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# Mount Nansen Remediation Project
# 2013 Site Investigation Data Report
# Yukon

Submitted to:

**Assessment and Abandoned Mines**
**Energy Mines and Resources**
Whitehorse, YT

Submitted by:

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# 1.0 INTRODUCTION

A site investigation (SI) program was carried out at the Mount Nansen site between September 3, 2013 and October 8, 2013 in support of the site remediation design. This report presents the data gathered during the field program and the associated laboratory data. Interpretation of the data and the incorporation of historic site data are presented in the Site Characterization Report (AMEC, 2014).

## 1.1 Site Location and Description

Mount Nansen is an abandoned gold and silver mine located 180 km north-northwest of the City of Whitehorse in Canada's Yukon Territory. The key areas of the site are (see Figure 1):

- the Brown McDade open pit;
- the waste rock area adjacent to the open pit;
- the tailings storage facility;
- the mill area; and
- the camp area.

Key features of the site that are relevant to the site investigation include:

- Dome Creek;
- Pony Creek;
- Pony Creek Adit, located in the east wall of the open pit;
- Huestis Adit (now buried but which formerly had an entrance located just north of the mill area);
- former Ketza shop;
- borrow areas (sand and "shale" areas); and
- Victoria Creek Wellhouse.

## 1.2 Previous Investigations

Mining has occurred at the Mount Nansen site in various forms since the 1960s with the most intensive period occurring in the late 1990s. A significant amount of work has been done with regards to the Mount Nansen site both before and especially after mining. The information available from these studies and particularly from previous investigation programs was reviewed as much as possible prior to developing the 2013 program. The previous investigations reviewed, and their influence on the 2013 SI program, are detailed in AMEC (2013a).

## 1.3 Purpose of 2013 Investigation Program

The 2013 site investigation program was developed in consideration of the work completed to date at the Mount Nansen site as summarized in the gap analysis and site investigation memos (AMEC, 2013a, 2013b). The intent of the program was to fill in information gaps where significant uncertainty and risk had been identified. The specific objectives for the site investigation completed at the major project elements are discussed in Section 3. Broadly, the key objectives were:

- to improve the tailings characterization, particularly as it relates to behaviour during relocation and placement;
- to improve the characterization of insitu materials under and around the tailings facility, in particular with regards to geochemistry and physical stability during remediation;
- to improve the understanding of hydrogeologic and thermal conditions around the open pit and particularly on the south side between the pit and Dome Creek;
- to expand the water quality dataset, particularly with respect to groundwater;
- to better understand the mill area soil contamination, flows and seepage;
- to improve estimates of the volumes of materials requiring containment in the open pit; and
- to provide the design team with confirmation of the onsite conditions and conceptual frameworks that have been developed to date.

## 1.4 Investigative Disciplines

The AMEC/AE investigative team was organized by technical discipline as follows:

- Geotechnical: materials relocation/management, physical integrity and stability of site structures and features;
- Water: movement and management of water and/or contaminants from source areas/ structures;
- Site Characterization: identification and characterization of hazardous materials and potential sources of soil and/or groundwater contamination, primarily related to former processing facilities and their ancillary structures;
- Infrastructure (Structures): dismantling/demolition (D&D) of structures and the disposition of D&D waste streams; and
- Infrastructure (Reclamation): surface restoration of disturbed and/or remediated lands and features.

The technical disciplines, as described above, are referenced at various junctures throughout this data report.

## 1.5 Evolution of Investigation Program

At the outset of the site investigation program, a preliminary work plan was developed to guide the site efforts. Consistent with the nature of site investigation programs, the plan identified the purpose and objectives of each planned investigation method and location with the expectation

that there would be some changes required to the planned methods and/or locations to accommodate the actual site conditions encountered. The information gathered from the investigation was consistent with the objectives that were laid out and the work largely followed the plan. There were, however, several modifications that were required as listed below:

- Initially, it was proposed that drill holes would be advanced around the open pit and then left open to allow geophysics and the installation of CMT wells at a later date. This was changed to the installation of conventional monitoring wells and vibrating wire installations and deletion of borehole geophysical surveys (acoustic televiewer, heat pulse flow survey and temperature measurement). The change was made in response to the observed ground conditions which indicated that the boreholes were unlikely to remain open for the geophysical surveys and/or for the installation of the CMT wells. The installation of vibrating wires compensated to a significant degree for the information not obtained through the geophysics by providing stabilized temperature readings and, where thawed conditions existed, continuously monitored pore pressure readings. This provided for measurement of the interconnectivity between the installation locations and the pit and a better understanding of the thermal regime. Paired shallow wells were drilled at each location allowing installation of a deep and shallow monitoring well giving the same groundwater coverage as would have been provided by the CMT wells. Detailed fracture logging and, where allowed by the rock mass properties, core orientation were completed making the acoustic televiewer survey less critical.
- Initially, reconnaissance of the open pit and Pony Creek Adit were proposed; however, these were removed from the program. This was done because the available information was considered to be sufficiently detailed for the current design needs, particularly with regards to the open pit. If required, assessment of the Adit would be more effectively completed once the base case design is further developed and a better understanding of the role of the Pony Creek Adit in the final pit configuration exists. Should further assessment be required to support design efforts, it will not require drilling or mobilization of a subcontractor to site and it, therefore, can be completed if, or when, it is needed.
- A limited number of electrical resistivity geophysical surveys were added to the program. Initially, this was done to identify underground obstructions and utilities as part of the safety protocol's ground clearance efforts. When good results were obtained, other lines were completed to provide insight into permafrost, and aide in identifying potential groundwater flow pathways to better target the groundwater shallow piezometers between the Huestis Adit and Dome Creek.
- A limited groundwater sampling event was included in the freshet site visit during May 2013 (AMEC, 2013c), involving groundwater sampling from two monitoring wells. These were located at the tailings facility, one inside (MW09-02), the other outside and downstream (MW09-24). The analytical results from these samples were used to refine the full-scale groundwater sampling investigation in 2013.
- One full-scale groundwater sampling event was completed in September 2013 which included all serviceable monitoring wells. An earlier spring/summer event was not possible, prior to the field program start in September 2013.

## 1.6 Summary of Investigations Completed

A list of all of the subsurface investigations and installations completed is provided in Appendix I and summarized below.

- 35 Boreholes (diamond, sonic & GeoProbe);
- 20 cone penetration tests;
- 40 test pits and 4 hand augers;
- 12 geophysics lines;
- 14 mini piezometer pairs;
- 5 single mini piezometers;
- 8 monitoring wells; and
- 5 vibrating wire locations including two with nested installations.

The subsurface investigations were complemented by a sampling program which consisted of:

- 24 existing groundwater well sample locations;
- 19 new groundwater locations sampled (27 new sampling locations installed but some were frozen or dry when sampling occurred);
- surface water sampling;
- 38 environmental soil samples;
- 95 soil samples for geotechnical testing;
- 156 soil samples for geochemical testing;
- 20 sediment samples;
- 21 samples of potentially hazardous material in the mill and development of hazardous material inventory;
- 14 seepage meter tests;
- 7 creek flow tests; and
- gas monitoring or well headspace and soil samples.

In addition to the investigations listed above, general site wide reconnaissance to support the development of reclamation concepts including observation of soils, vegetation, landforms and site aesthetics was completed. An initial visual assessment of the structures in the mill area and near the bunkhouse was also completed. General observations of the site conditions in consideration of possible geohazards and the potential for borrow material were also carried out.

## 1.7 Report Organization

The site investigation data report is organized with summary information presented in the main body with the detailed data appended as outlined below.

Section 2.0: describes the various investigative methods used including subsurface investigations, sampling protocols, laboratory methods, etc.;

Section 3.0: presents the objectives, scope and results for the various project areas or key features;
Appendix A: test hole logs organized by investigation type;
Appendix B: field reconnaissance notes;
Appendix C: photographic log of site conditions, core and test pits;
Appendix D: laboratory results, organized by discipline (e.g. geochemical, water quality, etc.);
Appendix E: specifications and calibrations for equipment used or installed;
Appendix F: readings from installed instrumentation and packer testing; and
Appendix G: geophysics survey results.

## 2.0 INVESTIGATION METHODOLOGY

### 2.1 Diamond Coring and Drilling Methodology

Coring and open-hole drilling was conducted as part of the hydrogeological site investigation. Four coring and drilling locations, identified as CH-P-13-01 to CH-P-13-04, inclusive, were selected on the basis of hydrogeological setting and proximity to the open pit, with two other locations, identified as CH-P-13-05 and CH-P-13-06, located at the open pit floor. The locations, relative to the open pit, were as follows (Figures 1 and 3):

- CH-P-13-01 - southwest of open pit;
- CH-P-13-02 - south of open pit;
- CH-P-13-03 - southeast of open pit;
- CH-P-13-04 - east of open pit;
- CH-P-13-05 - open pit floor; and
- CH-P-13-06 - open pit floor and inclined 45 degrees east.

Each location was initially planned to be cored to 50 m depth. At four corehole locations outside the open pit, a companion, borehole was drilled to 10 metres depth, for installation of a PVC well capable of monitoring and sampling groundwater from the shallow active layer.

One corehole within the open pit (CH-P-13-06) was inclined at 45 º, with an 80 º azimuth, commencing from the open pit floor and advanced easterly into the east pit wall, to intercept a major bedrock discontinuity documented as the Footwall Fault. Core recovered from this inclined corehole was oriented using an ACT II orientation tool (Reflex Instruments). The other five coreholes were advanced vertically.

During implementation of the coring and drilling program, the four locations outside the open pit encountered relatively shallow overburden, overlying a vertical profile of highly weathered bedrock extending to significant depths. At the first location (CH-P-13-01), after drilling a weathered bedrock profile, artesian pressure was encountered necessitating the plugging and cement sealing of the corehole without any instrumentation installations.

Coring was conducted by EarthTek Drilling Ltd. (Whitehorse) using a track-mounted drill rig and NQ-sized coring equipment. The coring and open-hole drilling program was conducted with the following methodology:

- A tailgate safety meeting was held between AMEC field staff and EarthTek staff to discuss the daily work plan, anticipated hazards, PPE, and hazard mitigation procedures.
- Preliminary coreholes locations were obtained for coring rig setup, using a handheld GPS receiver. The 'as built' corehole collar coordinates and elevation were surveyed by YES Engineering Ltd., after the completion of coring activities.
- For the two coreholes located inside the open pit, a safety zone was created by surrounding the drill rig with a temporary wall of concrete lock-blocks. A staff member from EBA Engineering was present throughout the open pit work to act as a safety spotter and rock stability specialist.
- The coreholes were advanced using diamond core bits, with water and drilling mud as needed. Temporary casing was installed to minimize cave in.
- The core was retrieved within a 3 metre long core barrel, fitting inside the diamond drill bit and drill rods.
- For the oriented hole, the ACT II tool aligned the core and core barrel at the start and end of each core run. This process allowed the marking of a reference line on the recovered core surface. The reference line enabled fractured core segments to be matched during core logging and to give an indication of fracture orientation.
- Each core run was photo-logged in core boxes and logged by AMEC, noting characteristics including rock type, relative strength, weathering, fracture spacing, fracture surface quality and infill. Rock logging terminology is described in Corehole Log References, Appendix A3.
- On completion of coring, core boxes were transported and stored at the Camp facility, for project storage.
- Packer testing and falling head testing using packer equipment were conducted at 5 metre intervals to give a semi-continuous record of hydraulic conductivity.
- Where the bedrock profile was too highly weathered and obtaining a packer seal was not possible, a packer test was not conducted.
- Where the change in corehole water level was measurable, a falling head test was completed, in which the borehole was filled with water and the water level decline measured over set time intervals.
- Packer testing was conducted following AMEC geotechnical standards. In summary, this involved inserting the inflatable packer to isolate the lowermost corehole section, followed by inflation of the packer to seal off the bottom section of the corehole. Water was then pumped into the isolated section through a recirculating system to control the water pressure. The volume of water pumped into the hole is recorded at five pressures, that ramp up then ramp down the pressure.

## 2.2 Corehole Monitoring Well and Vibrating Wire Piezometer Installation

At the completion of the coring, instrumentation to measure groundwater levels, piezometric elevations and downhole temperatures were installed, as described in Section 3.2 and summarized below:

- Series of five VWPs, at 10 metre depth intervals:
  - CH-P-13-02/VWP and CH-P-13-06/VWP
- 10 metre deep, 1.5" diameter PVC monitor wells:
  - CH-P-13-01/10, CH-P-13-02/10, CH-P-13-03/10 and CH-P-13-04/10
- Single VWPs, attached at base of corehole:
  - CH-P-13-03/50, CH-P-13-04/35 and CH-P-13-05/50
- 35 to 50 metre deep, 1.0" diameter PVC monitor wells:
  - CH-P-13-03/50, CH-P-13-04/35 and CH-P-13-05/50

The monitor wells consisted of 1.5" and 1.0" PVC riser pipe and 3 metre-long screened sections at the base. Sand filter pack was installed around the screen intake sections and the annulus sealed part-way with bentonite clay sealant and the remaining annulus sealed to surface with cement-bentonite grout.

Vibrating wire piezometers (RST Instruments Ltd.) were installed into five of the six coreholes on completion of coring, following one of two configurations:

(1) Configuration 1 - a single piezometers attached to the lower screen section of a conventional PVC monitor well, installed within annular sand pack; or
(2) Configuration 2 - a string of five piezometers, each attached to a central grout tube, tremie-grouted in place, with a bentonite-cement grout mixture.

The following methodology was used for installation:

- Vibrating wire piezometer devices were saturated and calibrated following the manufacturer's instructions, prior to installation.
- Calibrations were conducted involving taking a '0' reading by suspending the piezometers in a bucket of water, at the same temperature as expected in the corehole, and taking three sets of pressure and temperature readings. This typically took about 30 minutes.
- While the piezometers are being calibrated, the filters are also soaked in the same water.
- Filters are re-attached to the piezometer by holding the piezometer upside down, with the space at the bottom of the piezometer filled with water.
- The calibrated and assembled piezometers were stored in water until shortly prior to installation.
- The serial number for each piezometer was documented, together with installation depth as measured from surface grade.
- At the completion of coring, each corehole was flushed to remove rock cuttings, prior to piezometer installation.

- For configuration 1 installations, piezometers were attached to the lowermost portion of the conventional PVC well screen using tie-wraps. The annulus adjacent to the wells screen was filled with select filter sand and the annulus then sealed with a bentonite grout to surface. This configuration provides pressure and temperature readings from the lowest portion of the well screen and also provides access for groundwater sampling.
- For configuration 2 piezometer strings, five piezometers were attached to a PVC grout tube using tie-wraps. The spacings between each piezometer device along the grout tube were measured to correspond to selected depths, i.e. 10 m, 20 m, 30 m, 40 m and 50 m (CH-P-13-02/VWP) and 20 m, 30 m, 40 m, 50 m and 60 m (CH-P-13-06/VWP). Note the latter instrumentation depths are cored depth from corehole collar elevation, at a 45 º inclination.
- As the PVC grout tube was lowered, the piezometer wires were uncoiled and attached at regular intervals to the grout tube, to prevent wires from tangling.
- On lowering the grout tube and attached instrumentation to the corehole base, tremie grouting was commenced.
- Grout was mixed in a ratio of 25 lbs bentonite to 94 lbs cement to 30 gallons water.
- Metal protective monuments were cemented in place, to protect the instrumentation, consisting of a metal, high-visibility, protective housing.
- RST data loggers were placed into each of the completed coreholes, above-ground metal housings and connected to the vibrating wire piezometers for long-term recording of piezometric pressure and temperature. Data logger specification sheets are provided in Appendix E2.
- RST data loggers for the multiple-string vibrating wire piezometers were connected and initiated on October 4 and 5, 2013. Data loggers for the single vibrating wire piezometers were connected and initiated on November 14 and 15, 2013. Both data loggers have 4 MB of memory corresponding to storage for 600,000 and 120,000 readings for the single and multi channel units, respectively. The battery lives are five and seven years for the single and multi channel units, respectively. Each data logger was configured to record piezometric and temperature data at six-hour intervals, resulting in a storage capacity for many years of readings. Loggers should be checked at regular intervals and downloaded at least annually or as needed to support design and monitoring inputs.

## 2.3 Sonic Drilling

Sonic drilling was completed by Dark Side Drilling, a division of Kryotek Arctic Innovation Inc. with soil logging completed by AMEC/AE field staff. Shane Magnusson completed the geotechnical logging and Stuart Van Bibber completed the environmental soils logging. Both field staff were responsible for collected geochemical samples as required. A track mounted rig, model SDC150, manufactured by Sonic Drilling Corporation and modified with a larger engine and tooling specific for permafrost drilling conditions, was used for the program. The rig also had the ability to be equipped with an ODEX system should the ground conditions require such drilling methods. ODEX drilling was not required in the 2013 investigation program.

With sonic drilling, high frequency vibrations are induced in the drill casing and rods which fluidizes the material adjacent to the casing allowing the casing and sampler to advance into the soil often without the use of drilling fluid. Drilling fluid was not used in the Mount Nansen drill program. In the dam and tailings area, drilling fluid was not used to avoid degrading the warm, marginally stable permafrost, particularly near the tailings dam where seepage is already a concern. Elsewhere onsite, drilling fluid was not required to reach the target depths. The drill head can also apply pressure and rotation as needed. The main advantage of sonic drilling is that a continuous core is retrieved and with the exception of the outer portion of the sample which was fluidized, the sonic method is generally considered to provide a relatively undisturbed sample.

Photos of the drill are included in Appendix C1. Drilling was completed using the following methodology:

- A tailgate safety meeting was held between AMEC or AE field staff and Dark Side drillers to discuss the daily work plan, anticipated hazards, PPE required and hazard mitigation procedures.
- Sonic drill holes were located by handheld GPS to be as near to the planned coordinates as safely possible, with consultation from Dark Side Drilling. In the tailings area, safety concerns with regards to the trafficability and strength of the tailings dictated where drilling could be completed and at the mill, concern regarding underground obstructions and utilities influenced the location of sonic holes. As-built coordinates were taken with handheld GPS.
- The drill hole was advanced by first drilling and sampling the upper 1.5 to 3.0 m, then planting casing to stabilize the surface soil.
- The 1.5 m long drill rods were placed through the casing and advanced by high-frequency vibration.
  - The holes were advanced without water or mud-support.
  - The holes did not require the downhole hammer / ODEX air drilling to advance through difficult soil.
  - The core barrel is fixed to the bottom of the drill rods. Usually every 1.5 to 3.0 m, the rods were pulled out of the hole. This occurred more frequently in difficult drilling situations.
- 75 mm diameter core was removed from the core barrel by turning on the sonic vibration and extruding the core from the core barrel.
- Sonic drilling continued until either the target depth was reached or refusal was encountered.
- Upon completion of drilling, the rods and drill casing were removed and if required, standpipes were installed (refer to Section 2.2.1). Where the borehole wall was stable, the hole was backfilled with available material.

### 2.3.1 Methods Specific to the Geotechnical Discipline

For geotechnical purposes, sonic drill core was logged using the following methodology:

- Core was placed in a NQ or HQ sized core box, and the box was labelled with the name of the drill hole, box number, project number and depth intervals in metres. Photographs of the core were taken at the drill site and a complete photographic log is available in Appendix C2.
- Soil was logged in accordance with the modified unified soil classification system with frozen soil logged following ASTM D4083. These logging conventions are summarized in the explanation sheet provided before the geotechnical borehole logs in Appendix A.
- Based on the field visual classification, specific samples were removed from the core as outlined in Section 2.8.1.
- Core boxes were then transported by pickup truck to the Mount Nansen Camp, and have been stored outside in the core racks for future reference or to provide additional material for testing if required.

Standpipe piezometers were installed in three of the sonic boreholes within the tailings unit to allow measurement of water elevation (refer to Section 3.1 and borehole logs in Appendix A1). Standpipes were installed in the following manner:

- 1” diameter PVC pipe in 10 foot lengths were used. Joints were bell ends and were taped together with Gorilla Tape.
- The screened interval was created by cutting slots into the solid pipe with a hacksaw. The slots were spaced approximately 150 mm apart.
- The bottom end of the standpipe had an end cap taped on.
- Upon the completion of the drill hole, each 10’ length of PVC pipe was lowered in, and subsequent sections were taped on as needed to provide the required total length.
- Dry sand from the nearby sand borrow to the northeast of the TSF dam was placed as backfill to surface in BH-T-13-03 and BH-T-13-04. BH-T-13-02 sloughed in around the standpipe, so no backfill was placed. For boreholes BH-T-13-03 and 04 which were installed in tailings, there was no low permeability confining layer in which to place a seal. This is consistent with other installations in tailings at the site and the standpipes are expected to reflect the water level in the tailings. The insitu sands in which the standpipe in BH-T-13-02 is located are not isolated by a seal because there was no bentonite available onsite when the installation was completed. The measured water level in BH-T-13-02 will also be influenced by water levels in the tailings and may not reflect the piezometric head in the insitu soils if there is downward drainage.

### 2.3.2 Methods Specific to the Site Characterization Discipline

Soil samples were collected by Stuart Van Bibber of Associated Engineering (AE) in 0.5 m intervals, and observations noting the presence or absence of pyrite, limestone, and rust staining, grain size composition, moisture content, and odours were recorded. Additionally, readings were measured for each sample using an RKI Eagle 2 Photo-ionization detector (PID). Depending on the nature and extent of contamination that was expected for each borehole,

target depths varied. Samples were submitted to the laboratory for the potential contaminants of concern (PCoCs). PCoCs were identified by the sample depth and location, as well as the field screening indicators noted. Site characterization boreholes were advanced at the Ketza Shop and the mill areas.

### 2.3.3 Methods Specific to the Geochemical Discipline

Samples of waste rock and insitu soils were gathered by the geotechnical and site characterization field staff. The samples were gathered at regular intervals according to the procedures outlined in Section 2.7.2. The field logs were reviewed by AMEC engineer, Judy Andrina, in consultation with the onsite field staff as necessary to identify which of the collected samples should be tested in the laboratory.

## 2.4 GeoProbe Drilling

GeoProbe drilling is a direct push method that involves advancing a drill assembly through soils by either the pushing power of the drill rig, or by a hydraulic hammer. The specification sheet for the GeoProbe system is included in Appendix E4. The system provides continuous samples 25 mm in diameter and is appropriate for use in relatively soft soils and appeared to fairly accurately preserve any layering or bedding structures. The drill equipment is relatively lightweight and was, therefore, appropriate for use in areas that could not be accessed by heavier drill equipment. GeoProbe drilling was completed by Darkside Drilling with AMEC providing supervising and logging services. The samples were logged by AMEC field engineer, Dan Piccininni.

On land drilling was carried out with a track mounted GeoProbe 540MT rig. A GeoProbe 520M portable rig was mounted on a small custom built, low draft barge to allow access to the tailings pond. The tooling for either rig is interchangeable and in addition to the direct push sampler, the rigs can be equipped with CPT, augers and downhole hammer equipment. The following methodology was followed for the GeoProbe drilling:

- Tailgate meetings were held at the start of each day and when conditions or tasks changed to discuss the work plan, anticipated hazards and the required PPE and safe work practices to mitigate those hazards.
- Test locations were identified in consideration of planned locations, representative coverage based on the actual locations of other investigations completed prior to the GeoProbe drilling, and safe access.
- The GeoProbe tooling assembly consists of a clear plastic core sampler, with a built in core catcher, which fits inside a larger diameter drill rod with a cutting shoe attached. Additional metal centre rods and outer drill rods are screwed on as the drill advances.
- The sampler was pushed into the ground in 1 or 1.5 m intervals. Where ground conditions required it, the sampler was hammered into the ground using the hydraulic hammer.
- The sampler was brought to surface and the sample removed in a clear plastic casing.

- The samples were preliminarily logged at the drill site following the conventions outlined in Appendix A.
- Sampling continued in this fashion until refusal was reached, typically right near the top of the insitu deposits.
- Upon completion, the holes were allowed to slough in.
- Hole locations were obtained with a handheld GPS.
- The core was then relocated near the bunkhouse and logged in detail in accordance with the modified unified soil classification system with frozen soil logged following ASTM D4083. These logging conventions are summarized in Appendix A. The core was photographed and all material was placed in plastic bags. Specific sub-samples were collected for geotechnical testing as described in Section 2.8.1.

## 2.5 Cone Penetration Testing

Cone penetration testing (CPT) involves pushing an electric cone into soil. The cone is advanced at a constant, standard rate and built-in sensors that measure tip resistance, sleeve friction, and pore water pressure are monitored. A Classic Geotech cone was advanced by Dark Side drilling using the direct push GeoProbe rig described in Section 2.3. The Dark side staff were specifically trained and certified for the unit used in the program. The CPT equipment was calibrated in Whitehorse by a Geotech technician prior to use. AMEC field engineer, Dan Piccininni, was onsite for the duration of the CPT program. The CPT program followed ASTM D-3441 “Standard Test Method for Mechanical Cone Penetration Tests of Soil.” The CPT specification sheet is provided in Appendix E1 and photographs of the CPT are included in Appendix C1. CPTs were advanced to refusal using the GeoProbe rigs from the tailings beaches and the barge.

CPT does not provide physical soil samples; the measured properties are used to estimate various soil properties based on standard correlations. Some of the CPT locations were, therefore, paired with GeoProbe and sonic drill locations to confirm the interpretations. The CPT data were reduced by Dark Side using the Geotech software and also by AMEC using spreadsheets developed in-house.

Dissipation tests were also completed at certain locations. Where the tailings were thickest, dissipation tests were completed at intervals to assess head gradients. Elsewhere, attempts were made to carry out dissipation tests near the bottom of the tailings deposit. In total, 23 dissipation tests were attempted over the course of the CPT testing program; however, only 11 were carried out for a sufficiently long time to reach equilibrium.

The following specific methodology was used for the CPTs completed:

- At the start of each CPT hole, the cone was cleaned, and the rubber seals and glycerol fluid in which the pressure sensors were housed were replaced. The cone was also calibrated through a “zero test” in which the cone was suspended in the air.
- If required due to near surface frozen conditions, the GeoProbe bit was used to drill out the frozen material. All drill out locations were noted and drill out depths measured.

- Where drilling was completed from the barge, the height of the barge deck (or 0 depth) above the pond was measured.
- The CPT was advanced per ASTM D-3411 at a rate of 2 cm/s. Readings were recorded every 0.2 m.
- At specific locations, the CPT was stopped and equilibrium pore pressures were measured through a dissipation test. The cone was held stationary during the dissipation tests and the pore pressure channel monitored for a period of time, ideally until equilibrium conditions were achieved; however, this was not achieved in all cases because the test was stopped early.
- The CPT was advanced until one of the sensors reached or neared the maximum load limit or if the pushing capacity of the drill rig was reached, the test was stopped.
- The CPT was removed from the ground and the zero test was repeated.
- Test locations were obtained from a handheld GPS unit.

## 2.6 Test Pitting

Test pits were excavated by Boreal Engineering Ltd. with AMEC/AE staff providing supervision and soil logging. The test pits were completed using a tracked Caterpillar 324D excavator which had a standard boom, capable of a maximum vertical reach of 6 m. The excavator bucket was 1.0 m wide, with five digging teeth, and 1 yard$^3$ capacity. Photographs of the equipment are included in Appendix C1.

The test pit methodology was as follows:

- A tailgate safety meeting was held to discuss the anticipated hazards, PPE required and hazard mitigation procedures.
- Test pits were located by handheld GPS to be as near to the planned coordinates as safely possible, with consultation from the operator. As-built coordinates were taken with handheld GPS.
- The test pit logger was in constant communication verbally and with hand signs with the excavator operator for instructions/feedback from the operator. The test pit logger would normally stand near the corners of the test pit, and a safe distance away in the event the test pit collapsed.
- The operator would dig the bucket straight down about 10 cm into the undisturbed soil and bring the sample so the material could be observed and logged. The excavated material was then placed in a spoil pile adjacent to the test pit.
- Test pits were advanced until the operator was notified that a sample was to be retrieved, typically every 0.5 m, and in smaller increments if a change in soil unit was observed.
- If safe to do so, the logger would enter a test pit up to 1.2 m depth, or shallower based on the stand up performance to observe the soil exposed in the test pit walls.
- Samples and soil were logged per the modified unified soil classification system with frozen soil logged following ASTM D4083.
- The performance of the test pit would be recorded, such as degree and depth of sloughing, location and description of water seepage.

- Representative photos were taken of both the soil sample in the excavator bucket and of the test pit.
- Test pit depth, sample depth and depth of stratigraphic changes were measured by lowering a fibreglass measuring tape down the test pit.
- The maximum depth of the test pit was determined by:
  - the maximum reach of the excavator, typically 4 to 6 m depth depending on the horizontal reach of the test pit away from the excavator;
  - safety concerns, if the test pit sloughed excessively, causing tension cracks around the excavator, or soft ground conditions could not safely support the excavator advancing the test pit to a further depth; or
  - the excavator encountered refusal on hard soil/rock and was unable to continue.
- All test pits were backfilled upon completion, and graded to mimic the surrounding area and:
  - Select test pits were left open on the tailings beach overnight to assess the stand-up performance. Measurements and photos were taken before and after, then backfilled.
  - Test pits completed on the tailings dam were backfilled in 0.5 m compacted lifts with the excavator bucket. Erosion protection on the dam surface was replaced with material from the “shale” borrow area north of the tailings dam.

### 2.6.1 Methods Specific to the Geotechnical Discipline

In conjunction with the test pitting program, the excavator was used to observe and preliminarily assess the trafficability of the tailings surface. Soil logging and observations were recorded by Shane Magnusson of AMEC. This was done using the following methodology:

- Before the excavator went to a test pit site on the tailings surface, the operator and field engineer would walk on foot to assess the stability. In select spots, the excavator would dig a small hole or push into the tailings with the bucket to assess the stability and if it was safe to walk the excavator over.
- If deemed safe to proceed, the excavator would slowly walk on the surface. If the first pass was successful, several more would be completed in the same tracks.
- Observations of the tailings behaviour were recorded and photographs were taken to show the conditions after subsequent passes. Refer to the test pit photos in Appendix C3 for photos.

### 2.6.2 Methods Specific to the Site Characterization Discipline

Soil samples were collected by Stuart Van Bibber of AE in 0.5 m intervals from the test pit faces, and observations involving the presence or absence of pyrite, limestone, rust staining, grain size composition, moisture content, and odours were recorded. Additionally, PID readings were measured from each sample. Depending on the nature and extent of contamination that was expected at each location, target test pit depths varied. Samples were submitted to the laboratory for the PCoCs identified by the sample depth and location, as well as the field screening indicators noted. Site characterization test pits were dug at the Ketza Shop area, the mill area, and along the roadways.

### 2.6.3 Methods Specific to the Geochemical Discipline

Geochemical sampling was completed by the geotechnical and site characterization field staff at regular intervals following the procedures outlined in Section 2.7.2.

## 2.7 Geophysics

Electrical resistivity (ER) and induced polarization (IP) geophysical surveys were completed in the mill and tailings facility areas in order to confirm the absence of underground obstructions or utilities, to provide an indication of where the Huestis Adit or other preferential flow paths may be, to aide in the detection of potential contaminated zones, and to provide some additional data regarding depth to permafrost. The ER and IP surveys are completed at the same time and involve pounding electrodes into the ground and then injecting a direct electrical current into the ground. The voltage and chargeability are measured at measuring electrodes located at specific distances from the injection point for the ER and IP surveys, respectively. The ER surveys were the main method used to infer subsurface soil conditions because the resistivity of sands, silts, bedrock, and frozen soil vs. thawed soil are quite distinct IP. Induced polarization is particularly useful for detecting buried metallic objects. The sensitivity and penetrating depth of the survey can be configured by changing the electrode array and spacing that is used.

Darkside Drilling completed the geophysics surveys as well as the interpretation of the data. A Lipmann 4 point system was used to carry out the surveys, and the data were interpreted using Earth Imager 2D software from Advanced Geosciences Inc. The following general methodology was used:

- a cable with 20 to 100 electrodes at 1 to 5 m spacing was laid on the ground;
- electrodes were pounded 30 cm into the ground;
- the system was connected to a battery power source and a computer;
- data were collected and inverted and processed; and
- images were interpreted in consideration of the understood subsurface conditions including results of drilling.

## 2.8 Sampling Protocols

### 2.8.1 Geotechnical Sampling

Geotechnical soil sampling was carried out in the test pits, sonic and GeoProbe drill holes. Efforts were made to collect samples representative of typical conditions as well as from specific units of interest and to encompass the range of observed materials. Since the sonic and GeoProbe drilling produced continuous core and test pitting produced a significant volume of material the material retrieved was sub-sampled to provide samples for geotechnical laboratory testing. The sub-sampling methods used for the different investigation methods are summarized below.

Test pit sampling:

- Soil samples were typically collected from test pits at 0.5 m intervals or from each unit of interest, whichever was more frequent.
- Photographs were taken of the sample, beside the labelled sample bag to track the sample name.
- Samples were taken from the bottom of the bucket between the teeth to avoid collecting soil slough from higher up in the test pit.
- For bulk samples, a new, 5 gallon bucket was filled with approximately 10 kg of sample, sealed with a lid and the sample identifiers and description were written on the side and lid.
- For grab samples and moisture content samples, approximately 1-3 kg of soil was selected with a hand shovel that was free of debris from other soil samples.
  - Samples were place in a plastic sample bag and secured with a zap strap. Samples were double bagged if there was a risk of sharp rocks puncturing the bag.
  - The bag was labelled with a marker to denote the name of the test pit, sample ID name and depth.
- Samples were stockpiled in a cool covered area and were taken offsite for laboratory testing at the end of the program.

Sonic drilling sampling:

- As discussed in Section 2.3, the sonic core was placed directly into core boxes.
- The core boxes were labelled with the project name, drill hole number, box number and depth range on the top of the box and on the short side.
- Photographs were taken with a white board in the frame to denote the above details.
- The soil was visually logged and specific sub-sample locations were identified.
- Close-up photographs of the core would be taken of the sub-sample with a sample ID tag/bag.
- A clean hand shovel was used to sample about 0.3 to 1.0 kg of soil from a discrete interval of core. This typically corresponded to about a 10 cm length of core.
- Samples were placed in a plastic sample bag and secured with a zap strap. Samples were double bagged if there was a risk of sharp rocks puncturing the bag.
- The bag was labelled with a marker to denote the name of the drill hole, sample ID name and depth.
- Additional photos were taken for soil of particular interest, such as ice-rich core, with a tape-measure for scale.
- For drilling at the tailings area, moisture content samples were taken to an onsite laboratory for testing. Other samples were stockpiled and taken offsite for laboratory testing at the end of the program.

GeoProbe drilling:

- Upon completion of a GeoProbe hole, the core was lined up and photographed.

- Where only one soil type was encountered in a core run, the entire run was placed in a sample bag.
- Where multiple soil units were encountered, the core run would be divided into sub-samples at changes in stratigraphy.
- Samples were double bagged with the bags labelled with borehole ID and sample depth.
- Samples were stockpiled in a cool, dry, covered area and taken offsite for laboratory testing.

### 2.8.2 Geochemical Sampling

Geochemical samples were gathered from sonic boreholes and test pits. These samples were typically gathered at regular pre-determined intervals using the following protocols:

- Sample information was recorded for each test pit/borehole, including:
  - name of test pit or borehole;
  - sample ID name, ARD-01, ARD-02, ARD-03 and continued;
  - depth interval where samples were collected;
  - presence of sulphides minerals if present (identify minerals, in what quantity and at what interval);
  - presence of carbonate minerals if present (identify minerals and in what quantity and at what interval);
  - presence of iron stain if present; and
  - grain size distribution.
- One sample was taken for each assigned location and interval. The weight of the sample was 2 to 3 kg. Gloves and safety glasses were worn to protect the user from contamination and eye impact.
- Cross contamination was avoided on samples by using a clean shovel. Before using a shovel, solid materials remaining from other sampling locations were removed if present.
- Samples were collected ‘as is’ (dry or wet). If there was free water, it was drained from the samples before being placing into the plastic bag.
- Samples were collected at various grain sizes that existed at each interval except for particles larger than 6 inches which were removed due to the sample size.
- Samples were placed into plastic sample bags and double bagged if there was a concern that the bag would be punctured by sharp rocks.
- Sample information (borehole/test pit number and sample ID) was written on the plastic bag. Also, Tyvec tags with sample information were placed into the plastic bag as back up information for the laboratory.
- Sample bags were closed with zap straps to reduce the contact between the sample material and oxygen.
- Samples were stored in a dry and covered storage area.
- Once collected, several samples were placed into a rice bag which was sealed with a zap strap for shipment to the laboratory.

### 2.8.3 Site Characterization Sampling

Sample collection procedures followed laboratory sampling protocols. The soil samples that were collected were put in chemically inert 125 mL glass jars or sealed plastic bags. As directed by the ALS Laboratory, certain samples were packaged with no headspace. Samples were placed in a cooler and submitted to the ALS Laboratory in Whitehorse, Yukon. The samples were collected in accordance with the *Yukon Environment Act 2002/171* Contaminated Sites Regulation (CSR) Protocol No. 3 (YG, 2012b).

In order to collect quality data, duplicate soil samples were collected at a rate of 10%, and comprehensive quality assurance/quality control (QA/QC) measures proposed by BCMOE (2003) were used as guidelines, and included:

- wearing a new pair of disposable nitrile gloves for collecting and handling each soil sample;
- using laboratory supplied jars according to the laboratory's recommendations;
- keeping the sealed samples in a cooler filled with ice;
- shipping the samples on time, respecting the samples' holding time requirements proposed through the laboratory QA/QC measures;
- collecting field duplicates for laboratory QA/QC. Field duplicates of soil samples were collected by splitting the soil sample into two separate containers; and
- decontaminating all reusable sampling equipment that was used between locations to prevent cross contamination.

Grab samples of soil were collected by Stuart Van Bibber of AE at select locations (largely from the Former Explosives Storage area). These were collected by manually scraping the topsoil (up to 10 cm) off at each sample location, then by collecting a grab sample using a trowel. Samples were submitted to the laboratory for the PCoCs identified by the sample depth and location.

Laboratory reports are included in Appendix D5.

### 2.8.4 Water Sampling

Water samples were collected from the following locations:

- groundwater from existing and newly installed monitoring wells;
- groundwater from drive point monitoring wells installed as part of the creek monitoring program;
- surface water sampled at the SEEP sampling location and from the open pit; and
- tailings and waste rock field bins.

Most of the sampling completed by AMEC and AE was focused on groundwater as long term surface water sampling and hydrology measurements at the Site are being completed by other consultants (e.g. EDI).

Groundwater samples were collected in the mill area, the open pit area, the tailings storage facility, and from Dome and Pony Creeks. The results from the groundwater sampling are included in Appendix D3.

#### *2.8.4.1 Sample Collection*

The groundwater samples were collected by a team of field engineers and technicians including Nicole Fulcher, Nicole Jaques, Stuart Van Bibber, and Stefan Gronsdahl all of AE, led by Leslie Hardy of AMEC. Samples were collected using one of three different methods: 1) regular Waterra inertial lift pumps (½" diameter) in most monitoring wells; 2) small diameter (3/16") Waterra micro-purge inertial lift pumps for the small diameter monitoring wells; and 3) standard disposable weighted bailers for deeper monitoring wells where Waterra pumps were impractical. These sample collection devices were left in the monitoring wells for future sampling.

Minimal well purging was completed prior to sampling to minimize potential changes to the redox chemistry of the water. For the sampling completed with the Waterra pumps, enough water was purged to clear the tubing and samples were then collected directly from the tubing discharge. For the sampling completed with the weighted bailers, a minimum of two bailers full of water were removed from the well prior to sample collection. These groundwater sampling protocols are considered appropriate as the potential contaminants of concern at the Site are primarily metals and cyanides which are typically not volatile.

The monitoring wells were not developed prior to groundwater sampling as the contaminants of concern would be largely unaffected by the removal of fine grained sediments, and due to the fact that well development can alter the redox conditions around the well resulting in a sampling bias. In particular, well development on shallow water table wells can provide atmospheric oxygen which can alter the redox conditions near the well screen. Well development would not improve the sampling results, and may actually introduce a bias for oxygen reactive parameters such as sulphide. Based on these considerations, and the fact that well development would likely double the time required to sample each monitoring well, AMEC chose to use minimal purging prior to sample collection.

Various sampling methods were used during the water quality sampling program to obtain duplicate samples at a particular location in order to assess the potential for field biases in some of the results. Details regarding the water quality sampling protocols are included in Appendix B7.

The unsaturated field bins were sampled by collecting leachate from the collection bucket. The saturated field bins were sampled by draining leachate from the hose exiting the field bin.

#### *2.8.4.2 Field Data Collection*

After confirming the sampling location based on location and/or survey coordinates, field data were collected at each monitoring well in the following sequence:

- gas concentrations in the well headspace (i.e. above the water level);
- depth to water (DTW) measured from the top of casing (TOC);
- depth to bottom (DTB) to be used to confirm the well ID;
- sulphide measured using a field test kit[1];
- minimal purging of Waterra tubing or the removal of two bailers of water; and
- measurement of field water quality parameters[2] using a flow through cell to minimize the exposure of the water to atmospheric oxygen.

Gas concentrations in the monitoring well headspace were measured to determine concentrations of biogenic gases including methane which is a known breakdown product of cyanide degradation. Gas measurements were taken on two occasions using two different instruments. During the initial groundwater sampling in September 2013, an RKI Eagle instrument measuring methane ($CH_4$), carbon monoxide (CO), oxygen ($O_2$) and hydrogen sulphide ($H_2S$) was used. The results of this monitoring were considered suspect as all of the oxygen readings were 20.9% which is the atmospheric oxygen concentration. The RKI Eagle had a short (approximately 20 cm) intake hose and it was interpreted that the gas being sampled near the top of the well was simply air. Additionally, carbon monoxide is not a useful environmental parameter. Based on these considerations, a GEM 2000 Plus landfill gas instrument was used in early October to re-monitor the gas concentrations. This instrument had an approximately 1.5 m long hose which was fully inserted into the monitoring well to measure the gas concentrations. The GEM 2000 Plus measured methane, carbon monoxide, carbon dioxide, oxygen, hydrogen sulphide, and hydrogen. The remaining gas to make up 100% is referred to as the balance and this value is also provided by the instrument. The composition of the balance of the gases is unquantified, but is likely almost entirely nitrogen gas ($N_2$) which is also present as 78% of the atmosphere.

Field data were recorded for water quality parameters some of which are considered unstable upon exposure to atmosphere and not appropriate for laboratory analysis. Standard field parameters included temperature, pH, electrical conductivity (EC dissolved oxygen and redox potential. Sulphide was measured in the field because it is difficult to collect and preserve a representative sulphide sample for laboratory analysis due to the reactivity and volatility of sulphide in water. Therefore, the US EPA recommends that sulphide be measured in the field.

Due to access restrictions and the cold weather conditions during the sampling of the drive point monitoring wells as part of the creek study, these locations were not monitored for gases and the only field water quality measurements were for temperature, pH and EC. These changes minimized the amount of instrumentation that had to be transported to each sampling location while still providing key field data as needed. Water quality parameters that were omitted to minimize the field equipment required were dissolved oxygen and redox potential.

[1] Sulphide test kit used was from Chemetrics Ltd., model K-9510. This test kit has a method detection limit of 0.05 mg/L sulphide, and can measure up to 10 mg/L of sulphide. The sulphide test kit uses the same methylene blue method that is used in analytical laboratories to measure sulphide.

[2] Field water quality parameters were measured with a YSI Professional Plus multi-parameter instrument (or equivalent) measuring temperature, pH, electrical conductivity (EC), dissolved oxygen (DO), and redox potential.

### 2.8.5 Gas Monitoring

Gas monitoring was competed by AMEC and AE staff sampling the wells (refer to relevant sections for specific personnel) over the course of the 2013 field program to measure gases in the soils or in the monitoring wells. Two devices were used to monitor the gases that were likely to be encountered. These devices were a GasAlert extreme single gas detector that was calibrated to detect Hydrogen Cyanide (HCN), the other was a Landtech GEM 2000 gas monitor, which detected a variety of gases including Carbon Monoxide (CO), Methane ($CH_4$), Hydrogen Sulphide ($H_2S$), as well as the major atmospheric gases. The detectable tolerances for each unit are tabulated below. During the monitoring program, methane was the only gas that was noticed to have significantly elevated levels, in some of the wells.

**Table 1: Gas Detector limits**

| | HCN | CO | $CH_4$ | $H_2S$ | $O_2$ | $CO_2$ |
|---|---|---|---|---|---|---|
| GasAlert | 4.7-10 PPM | - | - | - | - | - |
| GEM 2000 | - | 0-2000 ±10% PPM | 0-70%±1% | 0-200±10% PPM | 0- 25%±1% | 0-40%±1% |

The gas monitoring for the monitoring wells around the tailings storage facility was completed with the GEM 2000 unit. Monitoring wells had the cap removed with the unit's intake hose (approximately 0.9 m long) inserted into the well. While the device was taking a reading, the well was capped and sealed. The test was ended once the values have stabilized.

During the CPT and GeoProbe drilling, the personal HCN monitor was used to detect any gas that might have been trapped in the tailings and released by the drilling process, particularly when samples were removed. The tolerance for this device was set to be significantly lower than is required from a health and safety perspective. For drilling on the water, an attempt was made to observe the presence of any bubbles as drill rods were being tripped out. No evidence of gas was observed or detected by the monitor.

## 2.9 Hydrotechnical Assessments

Two main field trips were undertaken as part of the Mount Nansen hydrotechnical site investigation (SI) program. The first trip was undertaken during spring (May 16 to 17, 2013 and May 21 to 24, 2013) to observe and characterize flow during the freshet. The second field trip was undertaken during the summer period (September 5 to 8, 2013) to characterize catchments and channels of Dome and Pony Creeks, measure flow and collect sediment samples. The hydrotechnical field work was completed by AMEC engineers, Robyn Andrisak in the spring and Charles Masala in the summer. Additional field activities relevant for the hydrotechnical evaluation involved longitudinal and cross section survey at selected locations in Dome Creek, which was performed by Yukon Engineering Services (YES).

### 2.9.1 Spring Field Trip

Hydrotechnical field activities conducted during the spring field trip included:

- reconnaissance of the site, focusing primarily on Dome and Pony catchment areas;
- flow measurement at selected locations;
- characterization of the channels and flow; and
- identification of surface water flow around the waste rock area.

Information and data collected during the spring program is presented in Table HT1 of Appendix B1.

### 2.9.2 Summer Field Trip

Activities conducted during the summer field trip included:

- catchment reconnaissance of Dome and Pony Creeks;
- collection of sediment samples upstream (10 samples) and downstream (10 samples) of the tailings storage facility;
- flow measurements in Dome and Pony Creeks; and
- Dome creek cross-section survey.

### 2.9.3 Sediment Sampling Methodology

The sediment samples were collected from Dome Creek at roughly 50 m intervals within a 500 m length upstream and downstream of Dome Creek. The samples were excavated using a hand shovel. A total of 1 to 2 kg of sample was collected at each location and placed in a plastic container. A photograph of each location was taken.

### 2.9.4 Flow Measurement Methodology

Two flow measurement methods were used, bucket and stop watch and the Marsh McBiney flow meter.

For the bucket and stop watch method, a 20 litre gallon bucket was used. The time it took for the bucket to fill was measured using a stop watch. For each flow measuring station, the bucket was filled at least twice. The average two times it took to fill the bucket was used to estimate flow rate.

The procedure for flow measurement using the March McBiney flow meter is based on the Manual of British Columbia Hydrometric Standards (BC MOE, 2009).

## 2.10 Creek Studies Groundwater Surface Water Interaction

### 2.10.1 Installation of Drive Point Piezometers

The drive-point type piezometers were manufactured by Solinst Canada Ltd. (refer to Appendix E3 for specifications) and consisted of a 6-inch metal screen, and screw on sections of 3 ft long stainless steel pipe. Photo 16 in Appendix C8 shows a typical assembly of the

piezometers. These are driven into the ground by an approximately 30 lb slide hammer. One planned location at Dome Creek (GSI-DC-04) was abandoned because of shallow refusal to the slide hammering. The difference in piezometer intake screen elevations provided a vertical hydraulic gradient, to identify whether groundwater was recharging the creek (gaining creek), or if creek water was discharging to the groundwater (losing).

The following methodology was used in the installation of the drive-point piezometers:

- A daily safety tailgate meeting was held to review procedures and safety issues specific to the work location for the day.
- Stations located using a handheld GPS, including some measurements as needed based on stream flow and channel development.
- Semi-permanent drive-point piezometers were installed in pairs, driven to depths of 1.0 m and 3.0 m, in the bank of the creek. Occasional refusals were encountered before the full intended depths.
- After a one day recovery time, the shallow groundwater levels inside the drive-points were measured using an electronic dip tape.
- On completion, the drive-point tops were closed.
- Piezometer locations and stick-up elevations were surveyed by YES Engineering during October 2013.
- The installation of the piezometers took place over the course of five days.

### 2.10.2 Seepage Meter Test Procedures

Three seepage meters were used, each consisting of a 14-inch diameter, low-profile metal drum lid, with two top handles. Using the handles, the meters were rotated into the creek sediment, in a manner that also expelled air from inside the meter. A clear sighting tube on top of the meter indicated when the creek water level was higher than the meter lid (i.e. fully submerged). Each seepage meter had a side port, with a ball valve, to which a water bag was connected for each test. Based on indications of vertical gradient direction, i.e. downwards or upwards, the thin-walled plastic bag was either attached nearly full, with a measured mass of creek water, or attached empty, respectively.

From the change in measured water mass in the plastic bag, over time, seepage flux rates per unit time and unit creek bed area were derived for each test location on Dome Creek and Pony Creek. Some locations were re-tested to check unusual responses (e.g. seepage meter not agreeing with vertical gradient direction, or if the bag emptied or filled faster than anticipated).

The following procedure was used for the seepage meter testing:

- A daily safety tailgate meeting was held to review procedures and safety issues specific to the work location for the day.
- Stations were selected close to the drive-point piezometers stations and positions confirmed using handheld GPS.
- The creek bed test site was cleared of vegetation, organic material and larger gravel and flattened, as needed, to give a suitable test site for the seepage meter.

- Seepage meters were installed by manually rotating them into the creek bed to form a seal with the creek bed sediment, i.e. no voids allowing short-circuiting of water. An acceptable installation was achieved when the meter was sufficiently sealed and no air bubbles were present inside the meter.
- Where possible, the seepage meters were positioned so that the thin-walled plastic bag was protected from faster creek currents.
- The plastic bag was attached, either filled with creek water or attached empty, to the side port of the seepage meter. The decision to fill the bag first, or not was based on the vertical hydraulic gradient findings, and whether groundwater was entering the creek (gaining) or leaving the creek (losing).
- The thin-walled bag with water was placed in a bucket for support when measuring so as not to damage the bag. Water volume was determined based on the mass using a digital weigh scale.
- The time of the start of the seepage meter test was noted.
- The seepage meter was monitored for the initial test period to determine a general seepage rate indication (fast, medium, or slow) to time subsequent visits and the measurement of water volume change in the plastic bag.
- At the end of the test, the time was noted, the plastic bag removed and final weight measured.
- Installation and testing of seepage meters occurred over the course of five days.

### 2.10.3 Creek Bed Temperature Survey

In addition to the drive-point piezometer and seepage meter installations, additional data were collected to support and refine reaches of Dome Creek and Pony Creek, where groundwater was entering, using creek bed water temperature.

A Field Scout Direct Soil EC meter, with a 0.6 m probe, was used involving temperature measurements at each of drive-point piezometer stations, plus intermediate locations between these stations. The method involved creek bed sections, without too much coarse gravel, for inserting the probe to a maximum of 0.5 m, below creek bed grade. Stabilized readings of water temperature and also electrical conductivity (EC) were recorded, together with a corresponding GPS location.

## 2.11 Laboratory Methods

### 2.11.1 Geotechnical

Laboratory testing was carried out in accordance with the methods outlined in Table 2 below.

