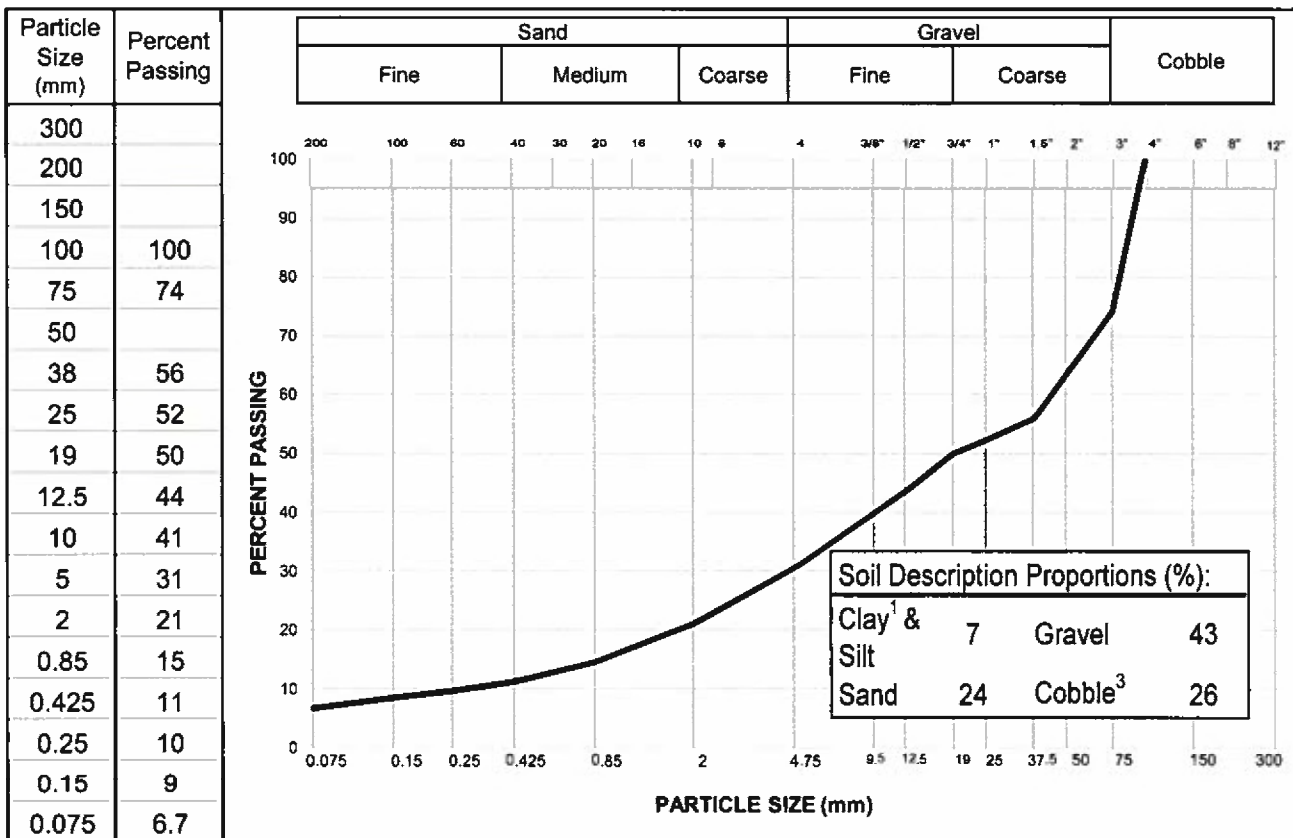
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PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: 2019 Borrow Source Investigation	Sample No.: SA02 (22)
Project No.: ENW.WENW03039-04.008	Material Type:
Site: Cantung Mine NT	Sample Loc.: BS-19TP07
Client: NATCL	Sample Depth: 1.9 - 2.0
Client Rep.:	Sampling Method: Grab
Date Tested: October 10, 2019 By: BW	Date Sampled: October 3, 2019
Soil Description ² : GRAVEL - some cobble, some sand	Sampled By: CC
Moisture Content: 8.9%	USC Classification: Cu: #N/A Cc: #N/A



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75


Specification: _____

Remarks: _____

Reviewed By: P.Eng.

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			Testpit No: BS-19TP08				
			Project: 2019 Borrow Source Investigation		Project No: ENW.WENW03039-04.008		
			Location: Cantung Mine		Ground Elev: 1113.04 m		
			Tungsten, Northwest Territories		UTM: 542738 E; 6869173 N; Z 9		
Depth (m)	Method	Soil Description	Ground Ice Description	Sample Type	Sample Number	Moisture Content (%)	Elevation (m)
0						<div> <div>Plastic Limit</div> <div>Moisture Content</div> <div>Liquid Limit</div> </div> <div> <div>20</div> <div>40</div> <div>60</div> <div>80</div> </div>	
		ORGANICS - moss, peat, roots, moist, dark brown, (100 mm thick)	Unfrozen				1113
		GRAVEL AND SAND - trace silt, occasional cobble, moist, compact, greyish brown, subrounded gravel					
1	Excavation				SA24	12.9	1112
2		- (Gravel - 48%; Sand - 43%; Silt & Clay - 9%)			SA25	10.5	1111
3					SA26	8.8	1110
		END OF TESTPIT (3.3 metres)					
4							1109
5							
 TETRA TECH			Contractor: North American Tungsten Corporation Ltd.		Completion Depth: 3.3 m		
			Drilling Rig Type: Hitachi 200		Start Date: October 4, 2019		
			Logged By: CPC		Completion Date: October 4, 2019		
			Reviewed By: TP		Page 1 of 1		

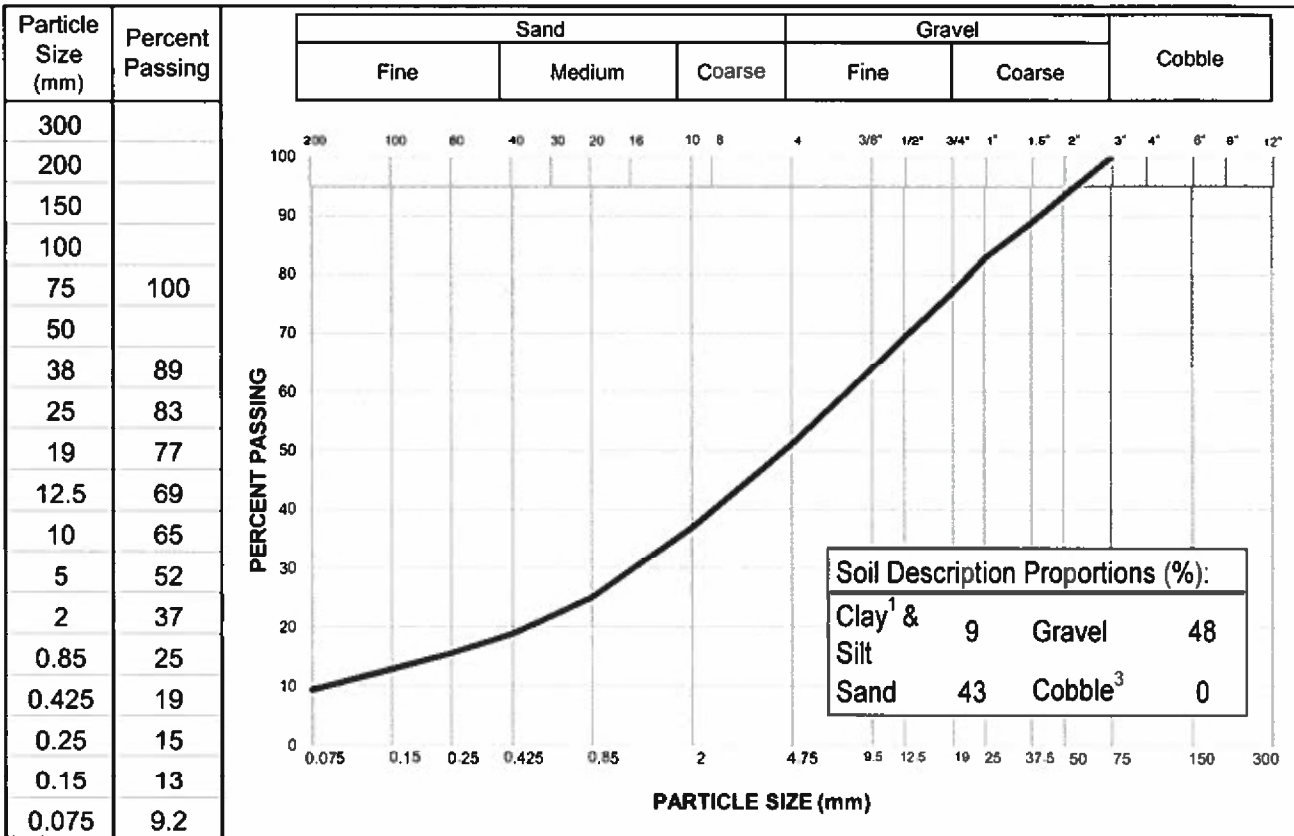
PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: 2019 Borrow Source Investigation
 Project No.: ENW.WENW03039-04.008
 Site: Cantung Mine NT
 Client: NATCL
 Client Rep.:
 Date Tested: October 10, 2019 By: BW
 Soil Description²: GRAVEL and SAND - trace silt

Sample No.: SA02 (25)
 Material Type:
 Sample Loc.: BS-19TP08
 Sample Depth: 1.9 - 2.0
 Sampling Method: Grab
 Date Sampled: October 4, 2019
 Sampled By: CC
 USC Classification: Cu: 89.0
 Cc: 2.4

Moisture Content: 9.5%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification: _____

Remarks: _____

Reviewed By: P.Eng.

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			Testpit No: BS-19TP09				
			Project: 2019 Borrow Source Investigation		Project No: ENW.WENW03039-04.008		
			Location: Cantung Mine		Ground Elev: 1115.49 m		
			Tungsten, Northwest Territories		UTM: 542710 E; 6869156 N; Z 9		
Depth (m)	Method	Soil Description	Ground Ice Description	Sample Type	Sample Number	Moisture Content (%)	Elevation (m)
0		ORGANICS - moss, peat, roots, moist, dark brown, (100 mm thick)	Unfrozen				
		GRAVEL - sandy, some cobbles, trace silt, moist, compact, greyish brown, subrounded gravel					
1	Excavation	- cobbles, some boulders					
2		- (Gravel - 65%; Sand - 27%; Silt & Clay - 8%)					
3							
4		END OF TESTPIT (3.7 metres)					
5							
			Contractor: North American Tungsten Corporation Ltd.		Completion Depth: 3.7 m		
			Drilling Rig Type: Hitachi 200		Start Date: October 4, 2019		
			Logged By: CPC		Completion Date: October 4, 2019		
			Reviewed By: TP		Page 1 of 1		

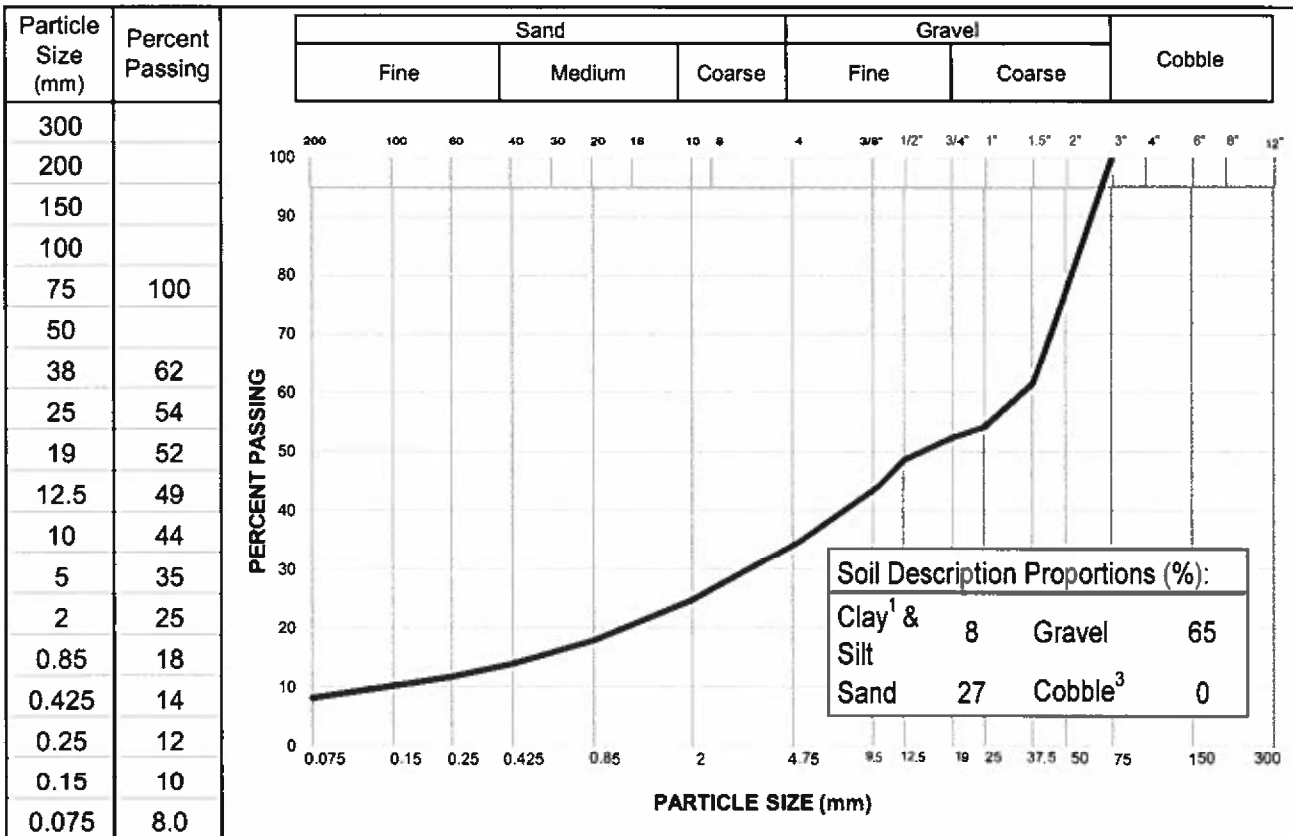


TETRA TECH

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: 2019 Borrow Source Investigation	Sample No.: SA02 (28)
Project No.: ENW.WENW03039-04.008	Material Type:
Site: Cantung Mine NT	Sample Loc.: BS-19TP09
Client: NATCL	Sample Depth: 1.9 - 2.0
Client Rep.:	Sampling Method: Grab
Date Tested: October 10, 2019 By: BW	Date Sampled: October 4, 2019
Soil Description ² : GRAVEL - sandy, trace silt	Sampled By: CC
Moisture Content: 7.5%	USC Classification: Cu: 239.6 Cc: 2.5



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75


Specification: _____

Remarks: _____

Reviewed By: P.Eng.

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			Testpit No: BS-19TP10				
			Project: 2019 Borrow Source Investigation		Project No: ENW.WENW03039-04.008		
			Location: Cantung Mine		Ground Elev: 1115.48 m		
			Tungsten, Northwest Territories		UTM: 542693 E; 6869131 N; Z 9		
Depth (m)	Method	Soil Description	Ground Ice Description	Sample Type	Sample Number	Moisture Content (%)	Elevation (m)
0						<div> <div>Plastic Limit</div> <div>Moisture Content</div> <div>Liquid Limit</div> </div> <div> <div>20</div> <div>40</div> <div>60</div> <div>80</div> </div>	
		ORGANICS - moss, peat, roots, moist, dark brown, (100 mm thick)	Unfrozen				
		GRAVEL - sandy, some silt, some cobbles and boulders, moist, compact, greyish brown, subrounded gravel					
1	Excavation			SA30	9.6	●	1115
2		- (Gravel - 60%; Sand - 29%; Silt & Clay - 11%)		SA31	11.3	●	1114
3				SA32	6.5	●	1113
		END OF TESTPIT (3.5 metres)					1112
4							
5							1111
 TETRA TECH			Contractor: North American Tungsten Corporation Ltd.		Completion Depth: 3.5 m		
			Drilling Rig Type: Hitachi 200		Start Date: October 4, 2019		
			Logged By: CPC		Completion Date: October 4, 2019		
			Reviewed By: TP		Page 1 of 1		

ASTM D7928 & C136

Cc: #N/A



Clay ¹ & Silt	11	Gravel	60
Sand	29	Cobble ³	0

³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75


Remarks:

Reviewed By: P.Eng.

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		Testpit No: BS-19TP11					
		Project: 2019 Borrow Source Investigation		Project No: ENW.WENW03039-04.008			
		Location: Cantung Mine		Ground Elev: 1115.59 m			
		Tungsten, Northwest Territories		UTM: 542880 E; 6869076 N; Z 9			
Depth (m)	Method	Soil Description	Ground Ice Description	Sample Type	Sample Number	Moisture Content (%)	Elevation (m)
0						Plastic Limit 20 Moisture Content 40 60 80 Liquid Limit	
		ORGANICS - moss, peat, roots, moist, dark brown, (100 mm thick)	Unfrozen				
		GRAVEL - sandy, some silt, moist, compact, greyish brown, subrounded gravel					
1	Excavation	- (Gravel - 62%; Sand - 27%; Silt & Clay - 11%)			SA33	7.9	
2				SA34	4.6		
3					SA35	4.5	
4		END OF TESTPIT (4.0 metres)					
5							

 TETRA TECH	Contractor: North American Tungsten Corporation Ltd.	Completion Depth: 4 m
	Drilling Rig Type: Hitachi 200	Start Date: October 4, 2019
	Logged By: CPC	Completion Date: October 4, 2019
	Reviewed By: TP	Page 1 of 1

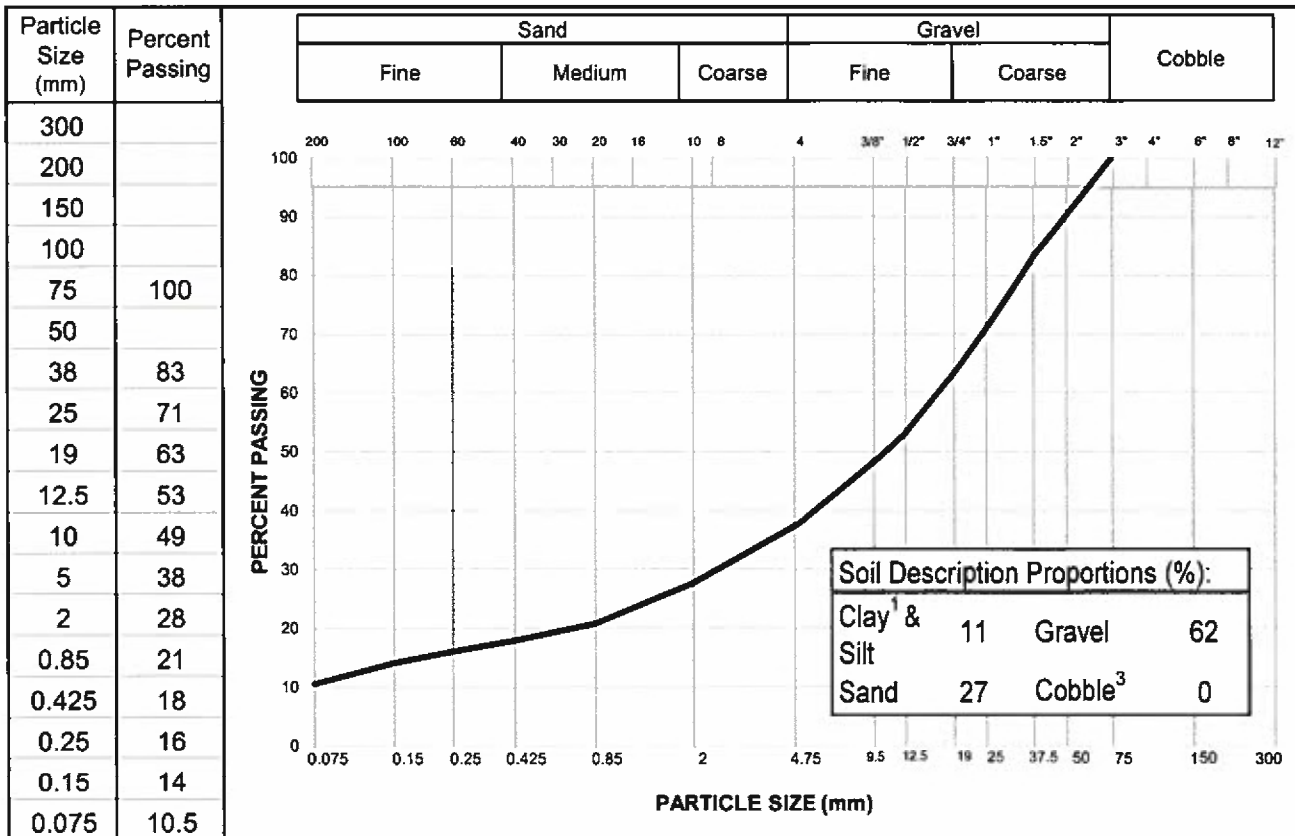
PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: 2019 Borrow Source Investigation
 Project No.: ENW.WENW03039-04.008
 Site: Cantung Mine NT
 Client: NATCL
 Client Rep.:
 Date Tested: October 10, 2019 By: BW
 Soil Description²: GRAVEL - sandy, some silt

Sample No.: SA02 (34)
 Material Type:
 Sample Loc.: BS-19TP11
 Sample Depth: 1.9 - 2.0
 Sampling Method: Grab
 Date Sampled: October 4, 2019
 Sampled By: CC
 USC Classification: Cu: #N/A
 Cc: #N/A

Moisture Content: 4.8%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75


Specification: _____

Remarks: _____

Reviewed By: P.Eng.

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			Testpit No: BS-19TP12				
			Project: 2019 Borrow Source Investigation		Project No: ENW.WENW03039-04.008		
			Location: Cantung Mine		Ground Elev: 1117.19 m		
			Tungsten, Northwest Territories		UTM: 542884 E; 6869039 N; Z 9		
Depth (m)	Method	Soil Description	Ground Ice Description	Sample Type	Sample Number	Moisture Content (%)	Elevation (m)
0						<div> <div>Plastic Limit</div> <div>Moisture Content</div> <div>Liquid Limit</div> </div> <div> <div>20</div> <div>40</div> <div>60</div> <div>80</div> </div>	
	Excavation	ORGANICS - moss, peat, roots, moist, dark brown, (100 mm thick)	Unfrozen				1117
		GRAVEL - sandy, some cobbles, trace silt, moist, compact, greyish brown, subrounded gravel					
1		- one very large boulder (1.0 metre diameter)					1116
2		SAND - some silt, trace gravel, moist, compact, greyish brown, fine to medium sand - (Gravel - 2%; Sand - 85%; Silt & Clay - 13%)					1115
3							1114
4		END OF TESTPIT (3.6 metres)					1113
5							
 TETRA TECH			Contractor: North American Tungsten Corporation Ltd.		Completion Depth: 3.6 m		
			Drilling Rig Type: Hitachi 200		Start Date: October 4, 2019		
			Logged By: CPC		Completion Date: October 4, 2019		
			Reviewed By: TP		Page 1 of 1		

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: 2019 Borrow Source Investigation

Sample No.: SA02 (37)

Project No.: ENW.WENW03039-04.008

Material Type:

Site: Cantung Mine NT

Sample Loc.: BS-19TP12

Client: NATCL

Sample Depth: 1.9 - 2.0

Client Rep.:

Sampling Method: Grab

Date Tested: October 10, 2019 By: BW

Date Sampled: October 4, 2019

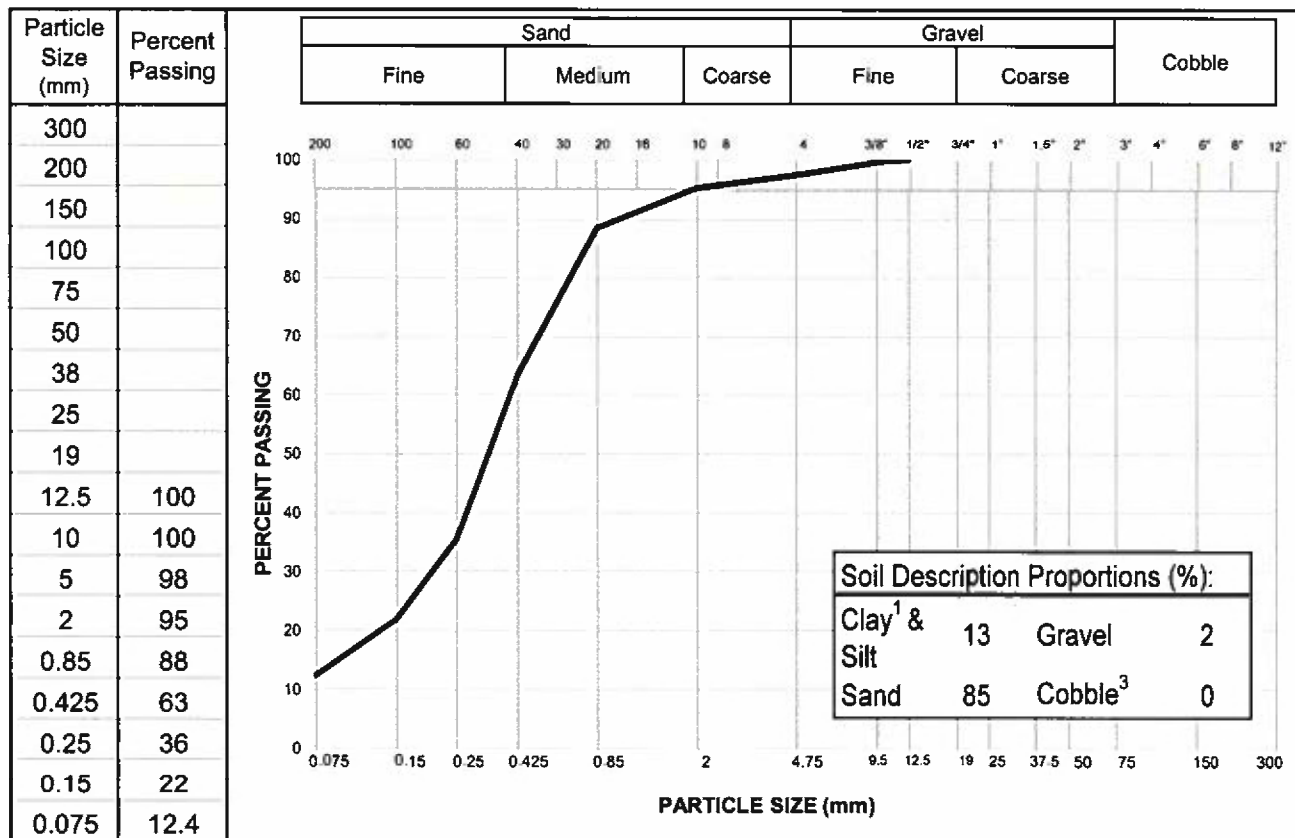
Soil Description²: SAND - some silt, trace gravel

Sampled By: CC

USC Classification: Cu: #N/A

Moisture Content: 7.6%

Cc: #N/A



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual

² The description is visually based & subject to Tt WM4400 description protocols

³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75


Specification: _____

Remarks: _____

Reviewed By: *[Signature]* P.Eng.

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			Testpit No: BS-19TP13				
			Project: 2019 Borrow Source Investigation		Project No: ENW.WENW03039-04.008		
			Location: Cantung Mine		Ground Elev: 1114.74 m		
			Tungsten, Northwest Territories		UTM: 542850 E; 6869017 N; Z 9		
Depth (m)	Method	Soil Description	Ground Ice Description	Sample Type	Sample Number	Moisture Content (%)	Elevation (m)
0						<div> <div>Plastic Limit</div> <div>Moisture Content</div> <div>Liquid Limit</div> </div> <div> <div>20</div> <div>40</div> <div>60</div> <div>80</div> </div>	
		ORGANICS - moss, peat, roots, moist, dark brown, (100 mm thick)	Unfrozen				
		GRAVEL - sandy, trace silt, cobbles, moist, compact, greyish brow, subrounded gravel					
1	Excavation						1114
2		- (Gravel - 71%; Sand - 22%; Silt & Clay - 7%)		SA39	9.6	●	1113
3				SA40	8.7	●	1112
4				SA41	10.7	●	1111
		END OF TESTPIT (3.7 metres)					1111
5							1110
 TETRA TECH			Contractor: North American Tungsten Corporation Ltd.		Completion Depth: 3.7 m		
			Drilling Rig Type: Hitachi 200		Start Date: October 4, 2019		
			Logged By: CPC		Completion Date: October 4, 2019		
			Reviewed By: TP		Page 1 of 1		

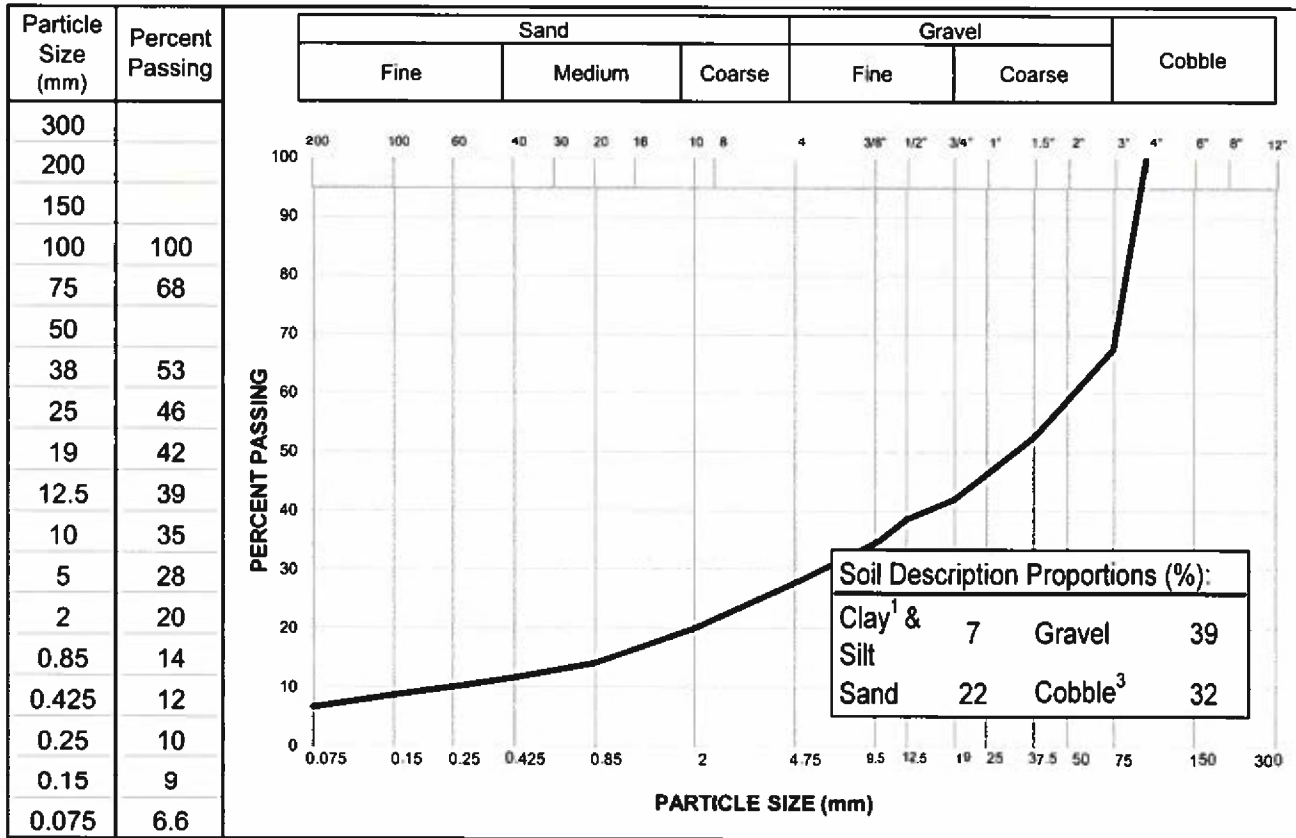
PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: 2019 Borrow Source Investigation
 Project No.: ENW.WENW03039-04.008
 Site: Cantung Mine NT
 Client: NATCL
 Client Rep.:
 Date Tested: October 10, 2019 By: KC
 Soil Description²: GRAVEL - cobbley, sandy, trace silt

Sample No.: SA02 (40)
 Material Type:
 Sample Loc.: BS-19TP13
 Sample Depth: 1.9 - 2.0
 Sampling Method: Grab
 Date Sampled: October 4, 2019
 Sampled By: CC
 USC Classification: Cu: #N/A
 Cc: #N/A

Moisture Content: 7.5%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification: _____

Remarks: _____

Reviewed By: P.Eng.