**Table 2: Laboratory Testing Methods**

| Laboratory Test | Standard Name | Standard |
|---|---|---|
| Sieve, Hydrometer | Standard Test Method for Particle Size Analysis of Soils | ASTM D422 |
| Moisture Content | Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass | ASTM D2216 |
| Oedometer Consolidation | Standard Test Methods for One-Dimensional Consolidation Properties of Soils Using Incremental Loading | ASTM D2435/2435M |
| Tempe Cell | Standard Test Method for Capillary-Moisture Relationships for Coarse- and Medium-Textured Soils by Porous-Plate Apparatus | ASTM D2325 |
| Standard Compaction | Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft$^3$ (600 kN-m/m$^3$)) | ASTM D698 |
| Organic Matter | Organic Matter (375 °C) | McKeague 4.23 Standard, from McKeague, J.A. 1978, *Manual on Soil Sampling and Methods of Analysis*, 2nd edition, Canadian Society of Soil Science, AAFE, Ottawa, Ontario, Canada |
| Atterberg Limits | Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils | ASTM D4318 |

### 2.11.2 Site Characterization

Soil samples were delivered to the ALS Laboratory in Whitehorse, then repackaged and shipped to their ALS Laboratory in Burnaby, which is a Canadian Association for Laboratory Accreditation facility. The samples were analyzed for PCoCs, and the methods used were compliant with the CSR Protocol No. 2 (YG, 2012a) and with Protocol No. 5 (YG, 2011).

Laboratory methods are explained in detail in the analytical reports (Appendix D5), and are summarized below:

- total organic carbon by the organic carbon combustion method;
- chlorinated hydrocarbons in soil by gas chromatography–mass spectrometry;
- chlorinated phenols by tumbler/gas chromatography–mass spectrometry;
- chromium trivalent and hexavalent;
- cyanide;
- dioxins and furans HR 1613B;
- extractable petroleum hydrocarbons (EPH) in solids by tumbler/gas chromatography–mass spectrometry;
- glycols (waste anti-freeze) in soil by wrist shaker gas chromatogram by flame ionization detector;
- mercury in soil by cold vapour atomic fluorescence spectroscopy;
- moisture for CSR metals calculations;
- light and heavy extractable petroleum hydrocarbons (LEPH/HEPH) subtraction method;
- metals in soil by collision reaction cell Inductively coupled plasma mass spectrometry;
- metals by inductively coupled plasma atomic emission spectroscopy (toxicity characteristic leaching procedure);
- mercury by cold vapour atomic fluorescence spectroscopy (toxicity characteristic leaching procedure);

- phenolics by tumbler gas chromatography–mass spectrometry;
- polycyclic aromatic hydrocarbons (PAH) by rotary extraction;
- polychlorinated biphenyls (PCBs) by extraction with gas chromatogram with electron capture detector;
- total PCBs in soil;
- pH in soil 1:2 soil: water extraction;
- volatile hydrocarbons (VH) in soil by headspace gas chromatography–mass spectrometry;
- volatile petroleum hydrocarbons (VPH) VH minus select aromatics;
- volatile organic compounds (VOC) 7 and/or VOC surrogates for soils;
- volatile petroleum hydrocarbons (VPH) VH minus BTEX/nC6/nC10;
- benzene, ethylbenzene, toluene, xylene (BTEX);
- VPH subtraction methods; and
- sum of xylenes isomer concentrations.

### 2.11.3 Water

Chemical analyses of the water samples were completed by ALS Environmental at their labs in Whitehorse and Burnaby, BC. ALS is accredited by the Canadian Association for Laboratory Accreditation (CALA) for the analyses completed, and the analytical methods used by ALS are consistent with the Yukon Contaminated Sites Regulation (CSR).

### 2.11.4 Geochemical

Geochemical analyses of the solid waste rock and insitu soil samples were completed by SGS Laboratories in Burnaby, BC. The tests methods used are summarized below. Two digestion methods were used to measure elemental metals: four acid digestion and aqua regia. Both digestion methods are commonly used to analyze the metal contents in solid samples from the site. The latter method is consistent with previous work onsite. The four acid digestion method is the strong acid digestion standard method which is adopted for Yukon contaminated sites based on analytical methods specified in the BC lab manual. The aqua regia method was used dominantly on the waste rock samples with some duplicate tests carried out using four acid digestion. On insitu soils from the tailings area, the four acid digestion method was used as the main test method with duplicate tests completed using the aqua regia method.

The selected insitu soil samples from the tailings pond also have the total cyanide and WAD cyanide testing.

**Table 3: Summary of Geochemical Laboratory Test Methods**

| Testing | Analysis Method | Reference Analysis Method |
|---|---|---|
| Acid Base Accounting | Paste pH: Sobek Method<br>Neutralization Potential: Modified Sobek<br>Total Sulphur: Leco Analyzer<br>Sulphate sulphur: leaching by hydrochloric acid (HCl)<br>Sulphide sulphur: leaching by Nitric Acid ($HNO_3$)<br>Total Inorganic Carbon: Leco analyzer | MEND |
| Elemental Metal | Acid digestion (four acid and aqua regia) followed by Inductively coupled plasma mass spectrometry (ICP-MS) | MEND |
| Leachable Metal | Shake Flask Extraction followed by ICP MS | MEND |
| Total Cyanide and WAD Cyanide | | Modified APHA- 4500-CN- O |

In addition, a limited number of tailings solid samples were sent to ALS environmental laboratories to measure total cyanide and WAD cyanide with a method that incorporates UV light so as to measure photochemical effect.

## 2.12 Infrastructure (Reclamation) Assessment

The purpose of the reclamation site investigation was to gather baseline information to support the development of a successful reclamation plan, and provide input to landform engineering for Mount Nansen. Information was required to determine limitations to reclamation, options for landform engineering, and baseline conditions prior to disturbance based on the adjacent undisturbed areas.

On September 12, 13 and 14, Associated Engineering (AE) completed an overview survey of the disturbances and adjacent undisturbed areas at the site. The survey team consisted of:

- a soil scientist;
- a landform specialist; and
- a vegetation ecologist and the reclamation and restoration lead.

### 2.12.1 Background Information Review

Prior to the survey, the Mount Nansen Reclamation Terrain Mapping and Materials Search completed by EBA Engineering Consultants (2009) was reviewed. This terrain mapping was completed at 1:20,000 scale over a broad regional study area to identify potential borrow sources for reclamation. The vegetation species lists for areas around the Mount Nansen disturbance documented by Ecological Logistics & Research Ltd. (ELR) were also obtained. This information was collected by ELR to be used in the ecosystem classification of the surrounding landscape.

### 2.12.2 Site Inspection Methods

The landform engineering component of the site investigation was at both a landscape scale (10 km or all you can see from one vantage point) and a landform scale (1 km). The reclamation component was at a landform scale. The site investigation included the following components:

- site orientation;
- survey of disturbance;
- survey of undisturbed areas; and
- trial planting assessment.

Once onsite, the crew oriented themselves by hiking up the hill to the north of the camp for a landscape view, and to observe landforms within the small valley. Dominant vegetation cover was documented in the high elevation areas.

The following disturbance areas within the Order in Council (OIC) boundary were surveyed:

- Dome Creek;
- Tailings Pond and Dam;
- Brown-McDade Pit;
- Waste Rock Area;
- Mill Complex;
- Camp Area;
- Roads;
- Exploration Lines; and
- Victoria Creek Wellhouse.

The survey of disturbance documented existing site conditions of the areas listed above, including:

- various soil substrates found throughout the disturbed areas (percent and size of coarse fragments);
- the extent of disturbance; and
- naturally occurring revegetation to identify species adaptation and success of re-colonization.

Surveys of undisturbed areas were at a reconnaissance level, documenting vegetation, terrain and soil characteristics. The undisturbed areas assessed are adjacent to the site and provide information on baseline soil and vegetation conditions in the area. A total of four soil plots were hand-dug to a depth of 1 m. Numerous hand-augured holes were also drilled to identify parent material, coarse fragment content, soil depth and depth to permafrost. Site, vegetation and soil conditions were described at each plot using the Field Manual for Describing Ecosystems in the Field data sheets (BC Ministry of Forests and Range and BC Ministry of Environment, 2010) and Soil Classification System of Canada (Soil Classification Working Group, 1998). The ELR species lists from plots completed of the areas assessed were also referenced. A specific system of ecosystem classification does not currently exist for the Yukon; however, ELR is in the process of completing ecosystem classification for the area.

In addition, reconnaissance level vegetation, terrain and soil surveys were conducted of potential fine-grained soil borrow sources approximately one hour east of the OIC along the Mount Nansen Road. This site was also undisturbed.

Three previous trial plantings installed by EDI Environmental Dynamics Inc. (2008) were assessed. They are located northwest of the mill site, south of the tailings dam, and along the cleared bank at Back Creek. The sites were assessed for percent planting survival and photo-documented, also noting substrate compositions and evidence of ground preparation for planting.

## 2.13 Infrastructure (Structures) Assessment

The SI program included inspections of site infrastructure, led by structural engineer, George De Ridder P.Eng., accompanied by a three-man environmental team under Alan Avery (Environmental Scientist). The objectives of the inspections were to:

- compile an inventory of all infrastructure for deconstruction;
- identify structural scope and configurations;
- generic inventory of building contents;
- identify materials and the potential breakdown of the deconstructed waste stream (i.e. proportions destined for recycling, salvage or disposal);
- identify and sample hazardous materials in buildings and structures for verification and augmentation of EBA hazmat reports; and
- develop feasible deconstruction strategies.

The following infrastructure components were included in the assessment:

- electrical infrastructure across the site, including the generating units at the mill;
- roads remediation options;
- pipes, culverts and the road bridge across Dome Creek;
- mill building complex, subdivided in 10 units;
- camp area buildings with three units; and
- two small pump stations/kiosks and an electrical distribution station.

Quantification of deconstruction waste was limited to the following:

- floor areas of all buildings were accurately field-surveyed for estimation of the overall deconstruction cost, broken down among individual building types; contents of buildings were only identified in generic terms and not itemized and costed, as this is not typically required for deconstruction tenders;
- the volume of crushed concrete waste was estimated, factoring in bulking for use as site remediation fill; and
- the length of the 3-phase 4,160 V electrical overhead power lines was estimated across the site

All buildings were de-energized during the inspection, with the exception of the main workshop next to the generating units at the east end of the mill complex. The three 175 kW diesel generators (two standby) are fully operational to provide 3-phase, 4,160 V power.

### 2.14 Geotechnical Reconnaissance

During the 2013 field program at Mount Nansen, an effort was made to observe and assess the general geotechnical and geological conditions. Specific attention was paid to geohazard potential around the property, as well as the potential for various borrow material sources around the site. The general site reconnaissance was completed by Dan Piccininni of AMEC and was a relatively informal exercise, which was completed through ongoing observations during the creek study and geotechnical programs and more formally during any downtime in the drilling program. Relevant pictures were taken, with accompanying notes, as well as slope angle or other measurements, where they were required. Hazards that were particularly considered and looked for included slope instability, including solifluction, road cut erosion, and avalanche potential. With regards to borrow potential, attention was paid to the potential for riprap sources and gravel material. The potential for fine grained borrow onsite had already been discounted.

General reconnaissance of the mill area and the tailings area was completed by Shane Magnusson of AMEC.

## 3.0 DETAILED SCOPE AND INVESTIGATION RESULTS

### 3.1 Tailings Facility

#### 3.1.1 Objectives and Scope

The objectives for the 2013 investigation program carried out at the tailings storage facility included:

- characterizing the tailings, in particular, the grain size, water level and response to excavation and transport;
- understanding the trafficability of the tailings beaches;
- characterizing the geotechnical characteristics of the insitu material particularly with regards to existing depth of thaw, thaw stability, and susceptibility to erosion;
- characterizing the geochemistry of the insitu material to assess depth of contamination;
- characterizing the geochemical nature of the tailings dam fill to assess volume of clean material available for reuse;
- confirming the geochemical nature of the tailings reported in the CANMET (2002) report and further investigating photochemical processes that may be occurring; and
- increasing the groundwater geochemistry database and gaining insight into biological or photochemical processes that may be affecting chemistry.

These issues were assessed through a variety of site investigation methods which were complemented by laboratory testing. The site investigation locations are shown in Figures 1 to 6 and summarized below with the details of each subsurface investigation presented in Table 4 with additional details provided for the standpipe installations in Table 5:

- 7 test pits on the tailings beaches;
- 4 sonic holes on the tailings beaches with standpipe piezometers installed at three locations;
- 9 GeoProbe holes consisting of five locations drilled from the barge and four on the tailings beaches where sonic access was not possible. The pond holes were located in areas where the thickest tailings were expected. The land based holes were located where access was possible to provide coverage in areas where the sonic rig and excavator could not safely work. Six of the GeoProbe holes were twinned with CPT holes to provide a correlation between CPT readings and sample collection;
- 20 CPTs with 11 successful dissipation tests. 12 of the CPT locations were advanced from the tailings beaches and eight were advanced from the barge. Certain locations were selected to allow correlation to physical samples obtained from drilling while the rest were located to provide representative coverage in a rough grid pattern. The test locations were influenced by access considerations and there was a slightly higher concentration in the area immediately west of the dam, where tailings were expected to be the thickest;
- 1 sonic hole at the tallest section of the dam;
- 4 geophysics lines;
- 3 test pits about half way down the face of the dam;
- 60 onsite moisture content tests (tailings and insitu);
- 72 samples sent for geotechnical laboratory testing;
- 55 samples sent for geochemical laboratory testing;
- 18 existing groundwater wells sampled and well headspace gas concentrations measured (refer to Figure 4); and
- gas monitoring of tailings samples and general area.

**Table 4: Summary of Subsurface Investigations in Tailings Facility Area**

| Investigation Location ID | Investigation Type[1] | Location Coordinates (UTM) | | | Investigation Depth (m) | Installations | Lab Tests Completed[2] | Insitu Testing[3] |
|---|---|---|---|---|---|---|---|---|
| | | Easting (m) | Northing (m) | Ground Elevation | | | | |
| BH-TD-13-01 | BH | 389,457.0 | 6,880,596.0 | 1099.5 | 25.0 | | GC/GT | V |
| TP-TD-13-01 | TP | 389,479.0 | 6,880,679.0 | 1096.2 | 4.7 | | GC/GT | V |
| TP-TD-13-02 | TP | 389,478.0 | 6,880,622.0 | 1095.4 | 6.0 | | GC/GT | V |
| TP-TD-13-03 | TP | 389,474.0 | 6,880,521.0 | 1095.0 | 6.0 | | GC/GT | V |
| BH-T-13-01 | BH | 389,173.0 | 6,880,610.0 | 1101.2 | 13.5 | | GC/GT | V |
| BH-T-13-02 | BH | 389,210.1 | 6,880,568.4 | 1098.5 | 12.0 | standpipe | GC/GT | V |
| BH-T-13-03 | BH | 389,419.0 | 6,880,675.0 | 1096.8 | 16.5 | standpipe | GC/GT | V |
| BH-T-13-04 | BH | 389,402.0 | 6,880,553.0 | 1097.0 | 18.5 | standpipe | GC/GT | V |
| CPT-T-13-01 | CPT | 389,196.0 | 6,880,711.0 | 1098.1 | 5.9 | | | CPTu |
| CPT-T-13-02 | CPT | 389,240.0 | 6,880,700.0 | 1097.3 | 3.9 | | | CPTu |
| CPT-T-13-03 | CPT | 389,333.0 | 6,880,679.0 | 1096.0 | 3.4 | | | CPTu, D |
| CPT-T-13-04 | CPT | 389,391.0 | 6,880,690.0 | 1096.0 | 3.0 | | | CPTu |
| CPT-T-13-05 | CPT | 389,426.0 | 6,880,672.0 | 1097.0 | 5.0 | | | CPTu |

| Investigation Location ID | Investigation Type[1] | Location Coordinates (UTM) | | | Investigation Depth (m) | Installations | Lab Tests Completed[2] | Insitu Testing[3] |
|---|---|---|---|---|---|---|---|---|
| | | Easting (m) | Northing (m) | Ground Elevation | | | | |
| CPT-T-13-06 | CPT | 389,205.0 | 6,880,639.0 | 1097.2 | 4.0 | | | CPTu |
| CPT-T-13-07A/B | CPT | 389,236.0 | 6,880,661.0 | 1096.6 | 4.2 | | | CPTu |
| CPT-T-13-08A/B | CPT | 389,307.0 | 6,880,654.0 | 1096.0 | 4.1 | | | CPTu, D |
| CPT-T-13-09 | CPT | 389,383.0 | 6,880,661.0 | 1096.0 | 4.9 | | | CPTu |
| CPT-T-13-10A/B | CPT | 389,400.0 | 6,880,630.0 | 1096.0 | 8.7 | | | CPTu, D |
| CPT-T-13-11 | CPT | 389,176.0 | 6,880,607.0 | 1101.1 | 0.5 | | | CPT |
| CPT-T-13-12 | CPT | 389,239.0 | 6,880,596.0 | 1097.2 | 4.3 | | | CPTu, D |
| CPT-T-13-13 | CPT | 389,308.0 | 6,880,592.0 | 1096.0 | 8.2 | | | CPTu, D |
| CPT-T-13-14 | CPT | 389,378.0 | 6,880,602.0 | 1096.0 | 9.7 | | | CPTu, D |
| CPT-T-13-15 | CPT | 389,399.0 | 6,880,550.0 | 1097.0 | 5.2 | | | CPTu, D |
| CPT-T-13-16 | CPT | 389,209.0 | 6,880,568.0 | 1098.6 | 4.7 | | | CPTu |
| CPT-T-13-17 | CPT | 389,249.0 | 6,880,554.0 | 1097.3 | 3.4 | | | CPTu |
| CPT-T-13-18 | CPT | 389,307.0 | 6,880,553.0 | 1096.1 | 6.6 | | | CPTu, D |
| CPT-T-13-19 | CPT | 389,378.0 | 6,880,547.0 | 1096.7 | 7.7 | | | CPTu, D |
| CPT-T-13-20 | CPT | 389,418.0 | 6,880,524.0 | 1099.7 | 6.2 | | | CPT |
| GP-T-13-01 | GP | 389,302.0 | 6,880,652.0 | 1096.0 | 7.0 | | GT | V |
| GP-T-13-02 | GP | 389,391.0 | 6,880,639.0 | 1096.0 | 6.5 | | GT | V |
| GP-T-13-03 | GP | 389,303.0 | 6,880,606.0 | 1096.0 | 9.0 | | GT | V |
| GP-T-13-04 | GP | 389,379.0 | 6,880,600.0 | 1096.0 | 11.5 | | GT | V |
| GP-T-13-10 | GP | 389,400.0 | 6,880,630.0 | 1096.0 | 9.5 | | GT | V |
| GP-T-13-18 | GP | 389,324.0 | 6,880,550.0 | 1096.0 | 6.3 | | GT | V |
| GP-T-13-21 | GP | 389,377.0 | 6,880,509.0 | 1098.0 | 3.3 | | GT | V |
| GP-T-13-22 | GP | 389,256.0 | 6,880,750.0 | 1097.5 | 5.1 | | GT | V |
| GP-T-13-23 | GP | 389,408.0 | 6,880,723.0 | 1096.8 | 8.8 | | GT | V |
| TP-T-13-01 | TP | 389,198.0 | 6,880,700.0 | 1097.7 | 2.7 | | GC/GT | V |
| TP-T-13-02 | TP | 389,263.0 | 6,880,706.0 | 1097.4 | 4.8 | | GC/GT | V |
| TP-T-13-04 | TP | 389,415.0 | 6,880,683.0 | 1096.8 | 5.2 | | GC/GT | V |
| TP-T-13-05 | TP | 389,250.0 | 6,880,620.0 | 1096.8 | 2.6 | | GT | V |
| TP-T-13-06 | TP | 389,198.0 | 6,880,593.0 | 1099.5 | 4.1 | | GC/GT | V |
| TP-T-13-07 | TP | 389,263.0 | 6,880,563.0 | 1097.7 | 3.4 | | GT | V |
| TP-T-13-09 | TP | 389,379.0 | 6,880,557.0 | 1096.5 | 4.4 | | GT | V |

Notes
1. BH=sonic borehole, TP=test pit, GP= GeoProbe borehole, CPT=cone penetration test location
2. GT=geotechnical, GC=geochemical
3. V=visual soil classification, CPTu=cone penetration test with pore pressure measurement, D=successful dissipation test completed

## Table 5: Summary of Standpipe Piezometers Installed in Tailings

| Borehole ID | UTM (Zone 8, NAD 83)[1] | | Ground Elevation (m) | Screened Interval Depth (m) [2] | Stickup Height (m) | Soil Unit at Screen Location[3] |
|---|---|---|---|---|---|---|
| | Easting (m) | Northing (m) | | | | |
| BH-T-13-02 | 389210 | 6880568 | 1098.3 | 5.1-6.1 | 1.0 | Insitu sand |
| BH-T-13-03 | 389419 | 6880675 | 1096.8 | 3.0-6.1 | 0.5 | Tailings & Insitu sand |
| BH-T-13-04 | 389402 | 6880553 | 1097.0 | 8.1-9.1 | 1.1 | Tailings |

Notes:
1. BH-T-13-03 and 04 UTM coordinates measured with a handheld GPS and the ground elevation was subsequently derived from the 2012 LiDAR survey. BH-T-13-02 was surveyed by Yukon Engineering Services (YES) in October 2013.
2. Screened interval measured from top of stickup.
3. Screened interval is not isolated by a seal.

### 3.1.2 Summary of Results

Logs that present the visual description of the soil recovered, water levels, sample locations and relevant observations made during the investigations are included in Appendices A1, A2, and A4 for the sonic drilling, test pitting and GeoProbe drilling, respectively. Photographic logs of the core and test pits are presented in Appendices C2, C3, and C4. In addition, a summary of the observations made regarding the response of the tailings to excavation and equipment loading is provided in Appendix B5. CPT results are presented in Appendix A5. The results from the geophysics completed are presented in Appendix G.

Specific samples gathered from the subsurface investigations were identified for further characterization in the laboratory. Some of the laboratory results are included in the logs but the logs do not present a comprehensive list of the laboratory testing completed. A complete list of the geotechnical and geochemical solid sample laboratory testing is included in tables in Appendices D1 and D2 and is summarized in Table 6. The complete laboratory results are provided following the summary tables in Appendices D1 and D2.

**Table 6: Summary of Laboratory Tests on Solid Samples**

| Test Type | No. of Tests on Tailings Samples | No. of Tests on Insitu Samples | No. of Tests on Dam Fill |
|---|---|---|---|
| Sieve Analyses[1] | 25 | 42 | 5 |
| Moisture Content | 24 | 58 | 1 |
| Atterberg Limits | 12 | 5 | 0 |
| Standard Proctor Compaction | 2 | 0 | 0 |
| Permeability | 1 | 0 | 0 |
| Tempe Cell | 2 | 0 | 0 |
| Oedometer 1D consolidation | 6 | 0 | 0 |
| Organic Content | 0 | 5 | 0 |
| SAR, CEC, pH | 0 | 7 | 0 |
| Acid Base Accounting[2] | 0 | 30 | 11 |
| Leachable metals (Shake Flask Extraction) | 0 | 11 | 9 |
| Elemental metals[3] | 4 | 30 | 11 |
| Cyanide Complexes | 4 | 15 | 0 |

Notes:
1. Where appropriate hydrometer tests were completed
2. Acid base accounting includes Paste pH, Neutralization Potential, Sulphate sulphur, Sulphide sulphur and Total Inorganic Carbon.
3. Elemental metals assessed by aqua regia and/or four acid digestion.

Water quality testing in the tailings storage facility area was restricted to groundwater monitoring because there is a sufficiently large database regarding the surface and tailings water chemistry. The wells that were sampled at the tailings facility are shown in Figure 4. A total of 10 samples were gathered and tested for general water quality parameters, cyanides, organic / inorganic chemistry and metals. The sampling results are included in Appendix D3. Gas concentrations in the wellheads were also monitored during the sampling program. In addition, personal gas monitors were used when work was carried out. The personal gas monitors did not detect any gas concentrations of concern. The results of the wellhead gas monitoring are summarized in Appendix D3.

The existing piezometers at the tailings storage facility, which consist of pneumatic and vibrating wire piezometers, were read during the field program. The results have been appended to historic data and are presented in Appendices F1, F2 and F6. In addition, the water levels from those piezometers, the monitoring wells and the newly installed standpipes are summarized in Table F2. The existing thermistors in the tailings area were also read and the results are presented in Appendix F3.

## 3.2 Brown M$^{c}$Dade Open Pit

### 3.2.1 Objectives and Scope

The main objectives for the 2013 site investigation program related to the open pit and surrounding bedrock rock mass included data collection to increase the understanding of groundwater movement, specifically:

- Characterizing the general rock mass of the open pit floor, pit walls and nearby vicinity of the open pit rock mass to define the main lithology types present and rock weathering profiles.
- Quantifying the hydrogeological setting of the open pit pond and the annual change in pond level with respect to the shallow groundwater component (i.e. groundwater entering and leaving the open pit pond).
- Determining the connectivity of the open pit pond to deeper groundwater potentially underflowing the open pit area and moving into the Dome Creek and Pony Creek catchments.
- Evaluating the relative significance of rock structure to potential groundwater movement (i.e. major faulting, that intercept the open pit and may represent preferential pathways for groundwater movement).
- Evaluating the significance of the role of permafrost within the rock mass surrounding and underlying the open pit, if present, to identify potential barriers to groundwater movement.

To meet these main objectives, the site investigation included the following:

- Implementation of a bedrock coring program, involving diamond coring at four locations, southwest, south and east outside the open pit and at two locations inside the open pit.
- Logging of the rock mass to determine major lithology types, the degree of weathering and rock discontinuities, to develop major lithology and discontinuity profiles.
- Conducting hydraulic conductivity tests (permeability) within each corehole, at regular depth increments, to develop hydraulic conductivity profiles, involving packer testing and falling head testing.
- On completion, each corehole was provided with instrumentation to enable hydrogeological interpretation of piezometric elevations and insitu rock temperature, the latter to investigate permafrost presence. The instrumentation consisted of a combination of conventional PVC groundwater monitor wells and vibrating wire type piezometers.

The six corehole locations are shown on Figure 3. Table 7 summarizes the corehole completion depths and installations. Additional details of the installations are presented in a table at the front of Appendix A3 and are also included in the logs that are included subsequently in Appendix A3.

**Table 7: Summary of Corehole and Borehole Completion Depths and Associated Installation Details**

| Borehole ID | Total Depth Drilled (m) | Installation Type[2] | Depth From Top of Hole (m)[1] | | | | Stick Up (m) | Insitu Tests[4] |
|---|---|---|---|---|---|---|---|---|
| | | | VWP Install / MW Screened Interval[3] | Top of Sand Pack | Top of Bentonite Seal | Top of Grout | | |
| CH-P-13-01/10 | 10 | MW | 7-10 | 5.6 | 2.8 | 0 | 0.55 | V |
| CH-P-13-01/40 | 40 | No installation completed, plugged with Van Ruth plug at 13 mbgs | | | | 0 | 0 | V,P |
| CH-P-13-02/10 | 10 | MW | 7-10 | 5.6 | 2.8 | 0 | 0.76 | V |
| CH-P-13-02/VWP | 50 | VWP | 6.83 | N/A | N/A | 0 | 0 | V,P |
| | | VWP | 17.21 | | | | | |
| | | VWP | 27.63 | | | | | |
| | | VWP | 37.33 | | | | | |
| | | VWP | 48.02 | | | | | |
| CH-P-03/10 | 10 | MW | 7-10 | 5.6 | 2.8 | 0 | 0.71 | V |
| CH-P-03/50 | 50 | MW | 47-50 | 45.6 | 42.8 | 0 | 0.68 | V,P |
| | | VWP | 48.58 | | | | | |
| CH-P-04/10 | 10 | MW | 7-10 | 5.5 | 2.7 | 0 | 0.58 | V |
| CH-P-13-04/35 | 50 | MW | 32-35 | 30.6 | 27.8 | 0 | 0.63 | V,P |
| | | VWP | 35 | | | | | |
| CH-P-13-05/50 | 50 | MW | 47-50 | 45.6 | 42.8 | 0 | 0.88 | V,P |
| | | VWP | 49.40 | | | | | |
| CH-P-13-06/VWP | 60 | VWP | 20.23 | N/A | N/A | 0 | 0 | V,P |
| | | VWP | 29.30 | | | | | |
| | | VWP | 40.17 | | | | | |
| | | VWP | 49.32 | | | | | |
| | | VWP | 58.88 | | | | | |

Notes:
1. All installation depths are cored depth, not true vertical depth.
2. MW=monitoring well, VWP=vibrating wire piezometer (serial numbers, etc., provided in Appendix A3)
3. Deep monitoring wells are 1" diameter PVC. Shallow monitoring wells are 1.5" diameter PVC.
4. V=visual logging, P=packer test

### 3.2.2 Summary of Results

Corehole logs are provided in Appendix A3. These include descriptions of the major lithology types that were encountered, weathering, relative rock strength, together with discontinuity descriptions, information related to potential groundwater movement and colour staining of fracture surfaces. A Corehole Log References description sheet is also provided.

A photo log of the recovered core was created that involved a photo of every core run, including labelling to indicate the core run interval depths. These photos are provided in Appendix C5, indexed by corehole identifier, core box number, depth interval and date.

The results of packer tests performed in the bedrock are provided in Appendix F5. These gave hydraulic conductivity (K) results that varied from $10^{-6}$ m/s to $10^{-8}$ m/s, as shown in the Summary of Packer Test Results figure, Appendix F5. In the four coreholes outside the open pit, a significant depth of bedrock weathering was encountered, with weathering profiles extending in the order of 30 metres. When the bedrock strength was too low, packer testing was not possible.

Data loggers, attached to the vibrating wire piezometers, were downloaded to provide the first data set to derive piezometric elevations and insitu temperatures, as provided in Appendix F3. Of these temperature data, the data loggers configured in October 2013 were plotted, as shown in Appendix F3.

Groundwater samples were obtained from five wells, including three newly installed wells, around the open pit as shown in Figure 4. Note that some of the groundwater wells were dry or frozen upon sampling and, therefore, no samples were recovered. The samples were tested for general water quality parameters, cyanide, organic / inorganic chemistry and metals. Results of the groundwater quality testing are presented in Appendix D3.

The pit pond was sampled at three different elevations from the same location to assess the potential variation in chemistry with depth. The samples were tested for general water quality parameters, cyanide, organic / inorganic chemistry and metals. Results of the water quality testing are presented in Appendix D3.

## 3.3 Waste Rock Area

### 3.3.1 Objectives and Scope

The objectives of the investigations carried out at the waste rock area near the open pit were:

- to increase the geochemical database and improve the understanding of the distribution of potentially acid generating (PAG) and non-acid generating (NAG) rock to allow a better estimate of the volume of waste rock that can realistically be separated as suitable for use in reclamation or regraded in place;
- to improve the characterization of the waste rock particles sizes in order to assess the behaviour of the material in either the backfilled open pit or as material used in reclamation; and
- to confirm the understood foundation conditions and state of waste rock material (i.e. unsaturated and largely unfrozen).

In support of these objectives, the following investigations were completed:

- 1 sonic drill hole in the deepest part of the waste rock area;
- 11 test pits around the waste rock area; and
- samples sent for geochemical assessment and particle size distribution.

The locations of the subsurface investigations are shown in Figure 1 and summarized in the table below with additional details provided in Appendix I.

**Table 8: Summary of Subsurface Investigations Completed in Waste Rock Area**

| Investigation Location ID | Investigation Type[1] | Location Coordinates (UTM) | | | Investigation Depth (m) | Installations | Lab Tests Completed[2] | Insitu Testing[3] |
|---|---|---|---|---|---|---|---|---|
| | | Easting (m) | Northing (m) | Ground Elevation | | | | |
| BH-WA-13-01 | BH | 388,815.0 | 6,881,564.0 | 1227.9 | 12.5 | n/a | GT | V |
| TP-WA-13-01 | TP | 388,770.0 | 6,881,707.0 | 1231.8 | 4.5 | n/a | GT | V |
| TP-WA-13-02 | TP | 388,958.0 | 6,881,673.0 | 1213.0 | 5.6 | n/a | GC/GT | V |
| TP-WA-13-03 | TP | 388,988.0 | 6,881,634.0 | 1216.8 | 4.6 | n/a | GC/GT | V |
| TP-WA-13-04 | TP | 388,807.0 | 6,881,591.0 | 1228.0 | 6.1 | n/a | GT | V |
| TP-WA-13-05 | TP | 388,708.0 | 6,881,499.0 | 1211.3 | 4.2 | n/a | GC/GT | V |
| TP-WA-13-06 | TP | 388,711.0 | 6,881,442.0 | 1209.1 | 4.5 | n/a | GC/GT | V |
| TP-WA-13-07 | TP | 388,774.0 | 6,881,430.0 | 1214.2 | 5.8 | n/a | GT | V |
| TP-WA-13-08 | TP | 388,922.0 | 6,881,356.0 | 1214.7 | 4.7 | n/a | GC/GT | V |
| TP-WA-13-09 | TP | 388,834.0 | 6,881,319.0 | 1204.9 | 5.2 | n/a | GC/GT | V |
| TP-WA-13-10 | TP | 389,001.0 | 6,881,272.0 | 1214.0 | 4.1 | n/a | GC/GT | V |
| TP-WA-13-11 | TP | 389,001.0 | 6,881,208.0 | 1202.0 | 5.0 | n/a | GC/GT | V |

Notes
1. BH=sonic borehole, TP=test pit, GS= grab sample
2. GT=geotechnical, GC=geochemical
3. V=visual soil classification

### 3.3.2 Summary of Results

Material descriptions, water levels, general observations and sample locations are provided on the borehole and test pit logs included in Appendices A1 and A2, respectively. Photographic logs are provided in Appendices C2 and C3. Based on the observed conditions, representative samples of the waste rock were selected for geotechnical and geochemical testing. Only the finer fraction was sub-sampled; the amount of material greater than 1” was estimated visually. Where insitu ground was encountered, it generally consisted of highly weathered and fractured bedrock and, therefore, no insitu samples were selected for laboratory testing. Because of the coarse nature of the material encountered, the geotechnical testing has been limited to sieve testing. Bulk samples have been collected and are in storage should additional testing be warranted to support the pit backfill design or other aspects of the remediation design. The geochemical analyses were concentrated in areas where previous work indicated that the waste rock may be NAG.

The laboratory testing completed on material from the waste rock area is summarized in Table 9 below. Individual sample results are tabulated in Tables D1 and D2 followed by the complete laboratory results in Appendices D1 and D2.

**Table 9: Summary of Testing Completed**

| Test Type | No of Tests on Waste Rock Samples |
|---|---|
| Sieve Analyses | 19 |
| Acid Base Accounting[Note 1] | 32 |

Notes:
1. Acid base accounting includes Paste pH, Neutralization Potential, Sulphate sulphur, Sulphide sulphur and Total Inorganic Carbon.

## 3.4 Mill Area, Shop and Storage Areas, and Site Roadways

Areas of potential environmental concern were identified during the data gap analysis and the development of the SI program scope. The specific issues of concern were listed in AMEC, 2013a and have been referenced herein by the identifier numbers (Data Gap ID). All of the issues noted were investigated with the exception of Data Gap ID 16. The material in the basins in the mill was not sampled because it is a small volume; it will be removed from site and it is not hazardous material. These areas included the Ketza Shop area, mill area, roadways and the historical explosives storage area (Figure 1).

The Site Characterization component of the SI program focused on identifying potential contamination including metals, hydrocarbons, anti-freeze, landfill parameters, cyanide, and hydrocarbons. No solid samples were collected from the old tailings ponds during the 2013 Site Investigation. The solid materials from the old tailings ponds (Ponds #1 and #2) were previously sampled by Altura, and the results were reported in the Mill Area Geochemical Characterization Summary of 2010 Field Investigations Report (R161) (Altura, 2010).

As shown in Figure 4, groundwater sampling from new drive point piezometers and existing wells was completed in the mill and Huestis Adit area.

### 3.4.1 Summary of Investigations Completed

The locations and summary of the site characterization soil sampling included:

- **Ketza Shop Area**: Due to historic spills at this location, the PCoCs include hydrocarbons and metals. Two boreholes were advanced using a sonic drill rig to 4.0 – 5.0 metres below ground surface (mbgs) and three test pits were advanced with a backhoe to 2.0 mbgs.
- **Mill Area**: Due to the variety of hazardous chemicals that were stored and used in this location, the PCoCs include metals, antifreeze parameters, cyanide, landfill parameters and hydrocarbons. Nine boreholes were advanced to 3.0 – 5.5 mbgs, and five test pits were advanced to 2.0 - 5.0 mbgs.
- **Roadways:** Due to uncertainty about contaminated materials (i.e. hydrocarbons, waste rock and tailing) used during road construction and maintenance, the PCoCs include hydrocarbons and metals. Five test pits were advanced to depths of 1.5 - 2.0 mbgs.

- **Former Explosive Storage Area:** Due to storage of explosives in this location, the PCoCs include nutrients. Four surface samples (0.1-0.2 mbgs) were collected. Three of them were within the former explosives area clearing, and one was collected approximately 200 m up gradient of the site for background concentrations.

The locations of the subsurface investigations are show in Figures 3 and 5 and are summarized in the table below.

**Table 10: Subsurface Investigations at Mill, Ketza Shop and Roads**

| Location ID | Investigation Type[1] | Area | Location Coordinates (UTM) | | | Investigation Depth (m) | Installs | Lab Testing[2] | Insitu Tests |
|---|---|---|---|---|---|---|---|---|---|
| | | | Easting (m) | Northing (m) | Elevation (m) | | | | |
| BH-KZ-13-01 | BH | KZ | 388,683.4 | 6,881,754.8 | 1232.2 | 4.0 | | Env | V, VOC |
| BH-KZ-13-02 | BH | KZ | 388,687.4 | 6,881,741.8 | 1232.1 | 5.0 | | Env | V, VOC |
| TP-KZ-13-01 | TP | KZ | 388,683.4 | 6,881,754.8 | 1232.2 | 2.0 | | Env | V, VOC |
| TP-KZ-13-02 | TP | KZ | 388,694.0 | 6,881,716.5 | 1231.4 | 2.0 | | Env | V, VOC |
| TP-KZ-13-03 | TP | KZ | 388,665.1 | 6,881,737.6 | 1232.5 | 2.0 | | Env | V, VOC |
| BH-M-13-01 | BH | Mill | 388,026.0 | 6,880,954.0 | 1192.3 | 3.0 | | Env | V, VOC |
| BH-M-13-02 | BH | Mill | 388,055.4 | 6,880,939.0 | 1191.1 | 3.5 | | Env | V, VOC |
| BH-M-13-03 | BH | Mill | 387,990.2 | 6,881,007.1 | 1190.6 | 4.0 | MW | Env | V, VOC |
| BH-M-13-04 | BH | Mill | 387,983.9 | 6,881,066.6 | 1184.4 | 4.5 | | GC/Env | V, VOC |
| BH-M-13-05 | BH | Mill | 387,971.1 | 6,881,019.5 | 1191.3 | 5.5 | | Env | V, VOC |
| BH-M-13-06 | BH | Mill | 387,949.4 | 6,881,042.7 | 1191.5 | 4.5 | | Env | V, VOC |
| BH-M-13-07 | BH | Mill | 387,903.2 | 6,881,073.2 | 1192.5 | 3.0 | | Env | V, VOC |
| BH-M-13-08 | BH | Mill | 387,862.6 | 6,881,086.5 | 1194.4 | 4.0 | | GC/Env | V, VOC |
| TP-M-13-01 | TP | Mill | 388,029.3 | 6,880,994.6 | 1182.6 | 3.5 | | GC/Env | V, VOC |
| TP-M-13-02 | TP | Mill | 388,003.9 | 6,881,053.9 | 1181.8 | 2.0 | | GC/Env | V, VOC |
| TP-M-13-03 | TP | Mill | 387,943.0 | 6,881,120.0 | 1188.5 | 5.0 | | GC/Env | V, VOC |
| TP-M-13-04 | TP | Mill | 388,014.0 | 6,881,083.0 | 1180.8 | 2.0 | | GC/Env | V, VOC |
| TP-M-13-05 | TP | Mill | 387,811.8 | 6,881,026.9 | 1218.3 | 2.0 | | GC/Env | V, VOC |
| TP-SP-13-03 | GS | Mill | 388,140.2 | 6,880,806.2 | 1203.6 | | | Env | V, VOC |
| TP-SP-13-04 | GS | Mill | 388,136.7 | 6,880,779.8 | 1204.7 | | | Env | V, VOC |
| TP-SP-13-05 | GS | Mill | 388,119.7 | 6,880,798.6 | 1204.5 | | | Env | V, VOC |
| TP-SP-13-06 | GS | Mill | 388,098.4 | 6,880,760.5 | 1211.9 | | | Env | V, VOC |
| TP-R-13-01 | TP | Road | 387,876.1 | 6,880,969.8 | 1218.6 | 2.0 | | GC/Env | V, VOC |
| TP-R-13-02 | TP | Road | 387,714.1 | 6,881,150.7 | 1217.6 | 1.5 | | GC/Env | V, VOC |
| TP-R-13-03 | TP | Road | 387,794.3 | 6,881,334.1 | 1228.2 | 2.0 | | GC/Env | V, VOC |
| TP-R-13-04 | TP | Road | 389,160.9 | 6,881,108.2 | 1183.4 | 2.0 | | Env | V, VOC |
| TP-R-13-05 | TP | Road | 389,682.7 | 6,880,955.7 | 1127.3 | 2.0 | | Env | V, VOC |

Notes
1. BH=sonic borehole, TP=test pit, GS= grab sample
2. GT=geotechnical, GC=geochemical
3. V=visual soil classification, VOC=Volatile organic compounds

The laboratory testing completed on select samples is summarized in Table 11 below.

**Table 11: Summary of Environmental Testing on Soil Samples**

| Laboratory Test | Geographic Area | | | | | |
|---|---|---|---|---|---|---|
| | Ketza | Mill | Mill-Hazardous Materials | Road | Former Explosive Storage | Total |
| Physical | 6 | 25 | 0 | 3 | 4 | 38 |
| Metals | 7 | 24 | 0 | 0 | 4 | 35 |
| Leachable Metals | 4 | 11 | 5 | 3 | 0 | 23 |
| Volatile Organic Compounds | 3 | 13 | 0 | 0 | 0 | 16 |
| Extractable Petroleum Hydrocarbons | 0 | 14 | 0 | 0 | 0 | 14 |
| Volatile Organic Compounds | 0 | 12 | 0 | 0 | 0 | 12 |
| Polycyclic Aromatic Hydrocarbons | 0 | 12 | 0 | 0 | 0 | 12 |
| Cyanide | 4 | 6 | 0 | 0 | 0 | 10 |
| Miscellaneous [Note] | 0 | 3 | 0 | 3 | 0 | 6 |
| Ion Balance | 0 | 3 | 0 | 3 | 0 | 6 |
| Carbon | 0 | 2 | 0 | 0 | 4 | 6 |
| PCBs | 0 | 3 | 0 | 0 | 0 | 3 |
| Nitrogen | 0 | 0 | 0 | 0 | 4 | 4 |
| Glycols | 0 | 2 | 0 | 0 | 0 | 2 |
| Chlorinated Hydrocarbons | 0 | 2 | 0 | 0 | 0 | 2 |
| Phenols | 0 | 2 | 0 | 0 | 0 | 2 |

Note: Miscellaneous laboratory tests include: Volume Nanopure Water, Sample Weight, Redox, Conductivity, Total Acidity (to pH 8.3), Alkalinity, Sulphate

A hazardous materials inventory and investigation was conducted in order to identify and characterize the hazardous materials that remain at the Project Area. Two hazardous materials experts from Sumas Environmental Services Inc. surveyed the developed areas of site including the mill area (including the buildings), the former Ketza Shop area, the Bunkhouse, the Tailings Storage Facility and the Victoria Creek Wellhouse.

### 3.4.2 Mill Area

#### *3.4.2.1 Objectives and Scope*

Around the mill area, there was a variety of historic potential contaminant sources each with their PCoCs. The purpose of the Site Characterization field work in the mill area was to identify and delineate this potential historical contamination, and to conduct a hazardous materials inventory. The field work around the mill consisted of eight boreholes, five test pits, and a hazardous materials investigation (Figure 5).

#### *3.4.2.2 Borehole Purpose and Objectives*

The purpose and objective for each borehole in the mill area was to identify the potential locations of two historic fuel spills (Data Gap ID S10). Additionally, they had unique objectives, illustrated on Figure 5, and summarized as follows:

- **BH-M-13-01** was drilled in order to delineate potential contamination that may have resulted from landfill seepage spills (Data Gap ID S08), as well as the potential use of waste rock. The PCoCs included hydrocarbons and metals, as well as PCBs, glycols, chlorinated hydrocarbons, phenolics, dioxins and furans (commonly referred to as landfill parameters).
- **BH-M-13-02** was drilled in order to delineate potential contamination that may have resulted from landfill seepage (Data Gap ID S08), as well as the potential use of waste rock. The PCoCs included hydrocarbons, and leachable metals and metals, as well as PCBs, glycols, chlorinated hydrocarbons, phenolics, dioxins and furans (commonly referred to as landfill parameters).
- **BH-M-13-03, BH-M-13-04**, and **BH-M-13-05** were drilled in order to characterize materials to determine if waste rock or tailings were used in the construction of the area. Additionally, BH-M-13-03 was drilled to determine if contamination may have resulted from the waste oil barrel storage at this location (Data Gap ID S17), and BH-M-13-04 and BH-M-13-05 were drilled to characterize spills near a transformer storage area (Data Gap ID S12). PCoCs included hydrocarbons, PCBs metals and cyanide for BH-M-13-05.
- **BH-M-13-06** was drilled in order to determine if waste rock or tailings were used in the construction of the area, to determine if potential contamination from improper storage in the mill has reached this location (Data Gap ID S07, S13, S14, S15, S17 and S19), and to determine if there is contamination from the aboveground storage oil tank (AST) at this location. PCoCs include hydrocarbons and metals.
- **BH-M-13-07** was drilled in order to characterize materials to determine if waste rock or tailings were used in the construction of the area, to characterize potential contamination in front of the generator building (Data Gap ID S17), and to determine if potential contamination from improper storage in the mill has reached this location (Data Gap ID S07, S13, S14, S17 and S19). PCoCs include metals, cyanide and hydrocarbons. PCoCs for BH-M-13-07 also included antifreeze parameters (Data Gap ID S07).
- **BH-M-13-08** was drilled in order to characterize materials to determine if waste rock or tailings were used in the construction of the area, and to determine if potential contamination from improper storage in the mill has reached this location (Data Gap ID S07, S13, S14, S17 and S19). PCoCs include metals, cyanide and hydrocarbons. PCoCs for BH-M-13-08 also include antifreeze parameters.

#### *3.4.2.3 Test Pit Purpose and Objectives*

The purpose and objective for each test pit in the mill area (Figure 5) was to identify the potential locations of two historic fuel spills (Data Gap ID S10). Additionally, they had unique objectives:

- **TP-M-13-01** was excavated in order to determine if tailings or waste rock were used in the construction of the area. The PCoCs for this location were metals, cyanide and hydrocarbons.

- **TP-M-13-02, TP-M-13-03**, and **TP-M-13-04** were excavated in order to characterize spills near the transformer storage area (Data Gap ID S12), and to characterize materials to determine if tailings or waste rock were used in the construction of the area. The PCoCs were metals, cyanide, and hydrocarbons.
- **TP-M-13-05** was excavated in order to delineate vertical hydrocarbon contamination from a previously reported spill (Data Gap ID S18), and to characterize materials to determine if tailings or waste rock were used in the construction of the area. The PCoCs for this location were metals, cyanide and hydrocarbons.

#### *3.4.2.4 Hazardous Materials Inventory Purpose and Objectives*

A hazardous materials inventory was conducted at the mill area by Sumas Environmental Services Inc., led by Alan Avery, in order to classify and quantify the existing hazardous materials (Data Gap ID S06). The scope of the hazardous materials inventory included an investigation of the old rail car tank, a site reconnaissance, collecting samples, and materials analyses. During their survey, they collected samples of potentially hazardous materials for their classification. The samples were collected included:

- 1 liquid sample from Tank 39 in the Mill Building; and
- 2 sludge samples in the bermed area around Tanks 1-6 in the Mill Building.

The samples were analyzed by the toxicity characteristic leaching procedure.

#### *3.4.2.5 Summary of Results*

A summary of the results from the field screening and observations, along with a description of the samples that were submitted to the laboratory for analyses, are outlined in Section 6 of Appendix B8. Analytical results from the mill area are summarized in Appendix D5 and the borehole logs are available in Appendix A.

### 3.4.3 Ketza Shop Area

#### *3.4.3.1 Objectives and Scope*

The objectives of the site characterization at the Ketza Shop were to identify and delineate previous hydrocarbon spills, and to determine if geochemical contamination resulting from waste rock or tailings is present at this location. The scope of the site characterization investigations at the Ketza Shop was comprised of two boreholes and three test pits, as well as a hazardous materials inventory, as described below (Figure 3).

#### *3.4.3.2 Borehole Purpose and Objectives*

Two boreholes were advanced at the Ketza Shop area to delineate hydrocarbon contamination from previous spills. BH-KZ-13-01 was drilled near the area where a spill occurred from a former AST (Data Gap ID S09), and BH-KZ-13-02 was drilled near the location of a previous spill beneath the former Ketza Shop (Data Gap ID S10). The PCoCs for these boreholes included metals, cyanide and hydrocarbons.

#### *3.4.3.3 Test Pit Purpose and Objectives*

Three test pits were dug at the Ketza Shop location to delineate hydrocarbon contamination that occurred from spills within the shop, to the west of the shop, and to the south of the shop (Data Gap ID S09 and S10). TP-KZ-13-01 was dug north of the expected contamination, TP-KZ-13-02 was west of the expected contamination, and TP-KZ-13-03 was dug southwest of the expected contamination. The PCoCs for these locations were metals, cyanide and hydrocarbons.

#### *3.4.3.4 Hazardous Materials Inventory Purpose and Objectives*

A hazardous materials inventory was conducted at the Ketza Shop area to classify and quantify the hazardous materials that remain at this location (Data Gap ID S06). The scope of the hazardous materials inventory included a site reconnaissance, collecting samples, and analyses of samples for categorizing hazardous materials. During their survey, they collected samples of potentially hazardous materials for their classification. The samples collected included:

- 1 composite sample from two petroleum drums in the Ketza Shop area; and
- 1 composite sample from nine petroleum pails in the Ketza Shop area.

Each of the samples was analyzed by the toxicity characteristic leaching procedure.

#### *3.4.3.5 Summary of Results*

A summary of the results from the field screening and observations, along with a description of the samples that were submitted to the laboratory for analyses are outlined for each borehole or test pit in Section 7 of Appendix B8. Analytical results from the Ketza Shop are available in Appendix D5 and borehole logs are available in Appendix A.

### 3.4.4 Former Explosives Storage Area

#### *3.4.4.1 Objectives and Scope*

Sampling and analyses of soil from the former explosives storage area was conducted (Figure 5) in order to classify and quantify the hazardous materials that remain at this location.

The objective of the Site Characterization field work around the Former Explosives Storage area was to determine if contamination from the explosives may be present. The PCoCs for these samples included: total Kjeldahl Nitrogen, available ammonium (as N), nitrate + nitrite (as N), nitrate (as N) and nitrite (as N). The scope of the work for this area included four grab samples (Figure 5).

#### *3.4.4.2 Summary of Results*

Analytical results from the Former Explosives Storage area are provided in Appendix D5. The three samples from the area and the one background sample were analyzed for the PCoCs associated with explosives. They were also analyzed for metals concentrations to further understand distributions at the Mount Nansen area.