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		Testpit No: BS-19TP14					
		Project: 2019 Borrow Source Investigation			Project No: ENW.WENW03039-04.008		
		Location: Cantung Mine			Ground Elev: 1121.45 m		
		Tungsten, Northwest Territories			UTM: 543026 E; 6868982 N; Z 9		
Depth (m)	Method	Soil Description	Ground Ice Description	Sample Type	Sample Number	Moisture Content (%)	Elevation (m)
0		ORGANICS - moss, peat, roots, moist, dark brown, (100 mm thick) GRAVEL - sandy, some silt, moist, compact, greyish brown, subangular gravel	Unfrozen				
1	Excavation	- ash layer		SA42	6	●	1121
2		- (Gravel - 57%; Sand - 27%; Silt & Clay - 16%)		SA43	6.7	●	1120
3				SA44	4.9	●	1119
4		END OF TESTPIT (3.7 metres)					1118
5							1117
		Contractor: North American Tungsten Corporation Ltd.			Completion Depth: 3.7 m		
		Drilling Rig Type: Hitachi 200			Start Date: October 4, 2019		
		Logged By: CPC			Completion Date: October 4, 2019		
		Reviewed By: TP			Page 1 of 1		

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: 2019 Borrow Source Investigation

Sample No.: SA02 (43)

Project No.: ENW.WENW03039-04.008

Material Type:

Site: Cantung Mine NT

Sample Loc.: BS-19TP14

Client: NATCL

Sample Depth: 1.9 - 2.0

Client Rep.:

Sampling Method: Grab

Date Tested: October 10, 2019 By: DK

Date Sampled: October 4, 2019

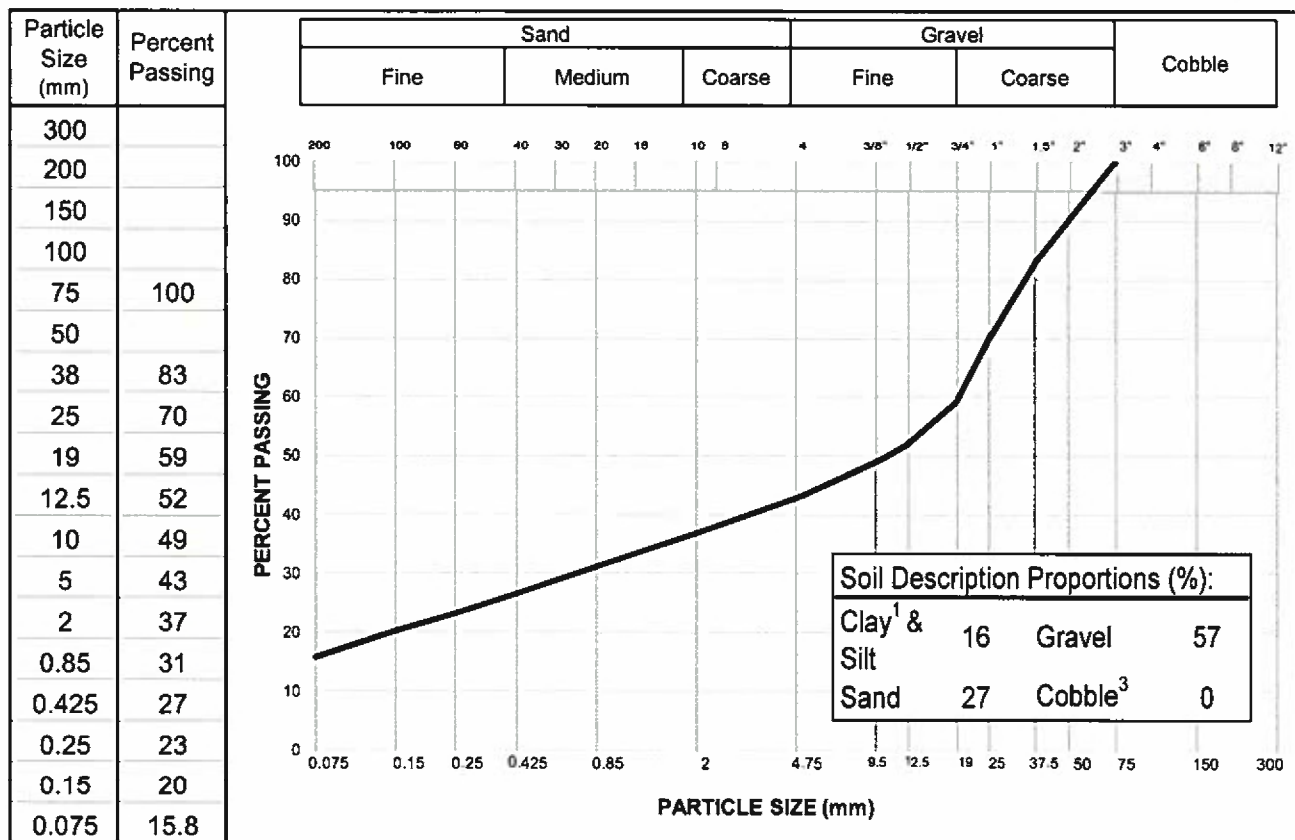
Soil Description²: GRAVEL - sandy, some silt

Sampled By: CC

USC Classification: Cu: #N/A

Moisture Content: 6.7%

Cc: #N/A



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual

² The description is visually based & subject to Tt WM4400 description protocols

³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75


Specification:

Remarks:

Reviewed By: P.Eng.

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			Testpit No: BS-19TP15				
			Project: 2019 Borrow Source Investigation		Project No: ENW.WENW03039-04.008		
			Location: Cantung Mine		Ground Elev: 1117.57 m		
			Tungsten, Northwest Territories		UTM: 543044 E; 6868955 N; Z 9		
Depth (m)	Method	Soil Description	Ground Ice Description	Sample Type	Sample Number	Moisture Content (%)	Elevation (m)
0						<div> <div>Plastic Limit</div> <div>Moisture Content</div> <div>Liquid Limit</div> </div> <div> <div>20</div> <div>40</div> <div>60</div> <div>80</div> </div>	
	Excavation	ORGANICS - moss, peat, roots, moist, dark brown, (100 mm thick)	Unfrozen				
		GRAVEL - sandy, some silt, moist, compact, greyish brown, subrounded gravel					
		- thin ash layer - orangey brown					
1		- greyish brown					1117
					SA45	11.2	
2		- (Gravel - 57%; Sand - 31%; Silt & Clay - 12%) - some cobbles and boulders			SA46	6.4	
							1116
							1115
3		END OF TESTPIT (3.0 metres)			SA47	3.7	
							1114
4							
							1113
5							
 TETRA TECH			Contractor: North American Tungsten Corporation Ltd.		Completion Depth: 3 m		
			Drilling Rig Type: Hitachi 200		Start Date: October 4, 2019		
			Logged By: CPC		Completion Date: October 4, 2019		
			Reviewed By: TP		Page 1 of 1		

PARTICLE SIZE ANALYSIS REPORT

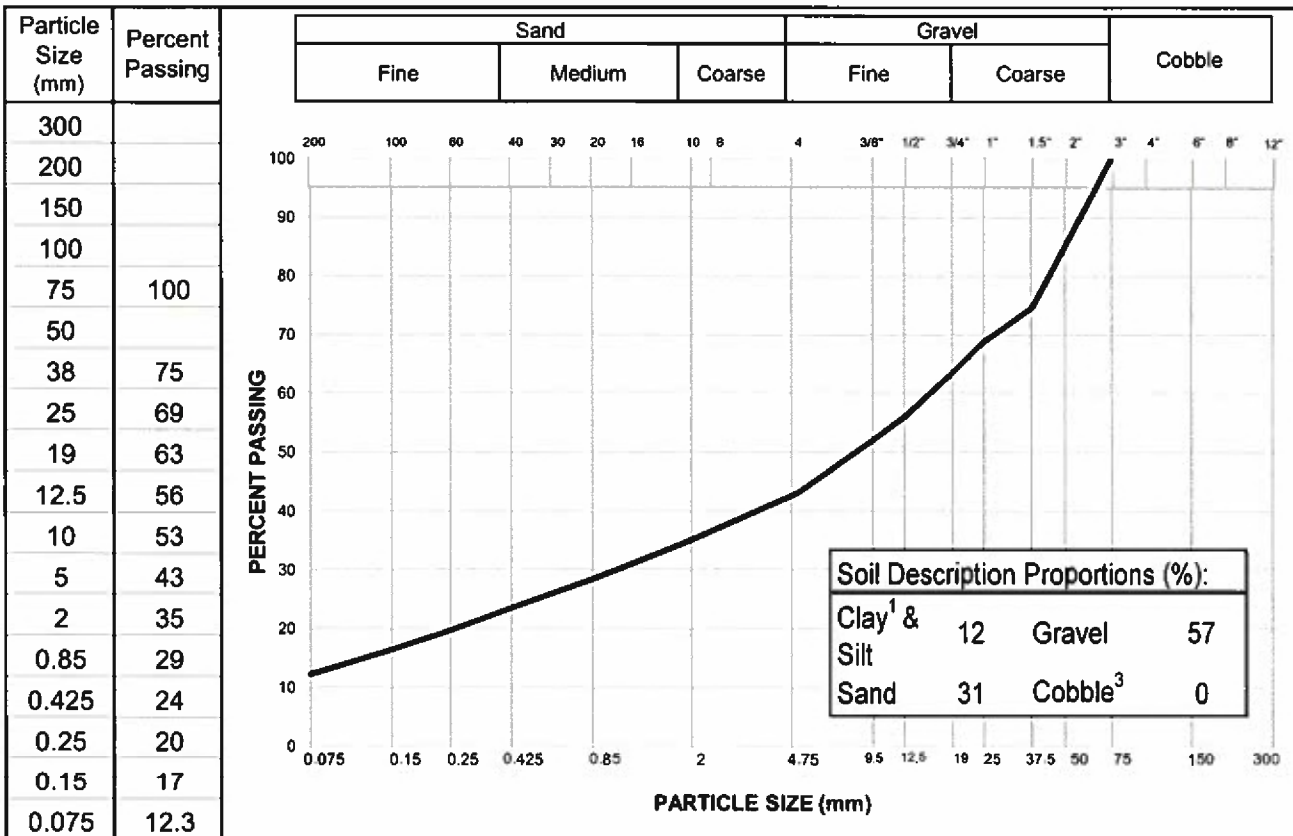
ASTM D7928 & C136

Project: 2019 Borrow Source Investigation
 Project No.: ENW.WENW03039-04.008
 Site: Cantung Mine NT
 Client: NATCL
 Client Rep.:
 Date Tested: October 10, 2019 By: DK
 Soil Description²: GRAVEL - sandy, some silt

Sample No.: SA02 (46)
 Material Type:
 Sample Loc.: BS-19TP15
 Sample Depth: 1.9 - 2.0
 Sampling Method: Grab
 Date Sampled: October 4, 2019
 Sampled By: CC

USC Classification: Cu: #N/A
 Cc: #N/A

Moisture Content: 6.4%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification: _____


Remarks: _____

Reviewed By: _____

P.Eng.

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			Testpit No: BS-19TP16				
			Project: 2019 Borrow Source Investigation		Project No: ENW.WENW03039-04.008		
			Location: Cantung Mine		Ground Elev: 1116.02 m		
			Tungsten, Northwest Territories		UTM: 543059 E; 6868930 N; Z 9		
Depth (m)	Method	Soil Description	Ground Ice Description	Sample Type	Sample Number	Moisture Content (%)	Elevation (m)
0						<div> <div>Plastic Limit</div> <div>Moisture Content</div> <div>Liquid Limit</div> </div> <div> <div>20</div> <div>40</div> <div>60</div> <div>80</div> </div>	
		ORGANICS - moss, peat, roots, moist, dark brown, (200 mm thick)	Unfrozen				1116
		GRAVEL - sandy, trace to some silt, one large boulder, moist, compact, greyish brown, subrounded gravel					
1	Excavation	- cobbles and boulders		SA48	6	●	1115
2		SILT AND SAND - moist, firm, brownish grey - (Gravel - 0%; Sand - 44%; Silt & Clay - 56%)		SA49	15.8	●	1114
3		GRAVEL - sandy, some cobbles, trace to some silt, moist, compact, greyish brown, subrounded gravel					1113
		END OF TESTPIT (3.7 metres)		SA50	7.5	●	
4							1112
5							
 TETRA TECH			Contractor: North American Tungsten Corporation Ltd.		Completion Depth: 3.7 m		
			Drilling Rig Type: Hitachi 200		Start Date: October 4, 2019		
			Logged By: CPC		Completion Date: October 4, 2019		
			Reviewed By: TP		Page 1 of 1		

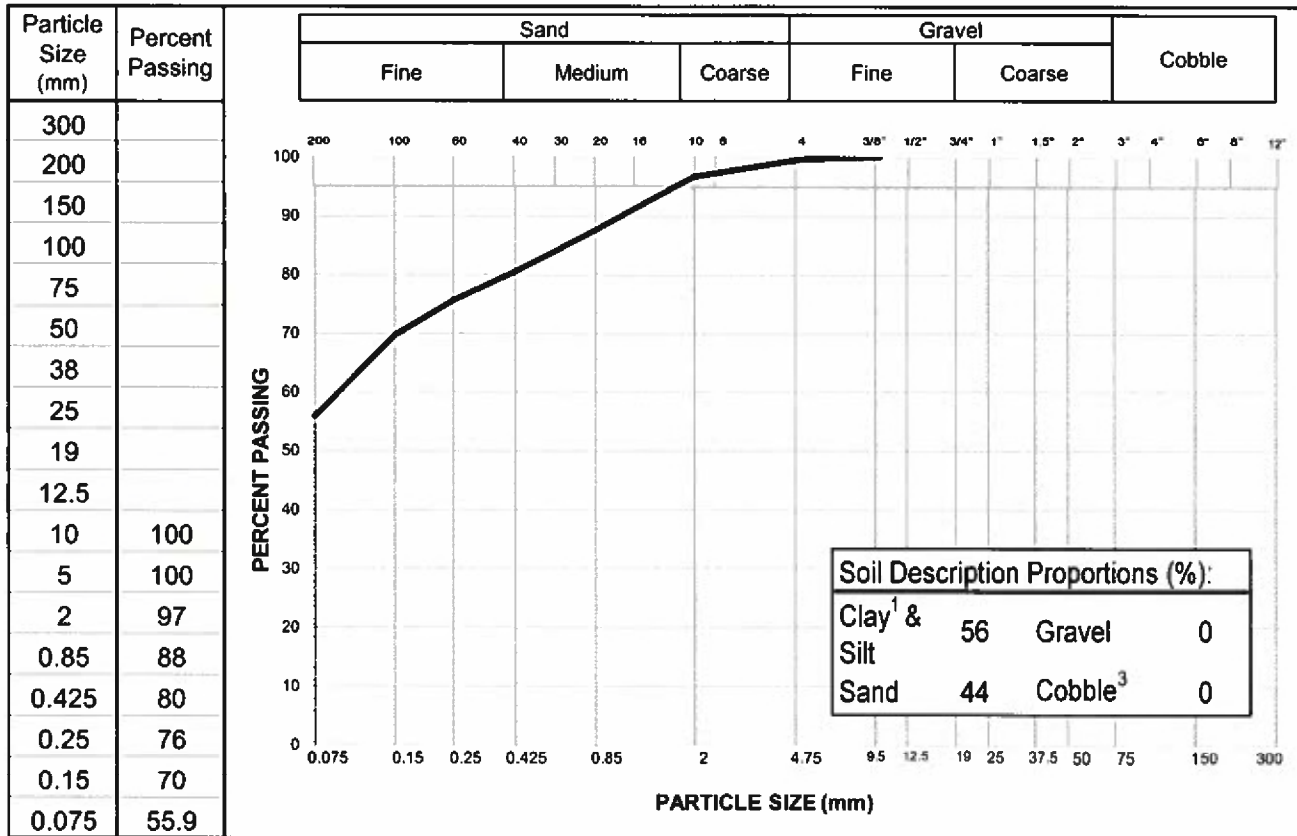
PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

Project: 2019 Borrow Source Investigation
 Project No.: ENW.WENW03039-04.008
 Site: Cantung Mine NT
 Client: NATCL
 Client Rep.:
 Date Tested: October 10, 2019 By: DK
 Soil Description²: SILT and SAND

Sample No.: SA02 (49)
 Material Type:
 Sample Loc.: BS-19TP16
 Sample Depth: 1.9 - 2.0
 Sampling Method: Grab
 Date Sampled: October 4, 2019
 Sampled By: CC
 USC Classification: Cu: #N/A
 Cc: #N/A

Moisture Content: 15.8%



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification: _____


Remarks: _____

Reviewed By: P.Eng.

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			Testpit No: BS-19TP17				
			Project: 2019 Borrow Source Investigation		Project No: ENW.WENW03039-04.008		
			Location: Cantung Mine		Ground Elev: 1142.14 m		
			Tungsten, Northwest Territories		UTM: 540800 E; 6870999 N; Z 9		
Depth (m)	Method	Soil Description	Ground Ice Description	Sample Type	Sample Number	Moisture Content (%)	Elevation (m)
0						<div> <div>Plastic Limit</div> <div>Moisture Content</div> <div>Liquid Limit</div> </div> <div> <div>20</div> <div>40</div> <div>60</div> <div>80</div> </div>	
		ORGANICS - moss, peat, roots, moist, dark brown, (300 mm thick)	Unfrozen				1142
		SILT - some sand, firm, (200 mm thick)					
		GRAVEL - sandy, some silt, moist, compact, greyish brown, subrounded gravel					
1	Excavation			SA51	8.7	●	1141
2		- (Gravel - 58%; Sand - 31%; Silt & Clay - 11%)		SA52	7.3	●	1140
3				SA53	7.7	●	1139
4		END OF TESTPIT (4.0 metres)					1138
5							

 TETRA TECH	Contractor: North American Tungsten Corporation Ltd.	Completion Depth: 4 m
	Drilling Rig Type: Hitachi 200	Start Date: October 3, 2019
	Logged By: CPC	Completion Date: October 3, 2019
	Reviewed By: TP	Page 1 of 1

PARTICLE SIZE ANALYSIS REPORT

ASTM D7928 & C136

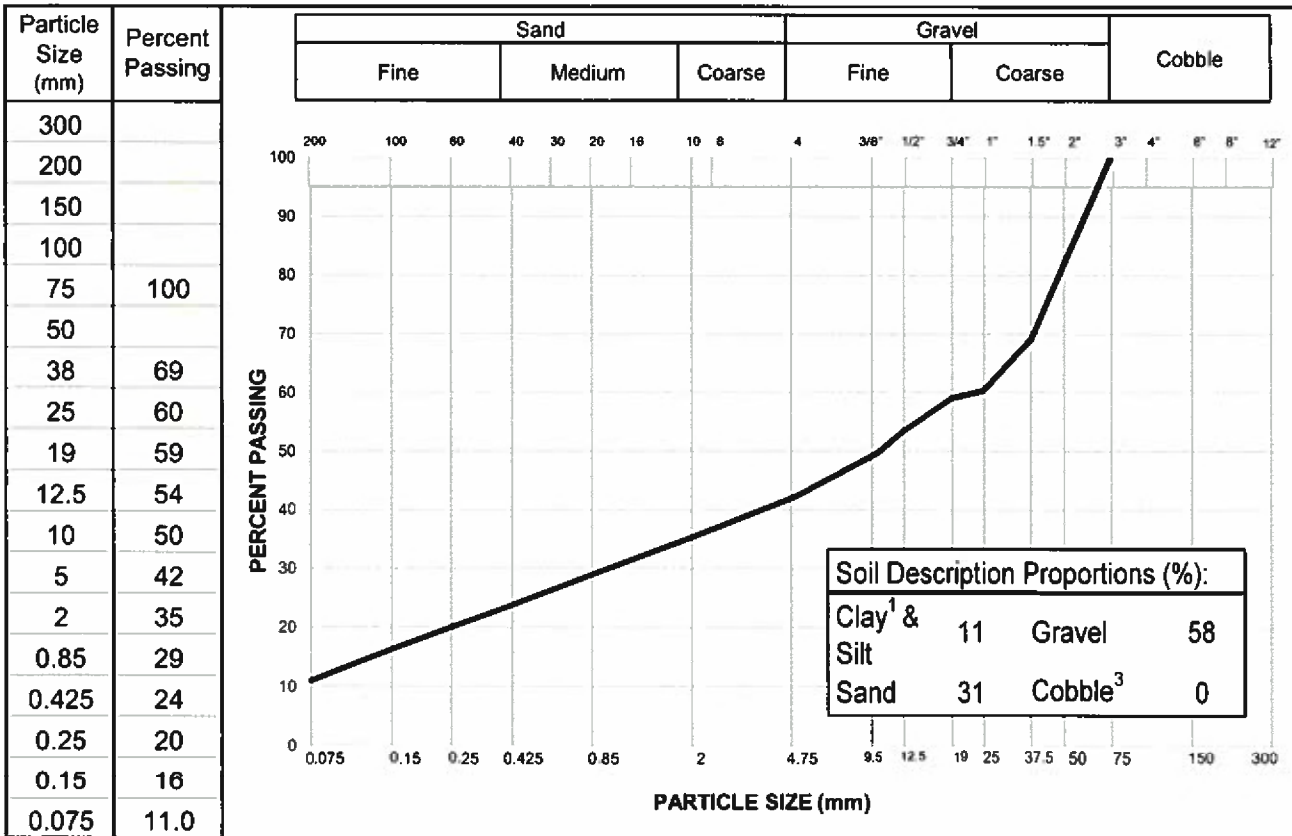
Project: 2019 Borrow Source Investigation
 Project No.: ENW.WENW03039-04.008
 Site: Cantung Mine NT
 Client: NATCL
 Client Rep.:
 Date Tested: October 10, 2019 By: DK
 Soil Description²: GRAVEL - sandy, some silt

Sample No.: SA02 (52)
 Material Type:
 Sample Loc.: BS-19TP17
 Sample Depth: 1.9 - 2.0 m
 Sampling Method: Grab
 Date Sampled: October 4, 2019
 Sampled By: CC

USC Classification: Cu: #N/A

Moisture Content: 7.3%

Cc: #N/A



Notes: ¹ The upper clay size of 2 um, per the Canadian Foundation Engineering Manual
² The description is visually based & subject to Tt WM4400 description protocols
³ If cobbles are present, sampling procedure may not meet ASTM C702 & D75

Specification: _____

Remarks: _____

Reviewed By: _____

P.Eng.

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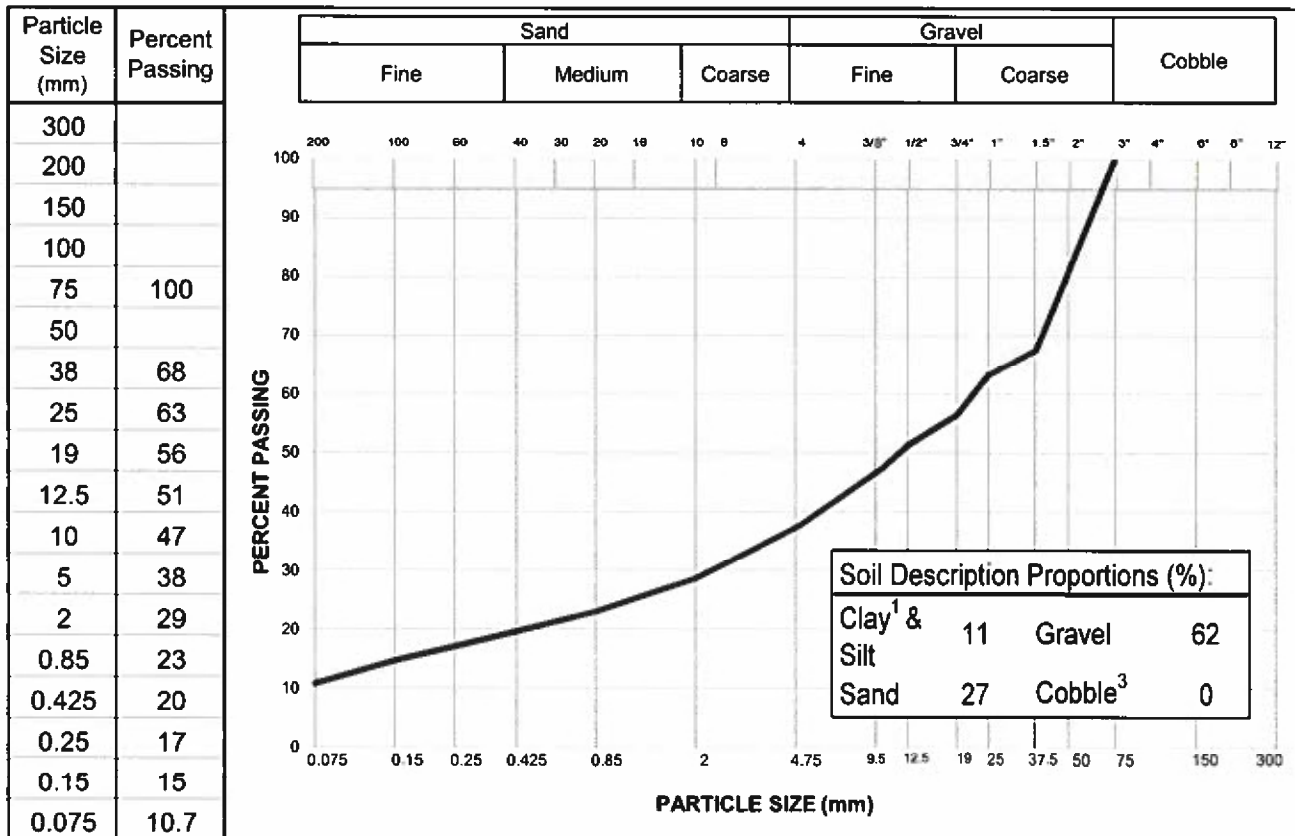
ASTM D7928 & C136

Cc: #N/A

			Testpit No: BS-19TP19				
			Project: 2019 Borrow Source Investigation		Project No: ENW.WENW03039-04.008		
			Location: Cantung Mine		Ground Elev: 1141.82 m		
			Tungsten, Northwest Territories		UTM: 540750 E; 6871200 N; Z 9		
Depth (m)	Method	Soil Description	Ground Ice Description	Sample Type	Sample Number	Moisture Content (%)	Elevation (m)
0						<div> <div>Plastic Limit</div> <div>Moisture Content</div> <div>Liquid Limit</div> </div> <div> <div>20</div> <div>40</div> <div>60</div> <div>80</div> </div>	
0	Excavation	ORGANICS - moss, peat, roots, moist, dark brown, (200 mm thick)	Unfrozen				<div>1141</div> <div>1140</div> <div>1139</div> <div>1138</div> <div>1137</div>

ASTM D7928 & C136

Cc: #N/A



Reviewed By: [Signature] P.Eng.

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed to recognized industry standards, unless noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.



TETRA TECH

APPENDIX D

GEOCHEMISTRY TESTING LABORATORY CERTIFICATES



ALS Canada Ltd.
2103 Dollarton Hwy
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To: TETRA TECH CANADA INC.
885 DUNSMUIR STREET
VANCOUVER BC V6C 1N5

Page: 1
Total # Pages: 2 (A - D)
Plus Appendix Pages
Finalized Date: 5-DEC-2017
Account: TGM

CERTIFICATE VA17251091

Project: 704- ENW.WENW03039- 02

P.O. No.: ENW.WENW03039- 02

This report is for 6 Rock samples submitted to our lab in Vancouver, BC, Canada on
15- NOV- 2017.

The following have access to data associated with this certificate:

S. KINGSTON

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI- 21	Received Sample Weight
SND- 01	Send samples to external laboratory
LOG- 22	Sample login - Rcd w/o BarCode
CRU- 31	Fine crushing - 70% < 2mm
SPL- 21	Split sample - riffle splitter
PUL- 31	Pulverize split to 85% < 75 um
SPL- 21X	Addl Crush Split w No Analysis

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
S- IR07	Sulphide Sulphur (Leco)	LECO
C- GAS05	Inorganic Carbon (CO2)	
ME- MS61	48 element four acid ICP- MS	
OA- VOL08	Basic Acid Base Accounting	
S- IR08	Total Sulphur (Leco)	LECO
OA- ELE07	Paste pH	
S- GRA06a	Sulfate Sulfur (HCl leachable)	WST- SEQ

To: TETRA TECH CANADA INC.
ATTN: S. KINGSTON
885 DUNSMUIR STREET
VANCOUVER BC V6C 1N5

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Signature:

Colin Ramshaw, Vancouver Laboratory Manager



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Plus Appendix Pages
Finalized Date: 5- DEC- 2017
Account: TGM

Project: 704-ENW.WENW03039- 02

CERTIFICATE OF ANALYSIS VA17251091

Sample Description	Method Analyte Units LOR	WEI- 21 Recvd Wt. kg 0.02	OA- VOL08 FIZZ RAT Unity 1	OA- VOL08 MPA tCaCO3/1kt 0.3	OA- VOL08 NNP tCaCO3/1kt 1	OA- VOL08 NP tCaCO3/1kt 1	OA- VOL08 Ratio (N Unity 0.01	OA- ELE07 pH Unity 0.1	S- IR08 S % 0.01	S- IR07 Sulphide % 0.01	C- GAS05 C % 0.05	C- GAS05 CO2 % 0.2	S- GRA06a S % 0.01	ME- MS61 Ag ppm 0.01	ME- MS61 Al % 0.01	ME- MS61 As ppm 0.2
9- 16- JD- 04		1.96	2	1.3	34	35	28.00	8.2	0.04	0.02	0.33	1.2	<0.01	0.28	6.27	19.3
9- 16- JD- 05		1.94	2	1.3	37	38	30.40	8.0	0.04	0.03	0.38	1.4	<0.01	0.25	6.16	19.0
9- 16- JD- 17		2.14	2	1.6	22	24	15.36	7.9	0.05	0.02	0.19	0.7	<0.01	0.31	7.71	22.4
9- 16- JD- 10		2.26	4	0.6	477	478	764.8	8.6	0.02	<0.01	5.31	19.5	<0.01	0.08	3.53	5.9
9- 16- JD- 13		2.26	4	0.9	339	340	362.7	8.4	0.03	<0.01	3.57	13.1	<0.01	0.04	4.60	8.4
9- 16- JD- 50		2.06	3	2.2	144	146	66.74	8.2	0.07	0.02	1.59	5.8	<0.01	0.27	6.59	20.2



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Finalized Date: 5- DEC- 2017
Account: TGM

Project: 704-ENW.WENW03039- 02

CERTIFICATE OF ANALYSIS VA17251091

Sample Description	Method Analyte Units LOR	ME- MS61 Ba ppm 10	ME- MS61 Be ppm 0.05	ME- MS61 Bi ppm 0.01	ME- MS61 Ca % 0.01	ME- MS61 Cd ppm 0.02	ME- MS61 Ce ppm 0.01	ME- MS61 Co ppm 0.1	ME- MS61 Cr ppm 1	ME- MS61 Cs ppm 0.05	ME- MS61 Cu ppm 0.2	ME- MS61 Fe % 0.01	ME- MS61 Ga ppm 0.05	ME- MS61 Ge ppm 0.05	ME- MS61 Hf ppm 0.1	ME- MS61 In ppm 0.005
9- 16- JD- 04		5940	1.77	0.23	1.24	2.25	72.7	12.2	63	4.05	33.5	3.60	15.15	0.14	2.5	0.047
9- 16- JD- 05		5830	1.75	0.41	1.42	2.31	66.1	10.5	65	4.00	30.3	3.48	15.10	0.14	2.2	0.040
9- 16- JD- 17		8170	2.22	0.29	0.86	2.55	82.0	15.4	76	5.33	40.1	4.00	19.05	0.14	2.6	0.057
9- 16- JD- 10		1220	1.33	0.81	17.20	0.73	57.3	4.9	24	3.64	11.8	1.54	8.30	0.11	1.4	0.028
9- 16- JD- 13		840	2.01	0.60	10.10	0.10	60.2	5.2	27	4.56	7.8	1.80	10.15	0.13	1.4	0.028
9- 16- JD- 50		4330	1.88	0.30	4.66	2.22	79.4	12.1	66	10.75	30.7	3.35	18.00	0.15	2.6	0.044