### 3.4.5 Roadways

#### *3.4.5.1 Objectives and Scope*

The objectives of the Site Characterization field work along the roadways were to determine if these were constructed with waste rock or tailings or if this material may have been contaminated from the use of oil as a dust suppressant (Data Gap ID S01, S02, S05 and S11). The PCoCs for these samples included metals, cyanide and hydrocarbons. The scope of the work along the roadways included five test pits (Figure 5).

#### *3.4.5.2 Summary of Results*

A summary of results from the field screening and observations, along with a description of the samples that were submitted to the laboratory for analyses, is outlined for each test pit, illustrated on Figure 5 and provided in Section 8 of Appendix B8. Analytical results from the Roadways are provided in Appendix D5 and borehole logs in Appendix A.

### 3.4.6 Bunkhouse Area

#### *3.4.6.1 Objectives and Scope*

A hazardous materials inventory was conducted at the bunkhouse area (Figure 5) in order to classify and quantify the hazardous materials that remain at this location. The scope of the hazardous materials inventory included a site reconnaissance, collecting samples and hazardous materials categorizing.

#### *3.4.6.2 Summary of Results*

The results of the bunkhouse area hazardous materials survey are provided in Section 9 of Appendix B8.

## 3.5 Dome and Pony Creeks

### 3.5.1 Objectives and Scope

The main objectives for the 2013 site investigation program related to Dome and Pony Creeks included data collection to increase the understanding of surface and groundwater, specifically:

- Characterizing the watershed and channel of Dome Creek to enable hydrological modelling and future design.
- Characterizing the undisturbed portions of the Dome channel upstream and downstream of the tailings area.
- Identifying flow patterns and quantifying flows at different locations within Dome Creek.
- Characterizing creek bed sediment along Dome Creek, 500 metres upstream and 500 metres downstream of the tailings facility.
- Surveying topographic sections, transverse to the Dome Creek channel, to define natural creek profiles as the basis for future reconstruction of the tailings facility diversion channel.
- Quantifying groundwater-surface water interaction along Dome Creek and Pony Creek to establish the groundwater flow components to surface water as inputs to site-wide surface water quality modelling and compliance assessment.
- Quantifying groundwater-surface water interaction in the uppermost area of Dome Creek, northeast of the mill complex in the Huestis Adit (former 4100 Level Adit) area, representing the lowest drainage outlet from the former Huestis underground workings.

To meet these objectives, the site investigation completed in 2013 included the following:

- Implementation of hydrotechnical investigation involving in-creek flow measurements, sediment sampling and surveying topographic cross-sections.
- Implementation of a groundwater-surface interaction (GSI) study at 15 creek stations (10 on Dome Creek and five on Pony Creek). At each station, temporary instrumentation was installed and creek bed measurements made as follows:
  - Installation of dual drive-point type piezometers (upper and lower) within the creek bank, within a metre of the defined creek channel, to derive groundwater elevations and vertical hydraulic gradients (shown as GSI locations in Figure 1. Installation was attempted at 10 locations in Dome Creek but shallow refusal resulting in abandoning location GSI 4. All five installations in Pony Creek were successful).
  - Temporary installation of seepage meters, into the creek bed, to quantify the unit seepage rate of groundwater entering, or leaving, the creek (at 10 GSI locations in Dome Creek and four in Pony Creek).
  - A survey of the creek bed water temperature, using a 0.6 m long temperature probe, to give the general locations of where different temperature groundwater was entering the creeks.

The hydrotechnical investigation and the 15 groundwater-surface water interaction stations are shown on Figure 1 and summarized in the table below. In addition to the locations shown in the table below, there were various sites where temperature and electrical conductivity measurements were taken. These are included in the table in Appendix I.

**Table 12: Summary of Groundwater Surface Water Interaction and Hydrotechnical Sampling Locations**

| Location ID | Investigation Type[1] | Area | Location Coordinates (UTM) | | | Investigation Depth (m) | Installs[2] | Lab Testing[3] | Insitu Tests[4] |
|---|---|---|---|---|---|---|---|---|---|
| | | | Easting (m) | Northing (m) | Elevation (m) | | | | |
| GSI-DC-01-A | MP-P | Dome Cr | 387,675.7 | 6,881,123.3 | 1218.7 | 1.1 | DP | WQ | S |
| GSI-DC-01-B | MP-P | Dome Cr | 387,675.7 | 6,881,122.9 | 1218.8 | 2.8 | DP | WQ | S |
| GSI-DC-02-A | MP-P | Dome Cr | 387,839.5 | 6,881,128.5 | 1196.6 | 1.1 | DP | WQ | S |
| GSI-DC-02-B | MP-P | Dome Cr | 387,839.7 | 6,881,128.5 | 1196.6 | 3.0 | DP | WQ | S |
| GSI-DC-03-A | MP-P | Dome Cr | 388,106.5 | 6,881,078.2 | 1170.0 | 1.1 | DP | WQ | S |
| GSI-DC-03-B | MP-P | Dome Cr | 388,106.8 | 6,881,078.1 | 1170.0 | 2.9 | DP | WQ | S |
| GSI-DC-04-A | Seepage | Dome Cr | 388,407.0 | 6,880,968.0 | 1143.1 | 0.0 | | WQ | S |
| GSI-DC-05-A | MP-P | Dome Cr | 388,723.5 | 6,880,835.8 | 1119.2 | 1.0 | DP | WQ | S |
| GSI-DC-05-B | MP-P | Dome Cr | 388,723.7 | 6,880,835.2 | 1119.2 | 2.3 | DP | WQ | S |
| GSI-DC-06-A | MP-P | Dome Cr | 389,790.7 | 6,880,568.1 | 1066.6 | 1.1 | DP | WQ | S |
| GSI-DC-06-B | MP-P | Dome Cr | 389,791.1 | 6,880,568.1 | 1066.5 | 2.4 | DP | WQ | S |
| GSI-DC-07-A | MP-P | Dome Cr | 390,066.1 | 6,880,639.1 | 1056.7 | 1.1 | DP | WQ | S |
| GSI-DC-07-B | MP-P | Dome Cr | 390,065.7 | 6,880,639.3 | 1056.7 | 2.9 | DP | WQ | S |
| GSI-DC-08-A | MP-P | Dome Cr | 390,310.9 | 6,880,583.9 | 1048.5 | 1.1 | DP | WQ | S |
| GSI-DC-08-B | MP-P | Dome Cr | 390,311.5 | 6,880,583.7 | 1048.5 | 2.5 | DP | WQ | S |
| GSI-DC-09-A | MP-P | Dome Cr | 390,615.5 | 6,880,493.1 | 1037.0 | 1.1 | DP | WQ | S |
| GSI-DC-09-B | MP-P | Dome Cr | 390,615.6 | 6,880,492.6 | 1037.0 | 2.9 | DP | WQ | S |
| GSI-DC-10-A | MP-P | Dome Cr | 390,862.6 | 6,880,449.0 | 1030.6 | 1.1 | DP | WQ | S |
| GSI-DC-10-B | MP-P | Dome Cr | 390,862.4 | 6,880,449.2 | 1030.6 | 2.8 | DP | WQ | S |
| HA-DC-04 | HA | Dome Cr | 388,407.0 | 6,880,968.0 | 1143.1 | 1.0 | - | - | V |
| HA-DC-05 | HA | Dome Cr | 388,725.0 | 6,880,831.0 | 1119.7 | 2.5 | - | - | V |
| SED-DC-1 | GS | Dome Cr | 388,800.0 | 6,880,834.0 | 1116.4 | 0.2 | - | GC, PSD | V |
| SED-DC-10 | GS | Dome Cr | 389,169.0 | 6,880,792.0 | 1100.2 | 0.2 | - | GC, PSD | V |
| SED-DC-11 | GS | Dome Cr | 389,693.0 | 6,880,561.0 | 1070.8 | 0.2 | - | GC, PSD | V |
| SED-DC-12 | GS | Dome Cr | 389,741.0 | 6,880,574.0 | 1069.2 | 0.2 | - | GC, PSD | V |
| SED-DC-13 | GS | Dome Cr | 389,789.0 | 6,880,564.0 | 1067.3 | 0.2 | - | GC, PSD | V |
| SED-DC-14 | GS | Dome Cr | 389,833.0 | 6,880,579.0 | 1065.0 | 0.2 | - | GC, PSD | V |
| SED-DC-15 | GS | Dome Cr | 389,864.0 | 6,880,616.0 | 1064.0 | 0.2 | - | GC, PSD | V |
| SED-DC-16 | GS | Dome Cr | 389,909.0 | 6,880,645.0 | 1062.3 | 0.2 | - | GC, PSD | V |
| SED-DC-17 | GS | Dome Cr | 389,955.0 | 6,880,645.0 | 1060.1 | 0.2 | - | GC, PSD | V |
| SED-DC-18 | GS | Dome Cr | 390,002.0 | 6,880,639.0 | 1058.4 | 0.2 | - | GC, PSD | V |
| SED-DC-19 | GS | Dome Cr | 390,050.0 | 6,880,643.0 | 1056.9 | 0.2 | - | GC, PSD | V |
| SED-DC-2 | GS | Dome Cr | 388,846.0 | 6,880,832.0 | 1112.6 | 0.2 | - | GC, PSD | V |
| SED-DC-20 | GS | Dome Cr | 390,098.0 | 6,880,623.0 | 1055.6 | 0.2 | - | GC, PSD | V |
| SED-DC-3 | GS | Dome Cr | 388,894.0 | 6,880,826.0 | 1110.4 | 0.2 | - | GC, PSD | V |
| SED-DC-4 | GS | Dome Cr | 388,942.0 | 6,880,817.0 | 1108.1 | 0.2 | - | GC, PSD | V |
| SED-DC-5 | GS | Dome Cr | 388,986.0 | 6,880,795.0 | 1105.9 | 0.2 | - | GC, PSD | V |
| SED-DC-6 | GS | Dome Cr | 389,027.0 | 6,880,770.0 | 1104.1 | 0.2 | - | GC, PSD | V |
| SED-DC-7 | GS | Dome Cr | 389,067.0 | 6,880,714.0 | 1101.2 | 0.2 | - | GC, PSD | V |
| SED-DC-8 | GS | Dome Cr | 389,079.0 | 6,880,752.0 | 1100.4 | 0.2 | - | GC, PSD | V |
| SED-DC-9 | GS | Dome Cr | 389,124.0 | 6,880,775.0 | 1100.9 | 0.2 | - | GC, PSD | V |
| GSI-HA-01-A | MP | Mill (Adit) | 387,843.5 | 6,881,132.0 | 1196.7 | 1.9 | DP | WQ | - |
| GSI-HA-02-A | MP | Mill (Adit) | 387,863.1 | 6,881,129.8 | 1195.9 | 1.6 | DP | WQ | - |

| Location ID | Investigation Type[1] | Area | Location Coordinates (UTM) | | | Investigation Depth (m) | Installs[2] | Lab Testing[3] | Insitu Tests[4] |
|---|---|---|---|---|---|---|---|---|---|
| | | | Easting (m) | Northing (m) | Elevation (m) | | | | |
| GSI-HA-03-A | MP | Mill (Adit) | 387,880.8 | 6,881,129.8 | 1194.0 | 1.3 | DP | WQ | - |
| GSI-HA-04-A | MP | Mill (Adit) | 387,917.6 | 6,881,130.5 | 1190.0 | 1.6 | DP | WQ | - |
| GSI-HA-05-A | MP | Mill (Adit) | 387,898.5 | 6,881,124.4 | 1192.4 | 1.3 | DP | WQ | - |
| GSI-PC-01-A | MP-P | Pony Cr | 388,719.8 | 6,881,918.1 | 1224.1 | 1.1 | DP | WQ | S |
| GSI-PC-01-B | MP-P | Pony Cr | 388,720.1 | 6,881,917.9 | 1224.1 | 2.9 | DP | WQ | S |
| GSI-PC-02-A | MP-P | Pony Cr | 388,908.6 | 6,881,785.4 | 1202.5 | 1.1 | DP | WQ | S |
| GSI-PC-02-B | MP-P | Pony Cr | 388,908.1 | 6,881,785.5 | 1202.5 | 2.9 | DP | WQ | S |
| GSI-PC-03-A | MP-P | Pony Cr | 389,260.0 | 6,881,707.4 | 1159.8 | 1.1 | DP | WQ | S |
| GSI-PC-03-B | MP-P | Pony Cr | 389,260.3 | 6,881,707.3 | 1159.7 | 2.0 | DP | WQ | S |
| GSI-PC-04-A | MP-P | Pony Cr | 389,585.4 | 6,881,658.1 | 1129.2 | 1.0 | DP | WQ | S |
| GSI-PC-04-B | MP-P | Pony Cr | 389,586.0 | 6,881,657.6 | 1129.2 | 2.9 | DP | WQ | S |
| GSI-PC-05-A | MP-P | Pony Cr | 389,713.0 | 6,881,660.5 | 1116.5 | 1.1 | DP | WQ | - |
| GSI-PC-05-B | MP-P | Pony Cr | 389,713.3 | 6,881,660.6 | 1116.4 | 2.8 | DP | WQ | - |

Notes:
1. MP-P=mini piezometer pair, HA=hand auger, GS-grab sample, MP=mini piezometer (single)
2. DP= drive point (mini) piezometer
3. WQ=water quality, GC=geochemical, PSD=particle size distribution
4. V=visual, S=seepage meter, temperature reading and electrical conductivity

### 3.5.2 Summary of Results

A summary of the hydrotechnical findings during site investigation are presented in Appendix B1. This includes flow measurements taken in Dome and Pony Creeks, including the tailings facility diversion channel. The topographic surveying, involving 11 transects across Dome Creek, upstream and downstream of the tailings facility, and two longitudinal profiles are also included in Appendix B1. Photographs taken during the hydrotechnical site visit are included in Appendix C6 and the laboratory results for the sediment samples are included in Appendix D4.

For the groundwater-surface water interaction study, each station was photo logged as presented in Appendix C8. Shallow groundwater levels and elevations from these dual drive-point mini-piezometers, are provided in Appendix F4. Summary tables of the creek bed seepage meter and temperature survey results are also included. Overall, these data identified gaining reaches of Dome and Pony Creeks, in which groundwater is contributing to surface water flow in a quantifiable manner.

## 3.6 Borrow Areas

### 3.6.1 Objectives and Scope

The onsite borrow potential and identified borrow areas have been reasonably well characterized from previous work onsite, particularly from dam construction activities. A recent terrain mapping and borrow search study which encompassed the Mount Nansen OIC and a corridor along the site access road was also completed (EBA, 2009). The main objectives of the 2013 site investigation with regards to borrow areas were, therefore:

- to confirm conditions in sand borrow areas;

- to better understand the near surface conditions in the “shale” borrow area; and
- to confirm the general understanding of geologic framework relative to borrow.

Figure 6 includes the locations of the subsurface investigations completed in the borrow areas in 2013. The details of the investigation locations are presented in Table 13 below as well as in Appendix I. The investigations consisted of:

- 3 test pits in the sand borrow area downstream of the tailings storage facility;
- 2 hand augers in the sand area upstream of the tailings storage facility;
- 3 “test pits” in the “shale” borrow area;
- general site reconnaissance with regards to borrow;
- samples sent for geochemical testing to confirm characteristics; and
- samples sent for grain size testing.

**Table 13: Borrow Area Investigation Locations**

| Location ID | Investigation Type[1] | Area | Location Coordinates | | | Investigation Depth (m) | Installs | Lab Tests[2] | Insitu Tests[3] |
|---|---|---|---|---|---|---|---|---|---|
| | | | Easting (m) | Northing (m) | Elevation (m) | | | | |
| HA-BA-13-01 | HA | U/S Sand | 388,945.0 | 6,880,716.0 | 1113.8 | 3.0 | n/a | GC/GT | V |
| HA-BA-13-02 | HA | U/S Sand | 389,017.0 | 6,880,702.0 | 1108.7 | 3.0 | n/a | GC/GT | V |
| TP-BA-13-03 | TP | D/S Sand | 389,695.0 | 6,880,691.0 | 1085.7 | 5.2 | n/a | GC/GT | V |
| TP-BA-13-04 | TP | D/S Sand | 389,616.0 | 6,880,643.0 | 1086.6 | 5.5 | n/a | GC/GT | V |
| TP-BA-13-05 | TP | D/S Sand | 389,798.0 | 6,880,702.0 | 1079.4 | 5.3 | n/a | GC/GT | V |
| TP-BA-13-06 | TP | “Shale” | 389,694.0 | 6,881,040.0 | 1141.8 | 1.3 | n/a | GC | V |
| TP-BA-13-07 | TP | “Shale” | 389,739.0 | 6,881,045.0 | 1140.5 | 1.2 | n/a | GC | V |
| TP-BA-13-08 | TP | “Shale” | 389,913.0 | 6,881,158.0 | 1147.8 | 1.4 | n/a | GC | V |

Notes:
1. HA=hand auger, TP=test pit, DP= drive point (mini) piezometer
2. GC=geochemical, GT=geotechnical
3. V=visual

### 3.6.2 Summary of Results

The test pit and hand auger logs are included in Appendix C3 and include visual descriptions of the material encountered and observations regarding the material’s response to and ease of excavation. Photographs of the test pits are included in Appendix C3. Specific samples obtained from the sand borrow areas upstream and downstream of the tailings storage facility were selected for geotechnical and geochemical laboratory tests. It was considered sufficient to geotechnically characterize the material in the “shale” borrow area visually because if used for reclamation, it would serve only as general fill material. Select samples were sent for geochemical analyses to confirm their acceptability as general fill.

The laboratory testing completed on borrow material is summarized in Table 14 below. The test results are presented in Appendices D1 and D2.

**Table 14: Summary of Laboratory Testing Completed on Borrow Material**

| Test Type | No. of Tests |
|---|---|
| Sieve Analyses | 2 |
| ABA Test[1] | 21 |
| Leachable Metals (Shake Flask Extraction) | 9 |
| Elemental Metals[2] | 21 |
| Cyanide Complexes | 0 |

Notes:
1. Acid base accounting includes Paste pH, Neutralization Potential, Sulphate sulphur, Sulphide sulphur and Total Inorganic Carbon.
2. Elemental metals assessed by aqua regia and/or four acid digestion.

## 3.7 Site Wide Reclamation Assessment

From a landform perspective, the focus of the Mount Nansen project is to restore the natural landform which, in turn, leads to natural function. Topographic mapping shows original contours of Dome Creek through the valley. The areas adjacent to the other disturbances have remnant edges and interrupted landforms that provide a clue to the landform prior to disturbance, as do the loess deposits located in the valley bottom near Dome Creek and the tailings. These can provide a picture of what the natural landform was prior to mining disturbance. The results of and observations made during the surveys carried out in support of the reclamation assessment are presented in Appendix B3 with photographs included in Appendix C7.

### 3.7.1 Survey of Disturbance

In the disturbed areas within the OIC, the level and timing of disturbance varies, but the common theme is that in areas where topsoil was removed, the vegetation has very limited success in becoming re-established. Naturally occurring revegetation in disturbed areas range from 0% to 20% cover. The waste rock and overburden surfaces are mainly comprised of compacted, coarse rock containing very little fines (typically less than 30%). This material generally does not support vegetation growth. The areas where vegetation has become established are when a microsite has been created, usually resulting from a depression. Vegetation becoming established in depressions is due to moisture collecting, seeds becoming trapped and germinating, growing and decomposing, which initiates nutrient cycling. Nutrient cycling eventually supports more complex plant communities.

On the exploration lines, soils and subsoils have been side-cast with depths below ground surface measuring over 1 m, exposing the nutrient poor substrates. Many of these exploration lines have become preferential paths for water courses, which has resulted in formation of minor erosion rills. Vegetation growth is generally very poor in the troughs; however, willow growth on side cast material is vigorous.

### 3.7.2 Undisturbed Areas

The slopes of the Dome Creek Valley are north and south facing with aspects ranging from 25 to 35%. The natural vegetative cover of the north and south facing slopes are markedly different; this is primarily due to depth of a permafrost table.

The dominant vegetation on north facing slopes consists of dwarf birch (*Betula nana*), willow (*Salix* sp.), sedges (*Carex* sp.) and extensive moss cover. The presence of these hydrophilic species is primarily due to the presence of a permafrost table that is approximately 30 to 60 cm below ground surface. The permafrost table results in a perched water table and poorly drained soils. The soils are comprised of approximately 20 cm of fibric (poorly decomposed) material over eolian sand.

The dominant vegetation on the south facing slopes are white spruce (*Picea glauca*) in the overstory, willow and Labrador tea (*Ledum groenlandacum*) in the understory, and crowberry (*Empetrum nigrum*), caribou lichens (*Cladina* spp.), and red-stemmed feather moss (*Pleurozium schreberi*) as the ground cover. Based on the size of the trees, the short growing period and limited soil nutrient availability, the trees are likely at least 200 years old, although tree cores were not taken but a fallen tree was found and tree rungs counted. There is no permafrost on these south facing slopes, resulting in much drier soil conditions. Soils are generally comprised of 10 cm of forest duff, over approximately 13 cm of tephra (volcanic ash). This is underlain by colluvial material consisting of a thin topsoil layer (2 cm) of dark brown sandy clay loam with approximately 10% angular coarse fragments. This is underlain by 13 cm of dark olive brown sandy clay loam with 10% coarse fragments grading to weathered bedrock with approximately 70% coarse fragment. Soils are considered moderately well drained.

On the tops of the Tors, which are distinctive features of non-glaciated mountain tops outside of the OIC, there is little vegetation cover. What vegetation cover becomes established would be considered pioneer species, and is dominated by dryas (*Dryas* spp.), a nitrogen fixing plant.

The potential fine-grained borrow soils located one hour east of the OIC is comprised of silty clay loam glaciolacustrine sediments located in the western margins of the Pleistocene glaciation. A permafrost table was encountered at approximately 40 cm below ground surface. The location of this material is approximately 800 m from the Mount Nansen Road, through undulating terrain. This area was forested as well, with trees that are upwards of 200 years (this was once again based on counting tree rings on a fallen tree).

The trial plantings observed were unsuccessful. The percent survival is approximately 5% or less at all sites. The exposed hill side above the mill is a convex surface, with no microsites, and it is very hard packed. This is consistent with the trial planting near Back Creek, except for the one site where the substrate was mounded, loosening the soil and allowing a space for the cuttings to develop roots. The plantings in the area south of the tailings were stuck into organic substrate that is blackened due to overflow from the tailings. The cuttings were inserted horizontally, but none of them were observed to have survived.

## 3.8 Site Wide Structures Assessment

Findings from the inspections of site structures conducted during the SI program are outlined in the following sections.

### 3.8.1 Mill Complex and Workshop

Mill and workshop area inspections identified the following:

- Structures were in good to fair condition with a high potential for reuse (salvage) of heavier steel components (expected 75+%). Advanced corrosion was present to a limited extent on columns and roof purlins in the zones between agitator tanks and ball mills. Steel cladding conditions were generally poor-fair, with corrosion near floors and on ceilings and ice damage on overhangs and gables (expect 20-30% salvage/reuse, balance to recycle).
- The steel framing is of good design and generally good condition, painted, and cladded with galvanized steel sheeting, including limited quantities of tin sheeting on walls and possibly also on roofs. Testing of the paint has indicated that there is no lead and PCB paint in large enough quantities to be identified as hazardous waste.
- The interior of the complex is highly congested with residual process equipment (i.e. steel tanks, wood stave tanks, steel, PVC and HDPE pipes, mezzanine flooring, cable racks, electrical boards, instrumentation and cabling, racking, wood office cubicles and tool stores). Some cable racks were stripped of heavier gauge cabling.
- The large steel agitator tanks were drained but not cleaned of residual sludge. These tanks appeared to be second-hand units with old scratch damage and worn coatings (expect low potential for salvage; however, 100% recycling as scrap). The building shell will have to be removed before deconstructing the larger tanks.
- Large wood stave bins for raw materials feeding the ball mills have potential for salvage or recycle of the wood. Some smaller wood stave mixing tanks are severely saturated with wet sludge and will probably be classified as hazardous waste.
- Base concrete floors are staggered in three mezzanine steps with retaining walls. Multiple machine bases and tank pedestals in concrete appear to be contaminated with oil and process spillage. Groundwater was seeping into the west tank zone of the building.
- The most feasible deconstruction method appears to be systematic dismantling for salvage and recycling of materials, largely steel and concrete. Roofs and wall cladding will go first to open up for the retrieval of tanks and miscellaneous process equipment. Primary frames will go after dismantling of secondary girts, purlins and flooring. Large tanks will go after complete removal of the building shell, followed by demolition of the concrete floors, machine foundations and lastly retaining walls. Much of the concrete can be crushed onsite and recycled for road building and rehabilitation of the site, depending on the hazardous substance assessment.
- The power generation and fuel system (propane, gas and diesel) was not assessed during the program.

### 3.8.2 Bunkhouse, Camp Shed and Cookhouse Buildings

The wood framed, wood sided and gypsum board interiors with steel cladded roofing will likely be deconstructed by removing steel roofing and interior fittings (doors, windows, bathroom and kitchen) for recycling and disposal (gypsum) before push-over demolition with a machine. The bunkhouse has salvageable laminated beams in the floor structure. Woods will likely be recycled with portions potentially disposed of as waste onsite. Small quantities of concrete pad foundations are expected to be recycled as crushed fill onsite. The buildings were energized with electric power.

### 3.8.3 Small Pump Houses

Wooden constructions for the Victoria Creek Wellhouse, the seepage pond pump and the electrical transfer station will be pushed over after removal of electrical and mechanical fittings for recycling. Small amounts of concrete and steel components can be recycled.

## 3.9 Site Wide Geotechnical Reconnaissance

The site observations made confirmed previous work onsite that suggest the only significant borrow sources onsite are the sand from which the dam was constructed and fractured, friable rock. There is a limited amount of strong granitic rock in the waste area which is presumed to have come from the open pit. The pit walls, however, do not show evidence of such material although a review of historic data may provide more information in this regard. No obvious large scale geohazards were observed onsite. The field memorandum describing these observations is included in Appendix B2.

# 4.0 SUMMARY

A memorandum summarizing the scope and conduct of the SI program was prepared shortly after field demobilization. This memo is provided in Appendix H.

## 5.0 LIMITATIONS AND CLOSURE

This report was prepared exclusively for Assessment and Abandoned Mines, Energy Mines and Resources by AMEC Environment & Infrastructure, a wholly owned subsidiary of AMEC Americas Limited. The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in AMEC services and based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended to be used by Assessment and Abandoned Mines, Energy Mines and Resources only, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

Yours truly,

**AMEC Environment & Infrastructure**

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SIGNATURE
Date 16 April 2014
PERMIT NUMBER PP130
Association of Professional Engineers of Yukon

## 6.0 REFERENCES

AMEC Environment & Infrastructure (AMEC). 2013. “Mount Nansen Remediation Project Preliminary 2013 Site Investigation Plan” BC MOE, 2009 “Manual of British Columbia Hydrometric Standards”.

AMEC Environment & Infrastructure (AMEC). 2013a. Memo to J. Perron of Government of Yukon re “Mount Nansen Remediation Project, Data Gap Analysis”. 24 July 2013.

AMEC Environment & Infrastructure (AMEC). 2013b. Memo to J. Perron of Government of Yukon re “Mount Nansen Remediation Project, 2013 Site Investigation Plan”. 25 July 2013.

AMEC Environment & Infrastructure (AMEC). 2013c. Memo to J. Perron of Government of Yukon re “Mount Nansen Remediation Project, Freshet Site Visits 16 and 21 to 23 May 2013 Final – Revision 1”. 24 July 2013.

AMEC Environment & Infrastructure (AMEC). 2014. Mount Nansen Remediation Project, Site Characterization Report. Submitted to Assessment and Abandoned Mines Branch, Department of Energy, Mines and Resources, Government of Yukon.

British Columbia Ministry of Environment (BCMOE). 2003. British Columbia Field Sampling Manual. January 2003.

British Columbia Ministry of Environment (BCMOE). 2009 “Manual of British Columbia Hydrometric Standards”

British Columbia Ministry of Forests and Range and British Columbia Ministry of Environment. 2010. Field manual for describing terrestrial ecosystems. 2nd ed. Forest Science Program, Victoria, B.C. Land Manag. Handb. No. 25.

CANMET. 2002. Assessment of Chemical Stability of Impounded Tailings at Mount Nansen, Yukon Territory, Report submitted to Water Resources Division, Indian and Northern Affairs, Canada, Whitehorse, Report MMSL 02-011(CR), June 2002.

EBA. 2009. Mt. Nansen Mine Reclamation Terrain Mapping and Materials Search, Report submitted to the Government of Yukon, Energy, Mines and Resources Assessment and Abandoned Mines Branch, September 2009.

EDI Environmental Dynamics Inc. 2008. Mt. Nansen Mine Site – Summary of 2008 Bioengineering Works. Prepared for Yukon Government - Assessment and Abandoned Mines Branch, Whitehorse YT.

Soil Classification Working Group. 1998. The Canadian System of Soil Classification, 3rd ed. Agriculture and Agri-Food Canada Publication 1646, 187 pp.

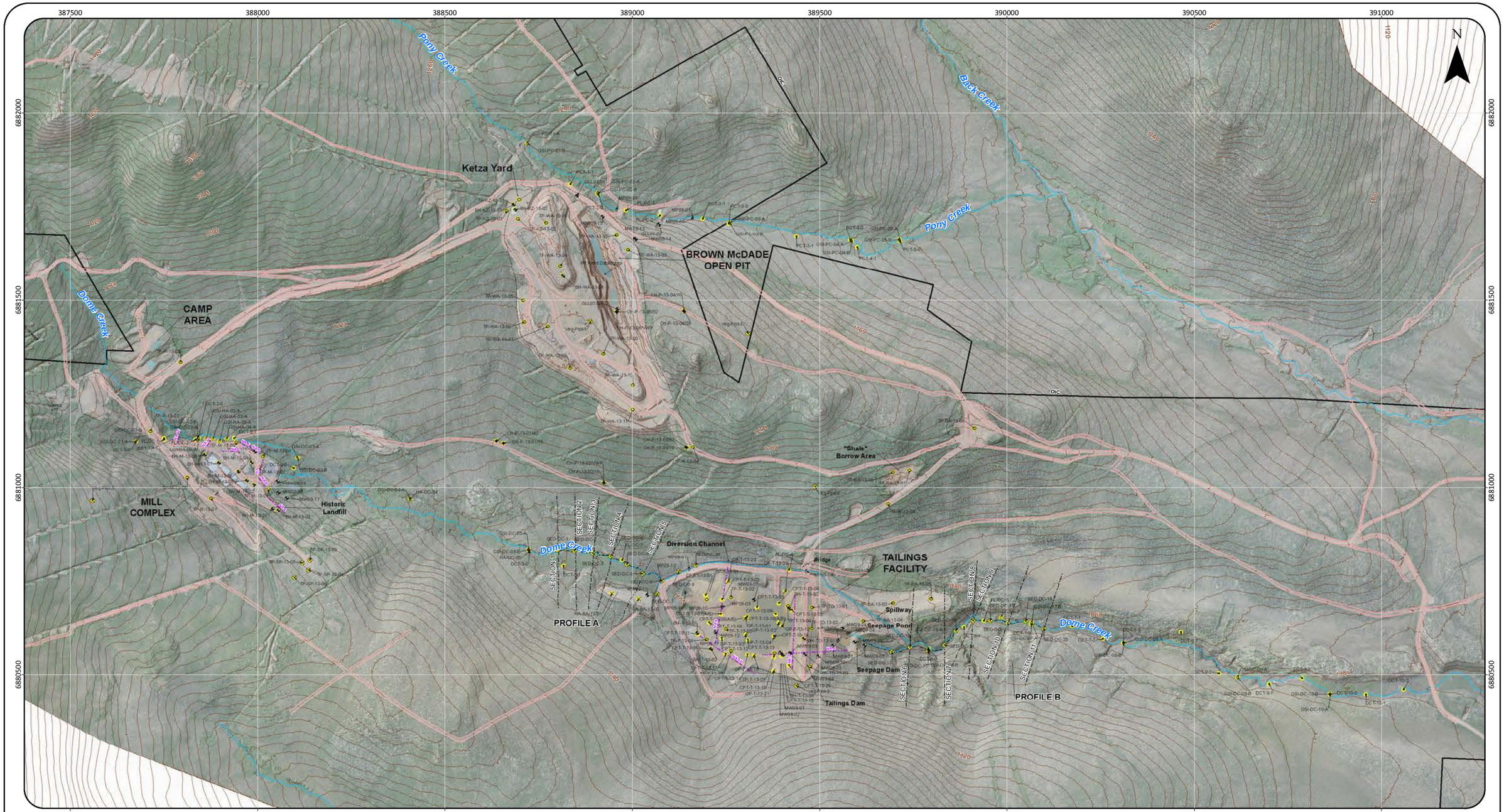
Yukon Government (YG). 2011. Protocol No. 5: Petroleum Hydrocarbon Analytical Methods and Standards. *Yukon Environment Act O.I.C. 2002/171.*

Yukon Government (YG). 2012a. Protocol No. 2: Analysis of Samples Taken in Relation to the Contaminated Sites Regulation. *Yukon Environment Act O.I.C. 2002/171.*

Yukon Government (YG). 2012b. Protocol No. 3: Soil Sampling Procedures at Contaminated Sites. *Yukon Environment Act O.I.C. 2002/171.*

## FIGURES


**Figure 1:** Overview Site Plan
**Figure 2:** Tailings Facility Detail
**Figure 3:** Open Pit Detail
**Figure 4:** Groundwater Monitoring Locations Fall 2013
**Figure 5:** Mill and Upper Dome Creek Detail
**Figure 6:** Mid Dome Creek and Borrow Areas Detail




**Data Source:**

Roads, trails, streams, waterbodies, watercourses and infrastructure areas digitized using 2008 Quickbird imagery (courtesy of Yukon Geomatics) and spatial data provided by Yukon government.

Heli LIDAR Data Survey and Imagery, 2012

Datum: NAD 1983 CSRS UTM Zone 8N

**Legend**

- Borehole
- Hydrogeological
- CPT
- Geoprobe
- Grab Sample
- Hand Auger
- Mini Piezometer
- Temperature or Flow Measurement
- Test Pit
- 2013 Locations
- OIC
- Geophysics Lines
- Surveyed Sections
- Contour (5 m)
- Disturbed Area
- Roads
- Streams

Associated Engineering — Global Perspective, Local Focus

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**MOUNT NANSEN REMEDIATION PROJECT**

**Figure 1**

**2013 SITE INVESTIGATION DATA REPORT**

**OVERVIEW SITE PLAN**

Scale 1:10,000

Metres

0 250 500

March 10, 2014

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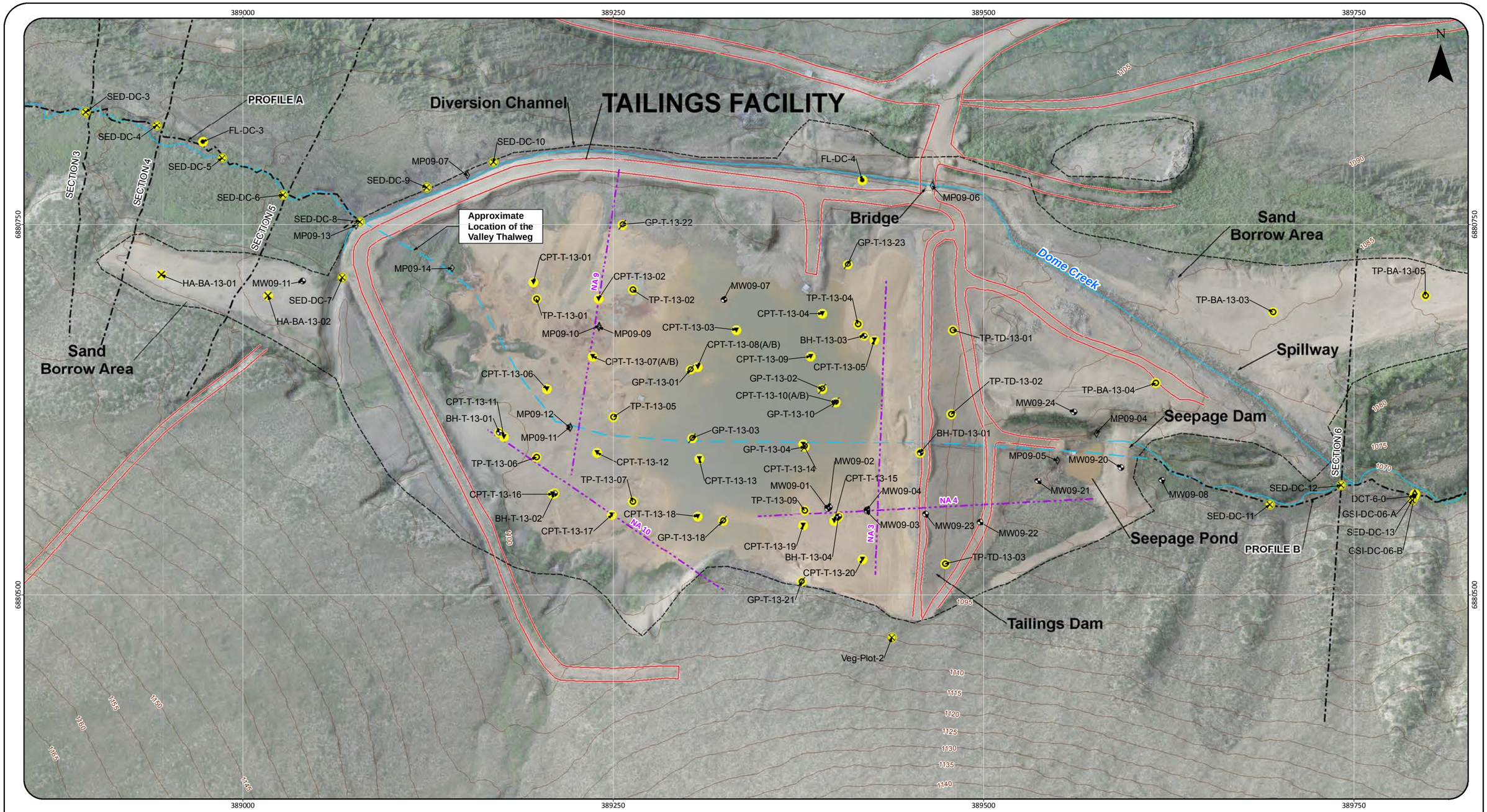


**Data Source:**

Roads, trails, streams, waterbodies, watercourses and infrastructure areas digitized using 2008 Quickbird imagery (courtesy of Yukon Geomatics) and spatial data provided by Yukon government.

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**Legend**

- Borehole
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- Roads
- Streams

Associated Engineering — Global Perspective. Local Focus.

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Yukon Energy, Mines and Resources — Assessment and Abandoned Mines

**MOUNT NANSEN REMEDIATION PROJECT**

Figure 2

**2013 SITE INVESTIGATION DATA REPORT**

**TAILINGS FACILITY DETAIL**

Scale 1:2,500

Metres

0 50 100

March 10, 2014

S:\PROJECTS\VM00605 - Mount Nansen\GIS\Mapping\VM00605_0014e_11x17_2013SiteInvestigationDataReport_TSFDetail.mxd

| Testhole | Drilled Depth (m) | Instrument(s) Installed |
|---|---|---|
| CH-P-13-01/10 | 10 | MW |
| CH-P-13-01/40 | 40 | - |
| CH-P-13-02/10 | 10 | MW |
| CH-P-13-02/VWP | 50 | VWP |
| CH-P-13-03/10 | 10 | MW |
| CH-P-13-03/50 | 50 | MW, VWP |
| CH-P-13-04/10 | 10 | MW |
| CH-P-13-04/35 | 50 | MW, VWP |
| CH-P-13-05/50 | 50 | MW, VWP |
| CH-P-13-06/VWP | 60 | VWP |

MW = Monitoring Well
VWP = Vibrating Wire Piezometer with temperature measurement

388000 388500 389000 389500

6882000 6881500 6881000

N

Pony Creek

Ketza Yard

GSI-PC-01-A
GSI-PC-01-B
PCT-1-1
GLL07-01
GSI-PC-02-A
GSI-PC-02-B
MP09-03
FL-PC-1
PCT-2-0
TP-KZ-13-01
BH-KZ-13-01
BH-KZ-13-02
TP-KZ-13-03
TP-WA-13-01
TP-KZ-13-02
MW09-15
MW09-13
GLL07-02
MW09-14
PONY CREEK ADIT
TP-WA-13-02
Northwest Pile
East Pile
TP-WA-13-04
TP-WA-13-03
Pit Pond Datalogger
BROWN McDADE OPEN PIT
BH-WA-13-01
TP-WA-13-05
WASTE ROCK AREA
GLL07-03
Ore Stockpile
CH-P-13-05/50
CH-P-13-04/10
CH-P-13-04/35
Veg-Plot-5
TP-WA-13-06
Veg-Plot-1
CH-P-13-06/VWP
TP-WA-13-07
TP-WA-13-08
West Mid Pile
TP-WA-13-09
West Lower Pile
South Pile
Low Grade Ore Backfill
TP-WA-13-10
Southwest Upper Pile
TP-WA-13-11
Southwest Lower Pile
CH-P-13-01/40
CH-P-13-01/10
CH-P-13-03/50
CH-P-13-03/10
TP-R-13-04
CH-P-13-02/VWP
CH-P-13-02/10
GSI-DC-03-A
TP-M-13-04
DCT-3-0
GSI-DC-03-B
TP-M-13-02
MW09-19
MP09-01
PCT-2-1
PCT-3-0
FL-PC-2
MP09-08
GSI-PC-03-A
GSI-PC-03-B
PCT-3-1
PCT-4-0
GSI-PC-05-A
GSI-PC-05-B
PCT-5-0
GSI-PC-04-A
GSI-PC-04-B
PCT-4-1
Pony Creek
"Shale" Borrow Area
TP-BA-13-08
"Shale" Borrow Area
TP-BA-13-06
TP-BA-13-07

**Data Source:**

Roads, trails, streams, waterbodies, watercourses and infrastructure areas digitized using 2008 Quickbird imagery (courtesy of Yukon Geomatics) and spatial data provided by Yukon government.

Heli LIDAR Data Survey and Imagery, 2012

Datum: NAD 1983 CSRS UTM Zone 8N

**Legend**

- Borehole
- Hydrogeological
- CPT
- Geoprobe
- Grab Sample
- Hand Auger
- Mini Piezometer
- Temperature or Flow Measurement
- Test Pit
- 2013 Locations
- OIC
- Contour (5 m)
- Disturbed Area
- Roads
- Streams
- Waste Pile Area

Associated Engineering — Global Perspective. Local Focus.

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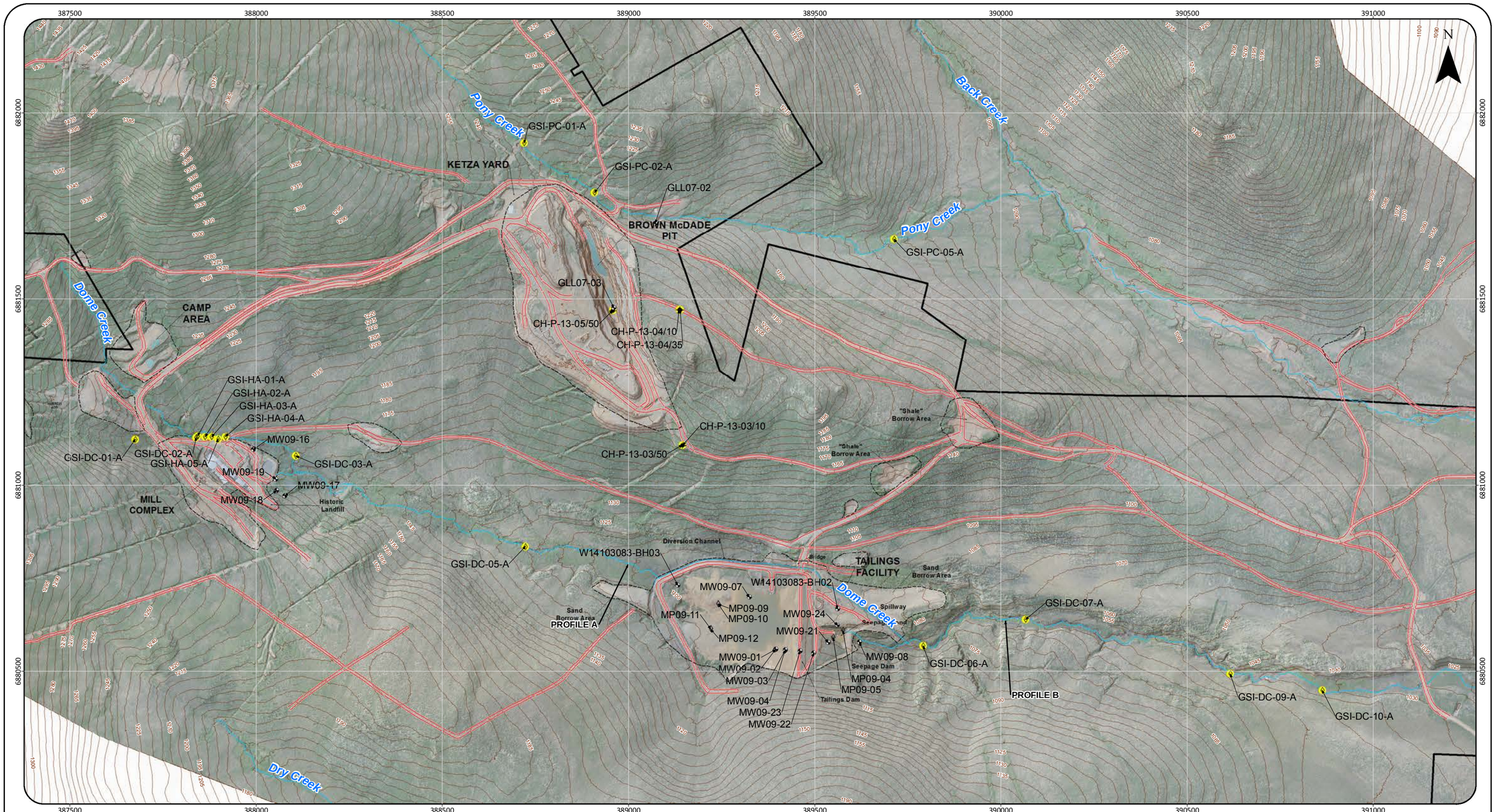
Yukon Energy, Mines and Resources — Assessment and Abandoned Mines

MOUNT NANSEN REMEDIATION PROJECT
Figure 3
2013 SITE INVESTIGATION DATA REPORT
OPEN PIT DETAIL

Scale 1:5,000
Metres
0 100 200
March 10, 2014

S:\PROJECTS\VM00605 - Mount Nansen\GIS\Mapping\VM00605_0014e_11x17_2013SiteInvestigationDataReport_PitDetail.mxd




**Data Source:**

Roads, trails, streams, waterbodies, watercourses and infrastructure areas digitized using 2008 Quickbird imagery (courtesy of Yukon Geomatics) and spatial data provided by Yukon government.

Heli LIDAR Data Survey and Imagery, 2012

Datum: NAD 1983 CSRS UTM Zone 8N

**Legend**

- Borehole
- Hydrogeological
- CPT
- Geoprobe
- Grab Sample
- Hand Auger
- Mini Piezometer
- Temperature or Flow Measurement
- Test Pit
- 2013 Locations
- OIC
- Contour (5 m)
- Disturbed Area
- Roads
- Streams

Note:
Refer to Appendix B7 and D3 in the 2013 Site Investigation Report for details of groundwater sampling.

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Yukon Energy, Mines and Resources — Assessment and Abandoned Mines

**MOUNT NANSEN REMEDIATION PROJECT**

**Figure 4**

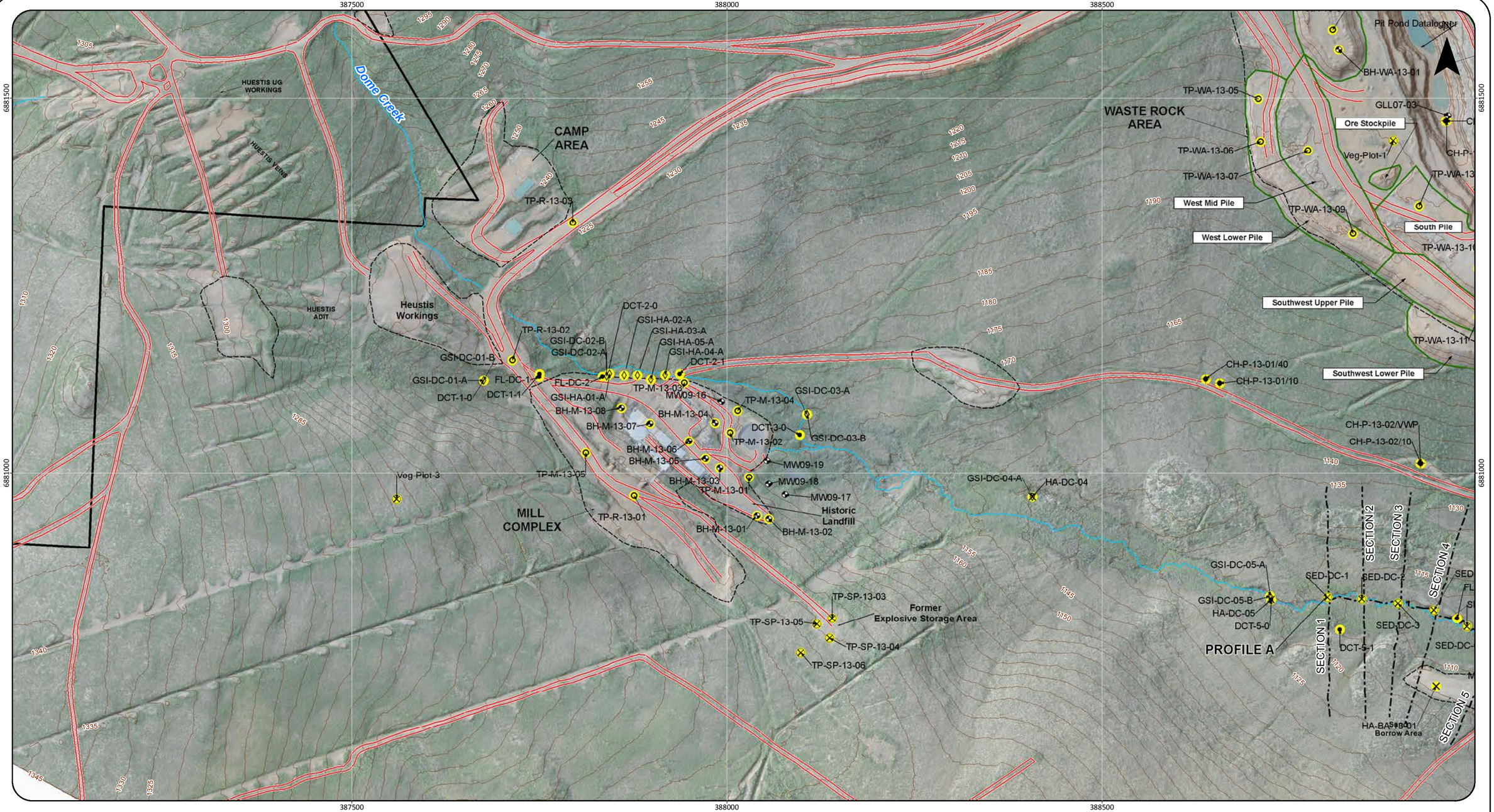
**2013 SITE INVESTIGATION DATA REPORT**

**GROUNDWATER MONITORING LOCATIONS FALL 2013**

Scale 1:10,000
Metres
0 250 500

April 3, 2014

S:\PROJECTS\VM00605 - Mount Nansen\GIS\Mapping\VM00605_0010b_11x17_2013SiteInvestigationDataReport_groundwater_v2.mxd




**Data Source:**

Roads, trails, streams, waterbodies, watercourses and infrastructure areas digitized using 2008 Quickbird imagery (courtesy of Yukon Geomatics) and spatial data provided by Yukon government.