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Page: 2 - C
Total # Pages: 2 (A - D)
Plus Appendix Pages
Finalized Date: 5- DEC- 2017
Account: TGM

Project: 704-ENW.WENW03039- 02

CERTIFICATE OF ANALYSIS VA17251091

Sample Description	Method Analyte Units LOR	ME-MS61 K %	ME-MS61 La ppm	ME-MS61 Li ppm	ME-MS61 Mg %	ME-MS61 Mn ppm	ME-MS61 Mo ppm	ME-MS61 Na %	ME-MS61 Nb ppm	ME-MS61 Ni ppm	ME-MS61 P ppm	ME-MS61 Pb ppm	ME-MS61 Rb ppm	ME-MS61 Re ppm	ME-MS61 S %	ME-MS61 Sb ppm
9- 16- JD- 04		2.39	35.7	45.6	0.74	353	5.21	0.24	9.8	51.7	930	18.5	115.0	0.004	0.05	4.08
9- 16- JD- 05		2.20	32.8	43.4	0.72	312	5.69	0.23	9.3	46.8	950	17.9	110.0	0.008	0.05	3.76
9- 16- JD- 17		2.73	41.0	51.9	0.79	367	5.76	0.22	10.7	66.3	1020	22.6	140.5	0.006	0.06	4.53
9- 16- JD- 10		1.90	27.3	31.6	4.62	357	0.52	0.30	7.3	12.2	690	13.3	76.2	<0.002	0.01	0.43
9- 16- JD- 13		2.36	29.6	39.2	4.24	367	0.41	0.57	8.7	11.8	560	13.4	101.5	0.002	0.03	0.31
9- 16- JD- 50		2.40	40.6	47.8	1.54	402	5.48	0.25	11.2	48.4	990	21.5	120.0	0.004	0.07	3.87



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Total # Pages: 2 (A - D)
Plus Appendix Pages
Finalized Date: 5- DEC- 2017
Account: TGM

Project: 704-ENW.WENW03039- 02

CERTIFICATE OF ANALYSIS VA17251091

Sample Description	Method Analyte Units LOR	ME- MS61 Sc ppm 0.1	ME- MS61 Se ppm 1	ME- MS61 Sn ppm 0.2	ME- MS61 Sr ppm 0.2	ME- MS61 Ta ppm 0.05	ME- MS61 Te ppm 0.05	ME- MS61 Th ppm 0.01	ME- MS61 Ti % 0.005	ME- MS61 Ti ppm 0.02	ME- MS61 U ppm 0.1	ME- MS61 V ppm 1	ME- MS61 W ppm 0.1	ME- MS61 Y ppm 0.1	ME- MS61 Zn ppm 2	ME- MS61 Zr ppm 0.5
9- 16- JD- 04		10.7	2	1.7	76.0	0.73	<0.05	12.15	0.325	1.00	3.6	290	1.2	15.6	278	88.2
9- 16- JD- 05		10.5	1	1.9	85.5	0.67	0.06	10.75	0.313	0.95	3.5	259	5.4	14.3	273	76.9
9- 16- JD- 17		14.0	1	2.2	81.6	0.77	0.06	12.75	0.380	1.22	3.9	316	1.4	17.1	334	88.5
9- 16- JD- 10		5.2	1	1.8	193.5	0.54	<0.05	8.20	0.167	0.41	1.8	39	2.5	10.2	49	47.0
9- 16- JD- 13		5.5	<1	2.2	157.0	0.70	<0.05	11.85	0.195	0.56	2.3	42	9.7	10.8	35	50.7
9- 16- JD- 50		10.9	1	2.0	114.0	0.81	0.05	12.50	0.351	0.99	3.9	370	11.5	18.2	263	91.2



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Page: Appendix 1
Total # Appendix Pages: 1
Finalized Date: 5- DEC- 2017
Account: TGM

Project: 704- ENW.WENW03039- 02

CERTIFICATE OF ANALYSIS VA17251091

CERTIFICATE COMMENTS	
Applies to Method:	ANALYTICAL COMMENTS
Applies to Method:	LABORATORY ADDRESSES

REE's may not be totally soluble in this method.
ME- MS61

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.
C- GAS05
OA- ELE07
S- IR07
SPL- 21X
CRU- 31
OA- VOL08
S- IR08
WEI- 21
LOG- 22
PUL- 31
SND- 01

ME- MS61
S- GRA06a
SPL- 21



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Total # Pages: 2 (A - D)
Plus Appendix Pages
Finalized Date: 5-DEC-2017
Account: TGM

CERTIFICATE VA17251089

Project: 704- ENW.WENW03039- 02

P.O. No.: ENW.WENW03039- 02

This report is for 2 Rock samples submitted to our lab in Vancouver, BC, Canada on 15- NOV- 2017.

The following have access to data associated with this certificate:

S. KINGSTON

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI- 21	Received Sample Weight
LOG- 22	Sample login - Rcd w/o BarCode
CRU- 31	Fine crushing - 70% < 2mm
SPL- 21	Split sample - riffle splitter
PUL- 31	Pulverize split to 85% < 75 um
SPL- 21X	Addl Crush Split w No Analysis
SND- 01	Send samples to external laboratory

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION
OA- ELE07	Paste pH
S- GRA06a	Sulfate Sulfur (HCl leachable)
S- IR07	Sulphide Sulphur (Leco)
C- GAS05	Inorganic Carbon (CO2)
ME- MS61	48 element four acid ICP- MS
OA- VOL08	Basic Acid Base Accounting
S- IR08	Total Sulphur (Leco)
	WST- SEQ LECO
	LECO

To: TETRA TECH CANADA INC.
ATTN: S. KINGSTON
885 DUNSMUIR STREET
VANCOUVER BC V6C 1N5

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Signature:

Colin Ramshaw, Vancouver Laboratory Manager



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Finalized Date: 5- DEC- 2017
Account: TGM

Project: 704- ENW.WENW03039- 02

CERTIFICATE OF ANALYSIS VA17251089

Sample Description	Method Analyte Units LOR	WEI- 21 Recvd Wt. kg 0.02	OA- VOL08 FIZZ RAT Unity 1	OA- VOL08 MPA tCaCO3/1kt 0.3	OA- VOL08 NNP tCaCO3/1kt 1	OA- VOL08 NP tCaCO3/1kt 1	OA- VOL08 Ratio (N Unity 0.01	OA- ELE07 pH Unity 0.1	S- IR08 S % 0.01	S- IR07 Sulphide % 0.01	C- GAS05 C % 0.05	C- GAS05 CO2 % 0.2	S- GRA06a S % 0.01	ME- MS61 Ag ppm 0.01	ME- MS61 Al % 0.01	ME- MS61 As ppm 0.2
9- 16- JD- 52 9- 16- JD- 53		10.40 7.48	1 1	<0.3 <0.3	7 9	7 9	44.80 57.60	8.5 9.1	<0.01 <0.01	0.01 0.01	<0.05 <0.05	<0.2 0.2	0.01 <0.01	0.02 0.02	7.55 7.55	0.7 0.8



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CERTIFICATE OF ANALYSIS VA17251089

Sample Description	Method Analyte Units LOR	ME- MS61 Ba ppm 10	ME- MS61 Be ppm 0.05	ME- MS61 Bi ppm 0.01	ME- MS61 Ca % 0.01	ME- MS61 Cd ppm 0.02	ME- MS61 Ce ppm 0.01	ME- MS61 Co ppm 0.1	ME- MS61 Cr ppm 1	ME- MS61 Cs ppm 0.05	ME- MS61 Cu ppm 0.2	ME- MS61 Fe % 0.01	ME- MS61 Ga ppm 0.05	ME- MS61 Ge ppm 0.05	ME- MS61 Hf ppm 0.1	ME- MS61 In ppm 0.005
9- 16- JD- 52		650	4.08	0.42	1.44	0.04	79.8	3.5	11	10.90	2.6	1.88	19.00	0.15	1.6	0.036
9- 16- JD- 53		630	5.53	1.05	1.04	0.04	79.3	3.4	12	7.96	2.8	1.70	18.65	0.14	1.7	0.018



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CERTIFICATE OF ANALYSIS VA17251089

Sample Description	Method Analyte Units LOR	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61
		K %	La ppm	Li ppm	Mg %	Mn ppm	Mo ppm	Na %	Nb ppm	Ni ppm	P ppm	Pb ppm	Rb ppm	Re ppm	S %	Sb ppm		
9- 16- JD- 52		3.78	39.9	133.0	0.43	395	2.49	2.26	11.8	3.1	540	40.4	220	<0.002	0.01	0.14		
9- 16- JD- 53		3.70	39.3	100.5	0.42	293	0.80	2.25	10.1	2.8	580	39.4	200	<0.002	0.01	0.11		



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CERTIFICATE OF ANALYSIS VA17251089

Sample Description	Method Analyte Units LOR	ME-MS61 Sc ppm 0.1	ME-MS61 Se ppm 1	ME-MS61 Sn ppm 0.2	ME-MS61 Sr ppm 0.2	ME-MS61 Ta ppm 0.05	ME-MS61 Te ppm 0.05	ME-MS61 Th ppm 0.01	ME-MS61 Ti % 0.005	ME-MS61 Ti ppm 0.02	ME-MS61 U ppm 0.1	ME-MS61 V ppm 1	ME-MS61 W ppm 0.1	ME-MS61 Y ppm 0.1	ME-MS61 Zn ppm 2	ME-MS61 Zr ppm 0.5
9-16-JD-52		5.6	<1	4.4	238	1.33	<0.05	18.55	0.213	1.21	3.4	29	3.8	8.5	43	46.2
9-16-JD-53		5.2	<1	2.9	221	1.14	<0.05	18.80	0.202	1.00	5.5	28	8.1	9.1	32	48.3



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Total # Appendix Pages: 1
Finalized Date: 5- DEC- 2017
Account: TGM

Project: 704- ENW.WENW03039- 02

CERTIFICATE OF ANALYSIS VA17251089

CERTIFICATE COMMENTS	
	<p>ANALYTICAL COMMENTS</p> <p>REE's may not be totally soluble in this method. ME- MS61</p> <p>Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.</p> <p>LABORATORY ADDRESSES</p> <div><div>CRU- 31 OA- VOL08 S- IR07 SPL- 21X</div><div>LOG- 22 PUL- 31 SND- 01</div><div>ME- MS61 S- GRA06a SPL- 21</div></div>
Applies to Method:	
Applies to Method:	



Tetra Tech Canada Inc.
ATTN: Scott Kingston
1000 - 885 Dunsmuir Street, 10th floor
Vancouver BC V6E 1N5

Date Received: 28- NOV- 17
Report Date: 05- DEC- 17 15:51 (MT)
Version: FINAL

Client Phone: 604- 685- 0275

Certificate of Analysis

Lab Work Order #: L2028191
Project P.O. #: NOT SUBMITTED
Job Reference: 704- ENW.WENW03039- 02
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L2028191-1 Other	L2028191-2 Other	L2028191-3 Other	L2028191-4 Other	
		9-16-JD-52	9-16-JD-04	9-16-JD-10	9-16-JD-50	
Grouping	Analyte					
SOIL						
Physical Tests	Hardness (as CaCO ₃) (mg/L)	2.15	40.0	26.9	43.2	
	Moisture (%)	<0.25	<0.25	<0.25	<0.25	
Leachable Anions & Nutrients	Acidity (as CaCO ₃) (mg/L)	<4.0	<4.0	<4.0	<4.0	
	Alkalinity, Total (as CaCO ₃) (mg/L)	4.7	37.3	27.8	38.6	
	Ammonia, Total Leachable (as N) (mg/L)	0.0151	0.0375	0.0245	0.0495	
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	
	Conductivity (uS/cm)	27.5	82.9	58.4	93.3	
	Fluoride (F) (mg/L)	0.071	0.175	0.045	0.522	
	Nitrate (as N) (mg/L)	0.0075	0.105	0.0762	0.0408	
	Nitrite (as N) (mg/L)	<0.0010	0.0110	0.0052	0.0137	
	pH (pH)	7.32	8.45	9.18	8.66	
	Sulfate (SO ₄) (mg/L)	2.39	4.67	2.14	5.95	
Leachable Metals	Aluminum (Al)-Leachable (mg/L)	0.657	0.179	0.594	0.0839	
	Antimony (Sb)-Leachable (mg/L)	<0.00010	0.00118	0.00018	0.00152	
	Arsenic (As)-Leachable (mg/L)	<0.0010	<0.0010	0.0015	0.0010	
	Barium (Ba)-Leachable (mg/L)	0.0070	0.570	0.0779	0.196	
	Beryllium (Be)-Leachable (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Bismuth (Bi)-Leachable (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Boron (B)-Leachable (mg/L)	0.011	<0.010	<0.010	0.015	
	Cadmium (Cd)-Leachable (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Calcium (Ca)-Leachable (mg/L)	0.55	14.8	9.55	14.9	
	Chromium (Cr)-Leachable (mg/L)	<0.00050	0.00103	<0.00050	0.00117	
	Cobalt (Co)-Leachable (mg/L)	0.00020	<0.00010	<0.00010	<0.00010	
	Copper (Cu)-Leachable (mg/L)	0.0025	<0.0010	<0.0010	<0.0010	
	Iron (Fe)-Leachable (mg/L)	0.250	0.036	<0.030	0.047	
	Lead (Pb)-Leachable (mg/L)	0.00082	<0.00010	<0.00010	<0.00010	
	Lithium (Li)-Leachable (mg/L)	<0.0050	<0.0050	<0.0050	0.0138	
	Magnesium (Mg)-Leachable (mg/L)	0.188	0.715	0.742	1.46	
	Manganese (Mn)-Leachable (mg/L)	0.0191	0.00122	<0.00050	0.00099	
	Mercury (Hg)-Leachable (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Molybdenum (Mo)-Leachable (mg/L)	0.00104	0.00314	0.00054	0.00749	
	Nickel (Ni)-Leachable (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Phosphorus (P)-Leachable (mg/L)	<0.30	<0.30	<0.30	<0.30	
	Potassium (K)-Leachable (mg/L)	4.62	1.81	2.10	1.88	
	Selenium (Se)-Leachable (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Silicon (Si)-Leachable (mg/L)	3.80	1.73	1.51	2.47	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L2028191-1 Other 9-16-JD-52	L2028191-2 Other 9-16-JD-04	L2028191-3 Other 9-16-JD-10	L2028191-4 Other 9-16-JD-50	
Grouping	Analyte					
SOIL						
Leachable Metals	Silver (Ag)-Leachable (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Sodium (Na)-Leachable (mg/L)	2.34	0.546	0.187	0.578	
	Strontium (Sr)-Leachable (mg/L)	0.00346	0.0341	0.0128	0.0307	
	Thallium (Tl)-Leachable (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Tin (Sn)-Leachable (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Titanium (Ti)-Leachable (mg/L)	0.014	<0.010	<0.010	<0.010	
	Uranium (U)-Leachable (mg/L)	0.00628	0.000446	0.000270	0.000599	
	Vanadium (V)-Leachable (mg/L)	0.0012	0.0016	0.0012	0.0016	
	Zinc (Zn)-Leachable (mg/L)	<0.010	<0.010	<0.010	<0.010	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Antimony (Sb)-Leachable	DUP-H	L2028191-1, -2, -3, -4

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-SHKFLSK-PCT-VA	Soil	Acidity by PCT (SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES
This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures adapted from APHA Method 2310 "Acidity".			
Lab deionized water is used in the creation of the samples for acidity testing. Although of very low ionic strength, the water does have pH <8.3, and hence inherent acidity, and may contribute measurable acidity levels near the limit of reporting."			
ALK-SHKFLSK-PCT-VA	Soil	Alkalinity by PCT (SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES
This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures adapted from APHA Method 2320 "Alkalinity".			
BR-SHKFLSK-IC-VA	Soil	Bromide by IC (SHAKEFLASK)	BC MIN. OF ENERGY AND MINES/APHA 4110 B.
This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter. The analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
CL-SHKFLSK-IC-VA	Soil	Chloride by IC (SHAKEFLASK)	BC MIN. OF ENERGY AND MINES/APHA 4110 B.
This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter. The analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
EC-SHKFLSK-PCT-VA	Soil	EC by PCT (SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES
This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures adapted from APHA Method 2510 "Conductivity".			
F-SHKFLSK-IC-VA	Soil	Fluoride by IC (SHAKEFLASK)	BC MIN. OF ENERGY AND MINES/APHA 4110 B.
This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter. The analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
HARDNESS-CALC-VA	Soil	Hardness	APHA 2340B
Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.			
HG-SHKFLSK-CVAFS-VA	Soil	Mercury by CVAAS (SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES
This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using atomic absorption spectrophotometry (EPA Method 245.7). The Shakeflask extraction is an empirical procedure with pre-defined characteristics. Recovery of some elements (Ag, Bi, Hg, and Sn) by this method can be variable due to the neutral pH of the extraction fluid. LCS QC sample DQOs for these elements have been established at 50-130% for this reason			
MET-SHKFLSK-MS-VA	Soil	Metals by ICPMS (SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES
This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using inductively coupled plasma - mass spectrophotometry (EPA Method 6020A). The Shakeflask extraction is an empirical procedure with pre-defined characteristics. Recovery of some elements (Ag, Bi, Hg, and Sn) by this method can be variable due to the neutral pH of the extraction fluid. LCS QC sample DQOs for these elements have been established at 50-130% for this reason.			

Reference Information

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

NH3-SHKFLSK-F-VA Soil Ammonia by Fluorescence (SHAKE FLASK) BC MIN. OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter. The analysis is carried out using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-SHKFLSK-IC-VA Soil Nitrite by IC (SHAKEFLASK) BC MIN. OF ENERGY AND MINES/APHA 4110 B.

This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter. The analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

NO3-SHKFLSK-IC-VA Soil Nitrate by IC (SHAKEFLASK) BC MIN. OF ENERGY AND MINES/APHA 4110 B.

This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter. The analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

PH-SHKFLSK-MAN-VA Soil pH by Manual Meter (SHAKEFLASK) BC MINISTRY OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently analysed using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode.

SO4-SHKFLSK-IC-VA Soil Sulfate by IC (SHAKEFLASK) BC MIN. OF ENERGY AND MINES/APHA 4110 B.

This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter. The analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
----------------------------	---------------------

VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA
----	---

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg ww - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



L2028191-COFC

Analysis Request Form

Date:	11/25/2017
Workorder Number:	VA17251089 & 91 TGM
Analyzing Laboratory:	ALSE
Client Contact Name:	Scott Kingston
Client Company Name:	Tetra Tech Canada Inc.
Project Name:	704-ENW.WENW03039-02
Number of Samples & Country of Origin:	4 , Canada
Sample IDs:	9-16-JD-52 (VA17251089) 9-16-JD-04 , 9-16-JD-10 , 9-16-JD-50 (VA17251091)
Sample Type:	<input type="checkbox"/> Drill Core <input type="checkbox"/> Percussion <input type="checkbox"/> Rock <input type="checkbox"/> Soil <input type="checkbox"/> Pulp <input checked="" type="checkbox"/> Other
Analysis Required:	Shake Flask (OA-SFE01)
Special Instructions:	SCAN TO OUTSIDE LAB ALS contact (Deidre Heffernan)
Sample Disposition:	<input type="checkbox"/> Return <input checked="" type="checkbox"/> Dispose after analysis
Results to:	Attention: Scott Kingston Tetra Tech Canada Inc. 885 Dunsmuir St. Vancouver BC Canada , V6C 1N5 Email:scott.kingston@tetrattech.com
Invoice to:	Attention: Scott Kingston Address: Same as above Phone: Enter Client Phone Number Here Email: scott.kingston@tetrattech.com

NOV 28 2017 17:13:35 JC

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Quantitative XRD Results for Two Samples – ALS Work Order #VA18022192

Date: 16 February 2018
Prepared by: Ben Eaton
Reviewed by: Peter Whittaker
Contributors:
Distribution: ClientServicesCANW@alsglobal.com

Document #: R2018-029
Revision #: 0
AuTec project #: 100433

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1 Introduction

Two samples (Table 1) were received from ALS for quantitative X-ray diffraction (QXRD) analysis.

Table 1 – ALS and corresponding AuTec mineralogy sample descriptions and numbers.

ALS Sample Number	Mineralogy Sample Number
9-16-JD-13	M180211
9-16-JD-50	M180212

2 Sample Preparation

The samples were ground for approximately five minutes in a McCrone Micronizing Mill using reagent alcohol. Grinding in the Micronizing Mill reduces particles to between 5 and 10 μm in size without distorting the crystal lattices which are critical for diffraction of X-rays.

Diffraction data was collected over a range of $5-75^\circ 2\theta$ with $\text{Co K}\alpha$ radiation using a Bruker D8 Focus Bragg-Brentano diffractometer. The diffractometer uses a 0.6mm divergence slit and incident and diffracted-beam Soller slits. The system is equipped with a LYNXEYE - Super Speed Detector.

Diffraction data produced is analyzed and peaks are identified using HighScore Plus software by Panalytical using the Crystallography Open Database. Refinement of diffraction data is done using Topas 5.0 by Bruker AXS.

Detection limits for X-ray diffraction depend on multiple factors but, as a general rule if the peak to background ratio is low, the detection limit is approximately 2.0 wt%. For samples in which the peak to background ratio is high and there is good crystallinity, the detection limit can be less than 0.5 wt%. If a phase is present at less than 0.5 wt%, it could still be identified, but confidence decreases.

3 Results

The minerals identified in these samples along with their ideal chemical formulae are included in Table 2.

Within this sample suite, the major phases identified were quartz and muscovite, and the moderate phases were orthoclase and dolomite. The minor phases identified were albite, clinocllore, phlogopite, and calcite. The modal abundances of the major, intermediate, minor, and trace phases (Table 3) vary between samples (Table 4).

The minerals used during refinement were selected with no knowledge of provenance but were selected based on best fit. QXRD values are normalized to 100% of the minerals that are detected after removal of the corundum spike value.

Corundum spikes are a known crystalline phase added at a known weight percent that can then be used to quantify amorphous content if it is present in a sample. Amorphous material will show as a hump in the background intensity between 20 and $30^\circ 2\theta$. Amorphous content is not apparent in the scan data for the current samples. The Rietveld refinement plots show a value for corundum. The values in Table 4 have been normalized to 100% after removing the value that was calculated for corundum.

Copies of individual diffraction patterns are found in Appendix I (Figures 1 to 2).

Table 2 – Identified minerals with ideal chemical formulae.

Mineral	Ideal Chemical Formula
Quartz	SiO_2
Albite	$\text{NaAlSi}_3\text{O}_8$
Orthoclase	KAlSi_3O_8
Clinocllore	$(\text{Mg,Fe})_5\text{AlSi}_3\text{Al}_2\text{O}_{10}(\text{OH})_8$
Muscovite	$\text{KAl}_2(\text{AlSi}_3\text{O}_{10})(\text{OH})_2$
Phlogopite	$\text{KMg}_3(\text{Si}_3\text{Al})\text{O}_{10}(\text{FOH})_2$
Calcite	CaCO_3
Dolomite	$\text{CaMg}(\text{CO}_3)_2$

Table 3 – Major, intermediate, minor, and trace phase grouping definitions.

Grouped Amount	Weight Percent Range
Major	>30
Moderate	<30 >10
Minor	<10 >2
Trace	<2

Table 4 - Quantitative XRD results, modal wt%.

Mineral	M180211 9-16-JD-13	M180212 9-16-JD-50
Quartz	40.5	53.9
Albite	9.0	0.0
Orthoclase	14.7	0.0
Clinocllore	0.0	3.9
Muscovite	0.0	31.9
Phlogopite	4.0	0.0
Calcite	7.0	3.9
Dolomite	24.9	6.4
Total	100.0	100.0

APPENDIX I DIFFRACTION PATTERNS FOR INDIVIDUAL SAMPLES

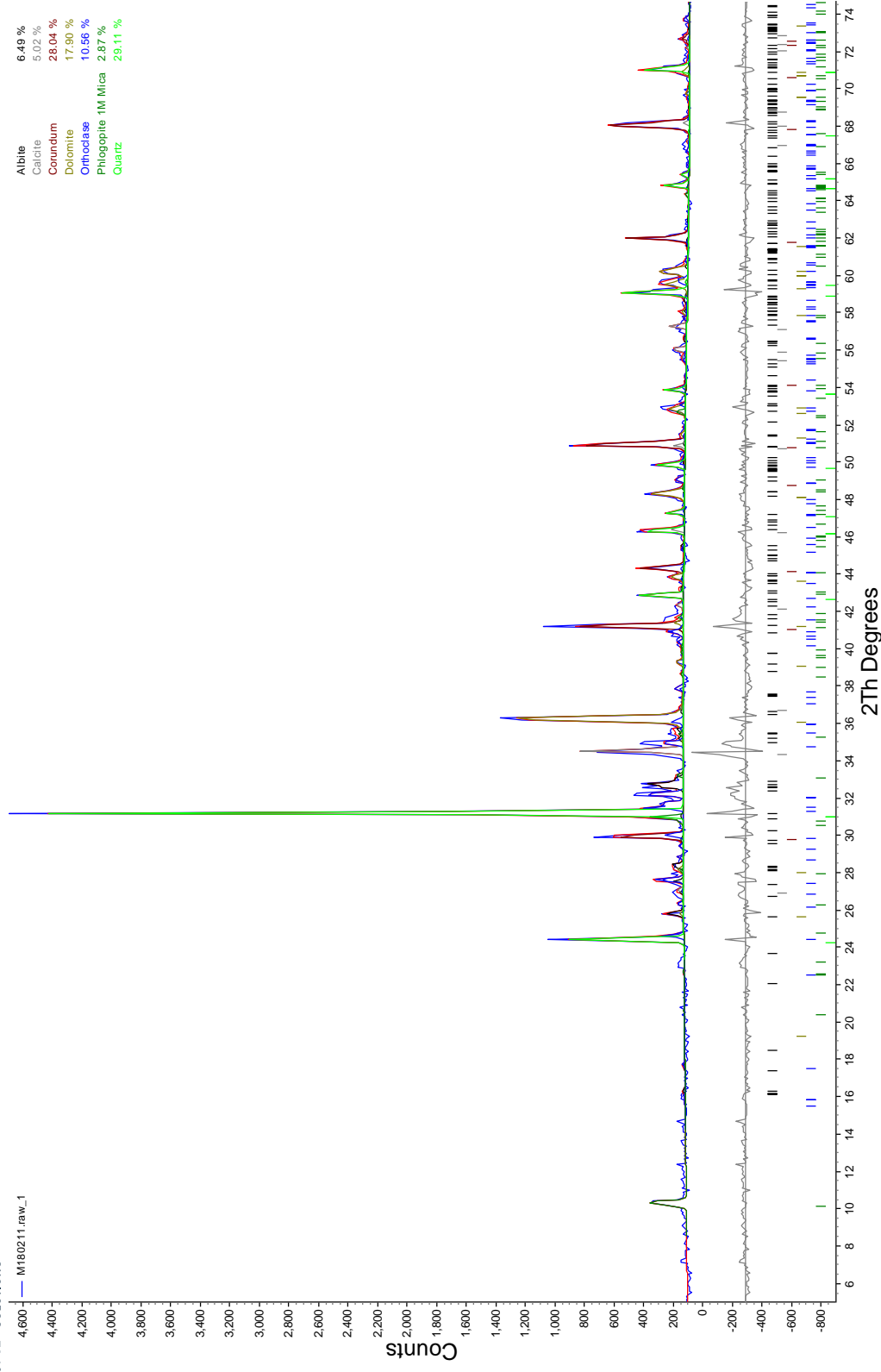


Figure 1: Rietveld refinement plot of 9-16-JD-13 (M180211). The blue line is the measured intensity, the red line is the calculated pattern, other coloured lines are individual mineral patterns, the grey line is the difference profile and the vertical bars are the reflection positions. The peak at 9°2θ is associated with the corundum spike.

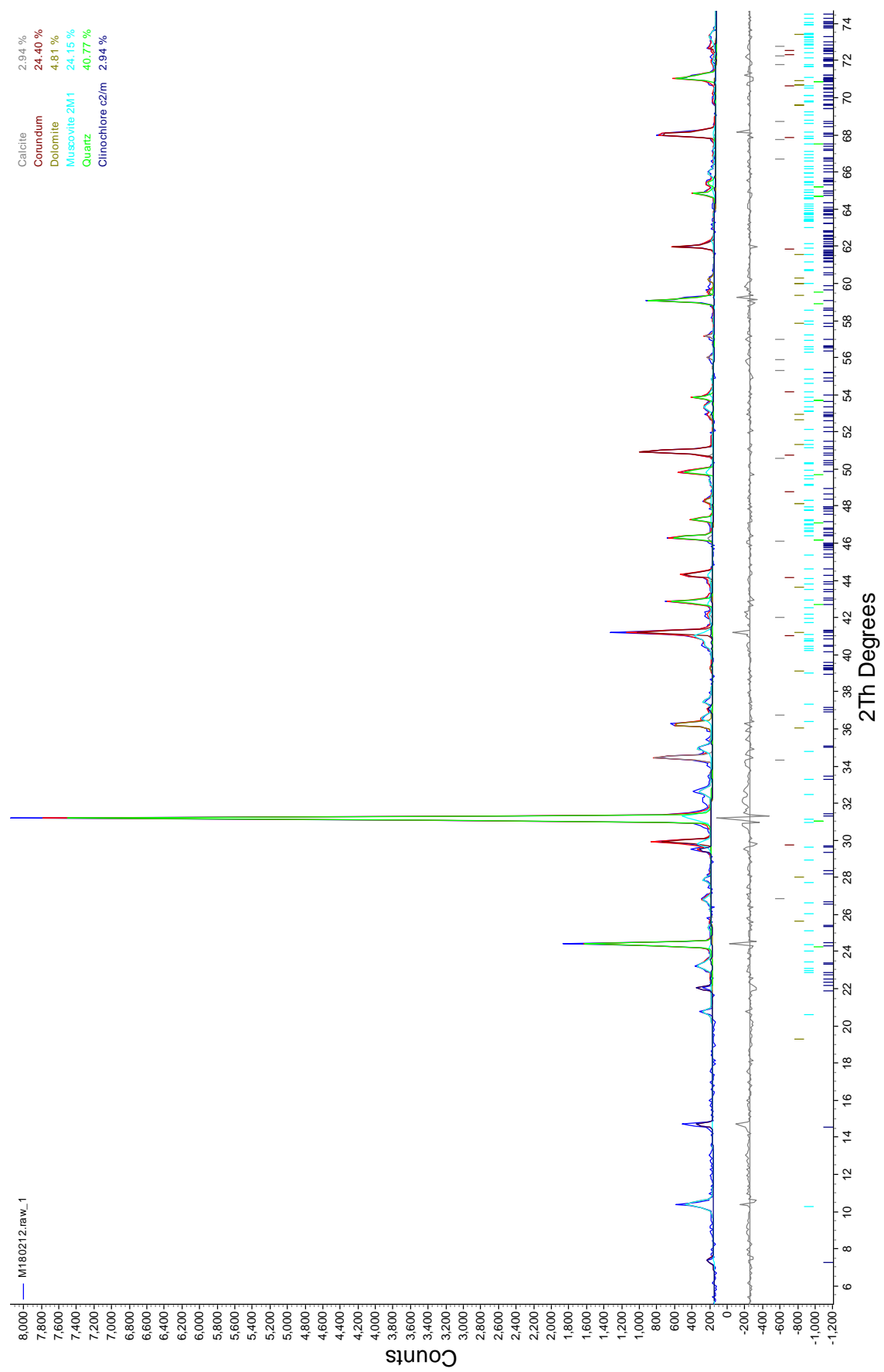


Figure 2: Rietveld refinement plot of 9-16-JD-50 (M180212). The blue line is the measured intensity, the red line is the calculated pattern, other coloured lines are individual mineral patterns, the grey line is the difference profile and the vertical bars are the reflection positions. The peak at 9°2θ is associated with the corundum spike.

APPENDIX D

GEOCHEMISTRY TESTING LABORATORY CERTIFICATES



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VANCOUVER BC V6C 1N5

Page: 1
Total # Pages: 2 (A - D)
Plus Appendix Pages
Finalized Date: 5- DEC- 2017
Account: TGM

CERTIFICATE VA17251091

Project: 704- ENW.WENW03039- 02

P.O. No.: ENW.WENW03039- 02

This report is for 6 Rock samples submitted to our lab in Vancouver, BC, Canada on 15- NOV- 2017.