Heli LIDAR Data Survey and Imagery, 2012

Datum: NAD 1983 CSRS UTM Zone 8N

**Legend**

- Borehole
- Hydrogeological
- CPT
- Geoprobe
- Grab Sample
- Hand Auger
- Mini Piezometer
- Temperature or Flow Measurement
- Test Pit
- 2013 Locations
- OIC
- Surveyed Sections
- Contour (5 m)
- Disturbed Area
- Roads
- Streams
- Waste Pile Area

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Yukon Energy, Mines and Resources — Assessment and Abandoned Mines

MOUNT NANSEN REMEDIATION PROJECT

Figure 5

2013 SITE INVESTIGATION DATA REPORT

MILL AND UPPER DOME CREEK DETAIL

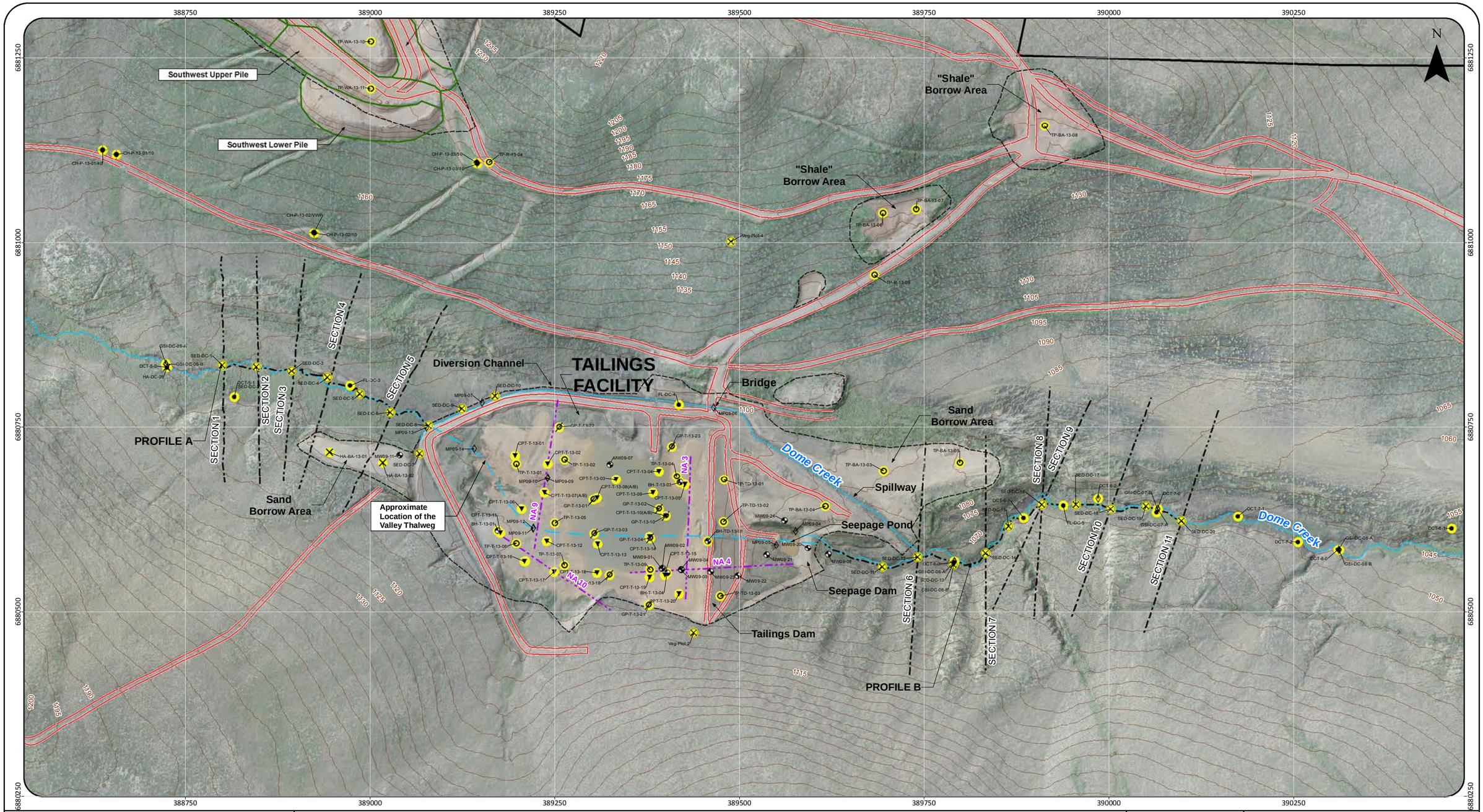
Scale 1:5,000

Metres

0 100 200

March 10, 2014

S:\PROJECTS\VM00605 - Mount Nansen\GIS\Mapping\VM00605_0014e_11x17_2013SiteInvestigationDataReport_MillDetail.mxd




**Data Source:**

Roads, trails, streams, waterbodies, watercourses and infrastructure areas digitized using 2008 Quickbird imagery (courtesy of Yukon Geomatics) and spatial data provided by Yukon government.

Heli LIDAR Data Survey and Imagery, 2012

Datum: NAD 1983 CSRS UTM Zone 8N

**Legend**

- Borehole
- Hydrogeological
- CPT
- Geoprobe
- Grab Sample
- Hand Auger
- Mini Piezometer
- Temperature or Flow Measurement
- Test Pit
- 2013 Locations
- OIC
- Geophysics Lines
- Surveyed Sections
- Contour (5 m)
- Disturbed Area
- Roads
- Streams
- Waste Pile Area

Note:
Refer to Figure 2 for a close-up look at 2013 Site Investigation locations in the Tailings Facility.

Associated Engineering — Global Perspective. Local Focus.

amec

Yukon Energy, Mines and Resources
Assessment and Abandoned Mines

MOUNT NANSEN REMEDIATION PROJECT
Figure 6

2013 SITE INVESTIGATION DATA REPORT

MID DOME CREEK AND BORROW AREAS DETAIL

Scale 1:5,000
Metres
0 100 200

March 11, 2014

S:\PROJECTS\VM00605 - Mount Nansen\GIS\Mapping\VM00605_0015a_11x17_2013SiteInvestigationDataReport_BorrowAreaDetail.mxd

# APPENDIX A

# TEST HOLE LOGS

# Appendix A1

# Sonic Drill Logs

## EXPLANATION OF TERMS FOR GEOTECHNICAL SOIL LOGS

### 1.0 SOIL CONSTITUENTS

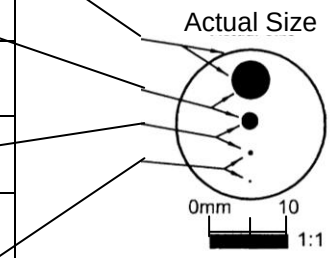
Based on particle size and distribution per the Modified Unified Soil Classification System as described in the following tables.

Proportions of Constituents:

| Descriptive Term | Proportion by Weight |
|---|---|
| noun (e.g. sand, etc.) | over 50% |
| and (e.g. and sand, etc.) | over 35% |
| adjective (e.g. sandy, etc.) | 20% to 35% |
| some (e.g. some sand, etc.) | 10% to 20% |
| trace (e.g. trace sand, etc.) | 0% to 10% |

Particle Sizes:

| Material | Fraction | Sieve Size (grain size) | Approx Scale |
|---|---|---|---|
| Boulders | | > 200 mm | Larger than a soccer ball |
| Cobbles | | Less than 200 mm & retained on 3-in (75 mm) sieve | Fist sized to soccer ball sized |
| Gravel | Coarse | Passes 3-in (75 mm) sieve & retained on ¾-in (19 mm) sieve | Thumb sized to fist sized |
| | Fine | Passes ¾-in (19 mm) sieve & retained on No. 4 (4.75 mm) sieve | Pea sized to thumb sized |
| Sand | Coarse | Passes No. 4 (4.75 mm) sieve & retained on No. 10 (2.00 mm) sieve | Rock salt sized to pea sized |
| | Medium | Passes No. 10 (2.00 mm) sieve & retained on No. 40 (425 μm) sieve | Sugar sized to rock salt sized |
| | Fine | Passes No. 40 (425 μm) sieve & Retained on No. 200 (75 μm) sieve | Flour sized to sugar sized |
| Fines (silt & clay) | | Passes No. 200 (75 μm) sieve | Flour sized and smaller (indiscernible to naked eye) |




Gradation of Coarse Fraction:

| Descriptive Term | Field Identification |
|---|---|
| Well graded | contains particles of sizes assorted over a wide range with no one size predominating or missing |
| Poorly Graded | contains a limited range of particle sizes |
| Uniform Graded | contains a predominance of one size |
| Gap Graded | missing a size within a range |

## 2.0 RELATIVE DENSITY / CONSISTENCY

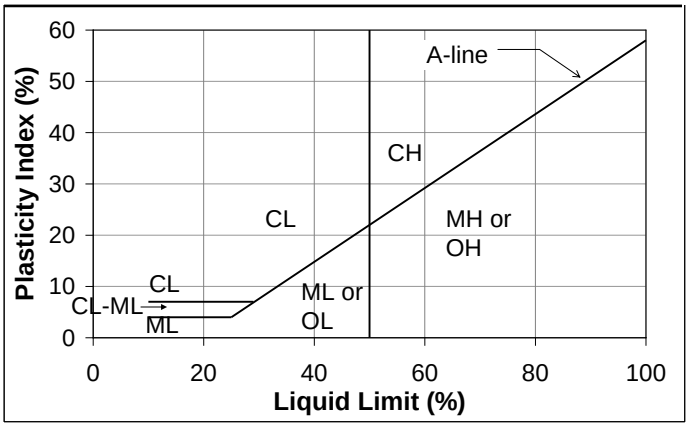
For Coarse Grained Soils:

| Descriptive Term | Relative Density | SPT N-Value |
|---|---|---|
| Very Loose | 0 - 20 % | 0 – 4 |
| Loose | 20 – 40 % | 4 – 10 |
| Compact | 40 – 70 % | 10 – 30 |
| Dense | 70 – 90 % | 30 – 50 |
| Very Dense | 90 – 100 % | > 50 |

For Fine Grained Soils:

| Consistency | Field Identification | Undrained Strength (kPa) | SPT N Value |
|---|---|---|---|
| Very Soft | Easily penetrated several centimetres by the fist | < 12 | 0 - 2 |
| Soft | Easily penetrated several centimetres by the thumb | 12 – 25 | 2 - 4 |
| Firm | Can be penetrated several centimetres by the thumb with moderate effort | 25 – 50 | 4 - 8 |
| Stiff | Readily indented by the thumb but penetrated only with great effort | 20 – 100 | 8 - 15 |
| Very Stiff | Readily indented by the Thumbnail | 100 – 200 | 15 - 30 |
| Hard | Indented with difficulty by the Thumbnail | > 200 | > 30 |

## 3.0 PLASTICITY



## 4.0 MOISTURE

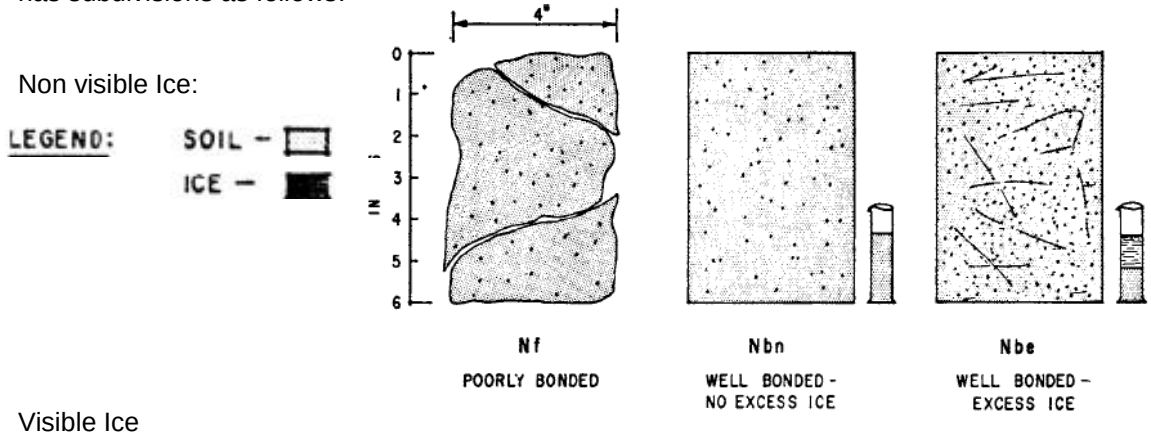
| Descriptive Term | Field Identification |
|---|---|
| Dry | no visible moisture, dusty |
| Damp | slight moisture content but fingers do not become moistened when touching soil. Only fines sticks to fingers. |
| Moist | visible moisture, but no visible free water, finger becomes moistened when touching the soil. Soil does not stick to fingers. Near the plastic limit for cohesive soil. |
| Wet | a film of water is present on particle surface, soil sticks to fingers. |
| Free water | water is separated from soil particles. |

## 5.0 FROZEN SOIL DESCRIPTION

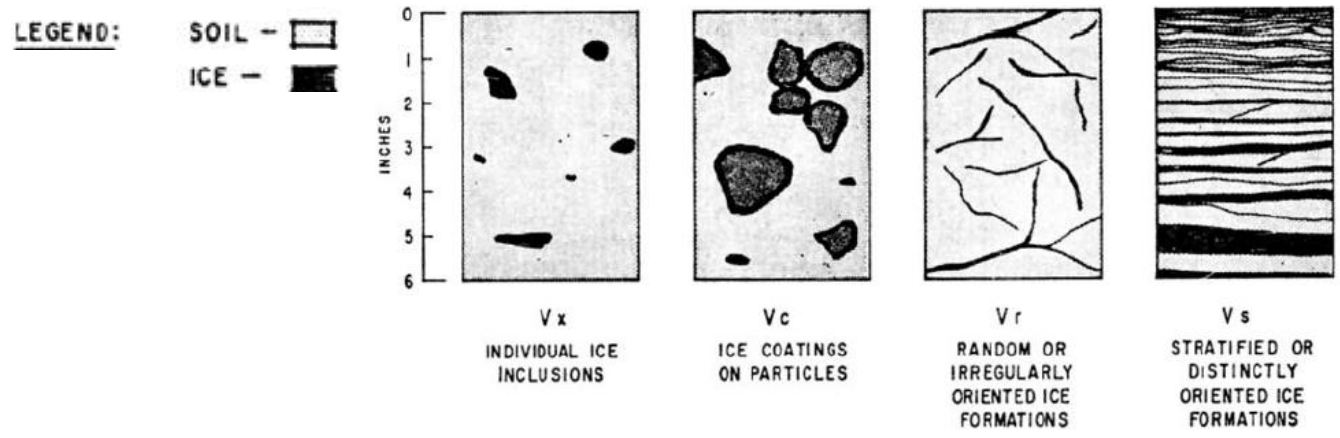
**Permafrost (see ASTM D4083)**

Three main categories – not visible (i.e. a frozen soil but ice is not visible to the naked eye), visible (can see ice but there is more soil than ice), and ice (>1" thickness where there is more ice than soil). Each has subdivisions as follows:

Non visible Ice:



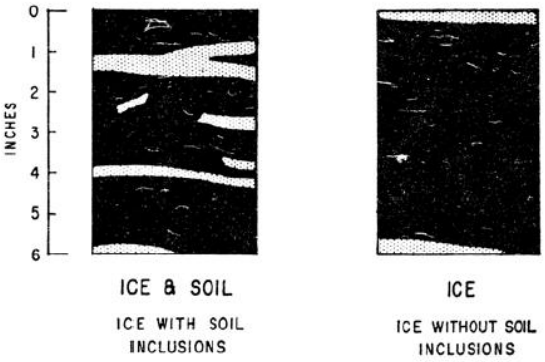

Visible Ice



## Explanation of Terms for Geotechnical Logs

Ice

LEGEND: SOIL – ICE –



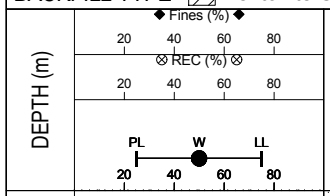

### 6.0 DEFINITION OF SYMBOLS USED ON LOGS

| SOIL | | SOIL | | WELL DETAILS | |
|---|---|---|---|---|---|
| | GRAVEL, well graded, to and SAND little to no fines,(GW) | | SILT, high plastic (MH) | | Solid pipe with BACKFILL |
| | GRAVEL, poorly graded, to and SAND little to no fines (GP) | | CLAY, low plastic (CL) | | Solid Pipe with BENTONITE |
| | GRAVEL, silty to and SAND, and SILT(GM) | | CLAY, medium plastic (CI) | | Solid pipe with GROUT |
| | GRAVEL, clayey to and SAND, and CLAY (GC) | | CLAY, high plastic (CH) | | Solid pipe with SAND |
| | SAND, well graded, to gravely, little to no fines, (SW) | | ORGANIC silt or clay, low plastic (OL) | | Slotted pipe with SAND |
| | SAND, poorly graded, to gravely, little to no fines (SW) | | ORGANIC silt or clay, high plastic (OH) | | Slotted pipe with NO BACKFILL |
| | SAND, silty (SM) | | PEAT (Pt) | | SAND backfill |
| | SAND, clayey to SAND and CLAY (SC) | ROCK | | | GROUT backfill |
| | FILL | | Granodiorite (GRDR) | | GENERAL BACKFILL (e.g. drill cutting, slough) |
| | SILT, low plastic (ML) | | Andesite (ANDS) | | |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Borehole No: BH-T-13-01 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880610 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389173 | Elevation (m): 1101 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough




| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|
| | | SAND<br>Fine to medium grained, silty, compact, orange to brown, damp to moist.<br>(Tailings) | | MC1 | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Tailings surface was stable and well drained for the drill. Minor rutting due to driving pickup trucks on the loose, dry sand. The TSF pond edge is approximately 100 m to the east.<br>... Moisture content tests performed on-site. | 1101 |
| | | SAND<br>Fine to medium grained, trace subangular gravel, trace silt, compact, grey, damp to moist.<br>(In Situ) | | MC2<br>ARD1 | | | |
| 1 | | ... From 0.6 to 1.6 m: trace rootlets. | | | | | 1100 |
| | | | | | | ... From 1.5 to 3.0 m: no core recovery. | |
| 2 | | | | | | | 1099 |
| 3 | | | | MC3 | | | 1098 |
| | | | | ARD2 | | | |
| 4 | | | | MC4 | | | 1097 |
| | | ... From 4.2 to 4.5 m: moist to wet. | | | | ... Water level estimated based on observations during drilling. | |
| | | SAND<br>Fine to medium grained, trace gravel, trace silt, grey, with trace 1 to 5 mm thick organic laminations, frozen, Nbn, no excess ice, well bonded, trace <1 mm ice crystals visible dominantly in the organic laminations, moist to wet when thawed.<br>(Permafrost) | | MC5 | | ... When permafrost soil thaws: density is compact to dense, most core retains its shape without excess water pooling in the core box before transported. When samples are | |

C01 (100) C02 (0) C03 (100)

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:39 PM (SMART LOG)

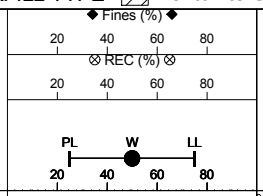
amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-15 7:45:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-15 12:30:00 PM | Reviewed By: R. Wood |
| Completion Depth: 13.50 m | Page 1 of 3 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Borehole No: BH-T-13-01 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880610 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389173 | Elevation (m): 1101 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

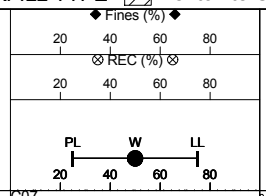



| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|
| 6 | C04 100 | SAND<br>Fine to medium grained, trace gravel, trace silt, grey, with trace 1 to 5 mm thick organic laminations, frozen, Nbn, no excess ice, well bonded, trace <1 mm ice crystals visible dominantly in the organic laminations, moist to wet when thawed.<br>(Permafrost) *(continued)* | | MC6<br>ARD3<br>GS1<br>MC7<br>MC8 | | transported in a pickup truck, localized areas which had higher amounts of water liquefied in the core box. | 1096<br>1095 |
| 7 | C05 100 | | | MC9<br>ARD4<br>MC10 | | | 1094 |
| 8 | C06 100 | | | MC11<br>MC12<br>ARD5<br>MC13<br>GS2 | | | 1093 |
| 9 | C07 100 | | | MC14<br>MC15<br>ARD6 | | | 1092 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Borehole No: BH-T-13-01 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880610 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389173 | Elevation (m): 1101 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough




| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|
| | | SAND<br>Fine to medium grained, trace gravel, trace silt, grey, with trace 1 to 5 mm thick organic laminations, frozen, Nbn, no excess ice, well bonded, trace <1 mm ice crystals visible dominantly in the organic laminations, moist to wet when thawed.<br>(Permafrost) *(continued)* | | MC16 | | ... Below 10.0 m: slow drilling, approximately half of the drill stem is filled with slough, good recovery of sampled soil. | 1091 |
| | | ... From 10.0 to 10.7 m: sand is medium grained. | | MC17 | | | |
| | | ... From 10.7 to 13.3 m: brown to dark grey. | | | | | |
| 11 | | | | MC18 | | | |
| | 100 | | | ARD7 | | | 1090 |
| | | | | MC19 | | | |
| | | | | GS3 | | | |
| 12 | | | | MC20 | | | 1089 |
| | 100 | ... At 12.7 m: ice lens 15 cm in length, ICE, hard, colourless to grey, clear to cloudy, stratified in 1 to 5 mm thick micro ice lenses. | | MC21 | | | |
| 13 | | | | ARD8 | | | 1088 |
| | | ... From 13.3 to 13.5 m: sand is medium to coarse grained, trace silt, no visible ice. | | MC22 | | | |
| | | END OF HOLE at 13.5 m<br>Reached target depth.<br>No well installation.<br>Hole sloughed in. | | | | ... At 13.5 m: hole squeezing in, difficult to remove rods | |
| 14 | | | | | | | 1087 |



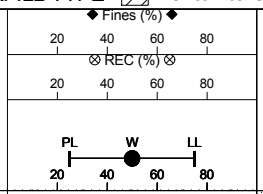
amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-15 7:45:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-15 12:30:00 PM | Reviewed By: R. Wood |
| Completion Depth: 13.50 m | Page 3 of 3 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Borehole No: BH-T-13-02 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880564 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389210 | Elevation (m): 1098 |

SAMPLE TYPE: Shelby Tube; Core; SPT (N); Grab Sample

BACKFILL TYPE: Bentonite Chips; Bentonite Grout; Bentonite Pellets; Cement Grout; Drill Cuttings; Sand; Slough




| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|
| 0 | | SAND<br>Fine to medium grained, silty, compact, brown, trace laminations of dark grey tailings with sulphide minerals, wet.<br>(Tailings) | | MC1 | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Tailings surface was soft, rutting after one pass, stamping feet on the surface results in liquefaction. The TSF pond edge is approximately 80 m to the east.<br>... Moisture content tests performed on-site<br>... Water level measured in standpipe September 17, 2013 - 3 days after well installation. | 1098 |
| | | | | GS1 | | | |
| 1 | | | | | | | 1097 |
| | | | | MC2 | | | |
| | | SAND<br>Fine to medium grained sand, some silt, compact to dense, grey to dark grey, no structure, trace organics, trace rootlets, trace white 1 mm crystals, moist to wet, smells of decomposing vegetation.<br>(In Situ) | | MC3 | | | |
| 2 | | | | ARD1 | | | 1096 |
| | | SAND<br>Fine to medium grained, trace silt, trace gravel, compact to dense, trace 1 to 5 mm thick laminations of rootlets/organics, grey to brown, saturated to wet, smells of decomposing vegetation.<br>(In Situ) | | MC4 | | | |
| 3 | | | | ARD2 | | | 1095 |
| | | | | MC5 | | | |
| 4 | | | | | | | 1094 |

C01 at 100 (0 m); C02 at 100 (2 m); C03 at 100 (3 m)

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:39 PM (SMART LOG)

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-14 2:00:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-14 4:00:00 PM | Reviewed By: R. Wood |
| Completion Depth: 12.00 m | Page 1 of 3 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Borehole No: BH-T-13-02 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880564 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389210 | Elevation (m): 1098 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | Fines (%) / REC (%) / PL W LL | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|
| | | | | | MC6 | | | |
| | C04 100 | | SILTY SAND<br>Fine to medium grained, grey, trace 1 to 5 mm thick laminations of organics, frozen, Nbn, well bonded, no excess ice, trace ice crystals <1 mm visible in organic laminations, moist to wet when thawed, smells of decomposing vegetation.<br>(Permafrost) | | ARD3 | | | |
| | | | | | MC7 | | | 1093 |
| 6 | | | | | MC8 | | | |
| | | | | | GS2 | | | 1092 |
| | C05 100 | | | | ARD4<br>MC9 | | | |
| 7 | | | | | MC10 | | | |
| | | | | | MC11 | | | 1091 |
| 8 | | | | | MC12 | | | |
| | C06 100 | | | | ARD5 | | | |
| | | | ICE<br>Hard, colourless to grey, clear to cloudy, trace 1 to 5 mm laminations of sand. | | MC13 | | | 1090 |
| | | | | | MC14 | | | |
| | | | | | GS3 | | | |
| 9 | | | | | MC15 | | | |
| | | | SILTY SAND<br>Fine to medium grained, dark grey, trace 1 to 5 mm thick laminations of organics, frozen, Nbn, well bonded, no excess ice, trace ice crystals <1 mm visible in organic laminations, moist to wet when thawed, smells of decomposing vegetation.<br>(Permafrost) | | MC16 | | | 1089 |
| | | | | | ARD6 | | | |
| | C07 100 | | ... At 9.7 m: 3 cm ice lens, ICE, hard, colourless to grey, clear to cloudy, stratified with soil | | MC17 | | | |

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|---|---|---|
| Start Date: 2013-09-14 2:00:00 PM | Logged By: S. Magnusson | |
| Completion Date: 2013-09-14 4:00:00 PM | Reviewed By: R. Wood | |
| Completion Depth: 12.00 m |  | |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:39 PM (SMART LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Borehole No: BH-T-13-02 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880564 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389210 | Elevation (m): 1098 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | Fines (%) / REC (%) / PL W LL | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|
| 11 | C07 | | SAND<br>Fine to medium grained, some gravel angular to 25 mm diameter, trace to some silt, dark grey, trace 1 to 5 mm thick laminations of organics, frozen, Nbn, well bonded, no excess ice, trace ice crystals <1 mm visible in organic laminations, moist to wet when thawed, smells of decomposing vegetation. | | MC18<br>GS4<br>MC19<br>MC20<br>ARD7<br>MC21 | | ... Below 10.0 m: slow, difficult drilling. Approximately half of the frozen core has melted on the outside by the time it is brought to the surface | 1088 |
| 12 | C08 | 100 | END OF HOLE at 12.0 m<br>Reached target depth.<br>Hole sloughed in.<br>25 mm diameter PVC standpipe installed with 1.0 m stickup, taped bell joints, hacksaw cut screen, no seal placed and no backfill and backfill was In Situ sand and tailings. | | | | ... Ground around the drill has liquified, footing of drill mast about 30 cm below ground surface. | 1087<br>1086<br>1085<br>1084 |
| 13 | | | | | | | | |
| 14 | | | | | | | | |

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|---|---|---|
| Start Date: 2013-09-14 2:00:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-14 4:00:00 PM | Reviewed By: R. Wood |
| Completion Depth: 12.00 m | Page 3 of 3 |

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:39 PM (SMART LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Borehole No: BH-T-13-03 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880675 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389419 | Elevation (m): 1097 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | Fines (%) 20 40 60 80 / REC (%) 20 40 60 80 / PL W LL 20 40 60 80 | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|
| 0 | C01 100 | | SAND<br>Fine grained, silty, loose to compact, brown to orange, brown, damp.<br>(Tailings) | | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Tailings surface was stable and well drained for the drill. Dry loose sand tailings on surface. Support pickup trucks unable to access the drill site due to limited access from the tailings dam. | 1096 |
| 1 | | | | | GS1 | | | |
| 2 | C02 100 | | SAND AND SILT<br>Fine grained sand, compact, brown to orange, wet to saturated<br>(Tailings) | | GS2 | | ... Water level measured September 17, 2013 - 4 days after well installation. | 1095 |
| 3 | C03 100 | | | | GS3 | | | 1094 |
| 4 | | | | | GS4 | | | 1093 |
| | | | | | ARD1 | | | 1092 |
| | | | | | GS5 | | ... Sample GS5: Non plastic. | |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:39 PM (SMART LOG)

amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-13 1:30:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-13 5:30:00 PM | Reviewed By: R. Wood |
| Completion Depth: 16.50 m | Page 1 of 4 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Borehole No: BH-T-13-03 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880675 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389419 | Elevation (m): 1097 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | Fines (%) / REC (%) / PL W LL | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|
| | | | SAND<br>Coarse to fine grained, trace gravel with up to 25 mm angular pieces, silty, compact to dense, grey to dark grey, wet.<br>(In Situ) *(continued)*<br>... From 4.7 to 5.0 m: Layers 1 to 10 cm thick of organics/dark grey soil spaced 1 to 5 cm apart amongst the sand, dark grey to black, smells of decomposing vegetation. | | | | | |
| | C04 100 | | | | | | | 1091 |
| 6 | | | ... From 6.0 to 11.1 m: trace gravel, grey to brown | | GS6 | | | |
| | | | | | ARD2 | | | |
| | C05 100 | | | | | | | 1090 |
| 7 | | | | | GS7 | | | |
| | | | | | | | ... From 7.5 to 9.0 m: hard/slow drilling | 1089 |
| 8 | | | | | GS8<br>ARD3 | | | |
| | C06 100 | | | | | | | 1088 |
| 9 | | | ... From 9.0 to 9.2 m: trace organics layered 1 to 5 mm thick, spaced 1 to 5 mm apart, black, smells of decomposing vegetation. | | GS9<br>ARD4 | | | |
| | | | SAND<br>Coarse to fine grained, trace gravel, trace silt, compact to dense, grey to dark grey, wet, smells of decomposing vegetation<br>(In Situ) | | | | | |
| | C07 100 | | | | | | | 1087 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:39 PM (SMART LOG)

amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-13 1:30:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-13 5:30:00 PM | Reviewed By: R. Wood |
| Completion Depth: 16.50 m | Page 2 of 4 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Borehole No: BH-T-13-03 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880675 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389419 | Elevation (m): 1097 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | Fines (%) 20 40 60 80 / REC (%) 20 40 60 80 / PL W LL 20 40 60 80 | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|
| | C07 | | SAND<br>Coarse to fine grained, trace gravel, trace silt, compact to dense, grey to dark grey, wet, smells of decomposing vegetation<br>(In Situ) *(continued)* | | GS10 | | | |
| | | | | | ARD5 | | | 1086 |
| 11 | | | | | GS11 | | | |
| | C08 | 100 | ... From 11.1 to 12.8 m: gravelly, angular up to 25 mm diameter, gravel particles are black or yellow coloured. | | | | | 1085 |
| 12 | | | | | GS12 | | | |
| | | | | | ARD6 | | | |
| | C09 | 100 | | | | | | 1084 |
| | | | SAND<br>Fine to medium grained, trace silt, trace gravel, compact to dense, dark grey, wet.<br>(In Situ) | | | | | |
| 13 | | | | | GS13 | | | |
| | | | | | ARD7 | | | 1083 |
| 14 | | | | | GS14 | | | |
| | C10 50 | | | | | | | 1082 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:39 PM (SMART LOG)

amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-13 1:30:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-13 5:30:00 PM | Reviewed By: R. Wood |
| Completion Depth: 16.50 m | Page 3 of 4 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Borehole No: BH-T-13-03 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880675 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389419 | Elevation (m): 1097 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | Fines (%) 20 40 60 80 / REC (%) 20 40 60 80 / PL W LL 20 40 60 80 | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|
| 16 | C11 100 | | SAND<br>Fine grained sand, some silt, trace gravel, dense, layers 1 to 5 cm thick of trace organics amongst mineral soils spaced 1 to 5 cm apart, moist to wet, trace rootlets, smells of decomposing vegetation.<br>(In Situ) | | GS15<br>ARD8 | | | 1081 |
| | | | | | GS16 | | | |
| | | | END OF HOLE AT 16.5 m<br>Reached target depth.<br>25 mm diameter PVC standpipe installed with hacksaw cut screens, taped bell joints, 0.53 m stickup.<br>Standpipe backfill from sand borrow area, northwest of the tailings dam. | | | | Hole is squeezing in on the drill rods, no rotation, difficult to remove rods | 1080 |
| 17 | | | | | | | | 1079 |
| 18 | | | | | | | | 1078 |
| 19 | | | | | | | | 1077 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:39 PM (SMART LOG)

amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-13 1:30:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-13 5:30:00 PM | Reviewed By: R. Wood |
| Completion Depth: 16.50 m | Page 4 of 4 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Borehole No: BH-T-13-04 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880553 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389402 | Elevation (m): 1097 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

Fines (%) 20 40 60 80
REC (%) 20 40 60 80
PL W LL 20 40 60 80

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|
| 0 | C01 100 | SAND<br>Fine to medium grained, some silt, loose to compact, orange to brown, damp.<br>(Tailings) | | MC1 | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Tailings surface was stable and well drained for the drill. Minor rutting due to driving pickup trucks on the loose, dry sand.<br>... Moisture content tests performed on-site. | 1096 |
| 1 | | | | | | | |
| 2 | C02 100 | ... Below 1.9 m: wet to saturated. | | MC2 | | | 1095 |
| | | | | GS1 | | ... Water level measured in standpipe September 17, 2013 - 3 days after well installation. | |
| 3 | C03 17 | | | | | | 1094 |
| 4 | | | | | | | 1093 |
| | | | | | | | 1092 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:39 PM (SMART LOG)

amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-14 8:30:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-14 12:00:00 PM | Reviewed By: R. Wood |
| Completion Depth: 18.50 m | Page 1 of 4 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Borehole No: BH-T-13-04 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880553 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389402 | Elevation (m): 1097 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

Fines (%) 20 40 60 80 | REC (%) 20 40 60 80 | PL W LL 20 40 60 80

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|
| | | SAND<br>Fine to medium grained, some silt, loose to compact, orange to brown, damp.<br>(Tailings) *(continued)*<br>... From 5.1 to 5.7 m: Fine grained sand, some silt, compact, with 1 to 5 cm layers of trace organics, grey to dark grey, wet to saturated, smells of decomposing vegetation.<br><br>... From 5.7 to 8.5 m: trace organic laminations, loose, slightly laminated with fine sand, moist to wet. | | MC3 | | | |
| | | | | ARD1 | | | |
| | | | | MC4 | | | |
| 6 | | | | | | ... From 6.0 to 8.0 m: Drill encounted little to no resistance. | 1091 |
| | | | | MC5 | | | |
| 7 | | | | ARD2 | | | 1090 |
| | | | | MC6 | | | 1089 |
| | | SILT<br>Trace sand, trace organics, soft, trace rootlets, black to dark grey, saturated to wet, smells of decomposing vegetation.<br>(In Situ) | | MC7 | | | |
| | | | | GS2 | | | |
| 9 | | | | ARD3 | | | 1088 |
| | | | | MC8 | | | 1087 |

C04 100 | C05 60 | C06 90

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:39 PM (SMART LOG)

amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

Start Date: 2013-09-14 8:30:00 AM | Logged By: S. Magnusson

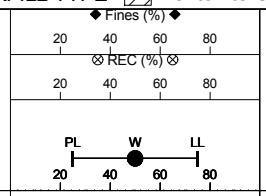
Completion Date: 2013-09-14 12:00:00 PM | Reviewed By: R. Wood

Completion Depth: 18.50 m

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Borehole No: BH-T-13-04 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880553 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389402 | Elevation (m): 1097 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough




| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|
| | | **SILT**<br>Trace sand, trace organics, soft, trace rootlets, black to dark grey, saturated to wet, smells of decomposing vegetation.<br>(In Situ) *(continued)* | | ARD4 | | | |
| 11 | | | | MC9 | | | 1086 |
| | | **SAND AND SILT**<br>Fine to medium grained, grey to dark grey, Frozen, Nbn, well bonded, no excess ice, trace 2 to 5 mm ice crystals present dominantly in the organics, smells of decomposing vegetation.<br>(Permafrost) | | MC10<br>GS3<br>MC11<br>ARD5<br>MC12 | | ... When permafrost soil thaws: density is compact to dense, most core retains its shape without excess water pooling in the core box before transported. When samples are transported in a pickup truck, select areas which had higher amounts of water liquefied in the core box. | |
| 12 | | | | | | | 1085 |
| | | **SAND**<br>Fine to medium grained, trace to some silt, trace gravel, trace 1 to 5 mm laminations of organics, grey to dark grey, frozen, Nbn, trace 1 to 5 mm ice crystals present dominantly in the organics, wet to saturated when thawed, smells of decomposing vegetation.<br>(Permafrost) | | MC13 | | | |
| 13 | | | | GS4<br>MC14<br>ARD6 | | | 1084 |
| 14 | | | | MC15 | | | 1083 |
| | | | | | | | 1082 |

C07 100
C08 100
C09 100



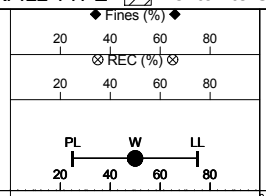
amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-14 8:30:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-14 12:00:00 PM | Reviewed By: R. Wood |
| Completion Depth: 18.50 m | Page 3 of 4 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Borehole No: BH-T-13-04 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880553 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389402 | Elevation (m): 1097 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough




| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|
| 16 | | SAND<br>Fine to medium grained, trace to some silt, trace gravel, trace 1 to 5 mm laminations of organics, grey to dark grey, frozen, Nbn, trace 1 to 5 mm ice crystals present dominantly in the organics, wet to saturated when thawed, smells of decomposing vegetation.<br>(Permafrost) *(continued)* | | MC16 | | | 1081 |
| | | | | ARD7 | | | |
| | | | | MC17 | | | |
| 17 | | | | MC18 | | | 1080 |
| | | | | MC19 | | | |
| | | | | ARD8 | | | |
| 18 | | | | MC20 | | | 1079 |
| | | | | ARD9 | | | |
| 19 | | END OF HOLE AT 18.5 m<br>Reached target depth.<br>25 mm diameter standpipe installed with taped bell joints, hacksaw slots and 1.1 m stickup.<br>Hole sloughed in below standpipe.<br>Standpipe backfill from sand borrow area, northwest of the tailings dam. | | | | Hole squeezing drill rods | 1078 |
| | | | | | | | 1077 |

C10 100
C11 100
C12 100

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:39 PM (SMART LOG)

amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-14 8:30:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-14 12:00:00 PM | Reviewed By: R. Wood |
| Completion Depth: 18.50 m | Page 4 of 4 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Dam | Borehole No: BH-TD-13-01 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880596 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389457 | Elevation (m): 1099 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

Fines (%) 20 40 60 80 | REC (%) 20 40 60 80 | PL W LL 20 40 60 80

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|
| | | SAND AND GRAVEL<br>Trace silt, angular up to 25 mm, brown, damp.<br>(Dam Erosion Protection) | | ARD1 | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Drill hole located in the center of the access road on the tailings dam crest.<br>... Weather is sunny and breezy, samples are drying out quickly in the core boxes. | 1099 |
| 1 | 100 C01 | SAND<br>Fine to medium grained, trace silt, trace angular gravel up to 50 mm diameter, compact, grey to light brown, damp to moist.<br>(Tailings Dam Fill)<br>... At 0.9 m: Geosynthetic clay liner (GCL), approximately 5 mm thick. | | GS1<br>ARD2 | | | |
| | | ... From 1.5 to 3.0 m: some gravel, angular to 50 mm diameter. | | | | ... From 1.5 to 3.0 m: Slow, difficult drilling. Core brought to surface has a temperature of approximately 60°C and is dry. | 1098 |
| 2 | 100 C02 | | | ARD3 | | | 1097 |
| 3 | 100 C03 | | | ARD4<br>GS2 | | | 1096 |
| 4 | | | | ARD5<br>GS3 | | | 1095 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:39 PM (SMART LOG)

amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-12 10:30:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-13 10:30:00 AM | Reviewed By: R. Wood |
| Completion Depth: 25.00 m | Page 1 of 6 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Dam | Borehole No: BH-TD-13-01 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880596 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389457 | Elevation (m): 1099 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | Fines (%) / REC (%) / PL W LL | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|
| | C04 | 100 | SAND<br>Fine to medium grained, trace silt, trace angular gravel up to 50 mm diameter, compact, grey to light brown, damp to moist.<br>(Tailings Dam Fill) *(continued)* | | ARD6<br>GS4 | | | |
| 6 | C05 | 100 | | | ARD7<br>GS5 | | | 1094<br>1093 |
| 7 | C06 | 100 | | | ARD8<br>GS6 | | | 1092 |
| 8 | C07 | 100 | | | | | | 1091 |
| 9 | C08 | 100 | ... From 9.4 to 17.1 m: grey, moist to wet. | | ARD9<br>GS7 | | | 1090 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Dam | Borehole No: BH-TD-13-01 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880596 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389457 | Elevation (m): 1099 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | Fines (%) / REC (%) / PL W LL | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|
| | | | SAND<br>Fine to medium grained, trace silt, trace angular gravel up to 50 mm diameter, compact, grey to light brown, damp to moist.<br>(Tailings Dam Fill) *(continued)* | | ARD10<br>GS8 | | ... Soil temperature: 9°C. | 1089 |
| 11 | C09 100 | | | | | | | 1088 |
| 12 ▼ | | | ... From 12.0 to 17.1 m: wet to saturated, temperature about 5°C. | | GS9<br>ARD11 | | ... Water level estimated from observations during drilling.<br>... Soil temperature: 5°C. | |
| | C10 100 | | | | | | | 1087 |
| 13 | | | | | | | ... Soil temperature: 6°C. | |
| | | | | | GS10<br>ARD12 | | | 1086 |
| 14 | C11 100 | | | | | | | 1085 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:39 PM (SMART LOG)

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-12 10:30:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-13 10:30:00 AM | Reviewed By: R. Wood |
| Completion Depth: 25.00 m | Page 3 of 6 |

| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Dam | Borehole No: BH-TD-13-01 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880596 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389457 | Elevation (m): 1099 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | Fines (%) 20 40 60 80 / REC (%) 20 40 60 80 / PL W LL 20 40 60 80 | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|
| | | | SAND<br>Fine to medium grained, trace silt, trace angular gravel up to 50 mm diameter, compact, grey to light brown, damp to moist.<br>(Tailings Dam Fill) *(continued)* | | GS11<br>ARD13 | | | |
| | C12 100 | | | | | | | 1084 |
| 16 | | | | | | | | |
| | | | | | | | | 1083 |
| 17 | | | | | GS12 | | ... Soil temperature: 10°C. | |
| | C13 100 | | SAND<br>Fine to medium grained, trace silt, compact to dense, grey, trace to some laminations of 1 to 5 mm organics, wet to saturated, smells of decomposing vegetation.<br>(In Situ) | | ARD14 | | | 1082 |
| 18 | | | | | GS13<br>ARD15 | | ... At 18 m: approximately 4 m of slough in the drill stem above the core barrel.<br>... At 18 m: finished drilling on September 12 at 5:30 PM, resumed drilling September 13 at 7:40 AM. | 1081 |
| | C14 100 | | SAND<br>Fine to medium grained, silty, trace gravel, compact, black, with trace laminations of 1 mm white crystals, wet to saturated.<br>(In Situ) | | GS14<br>ARD16 | | ... Soil temperature: 2°C.<br>... Sample GS14: Non plastic. | |
| 19 | | | SAND<br>Fine to medium grained, trace gravel, trace silt, compact to dense, grey, trace 1 to 5 mm thick laminations organics, saturated, smells of decomposing vegetation.<br>(In Situ) | | | | | 1080 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:39 PM (SMART LOG)

amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

| Start Date: 2013-09-12 10:30:00 AM | Logged By: S. Magnusson |
|---|---|
| Completion Date: 2013-09-13 10:30:00 AM | Reviewed By: R. Wood |
| Completion Depth: 25.00 m | Page 4 of 6 |

| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Dam | Borehole No: BH-TD-13-01 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880596 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389457 | Elevation (m): 1099 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | Fines (%) 20 40 60 80 / REC (%) 20 40 60 80 / PL W LL 20 40 60 80 | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|
| | C15 | 100 | SAND<br>Fine to medium grained, trace gravel, trace silt, compact to dense, grey, trace 1 to 5 mm thick laminations organics, saturated, smells of decomposing vegetation.<br>(In Situ) *(continued)* | | GS15<br>ARD17 | | | 1079 |
| 21 | | | | | | | | 1078 |
| | C16 | 100 | SAND<br>Fine to medium grained, trace silt, grey to dark grey, with trace 1 to 5 mm organic laminations, frozen, Nbn, no excess ice, well bonded, trace <1 mm ice crystals visible dominantly in the organic laminations, wet when thawed.<br>(Permafrost) | | GS16<br>ARD18<br>GS17 | | ... Soil temperature: 0°C. Values considered very approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket. | |
| 22 | | | | | | | | 1077 |
| | C17 | 100 | GRAVEL AND SAND<br>Trace silt, angular up to 50 mm diameter, grey to dark grey, with trace 1 to 5 mm thick organic laminations, frozen, Nbn, no excess ice, well bonded, trace <1 mm ice crystals visible dominantly in the organic laminations, wet when thawed.<br>(Permafrost)<br><br>... From 23.2 to 23.3 m: trace to some organics, black, smells of decomposing vegetation. | | GS18<br>GS19<br>ARD19<br>GS21<br>GS20 | | ... From 22.5 to 24.0 m: slow drilling, permafrost core is mostly melted when retrieved from the core barrel. | |
| 23 | | | | | | | | 1076 |
| 24 | C18 | 100 | ... From 24.0 to 25.0 m: grey to dark brown. | | GS22<br>GS23<br>ARD20<br>GS24 | | ... Hole squeezing rods, difficult to advance | 1075 |

| Start Date: 2013-09-12 10:30:00 AM | Logged By: S. Magnusson |
|---|---|
| Completion Date: 2013-09-13 10:30:00 AM | Reviewed By: R. Wood |
| Completion Depth: 25.00 m | Page 5 of 6 |

amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:39 PM (SMART LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Dam | Borehole No: BH-TD-13-01 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880596 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 389457 | Elevation (m): 1099 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | Fines (%) / REC (%) / PL W LL | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|
| 26 | | | END OF HOLE at 25.0 m<br>Reached target depth.<br>No well installation.<br>Backfilled to surface with dry sand from the adjacent sand borrow to the northeast of the dam. | | | | | 1074<br>1073<br>1072<br>1071<br>1070 |
| 27 | | | | | | | | |
| 28 | | | | | | | | |
| 29 | | | | | | | | |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:39 PM (SMART LOG)

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

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| Start Date: 2013-09-12 10:30:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-13 10:30:00 AM | Reviewed By: R. Wood |
| Completion Depth: 25.00 m | Page 6 of 6 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - Northwest Pile | Borehole No: BH-WA-13-01 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881564 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 388815 | Elevation (m): 1228 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | Fines (%) / REC (%) / PL W LL | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|
| 0 | C01 100 | | SAND AND GRAVEL<br>trace silt, gravel particles to 75 mm diameter, angular, loose to compact, brown, dry to damp, rock fragments are slightly weathered (low oxidation), most of the fragments are hard and difficult to break with a rock hammer. (Waste Rock) | | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... The weather is extremely windy. Core samples are drying out almost instantly on the surface once placed in the core box. | 1227 |
| 1 | | | | | GS1 | | | |
| 2 | C02 30 | | | | GS2 | | | 1226 |
| 3 | C03 70 | | ... From 3.3 to 4.4 m: damp, approximately 50% gravel. | | GS3 | | | 1225 |
| 4 | | | ... From 4.4 to 6.0 m: some silt, brown to orange, damp to moist, highly weathered, ore sulphides present, rock fragments are easily broken with a rock hammer or hands. | | GS4 | | | 1224 |
| | | | | | | | | 1223 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:39 PM (SMART LOG)

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-11 1:00:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-11 4:00:00 PM | Reviewed By: R. Wood |
| Completion Depth: 12.50 m |  |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - Northwest Pile | Borehole No: BH-WA-13-01 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881564 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 388815 | Elevation (m): 1228 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | Fines (%) 20 40 60 80 / REC (%) 20 40 60 80 / PL W LL 20 40 60 80 | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|
| | C04 100 | | SAND AND GRAVEL<br>trace silt, gravel particles to 75 mm diameter, angular, loose to compact, brown, dry to damp, rock fragments are slightly weathered (low oxidation), most of the fragments are hard and difficult to break with a rock hammer. (Waste Rock) *(continued)* | | GS5 | | | |
| 6 | | | | | | | | 1222 |
| | | | ... From 6.0 to 6.4 m: higher gravel content (approximately 70% oversize 25 mm), grey, lower weathering level. | | GS6 | | | |
| | | | ... From 6.4 to 8.5 m: trace to some silt, brown to orange, higher oxidation level, rock fragments easily broken with a rock hammer or hands. | | | | | |
| | C05 100 | | | | | | | |
| 7 | | | | | GS7 | | | 1221 |
| | | | | | | | | |
| | | | | | | | | |
| 8 | C06 100 | | | | GS8 | | | 1220 |
| | | | SANDY GRAVEL<br>trace silt, subangular, gravel fragments to 75 mm diameter, grey to brown, dry to damp, low weathering with minor surface staining on rock fragments, rock fragments angular with sharp edges rounded off. (Weathered Bedrock) | | | | | |
| 9 | | | | | GS9 | | | 1219 |
| | C07 30 | | | | | | | |
| | | | | | | | | 1218 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:39 PM (SMART LOG)

amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-11 1:00:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-11 4:00:00 PM | Reviewed By: R. Wood |
| Completion Depth: 12.50 m | Page 2 of 3 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - Northwest Pile | Borehole No: BH-WA-13-01 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881564 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 388815 | Elevation (m): 1228 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | Fines (%) 20 40 60 80 / REC (%) 20 40 60 80 / PL W LL 20 40 60 80 | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | WELL/BACKFILL DETAILS | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|
| | C07 | | GRAVEL<br>trace to some sand and silt, subangular gravel particles to 75 mm diameter, grey to brown, dry to damp, low oxidation and hard to break with a rock hammer.<br>(Bedrock) | | GS10 | | | |
| 11 | C08 100 | | SAND AND GRAVEL<br>trace silt, subangular gravel fragments to 75 mm diameter, grey to brown, dry to damp, low weathering with minor surface staining on rock fragments, rock fragments angular, but sharp edges rounded off.<br>(Weathered Bedrock) | | GS11 | | | 1217 |
| 12 | C09 100 | | ... From 11.5 to 11.8 m: orange, damp, elevated weathering level. | | GS12 | | | 1216 |
| 13 | | | END OF HOLE at 12.5 m<br>Reached target depth.<br>No groundwater encountered.<br>No well installation.<br>Hole sloughed in. | | | | | 1215 |
| 14 | | | | | | | | 1214 |
| | | | | | | | | 1213 |



amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-11 1:00:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-11 4:00:00 PM | Reviewed By: R. Wood |
| Completion Depth: 12.50 m | Page 3 of 3 |

| Project: Mount Nansen 2013 Site Investigation | Area: Ketza Shop | Borehole No: BH-KZ-13-01 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881754.808 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 388683.392 | Elevation (m): 1232.21 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 675 | N | N | N | | SAND, gravel | 1720 methane @ 0.3m | |
| | | 0.6-1.0 | damp | 52 | N | N | N | | SAND, clay, gravel, | 0 methane @ this interval | |
| 1 | | 1.1-1.5 | damp | 9 | N | N | Y | | SAND, gravel, clay, | Cobbles 5%<br>Rust colour noted on large cobbles<br>Mostly course gravel with some fines | 1231 |
| | | 1.6-2.0 | damp | 0 | N | N | Y | | GRAVEL, sand, clay, cobble, | Cobbles 5%<br>Minor rust colour<br>Mostly course gravel with some fines | |
| 2 | | 2.1-2.5 | damp | 0 | N | N | Y | | GRAVEL, sand, | Cobbles 5%<br>Minor rust colour on course gravel % cobbles | 1230 |
| | | 2.6-3.0 | damp | 0 | N | N | Y | | SAND, GRAVEL, cobble, | Cobbles 5%<br>Minor rust colour | |
| 3 | | 3.1-3.5 | damp | 6 | N | N | Y | | SAND, gravel, cobble, | Cobbles 5%<br>Minor rust colour<br>Some HCs noted by odour & PID possible contamination from drill grease | 1229 |
| | | 3.6-4.0 | dry | 0 | N | N | N | | GRAVEL, sand, cobble, | Cobbles 5%<br>No rust<br>refusal due to cobble cannot go further | |
| 4 | | | | | | | | | END OF HOLE at 4.0 m<br>CANNOT GO FURTHER BECAUSE OF COBBLE | | 1228 |
| 5 | | | | | | | | | | | 1227 |

| Start Date: 2013-09-09 9:00 AM | Logged By: S. Van Bibber |
|---|---|
| Completion Date: 2013-09-09 11:00 AM | Reviewed By: N. Jacques |
| Completion Depth: 4.0 m | Page 1 of 1 |

amec Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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| Project: Mount Nansen 2013 Site Investigation | Area: Ketza Shop | Borehole No: BH-KZ-13-02 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881741.767 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 388687.368 | Elevation (m): 1232.14 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | N | N | N | | SAND, gravel, silt, | Obvious staining first 0.1m of hole<br>Clean afterwards, turns into regular soil | |
| | | 0.6-1.0 | damp | 0 | N | N | Y | | SAND, gravel, silt, | Obvious staining 0.7-1.0m<br>Brown sandy grave resduum after | |
| 1 | | 1.1-1.5 | damp | 0 | N | N | Y | | SAND, silt, gravel, | Consolidated clay/sand mixture 1.1-1.3m<br>Sandy silt therafter | 1231 |
| | | 1.6-2.0 | damp | 0 | N | N | Y | | SAND, gravel, silt, | Quartz small amount of rust<br>some consolidation of material | |
| 2 | | 2.1-2.5 | damp | 0 | N | N | Y | | SAND, gravel, silt, clay, | Small amount of rust<br>~5% cobbles | 1230 |
| | | 2.6-3.0 | dry | 0 | N | N | Y | | SAND, silt, clay, gravel, | Small amount of rust | |
| 3 | | 3.1-3.5 | dry | 0 | N | N | Y | | SAND, gravel, silt, clay, | Trace organics<br>Slightly more coarse layer 3.1-3.3m<br>light sandy residuum | 1229 |
| | | 3.6-4.0 | dry | 0 | N | N | Y | | SAND, gravel, silt, clay, | Light sandy residuum | |
| 4 | | 4.1-4.5 | dry | 0 | N | N | Y | | GRAVEL, sand, silt, | Light brown-white in colour | 1228 |
| | | 4.6-5.0 | dry | 0 | N | N | Y | | GRAVEL, sand, silt, | Light brown-white in colour<br>To difficult to drill further | |
| 5 | | | | | | | | | END OF HOLE at 5.0 m | | 1227 |

| | | |
|---|---|---|
| amec / Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS. | Start Date: 2013-09-10 10:30 AM | Logged By: S. Van Bibber |
| | Completion Date: 2013-09-10 11:40 AM | Reviewed By: N. Jacques |
| | Completion Depth: 5.0 m | Page 1 of 1 |

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| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: BH-M-13-01 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880953.993 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 388026.003 | Elevation (m): 1192.27 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | | 0 | | | | | | Garbage<br>No Sample | |
| | | 0.6-1.0 | | 0 | | | | | | Garbage<br>No Sample | |
| 1 | | 1.1-1.5 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, | Some Garbage | 1191 |
| | | 1.6-2.0 | damp | 0 | N | N | Y | | SAND, gravel, silt, | No Garbage, Galena | |
| 2 | | 2.1-2.5 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, | No Garbage, Galena | 1190 |
| | | 2.6-3.0 | wet | 0 | N | N | Y | | SAND, gravel, silt, | Garbage and Woody debris | |
| 3 | | | | | | | | | END OF HOLE at 3.0 m | | 1189 |
| 4 | | | | | | | | | | | 1188 |
| 5 | | | | | | | | | | | 1187 |

| Start Date: 2013-09-10 9:00 AM | Logged By: S. Van Bibber |
|---|---|
| Completion Date: 2013-09-10 10:20 AM | Reviewed By: N. Jacques |
| Completion Depth: 3.0 m | Page 1 of 1 |

amec Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

03-07-2014 C:\Users\40868js\Documents\M-Tech\mount nansen\bh-m-13-01.bor

| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: BH-M-13-02 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880938.978 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 388055.417 | Elevation (m): 1191.08 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | N | N | N | | SAND, gravel, organics, | Gravel found in upper 0.2m<br>Some organics | |
| | | 0.6-1.0 | damp | 0 | N | N | N | | SAND, gravel, organics, | Trace organics | |
| 1 | | 1.1-1.5 | damp | 0 | N | N | N | | SAND, gravel, | Dark brown soil<br>Some Quartz | 1190 |
| | | 1.6-2.0 | damp | 0 | N | N | N | | SAND, | Dark brown soil | |
| 2 | | 2.1-2.5 | damp | 0 | N | N | Y | | SAND, gravel, cobble, | Cobbles 5%<br>Some rust noted on large rocks | 1189 |
| | | 2.6-3.0 | moist | 0 | N | N | Y | | SAND, gravel, cobble, | Cobbles 5%<br>Some rust noted on larger rocks | |
| 3 | ▼ | 3.1-3.5 | wet | 0 | N | N | Y | | SAND, gravel, | Water reached @ end of borehole.<br>Some rust | 1188 |
| | | | | | | | | | END OF HOLE at 3.5 m<br>REACHED WATER | | |
| 4 | | | | | | | | | | | 1187 |
| 5 | | | | | | | | | | | 1186 |

| | | |
|---|---|---|
| amec / Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS. | Start Date: 2013-09-09 2:20 PM | Logged By: S. Van Bibber |
| | Completion Date: 2013-09-09 3:30 PM | Reviewed By: N. Jacques |
| | Completion Depth: 3.5 m | Page 1 of 1 |

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| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: BH-M-13-03 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881007.131 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 387990.154 | Elevation (m): 1190.62 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | N | N | N | | SAND, gravel, | Some rust noted on rock & w/i sand | |
| | | 0.6-1.0 | damp | 0 | N | N | Y | | SAND, clay, gravel, | 0.5-0.75 rust on rock, rough angular rock<br>0.75-1.0 hard clay material | |
| 1 | | 1.1-1.5 | damp | 0 | N | N | Y | | SAND, gravel, | Very small amount of rust on some rocks | 1189 |
| | | 1.6-2.0 | damp | 0 | N | N | Y | | SAND, gravel, | | |
| 2 | | 2.1-2.5 | damp | 0 | N | N | Y | | SAND, gravel, silt, | Consolidated sand & silt found @ ~2.4-2.5 | 1188 |
| | | 2.6-3.0 | damp | 0 | N | N | N | | SAND, gravel, silt, | Organics found to start @ 3.0 (10%) | |
| 3 | | 3.1-3.5 | damp | 0 | N | N | N | | SAND, gravel, organics, | Organics found to reach 3.3m (10%) | 1187 |
| | | 3.6-4.0 | damp | 0 | N | N | N | | SAND, gravel, | Refusal @ 4.1m | |
| 4 | | | | | | | | | END OF HOLE at 4.0 m<br>STOPPED BY COBBLE | | 1186 |
| 5 | | | | | | | | | | | 1185 |

| | | |
|---|---|---|
| amec / Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS. | Start Date: 2013-09-09 4:00 PM | Logged By: S. Van Bibber |
| | Completion Date: 2013-09-09 5:35 PM | Reviewed By: N. Jacques |
| | Completion Depth: 4.0 m | Page 1 of 1 |

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| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: BH-M-13-04 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881066.636 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 387983.881 | Elevation (m): 1184.39 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | dry | 0 | N | N | Y | | GRAVEL, sand, silt, | Some large cobbles<br>Quartz | |
| | | 0.6-1.0 | dry | 0 | N | N | Y | | GRAVEL, sand, silt, | Lots of rust stain | |
| 1 | | 1.1-1.5 | damp | 270 | N | N | Y | | GRAVEL, sand, silt, | | 1183 |
| | | 1.6-2.0 | | | | | | | | Air Pocket<br>No Sample | |
| 2 | | 2.1-2.5 | | | | | | | | Air Pocket<br>No Sample | 1182 |
| | | 2.6-3.0 | | | | | | | | Air Pocket<br>No Sample | |
| 3 | | 3.1-3.5 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, clay, | Large gravels<br>Not waste rock<br>rounded gravels | 1181 |
| | | 3.6-4.0 | damp | 0 | N | N | Y | | GRAVEL, sand, clay, silt, | Large gravels<br>Not waste rock<br>rounded gravels | |
| 4 | | 4.1-4.5 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, clay, | Large gravels<br>Not waste rock<br>rounded gravels | 1180 |
| | | | | | | | | | END OF HOLE at 4.5 m | | |
| 5 | | | | | | | | | | | 1179 |

| | | |
|---|---|---|
| amec / Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS. | Start Date: 2013-09-10 5:20 PM | Logged By: S. Van Bibber |
| | Completion Date: 2013-09-10 6:00 PM | Reviewed By: N. Jacques |
| | Completion Depth: 4.5 m | Page 1 of 1 |

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| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: BH-M-13-04 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881066.636 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 387983.881 | Elevation (m): 1184.39 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, | Organics present<br>Some percipitate of sorts (?) | |
| | | 0.6-1.0 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, | Trace organics<br>Consolidated material present | |
| 1 | | 1.1-1.5 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, | Trace organics<br>Consolidated material present | 1183 |
| | | 1.6-2.0 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, | Trace organics<br>Very consolidated silt layer | |
| 2 | | | | | | | | | END OF HOLE at 2.0 m | | 1182 |
| 3 | | | | | | | | | | | 1181 |
| 4 | | | | | | | | | | | 1180 |
| 5 | | | | | | | | | | | 1179 |

| Start Date: 2013-09-11 9:00 AM | Logged By: S. Van Bibber |
|---|---|
| Completion Date: 2013-09-11 9:15 AM | Reviewed By: N. Jacques |
| Completion Depth: 2.0 m | Page 1 of 1 |

amec Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: BH-M-13-05 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881019.478 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 387971.132 | Elevation (m): 1191.32 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | dry | 0 | N | N | Y | | GRAVEL, sand, silt, | White-ish Percipitates | |
| | | 0.6-1.0 | dry | 0 | N | N | Y | | GRAVEL, sand, clay, | | |
| 1 | | 1.1-1.5 | dry | 0 | N | Y | Y | | SAND, gravel, silt, | 1.4 m change from dark to light brown sands | 1190 |
| | | 1.6-2.0 | dry | 0 | N | Y | Y | | SAND, gravel, silt, | | |
| 2 | | | | | | | | | END OF HOLE at 2.0 m | | 1189 |
| 3 | | | | | | | | | | | 1188 |
| 4 | | | | | | | | | | | 1187 |
| 5 | | | | | | | | | | | 1186 |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| Start Date: 2013-09-10 10:40 AM | Logged By: S. Van Bibber |
|---|---|
| Completion Date: 2013-09-10 11:00 AM | Reviewed By: N. Jacques |
| Completion Depth: 2.0 m | Page 1 of 1 |

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| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: BH-M-13-05 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881019.478 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 387971.132 | Elevation (m): 1191.32 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | dry | 0 | N | N | Y | | SAND, gravel, silt, | 1st half light brown<br>Quartz<br>Slight Odor | |
| | | 0.6-1.0 | damp | 0 | N | N | Y | | GRAVEL, sand, clay, | Slight Odor<br>Quartz<br>Methane 10ppm | |
| 1 | | 1.1-1.5 | dry | 0 | N | N | Y | | SAND, gravel, silt, | Large cobble present<br>Quartz<br>Methane 55ppm | 1190 |
| | | 1.6-2.0 | dry | 0 | N | N | Y | | SAND, gravel, silt, | Quartz<br>Cobble sizes<br>methane 15ppm | |
| 2 | | 2.1-2.5 | damp | 0 | N | N | Y | | SAND, gravel, silt, | Fine gravels<br>Quartz | 1189 |
| | | 2.6-3.0 | damp | 0 | N | N | Y | | SAND, gravel, silt, | Sand & fine gravels<br>Quartz<br>Consistant Colours | |
| 3 | | 3.1-3.5 | n/a | 0 | N | N | Y | | SAND, gravel, silt, | Had to use water to retreive from core barrel | 1188 |
| | | 3.6-4.0 | damp | 0 | N | N | Y | | SAND, gravel, silt, | organics noted, likely original ?<br>Light brown, sandy layer below organics | |
| 4 | | 4.1-4.5 | damp | 0 | N | N | Y | | SAND, gravel, silt, | Darker more consolidated material | 1187 |
| | | 4.6-5.0 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, | Organics layer<br>Turns to brown loose material | |
| 5 | | | | | | | | | | | 1186 |

| Start Date: 2013-09-10 11:06 AM | Logged By: S. Van Bibber |
|---|---|
| Completion Date: 2013-09-10 1:30 PM | Reviewed By: N. Jacques |
| Completion Depth: 5.5 m | Page 1 of 2 |

amec Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: BH-M-13-05 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881019.478 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 387971.132 | Elevation (m): 1191.32 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | ▼ | 5.1-5.5 | wet | 0 | N | N | Y | | GRAVEL, sand, silt, | Ground water reached at 5.2m | |
| | | | | | | | | | END OF HOLE at 5.5 m | | |
| 6 | | | | | | | | | | | 1185 |
| 7 | | | | | | | | | | | 1184 |
| 8 | | | | | | | | | | | 1183 |
| 9 | | | | | | | | | | | 1182 |
| 10 | | | | | | | | | | | 1181 |

| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: BH-M-13-06 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881042.697 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 387949.356 | Elevation (m): 1191.51 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | N | N | Y | | SAND, gravel, cobble, | Cobble 5%<br>Rust noted on rocks in upper 0.25m of drill hole | |
| | | 0.6-1.0 | damp | 0 | N | N | Y | | SAND, gravel, | A lot of rust noted on rocks % sand | |
| 1 | | 1.1-1.5 | damp | 0 | N | N | Y | | SAND, gravel, clay, | High amount of rust on rocks & in sand | 1190 |
| | | 1.6-2.0 | damp | 0 | N | N | Y | | SAND, gravel, clay, | Small amount of rust in sand | |
| 2 | | 2.1-2.5 | damp | 0 | N | N | N | | SAND, clay, gravel, | No rust noted in soil or rock | 1189 |
| | | 2.6-3.0 | wet | 0 | N | N | N | | SILT, sand, | Sandy layer hit @ 2.6<br>Then silt layer then on | |
| 3 | | 3.1-3.5 | wet | 0 | N | N | N | | SILT, sand, | Permafrost layer hit @ 3.3m | 1188 |
| | | 3.6-4.0 | wet | 0 | N | N | N | | SILT, sand, gravel, | Permafrost cuds @ 3.6m then becomes greyish silty muck | |
| 4 | | 4.1-4.5 | wet | 0 | N | N | N | | SILT, sand, gravel, | Permafrost hit again @ 4.0-4.3m then becomes sandy silty muck | 1187 |
| | | | | | | | | | END OF HOLE at 4.5 m | | |
| 5 | | | | | | | | | | | 1186 |

| Start Date: 2013-09-09 6:00 PM | Logged By: S. Van Bibber |
|---|---|
| Completion Date: 2013-09-09 7:30 PM | Reviewed By: N. Jacques |
| Completion Depth: 4.5 m | Page 1 of 1 |

amec Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: BH-M-13-07 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881073.210 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 387903.154 | Elevation (m): 1192.46 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, | start<br>Colour difference from dark to light, some large gravels | |
| | | 0.6-1.0 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, | Quartz | |
| 1 | | 1.1-1.5 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, | Hit ground water | 1191 |
| | ▼ | 1.6-2.0 | wet | 0 | N | N | Y | | GRAVEL, sand, silt, | Quartz<br>Cobble sizes | |
| 2 | | 2.1-2.5 | | 0 | | | | | | Wet sandy gravel | 1190 |
| | | 2.6-3.0 | | 0 | | | | | | Lost sample due to ground water | |
| 3 | | 3.1-3.5 | wet | | | | | | | Disturbed sample<br>Mixed sample<br>ground water | 1189 |
| | | 3.6-4.0 | wet | | | | | | | | |
| 4 | | 4.1-4.5 | wet | | | | | | | | 1188 |
| | | | | | | | | | END OF HOLE at 4.5 m | | |
| 5 | | | | | | | | | | | 1187 |

| | | |
|---|---|---|
| Start Date: 2013-09-10 1:50 PM | Logged By: S. Van Bibber | |
| Completion Date: 2013-09-10 2:15 PM | Reviewed By: N. Jacques | |
| Completion Depth: 4.5 m | Page 1 of 1 | |

amec Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: BH-M-13-07 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881073.210 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 387903.154 | Elevation (m): 1192.46 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | moist | 43 | N | N | Y | | GRAVEL, sand, silt, | First 0.4 m topsoil<br>Smell starts below | |
| | | 0.6-1.0 | moist | 168 | N | N | N | | SAND, gravel, silt | Black<br>Strong Smell | |
| 1 | | 1.1-1.5 | moist | 119 | N | N | N | | SAND, gravel, silt, | Black<br>Strong Smell | 1191 |
| | ▼ | 1.6-2.0 | | | | | | | | Water @ 1.7 m<br>No sample because of ground water | |
| 2 | | 2.1-2.5 | | | | | | | | Ground water<br>No sample becuse of ground water | 1190 |
| | | 2.6-3.0 | moist | 49 | N | N | N | | GRAVEL, sand, silt, | Below ground water | |
| 3 | | | | | | | | | END OF HOLE at 3.0 m | | 1189 |
| 4 | | | | | | | | | | | 1188 |
| 5 | | | | | | | | | | | 1187 |

| Start Date: 2013-09-10 1:50 PM | Logged By: S. Van Bibber |
|---|---|
| Completion Date: 2013-09-10 2:15 PM | Reviewed By: N. Jacques |
| Completion Depth: 4.5 m | Page 1 of 1 |

amec Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: BH-M-13-07 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881073.210 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 387903.154 | Elevation (m): 1192.46 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, | Light brown colour | |
| | | 0.6-1.0 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, | Colour changes to a darker brown | |
| 1 | | 1.1-1.5 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, | Quartz<br>Lighter colour brown | 1191 |
| | | 1.6-2.0 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, | Wet sandy gravel last 0.2m<br>Likely water after<br>Quartz<br>Same colour as 1.1-1.5m | |
| 2 | | | | | | | | | END OF HOLE at 2.0 m | | 1190 |
| 3 | | | | | | | | | | | 1189 |
| 4 | | | | | | | | | | | 1188 |
| 5 | | | | | | | | | | | 1187 |

| Start Date: 2013-09-11 9:20 AM | Logged By: S. Van Bibber |
|---|---|
| Completion Date: 2013-09-11 9:35 AM | Reviewed By: N. Jacques |
| Completion Depth: 2.0 m | Page 1 of 1 |

amec Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: BH-M-13-08 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881086.530 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 387862.639 | Elevation (m): 1194.36 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | wer | 0 | N | N | N | | SAND, gravel, silt, | Saturated sands, some fine gravels | |
| | | 0.6-1.0 | moist | 0 | N | N | Y | | GRAVEL, sand, silt, | | |
| 1 | | 1.1-1.5 | damp | 0 | N | N | Y | | SAND, gravel, silt, | Some white crumbly silt Size content | 1193 |
| | | 1.6-2.0 | damp | 0 | N | N | Y | | CLAY, silt, sand, gravel, | | |
| 2 | | 2.1-2.5 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, clay, | | 1192 |
| | | 2.6-3.0 | damp | 0 | N | N | Y | | SAND, gravel, silt, clay, | Lots of rust stain in small gravel size | |
| 3 | | 3.1-3.5 | damp | 35 | N | N | Y | | GRAVEL, clay, sand, silt, | Clay rich, decompossed bedrock | 1191 |
| | | 3.6-4.0 | damp | 21 | N | N | Y | | SAND, clay, gravel, silt, | Reached bedrock refusal | |
| 4 | | | | | | | | | END OF HOLE at 4.0 m | | 1190 |
| 5 | | | | | | | | | | | 1189 |

| Start Date: 2013-09-10 4:00 PM | Logged By: S. Van Bibber |
|---|---|
| Completion Date: 2013-09-10 4:40 PM | Reviewed By: N. Jacques |
| Completion Depth: 4.0 m | Page 1 of 1 |

amec Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

03-07-2014 C:\Users\40868js\Documents\M-Tech\mount nansen\bh-m-13-08.bor

| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: BH-M-13-08 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881086.530 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Sonic | Easting (UTM Zone 8, NAD 83): 387862.639 | Elevation (m): 1194.36 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | moist | 0 | N | N | N | | SAND, gravel, silt, | Trace organics | |
| | | 0.6-1.0 | moist | 0 | N | N | Y | | GRAVEL, sand, silt, | Saturated sands & gravel<br>Small clay layer | |
| 1 | | 1.1-1.5 | moist | 0 | N | N | Y | | SAND, gravel, silt, | Last half very moist | 1193 |
| | | 1.6-2.0 | moist | 0 | N | N | Y | | CLAY, silt, sand, gravel, | Large clay layer @ 1.6-1.9 m<br>Final 0.1 m sand, silt & clay | |
| 2 | | | | | | | | | END OF HOLE at 2.0 m | | 1192 |
| 3 | | | | | | | | | | | 1191 |
| 4 | | | | | | | | | | | 1190 |
| 5 | | | | | | | | | | | 1189 |

| Start Date: 2013-09-11 9:40 AM | Logged By: S. Van Bibber |
|---|---|
| Completion Date: 2013-09-11 9:55 AM | Reviewed By: N. Jacques |
| Completion Depth: 2.0 m | Page 1 of 1 |

amec Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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# Appendix A2

# Test Pit Logs

## EXPLANATION OF TERMS FOR GEOTECHNICAL SOIL LOGS

### 1.0 SOIL CONSTITUENTS

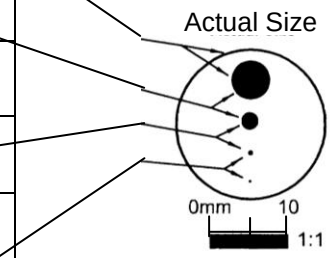
Based on particle size and distribution per the Modified Unified Soil Classification System as described in the following tables.

Proportions of Constituents:

| Descriptive Term | Proportion by Weight |
|---|---|
| noun (e.g. sand, etc.) | over 50% |
| and (e.g. and sand, etc.) | over 35% |
| adjective (e.g. sandy, etc.) | 20% to 35% |
| some (e.g. some sand, etc.) | 10% to 20% |
| trace (e.g. trace sand, etc.) | 0% to 10% |

Particle Sizes:

| Material | Fraction | Sieve Size (grain size) | Approx Scale |
|---|---|---|---|
| Boulders | | > 200 mm | Larger than a soccer ball |
| Cobbles | | Less than 200 mm & retained on 3-in (75 mm) sieve | Fist sized to soccer ball sized |
| Gravel | Coarse | Passes 3-in (75 mm) sieve & retained on ¾-in (19 mm) sieve | Thumb sized to fist sized |
| | Fine | Passes ¾-in (19 mm) sieve & retained on No. 4 (4.75 mm) sieve | Pea sized to thumb sized |
| Sand | Coarse | Passes No. 4 (4.75 mm) sieve & retained on No. 10 (2.00 mm) sieve | Rock salt sized to pea sized |
| | Medium | Passes No. 10 (2.00 mm) sieve & retained on No. 40 (425 μm) sieve | Sugar sized to rock salt sized |
| | Fine | Passes No. 40 (425 μm) sieve & Retained on No. 200 (75 μm) sieve | Flour sized to sugar sized |
| Fines (silt & clay) | | Passes No. 200 (75 μm) sieve | Flour sized and smaller (indiscernible to naked eye) |




Gradation of Coarse Fraction:

| Descriptive Term | Field Identification |
|---|---|
| Well graded | contains particles of sizes assorted over a wide range with no one size predominating or missing |
| Poorly Graded | contains a limited range of particle sizes |
| Uniform Graded | contains a predominance of one size |
| Gap Graded | missing a size within a range |

## 2.0 RELATIVE DENSITY / CONSISTENCY

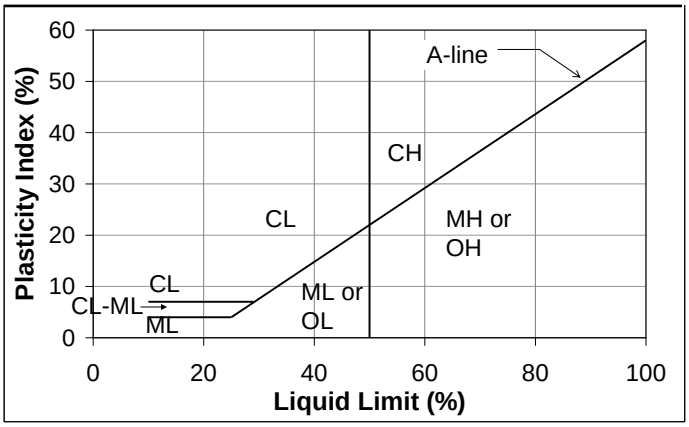
For Coarse Grained Soils:

| Descriptive Term | Relative Density | SPT N-Value |
|---|---|---|
| Very Loose | 0 - 20 % | 0 – 4 |
| Loose | 20 – 40 % | 4 – 10 |
| Compact | 40 – 70 % | 10 – 30 |
| Dense | 70 – 90 % | 30 – 50 |
| Very Dense | 90 – 100 % | > 50 |

For Fine Grained Soils:

| Consistency | Field Identification | Undrained Strength (kPa) | SPT N Value |
|---|---|---|---|
| Very Soft | Easily penetrated several centimetres by the fist | < 12 | 0 - 2 |
| Soft | Easily penetrated several centimetres by the thumb | 12 – 25 | 2 - 4 |
| Firm | Can be penetrated several centimetres by the thumb with moderate effort | 25 – 50 | 4 - 8 |
| Stiff | Readily indented by the thumb but penetrated only with great effort | 20 – 100 | 8 - 15 |
| Very Stiff | Readily indented by the Thumbnail | 100 – 200 | 15 - 30 |
| Hard | Indented with difficulty by the Thumbnail | > 200 | > 30 |

## 3.0 PLASTICITY



## 4.0 MOISTURE

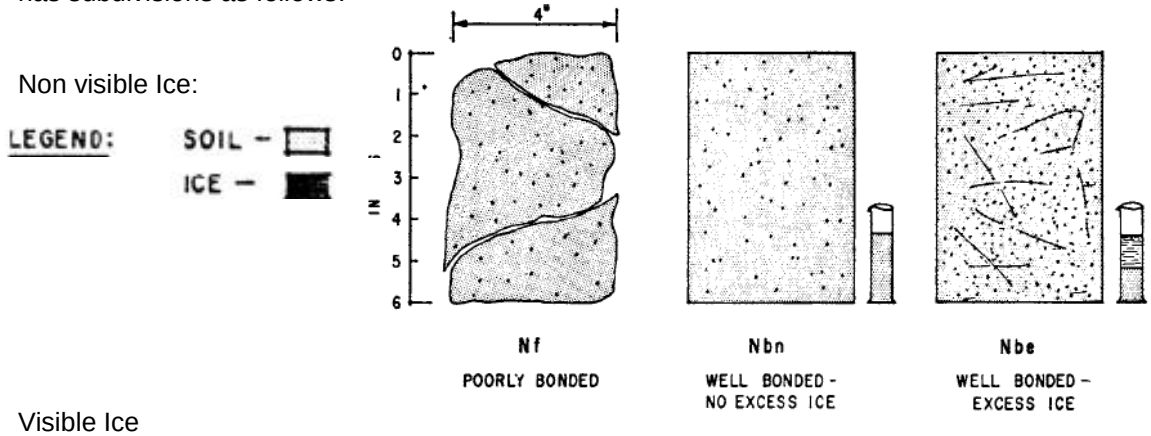
| Descriptive Term | Field Identification |
|---|---|
| Dry | no visible moisture, dusty |
| Damp | slight moisture content but fingers do not become moistened when touching soil. Only fines sticks to fingers. |
| Moist | visible moisture, but no visible free water, finger becomes moistened when touching the soil. Soil does not stick to fingers. Near the plastic limit for cohesive soil. |
| Wet | a film of water is present on particle surface, soil sticks to fingers. |
| Free water | water is separated from soil particles. |

## 5.0 FROZEN SOIL DESCRIPTION

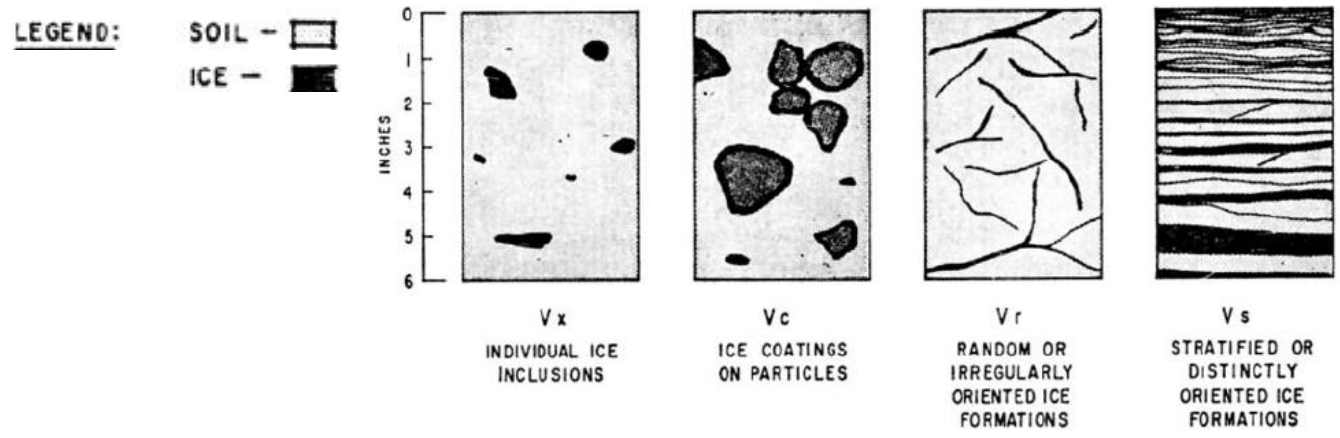
**Permafrost (see ASTM D4083)**

Three main categories – not visible (i.e. a frozen soil but ice is not visible to the naked eye), visible (can see ice but there is more soil than ice), and ice (>1" thickness where there is more ice than soil). Each has subdivisions as follows:

Non visible Ice:



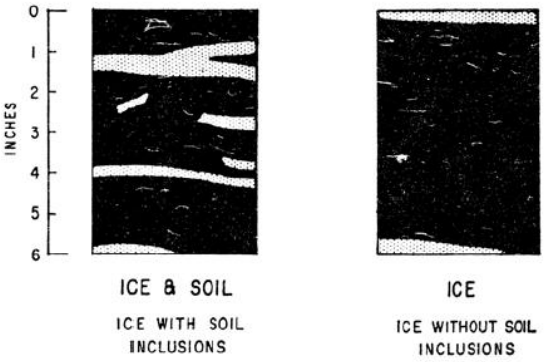

Visible Ice



## Explanation of Terms for Geotechnical Logs

Ice

LEGEND: SOIL – ICE –




### 6.0 DEFINITION OF SYMBOLS USED ON LOGS

| SOIL | | SOIL | | WELL DETAILS | |
|---|---|---|---|---|---|
| | GRAVEL, well graded, to and SAND little to no fines,(GW) | | SILT, high plastic (MH) | | Solid pipe with BACKFILL |
| | GRAVEL, poorly graded, to and SAND little to no fines (GP) | | CLAY, low plastic (CL) | | Solid Pipe with BENTONITE |
| | GRAVEL, silty to and SAND, and SILT(GM) | | CLAY, medium plastic (CI) | | Solid pipe with GROUT |
| | GRAVEL, clayey to and SAND, and CLAY (GC) | | CLAY, high plastic (CH) | | Solid pipe with SAND |
| | SAND, well graded, to gravely, little to no fines, (SW) | | ORGANIC silt or clay, low plastic (OL) | | Slotted pipe with SAND |
| | SAND, poorly graded, to gravely, little to no fines (SW) | | ORGANIC silt or clay, high plastic (OH) | | Slotted pipe with NO BACKFILL |
| | SAND, silty (SM) | | PEAT (Pt) | | SAND backfill |
| | SAND, clayey to SAND and CLAY (SC) | ROCK | | | GROUT backfill |
| | FILL | | Granodiorite (GRDR) | | GENERAL BACKFILL (e.g. drill cutting, slough) |
| | SILT, low plastic (ML) | | Andesite (ANDS) | | |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Sand Borrow Area | Test Pit No: TP-BA-13-03 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880691 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389695 | Elevation (m): 1086 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| 0 | | SAND<br>Fine to medium grained, trace silt, trace angular gravel to 75 mm diameter with surface weathering, loose to compact, some 1 mm dark grey to black layers of fine grained sand laminations spaced 1 to 10 mm apart, light grey to brown, damp.<br>(In Situ) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth.<br>... Gravel rock appears to be a meta-sedimentary rock with orange oxidized surface staining. | |
| | | | | GS1 | | |
| | | ... From 0.7 to 1.2 m: Increasing frequency of gravel to 10%. | | | | 1085 |
| 1 | | | | ARD-01<br>GS2 | | |
| | | | | GS3 | | 1084 |
| 2 | | | | ARD-02<br>GS4-BULK | | |
| | | ... From 2.1 to 3.1 m: Lower frequency of dark coloured laminations. | | | | |
| | | | | GS5 | | 1083 |
| 3 | | | | GS6 | | |
| | | ... From 3.1 to 3.7 m: Increasing frequency of gravel to 15%. | | | | |
| | | | | ARD-03<br>GS7 | | 1082 |
| 4 | | | | | | |
| | | SAND<br>Fine to medium grained, trace silt, trace gravel, dense, trace to some 1 mm dark grey to black layers of fine grained sand laminations spaced 1 to 10 mm apart, grey, frozen, Nbn, no visible ice crystals, moist when thawed.<br>(Permafrost) | | GS8 | ... Soil temperature: -1°C. Value considered very approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket.<br>... Below 4.4 m: Hard digging. | 1081 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:34 PM (TEST PIT LOG)

amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-05 8:45:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-05 11:00:00 AM | Reviewed By: R. Wood |
| Completion Depth: 5.20 m | Page 1 of 2 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Sand Borrow Area | Test Pit No: TP-BA-13-03 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880691 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389695 | Elevation (m): 1086 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | | | ARD-04 | | |
| | | | | GS9 | | |
| | | END OF TEST PIT at 5.2 m<br>Test pit refusal.<br>Test pit sloughed.<br>No free water observed.<br>Test pit backfilled with excavated material. | | | | 1080 |
| 6 | | | | | | 1079 |
| 7 | | | | | | 1078 |
| 8 | | | | | | 1077 |
| 9 | | | | | | 1076 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:34 PM (TEST PIT LOG)

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-05 8:45:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-05 11:00:00 AM | Reviewed By: R. Wood |
| Completion Depth: 5.20 m | Page 2 of 2 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Sand Borrow Area | Test Pit No: TP-BA-13-04 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880643 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389616 | Elevation (m): 1087 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SAND AND GRAVEL<br>Angular rock fragments to about 150 mm diameter, loose to compact, grey to brown, dry to damp.<br>(Rockfill) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth. | |
| | | SAND<br>Fine to medium grained, trace silt, trace angular gravel to 75 mm diameter with surface weathering, loose to compact, some 1 mm dark grey to black layers of fine grained sand laminations spaced 1 to 10 mm apart, light grey to brown, damp.<br>(In Situ) | | | | 1086 |
| 1 | | | | ARD-01<br>GS1 | | |
| | | | | | | 1085 |
| 2 | | | | ARD-02<br>GS2 | | |
| | | | | | | 1084 |
| 3 | | | | ARD-03<br>GS3 | | |
| | | ... From 3.3 to 3.8 m: Increased frequency of gravel to 10%. | | | | |
| | | | | GS4-BULK | | 1083 |
| | | ... From 3.8 to 5.3 m: Moist. | | | ... Soil temperature: 2°C. Value considered very approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket.<br>... Water level estimated based on moist soil samples retrieved from the excavator bucket. | |
| 4 | | | | | | |
| | | | | ARD-04<br>GS5 | | 1082 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:34 PM (TEST PIT LOG)

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-05 2:50:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-05 4:30:00 PM | Reviewed By: R. Wood |
| Completion Depth: 5.50 m | Page 1 of 2 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Sand Borrow Area | Test Pit No: TP-BA-13-04 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880643 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389616 | Elevation (m): 1087 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SAND<br>Fine to medium grained, trace silt, trace gravel, dense, grey to brown, frozen, Nbn, no visible ice crystals, moist when thawed.<br>(Permafrost) | | GS6 | ... Soil temperature: 1°C. Value considered very approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket.<br>... From 5.3 to 5.5 m: Hard digging, excavator bucket teeth marks visible in soil. | |
| | | END OF TEST PIT at 5.5 m<br>Test pit has sloughed to a circular shape, 9 m diameter.<br>Free water is slowly ponding on the bottom of the test pit.<br>Test pit backfilled with excavated material. | | | | |
| 6 | | | | | | 1081 |
| | | | | | | 1080 |
| 7 | | | | | | |
| | | | | | | 1079 |
| 8 | | | | | | |
| | | | | | | 1078 |
| 9 | | | | | | |
| | | | | | | 1077 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:34 PM (TEST PIT LOG)

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-05 2:50:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-05 4:30:00 PM | Reviewed By: R. Wood |
| Completion Depth: 5.50 m | Page 2 of 2 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Sand Borrow Area | Test Pit No: TP-BA-13-05 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880702 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389798 | Elevation (m): 1079 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SAND<br>Fine to medium grained, trace silt, trace angular gravel to 75 mm diameter with surface weathering, loose to compact, some 1 mm dark grey to black layers of fine grained sand laminations spaced 1 to 10 mm apart, light grey to brown, damp, no odor.<br>(In Situ) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth. | 1079 |
| 1 | | | | ARD-01<br>GS1 | | 1078 |
| 2 | | | | ARD-02<br>GS2 | | 1077 |
| 3 ▼ | | ... From 3.0 to 3.8 m: Moist, decreased amount of gravel. | | GS3-BULK | .. Water level estimated based on water seeping into the test pit at 3.0 m depth. | 1076 |
| | | | | ARD-03 | | |
| | | ... From 3.8 to 5.3 m: wet to saturated. | | | | |
| 4 | | | | GS4 | | 1075 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:34 PM (TEST PIT LOG)

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-05 11:20:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-05 2:10:00 PM | Reviewed By: R. Wood |
| Completion Depth: 5.30 m | Page 1 of 2 |

| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Sand Borrow Area | Test Pit No: TP-BA-13-05 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880702 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389798 | Elevation (m): 1079 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | | | ARD-04 GS5 | | |
| | | END OF TESTPIT at 5.3 m<br>Hole sloughed in to circular shape at 10 m diameter.<br>Free water slowly seeping in at 3.0 m depth.<br>Test pit backfilled with excavated material. | | | ... Hard digging at 5.3 m. | 1074 |
| 6 | | | | | | 1073 |
| 7 | | | | | | 1072 |
| 8 | | | | | | 1071 |
| 9 | | | | | | 1070 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:34 PM (TEST PIT LOG)

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

| Start Date: 2013-09-05 11:20:00 AM | Logged By: S. Magnusson |
|---|---|
| Completion Date: 2013-09-05 2:10:00 PM | Reviewed By: R. Wood |
| Completion Depth: 5.30 m | Page 2 of 2 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: "Shale" Borrow Area | Test Pit No: TP-BA-13-06 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881040 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389694 | Elevation (m): 1142 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| 0 | | BEDROCK<br>Fractured, variably oxided from surficial staining to crumbling in your hand, meta-sedimentary rock, grey to brown to orange, dry to damp.<br>(In Situ) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth.<br>... Test pit longitudinal axis orientated parallel to the primary strike orientation of the bedrock. Rock is dipping approximately 70° to the northwest. The purpose of this test pit it to assess the rippability of the bedrock. | 1142 |
| 1 | | | | ARD-01<br>GS1-BULK | | 1141 |
| | | END OF TEST PIT at 1.3 m<br>Hit refusal in test pit.<br>No sloughing.<br>No free water encountered.<br>Test pit backfilled with excavated material. | | | | |
| 2 | | | | | | 1140 |
| 3 | | | | | | 1139 |
| 4 | | | | | | 1138 |
| | | | | | | 1137 |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-08 11:15:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-08 11:50:00 AM | Reviewed By: R. Wood |
| Completion Depth: 1.30 m | Page 1 of 1 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:34 PM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: "Shale" Borrow Area | Test Pit No: TP-BA-13-07 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881045 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389739 | Elevation (m): 1140 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| 0 | | SAND AND GRAVEL AND COBBLES<br>Scree rock overlying bedrock, angular particles to 200 mm diameter, variably oxidized, brown, dry to damp. The south side of the test pit is bright orange and highly weathered, while the north side of the test pit is competant and slightly weathered.<br>(In Situ) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth.<br>... Test pit longitudinal axis orientated about 45° to the general strike of the beds, dipping about 70° to the northwest. Re-orientated the excavator to dig perpendicular to the strike of the bedrock, but reached the same refusal depth. | 1140 |
| | | BEDROCK<br>Weathered bedrock, variably weathered from bright orange colour where it crumbles in your hand to a hard, grey, friable meta-sedimentary rock, dry.<br>(In Situ) | | ARD-01 | | |
| 1 | | | | ARD-02 | | |
| | | END OF TEST PIT at 1.2 m<br>Test pit hit refusal.<br>No free water observed.<br>Test pit backfilled with excavated material. | | | ... After TP-BA-13-07 completed, moved the excavator to the base of the bedrock outcrop and ripped at the vertical face. By exploiting the fractures in the rock, the excavator was able to rip the bedrock into pieces up to 300 mm. An area about 8 m wide x 2 m high, the excavator was able to cut about 3 m into the rock in 10 minutes. | 1139 |
| 2 | | | | | | 1138 |
| 3 | | | | | | 1137 |
| 4 | | | | | | 1136 |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-08 9:50:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-08 11:00:00 AM | Reviewed By: R. Wood |
| Completion Depth: 1.20 m | Page 1 of 1 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:34 PM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: "Shale" Borrow Area | Test Pit No: TP-BA-13-08 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881158 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389913 | Elevation (m): 1148 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| 0 | | BEDROCK<br>Variably weathered meta-sedimentary rock. Intact areas are grey, friable and can be broken with 2 hits of a rock hammer. Weathered areas are orange to red, oxidized and have phyllite/schist alteration and 1 hit of a rock hammer crumbles the rock. Dry.<br>(In Situ) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth.<br>... Rippability test in the shale borrow area. The excavator is facing uphill on a slope about 4H:1V, digging into the bedrock parallel to the major strike orientation. | 1148 |
| 1 | | | | ARD-01 | | 1147 |
| 1.4 | | END OF TEST PIT at 1.4 m<br>Test pit hit refusal.<br>No free water observed.<br>Test pit backfilled with excavated material. | | | ... With the excavator digging uphill, the far side of the test pit is more rippable where the excavator is digging more vertically into the face of the rock, compared to digging downwards. | 1146 |
| 2 | | | | | | 1145 |
| 3 | | | | | | 1144 |
| 4 | | | | | | 1143 |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-08 2:20:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-08 3:00:00 PM | Reviewed By: R. Wood |
| Completion Depth: 1.40 m | Page 1 of 1 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:34 PM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Test Pit No: TP-T-13-01 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880700 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389198 | Elevation (m): 1098 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SAND AND SILT<br>Fine to medium grained sand, loose to compact, slightly stratified, orange to brown, wet, 5 to 20 cm layers of tailings slimes interbedded.<br>(Tailings) | | GS2 | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth.<br>... The tailings surface in the northwest portion of the TSF is not very stable for the excavator. Local areas slightly higher in elevation (about 10 to 30 cm) with vegetation are stable for one pass with the excavator, multiple passing or turning around results in major rutting and requires the bucket to get unstuck. Lower lying areas are stained red on surface and have little vegetation are soft, operator not comfortable walking the excavator on these areas. | 1097 |
| 1 | | SILT AND SAND<br>Fine to medium grained sand, compact, slightly stratified, grey to brown to orange, damp to moist<br>(Tailings) | | GS1 | | 1096 |
| 2 | | GRAVEL<br>Some fine to medium grained sand, angular to 50 mm diameter, trace silt, compact, grey, saturated to free water, with rootlets and abundant cobbles to 200 mm diameter.<br>(In Situ) | | ARD1<br>GS3 | ... Below 2.1 m: water pooling in the test pit.<br>... Water level approximated based on water seeping into test pit. | |
| | | | | GS4Bulk | | 1095 |
| 3 | | END OF TESTPIT at 2.7 m<br>Test pit is sloughing.<br>Water pooling into the test pit quickly.<br>Test pit backfilled with excavated material. | | | Excavator is sinking into the tailings. | 1094 |
| 4 | | | | | | 1093 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:34 PM (TEST PIT LOG)

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-07 10:00:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-07 11:15:00 AM | Reviewed By: R. Wood |
| Completion Depth: 2.70 m | Page 1 of 1 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Test Pit No: TP-T-13-02 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880706 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389263 | Elevation (m): 1097 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SAND<br>Fine to medium grained, trace silt, loose to compact, light brown to orange, damp to moist.<br>(Tailings) | | GS1 | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth.<br>... The tailings surface in the northwest portion of the TSF is not very stable for the excavator. Local areas slightly higher in elevation (about 10 to 30 cm) with vegetation are stable for one pass with the excavator, multiple passing or turning around results in major rutting and requires the bucket to get unstuck. Lower lying areas are stained red on surface and have little vegetation are soft, operator not comfortable walking the excavator on these areas. | 1097 |
| 1 | | SILT<br>trace fine grained sand, soft to firm, slightly stratified grain sizes, grey, moist to wet.<br>(Tailings) | | GS2-BULK | ... Test pit is standing vertically from 0.0 to 2.5 m, bucket teeth visible in test pit wall.<br>... Water level based on seepage observed into the test pit at completion.<br>... Soil may be slightly plastic, can roll soil into a 2 mm wide worm. Striking palm of hand holding a ball of soil results in water bleeding out (mostly silt). | 1096 |
| | | ... From 1.6 to 2.5 m: brown. | | | | |
| 2 | | | | | ... Water seeping in approximately 0.5 litre/second.<br>... Most of the seepage is from the north side of the test pit. | 1095 |
| | | ORGANICS<br>Loose to compact, black, moist, with rootlets, smells of decaying vegetation.<br>(In Situ) | | ARD01<br>GS3 | | |
| | | SAND<br>Fine to medium grained, trace to some silt, trace 1 to 5 mm laminations of organics, compact, grey, moist.<br>(In Situ) | | | | |
| 3 | | | | GS4-BULK | | 1094 |
| 4 | | | | ARD2 | | 1093 |
| | | GRAVEL AND SAND<br>Trace silt, angular gravel particles to about 50 mm diameter, loose to compact, trace organic laminations to 10 mm, grey, free water.<br>(In Situ) | | ARD3<br>GS5 | ... Soil temperature: 0°C. Value considered very approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket. | |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:34 PM (TEST PIT LOG)

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-07 11:40:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-07 2:00:00 PM | Reviewed By: R. Wood |
| Completion Depth: 4.80 m | Page 1 of 2 |

| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Test Pit No: TP-T-13-02 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880706 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389263 | Elevation (m): 1097 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | END OF TEST PIT at 4.8 m<br>Sides sloughing in.<br>At completion, circular shaped on surface, 7.0 m diameter.<br>Water observed seeping in below 2.5 m, and at 0.9 m (top of the fine grained tailings).<br>Test pit backfilled with excavated material. | | | | 1092 |
| 6 | | | | | | 1091 |
| 7 | | | | | | 1090 |
| 8 | | | | | | 1089 |
| 9 | | | | | | 1088 |

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

| Start Date: 2013-09-07 11:40:00 AM | Logged By: S. Magnusson |
|---|---|
| Completion Date: 2013-09-07 2:00:00 PM | Reviewed By: R. Wood |
| Completion Depth: 4.80 m | Page 2 of 2 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:34 PM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Test Pit No: TP-T-13-04 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880683 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389415 | Elevation (m): 1097 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SAND AND SILT<br>Fine grained, compact, laminated 5 to 20 mm thick with slightly finer grained sand, brown to orange, damp.<br>(Tailings) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth.<br>... Tailings surface was stable for the excavator to traffic on. Minor rutting after several passes. Dry loose sand tailings on surface. | 1096 |
| 1 | | | | GS1-BULK | | |
| ▼ | | ... From 1.5 to 1.8 m: wet to saturated. | | | ... Water level based on samples retrieved from test pit. No free water noted. | |
| | | SILT<br>Some sand, trace to some clay, soft to firm, non-plastic, grey, saturated, some layers are an olive-yellow-tan colour finer grained material. Some fine to medium grained sand interbedded in 5 to 30 cm thick layers.<br>(Tailings) | | | | 1095 |
| 2 | | | | GS2<br>GS3 | | |
| | | | | GS4 | | 1094 |
| 3 | | | | GS5-BULK | | |
| | | SAND<br>Fine to medium grained, silty, trace organics, loose to compact, black to grey, damp to moist, smells of decaying vegetation.<br>(In Situ) | | ARD1<br>GS6 | | 1093 |
| 4 | | | | | | |
| | | | | | ... From 4.9 to 5.2 m: hard digging. | 1092 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:34 PM (TEST PIT LOG)

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-06 4:30:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-06 6:15:00 PM | Reviewed By: R. Wood |
| Completion Depth: 5.20 m | Page 1 of 2 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Test Pit No: TP-T-13-04 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880683 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389415 | Elevation (m): 1097 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SAND<br>Fine to medium grained, some gravel to 50 mm diameter, trace fines, angular, dense, grey, moist.<br>(In Situ) *(continued)* | | ARD2<br>GS7 | ... Soil temperature: 1°C. Value considered very approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket.<br>Test pit left open overnight to assess stand up performance<br>... Did not enlarge in size on surface (6 m wide)<br>... Side sloughing in<br>... Water ponding to 2.3 m depth with yellow foam on surface<br>... Wet zone of seepage 2.0 to 2.3 m depth above the water surface<br>... The surrounding tailings pond is 8 to 12 m away, and 1.2 m deep from the top of the test pit.<br>... Test pit backfilled with excavated material. | 1091 |
| 6 | | | | | | |
| | | END OF TEST PIT at 5.2 m<br>Test pit is sloughing in.<br>No freewater observed.<br>Test pit left open overnight to assess stand up performance. | | | | 1090 |
| 7 | | | | | | |
| | | | | | | 1089 |
| 8 | | | | | | |
| | | | | | | 1088 |
| 9 | | | | | | |
| | | | | | | 1087 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:34 PM (TEST PIT LOG)