The following have access to data associated with this certificate:

S. KINGSTON

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI- 21	Received Sample Weight
SND- 01	Send samples to external laboratory
LOG- 22	Sample login - Rcd w/o BarCode
CRU- 31	Fine crushing - 70% < 2mm
SPL- 21	Split sample - riffle splitter
PUL- 31	Pulverize split to 85% < 75 um
SPL- 21X	Addnl Crush Split w No Analysis

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
S- IR07	Sulphide Sulphur (Leco)	LECO
C- GAS05	Inorganic Carbon (CO2)	
ME- MS61	48 element four acid ICP- MS	
OA- VOL08	Basic Acid Base Accounting	
S- IR08	Total Sulphur (Leco)	LECO
OA- ELE07	Paste pH	
S- GRA06a	Sulfate Sulfur (HCl leachable)	WST- SEQ

To: TETRA TECH CANADA INC.
ATTN: S. KINGSTON
885 DUNSMUIR STREET
VANCOUVER BC V6C 1N5

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Signature:

Colin Ramshaw, Vancouver Laboratory Manager



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Page: 2 - A
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Plus Appendix Pages
Finalized Date: 5- DEC- 2017
Account: TGM

Project: 704- ENW.WENW03039- 02

CERTIFICATE OF ANALYSIS VA17251091

Sample Description	Method Analyte Units LOR	WEI- 21	OA- VOL08	OA- VOL08	OA- VOL08	OA- VOL08	OA- VOL08	OA- ELE07	S- IR08	S- IR07	C- GAS05	C- GAS05	S- GRA06a	ME- MS61	ME- MS61	ME- MS61
		Recvd Wt.	FIZZ RAT	MPA	NNP	NP	Ratio (N	pH	S	Sulphide	C	CO2	S	Ag	Al	As
		kg	Unity	tCaCO3/1Kt	tCaCO3/1Kt	tCaCO3/1Kt	Unity	Unity	%	%	%	%	%	ppm	%	ppm
		0.02	1	0.3	1	1	0.01	0.1	0.01	0.01	0.05	0.2	0.01	0.01	0.01	0.2
9- 16- JD- 04		1.96	2	1.3	34	35	28.00	8.2	0.04	0.02	0.33	1.2	<0.01	0.28	6.27	19.3
9- 16- JD- 05		1.94	2	1.3	37	38	30.40	8.0	0.04	0.03	0.38	1.4	<0.01	0.25	6.16	19.0
9- 16- JD- 17		2.14	2	1.6	22	24	15.36	7.9	0.05	0.02	0.19	0.7	<0.01	0.31	7.71	22.4
9- 16- JD- 10		2.26	4	0.6	477	478	764.8	8.6	0.02	<0.01	5.31	19.5	<0.01	0.08	3.53	5.9
9- 16- JD- 13		2.26	4	0.9	339	340	362.7	8.4	0.03	<0.01	3.57	13.1	<0.01	0.04	4.60	8.4
9- 16- JD- 50		2.06	3	2.2	144	146	66.74	8.2	0.07	0.02	1.59	5.8	<0.01	0.27	6.59	20.2



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Page: 2 - B
Total # Pages: 2 (A - D)
Plus Appendix Pages
Finalized Date: 5- DEC- 2017
Account: TGM

Project: 704- ENW.WENW03039- 02

CERTIFICATE OF ANALYSIS VA17251091

Sample Description	Method Analyte Units LOR	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61
		Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe	Ga	Ge	Hf
		ppm 10	ppm 0.05	ppm 0.01	% 0.01	ppm 0.02	ppm 0.01	ppm 0.1	ppm 1	ppm 0.05	ppm 0.2	% 0.01	ppm 0.05	ppm 0.05	ppm 0.1
9- 16- JD- 04		5940	1.77	0.23	1.24	2.25	72.7	12.2	63	4.05	33.5	3.60	15.15	0.14	2.5
9- 16- JD- 05		5830	1.75	0.41	1.42	2.31	66.1	10.5	65	4.00	30.3	3.48	15.10	0.14	2.2
9- 16- JD- 17		8170	2.22	0.29	0.86	2.55	82.0	15.4	76	5.33	40.1	4.00	19.05	0.14	2.6
9- 16- JD- 10		1220	1.33	0.81	17.20	0.73	57.3	4.9	24	3.64	11.8	1.54	8.30	0.11	1.4
9- 16- JD- 13		840	2.01	0.60	10.10	0.10	60.2	5.2	27	4.56	7.8	1.80	10.15	0.13	1.4
9- 16- JD- 50		4330	1.88	0.30	4.66	2.22	79.4	12.1	66	10.75	30.7	3.35	18.00	0.15	2.6



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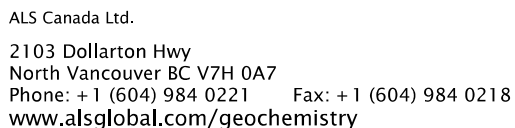
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Plus Appendix Pages
Finalized Date: 5- DEC- 2017
Account: TGM

Project: 704- ENW.WENW03039- 02

CERTIFICATE OF ANALYSIS VA17251091

Sample Description	Method Analyte Units LOR	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61	ME- MS61
		K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P	Pb	Rb	Re	S
		%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%
		0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10	0.5	0.1	0.002	0.01
9- 16- JD- 04		2.39	35.7	45.6	0.74	353	5.21	0.24	9.8	51.7	930	18.5	115.0	0.004	0.05
9- 16- JD- 05		2.20	32.8	43.4	0.72	312	5.69	0.23	9.3	46.8	950	17.9	110.0	0.008	0.05
9- 16- JD- 17		2.73	41.0	51.9	0.79	367	5.76	0.22	10.7	66.3	1020	22.6	140.5	0.006	0.06
9- 16- JD- 10		1.90	27.3	31.6	4.62	357	0.52	0.30	7.3	12.2	690	13.3	76.2	<0.002	0.01
9- 16- JD- 13		2.36	29.6	39.2	4.24	367	0.41	0.57	8.7	11.8	560	13.4	101.5	0.002	0.03
9- 16- JD- 50		2.40	40.6	47.8	1.54	402	5.48	0.25	11.2	48.4	990	21.5	120.0	0.004	0.07



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Page: Appendix 1
Total # Appendix Pages: 1
Finalized Date: 5- DEC- 2017
Account: TGM

Project: 704- ENW.WENW03039- 02

CERTIFICATE OF ANALYSIS VA17251091

CERTIFICATE COMMENTS

ANALYTICAL COMMENTS

Applies to Method: REE's may not be totally soluble in this method.
ME- MS61

LABORATORY ADDRESSES

Applies to Method: Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.
C- GAS05 CRU- 31 LOG- 22 ME- MS61
OA- ELE07 OA- VOL08 PUL- 31 S- GRA06a
S- IR07 S- IR08 SND- 01 SPL- 21
SPL- 21X WEI- 21



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Finalized Date: 5- DEC- 2017
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CERTIFICATE VA17251089

Project: 704- ENW.WENW03039- 02

P.O. No.: ENW.WENW03039- 02

This report is for 2 Rock samples submitted to our lab in Vancouver, BC, Canada on 15- NOV- 2017.

The following have access to data associated with this certificate:

S. KINGSTON

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI- 21	Received Sample Weight
LOG- 22	Sample login - Rcd w/o BarCode
CRU- 31	Fine crushing - 70% < 2mm
SPL- 21	Split sample - riffle splitter
PUL- 31	Pulverize split to 85% < 75 um
SPL- 21X	Addnl Crush Split w No Analysis
SND- 01	Send samples to external laboratory

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	
OA- ELE07	Paste pH	
S- GRA06a	Sulfate Sulfur (HCl leachable)	WST- SEQ
S- IR07	Sulphide Sulphur (Leco)	LECO
C- GAS05	Inorganic Carbon (CO2)	
ME- MS61	48 element four acid ICP- MS	
OA- VOL08	Basic Acid Base Accounting	
S- IR08	Total Sulphur (Leco)	LECO

To: TETRA TECH CANADA INC.
ATTN: S. KINGSTON
885 DUNSMUIR STREET
VANCOUVER BC V6C 1N5

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Signature:

Colin Ramshaw, Vancouver Laboratory Manager



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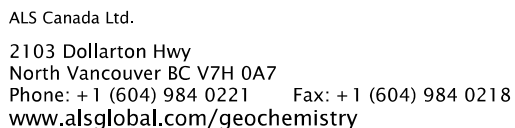
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Project: 704- ENW.WENW03039- 02

CERTIFICATE OF ANALYSIS VA17251089

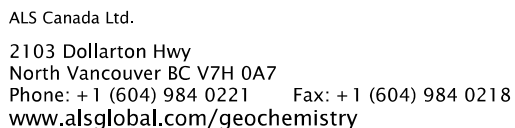
Sample Description	Method Analyte Units LOR	WEI- 21	OA- VOL08	OA- VOL08	OA- VOL08	OA- VOL08	OA- VOL08	OA- ELE07	S- IR08	S- IR07	C- GAS05	C- GAS05	S- GRA06a	ME- MS61	ME- MS61	ME- MS61
		Recvd Wt.	FIZZ RAT	MPA	NNP	NP	Ratio (N	pH	S	Sulphide	C	CO2	S	Ag	Al	As
		kg	Unity	tCaCO3/1Kt	tCaCO3/1Kt	tCaCO3/1Kt	Unity	Unity	%	%	%	%	%	ppm	%	ppm
		0.02	1	0.3	1	1	0.01	0.1	0.01	0.01	0.05	0.2	0.01	0.01	0.01	0.2
9- 16-JD- 52		10.40	1	<0.3	7	7	44.80	8.5	<0.01	0.01	<0.05	<0.2	0.01	0.02	7.55	0.7
9- 16-JD- 53		7.48	1	<0.3	9	9	57.60	9.1	<0.01	0.01	<0.05	0.2	<0.01	0.02	7.55	0.8



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Total # Pages: 2 (A - D)
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CERTIFICATE OF ANALYSIS VA17251089

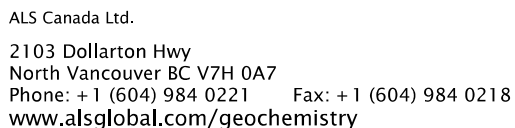
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Project: 704- ENW.WENW03039- 02

CERTIFICATE OF ANALYSIS VA17251089

CERTIFICATE COMMENTS

ANALYTICAL COMMENTS

Applies to Method: REE's may not be totally soluble in this method.
ME- MS61

LABORATORY ADDRESSES

Applies to Method: Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.
C- GAS05 CRU- 31 LOG- 22 ME- MS61
OA- ELE07 OA- VOL08 PUL- 31 S- GRA06a
S- IR07 S- IR08 SND- 01 SPL- 21
SPL- 21X WEI- 21



Tetra Tech Canada Inc.
ATTN: Scott Kingston
1000 - 885 Dunsmuir Street, 10th floor
Vancouver BC V6E 1N5

Date Received: 28- NOV- 17
Report Date: 05- DEC- 17 15:51 (MT)
Version: FINAL

Client Phone: 604- 685- 0275

Certificate of Analysis

Lab Work Order #: L2028191
Project P.O. #: NOT SUBMITTED
Job Reference: 704- ENW.WENW03039- 02
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L2028191-1 Other	L2028191-2 Other	L2028191-3 Other	L2028191-4 Other	
		9-16-JD-52	9-16-JD-04	9-16-JD-10	9-16-JD-50	
Grouping	Analyte					
SOIL						
Physical Tests	Hardness (as CaCO ₃) (mg/L)	2.15	40.0	26.9	43.2	
	Moisture (%)	<0.25	<0.25	<0.25	<0.25	
Leachable Anions & Nutrients	Acidity (as CaCO ₃) (mg/L)	<4.0	<4.0	<4.0	<4.0	
	Alkalinity, Total (as CaCO ₃) (mg/L)	4.7	37.3	27.8	38.6	
	Ammonia, Total Leachable (as N) (mg/L)	0.0151	0.0375	0.0245	0.0495	
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	
	Conductivity (uS/cm)	27.5	82.9	58.4	93.3	
	Fluoride (F) (mg/L)	0.071	0.175	0.045	0.522	
	Nitrate (as N) (mg/L)	0.0075	0.105	0.0762	0.0408	
	Nitrite (as N) (mg/L)	<0.0010	0.0110	0.0052	0.0137	
	pH (pH)	7.32	8.45	9.18	8.66	
	Sulfate (SO ₄) (mg/L)	2.39	4.67	2.14	5.95	
Leachable Metals	Aluminum (Al)-Leachable (mg/L)	0.657	0.179	0.594	0.0839	
	Antimony (Sb)-Leachable (mg/L)	<0.00010	0.00118	0.00018	0.00152	
	Arsenic (As)-Leachable (mg/L)	<0.0010	<0.0010	0.0015	0.0010	
	Barium (Ba)-Leachable (mg/L)	0.0070	0.570	0.0779	0.196	
	Beryllium (Be)-Leachable (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Bismuth (Bi)-Leachable (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Boron (B)-Leachable (mg/L)	0.011	<0.010	<0.010	0.015	
	Cadmium (Cd)-Leachable (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Calcium (Ca)-Leachable (mg/L)	0.55	14.8	9.55	14.9	
	Chromium (Cr)-Leachable (mg/L)	<0.00050	0.00103	<0.00050	0.00117	
	Cobalt (Co)-Leachable (mg/L)	0.00020	<0.00010	<0.00010	<0.00010	
	Copper (Cu)-Leachable (mg/L)	0.0025	<0.0010	<0.0010	<0.0010	
	Iron (Fe)-Leachable (mg/L)	0.250	0.036	<0.030	0.047	
	Lead (Pb)-Leachable (mg/L)	0.00082	<0.00010	<0.00010	<0.00010	
	Lithium (Li)-Leachable (mg/L)	<0.0050	<0.0050	<0.0050	0.0138	
	Magnesium (Mg)-Leachable (mg/L)	0.188	0.715	0.742	1.46	
	Manganese (Mn)-Leachable (mg/L)	0.0191	0.00122	<0.00050	0.00099	
	Mercury (Hg)-Leachable (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Molybdenum (Mo)-Leachable (mg/L)	0.00104	0.00314	0.00054	0.00749	
	Nickel (Ni)-Leachable (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Phosphorus (P)-Leachable (mg/L)	<0.30	<0.30	<0.30	<0.30	
	Potassium (K)-Leachable (mg/L)	4.62	1.81	2.10	1.88	
	Selenium (Se)-Leachable (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Silicon (Si)-Leachable (mg/L)	3.80	1.73	1.51	2.47	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L2028191-1 Other 9-16-JD-52	L2028191-2 Other 9-16-JD-04	L2028191-3 Other 9-16-JD-10	L2028191-4 Other 9-16-JD-50	
Grouping	Analyte					
SOIL						
Leachable Metals	Silver (Ag)-Leachable (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Sodium (Na)-Leachable (mg/L)	2.34	0.546	0.187	0.578	
	Strontium (Sr)-Leachable (mg/L)	0.00346	0.0341	0.0128	0.0307	
	Thallium (Tl)-Leachable (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Tin (Sn)-Leachable (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Titanium (Ti)-Leachable (mg/L)	0.014	<0.010	<0.010	<0.010	
	Uranium (U)-Leachable (mg/L)	0.00628	0.000446	0.000270	0.000599	
	Vanadium (V)-Leachable (mg/L)	0.0012	0.0016	0.0012	0.0016	
	Zinc (Zn)-Leachable (mg/L)	<0.010	<0.010	<0.010	<0.010	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Antimony (Sb)-Leachable	DUP-H	L2028191-1, -2, -3, -4

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-SHKFLSK-PCT-VA	Soil	Acidity by PCT (SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES
This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures adapted from APHA Method 2310 "Acidity".			
Lab deionized water is used in the creation of the samples for acidity testing. Although of very low ionic strength, the water does have pH <8.3, and hence inherent acidity, and may contribute measurable acidity levels near the limit of reporting."			
ALK-SHKFLSK-PCT-VA	Soil	Alkalinity by PCT (SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES
This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures adapted from APHA Method 2320 "Alkalinity".			
BR-SHKFLSK-IC-VA	Soil	Bromide by IC (SHAKEFLASK)	BC MIN. OF ENERGY AND MINES/APHA 4110 B.
This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter. The analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
CL-SHKFLSK-IC-VA	Soil	Chloride by IC (SHAKEFLASK)	BC MIN. OF ENERGY AND MINES/APHA 4110 B.
This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter. The analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
EC-SHKFLSK-PCT-VA	Soil	EC by PCT (SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES
This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures adapted from APHA Method 2510 "Conductivity".			
F-SHKFLSK-IC-VA	Soil	Fluoride by IC (SHAKEFLASK)	BC MIN. OF ENERGY AND MINES/APHA 4110 B.
This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter. The analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
HARDNESS-CALC-VA	Soil	Hardness	APHA 2340B
Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.			
HG-SHKFLSK-CVAFS-VA	Soil	Mercury by CVAAS (SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES
This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using atomic absorption spectrophotometry (EPA Method 245.7). The Shakeflask extraction is an empirical procedure with pre-defined characteristics. Recovery of some elements (Ag, Bi, Hg, and Sn) by this method can be variable due to the neutral pH of the extraction fluid. LCS QC sample DQOs for these elements have been established at 50-130% for this reason			
MET-SHKFLSK-MS-VA	Soil	Metals by ICPMS (SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES
This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using inductively coupled plasma - mass spectrophotometry (EPA Method 6020A).			
The Shakeflask extraction is an empirical procedure with pre-defined characteristics. Recovery of some elements (Ag, Bi, Hg, and Sn) by this method can be variable due to the neutral pH of the extraction fluid. LCS QC sample DQOs for these elements have been established at 50-130% for this reason.			