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-06 4:30:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-06 6:15:00 PM | Reviewed By: R. Wood |
| Completion Depth: 5.20 m | Page 2 of 2 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Test Pit No: TP-T-13-05 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880620 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389250 | Elevation (m): 1097 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| 0 | | SAND<br>Fine to medium grained, trace to some silt, loose to compact, trace to some 5 to 20 mm laminations of grey finer grained material, brown to orange, moist to wet. (Tailings) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth.<br>... Excavator access to test pit site difficult. One pass results in 15 cm ruts, two passes results in large ruts that liquifies when walking on foot. Test pit completed on a mound about 30 cm above the surroundings tailings. | 1096 |
| 1 | | | GS1 | | ... At 0.8 m, water seeping into the test pit.<br>... The tailings pond is 12.5 m away, and 0.8 m below the top of the test pit.<br>... The test pit is sloughing and the ground is very soft. | 1095 |
| 2 | | | GS2 | | | 1094 |
| 3 | | END OF TEST PIT at 2.6 m<br>Test pit is sloughing to 4 m wide.<br>Water seeping into excavation from 0.8 m depth.<br>Test pit backfilled with excavated material. | | | ... The excavator is sinking into the tailings, cracks visible. Terminated test pit due to safety.<br>... After backfilling, the excavator bucket tapped the surface about a dozen times to liquefy the backfill. Dozens of sandboils approximately 5 to 15 cm in diameter developed, and about 10 cm of water ponded on the surface of the test pit. Revisiting the site after several days, the ponded water was gone and the backfill was still very soft and unsafe to walk on. | 1093 |
| 4 | | | | | | 1092 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:34 PM (TEST PIT LOG)

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-07 3:10:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-07 3:50:00 PM | Reviewed By: R. Wood |
| Completion Depth: 2.60 m | Page 1 of 1 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Test Pit No: TP-T-13-06 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880593 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389198 | Elevation (m): 1099 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SAND AND SILT<br>Fine to medium grained sand, compact, stratified with some some sulphide rich layers, brown to orange, moist.<br>(Tailings) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth.<br>... No difficulty for excavator to access the test pit site. The area is raised, coarser grained, and well drained. Minor rutting after multiple passes. | 1099 |
| | | | | GS1-BULK | | |
| 1 | | ... From 0.9 to 2.0 m: wet to saturated. | | | | 1098 |
| | | ... From 1.7 to 2.01 m: grey coloured. | | | | |
| 2 | | SAND<br>Fine to medium grained sand, silty, trace organics, compact to dense, dark grey, saturated, smells of decaying vegetation.<br>(In Situ) | | | ... Moderately hard digging | |
| | | | | GS2<br>ARD1 | ... Soil temperature: 5°C. | 1097 |
| 3 | | | | GS3<br>ARD2 | ... Soil temperature: 2°C. | 1096 |
| 4 | | | | GS4<br>ARD3 | ... Soil temperature: 1°C. Values considered very approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket.<br>... Cracks forming around the test pit and excavator<br>Test pit left open overnight. A brief heavy rainfall occured in the morning of Sept 8, 2013.<br>... Surface dimensions 7 m long and 6 m wide enlarged to 8 m long and 7 m wide<br>... Water surface at 1.6 m below and frothy yellow<br>... Wet seepage zone 1.3 to 1.6 m depth, above water surface<br>... Tension cracks visible 1 to 1.5 m from the edge on surface<br>... Sides are vertical to 0.8 m depth, then about 2H:1V to the water surface<br>... Test pit backfilled with excavated material. | 1095 |
| | | END OF TEST PIT at 4.1 m<br>Water seeping in at 2.5 m depth.<br>Test pit sloughing in.<br>Test pit left open overnight to assess stand up performance. | | | | |

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-07 5:30:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-07 6:40:00 PM | Reviewed By: R. Wood |
| Completion Depth: 4.10 m | Page 1 of 1 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Test Pit No: TP-T-13-07 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880563 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389263 | Elevation (m): 1098 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SILT<br>Some fine to medium grained sand, loose to compact, laminated 5 to 15 cm grey fine grained silmes, brown to orange, moist.<br>(Tailings) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth.<br>... The tailings surface is red coloured and firm around the test pit. 25 mm ruts occur after one pass of the excavator. | 1097 |
| 1 ▼ | | ... From 1.0 to 3.4 m: saturated, test pit sloughing in. | | GS1 | ... Water level based on observation in test pit.<br>The tailings pond water level is 16 m east of the test pit, and 1.0 m below the top of the test pit. | 1096 |
| 2 | | | | GS2 | | 1095 |
| 3 | | | | GS3 | | 1094 |
| 4 | | END OF TEST PIT at 3.4 m<br>Test pit sloughing in.<br>No free water.<br>Test pit left open overnight to assess stand up performance. | | | ... Cracks on the tailings surface forming around the excavator<br>... Soil temperature: 2°C. Value considered very approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket.<br>Test pit left open overnight to assess stand up performance<br>... Test pit size on surface is unchanged at about 7.0 m diameter.<br>... Water level is at 1.4 m depth<br>... Wet seepage zone on pit sides is at 1.2 to 1.4 m depth<br>... Depth of water in the center of the test pit is 0.5 m.<br>... Test pit backfilled with excavated material. | 1093 |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-07 4:15:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-07 5:15:00 PM | Reviewed By: R. Wood |
| Completion Depth: 3.40 m | Page 1 of 1 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:34 PM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Test Pit No: TP-T-13-09 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880557 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389379 | Elevation (m): 1097 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SAND<br>Fine to medium grained, some silt to silty, slightly stratified with finer grained sediments, loose to compact, light brown to orange, moist to wet.<br>(Tailings) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth.<br>... Tailings surface was stable for the excavator to traffic on. Minor rutting after several passes. Dry loose sand tailings on surface. | 1096 |
| 1 | | | | GS1 | | |
| | | ... At 1.2 m: water seeping into testpit, wet to saturated.<br>Side sloughing in 150 to 300 mm wide slabs, test pit vertical to 1 m depth. | | | ... Water level based on water seeping in test pit at 1.2 m. | 1095 |
| 2 | | ... From 2.0 to 3.0 m: grey coloured, wet to saturated. | | GS2 | | 1094 |
| 3 | | | | GS3 | | 1093 |
| 4 | | | | GS4 | | |
| | | END OF TESTPIT at 4.4 m<br>No free water visible.<br>Test pit sloughing in to 3.5 m depth, slough appears dry/damp.<br>Test pit left open overnight to assess stand up performance. | | | Test pit left open overnight to assess stand up performance.<br>... Test pit is 8.0 m in diameter at the end of the day, and 9.0 m the following day<br>... Side walls are vertical for about 1 m, then 2H:1V to the water level<br>... Water in test pit is 1.6 m depth, yellow and frothy<br>... Seepage, wet zone is 1.3 to 1.3 m depth | 1092 |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-06 2:30:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-06 4:20:00 PM | Reviewed By: R. Wood |
| Completion Depth: 4.40 m | Page 1 of 2 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:34 PM (TEST PIT LOG)

| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Beach | Test Pit No: TP-T-13-09 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880557 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389379 | Elevation (m): 1097 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | | | | ... The tailings pond is about 7 m to the north, and 0.7 m below the top of the test pit<br>... Tension cracks about 1 m away from the perimeter of the test pit<br>... Test pit backfilled with excavated material. | 1091 |
| 6 | | | | | | 1090 |
| 7 | | | | | | 1089 |
| 8 | | | | | | 1088 |
| 9 | | | | | | 1087 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| Start Date: 2013-09-06 2:30:00 PM | Logged By: S. Magnusson |
|---|---|
| Completion Date: 2013-09-06 4:20:00 PM | Reviewed By: R. Wood |
| Completion Depth: 4.40 m |  |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Dam | Test Pit No: TP-TD-13-01 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880679 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389479 | Elevation (m): 1096 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SAND AND GRAVEL<br>Some cobbles, angular, to approximately 150 mm, compact, brown, damp to dry.<br>("Shale" Borrow Material) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth.<br>... Below 0.3 m: Sand has laminations and appears to be insitu, not fill placed for dam construction. | 1096 |
| | | SAND<br>Fine to medium grain, trace to some silt, fine laminations of dark grey material 1 mm thick every 25 to 75 mm, compact, light brown to grey, with trace angular oxidized rock fragments up to 75 mm diameter.<br>(In Situ) | | | | |
| 1 | | | | ARD-01 | | 1095 |
| 2 | | | | ARD-02 | | 1094 |
| | | ... From 2.2 to 4.4 m: Fewer rock fragments. | | | | |
| 3 | | | | ARD-03<br>GS1 | | 1093 |
| 4 | | | | | | 1092 |
| | | ... From 4.4 to 4.7 m: Hard digging, possible permafrost, no visible ice crystals, moist when thawed. | | ARD-04 | ... Soil temperature: 0°C. Value considered very approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket. | |
| | | END OF TESTPIT at 4.7 m. Excavator hit refusal.<br>Side sloughing in. No free water observed.<br>Test pit backfilled in excavator bucket compacted 0.5 m thick lifts with excavated | | | | |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-05 5:00:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-05 6:30:00 PM | Reviewed By: R. Wood |
| Completion Depth: 4.70 m | Page 1 of 2 |

| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Dam | Test Pit No: TP-TD-13-01 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880679 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389479 | Elevation (m): 1096 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | material. | | | | 1091 |
| 6 | | | | | | 1090 |
| 7 | | | | | | 1089 |
| 8 | | | | | | 1088 |
| 9 | | | | | | 1087 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| Start Date: 2013-09-05 5:00:00 PM | Logged By: S. Magnusson |
|---|---|
| Completion Date: 2013-09-05 6:30:00 PM | Reviewed By: R. Wood |
| Completion Depth: 4.70 m |  |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Dam | Test Pit No: TP-TD-13-02 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880668 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389459 | Elevation (m): 1095 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SAND AND GRAVEL<br>Some cobbles, angular, to approximately 150 mm, compact, brown, damp to dry, with trace rootlets.<br>("Shale" Borrow Material) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth.<br>... Test pit walls standing up near vertically. | |
| | | SAND<br>Fine to medium grained, trace silt, trace angular gravel to 75 mm diameter with surface weathering, no laminations/structure, compact to dense, light brown to grey, damp.<br>(FILL) | | | | 1095 |
| 1 | | | | ARD-01 | | 1094 |
| 2 | | SAND<br>Fine to medium grained, trace silt, fine laminations of dark grey material, compact, light brown to grey, damp.<br>(In Situ) | | ARD-02 | | 1093 |
| 3 | | ... From 3.2 to 3.7 m: Colour is grey, dense, damp to moist. | | | | 1092 |
| | | | | ARD-03<br>GS1 | ... Soil temperature: 5°C. Value considered very approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket. | |
| | | ... From 3.7 to 6.0 m: Less frequent laminations, brown coloured, trace gravel, dense, damp to moist. | | | | |
| 4 | | | | | ... Soil temperature: 3°C. Value considered very approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket. | 1091 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-06 8:20:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-06 10:20:00 AM | Reviewed By: R. Wood |
| Completion Depth: 6.00 m | Page 1 of 2 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Dam | Test Pit No: TP-TD-13-02 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880668 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389459 | Elevation (m): 1095 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SAND<br>Fine to medium grained, trace silt, fine laminations of dark grey material, compact, light brown to grey, damp.<br>(In Situ) *(continued)* | | ARD-04 | | 1090 |
| 6 | | | | GS2 | | |
| | | END OF TEST PIT at 6.0 m<br>Maximum reach of the excavator.<br>Test pit is not sloughing, standing up near vertical.<br>No free water observed.<br>Test pit backfilled in bucket compacted 0.5 m thick lifts with excavated material. | | | | 1089 |
| 7 | | | | | | 1088 |
| 8 | | | | | | 1087 |
| 9 | | | | | | 1086 |

| | | |
|---|---|---|
| Start Date: 2013-09-06 8:20:00 AM | Logged By: S. Magnusson | |
| Completion Date: 2013-09-06 10:20:00 AM | Reviewed By: R. Wood | |
| Completion Depth: 6.00 m | Page 2 of 2 | |

amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Dam | Test Pit No: TP-TD-13-03 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880521 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389474 | Elevation (m): 1095 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SAND AND GRAVEL<br>Some cobbles, angular, to approximately 150 mm, compact, brown, damp to dry<br>("Shale" Borrow Material) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth. | |
| | | SAND<br>Fine to medium grained, trace to some silt, trace angular gravel to 50 mm diameter with surface weathering,compact, no laminations/structure, grey to light brown, damp to moist.<br>(Fill) | | | | |
| 1 | | | | ARD-01 | | 1094 |
| | | ... From 1.2 to 2.8 m: 10 to 30 cm thick layers of grey sand fill, compact to dense. | | | | |
| 2 | | | | ARD-02 | | 1093 |
| | | ... From 2.8 to 4.5 m: dense. | | | | |
| 3 | | | | ARD-03 | | 1092 |
| 4 | | | | | | 1091 |
| | | ... From 4.4 to 4.5 m: Above the organics layer, the sand is white and appears to have crystals/precipitates. | | ARD-04<br>ARD-05 | | |
| | | ORGANICS<br>Compact, black, moist, smells of decomposing vegetation, with rootlets.<br>(In Situ) | | GS1 | | 1090 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-06 1:45:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-06 1:45:00 PM | Reviewed By: R. Wood |
| Completion Depth: 6.00 m | Page 1 of 2 |

| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Facility - Tailings Dam | Test Pit No: TP-TD-13-03 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6880521 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389474 | Elevation (m): 1095 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SAND<br>Fine to medium grained, trace silt, compact, interbedded with coarser grained brown sand, grey, moist.<br>(In Situ) *(continued)* | | | ... Soil temperature: 0°C. Value considered very approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket. | |
| 6 | | SAND<br>Fine to medium grained, trace silt, dense, grey, frozen, Nbn, no visible ice crystals, moist to wet when thawed.<br>(Permafrost) | | ARD-06 GS2 | ... Soil temperature: -1°C. Value considered very approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket.<br>... Water level estimated based on wet soil samples retrieved in test pit.<br>... From 5.8 to 6.0 m: Hard digging | 1089 |
| | | END OF TESTPIT at 6.0 m<br>Small amount of free water observed on the bottom of the test pit after 10 minutes.<br>Test pit slightly sloughing, walls generally near vertical.<br>Test pit backfilled in bucket compacted 0.5 m lifts with excavated material. | | | | |
| 7 | | | | | | 1088 |
| 8 | | | | | | 1087 |
| 9 | | | | | | 1086 |
| | | | | | | 1085 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

| Start Date: 2013-09-06 1:45:00 PM | Logged By: S. Magnusson |
|---|---|
| Completion Date: 2013-09-06 1:45:00 PM | Reviewed By: R. Wood |
| Completion Depth: 6.00 m |  |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - Northwest Pile | Test Pit No: TP-WA-13-01 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881707 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 388770 | Elevation (m): 1232 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | GRAVEL<br>Sandy, some cobbles, trace boulders to 500 mm diameter, angular, trace to some silt, compact to dense, brown to orange to grey, damp to moist, rocks are variably weathered from intact grey colour, and hard to break with a rock hammer, to a vibrant orange colour which crumbles to the touch, approximately 50% > 25 mm.<br>(Waste Rock)<br>... From surface to 0.6 m: dry, approximately 50% > 25 mm.<br>... From 0.6 to 1.3 m: dense, orange. | | GS2 | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth. | 1231 |
| 1 | | | | GS1 | | |
| | | GRAVEL AND COBBLES<br>Sandy, trace silt, some boulders to 600 mm diameter, angular, compact to dense, brown to orange, variably weathered, damp to moist, approximately 70% > 25 mm.<br>(Waste Rock) | | | | 1230 |
| 2 | | | | GS3 | | |
| | | | | | | 1229 |
| 3 | | | | GS4-BULK | | |
| | | ... From 3.8 to 4.5 m: less weathered with surface staining only. | | | ... Soil temperature: 2°C. Value considered approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket. | 1228 |
| 4 | | | | GS5 | | |
| | | END OF TEST PIT at 4.5 m<br>Maximum reach of excavator.<br>No free water observed.<br>Test pit sloughed, becoming unstable.<br>Test pit backfilled with excavated material. | | | | 1227 |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-10 5:30:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-10 6:45:00 PM | Reviewed By: R. Wood |
| Completion Depth: 4.50 m | Page 1 of 1 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - East Pile | Test Pit No: TP-WA-13-02 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881673 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 388958 | Elevation (m): 1213 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SAND AND GRAVEL<br>Some cobbles, trace boulders to 300 mm, trace to some silt, angular, compact to dense, brown to orange to grey, damp to moist, rocks are variably weathered from intact, grey colour and hard to break with a rock hammer, to a vibrant orange colour which crumbles to the touch, approximately 40% > 25 mm.<br>(Waste Rock)<br><br>... From 0.7 to 1.9 m: compact to dense, moist. | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth. | |
| 1 | | | | ARD-01<br>GS1 | | 1212 |
| 2 | | ORGANICS<br>Compact, black, moist, smells of decaying vegetation, with 5 cm diameter roots/branches.<br>(In Situ) | | ARD-02<br>GS2 | | 1211 |
| | | GRAVEL AND SAND<br>Some cobbles to 150 mm diameter, angular, trace to some silt, compact, brown, moist to wet, slightly weathered, approximately 30% > 25 mm.<br>(Waste Rock) | | | | |
| 3 | | | | ARD-03<br>GS3 | | 1210 |
| | | ORGANICS<br>Soft, brown to black, moist, with wood fibres and rootlets.<br>(In Situ) | | | ... Below 3.3 m: Test pit is stable and standing nearly vertical. Above 3.3 m, the test pit is sloughing. | |
| | | SAND<br>Fine to medium grained, subangular, some gravels and cobbles to 150 mm diameter, trace to some silt, compact, grey to light brown, damp to moist, gravel and cobbles are slightly weathered and stained on the surface, approximately 30% > 25 mm.<br>(In Situ) | | | ... Soil temperature: 2°C. Value considered approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket. | |
| 4 | | | | GS4 | | 1209 |
| | | | | | ... Soil temperature: -1°C. Value considered approximate. | |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-10 10:50:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-10 12:10:00 PM | Reviewed By: R. Wood |
| Completion Depth: 5.60 m | Page 1 of 2 |

| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - East Pile | Test Pit No: TP-WA-13-02 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881673 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 388958 | Elevation (m): 1213 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | BEDROCK<br>Fractured rock to 300 mm, angular, dense, orange, moist, weathered to sand and trace silt, fairly hard to break with a rock hammer, approximately 60% > 25 mm.<br>(In Situ) *(continued)* | | GS5 | Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket. | |
| | | END OF TEST PIT at 5.6 m<br>Maximum reach of the excavator.<br>No free water observed.<br>Test pit backfilled with excavated material. | | | | |
| 6 | | | | | | 1207 |
| 7 | | | | | | 1206 |
| 8 | | | | | | 1205 |
| 9 | | | | | | 1204 |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| Start Date: 2013-09-10 10:50:00 AM | Logged By: S. Magnusson |
|---|---|
| Completion Date: 2013-09-10 12:10:00 PM | Reviewed By: R. Wood |
| Completion Depth: 5.60 m | Page 2 of 2 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - East Pile | Test Pit No: TP-WA-13-03 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881634 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 388988 | Elevation (m): 1217 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SAND<br>Cobbly to 150 mm diameter, some gravel, angular, trace silt, loose to compact, brown to orange, damp to moist, low to moderate oxidation with mostly surface staining, rock is hard to break with a rock hammer, approximately 45% > 25 mm.<br>(Waste Rock) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth. | 1216 |
| 1 | | | | ARD-01<br>GS1 | | |
| | | ... From 1.4 to 2.6: Compact to dense, moist. | | | | 1215 |
| 2 | | ... From 1.9 to 2.6 m: Brown, lower level of oxidation, trace pieces of organics and rootlets mixed with the waste rock. | | ARD-02<br>GS2 | | |
| | | ORGANICS<br>Compact, black, moist, with pieces of decomposed moss and 1 to 2 cm willow branches laying down over top the organics.<br>(In Situ) | | | | 1214 |
| 3 | | GRAVEL AND COBBLES<br>Particles to 200 mm diameter, anuglar, some sand, trace silt, brown, moist, with trace rootlets and organics, rock is slightly weathered and hard to break with a rock hammer, approximately 75% > 25 mm.<br>(Waste Rock) | | ARD-03 | ... Below 3.1 m: Test pit is standing up nearly vertical, and sloughing above 3.1 m. | |
| | | | | GS3 | | |
| | | ORGANICS<br>Some sand, loose, black, moist, with rootlets and wood fibres.<br>(In Situ) | | | | |
| | | SAND<br>Trace to some boulders and cobbles to 600 mm, some to trace silt, compact, brown, moist to wet, rocks are lightly weathered on surface and hard to break with a rock hammer, approximately 30% > 25 mm.<br>(In Situ) | | | | 1213 |
| 4 | | | | GS4-BULK | | |
| | | END OF TEST PIT at 4.6 m<br>Test pit hit refusal.<br>No free water observed. Test pit sloughed above 3.1 m.<br>Test pit backfilled with backfilled material. | | | | 1212 |

| | | |
|---|---|---|
| Start Date: 2013-09-10 8:45:00 AM | Logged By: S. Magnusson | |
| Completion Date: 2013-09-10 10:40:00 AM | Reviewed By: R. Wood | |
| Completion Depth: 4.60 m | Page 1 of 1 | |

amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - Northwest Pile | Test Pit No: TP-WA-13-04 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881591 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 388807 | Elevation (m): 1228 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | GRAVEL AND SAND<br>Some cobbles, angular, trace silt, trace boulders to 500 mm diameter, angular, dense, dark brown, damp to moist, rock fragements are slightly weathered, hard to break with a rock hammer, granitic rocks present are heavily weathered and can crumble in hands, approximately 40% > 25 mm.<br>(Waste Rock) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth. | |
| 1 | | | | GS1 | | 1227 |
| 2 | | | | GS2 | | 1226 |
| | | ... From 2.3 to 3.2 m: Increasing oversize content to approximately 50% > 25 mm, the matrix soil has lower amounts of weathering. | | | ... Below 2.3 m: Test pit is standing up nearly vertical, and starting to undercut below 3 m, resulting in overhanging portions. Test pit is sloughing above 2.3 m. | |
| 3 | | | | GS3 | | 1225 |
| | | ... From 3.2 to 4.2 m: Increasing oversize to approximately 60% > 25 mm with boulders up to 1 m diameter, rock fragments are more oxidized, matrix soil is moist and consists of sand, trace silt, with some pieces of blasting cord. | | | | |
| 4 | | | | GS4 | | 1224 |
| | | ... From 4.2 to 5.6 m: Decreasing oversize to approximately 40% > 25 mm, trace boulders, moist to wet. | | | | |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-10 3:10:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-10 5:10:00 PM | Reviewed By: R. Wood |
| Completion Depth: 6.10 m | Page 1 of 2 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - Northwest Pile | Test Pit No: TP-WA-13-04 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881591 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 388807 | Elevation (m): 1228 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | GRAVEL AND SAND<br>Some cobbles, angular, trace silt, trace boulders to 500 mm diameter, angular, dense, dark brown, damp to moist, rock fragements are slightly weathered, hard to break with a rock hammer, granitic rocks present are heavily weathered and can crumble in hands, approximately 40% > 25 mm.<br>(Waste Rock) *(continued)*<br><br>... From 5.6 to 6.1 m: Increasing oversize to approximately 50% > 25 mm, highly weathered, moist to wet. | | GS5 | ... Soil temperature: -1°C. Value considered approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket. | |
| 6 | | | | GS6 | | 1222 |
| | | END OF TEST PIT at 6.1 m<br>Maximum reach of excavator.<br>No free water observed.<br>Test pit is standing nearly vertical.<br>Test pit backfilled with excavated material. | | | | |
| 7 | | | | | | 1221 |
| 8 | | | | | | 1220 |
| 9 | | | | | | 1219 |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-10 3:10:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-10 5:10:00 PM | Reviewed By: R. Wood |
| Completion Depth: 6.10 m | Page 2 of 2 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - West Lower Pile | Test Pit No: TP-WA-13-05 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881499 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 388708 | Elevation (m): 1211 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| 0 | | GRAVEL<br>Cobbly, trace to some boulders to 600 mm diameter, angular, sandy, trace silt, compact, brown, damp to moist, rock fragments slightly weathered and hard to break with a rock hammer, rock mostly igneous, approximately 50% > 25 mm, with trace pieces of blasting cord.<br>(Waste Rock) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth. | 1211 |
| 1 | | | | ARD-01<br>GS1 | | 1210 |
| 2 | | | | ARD-02<br>GS2 | | 1209 |
| | | GRAVEL AND COBBLES<br>Angular, sandy, trace silt, some boulders to 1 m diameter, angular, compact to dense, brown, moist, slightly weathered, approximately 70% > 25 mm. | | | ... From 2.5 to 4.2 m: Test pit is slumping, difficult digging with large boulders present. | |
| 3 | | | | ARD-03<br>GS3 | | 1208 |
| 4 | | | | ARD-04<br>GS4 | | |
| | | END OF TEST PIT at 4.2 m<br>Test pit hit refusal.<br>No free water observed.<br>Test pit sloughed.<br>Test pit backfilled with excavated material. | | | ... At completion: Test pit is approximately 6.5 m long and 5.5 m wide on surface, the top 2.5 m of finer grained soil is vertical and overhanging the higher boulder content material below. | 1207 |

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-09 1:15:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-09 3:00:00 PM | Reviewed By: R. Wood |
| Completion Depth: 4.20 m | Page 1 of 1 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - West Lower Pile | Test Pit No: TP-WA-13-06 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881442 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 388711 | Elevation (m): 1209 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SAND<br>Fine to medium grained, trace silt, trace gravel to 50 mm diameter, loose, grey, dry.<br>(Road Topping) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth.<br>... In order to start the test pit some 1-2 m diameter boulders had to be moved, some of these boulders crumbled in the excavator bucket when the thumb held them. | 1209 |
| | | GRAVEL AND SAND<br>Cobbly, trace boulders to 600 mm diameter, angular, trace silt, compact, stratified in 300 mm layers, brown to orange, damp to moist, rock is moderately weathered and hard, approximately 45% > 25 mm.<br>(Waste Rock) | | | | |
| 1 | | | | ARD-01<br>GS1 | | 1208 |
| | | ... From 1.2 to 2.2 m: Less weathering of the rock and matrix soil. | | | | |
| 2 | | | | ARD-02<br>GS2 | | 1207 |
| | | ... From 2.2 to 3.5 m: Some boulders to 600 mm diameter, moist, some rock pieces are highly weathered and crumble in your hand, approximately 60% > 25 mm. | | | ... Below 2.2 m: Test pit walls are is standing up nearly vertical, hard digging. Test pit is sloughing above 2.2 m. | |
| 3 | | | | ARD-03<br>GS3-BULK | | 1206 |
| | | ... From 3.5 to 4.5 m: Orange, high level of weathering. | | | | |
| 4 | | | | ARD-04<br>GS4 | | 1205 |
| | | END OF TEST PIT at 4.5 m<br>Test pit hit refusal.<br>No free water observed.<br>Test pit sloughed a bit.<br>Test pit backfilled with excavated material. | | | | |

| | | |
|---|---|---|
| Start Date: 2013-09-09 3:15:00 PM | Logged By: S. Magnusson | |
| Completion Date: 2013-09-09 5:00:00 PM | Reviewed By: R. Wood | |
| Completion Depth: 4.50 m | Page 1 of 1 | |

amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - West Mid Pile | Test Pit No: TP-WA-13-07 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881430 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 388774 | Elevation (m): 1214 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | GRAVEL AND SAND<br>Cobbly, trace silt, trace boulders to 300 mm diameter, angular, compact, brown to orange, dry to damp, moderate level of weathering, approximately 40% > 25 mm. (Waste Rock)<br>... From 0.3 to 4.8 m: Trace to some silt, dense to very dense, moist to wet. | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth.<br>... From 0.3 to 4.8 m: Hard digging, bucket teeth marks on test pit sides, test pit standing near vertical to 1.5 m depth, then sloughing and widening below 1.5 m. | 1214 |
| 1 | | | | GS1 | | 1213 |
| 2 | | | | GS2-BULK | | 1212 |
| 3 | | | | GS3 | | 1211 |
| 4 | | | | GS4 | | 1210 |
| | | | | GS5 | | |

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-10 1:30:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-10 3:00:00 PM | Reviewed By: R. Wood |
| Completion Depth: 5.80 m | Page 1 of 2 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - West Mid Pile | Test Pit No: TP-WA-13-07 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881430 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 388774 | Elevation (m): 1214 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | GRAVEL<br>Cobbly, trace silt, sandy, trace boulders to 300 mm diameter, dense, orange, moist, high level of weathering, rock crumbled with a blow from the rock hammer, approximately 60% > 25 mm.<br>(Waste Rock) *(continued)* | | | | 1209 |
| | | ... From 5.6 to 5.8 m: Some silt/clay, brown, moist, less weathering. | | GS6 | ... Soil temperature: 1°C. Value considered approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket. | |
| 6 | | END OF TEST PIT at 5.8 m<br>Maximum reach of excavator.<br>Test pit standing near vertical.<br>No free water observed.<br>Test pit backfilled with excavated material. | | | | 1208 |
| 7 | | | | | | 1207 |
| 8 | | | | | | 1206 |
| 9 | | | | | | 1205 |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-10 1:30:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-10 3:00:00 PM | Reviewed By: R. Wood |
| Completion Depth: 5.80 m | Page 2 of 2 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - South Pile | Test Pit No: TP-WA-13-08 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881356 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 388922 | Elevation (m): 1215 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | GRAVEL<br>Cobbly,trace boulders to 600 mm diameter, sandy, trace silt, compact, brown to orange, damp to moist, approximately half of the rock pieces are highly weathered and break easily with a rock hammer, and the other half are stained on surface and competent, approximately 50% > 25 mm.<br>(Waste Rock) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth. | 1214 |
| 1 | | | | ARD-01<br>GS1-BULK | | |
| | | | | | | 1213 |
| 2 | | | | ARD-02<br>GS2 | | |
| | | ... At 2.2 m: Plastic sample bag encontered. | | | | 1212 |
| 3 | | | | ARD-03<br>GS3 | | |
| | | ... at 3.1 m: Pieces of organics/top soil with rootlets mixed up in the waste rock. | | | | |
| | | BEDROCK<br>Weathered to cobbles, boulders, gravel and sand pieces, to 1 m diameter, dense, red to orange to brown, moist, bedrock is variably oxidized with numerous fractures, some pieces are intact 1 m boulders, and some crumble in your hand, highly weathered parts consist of sand, some silt, some gravel and moist, approximately 60% > 25 mm.<br>(In Situ) | | | ... Weathered bedrock temperature: 5°C. Value considered approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket.<br>... Below 3.2 m: Hard digging, tooth marks present on test pit wall. | 1211 |
| 4 | | ... From 4.0 to 4.7 m: Matrix soil between rock is hard and clumps together, permafrost? | | GS4 | ... Weathered bedrock temperature: 2°C. Value considered approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket.<br>... Below 4.0 m: Test pit standing near vertical, sloughing abouve 4.0 m. | |
| | | END OF TEST PIT at 4.7 m<br>Test pit hit refusal. No free water observed.<br>Test pit sloughed to 7 m long and 5.5 m wide. Test pit backfilled with excavated | | | | 1210 |

| | | |
|---|---|---|
| Start Date: 2013-09-09 10:50:00 AM | Logged By: S. Magnusson | |
| Completion Date: 2013-09-09 1:00:00 PM | Reviewed By: R. Wood | |
| Completion Depth: 4.70 m |  | |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - South Pile | Test Pit No: TP-WA-13-08 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881356 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 388922 | Elevation (m): 1215 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | material. | | | | |
| 6 | | | | | | 1209 |
| 7 | | | | | | 1208 |
| 8 | | | | | | 1207 |
| 9 | | | | | | 1206 |
| | | | | | | 1205 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

| Start Date: 2013-09-09 10:50:00 AM | Logged By: S. Magnusson |
|---|---|
| Completion Date: 2013-09-09 1:00:00 PM | Reviewed By: R. Wood |
| Completion Depth: 4.70 m | Page 2 of 2 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - West Lower Pile | Test Pit No: TP-WA-13-09 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881319 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 388834 | Elevation (m): 1205 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | GRAVEL<br>Cobbly, sandy, some boulders to 1 m diameter, angular, loose to compact, orange to brown, damp to moist, rock is highly weathered and fractured, granitic rocks have weathered to a powder, while meta-sedimentary rock is stained on surface and competent, matrix soil is highly weathered, approximately 60% > 25 mm.<br>(Waste Rock) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth.<br>... Difficult access to test pit site, excavator constructed a temporary access route, lots of large weathered boulders around site. | |
| | | | | ARD-01<br>GS1 | | |
| 1 | | ... From 0.9 to 2.2 m: Some to trace silt, trace to some boulders, dense, grey, moist, less weathering, approximately 50% > 25 mm. | | | ... Below 0.9 m: Hard digging, test pit standing nearly vertical. | 1204 |
| | | | | ARD-02<br>GS2 | | |
| | | | | | | 1203 |
| 2 | | | | ARD-03<br>GS3 | | |
| | | COBBLES AND BOULDERS<br>Approximately 40% boulders to 1 m diameter, angular, some gravel, trace sand and silt, angular, dense, grey, moist, slightly weathered and rocks are competent, approximately 80% ? 25 mm, possible frozen conditions - no ice or water visible, based on temperature measurement.<br>(Waste Rock) | | | | |
| | | | | | | 1202 |
| 3 | | | | ARD-04<br>GS4 | | |
| | | | | | ... Soil temperature: -1°C. Value considered approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket. | |
| | | | | | | 1201 |
| 4 | | | | ARD-05<br>GS5 | | |
| | | | | | ... Soil temperature: 0°C. Value considered approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket. | |
| | | | | | | 1200 |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-10 8:30:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-10 11:00:00 AM | Reviewed By: R. Wood |
| Completion Depth: 5.20 m | Page 1 of 2 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - West Lower Pile | Test Pit No: TP-WA-13-09 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881319 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 388834 | Elevation (m): 1205 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | | | ARD-06 GS6 | ... Soil temperature: 0°C. Value considered approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket. | |
| | | END OF TEST PIT at 5.2 m<br>Maximum reach of excavator.<br>No free water observed.<br>Test pit sloughed a bit below 2.2 m.<br>Test pit backfilled with excavated material. | | | | |
| 6 | | | | | | 1199 |
| 7 | | | | | | 1198 |
| 8 | | | | | | 1197 |
| 9 | | | | | | 1196 |
| | | | | | | 1195 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-10 8:30:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-10 11:00:00 AM | Reviewed By: R. Wood |
| Completion Depth: 5.20 m | Page 2 of 2 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - South Pile | Test Pit No: TP-WA-13-10 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881272 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389001 | Elevation (m): 1214 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | COBBLES<br>Some boulders to 1 m diameter, some gravel, angular, some sand, trace silt, loose to compact, brown, damp to moist, rock pieces and soil moderately weathered, approximately 70% > 25 mm.<br>(Waste Rock) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth. | |
| 1 | | | | ARD-01<br>GS1 | | 1213 |
| 2 | | ... From 1.8 to 4.1 m: Some to trace boulders, sandy, compact to dense, approximately 20% of the rock pieces are weathered and break easily with a rock hammer, 80% of the rock pieces are intact with surface staining, approximately 60% > 25 mm. | | ARD-02<br>GS2 | | 1212 |
| 3 | | | | ARD-03<br>GS3 | | 1211 |
| 4 | | | | ARD-04<br>GS4 | ... Soil temperature: 4°C. Value considered approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket.<br>... At completion, the test pit is approximatel y 7.5 m long and 6 m wide and sloughing. | 1210 |
| | | END OF TEST PIT at 4.1 m<br>Test pit sloughed.<br>No free water observed.<br>Test pit backfilled with excavated material. | | | | |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-09 8:15:00 AM | Logged By: S. Magnusson |
| Completion Date: 2013-09-09 10:30:00 AM | Reviewed By: R. Wood |
| Completion Depth: 4.10 m | Page 1 of 1 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - Southwest Lower Pile | Test Pit No: TP-WA-13-11 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881208 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389001 | Elevation (m): 1202 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | COBBLES<br>Sandy, some gravel, some boulders to 600 mm diameter, angular, trace silt, loose to compact, brown, dry, approximately 70% > 25 mm, the matrix material is fine to medium grained sand, some silt, some gravel, compact, brown, moist.<br>(Waste Rock) | | | ... Coordinates taken with a handheld GPS. Elevation from 2012 LiDAR survey.<br>... Test pit completed with a tracked Caterpillar 324D excavator. Bucket is 1 m wide, 1 yd³ capacity, 5 teeth. | |
| 1 | | | | ARD-01<br>GS1 | | 1201 |
| | | GRAVEL AND SAND<br>Some cobbles, trace boulders to 600 mm diameter, trace silt, compact, brown to grey, moist, slighly weathered, approximately 40% > 25 mm.<br>(Waste Rock) | | | | |
| 2 | | | | ARD-02<br>GS2 | | 1200 |
| | | ... From 2.2 to 2.6 m: Oversize approximately 50% > 25 mm. | | | | |
| | | | | | ... From 2.6 to 3.8 m: Test pit standing up nearly vertical. | |
| 3 | | | | ARD-03<br>GS3 | | 1199 |
| | | | | | ... Soil temperature: 5°C. Value considered approximate. Taken with a probe thermometer 10 cm into the sample surface, retrieved in the excavator bucket. | |
| | | ... From 3.8 to 5.0 m: orange to brown, highly weathered, approximately 30% > 25 mm. | | | | |
| 4 | | | | ARD-04<br>GS4 | | 1198 |
| | | | | ARD-05 | | |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-08 3:45:00 PM | Logged By: S. Magnusson |
| Completion Date: 2013-09-08 5:50:00 PM | Reviewed By: R. Wood |
| Completion Depth: 5.00 m | Page 1 of 2 |

VM00605 MT NANSEN GEOTECH.GPJ 14-02-27 02:35 PM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Waste Rock Area - Southwest Lower Pile | Test Pit No: TP-WA-13-11 |
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD83): 6881208 | Project No: VM00605E |
| Contractor & Method: Boreal Engineering, Test Pit | Easting (UTM Zone 8, NAD83): 389001 | Elevation (m): 1202 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | END OF TEST PIT at 5.0 m.<br>Test pit sloughed and is unstable.<br>No free water observed.<br>Test pit backfilled with excavated material. | | GS5-BULK | | |
| 6 | | | | | | 1196 |
| 7 | | | | | | 1195 |
| 8 | | | | | | 1194 |
| 9 | | | | | | 1193 |

| | | |
|---|---|---|
| Start Date: 2013-09-08 3:45:00 PM | Logged By: S. Magnusson | |
| Completion Date: 2013-09-08 5:50:00 PM | Reviewed By: R. Wood | |
| Completion Depth: 5.00 m | Page 2 of 2 | |

| Project: Mount Nansen 2013 Site Investigation | Area: Ketza Shop | Borehole No: TP-KZ-13-01 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881754.808 | Project No: VM00605E |
| Contractor & Method: Boreal, Backhoe | Easting (UTM Zone 8, NAD 83): 388683.392 | Elevation (m): 1232.21 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | N | N | Y | | GRAVEL, sand, cobble, boulders, | Hard silt & clay layer on surface<br>Boulders 5%<br>Cobbles 25% | |
| | | 0.6-1.0 | damp | 0 | N | N | Y | | GRAVEL, sand, cobble, boulders, | Organic substrate @ 0.75m<br>Organics after ~0.75m<br>Cobbles 10%<br>Boulders 10% | |
| 1 | | 1.1-1.5 | damp | 0 | N | N | Y | | SAND, gravel, silt, cobble, | Cobbles 5%<br>Mostly sand | 1231 |
| | | 1.6-2.0 | damp | 0 | N | N | Y | | SAND, gravel, cobble, silt, | Cobbles 10%<br>Mostly sand at bottom of pit | |
| 2 | | | | | | | | | END OF HOLE @ 2.0m | | 1230 |
| 3 | | | | | | | | | | | 1229 |
| 4 | | | | | | | | | | | 1228 |
| 5 | | | | | | | | | | | 1227 |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| Start Date: 2013-09-11 6:00 PM | Logged By: S. Van Bibber |
|---|---|
| Completion Date: 2013-09-11 6:20 PM | Reviewed By: N. Jacques |
| Completion Depth: 2.0 m | Page 1 of 1 |

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| Project: Mount Nansen 2013 Site Investigation | Area: Ketza Shop | Borehole No: TP-KZ-13-02 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881716.545 | Project No: VM00605E |
| Contractor & Method: Boreal, Backhoe | Easting (UTM Zone 8, NAD 83): 388694.006 | Elevation (m): 1231.37 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | dry | 0 | Y | Y | Y | | GRAVEL, sand, boulders, cobble | Hard clay on surface<br>Boulders 25%<br>Cobbles 20%<br>Possible waste rock & limestone | |
| | | 0.6-1.0 | damp | 0 | Y | Y | Y | | GRAVEL, sand, cobble, boulders, | Possible limestone & waste rock<br>Cobbles 25%<br>Boulders 15% | |
| 1 | | 1.1-1.5 | damp | 0 | N | N | Y | | SAND, gravel, silt, cobble | Organic ground @ 1.2m<br>70% after this point<br>Cobbles 10% throughout | 1230 |
| | | 1.6-2.0 | damp | 0 | N | N | Y | | SAND, silt, cobble, gravel | Cobbles 10%<br>Mostly sand | |
| 2 | | | | | | | | | END OF HOLE @ 2.0m | | 1229 |
| 3 | | | | | | | | | | | 1228 |
| 4 | | | | | | | | | | | 1227 |
| 5 | | | | | | | | | | | 1226 |

| | | |
|---|---|---|
| amec / Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS. | Start Date: 2013-09-12 7:40 AM | Logged By: S. Van Bibber |
| | Completion Date: 2013-09-12 6:30 PM | Reviewed By: N. Jacques |
| | Completion Depth: 2.0 m | Page 1 of 1 |

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| Project: Mount Nansen 2013 Site Investigation | Area: Ketza Shop | Borehole No: TP-KZ-13-03 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881737.564 | Project No: VM00605E |
| Contractor & Method: Boreal, Backhoe | Easting (UTM Zone 8, NAD 83): 388665.053 | Elevation (m): 1232.53 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, | Hard silty compacted surface<br>Cobbles 30%, | |
| | | 0.6-1.0 | damp | 0 | N | N | Y | | SAND, cobble, gravel | Cobbles 30% | |
| 1 | | 1.1-1.5 | damp | 0 | N | N | Y | | SAND, cobble, gravel | Cobbles 40% | 1231 |
| | | 1.6-2.0 | damp | 0 | N | N | Y | | SAND, gravel, cobble, boulders, | Boulders 20%<br>Cobbles 20% | |
| 2 | | | | | | | | | END OF HOLE @ 2.0m | | 1230 |
| 3 | | | | | | | | | | | 1229 |
| 4 | | | | | | | | | | | 1228 |
| 5 | | | | | | | | | | | 1227 |

| | | |
|---|---|---|
| amec / Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS. | Start Date: 2013-09-11 3:50 PM | Logged By: S. Van Bibber |
| | Completion Date: 2013-09-11 4:20 PM | Reviewed By: N. Jacques |
| | Completion Depth: 2.0 m | Page 1 of 1 |

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| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: TP-M-13-01 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880994.579 | Project No: VM00605E |
| Contractor & Method: Boreal, Backhoe | Easting (UTM Zone 8, NAD 83): 388029.304 | Elevation (m): 1182.56 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | Y | N | Y | | SAND, gravel, silt, cobble | Cobbles 5%<br>Organics noted (trace) | |
| | | 0.6-1.0 | damp | 0 | Y | N | Y | | SAND, gravel, cobble, silt | Cobbles 10%<br>Some organics (organic layer @ 1.0m) | |
| 1 | | 1.1-1.5 | damp | 0 | N | N | Y | | SAND, silt, gravel, organics | Some organics<br>No signs of tailings | 1181 |
| | | 1.6-2.0 | damp | 0 | Y | N | Y | | SAND, gravel, cobble, silt, boulders | Cobbles 10%<br>Boulders 5%<br>Very dark soil 1.1-2.0m | |
| 2 | | 2.1-2.5 | damp | 0 | N | N | Y | | SAND, gravel, silt, cobble | Cobbles 5%<br>Very dark soil, smelly rotting organic smell | 1180 |
| | | 2.6-3.0 | damp | | | | | | | No indication contamination found.<br>No samples 2.6-3.5m | |
| 3 | | 3.1-3.5 | damp | | | | | | | | 1179 |
| | | | | | | | | | END OF HOLE @ 3.5m | | |
| 4 | | | | | | | | | | | 1178 |
| 5 | | | | | | | | | | | 1177 |

| | | |
|---|---|---|
| Start Date: 2013-09-13 5:05 PM | Logged By: S. Van Bibber | |
| Completion Date: 2013-09-13 5:45 PM | Reviewed By: N. Jacques | |
| Completion Depth: 3.5 m | Page 1 of 1 | |

amec Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: TP-M-13-02 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881053.940 | Project No: VM00605E |
| Contractor & Method: Boreal, Backhoe | Easting (UTM Zone 8, NAD 83): 388003.895 | Elevation (m): 1181.79 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | Y | N | Y | | SAND, gravel, cobble, boulders, silt | Cobbles 10%<br>Boulders 5%<br>Brown colour, some reddish-brown | |
| | | 0.6-1.0 | damp | 0 | Y | N | Y | | SAND, gravel, cobble, boulders, silt | Cobbles 15%<br>Boulders 10%<br>No change in colour<br>Some timber found in soil | |
| 1 | | 1.1-1.5 | | | | | | | cobble, boulders | Cobbles 15%<br>Boulders 10%<br>Hit pipe @ 1.4m, stopped excavating this hole. | 1180 |
| | | | | | | | | | END OF HOLE @ 1.5m | | |
| 2 | | | | | | | | | | | 1179 |
| 3 | | | | | | | | | | | 1178 |
| 4 | | | | | | | | | | | 1177 |
| 5 | | | | | | | | | | | 1176 |

| | | |
|---|---|---|
| amec / Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS. | Start Date: 2013-09-12 2:30 PM | Logged By: S. Van Bibber |
| | Completion Date: 2013-09-12 2:45 PM | Reviewed By: N. Jacques |
| | Completion Depth: 1.5 m | Page 1 of 1 |

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| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: TP-M-13-02 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881053.940 | Project No: VM00605E |
| Contractor & Method: Boreal, Backhoe | Easting (UTM Zone 8, NAD 83): 388003.895 | Elevation (m): 1181.79 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | N | N | Y | | SAND, gravel, cobble, boulders, silt | Cobbles 10%<br>Boulders 10% | |
| | | 0.6-1.0 | damp | 0 | N | N | Y | | SAND, gravel, cobble, silt, boulders | Cobbles 10%<br>Boulders 5% | |
| 1 | | 1.1-1.5 | damp | 0 | N | N | Y | | SAND, gravel, silt, cobble | Cobbles 5%<br>Brown black layer | 1180 |
| | | 1.6-2.0 | damp | 0 | N | N | Y | | SAND, silt, gravel, cobble | Cobbles 5%<br>Brown black layer | |
| 2 | | | | | | | | | END OF HOLE @ 2.0m | | 1179 |
| 3 | | | | | | | | | | | 1178 |
| 4 | | | | | | | | | | | 1177 |
| 5 | | | | | | | | | | | 1176 |

| | | |
|---|---|---|
| amec / Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS. | Start Date: 2013-09-13 5:10 PM | Logged By: S. Van Bibber |
| | Completion Date: 2013-09-13 6:25 PM | Reviewed By: N. Jacques |
| | Completion Depth: 2.0 m | Page 1 of 1 |

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| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: TP-M-13-03 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): N/A | Project No: VM00605E |
| Contractor & Method: Boreal, Backhoe | Easting (UTM Zone 8, NAD 83): N/A | Elevation (m): N/A |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | Y | N | Y | | SAND, gravel, cobble, silt | Cobbles 10%<br>Large woody construction debris | |
| | | 0.6-1.0 | damp | 0 | Y | N | Y | | SAND, gravel, organics, cobble, boulders, silt, | Cobbles 10%<br>Boulders 5%<br>More large wood pieces 20% | |
| 1 | | 1.1-1.5 | damp | 0 | Y | N | Y | | SAND, gravel, cobble, boulders, silt | Cobbles 20%<br>Boulders 10%<br>More moist & more cobbles 1.3-1.5<br>1.4m end of debris | |
| | | 1.6-2.0 | damp | 0 | Y | N | Y | | SAND, gravel, silt, cobble, boulders, | Cobbles 10%<br>Boulders 5%<br>Same colour as 0.0-1.5 | |
| 2 | | 2.1-2.5 | damp | 25 | - | N | Y | | SAND, gravel, silt, cobble, boulders | Cobbles 10%<br>Boulders 5%<br>2.3m contamination found | |
| | | 2.6-3.0 | damp | 6 | - | - | - | | SAND, gravel, silt, cobble, boulders | Cobbles 5%<br>Boulders 5%<br>Some organics found @ 2.8m onward | |
| 3 | | 3.1-3.5 | damp | 10 | - | - | - | | SAND, silt, gravel, cobble, organics | Cobbles 5%<br>Hit orginal ground @ 3.3m<br>More organics<br>Too contaminated to determine rock type | |
| | | 3.6-4.0 | damp | 2 | N | N | N | | SAND, silt, organics | Into mostly sand/silt/organics<br>Organics 5% | |
| 4 | | 4.1-4.5 | damp | 0 | N | N | N | | SAND, silt, organics | Lots of organics 10%<br>Not as black as dirt | |
| | ▼ | 4.6-5.0 | damp | 0 | N | N | N | | SAND, silt, organics | Organics 5%<br>Hit ground water @ 4.80 m | |
| 5 | | | | | | | | | END OF HOLE @ 5.0m | | |

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amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| Start Date: 2013-09-13 11:45 AM | Logged By: S. Van Bibber |
|---|---|
| Completion Date: 2013-09-13 3:00 PM | Reviewed By: N. Jacques |
| Completion Depth: 5.0 m | Page 1 of 1 |

| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: TP-M-13-04 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881082.994 | Project No: VM00605E |
| Contractor & Method: Boreal, Backhoe | Easting (UTM Zone 8, NAD 83): 388014.001 | Elevation (m): 1180.78 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | Y | N | Y | | SAND, gravel, cobble, silt, cobble | Cobbles 15%<br>Boulders 5%<br>Organics present (trace) | |
| | | 0.6-1.0 | wet | 0 | Y | N | Y | | SAND, gravel, cobble, boulders, silt | Cobbles 20%<br>Boulders 10%<br>Some organics | |
| 1 | | 1.1-1.5 | free water | 0 | N | N | Y | | GRAVEL, sand, cobble, boulders | Cobbles 30%<br>Boulders 15%<br>Possibly hit seep | |
| | | 1.6-2.0 | free water | 0 | - | - | - | | GRAVEL, sand, cobble, boulders | Cobbles 30%<br>Boulders 15%<br>Too muddy to determine Geochem. | |
| 2 | | | | | | | | | END OF HOLE @ 2.0m | Final 0.2m possible contamination, more likely organics | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |

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amec Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

| Start Date: 2013-09-13 4:30 PM | Logged By: S. Van Bibber |
|---|---|
| Completion Date: 2013-09-13 4:55 PM | Reviewed By: N. Jacques |
| Completion Depth: 2.0 m | Page 1 of 1 |

| Project: Mount Nansen 2013 Site Investigation | Area: Mill Area | Borehole No: TP-M-13-05 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881026.850 | Project No: VM00605E |
| Contractor & Method: Boreal, Backhoe | Easting (UTM Zone 8, NAD 83): 387811.761 | Elevation (m): 1218.32 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | N | N | Y | | SAND, gravel, cobble, boulders | Cobbles 20%<br>Boulders 5% | |
| | | 0.6-1.0 | damp | 0 | Y | N | Y | | SAND, gravel, cobble, boulders | Cobbles 20%<br>Boulders 5% | |
| 1 | | 1.1-1.5 | damp | 0 | Y | N | Y | | SAND, cobble, gravel | Cobbles 20%<br>Layer of whitish sand then rusty layer @ 1.3-1.5m | 1217 |
| | | 1.6-2.0 | damp | 0 | N | N | Y | | SAND, cobble, silt, gravel | Cobbles 25%<br>Red band of soil @ 1.7-1.8m | |
| 2 | | | | | | | | | END OF HOLE @ 2.0m | | 1216 |
| 3 | | | | | | | | | | | 1215 |
| 4 | | | | | | | | | | | 1214 |
| 5 | | | | | | | | | | | 1213 |

amec Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

| Start Date: 2013-09-12 11:00 AM | Logged By: S. Van Bibber |
|---|---|
| Completion Date: 2013-09-12 11:25 AM | Reviewed By: N. Jacques |
| Completion Depth: 2.0 m | Page 1 of 1 |

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| Project: Mount Nansen 2013 Site Investigation | Area: Road | Borehole No: TP-R-13-01 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6880969.759 | Project No: VM00605E |
| Contractor & Method: Boreal, Backhoe | Easting (UTM Zone 8, NAD 83): 387876.079 | Elevation (m): 1218.56 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | N | N | Y | | SAND, gravel, silt, cobble, boulders, | Cobbles 5%<br>Boulders 5%<br>Dark soil, some areas with near black soil | |
| | | 0.6-1.0 | damp | 0 | Y | N | Y | | SAND, gravel, cobble, boulders, silt | Cobbles 10%<br>Boulders 10%<br>Change in colour from dark brown to brown | |
| 1 | | 1.1-1.5 | damp | 0 | Y | N | Y | | SAND, boulders, gravel, cobble, silt | Cobbles 10%<br>Boulders 20%<br>Same colour as previous hole | 1217 |
| | | 1.6-2.0 | damp | 0 | Y | N | Y | | SAND, gravel, cobble, boulders, silt | Cobbles 20%<br>Boulders 20%<br>0.2m black/brown soil before end<br>refusal due to cobble @ 1.9m | |
| 2 | | | | | | | | | END OF HOLE @ 2.0m | | 1216 |
| 3 | | | | | | | | | | | 1215 |
| 4 | | | | | | | | | | | 1214 |
| 5 | | | | | | | | | | | 1213 |

| | | |
|---|---|---|
| Start Date: 2013-09-12 1:15 PM | Logged By: S. Van Bibber | |
| Completion Date: 2013-09-12 1:45 PM | Reviewed By: N. Jacques | |
| Completion Depth: 2.0 m | Page 1 of 1 | |

amec Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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| Project: Mount Nansen 2013 Site Investigation | Area: Road | Borehole No: TP-R-13-02 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881150.706 | Project No: VM00605E |
| Contractor & Method: Boreal, Backhoe | Easting (UTM Zone 8, NAD 83): 387714.119 | Elevation (m): 1217.59 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | N | N | Y | | SAND, gravel, cobble, boulders | Cobbles 25%<br>Boulders 10% | |
| | | 0.6-1.0 | damp | 0 | Y | N | Y | | SAND, gravel, cobble, boulders | One small rock on surface pile noted to have Pyrite<br>Cobbles 20%<br>Boulders 5% | |
| 1 | | 1.1-1.5 | damp | 0 | N | N | Y | | SAND, cobble, gravel, boulders | refusal due to cobble @ 1.4m<br>Cobbles 30%<br>Boulders 5% | 1227 |
| | | | | | | | | | END OF HOLE @ 1.5m | | |
| 2 | | | | | | | | | | | 1226 |
| 3 | | | | | | | | | | | 1225 |
| 4 | | | | | | | | | | | 1224 |
| 5 | | | | | | | | | | | 1223 |

| Start Date: 2013-09-12 9:50 AM | Logged By: S. Van Bibber |
|---|---|
| Completion Date: 2013-09-12 10:45 AM | Reviewed By: N. Jacques |
| Completion Depth: 1.5 m | Page 1 of 1 |

amec Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

03-07-2014 C:\Users\40868js\Documents\M-Tech\mount nansen\tp-r-13-02.bor

| Project: Mount Nansen 2013 Site Investigation | Area: Road | Borehole No: TP-R-13-03 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881334.111 | Project No: VM00605E |
| Contractor & Method: Boreal, Backhoe | Easting (UTM Zone 8, NAD 83): 387794.294 | Elevation (m): 1228.20 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | Y | N | Y | | SAND, gravel, cobble, boulders | Cobbles 25%<br>Boulders 15% | |
| | | 0.6-1.0 | damp | 0 | Y | N | Y | | SAND, cobble, gravel, boulders | Cobbles 25%<br>Boulders 20% | |
| 1 | | 1.1-1.5 | damp | 0 | Y | N | Y | | SAND, cobble, gravel, boulders | Cobbles 25%<br>Boulders 20% | 1227 |
| | | 1.6-2.0 | damp | 0 | Y | N | Y | | SAND, boulders, gravel, cobble, silt | Cobbles 15%<br>Boulders 25% | |
| 2 | | | | | | | | | END OF HOLE @ 2.0m | | 1226 |
| 3 | | | | | | | | | | | 1225 |
| 4 | | | | | | | | | | | 1224 |
| 5 | | | | | | | | | | | 1223 |

| Project: Mount Nansen 2013 Site Investigation | Area: Road | Borehole No: TP-R-13-04 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881082.994 | Project No: VM00605E |
| Contractor & Method: Boreal, Backhoe | Easting (UTM Zone 8, NAD 83): 388014.001 | Elevation (m): 1180.78 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | N | N | Y | | GRAVEL, sand, silt, | Cobbles 20%, 0.0-0.1m dry then damp | |
| | | 0.6-1.0 | damp | 0 | N | N | Y | | SAND, gravel, silt, | Cobbles 20% | |
| 1 | | 1.1-1.5 | damp | 0 | N | N | Y | | SAND, gravel, silt, | Organic layer hit @ 1.4m<br>Cobbles 10% | 1179 |
| | | 1.6-2.0 | damp | 0 | N | N | Y | | SAND, gravel | Cobbles 20% | |
| 2 | | | | | | | | | END OF HOLE @ 2.0m | | 1178 |
| 3 | | | | | | | | | | | 1177 |
| 4 | | | | | | | | | | | 1176 |
| 5 | | | | | | | | | | | 1175 |

| Start Date: 2013-09-11 3:00 PM | Logged By: S. Van Bibber |
|---|---|
| Completion Date: 2013-09-11 3:30 PM | Reviewed By: N. Jacques |
| Completion Depth: 2.0 m | Page 1 of 1 |

amec Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

03-07-2014 C:\Users\40868js\Documents\M-Tech\mount nansen\tp-r-13-04.bor

| Project: Mount Nansen 2013 Site Investigation | Area: Road | Borehole No: TP-R-13-05 |
|---|---|---|
| Client: Government of Yukon - AAM | Northing (UTM Zone 8, NAD 83): 6881026.850 | Project No: VM00605E |
| Contractor & Method: Boreal, Backhoe | Easting (UTM Zone 8, NAD 83): 387811.761 | Elevation (m): 1218.32 |

| DEPTH (m) | Water Level | SAMPLE NO | Water Content | PID (ppm) | Pyrite (y/n) | Limestone (y/n) | Rust (y/n) | SOIL SYMBOL | DESCRIPTION | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.0-0.5 | damp | 0 | Y | N | N | | SAND, gravel, silt, | Boulders & Cobble noted 1st 0.5m | |
| | | 0.6-1.0 | damp | 0 | Y | N | Y | | SAND, gravel, silt, | | |
| 1 | | 1.1-1.5 | damp | 0 | Y | N | Y | | SAND, gravel, silt, | Reddish brown soil | 1217 |
| | | 1.6-2.0 | damp | 0 | Y | N | Y | | SAND, gravel, silt, | Reddish brown soil | |
| 2 | | | | | | | | | END OF HOLE @ 2.0m | | 1216 |
| 3 | | | | | | | | | | | 1215 |
| 4 | | | | | | | | | | | 1214 |
| 5 | | | | | | | | | | | 1213 |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| Start Date: 2013-09-11 1:50 PM | Logged By: S. Van Bibber |
|---|---|
| Completion Date: 2013-09-11 2:15 PM | Reviewed By: N. Jacques |
| Completion Depth: 2.0 m | Page 1 of 1 |

03-07-2014 C:\Users\40868js\Documents\M-Tech\mount nansen\tp-r-13-05.bor

# Appendix A3

# Diamond Drill Logs

**Mount Nansen 2013 Site Investigation Corehole Installation Summary Table**

| Borehole ID | UTM Zone 8, NAD 83 | | | Total Depth Drilled (m) | Installation Type | VWP Serial Number | Depth From Top of Hole (m) | | | | Stick Up (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Northing | Easting | Ground Elevation (m) | | | | VWP Install / MW Screened Interval | Top of Sand Pack | Top of Bentonite Seal | Top of Grout | |
| **CH-P-13-01/10** | 6,881,119 | 388,656 | 1150.94 | 10 | MW | N/A | 7-10 | 5.6 | 2.8 | 0 | 0.55 |
| **CH-P-13-01/40** | 6,881,125 | 388,638 | 1150.94 | 40 | No Installation Completed | | | | | 0 | 0 |
| **CH-P-13-02/10** | 6,881,012 | 388,924 | 1145.89 | 10 | MW | N/A | 7-10 | 5.6 | 2.8 | 0 | 0.76 |
| **CH-P-13-02/VWP** | 6,881,013 | 388,923 | 1145.90 | 50 | VWP | VW26477 | 6.83 | N/A | N/A | 0 | 0 |
| | | | | | VWP | VW26478 | 17.21 | | | | |
| | | | | | VWP | VW26480 | 27.63 | | | | |
| | | | | | VWP | VW26482 | 37.33 | | | | |
| | | | | | VWP | VW26486 | 48.02 | | | | |
| **CH-P-03/10** | 6,881,106 | 389,145 | 1183.53 | 10 | MW | N/A | 7-10 | 5.6 | 2.8 | 0 | 0.71 |
| **CH-P-03/50** | 6,881,108 | 389,144 | 1183.87 | 50 | MW | N/A | 47-50 | 45.6 | 42.8 | 0 | 0.68 |
| | | | | | VWP | VW26484 | 48.58 | | | | |
| **CH-P-04/10** | 6,881,471 | 389,137 | 1225.63 | 10 | MW | N/A | 7-10 | 5.5 | 2.7 | 0 | 0.58 |
| **CH-P-13-04/35** | 6,881,470 | 389,138 | 1225.57 | 50 | MW | N/A | 32-35 | 30.6 | 27.8 | 0 | 0.63 |
| | | | | | VWP | VW26289 | 35 | | | | |
| **CH-P-13-05/50** | 6,881,468 | 388,957 | 1185.00 | 50 | MW | N/A | 47-50 | 45.6 | 42.8 | 0 | 0.88 |
| | | | | | VWP | VW26487 | 49.40 | | | | |
| **CH-P-13-06/VWP** | 6,881,469 | 388,958 | 1185.01 | 60 | VWP | VW26479 | 14.30 | N/A | N/A | 0 | 0 |
| | | | | | VWP | VW26481 | 20.72 | | | | |
| | | | | | VWP | VW26483 | 28.40 | | | | |
| | | | | | VWP | VW26485 | 34.87 | | | | |
| | | | | | VWP | VW26489 | 42.34 | | | | |

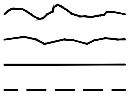
Notes:

1 MW = monitoring well
2 VWP = vibrating wire piezometer with temperature measurement
3 Coordinates from YES 2013 Survey
4 Refer to Appendix E2 for VWP Calibration Documentation and equipment specifications
5 Refer to Appendix F3 for VWP water levels
6 Refer to Appendix A3 for Corehole drill logs
7 CH-P-13-06/VWP was installed at a dip angle of 45°. Vertical depths are presented above.

Discontinuity Data

Fracture Type
JN = Joint
FT = Fault / Fault Zone

Roughness
VR = Very Rough
R = Rough
S = Smooth
SS = Slickensided



Shape

P = Planar C = Curved U = Undulating S = Stepped I = Irregular

Infill Type
$F_CO$ - Iron Oxide
FG - Fault Gauge
Cl - Chlorite
S - Sulfides
Ca - Calcite

Icon = Fracture Condition (RMR 1989)

| | |
|---|---|
| Very rough surfaces, fractures not continuous, no separation, unweathered | 30 |
| Slightly rough surfaces, separation < 1 mm, slightly weathered walls | 25 |
| Slightly rough surfaces, separation < 1 mm, highly weathered walls | 20 |
| Slickensided surfaces or gauge < 5 mm thick or separation 1-55 mm continuous | 10 |
| Soft guage > 5 mm thick or separation > 5 mm continuous | 0 |

Rock Strength

| | | |
|---|---|---|
| R0 | Extremely weak rock | Indented with thumbnail |
| R1 | Very weak rock | Crumbles under firm blows with point of a geological hammer, can be peeled by a pocket knife |
| R2 | Weak rock | Can be peeled by a pocket knife with difficulty, shallow indentations made by firm blow with point of geological hammer |
| R3 | Medium Strong Rock | Cannot be scraped or peeled with a pocket knife, specimen can be fractured with single firm blow of geological hammer |
| R4 | Strong Rock | Specimen requires more than one blow of geological hammer to fracture it |
| R5 | Very Strong Rock | Specimen requires many blows of geological hammer to fracture it |
| R6 | Extremely Strong Rock | Specimen can only be chipped with geological hammer |

Weathering

| Term | Symbol | Description | Discoloration Extent | Fracture Condition | Surface Characteristics |
|---|---|---|---|---|---|
| Fresh | W1 | No visible sign of rock material | None | Closed or discolored | Unchanged |
| Slightly Weathered | W2 | Discoloration indicates weathering of rock material on discontinuity surfaces. Less than 5% of rock mass altered | <20 % of fracture spacing on both sides of fracture | Discolored, may contain thin filling | Partial discoloration |
| Moderately Weathered | W3 | Less than 50 % of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a discontinuous framework or as corestones | <20 % of fracture spacing on both sides of fracture | Discolored, may contain thin filling | Parital to complete discoloration, not friable except poorly cemented rocks |
| Highly Weathered | W4 | More than 50 % of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a discontinuous framework or as corestones | Throughout | Filled with alteration materials | Friable and possibly pitted |
| Completely Weathered | W5 | 100 % of rock material is decomposed and/or disintegrated to soil. The original mass structure is still largely intact | Throughout | Filled with alteration materials | Resembles soil |
| Residual Soil | W6 | All rock material is converted to soil. The mass structure and material fabric are destroyed. There is a large change in volume, but the soil has not been significantly transported | Throughout | N/A | Resembles soil |

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CLIENT: Yukon Energy, Mines and Resources

TITLE: COREHOLE LOG REFERENCES

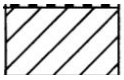
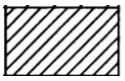
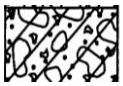
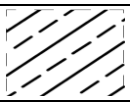
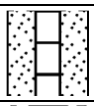
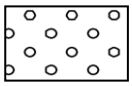
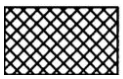
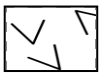
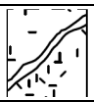
PROJECT: GOVERNMENT OF YUKON - AAM
MOUNT NANSEN 2013 SITE INVESTIGATION

| DWN BY: | DATE: | PROJECT NO: |
|---|---|---|
| BB | NOVEMBER 2013 | VM00605 |
| CHK'D BY: TK | | |

S:\External\VM00605E.522.30-CAD\VM00605-CoreHoleLogReferences.dwg - CHLogRef - Nov. 20, 2013 3:59pm - ben.brown

This drawing was originally produced in colour.

## DEFINITION OF SYMBOLS USED ON COREHOLE LOGS

| SOIL | | SOIL | | WELL DETAILS | |
|---|---|---|---|---|---|
| | GRAVEL, well graded, to and SAND little to no fines,(GW) | | SILT, high plastic (MH) | | Solid pipe with BACKFILL |
| | GRAVEL, poorly graded, to and SAND little to no fines (GP) |  | CLAY, low plastic (CL) | | Solid Pipe with BENTONITE |
| | GRAVEL, silty to and SAND, and SILT(GM) |  | CLAY, medium plastic (CI) | | Solid pipe with GROUT |
|  | GRAVEL, clayey to and SAND, and CLAY (GC) | | CLAY, high plastic (CH) | | Solid pipe with SAND |
| | SAND, well graded, to gravely, little to no fines, (SW) |  | ORGANIC silt or clay, low plastic (OL) |  | Slotted pipe with SAND |
|  | SAND, poorly graded, to gravely, little to no fines (SW) | | ORGANIC silt or clay, high plastic (OH) | | Slotted pipe with NO BACKFILL |
| | SAND, silty (SM) | | PEAT (Pt) | | SAND backfill |
| | SAND, clayey to SAND and CLAY (SC) | ROCK | | | GROUT backfill |
|  | FILL |  | Granodiorite (GRDR) |  | GENERAL BACKFILL (e.g. drill cutting, slough) |
| | SILT, low plastic (ML) | | Andesite (ANDS) | | |

| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-01/10 |
| Project Client: Government of Yukon - AAM | Northing: 6881119 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 388656 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 0 | Dip (from Horiz.): 90º | Surface Elevation: 1150.935 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Discontinuity Data: Roughness | Discontinuity Data: Shape | Discontinuity Data: Infill Type | Discontinuity Data: Infill Thickness (mm) | Discontinuity Data: Jcon (RMR 1989) | Discontinuity Data: Angle With Core Axis (degrees º) 30 60 | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) 1e-9 1e-8 1e-7 | Core Recovery: Solid Core Recovery (%) 20 40 60 80 | Core Recovery: Rock Quality Designation (%) 20 40 60 80 | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1150 | | Overburden | | | | | | | | | | | | | | | Coordinates and Elevation from 2013 YES survey. |
| 1 | | | | | | | | | | | | | | | | | | |
| 2 | 1149 | | | | | | | | | | | | | | | | | |
| 3 | 1148 | | | | | | | | | | | | | | | | | |
| 4 | 1147 | | | | | | | | | | | | | | | | | |
| 5 | 1146 | | | | | | | | | | | | | | | | | |
| 6 | 1145 | | | | | | | | | | | | | | | | | |
| 7 | 1144 | | Heavily weathered, very weak rock, iron oxide, brownish red in colour. | | | | | | | | | | | | | | | |
| 8 | 1143 | | | | | | | | | | | | | | | | | |
| 9 | 1142 | | | | | | | | | | | | | | | | | |
| 10 | 1141 | | | | | | | | | | | | | | | | | |
| | | | -End of hole at 10.0 m depth.<br>-Installed 1.5" diameter monitoring well, 10 Slot from 7 to 10 m.<br>-Sand pack from 5.6 to 10 m.<br>-Bentonite seal placed with coated pellets from 2.8 to 5.6 m.<br>-Cement-bentonite grout backfill from 2.8 m to surface.<br>-Protective monument installed at collar with 0.55 m stick up. | | | | | | | | | | | | | | | |

| | | | |
|---|---|---|---|
| amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS. | Start Date: 2013-09-30 | Logged By: D. Kennedy |
| | | Completion Date: 2013-09-30 | Reviewed By: Paul Morton |
| | | Completion Depth: 10 m | Page 1 of 1 |

Format: MT NANSEN ROCK LOG - 2013 File: MT NANSEN COREHOLE LOGS.GPJ Date: 2014-02-27 4:50:41 PM

| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-01/40 |
| Project Client: Government of Yukon - AAM | Northing: 6881125 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 388638 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 0 | Dip (from Horiz.): 90° | Surface Elevation: 1150.935 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Roughness | Shape | Infill Type | Infill Thickness (mm) | Jcon (RMR 1989) | Angle With Core Axis (degrees °) 30 60 | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) 1e-9 1e-8 1e-7 | Core Recovery: Solid Core Recovery (%) 20 40 60 80 | Core Recovery: Rock Quality Designation (%) 20 40 60 80 | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1150 | | Overburden | | | | | | | | | | | | | | | Coordinates and Elevation from 2013 YES survey. Heavily fractured and heavily weathered bedrock. No packer testing performed due to highly incompetent bedrock. |
| 6 | 1145 | | Heavily weathered, very weak rock, iron oxide, brownish red in colour. | 1 | | | | | | | | R0 | W5 | | 0 | 0 | | |
| 8 | 1143 | | | 2 | | | | | | | | R0 | W5 | | 0 | 0 | | |
| 12 | 1139 | | | 3 | | | | | | | | R1 | W4 | | 13 | 9 | | Van Ruth Plug installed at 13m. Water pressure would not allow deeper installation. Grout backfill to surface above plug. |
| 14 | 1137 | | | 4 | | | | | | | | R1 | W4 | | 10 | 14 | | |
| 15 | 1136 | | | 5 | JN | R | S | FeO | 1 | 10 | • | | | | | | | |
| 16 | 1135 | | | | JN | R | P | FeO | 1 | 10 | • | | | | | | | |
| | | | | | JN | R | P | FeO | 1 | 10 | • | R1 | W4 | | 10 | 24 | | |
| 18 | 1133 | | | 6 | | | | | | | | R1 | W4 | | 4 | 0 | | |
| 20 | 1131 | | | 7 | | | | | | | | R1 | W4 | | 0 | 0 | | |

Format: MT NANSEN ROCK LOG - 2013 File: MT NANSEN COREHOLE LOGS.GPJ Date: 2014-02-27 4:50:43 PM

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-05 | Logged By: T. Kostya |
| Completion Date: 2013-09-07 | Reviewed By: Paul Morton |
| Completion Depth: 40 m | Page 1 of 2 |

| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-01/40 |
| Project Client: Government of Yukon - AAM | Northing: 6881125 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 388638 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 0 | Dip (from Horiz.): 90º | Surface Elevation: 1150.935 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Roughness | Shape | Infill Type | Infill Thickness (mm) | Jcon (RMR 1989) | Angle With Core Axis (degrees º) | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) | Core Recovery: Solid Core Recovery (%) | Core Recovery: Rock Quality Designation (%) | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 1130 | | Heavily weathered, very weak rock, iron oxide, brownish red in colour. **(CONTINUED)** | 8 | | | | | | | | R1 | W4 | | 0 | 0 | | |
| 21 | 1129 | | | 9 | | | | | | | | R1 | W4 | | 0 | 0 | | |
| 22 | 1128 | | | 10 | | | | | | | | R1 | W4 | | 11 | 0 | | |
| 23 | 1127 | | | 11 | JN | R | I | FeO | 1 | 10 | | R1 | W4 | | 36 | 25 | | |
| 24 | 1126 | | | | JN | R | P | FeO | 1 | 10 | | | | | | | | |
| 25 | 1125 | | | | JN | R | I | FeO | 1 | 10 | | | | | | | | |
| 26 | 1124 | | | 12 | | | | | | | | R1 | W4 | | 21 | 8 | | |
| 27 | 1123 | | | 13 | | | | | | | | R1 | W4 | | 3 | 0 | | |
| 28 | 1122 | | | 14 | | | | | | | | R1 | W4 | | 0 | 0 | | |
| 29 | 1121 | | | 15 | | | | | | | | R1 | W4 | | 0 | 0 | | |
| 30 | 1120 | | | 16 | | | | | | | | R1 | W4 | | 11 | 0 | | |
| 31 | 1119 | | | 17 | JN | R | I | FeO | 1 | 10 | | R2 | W4 | | 32 | 31 | | |
| 32 | 1118 | | | | JN | R | P | FeO | 1 | 10 | | | | | | | | |
| 33 | 1117 | | | | JN | R | S | FeO | 1 | 10 | | | | | | | | |
| 34 | 1116 | | | | JN | R | I | FeO | 1 | 10 | | | | | | | | |
| 35 | 1115 | | | | JN | R | I | FeO | 1 | 10 | | | | | | | | |
| 36 | 1114 | | | | JN | R | I | FeO | 1 | 10 | | | | | | | | |
| 37 | 1113 | | | | JN | R | P | FeO | 1 | 10 | | | | | | | | |
| 38 | 1112 | | | 18 | JN | R | P | FeO | 1 | 10 | | R2 | W4 | | 43 | 46 | | |
| 39 | 1111 | | | | JN | R | C | FeO | 1 | 10 | | | | | | | | |
| 40 | | | | | JN | R | I | FeO | 1 | 10 | | | | | | | | |
| | | | | | JN | R | P | FeO | 1 | 10 | | | | | | | | |
| | | | | | JN | R | P | FeO | 1 | 10 | | | | | | | | |
| | | | | | JN | R | P | FeO | 1 | 10 | | | | | | | | |
| | | | | 19 | | | | | | | | R1 | W4 | | 6 | 0 | | |
| | | | | 20 | | | | | | | | R1 | W4 | | 0 | 0 | | Artesian Conditions. Shut in Pressure of 16 PSI and flow rate of 1.2 L/s. Hole was plugged with a Van Ruth Plug, grouted to surface, and abandoned. |

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| amec / Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS. | Start Date: 2013-09-05 | Logged By: T. Kostya |
| | Completion Date: 2013-09-07 | Reviewed By: Paul Morton |
| | Completion Depth: 40 m | Page 2 of 2 |

| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-02/10 |
| Project Client: Government of Yukon - AAM | Northing: 6881012 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 388924 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 0 | Dip (from Horiz.): 90º | Surface Elevation: 1145.893 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Discontinuity Data: Roughness | Discontinuity Data: Shape | Discontinuity Data: Infill Type | Discontinuity Data: Infill Thickness (mm) | Discontinuity Data: Jcon (RMR 1989) | Discontinuity Data: Angle With Core Axis (degrees º) 30 60 | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) 1e-9 1e-8 1e-7 | Core Recovery: Solid Core Recovery (%) 20 40 60 80 | Core Recovery: Rock Quality Designation (%) 20 40 60 80 | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1145 | | Overburden | | | | | | | | | | | | | | | Coordinates and Elevation from 2013 YES survey. |
| 2 | 1144 | | | | | | | | | | | | | | | | | |
| 3 | 1143 | | | | | | | | | | | | | | | | | |
| 4 | 1142 | | | | | | | | | | | | | | | | | |
| 5 | 1141 | | | | | | | | | | | | | | | | | |
| 6 | 1140 | | | | | | | | | | | | | | | | | |
| 7 | 1139 | | Heavily weathered, very weak rock, iron oxide, brownish red in colour. | | | | | | | | | | | | | | | |
| 8 | 1138 | | | | | | | | | | | | | | | | | |
| 9 | 1137 | | | | | | | | | | | | | | | | | |
| 10 | 1136 | | | | | | | | | | | | | | | | | |
| | | | -End of hole at 10.0 m depth.<br>-Installed 1.5" diameter monitoring well, 10 Slot from 7 to 10 m.<br>-Sand pack from 5.6 to 10 m.<br>-Bentonite seal placed with coated pellets from 2.8 to 5.6 m.<br>-Cement-bentonite grout backfill from 2.8 m to surface.<br>-Protective monument installed at collar with 0.76 m stick up. | | | | | | | | | | | | | | | |

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|---|---|---|---|
| Start Date: 2013-09-30 | | Logged By: D. Kennedy | |
| Completion Date: 2013-09-30 | | Reviewed By: Paul Morton | |
| Completion Depth: 10 m | | Page 1 of 1 | |

Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

Format: MT NANSEN ROCK LOG - 2013 File: MT NANSEN COREHOLE LOGS.GPJ Date: 2014-02-27 4:50:46 PM

| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-02/VWP |
| Project Client: Government of Yukon - AAM | Northing: 6881013 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 388923 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 0 | Dip (from Horiz.): 90° | Surface Elevation: 1145.904 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Discontinuity Data: Roughness | Discontinuity Data: Shape | Discontinuity Data: Infill Type | Discontinuity Data: Infill Thickness (mm) | Discontinuity Data: Jcon (RMR 1989) | Discontinuity Data: Angle With Core Axis (degrees °) 30 60 | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) 1e-9 1e-8 1e-7 | Core Recovery: Solid Core Recovery (%) 20 40 60 80 | Core Recovery: Rock Quality Designation (%) 20 40 60 80 | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1145 | | Overburden | 1 | | | | | | | | | W5 | | | | | Coordinates and Elevation from 2013 YES survey. |
| 2 | 1144 | | | | | | | | | | | | | | | | | |
| 3 | 1143 | | | | | | | | | | | | | | | | | |
| 4 | 1142 | | | | | | | | | | | | | | | | | |
| 5 | 1141 | | | | | | | | | | | | | | | | | |
| 6 | 1140 | | | | | | | | | | | | | | | | | |
| 7 | 1139 | | Heavily weathered, very weak rock, iron oxide, brownish red in colour. | 2 | | | | | | | | R2 | W4 | | 19 | 14 | | No Packer testing due to incompetent bedrock<br>Vibrating wire piezometer installed at 6.83 m, serial # VW26477 |
| 8 | 1138 | | | 3 | | | | | | | | R2 | W4 | | 0 | 0 | | |
| 9 | 1137 | | | | | | | | | | | | | | | | | |
| 10 | 1136 | | | 4 | | | | | | | | R2 | W4 | | 33 | 45 | | |
| 11 | 1135 | | | | | | | | | | | | | | | | | |
| 12 | 1134 | | | 5 | | | | | | | | R2 | W4 | | 15 | 9 | | |
| 13 | 1133 | | | | | | | | | | | | | | | | | |
| 14 | 1132 | | | 6 | | | | | | | | R2 | W4 | | 4 | 17 | | |
| 15 | 1131 | | | | | | | | | | | | | | | | | |
| 16 | 1130 | | | 7 | | | | | | | | R2 | W4 | | 31 | 23 | | |
| 17 | 1129 | | | 8 | | | | | | | | R2 | W4 | | 9 | 0 | | Vibrating wire piezometer installed at 17.21 m, serial # VW26478 |
| 18 | 1128 | | | 9 | | | | | | | | R2 | W4 | | 5 | 0 | | |
| 19 | 1127 | | | | | | | | | | | | | | | | | |
| 20 | 1126 | | | 10 | | | | | | | | R2 | W4 | | | 47 | | |

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amec

Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-29 | Logged By: D. Kennedy |
| Completion Date: 2013-09-30 | Reviewed By: Paul Morton |
| Completion Depth: 50 m |  |

| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-02/VWP |
| Project Client: Government of Yukon - AAM | Northing: 6881013 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 388923 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 0 | Dip (from Horiz.): 90° | Surface Elevation: 1145.904 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Roughness | Shape | Infill Type | Infill Thickness (mm) | Jcon (RMR 1989) | Angle With Core Axis (degrees °) | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) | Core Recovery: Solid Core Recovery (%) | Core Recovery: Rock Quality Designation (%) | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 | 1125 | | Heavily weathered, very weak rock, iron oxide, brownish red in colour. **(CONTINUED)** | 10 | JN | R | P | FeO | 1 | 10 | | R2 | W4 | | | 47 | | |
| | | | | | JN | R | P | FeO | 1 | 10 | | | | | | | | |
| 22 | 1124 | | | | JN | R | I | FeO | 1 | 10 | | | | | | | | |
| | | | | | JN | R | I | FeO | 1 | 10 | | | | | | | | |
| 23 | 1123 | | | 11 | JN | R | I | FeO | 1 | 10 | | R2 | W4 | | 85 | 87 | | Packer Test #1 - Falling Head Test (1.9e-8m/s) |
| | | | | | JN | R | I | FeO | 1 | 10 | | | | | | | | |
| 24 | 1122 | | | | JN | R | P | FeO | 1 | 10 | | | | | | | | |
| | | | | | JN | R | P | FeO | 1 | 10 | | | | | | | | |
| 25 | 1121 | | | 12 | | | | | | | | R2 | W4 | 1.E-08 m/s | | 34 | | |
| 26 | 1120 | | | | JN | R | I | FeO | 1 | 10 | | | | | | | | |
| 27 | 1119 | | | 13 | | | | | | | | R2 | W4 | | | 10 | | |
| 28 | 1118 | | | 14 | | | | | | | | R2 | W4 | | | 0 | | Vibrating wire piezometer installed at 27.63 m, serial # VW26480 |
| 29 | 1117 | | | 15 | | | | | | | | R2 | W4 | | | 10 | | Packer Test #2 - Falling Head Test (2.0e-7m/s) |
| 30 | 1116 | | | | | | | | | | | | | | | | | |
| 31 | 1115 | | | 16 | | | | | | | | R2 | W4 | 1.E-07 m/s | | 13 | | |
| 32 | 1114 | | | | | | | | | | | | | | | | | |
| 33 | 1113 | | | 17 | | | | | | | | R2 | W4 | | | 0 | | |
| | | | | 18 | | | | | | | | R2 | W4 | | | 0 | | |
| 34 | 1112 | | | | | | | | | | | | | | | | | Packer Test #3 - Constant Head Test (1.3e-6m/s) |
| 35 | 1111 | | | 19 | | | | | | | | R2 | W4 | | | 14 | | |
| 36 | 1110 | | | | | | | | | | | | | | | | | |
| 37 | 1109 | | | | | | | | | | | | | 1.E-06 m/s | | | | |
| 38 | 1108 | | | 20 | | | | | | | | R2 | W4 | | | 21 | | Vibrating wire piezometer installed at 37.33 m, serial # VW26482 |
| 39 | 1107 | | | | | | | | | | | | | | | | | |
| 40 | 1106 | | | 21 | | | | | | | | R2 | W4 | | | 0 | | |

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amec

Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-29 | Logged By: D. Kennedy |
| Completion Date: 2013-09-30 | Reviewed By: Paul Morton |
| Completion Depth: 50 m |  |

| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-02/VWP |
|---|---|---|
| Project Client: Government of Yukon - AAM | Northing: 6881013 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 388923 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 0 | Dip (from Horiz.): 90º | Surface Elevation: 1145.904 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Discontinuity Data: Roughness | Discontinuity Data: Shape | Discontinuity Data: Infill Type | Discontinuity Data: Infill Thickness (mm) | Discontinuity Data: Jcon (RMR 1989) | Discontinuity Data: Angle With Core Axis (degrees º) 30 60 | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) 1e-9 1e-8 1e-7 | Core Recovery: Solid Core Recovery (%) 20 40 60 80 | Core Recovery: Rock Quality Designation (%) 20 40 60 80 | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41 | 1105 | | Heavily weathered, very weak rock, iron oxide, brownish red in colour. **(CONTINUED)** | 22 | | | | | | | | R2 | W4 | | | 17 | | Packer Test #4 - No Flow between 40-50m |
| 42 | 1104 | | | | | | | | | | | | | | | | | |
| 43 | 1103 | | | | | | | | | | | | | | | | | |
| 44 | 1102 | | | 23 | | | | | | | | R2 | W4 | | | 20 | | |
| 45 | 1101 | | | | | | | | | | | | | | | | | |
| 46 | 1100 | | | | | | | | | | | | | | | | | |
| 47 | 1099 | | | 24 | | | | | | | | R2 | W4 | | | 0 | | |
| 48 | 1098 | | | 25 | | | | | | | | R2 | W4 | | | 0 | | Vibrating wire piezometer installed at 48.02 m, serial # VW26486 |
| 49 | 1097 | | | | | | | | | | | | | | | | | |
| 50 | 1096 | | | 26 | | | | | | | | R2 | W4 | | | 0 | | |
| | | | -End of Hole at 50.0 m<br>-Five nested vibrating wire piezometers strapped to 1" diameter PVC pipe.<br>-Ten channel data logger installed at collar of hole, refer to Appendix E2 of SI Data Report for equipment specifications of logger and piezometers.<br>-Hole backfilled from 50.0 m to surface with cement-bentonite grout.<br>-Protective monument installed at collar of hole. | | | | | | | | | | | | | | | |

| | | | |
|---|---|---|---|
| Start Date: 2013-09-29 | Logged By: D. Kennedy | | |
| Completion Date: 2013-09-30 | Reviewed By: Paul Morton | | |
| Completion Depth: 50 m | Page 3 of 3 | | |

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| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-03/10 |
| Project Client: Government of Yukon - AAM | Northing: 6881106 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 389145 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 0 | Dip (from Horiz.): 90º | Surface Elevation: 1183.834 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Discontinuity Data: Roughness | Discontinuity Data: Shape | Discontinuity Data: Infill Type | Discontinuity Data: Infill Thickness (mm) | Discontinuity Data: Jcon (RMR 1989) | Discontinuity Data: Angle With Core Axis (degrees º) 30 60 | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) 1e-9 1e-8 1e-7 | Core Recovery: Solid Core Recovery (%) 20 40 60 80 | Core Recovery: Rock Quality Designation (%) 20 40 60 80 | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1183 | | Overburden | | | | | | | | | | | | | | | Coordinates and Elevation from 2013 YES survey. |
| 1 | | | | | | | | | | | | | | | | | | |
| 2 | 1182 | | Heavily weathered, very weak rock, iron oxide, brownish red in colour. | | | | | | | | | | | | | | | |
| 3 | 1181 | | | | | | | | | | | | | | | | | |
| 4 | 1180 | | | | | | | | | | | | | | | | | |
| 5 | 1179 | | | | | | | | | | | | | | | | | |
| 6 | 1178 | | | | | | | | | | | | | | | | | |
| 7 | 1177 | | | | | | | | | | | | | | | | | |
| 8 | 1176 | | | | | | | | | | | | | | | | | |
| 9 | 1175 | | | | | | | | | | | | | | | | | |
| 10 | 1174 | | -End of hole at 10.0 m depth.<br>-Installed 1.5" diameter monitoring well, 10 Slot from 7 to 10 m.<br>-Sand pack from 5.6 to 10 m.<br>-Bentonite seal placed with coated pellets from 2.8 to 5.6 m.<br>-Cement-bentonite grout backfill from 2.8 m to surface.<br>-Protective monument installed at collar with 0.71 m stick up. | | | | | | | | | | | | | | | |

| | | |
|---|---|---|
| Start Date: 2013-09-14 | Logged By: T. Kostya | |
| Completion Date: 2013-09-14 | Reviewed By: Paul Morton | |
| Completion Depth: 10 m | Page 1 of 1 | |

Format: MT NANSEN ROCK LOG - 2013 File: MT NANSEN COREHOLE LOGS.GPJ Date: 2014-02-27 4:50:52 PM

| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-03/50 |
| Project Client: Government of Yukon - AAM | Northing: 6881108 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 389144 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 0 | Dip (from Horiz.): 90º | Surface Elevation: 1183.866 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Roughness | Shape | Infill Type | Infill Thickness (mm) | Jcon (RMR 1989) | Angle With Core Axis (degrees º) 30 60 | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) 1e-9 1e-8 1e-7 | Core Recovery: Solid Core Recovery (%) 20 40 60 80 | Core Recovery: Rock Quality Designation (%) 20 40 60 80 | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1183 | | Overburden | 1 | | | | | | | | - | W6 | | 0 | 0 | | Coordinates and Elevation from 2013 YES survey. |
| 2 | 1182 | | Heavily weathered, very weak rock, iron oxide, brownish red in colour. | 2 | | | | | | | | R0 | W5 | | 0 | 0 | | |
| 3 | 1181 | | | | | | | | | | | | | | | | | |
| 4 | 1180 | | | 3 | | | | | | | | R1 | W4 | | 0 | 0 | | |
| 5 | 1179 | | | | | | | | | | | | | | | | | |
| 6 | 1178 | | | | | | | | | | | | | | | | | |
| 7 | 1177 | | | 4 | JN | | | | | | | R2 | W4 | | 10 | 0 | | Packer Test #1 - Constant Head Test (1.2e-6 m/s) |
| 8 | 1176 | | | | | | | | | | | | | | | | | |
| 9 | 1175 | | | | | | | | | | | | | | | | | |
| 10 | 1174 | | | 5 | | | | | | | | R2 | W4 | 1.E-06 m/s | 0 | 0 | | |
| 11 | 1173 | | | | | | | | | | | | | | | | | |
| 12 | 1172 | | | 6 | JN<br>JN | R<br>R | P<br>P | FeO<br>FeO | <1<br><1 | 20<br>20 | | R2 | W4 | | 21 | 11 | | |
| 13 | 1171 | | | 7 | | | | | | | | R2 | W4 | | 0 | 0 | | Packer Test #2 - Constant Head Test (1.3e-6 m/s) |
| 14 | 1170 | | | | | | | | | | | | | | | | | |
| 15 | 1169 | | | 8 | | | | | | | | R2 | W4 | | 21 | 25 | | |
| 16 | 1168 | | | | | | | | | | | | | 1.E-06 m/s | | | | |
| 17 | 1167 | | Metasedimentary Bedrock (Gneiss), fine to course grained matrix, dark and light foliations, dark greenish grey in colour, iron oxide staining along joints, medium strength rock, moderately weathered. | 9 | JN<br>JN<br>JN<br>JN<br>JN<br>JN | R<br>R<br>R<br>R<br>R<br>R | I<br>P<br>P<br>P<br>P<br>I | FeO<br>FeO<br>FeO<br>FeO<br>FeO<br>FeO | <1<br><1<br><1<br><1<br><1<br><1 | 20<br>20<br>20<br>20<br>20<br>20 | | R2 | W3 | | 41 | 54 | | |
| 18 | 1166 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 19 | 1165 | | | | JN<br>JN<br>JN<br>JN | R<br>R<br>R<br>R | I<br>I<br>P<br>I | FeO<br>FeO<br>FeO<br>FeO | <1<br><1<br><1<br><1 | 20<br>20<br>20<br>20 | | | | | | | | |
| 20 | 1164 | | | 10 | JN | R | P | FeO | <1 | 20 | | R3 | W3 | 1.E-08 m/s | 28 | 21 | | Packer Test #3 - Falling Head Test (9.9e-8 m/s) |

| | | |
|---|---|---|
| Start Date: 2013-09-11 | | Logged By: T. Kostya |
| Completion Date: 2013-09-13 | | Reviewed By: Paul Morton |
| Completion Depth: 50 m | | Page 1 of 3 |

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| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-03/50 |
| Project Client: Government of Yukon - AAM | Northing: 6881108 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 389144 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 0 | Dip (from Horiz.): 90° | Surface Elevation: 1183.866 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Roughness | Shape | Infill Type | Infill Thickness (mm) | Jcon (RMR 1989) | Angle With Core Axis (degrees °) | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) | Core Recovery: Solid Core Recovery (%) | Core Recovery: Rock Quality Designation (%) | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 | 1163 | | Metasedimentary Bedrock (Gneiss), fine to course grained matrix, dark and light foliations, dark greenish grey in colour, iron oxide staining along joints, medium strength rock, moderately weathered. **(CONTINUED)** | 10 | JN | R | P | FeO | <1 | 20 | | R3 | W3 | | 28 | 21 | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| 22 | 1162 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | | | | 11 | JN | R | P | FeO | <1 | 20 | | R3 | W3 | | 0 | 0 | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 23 | 1161 | | | | JN | R | I | FeO | <1 | 20 | | | | 1.E-08 m/s | | | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| 24 | 1160 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | | | | 12 | JN | R | I | FeO | <1 | 20 | | R3 | W3 | | 37 | 38 | | |
| 25 | 1159 | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | Packer Test #4 - Constant Head Test (4.1e-7 m/s) |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| 26 | 1158 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | 13 | JN | R | P | FeO | <1 | 20 | | R3 | W3 | | 39 | 28 | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 27 | 1157 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| 28 | 1156 | | | | JN | R | I | FeO | 3 | 20 | | | | | | | | |
| | | | | | | | | | | | | | | 1.E-07 m/s | | | | |
| 29 | 1155 | | | 14 | | | | | | | | R3 | W3 | | 18 | 16 | | |
| | | | | | | | | | | | | | | | | | | |
| 30 | 1154 | | | | FT | | | FeO | 4 | 10 | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | | | | 15 | JN | R | P | FeO | <1 | 20 | | R3 | W3 | | 36 | 49 | | |
| 31 | 1153 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | Packer Test #5 - Falling Head Test (8.6e-8 m/s) |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 32 | 1152 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | | | Metasedimentary Bedrock (Quartzite), fine matrix, dark and light foliations, greyish white in colour, iron oxide discolouration along joints, very strong rock, slight weathering. | 16 | JN | R | I | FeO | 1 | 10 | | R4 | W2 | | 68 | 73 | | |
| 33 | 1151 | | | | JN | R | I | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| 34 | 1150 | | | | JN | R | I | FeO | <1 | 25 | | | | 1.E-08 m/s | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 25 | | | | | | | | |
| 35 | 1149 | | Metasedimentary Bedrock (Gneiss), fine to course grained matrix, dark and light foliations, dark greenish grey in colour, iron oxide staining along joints, medium strength rock, moderately weathered. | | JN | R | I | FeO | <1 | 25 | | | | | | | | |
| | | | | 17 | JN | R | P | FeO | <1 | 25 | | R4 | W2 | | 85 | 91 | | |
| 36 | 1148 | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| 37 | 1147 | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | JN | VR | P | FeO | <1 | 25 | | | | | | | | Packer Test #6 - Falling Head Test (1.3e-7 m/s) |
| 38 | 1146 | | | | JN | VR | P | FeO | <1 | 25 | | | | | | | | |
| | | | | 18 | | | | | | | | R5 | W2 | 1.E-07 m/s | 80 | 92 | | |
| 39 | 1145 | | | | | | | | | | | | | | | | | |
| | | | | | JN | VR | P | FeO | <1 | 25 | | | | | | | | |
| 40 | 1144 | | | | | | | | | | | | | | | | | |

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Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
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| Start Date: 2013-09-11 | Logged By: T. Kostya |
| Completion Date: 2013-09-13 | Reviewed By: Paul Morton |
| Completion Depth: 50 m | Page 2 of 3 |

| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-03/50 |
| Project Client: Government of Yukon - AAM | Northing: 6881108 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 389144 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 0 | Dip (from Horiz.): 90º | Surface Elevation: 1183.866 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Roughness | Shape | Infill Type | Infill Thickness (mm) | Jcon (RMR 1989) | Angle With Core Axis (degrees º) | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) | Core Recovery: Solid Core Recovery (%) | Core Recovery: Rock Quality Designation (%) | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41 | 1143 | | Metasedimentary Bedrock (Gneiss), fine to course grained matrix, dark and light foliations, dark greenish grey in colour, iron oxide staining along joints, medium strength rock, moderately weathered. **(CONTINUED)** | | JN | VR | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | S | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| 42 | 1142 | | | 19 | JN | R | S | FeO | <1 | 25 | | R5 | W2 | 1.E-07 m/s | 70 | 93 | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| 43 | 1141 | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | S | FeO | <1 | 25 | | | | | | | | Packer Test #7 - Falling Head Test (1.1e-8 m/s) |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| 44 | 1140 | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | 20 | JN | R | P | FeO | <1 | 25 | | R5 | W2 | | 70 | 86 | | |
| 45 | 1139 | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| 46 | 1138 | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| 47 | 1137 | | | | JN | R | P | FeO | <1 | 25 | | | | 1.E-08 m/s | | | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | 21 | JN | R | P | FeO | <1 | 25 | | R5 | W2 | | 60 | 82 | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| 48 | 1136 | | | | JN | R | I | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| 49 | 1135 | | | 22 | | | | | | | | R5 | W2 | | | | | Vibrating wire piezometer installed at 48.58 m, serial # VW26484 |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| 50 | 1134 | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | -End of Hole at 50.0 m<br>-Installed 1" diameter monitoring well with 10 slot screen from 47 to 50 m.<br>-Installed a vibrating wire piezometer at 48.58 m.<br>-Installed a single channel data logger at collar of hole, refer to Appendix E2 for equipment specifications for the logger and piezometer<br>-Sand backfill placed from 45.6 to 50 m.<br>-Bentonite seal with coated pellets from 42.8 to 45.6 m.<br>-Cement-bentonite grout installed from 42.8 m to surface.<br>-Protective monument and data logger installed at collar of hole with 0.68 m stick up. | | JN | R | P | FeO | <1 | 25 | | | | | | | | |

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Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

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| Start Date: 2013-09-11 | Logged By: T. Kostya |
| Completion Date: 2013-09-13 | Reviewed By: Paul Morton |
| Completion Depth: 50 m | Page 3 of 3 |

Format: MT NANSEN ROCK LOG - 2013 File: MT NANSEN COREHOLE LOGS.GPJ Date: 2014-02-27 4:50:58 PM

| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-04/10 |
| Project Client: Government of Yukon - AAM | Northing: 6881471 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 389137 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 0 | Dip (from Horiz.): 90º | Surface Elevation: 1225.630 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Discontinuity Data: Roughness | Discontinuity Data: Shape | Discontinuity Data: Infill Type | Discontinuity Data: Infill Thickness (mm) | Discontinuity Data: Jcon (RMR 1989) | Discontinuity Data: Angle With Core Axis (degrees º) 30 60 | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) 1e-9 1e-8 1e-7 | Core Recovery: Solid Core Recovery (%) 20 40 60 80 | Core Recovery: Rock Quality Designation (%) 20 40 60 80 | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1225 | | Overburden | | | | | | | | | | | | | | | Coordinates and Elevation from 2013 YES survey. |
| 1 | | | | | | | | | | | | | | | | | | |
| 2 | 1224 | | | | | | | | | | | | | | | | | |
| 3 | 1223 | | | | | | | | | | | | | | | | | |
| 4 | 1222 | | | | | | | | | | | | | | | | | |
| 5 | 1221 | | | | | | | | | | | | | | | | | |
| 6 | 1220 | | | | | | | | | | | | | | | | | |
| 7 | 1219 | | Heavily weathered, very weak rock, iron oxide, brownish red in colour. | | | | | | | | | | | | | | | |
| 8 | 1218 | | | | | | | | | | | | | | | | | |
| 9 | 1217 | | | | | | | | | | | | | | | | | |
| 10 | 1216 | | | | | | | | | | | | | | | | | |
| | | | -End of hole at 10.0 m depth.<br>-Installed 1.5" diameter monitoring well, 10 Slot from 7 to 10 m.<br>-Sand pack from 5.5 to 10 m.<br>-Bentonite seal placed with coated pellets from 2.8 to 5.5 m.<br>-Cement-bentonite grout backfill from 2.8 m to surface.<br>-Protective monument installed at collar with 0.58 m stick up. | | | | | | | | | | | | | | | |

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| amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS. | Start Date: 2013-09-17 | Logged By: T. Kostya |
| | | Completion Date: 2013-09-17 | Reviewed By: Paul Morton |
| | | Completion Depth: 10 m | Page 1 of 1 |

Format: MT NANSEN ROCK LOG - 2013 File: MT NANSEN COREHOLE LOGS.GPJ Date: 2014-02-27 4:51:03 PM

| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-04/35 |
| Project Client: Government of Yukon - AAM | Northing: 6881470 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 389138 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 0 | Dip (from Horiz.): 90° | Surface Elevation: 1225.567 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Roughness | Shape | Infill Type | Infill Thickness (mm) | Jcon (RMR 1989) | Discontinuity Data: Angle With Core Axis (degrees °) 30 60 | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) 1e-9 1e-8 1e-7 | Core Recovery: Solid Core Recovery (%) 20 40 60 80 | Core Recovery: Rock Quality Designation (%) 20 40 60 80 | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1225 | | Overburden | | | | | | | | | | | | | | | Coordinates and Elevation from 2013 YES survey. |
| 1 | | | | 1 | | | | | | | | R1 | W5 | | 5 | 0 | | |
| 2 | 1224 | | | | | | | | | | | | | | | | | |
| 3 | 1223 | | | | | | | | | | | | | | | | | |
| 4 | 1222 | | | 2 | | | | | | | | R1 | W4 | | 15 | 0 | | |
| 5 | 1221 | | | 3 | | | | | | | | R1 | W4 | | 31 | 43 | | |
| 6 | 1220 | | | | | | | | | | | | | | | | | |
| 7 | 1219 | | Heavily weathered, very weak rock, iron oxide, brownish red in colour. | 4 | | | | | | | | R1 | W4 | | 0 | 0 | | |
| 8 | 1218 | | | 5 | JN | R | I | FeO | 1 | 10 | | R2 | W4 | | 64 | 70 | | Packer Test #1 - No Flow between 7-13m |
| 9 | 1217 | | | | JN | R | I | FeO | 1 | 10 | | | | | | | | |
| 10 | 1216 | | Igneous - coarse grained matrix, speckled black and white in colour, iron oxide staining along joints, strong rock, moderately weathered. | 6 | JN | R | P | FeO | <1 | 20 | | R3 | W3 | | 57 | 64 | | |
| 11 | 1215 | | Metasedimentary Bedrock (Quartzite), fine matrix, dark and light foliations, greyish white in colour, iron oxide discolouration along joints, strong rock, slight weathering. | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| 12 | 1214 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 13 | 1213 | | Igneous - coarse grained matrix, speckled black and white in colour, iron oxide staining along joints, strong rock, moderately weathered. | 7 | JN | R | P | FeO | <1 | 20 | | R4 | W3 | | 93 | 93 | | Packer Test #2 - No Flow between 13-19m |
| 14 | 1212 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 15 | 1211 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 16 | 1210 | | | 8 | JN | R | P | FeO | <1 | 20 | | R4 | W2 | | 50 | 50 | | |
| 17 | 1209 | | | 9 | JN | R | P | FeO | <1 | 20 | | R4 | W3 | | 72 | 85 | | |
| 18 | 1208 | | | | JN | R | S | FeO | <1 | 20 | | | | | | | | |
| 19 | 1207 | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| 20 | 1206 | | | 10 | JN | R | P | FeO | <1 | 20 | | R5 | W2 | | 83 | 90 | | Packer Test #3 - No Flow between 19-25m |