Reference Information

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

NH3-SHKFLSK-F-VA Soil Ammonia by Fluorescence (SHAKE FLASK) BC MIN. OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter. The analysis is carried out using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-SHKFLSK-IC-VA Soil Nitrite by IC (SHAKEFLASK) BC MIN. OF ENERGY AND MINES/APHA 4110 B.

This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter. The analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

NO3-SHKFLSK-IC-VA Soil Nitrate by IC (SHAKEFLASK) BC MIN. OF ENERGY AND MINES/APHA 4110 B.

This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter. The analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

PH-SHKFLSK-MAN-VA Soil pH by Manual Meter (SHAKEFLASK) BC MINISTRY OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently analysed using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode.

SO4-SHKFLSK-IC-VA Soil Sulfate by IC (SHAKEFLASK) BC MIN. OF ENERGY AND MINES/APHA 4110 B.

This analysis is based upon the extraction procedure outlined in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND Report 1.20.1)" (William A. Price, 2009). In summary, a sample is extracted with deionized water at a 3:1 liquid to solids ratio for 24 hours. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter. The analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
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VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA
----	---

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg ww - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



L2028191-COFC

Analysis Request Form

Date:	11/25/2017
Workorder Number:	VA17251089 & 91 TGM
Analyzing Laboratory:	ALSE
Client Contact Name:	Scott Kingston
Client Company Name:	Tetra Tech Canada Inc.
Project Name:	704-ENW.WENW03039-02
Number of Samples & Country of Origin:	4 , Canada
Sample IDs:	9-16-JD-52 (VA17251089) 9-16-JD-04 , 9-16-JD-10 , 9-16-JD-50 (VA17251091)
Sample Type:	<input type="checkbox"/> Drill Core <input type="checkbox"/> Percussion <input type="checkbox"/> Rock <input type="checkbox"/> Soil <input type="checkbox"/> Pulp <input checked="" type="checkbox"/> Other
Analysis Required:	Shake Flask (OA-SFE01)
Special Instructions:	SCAN TO OUTSIDE LAB ALS contact (Deidre Heffernan)
Sample Disposition:	<input type="checkbox"/> Return <input checked="" type="checkbox"/> Dispose after analysis
Results to:	Attention: Scott Kingston Tetra Tech Canada Inc. 885 Dunsmuir St. Vancouver BC Canada , V6C 1N5 Email:scott.kingston@tetrattech.com
Invoice to:	Attention: Scott Kingston Address: Same as above Phone: Enter Client Phone Number Here Email: scott.kingston@tetrattech.com

NOV 28 2017 17:13:35 JC

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Quantitative XRD Results for Two Samples – ALS Work Order #VA18022192

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Revision #: 0
AuTec project #: 100433

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1 Introduction

Two samples (Table 1) were received from ALS for quantitative X-ray diffraction (QXRD) analysis.

Table 1 – ALS and corresponding AuTec mineralogy sample descriptions and numbers.

ALS Sample Number	Mineralogy Sample Number
9-16-JD-13	M180211
9-16-JD-50	M180212

2 Sample Preparation

The samples were ground for approximately five minutes in a McCrone Micronizing Mill using reagent alcohol. Grinding in the Micronizing Mill reduces particles to between 5 and 10 μm in size without distorting the crystal lattices which are critical for diffraction of X-rays.

Diffraction data was collected over a range of $5-75^{\circ}2\theta$ with $\text{Co K}\alpha$ radiation using a Bruker D8 Focus Bragg-Brentano diffractometer. The diffractometer uses a 0.6mm divergence slit and incident and diffracted-beam Soller slits. The system is equipped with a LYNXEYE - Super Speed Detector.

Diffraction data produced is analyzed and peaks are identified using HighScore Plus software by Panalytical using the Crystallography Open Database. Refinement of diffraction data is done using Topas 5.0 by Bruker AXS.

Detection limits for X-ray diffraction depend on multiple factors but, as a general rule if the peak to background ratio is low, the detection limit is approximately 2.0 wt%. For samples in which the peak to background ratio is high and there is good crystallinity, the detection limit can be less than 0.5 wt%. If a phase is present at less than 0.5 wt%, it could still be identified, but confidence decreases.

3 Results

The minerals identified in these samples along with their ideal chemical formulae are included in Table 2.

Within this sample suite, the major phases identified were quartz and muscovite, and the moderate phases were orthoclase and dolomite. The minor phases identified were albite, clinocllore, phlogopite, and calcite. The modal abundances of the major, intermediate, minor, and trace phases (Table 3) vary between samples (Table 4).

The minerals used during refinement were selected with no knowledge of provenance but were selected based on best fit. QXRD values are normalized to 100% of the minerals that are detected after removal of the corundum spike value.

Corundum spikes are a known crystalline phase added at a known weight percent that can then be used to quantify amorphous content if it is present in a sample. Amorphous material will show as a hump in the background intensity between 20 and $30^{\circ}2\theta$. Amorphous content is not apparent in the scan data for the current samples. The Rietveld refinement plots show a value for corundum. The values in Table 4 have been normalized to 100% after removing the value that was calculated for corundum.

Copies of individual diffraction patterns are found in Appendix I (Figures 1 to 2).

Table 2 – Identified minerals with ideal chemical formulae.

Mineral	Ideal Chemical Formula
Quartz	SiO_2
Albite	$\text{NaAlSi}_3\text{O}_8$
Orthoclase	KAlSi_3O_8
Clinocllore	$(\text{Mg,Fe})_5\text{AlSi}_3\text{Al}_2\text{O}_{10}(\text{OH})_8$
Muscovite	$\text{KAl}_2(\text{AlSi}_3\text{O}_{10})(\text{OH})_2$
Phlogopite	$\text{KMg}_3(\text{Si}_3\text{Al})\text{O}_{10}(\text{FOH})_2$
Calcite	CaCO_3
Dolomite	$\text{CaMg}(\text{CO}_3)_2$

Table 3 – Major, intermediate, minor, and trace phase grouping definitions.

Grouped Amount	Weight Percent Range
Major	>30
Moderate	<30 >10
Minor	<10 >2
Trace	<2

Table 4 - Quantitative XRD results, modal wt%.

Mineral	M180211 9-16-JD-13	M180212 9-16-JD-50
Quartz	40.5	53.9
Albite	9.0	0.0
Orthoclase	14.7	0.0
Clinocllore	0.0	3.9
Muscovite	0.0	31.9
Phlogopite	4.0	0.0
Calcite	7.0	3.9
Dolomite	24.9	6.4
Total	100.0	100.0

APPENDIX I
DIFFRACTION PATTERNS FOR INDIVIDUAL SAMPLES

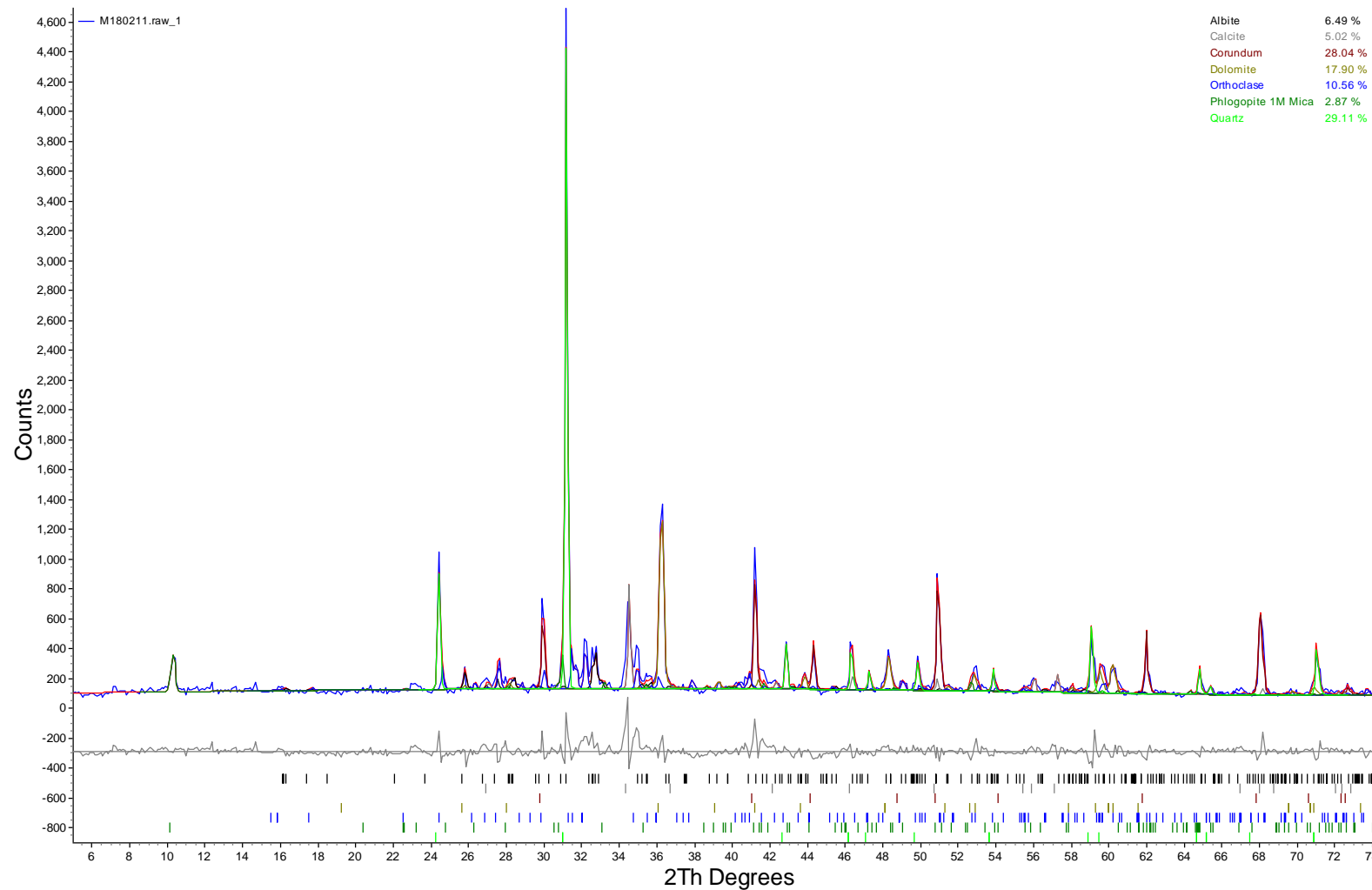


Figure 1: Rietveld refinement plot of 9-16-JD-13 (M180211). The blue line is the measured intensity, the red line is the calculated pattern, other coloured lines are individual mineral patterns, the grey line is the difference profile and the vertical bars are the reflection positions. The peak at $9^{\circ}2\theta$ is associated with the corundum spike.

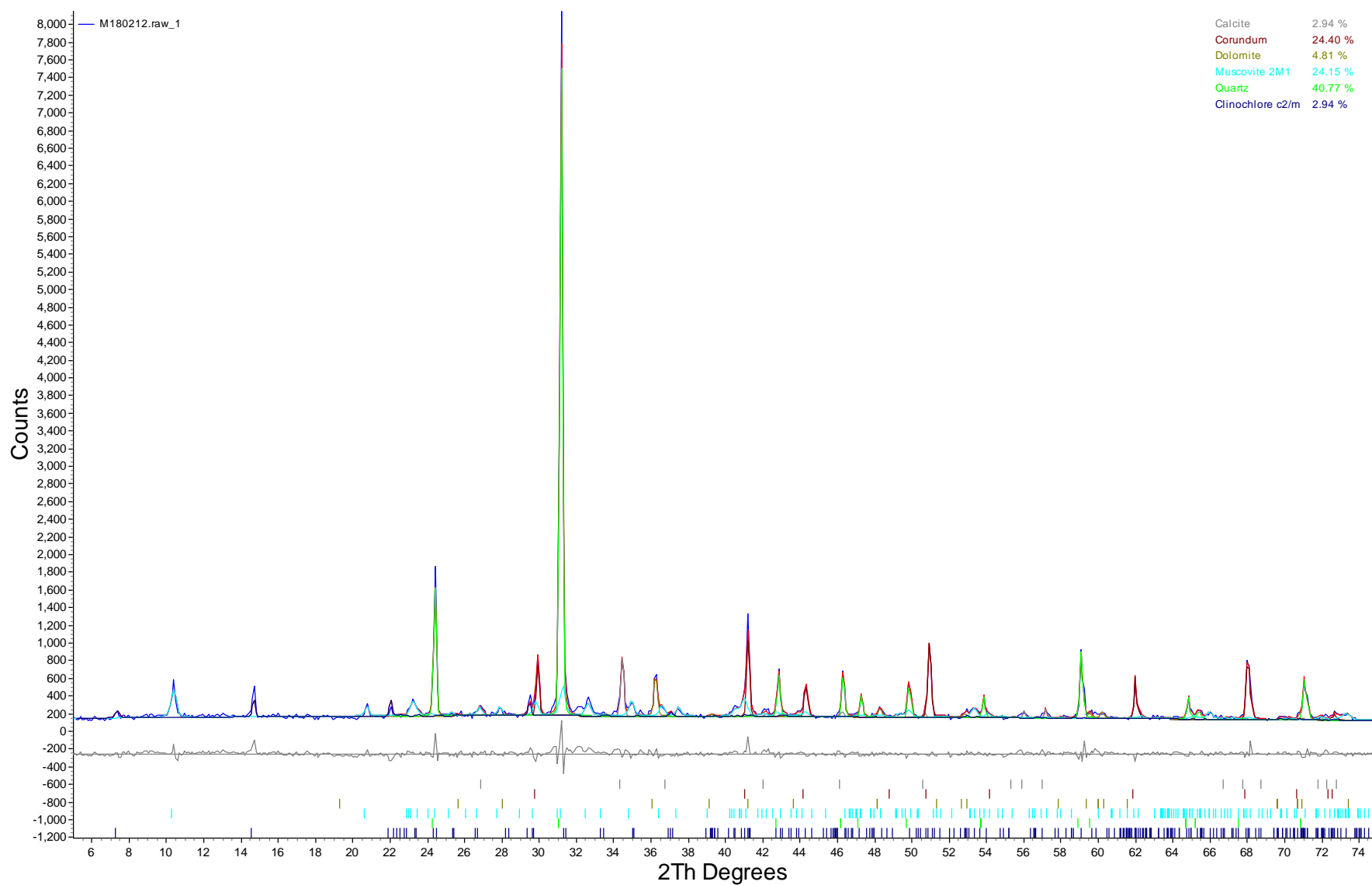


Figure 2: Rietveld refinement plot of 9-16-JD-50 (M180212). The blue line is the measured intensity, the red line is the calculated pattern, other coloured lines are individual mineral patterns, the grey line is the difference profile and the vertical bars are the reflection positions. The peak at 9°2θ is associated with the corundum spike.