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Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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| Start Date: 2013-09-14 | Logged By: T. Kostya |
| Completion Date: 2013-09-16 | Reviewed By: Paul Morton |
| Completion Depth: 50 m | Page 1 of 3 |

| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-04/35 |
| Project Client: Government of Yukon - AAM | Northing: 6881470 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 389138 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 0 | Dip (from Horiz.): 90º | Surface Elevation: 1225.567 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Roughness | Shape | Infill Type | Infill Thickness (mm) | Jcon (RMR 1989) | Angle With Core Axis (degrees º) 30 60 | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) 1e-9 1e-8 1e-7 | Core Recovery: Solid Core Recovery (%) 20 40 60 80 | Core Recovery: Rock Quality Designation (%) 20 40 60 80 | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 | 1205 | | Igneous - coarse grained matrix, speckled black and white in colour, iron oxide staining along joints, strong rock, moderately weathered. **(CONTINUED)** | 10 | JN | R | I | FeO | <1 | 20 | | R5 | W2 | | 83 | 90 | | |
| | 1204 | | | | JN | R | S | FeO | <1 | 20 | | | | | | | | |
| 22 | | | | | | | | | | | | | | | | | | |
| | 1203 | | | | | | | | | | | | | | | | | Packer Test #4 - Falling Head Test (2.7e-8m/s) |
| 23 | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 25 | | | | | | | | |
| | 1202 | | | 11 | JN | R | P | FeO | <1 | 25 | | R5 | W2 | | 47 | 47 | | |
| 24 | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 25 | | | | | | | | |
| | 1201 | | | | | | | | | | | | | | | | | |
| 25 | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 25 | | | | | | | | |
| | 1200 | | | | | | | | | | | | | | | | | |
| 26 | | | Metamorphic - Fine grain matrix, porphoritic, light pinkish white in colour, iron oxide staining along joints, medium strength, moderately weathered. | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | 1199 | | | 12 | JN | R | S | FeO | <1 | 20 | | R3 | W3 | | 50 | 50 | | |
| 27 | | | | | | | | | | | | | | | | | | |
| | 1198 | | Igneous - coarse grained matrix, speckled black and white in colour, iron oxide staining along joints, strong rock, moderately weathered. | | | | | | | | | | | | | | | |
| 28 | | | | | JN | R | I | FeO | <1 | 20 | | | | 1.E-08 m/s | | | | |
| | 1197 | | Metasedimentary Bedrock (Quartzite), fine matrix, dark and light foliations, greyish white in colour, iron oxide discolouration along joints, strong rock, slight weathering. | | | | | | | | | | | | | | | |
| 29 | | | | 13 | | | | | | | | R3 | W3 | | 0 | 0 | | |
| | 1196 | | | | | | | | | | | | | | | | | |
| 30 | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | S | FeO | <1 | 20 | | | | | | | | |
| | 1195 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 31 | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | 14 | JN | R | P | FeO | <1 | 20 | | R3 | W3 | | 62 | | | |
| | 1194 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 32 | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | 1193 | | | | | | | | | | | | | | | | | |
| 33 | | | | 15 | | | | | | | | R3 | W3 | | 29 | 29 | | |
| | 1192 | | Igneous - coarse grained matrix, speckled black and white in colour, iron oxide staining along joints, strong rock, moderately weathered. | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 34 | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | 16 | JN | R | S | FeO | <1 | 20 | | | | | | | | |
| | 1191 | | | | JN | R | S | FeO | <1 | 20 | | R2 | W4 | | 56 | 71 | | Packer Test #5 - Falling Head Test (8.8e-9m/s) |
| 35 | | | | | JN | R | P | FeO | 1 | 20 | | | | | | | | |
| | | | | | FT | | | | | | | | | | | | | |
| | 1190 | | FAULT ZONE - Gouge infilled with SAND, silty, some clay, reddish brown in colour, soft. | | | | | | | | | | | | | | | Vibrating wire piezometer installed at 35.0 m, serial # VW26289 |
| 36 | | | | 17 | | | | | | | | R0 | W6 | | 0 | 0 | | |
| | 1189 | | | | | | | | | | | | | | | | | |
| 37 | | | | | | | | | | | | | | 1.E-09 m/s | | | | |
| | 1188 | | Interbedded Igneous and Metasedimentary units. | | | | | | | | | | | | | | | |
| 38 | | | | | JN | R | S | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | 1187 | | | 18 | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| 39 | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | 1186 | | | | | | | | | | | | | | | | | |
| 40 | | | | | JN | R | S | FeO | <1 | 20 | | | | | | | | |

Format: MT NANSEN ROCK LOG - 2013 File: MT NANSEN COREHOLE LOGS.GPJ Date: 2014-02-27 4:51:09 PM

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Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-14 | Logged By: T. Kostya |
| Completion Date: 2013-09-16 | Reviewed By: Paul Morton |
| Completion Depth: 50 m | Page 2 of 3 |

| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-04/35 |
| Project Client: Government of Yukon - AAM | Northing: 6881470 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 389138 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 0 | Dip (from Horiz.): 90° | Surface Elevation: 1225.567 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Roughness | Shape | Infill Type | Infill Thickness (mm) | Jcon (RMR 1989) | Angle With Core Axis (degrees °) | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) | Core Recovery: Solid Core Recovery (%) | Core Recovery: Rock Quality Designation (%) | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | 1185 | | Igneous - coarse grained matrix, speckled black and white in colour, iron oxide staining along joints, strong rock, moderately weathered. | | JN | R | I | FeO | <1 | 20 | | | | | | | | Packer Test #6 - No Flow between 40-50m |
| 41 | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | 19 | JN | R | P | FeO | <1 | 20 | | R4 | W3 | | 70 | 80 | | |
| | 1184 | | | | JN | R | S | FeO | <1 | 20 | | | | | | | | |
| 42 | | | | | | | | | | | | | | | | | | |
| | 1183 | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| 43 | | | | | | | | | | | | | | | | | | |
| | 1182 | | | 20 | JN | R | P | FeO | <1 | 20 | | R4 | W2 | | 63 | 83 | | |
| 44 | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | 1181 | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 45 | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | 1180 | | Metasedimentary Bedrock (Quartzite), fine matrix, dark and light foliations, greyish white in colour, iron oxide discolouration along joints, strong rock, slight weathering. | | | | | | | | | | | | | | | |
| 46 | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | 1179 | | | 21 | JN | R | P | FeO | <1 | 20 | | R4 | W2 | | 55 | 63 | | |
| 47 | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | 1178 | | Igneous - coarse grained matrix, speckled black and white in colour, iron oxide staining along joints, strong rock, moderately weathered. | | JN | R | S | FeO | <1 | 20 | | | | | | | | |
| 48 | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | 1177 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 49 | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | 22 | JN | R | P | FeO | <1 | 20 | | R4 | W2 | | 40 | 50 | | |
| | 1176 | | Metasedimentary Bedrock (Quartzite), fine matrix, dark and light foliations, greyish white in colour, iron oxide discolouration along joints, strong rock, slight weathering. | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| 50 | | | -End of Hole at 50.0 m<br>-Installed 1" diameter monitoring well with 10 slot screen from 32 to 35 m.<br>-Installed a vibrating wire piezometer at 35.0 m.<br>-Installed a single channel data logger at collar of hole, refer to Appendix E2 for equipment specifications for the logger and piezometer<br>-Sand backfill placed from 30.6 to 35 m.<br>-Bentonite seal with coated pellets from 27.8 to 30.6 m<br>-Cement-bentonite grout installed from 27.8 m to surface.<br>-Protective monument and data logger installed at collar of hole with 0.63 m stick up. | | | | | | | | | | | | | | | |

| | | | |
|---|---|---|---|
| Start Date: 2013-09-14 | | Logged By: T. Kostya | |
| Completion Date: 2013-09-16 | | Reviewed By: Paul Morton | |
| Completion Depth: 50 m | | Page 3 of 3 | |

Format: MT NANSEN ROCK LOG - 2013 File: MT NANSEN COREHOLE LOGS.GPJ Date: 2014-02-27 4:51:09 PM

| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-05/50 |
| Project Client: Government of Yukon - AAM | Northing: 6881468 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 388957 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 0 | Dip (from Horiz.): 90° | Surface Elevation: 1184.999 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Roughness | Shape | Infill Type | Infill Thickness (mm) | Jcon (RMR 1989) | Discontinuity Data: Angle With Core Axis (degrees °) 30 60 | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) 1e-9 1e-8 1e-7 | Core Recovery: Solid Core Recovery (%) 20 40 60 80 | Core Recovery: Rock Quality Designation (%) 20 40 60 80 | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1184 | | Overburden | 1 | | | | | | | | R0 | W6 | | 0 | 0 | | Coordinates and Elevation from 2013 YES survey. |
| 2 | 1183 | | | | | | | | | | | | | | | | | |
| 3 | 1182 | | | | | | | | | | | | | | | | | |
| 4 | 1181 | | Heavily weathered, very weak rock, iron oxide, brownish red in colour. | 2 | | | | | | | | R0 | W6 | | 0 | 0 | | |
| 5 | 1180 | | Metasedimentary Bedrock (Quartzite), fine matrix, dark and light foliations, greyish white in colour, iron oxide discolouration along joints, medium strength rock, heavy to moderate weathering | 3 | JN<br>JN<br>JN<br>JN | R<br>R<br>R<br>R | P<br>P<br>I<br>I | FeO<br>FeO<br>FeO<br>FeO | 1<br>1<br>1<br>1 | 10<br>10<br>10<br>10 | | R2 | W4 | | 59 | 54 | | |
| 6 | 1179 | | | | JN | R | P | FeO | 1 | 10 | | | | | | | | |
| 7 | 1178 | | | 4 | JN<br>JN<br>JN | R<br>R<br>R | S<br>I<br>P | FeO<br>FeO<br>FeO | 1<br>1<br>1 | 10<br>10<br>10 | | R3 | W3 | | 90 | 97 | | Packer Test #1 - Constant Head Test (1.9e-7 m/s) |
| 8 | 1177 | | | | | | | | | | | | | | | | | |
| 9 | 1176 | | | | JN<br>JN | R<br>R | P<br>I | FeO<br>FeO | 1<br>1 | 10<br>10 | | | | | | | | |
| 10 | 1175 | | | 5 | | | | | | | | R2 | W4 | 1.E-07 m/s | 0 | 0 | | |
| 11 | 1174 | | | 6 | | | | | | | | R2 | W4 | | 47 | 40 | | |
| 12 | 1173 | | | | | | | | | | | | | | | | | |
| 13 | 1172 | | | 7 | | | | | | | | R2 | W4 | | 0 | 0 | | |
| 14 | 1171 | | | 8 | JN<br>JN<br>JN<br>JN<br>JN<br>JN | R<br>R<br>R<br>R<br>R<br>R | I<br>P<br>P<br>P<br>P<br>P | FeO<br>FeO<br>FeO<br>FeO<br>FeO<br>FeO | <1<br><1<br><1<br><1<br><1<br><1 | 20<br>20<br>20<br>20<br>20<br>20 | | R2 | W4 | | 41 | 45 | | Packer Test #2 - Falling Head Test (5.6e-8 m/s) |
| 15 | 1170 | | | | | | | | | | | | | | | | | |
| 16 | 1169 | | Igneous - fine grained matrix with coarse white clasts size, matrix is greenish grey in colour, iron oxide staining along joints, strong rock, moderately weathered. | 9 | | | | | | | | R2 | W4 | 1.E-08 m/s | 13 | 0 | | |
| 17 | 1168 | | | | | | | | | | | | | | | | | |
| 18 | 1167 | | | 10 | | | | | | | | R2 | W4 | | 0 | 0 | | |
| 19 | 1166 | | | 11 | JN<br>JN<br>JN<br>JN<br>JN | R<br>R<br>R<br>R<br>R | I<br>P<br>I<br>S<br>P | FeO<br>FeO<br>FeO<br>FeO<br>FeO | <1<br><1<br><1<br><1<br><1 | 20<br>20<br>20<br>20<br>20 | | R3 | W4 | | 40 | 50 | | |
| 20 | 1165 | | | 12 | JN<br>JN<br>JN | R<br>R<br>R | I<br>P<br>P | FeO<br>FeO<br>FeO | <1<br><1<br><1 | 20<br>20<br>20 | | R3 | W4 | 1.E-08 m/s | 30 | 30 | | Packer Test #3 - Falling Head Test (2.3e-8 m/s) |

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Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-21 | Logged By: T. Kostya |
| Completion Date: 2013-09-23 | Reviewed By: Paul Morton |
| Completion Depth: 50 m | Page 1 of 3 |

| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-05/50 |
| Project Client: Government of Yukon - AAM | Northing: 6881468 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 388957 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 0 | Dip (from Horiz.): 90º | Surface Elevation: 1184.999 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Roughness | Shape | Infill Type | Infill Thickness (mm) | Jcon (RMR 1989) | Angle With Core Axis (degrees º) | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) | Core Recovery: Solid Core Recovery (%) | Core Recovery: Rock Quality Designation (%) | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 | 1164 | | Igneous - fine grained matrix with coarse white clasts size, matrix is greenish grey in colour, iron oxide staining along joints, strong rock, moderately weathered. **(CONTINUED)** | 13 | | | | | | | | R2 | W4 | | 0 | 0 | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 22 | 1163 | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | | | | 14 | JN | R | P | FeO | <1 | 20 | | R3 | W4 | | 16 | 21 | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | 1.E-08 m/s | | | | |
| 23 | 1162 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 24 | 1161 | | Metasedimentary Bedrock (Quartzite), fine matrix, dark and light foliations, greyish white in colour, iron oxide discolouration along joints, medium strength to strong rock, heavy to moderate weathering | 15 | | | | | | | | R3 | W4 | | 11 | 12 | | |
| 25 | 1160 | | | 16 | | | | | | | | R2 | W4 | | 0 | 0 | | Packer Test #4 - Constant Head Test (2.7e-7 m/s) |
| 26 | 1159 | | | 17 | | | | | | | | R2 | W4 | | 0 | 0 | | |
| 27 | 1158 | | | | JN | | | | | | | | | | | | | |
| 28 | 1157 | | | | JN | R | P | FeO | <1 | 20 | | | | 1.E-07 m/s | | | | |
| | | | | 18 | JN | R | P | FeO | <1 | 20 | | R4 | W3 | | 53 | 66 | | |
| 29 | 1156 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | | | | | | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| 30 | 1155 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | 19 | | | | | | | | R3 | W3 | | 40 | 50 | | |
| 31 | 1154 | | | | | | | | | | | | | | | | | Packer Test #5 - Constant Head Test (1.9e-7 m/s) |
| 32 | 1153 | | | 20 | | | | | | | | R4 | W3 | | 20 | 22 | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 33 | 1152 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 34 | 1151 | | | | | | | | | | | | | 1.E-07 m/s | | | | |
| | | | | 21 | | | | | | | | R3 | W4 | | 0 | 0 | | |
| 35 | 1150 | | | | | | | | | | | | | | | | | |
| 36 | 1149 | | | | | | | | | | | | | | | | | |
| | | | | 22 | | | | | | | | R3 | W4 | | 0 | 0 | | |
| 37 | 1148 | | | | | | | | | | | | | | | | | |
| 38 | 1147 | | Igneous - fine grained matrix with coarse white clasts size, matrix is greenish grey in colour, heavily stained with iron oxide, medium strength to strong rock, highly weathered. | 23 | | | | | | | | R3 | W4 | | 0 | 0 | | Packer Test #6 - Falling Head Test (6.4e-8 m/s) |
| | | | | 24 | | | | | | | | R3 | W4 | 1.E-08 m/s | 0 | 0 | | |
| 39 | 1146 | | | | JN | | | | | | | | | | | | | |
| | | | | 25 | JN | R | I | FeO | <1 | 20 | | R3 | W4 | | 41 | 45 | | |
| 40 | 1145 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |

| | | |
|---|---|---|
| Start Date: 2013-09-21 | | Logged By: T. Kostya |
| Completion Date: 2013-09-23 | | Reviewed By: Paul Morton |
| Completion Depth: 50 m | | Page 2 of 3 |

Format: MT NANSEN ROCK LOG - 2013 File: MT NANSEN COREHOLE LOGS.GPJ Date: 2014-02-27 4:51:17 PM

| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-05/50 |
| Project Client: Government of Yukon - AAM | Northing: 6881468 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 388957 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 0 | Dip (from Horiz.): 90° | Surface Elevation: 1184.999 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Discontinuity Data: Roughness | Discontinuity Data: Shape | Discontinuity Data: Infill Type | Discontinuity Data: Infill Thickness (mm) | Discontinuity Data: Jcon (RMR 1989) | Discontinuity Data: Angle With Core Axis (degrees °) | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) | Core Recovery: Solid Core Recovery (%) | Core Recovery: Rock Quality Designation (%) | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41 | 1144 | | Igneous - fine grained matrix with coarse white clasts size, matrix is greenish grey in colour, heavily stained with iron oxide, medium strength to strong rock, highly weathered. **(CONTINUED)** | 25 | JN<br>JN<br>JN<br>JN<br>JN | R<br>R<br>R<br>R | P<br>P<br>P<br>C | FeO<br>FeO<br>FeO<br>FeO | <1<br><1<br><1<br><1 | 20<br>20<br>20<br>20 | | R3 | W4 | | 41 | 45 | | |
| 42 | 1143 | | | 26 | | | | | | | | R2 | W4 | 1.E-08 m/s | 28 | 28 | | |
| 43 | 1142 | | | | | | | | | | | | | | | | | |
| 44 | 1141 | | | 27 | | | | | | | | R2 | W4 | | 0 | 0 | | Packer Test #7 - Constant Head Test (2.1e-7 m/s) |
| 45 | 1140 | | Metasedimentary Bedrock (Quartzite), fine matrix, dark and light foliations, greyish white in colour, iron oxide discolouration along joints, medium strength to strong rock, heavy to moderate weathering. | 28 | | | | | | | | R2 | W4 | | 0 | 0 | | |
| 46 | 1139 | | | | | | | | | | | | | | | | | |
| 47 | 1138 | | | | | | | | | | | | | 1.E-07 m/s | | | | |
| 48 | 1137 | | | 29 | | | | | | | | R2 | W4 | | 40 | 41 | | |
| 49 | 1136 | | | | | | | | | | | | | | | | | |
| 50 | 1135 | | | 30 | | | | | | | | R2 | W4 | | 0 | 0 | | Vibrating wire piezometer installed at 49.40 m, serial # VW26487 |
| | | | -End of Hole at 50.0 m<br>-Installed 1" diameter monitoring well with 10 slot screen from 47 to 50 m.<br>-Installed a vibrating wire piezometer at 49.40 m.<br>-Installed a single channel data logger at collar of hole, refer to Appendix E2 for equipment specifications for the logger and piezometer<br>-Sand backfill placed from 45.6 to 50 m.<br>-Bentonite seal with coated pellets from 42.8 to 45.6 m.<br>-Cement-bentonite grout installed from 42.8 m to surface.<br>-Protective monument and data logger installed at collar of hole with 0.88 m stick up. | | | | | | | | | | | | | | | |

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Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

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|---|---|
| Start Date: 2013-09-21 | Logged By: T. Kostya |
| Completion Date: 2013-09-23 | Reviewed By: Paul Morton |
| Completion Depth: 50 m |  |

| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-06/VWP |
| Project Client: Government of Yukon - AAM | Northing: 6881469 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 388958 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 80 | Dip (from Horiz.): 45º | Surface Elevation: 1185.007 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Roughness | Shape | Infill Type | Infill Thickness (mm) | Jcon (RMR 1989) | Angle With Core Axis (degrees º) 30 60 | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) 1e-9 1e-8 1e-7 | Core Recovery: Solid Core Recovery (%) 20 40 60 80 | Core Recovery: Rock Quality Designation (%) 20 40 60 80 | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1184 | | Heavily weathered, very weak rock, iron oxide, brownish red in colour. | | | | | | | | | | | | | | | Coordinates and Elevation from 2013 YES survey. |
| 2 | 1183 | | | 1 | | | | | | | | R0 | W5 | | 0 | 0 | | |
| 3 | 1182 | | | | | | | | | | | | | | | | | |
| 4 | 1181 | | | | | | | | | | | | | | | | | |
| 5 | 1180 | | | 2 | | | | | | | | R1 | W4 | | 0 | 0 | | |
| 6 | 1179 | | | | | | | | | | | | | | | | | |
| 7 | 1178 | | | 3 | | | | | | | | R1 | W4 | | 0 | 0 | | |
| 8 | 1177 | | | | | | | | | | | | | | | | | |
| 9 | 1176 | | | 4 | | | | | | | | R1 | W4 | | 0 | 0 | | |
| 10 | 1175 | | | 5 | | | | | | | | R1 | W4 | | 0 | 0 | | Packer Test #1 - Falling Head Test (5.6e-8 m/s) |
| 11 | 1174 | | | | | | | | | | | | | | | | | |
| 12 | 1173 | | | 6 | | | | | | | | R1 | W4 | | 0 | 0 | | |
| 13 | 1172 | | Igneous - fine grained matrix with coarse white clasts size, matrix is greenish grey in colour, iron oxide staining along joints, strong rock, heavy to moderate weathering. | 7 | JN<br>JN<br>JN<br>JN<br>JN<br>JN<br>JN<br>JN<br>JN<br>JN | R<br>R<br>R<br>R<br>R<br>R<br>R<br>R<br>R<br>R | P<br>P<br>P<br>P<br>P<br>P<br>P<br>P<br>P<br>P | FeO<br>FeO<br>FeO<br>FeO<br>FeO<br>FeO<br>FeO<br>FeO<br>FeO<br>FeO | <1<br>5<br><1<br><1<br><1<br><1<br><1<br><1<br><1<br><1<br><1 | 20<br>10<br>20<br>20<br>20<br>10<br>20<br>20<br>20<br>20 | | R3 | W3 | 1.E-08 m/s | 45 | 60 | | |
| 14 | 1171 | | | | | | | | | | | | | | | | | |
| 15 | 1170 | | | 8 | JN<br>JN<br>JN | R<br>R | P<br>P | FeO<br>FeO<br>FeO | <1<br><1 | 20<br>20<br>10 | | R4 | W2 | | 50 | 65 | | |
| 16 | 1169 | | | | JN<br>JN<br>JN | R<br>R | P<br>S | FeO<br>FeO<br>FeO | <1<br><1<br>1 | 20<br>20<br>10 | | | | | | | | Packer Test #2 - Falling Head Test (3.4e-8 m/s) |
| 17 | 1168 | | | 9 | | | | | | | | R4 | W2 | | 30 | 50 | | |
| 18 | 1167 | | | | JN | R | P | FeO | <1 | 20 | | | | 1.E-08 m/s | | | | |
| 19 | 1166 | | | 10 | | | | | | | | R4 | W2 | | 50 | 54 | | |
| 20 | | | | | JN<br>JN | R<br>R | P<br>P | FeO<br>FeO | <1<br><1 | 20<br>20 | | | | | | | | |

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Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-23 | Logged By: T. Kostya |
| Completion Date: 2013-09-27 | Reviewed By: Paul Morton |
| Completion Depth: 60 m | Page 1 of 4 |

| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-06/VWP |
|---|---|---|
| Project Client: Government of Yukon - AAM | Northing: 6881469 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 388958 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 80 | Dip (from Horiz.): 45º | Surface Elevation: 1185.007 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Roughness | Shape | Infill Type | Infill Thickness (mm) | Jcon (RMR 1989) | Angle With Core Axis (degrees º) | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data (Max Permeability (m/s)) | Core Recovery: Solid Core Recovery (%) | Core Recovery: Rock Quality Designation (%) | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | | | Igneous - fine grained matrix with coarse white clasts size, matrix is greenish grey in colour, iron oxide staining along joints, strong rock, heavy to moderate weathering. **(CONTINUED)** | 10 | JN | R | I | FeO | <1 | 20 | | R4 | W2 | | 50 | 54 | | |
| | | | | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 21 | 1164 | | | | JN | R | S | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | 1.E-08 m/s | | | | |
| | | | | 11 | JN | R | P | FeO | <1 | 20 | | R4 | W2 | | 78 | 87 | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 22 | 1163 | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | Packer Test #3 - No Flow between 22-28m |
| | | | | | JN | | | FeO | <1 | 10 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| 23 | 1162 | | | 12 | | | | | | | | R4 | W2 | | 60 | 70 | | |
| 24 | 1161 | | | | JN | | | FeO | <1 | 10 | | | | | | | | |
| | | | | | JN | R | P | FeO | <1 | 20 | | | | | | | | |
| | | | | 13 | | | | | | | | R3 | W4 | | 0 | 0 | | |
| 25 | 1160 | | | 14 | | | | | | | | R3 | W4 | | 0 | 0 | | |
| 26 | 1159 | | | 15 | | | | | | | | R3 | W4 | | 0 | 0 | | |
| | | | | 16 | | | | | | | | R3 | W4 | | 0 | 0 | | |
| 27 | 1158 | | | 17 | | | | | | | | R3 | W4 | | 0 | 0 | | |
| | | | | 18 | | | | | | | | R3 | W4 | | 0 | 0 | | |
| 28 | 1157 | | | 19 | | | | | | | | R3 | W4 | | 0 | 0 | | |
| | | | | 20 | | | | | | | | R3 | W4 | | 0 | 0 | | Packer Test #4 - No Flow between 28-34m |
| | | | | 21 | | | | | | | | R3 | W4 | | 0 | 0 | | |
| 29 | 1156 | | | 22 | | | | | | | | R3 | W4 | | 0 | 0 | | |
| | | | | 23 | | | | | | | | R3 | W4 | | 0 | 0 | | Vibrating wire piezometer installed at 29.30 m, serial # VW26481 |
| 30 | 1155 | | Metasedimentary Bedrock (Gneiss), fine matrix, dark and light foliations, greyish white in colour, iron oxide discolouration along joints, medium strength to strong rock, heavy to moderate weathering. | | JN | R | I | FeO | <1 | 20 | | | | | | | | |
| | | | | | JN | R | I | Ca | <1 | 20 | | | | | | | | |
| 31 | 1154 | | | | JN | R | P | Ca | <1 | 20 | | | | | | | | |
| | | | | 24 | JN | R | P | Ca | <1 | 20 | | R4 | W2 | | 70 | 80 | | |
| 32 | 1153 | | | | | | | | | | | | | | | | | |
| 33 | 1152 | | | | | | | | | | | | | | | | | |
| | | | | 25 | JN | R | P | Cl | <1 | 20 | | R4 | W2 | | 80 | 90 | | |
| 34 | 1151 | | | | JN | R | P | Cl | <1 | 20 | | | | | | | | |
| 35 | 1150 | | Interbedded Gneiss and Igneous intrusions. | | JN | R | P | Cl | <1 | 20 | | | | | | | | Packer Test #5 - No Flow between 34-40m |
| | | | | | JN | R | P | Cl | <1 | 20 | | | | | | | | |
| | | | | 26 | | | | | | | | R4 | W2 | | 95 | 90 | | |
| 36 | 1149 | | | | JN | R | P | Cl | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | Cl | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | Cl | <1 | 20 | | | | | | | | |
| 37 | 1148 | | | | JN | R | P | Cl | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | S | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | S | <1 | 20 | | | | | | | | |
| 38 | 1147 | | | | JN | R | P | S | <1 | 20 | | | | | | | | |
| | | | | 27 | | | | | | | | R4 | W2 | | 93 | 100 | | |
| 39 | 1146 | | | | | | | | | | | | | | | | | |
| | | | | | JN | R | P | S | <1 | 20 | | | | | | | | |
| 40 | | | | | JN | R | P | S | <1 | 20 | | | | | | | | |

| | | |
|---|---|---|
| Start Date: 2013-09-23 | | Logged By: T. Kostya |
| Completion Date: 2013-09-27 | | Reviewed By: Paul Morton |
| Completion Depth: 60 m | | Page 2 of 4 |

Format: MT NANSEN ROCK LOG - 2013 File: MT NANSEN COREHOLE LOGS.GPJ Date: 2014-02-27 4:51:25 PM

| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-06/VWP |
| Project Client: Government of Yukon - AAM | Northing: 6881469 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 388958 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 80 | Dip (from Horiz.): 45º | Surface Elevation: 1185.007 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Roughness | Shape | Infill Type | Infill Thickness (mm) | Jcon (RMR 1989) | Angle With Core Axis (degrees º) | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) | Core Recovery: Solid Core Recovery (%) | Core Recovery: Rock Quality Designation (%) | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41 | 1144 | | Interbedded Gneiss and Igneous intrusions. **(CONTINUED)** | 28 | JN | R | P | S | <1 | 20 | | R4 | W1 | | 100 | 100 | | Packer Test #6 - Constant Head Test (6.6e-7 m/s) Vibrating wire piezometer installed at 40.17 m, serial # VW26483 |
| | | | | | JN | R | P | S | <1 | 20 | | | | | | | | |
| 42 | 1143 | | | | JN | R | P | S | <1 | 20 | | | | | | | | |
| 43 | 1142 | | | | JN | R | P | S | <1 | 20 | | | | 1.E-07 m/s | | | | |
| | | | | | JN | R | P | S | <1 | 20 | | | | | | | | |
| | | | | 29 | JN | R | P | S | <1 | 20 | | R4 | W2 | | 100 | 94 | | |
| 44 | 1141 | | | | JN | R | P | S | <1 | 20 | | | | | | | | |
| | | | | | JN | | | S | 1 | 10 | | | | | | | | |
| 45 | 1140 | | | | | | | | | | | | | | | | | |
| | | | | 30 | | | | | | | | R4 | W1 | | 100 | 100 | | |
| 46 | 1139 | | | | | | | | | | | | | | | | | |
| | | | | | JN | R | P | S | <1 | 20 | | | | | | | | Packer Test #7 - No Flow between 46-52m |
| 47 | 1138 | | | | JN | | | S | 1 | 10 | | | | | | | | |
| | | | | 31 | JN | R | P | S | <1 | 20 | | R4 | W2 | | 97 | 94 | | |
| | | | | | JN | R | P | S | <1 | 20 | | | | | | | | |
| 48 | 1137 | | | | JN | R | P | S | <1 | 20 | | | | | | | | |
| 49 | 1136 | | | | | | | | | | | | | | | | | |
| | | | | | JN | R | P | S | <1 | 20 | | | | | | | | Vibrating wire piezometer installed at 49.32 m, serial # VW26485 |
| 50 | 1135 | | | | | | | | | | | | | | | | | |
| | | | | 32 | | | | | | | | R4 | W2 | | 97 | 97 | | |
| 51 | 1134 | | | | | | | | | | | | | | | | | |
| | | | | | JN | R | P | S | <1 | 20 | | | | | | | | |
| 52 | 1133 | | | | JN | R | P | S | <1 | 20 | | | | | | | | |
| | | | | | JN | R | P | S | <1 | 20 | | | | | | | | Packer Test #8 - Falling Head Test (1.4e-8 m/s) |
| 53 | 1132 | | | | | | | | | | | | | | | | | |
| | | | | 33 | JN | R | P | S | <1 | 20 | | R5 | W2 | | 97 | 97 | | |
| 54 | 1131 | | | | JN | R | P | S | <1 | 20 | | | | | | | | |
| 55 | 1130 | | | | JN | R | P | S | <1 | 20 | | | | | | | | |
| 56 | 1129 | | | | | | | | | | | | | 1.E-08 m/s | | | | |
| | | | | 34 | | | | | | | | R5 | W2 | | 95 | 95 | | |
| 57 | 1128 | | | | | | | | | | | | | | | | | |
| 58 | 1127 | | | | | | | | | | | | | | | | | |
| 59 | 1126 | | | 35 | | | | | | | | R5 | W2 | | 100 | 100 | | Vibrating wire piezometer installed at 58.882 m, serial # VW26489 |
| 60 | | | | | | | | | | | | | | | | | | |

Format: MT NANSEN ROCK LOG - 2013 File: MT NANSEN COREHOLE LOGS.GPJ Date: 2014-02-27 4:51:25 PM

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-23 | Logged By: T. Kostya |
| Completion Date: 2013-09-27 | Reviewed By: Paul Morton |
| Completion Depth: 60 m | Page 3 of 4 |

| | | |
|---|---|---|
| Project Name: Mount Nansen Remediation Project | Area: Mount Nansen Site, Yukon Territory | Borehole No.: CH-P-13-06/VWP |
| Project Client: Government of Yukon - AAM | Northing: 6881469 | Project Number: VM00605 |
| Drilling Method: EarthTek Diamond Drilling | Easting: 388958 | Datum: NAD 83, UTM Zone 8 |
| Azimuth: 80 | Dip (from Horiz.): 45º | Surface Elevation: 1185.007 m |

| Depth (m) | Elevation (m) | Lithology Profile: Graphic Plot | Lithology Profile: Description | Run Number | Discontinuity Data: Fracture Type | Discontinuity Data: Roughness | Discontinuity Data: Shape | Discontinuity Data: Infill Type | Discontinuity Data: Infill Thickness (mm) | Discontinuity Data: Jcon (RMR 1989) | Discontinuity Data: Angle With Core Axis (degrees º) 30 60 | Rock Strength (ISRM) | Weathering (ISRM) | Packer Test Data: Max Permeability (m/s) 1e-9 1e-8 1e-7 | Core Recovery: Solid Core Recovery (%) 20 40 60 80 | Core Recovery: Rock Quality Designation (%) 20 40 60 80 | Instrumentation/Backfill | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | -End of Hole at 60.0 m<br>-Five nested vibrating wire piezometers strapped to 1" diameter PVC pipe.<br>-Ten channel data logger installed at collar of hole, refer to Appendix E2 of SI Data Report for equipment specifications of logger and piezometers.<br>-Hole backfilled from 60.0 m to surface with cement-bentonite grout.<br>-Protective monument installed at collar of hole. | | | | | | | | | | | | | | | |

| | | |
|---|---|---|
| Start Date: 2013-09-23 | Logged By: T. Kostya | |
| Completion Date: 2013-09-27 | Reviewed By: Paul Morton | |
| Completion Depth: 60 m |  | |

Format: MT NANSEN ROCK LOG - 2013 File: MT NANSEN COREHOLE LOGS.GPJ Date: 2014-02-27 4:51:26 PM

# Appendix A4

# GeoProbe Drill Logs

## EXPLANATION OF TERMS FOR GEOTECHNICAL SOIL LOGS

### 1.0 SOIL CONSTITUENTS

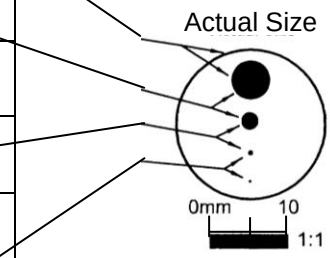
Based on particle size and distribution per the Modified Unified Soil Classification System as described in the following tables.

Proportions of Constituents:

| Descriptive Term | Proportion by Weight |
|---|---|
| noun (e.g. sand, etc.) | over 50% |
| and (e.g. and sand, etc.) | over 35% |
| adjective (e.g. sandy, etc.) | 20% to 35% |
| some (e.g. some sand, etc.) | 10% to 20% |
| trace (e.g. trace sand, etc.) | 0% to 10% |

Particle Sizes:

| Material | Fraction | Sieve Size (grain size) | Approx Scale |
|---|---|---|---|
| Boulders | | > 200 mm | Larger than a soccer ball |
| Cobbles | | Less than 200 mm & retained on 3-in (75 mm) sieve | Fist sized to soccer ball sized |
| Gravel | Coarse | Passes 3-in (75 mm) sieve & retained on ¾-in (19 mm) sieve | Thumb sized to fist sized |
| | Fine | Passes ¾-in (19 mm) sieve & retained on No. 4 (4.75 mm) sieve | Pea sized to thumb sized |
| Sand | Coarse | Passes No. 4 (4.75 mm) sieve & retained on No. 10 (2.00 mm) sieve | Rock salt sized to pea sized |
| | Medium | Passes No. 10 (2.00 mm) sieve & retained on No. 40 (425 μm) sieve | Sugar sized to rock salt sized |
| | Fine | Passes No. 40 (425 μm) sieve & Retained on No. 200 (75 μm) sieve | Flour sized to sugar sized |
| Fines (silt & clay) | | Passes No. 200 (75 μm) sieve | Flour sized and smaller (indiscernible to naked eye) |




Gradation of Coarse Fraction:

| Descriptive Term | Field Identification |
|---|---|
| Well graded | contains particles of sizes assorted over a wide range with no one size predominating or missing |
| Poorly Graded | contains a limited range of particle sizes |
| Uniform Graded | contains a predominance of one size |
| Gap Graded | missing a size within a range |

## 2.0 RELATIVE DENSITY / CONSISTENCY

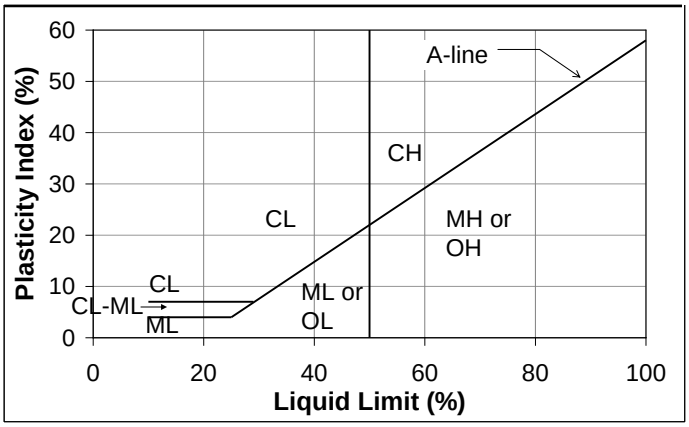
For Coarse Grained Soils:

| Descriptive Term | Relative Density | SPT N-Value |
|---|---|---|
| Very Loose | 0 - 20 % | 0 – 4 |
| Loose | 20 – 40 % | 4 – 10 |
| Compact | 40 – 70 % | 10 – 30 |
| Dense | 70 – 90 % | 30 – 50 |
| Very Dense | 90 – 100 % | > 50 |

For Fine Grained Soils:

| Consistency | Field Identification | Undrained Strength (kPa) | SPT N Value |
|---|---|---|---|
| Very Soft | Easily penetrated several centimetres by the fist | < 12 | 0 - 2 |
| Soft | Easily penetrated several centimetres by the thumb | 12 – 25 | 2 - 4 |
| Firm | Can be penetrated several centimetres by the thumb with moderate effort | 25 – 50 | 4 - 8 |
| Stiff | Readily indented by the thumb but penetrated only with great effort | 20 – 100 | 8 - 15 |
| Very Stiff | Readily indented by the Thumbnail | 100 – 200 | 15 - 30 |
| Hard | Indented with difficulty by the Thumbnail | > 200 | > 30 |

## 3.0 PLASTICITY



## 4.0 MOISTURE

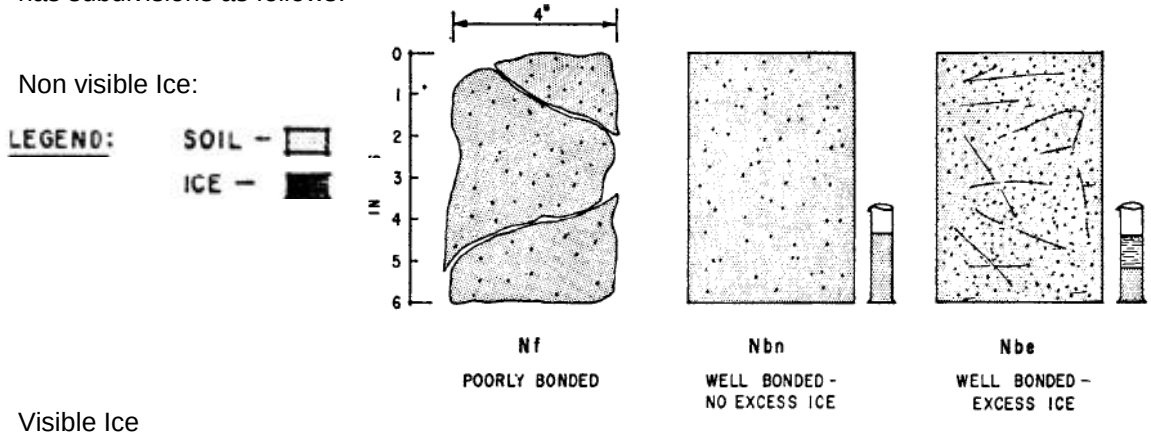
| Descriptive Term | Field Identification |
|---|---|
| Dry | no visible moisture, dusty |
| Damp | slight moisture content but fingers do not become moistened when touching soil. Only fines sticks to fingers. |
| Moist | visible moisture, but no visible free water, finger becomes moistened when touching the soil. Soil does not stick to fingers. Near the plastic limit for cohesive soil. |
| Wet | a film of water is present on particle surface, soil sticks to fingers. |
| Free water | water is separated from soil particles. |

## 5.0 FROZEN SOIL DESCRIPTION

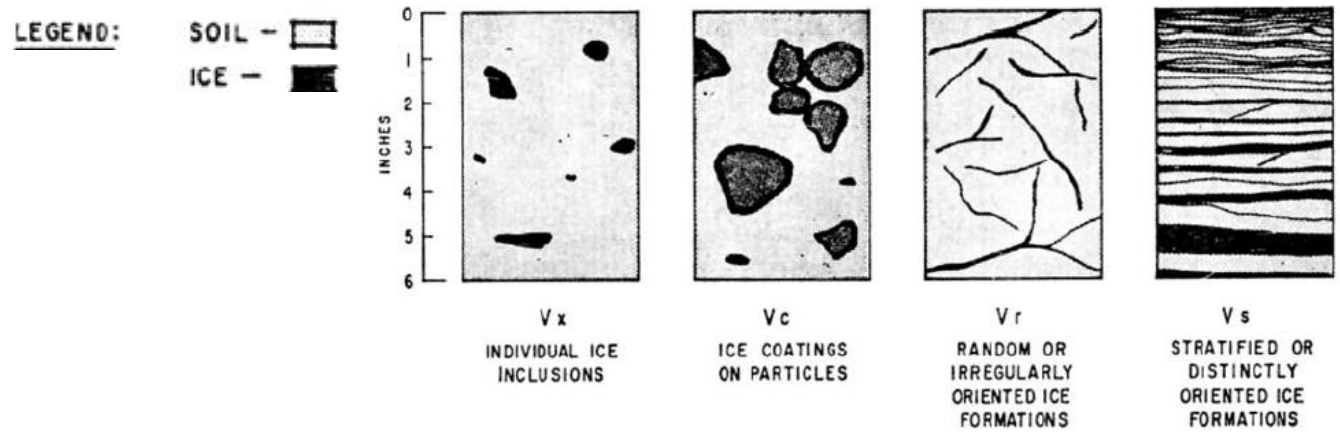
**Permafrost (see ASTM D4083)**

Three main categories – not visible (i.e. a frozen soil but ice is not visible to the naked eye), visible (can see ice but there is more soil than ice), and ice (>1" thickness where there is more ice than soil). Each has subdivisions as follows:

Non visible Ice:



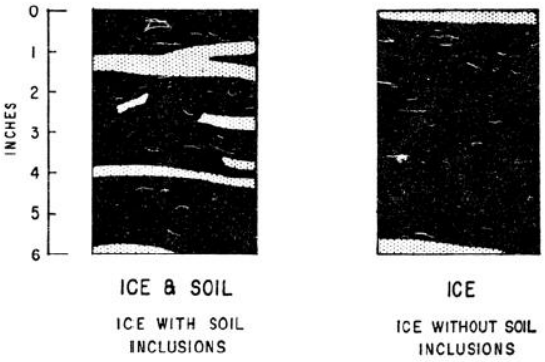

Visible Ice



## Explanation of Terms for Geotechnical Logs

Ice

LEGEND: SOIL – ICE –




### 6.0 DEFINITION OF SYMBOLS USED ON LOGS

| SOIL | | SOIL | | WELL DETAILS | |
|---|---|---|---|---|---|
| | GRAVEL, well graded, to and SAND little to no fines,(GW) | | SILT, high plastic (MH) | | Solid pipe with BACKFILL |
| | GRAVEL, poorly graded, to and SAND little to no fines (GP) | | CLAY, low plastic (CL) | | Solid Pipe with BENTONITE |
| | GRAVEL, silty to and SAND, and SILT(GM) | | CLAY, medium plastic (CI) | | Solid pipe with GROUT |
| | GRAVEL, clayey to and SAND, and CLAY (GC) | | CLAY, high plastic (CH) | | Solid pipe with SAND |
| | SAND, well graded, to gravely, little to no fines, (SW) | | ORGANIC silt or clay, low plastic (OL) | | Slotted pipe with SAND |
| | SAND, poorly graded, to gravely, little to no fines (SW) | | ORGANIC silt or clay, high plastic (OH) | | Slotted pipe with NO BACKFILL |
| | SAND, silty (SM) | | PEAT (Pt) | | SAND backfill |
| | SAND, clayey to SAND and CLAY (SC) | ROCK | | | GROUT backfill |
| | FILL | | Granodiorite (GRDR) | | GENERAL BACKFILL (e.g. drill cutting, slough) |
| | SILT, low plastic (ML) | | Andesite (ANDS) | | |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Storage Facility - Pond | Borehole No: GP-T-13-01 |
| Client: Yukon Government - AAM | Northing (UTM Zone 8, NAD83): 6880652 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Geoprobe | Easting (UTM Zone 8, NAD83): 389302 | Elevation (m): 1096 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| ▼ | | WATER | | | Coordinates from handheld GPS, elevation obtained from LiDAR information | |
| 1 | | SILT, trace to some sand, trace clay, soft to very soft, low plastic, orange-brown, wet. [TAILINGS] | | C1 | | 1095 |
| 2 | | From 2.37 m to 2.75 m colour change to grey-brown. | | C2 | | 1094 |
| 3 | | | | C3 | | 1093 |
| | | SAND and silt, fine grained, loose, brown to orange brown, wet. [TAILINGS] | | | Gravel - 0.0% Sand - 51.4% Fines - 48.6% | |
| 4 | | | | GS1 C4 | | 1092 |
| | | SILT, very soft, non plastic, black, organics, wet. [IN SITU] | | | At 4.55 m started to hammer to advance drill. | |
| 5 | | SAND, fine to medium grained, some silt, dense, black to dark grey brown, wet. [IN SITU] | | C5 | | 1091 |
| 6 | | At 5.75 m becoming very dense. | | C6 | At 5.75 m hammering becomes very hard. Gravel 1.0% Sand - 94.6% Fines - 4.4% | 1090 |
| 7 | | End of hole at 6.75 m due to refusal. No installation. | | | | 1089 |
| 8 | | | | | | 1088 |
| 9 | | | | | | 1087 |

VM00605E NANSEN GEOPROBE LOGS REV JAN 15.GPJ 14-02-26 11:20 AM (TEST PIT LOG)

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-10-01 4:00:00 PM | Logged By: D. Piccininni |
| Completion Date: 2013-10-01 5:00:00 PM | Reviewed By: R. Wood |
| Completion Depth: 6.75 m | Page 1 of 1 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Storage Facility - Pond | Borehole No: GP-T-13-02 |
| Client: Yukon Government - AAM | Northing (UTM Zone 8, NAD83): 6880639 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Geoprobe | Easting (UTM Zone 8, NAD83): 389391 | Elevation (m): 1096 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| 0 | | Water | | | Coordinates from handheld GPS, elevation obtained from LiDAR information | |
| 1 | | | | | | 1095 |
| 2 | | SILT, trace to some sand, fine grained, soft, low plastic, yellow-brown, wet. [TAILINGS] | | C1 | | 1094 |
| 3 | | | | C2 | | 1093 |
| 4 | | | | C3 | | 1092 |
| 5 | | From 4.6 m, trace clay. | | C4 | | 1091 |
| 6 | | | | C5 | | 1090 |
| | | SILT, stiff to very stiff, low plastic, black, trace organics, wet, visible individual ice inclusions. ($V_x$) [IN SITU/ PERMAFROST] | | | | |
| 7 | | End of hole @ 6.25 m due to refusal in permafrost. No installation. | | | | 1089 |
| 8 | | | | | | 1088 |
| 9 | | | | | | 1087 |

VM00605E NANSEN GEOPROBE LOGS REV JAN 15.GPJ 14-02-26 11:20 AM (TEST PIT LOG)

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-10-02 8:45:00 AM | Logged By: D. Piccininni |
| Completion Date: 2013-10-02 9:20:00 AM | Reviewed By: R. Wood |
| Completion Depth: 6.25 m | Page 1 of 1 |

| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Storage Facility - Pond | Borehole No: GP-T-13-03 |
|---|---|---|
| Client: Yukon Government - AAM | Northing (UTM Zone 8, NAD83): 6880606 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Geoprobe | Easting (UTM Zone 8, NAD83): 389303 | Elevation (m): 1096 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| ▼ | | WATER | | | Coordinates from handheld GPS, elevation obtained from LiDAR information | |
| 1 | | | | | | 1095 |
| | | SAND, fine grained, silty, poorly graded, loose to very loose, medium yellow-brown, wet. [TAILINGS] | | C1 | | |
| 2 | | | | | | 1094 |
| | | | | C2 | | |
| 3 | | | | | | 1093 |
| | | SILT, trace sand, soft, low plastic, brown, wet. [TAILINGS] | | GS1 | Gravel - 0.0% Sand - 2.5% Fines - 97.5% | |
| 4 | | | | C3 | | 1092 |
| | | From 4.38 m trace clay. | | | | |
| 5 | | | | C4 | | 1091 |
| | | From 5.75 m sandy. | | | Gravel - 0.0% Sand - 29.9% Fines - 70.1% | |
| 6 | | | | C5 | | 1090 |
| | | From 6.75 m, compact and brown to orange-brown. | | | | |
| 7 | | | | C6 | | 1089 |
| | | SAND, medium grained, trace silt, compact to dense, brown to dark brown, moist, trace organics in top 10cm of run. [IN SITU] | | | Gravel - 0.3% Sand - 97.8% Fines -1.9% | |
| 8 | | | | C7 | | 1088 |
| | | End of hole @ 8.75 m due to refusal.<br>No installation. | | | | |
| 9 | | | | | | 1087 |

VM00605E NANSEN GEOPROBE LOGS REV JAN 15.GPJ 14-02-26 11:20 AM (TEST PIT LOG)

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| Start Date: 2013-10-01 2:00:00 PM | Logged By: D. Piccininni |
|---|---|
| Completion Date: 2013-10-01 3:00:00 PM | Reviewed By: R. Wood |
| Completion Depth: 8.75 m | Page 1 of 1 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Storage Facility - Pond | Borehole No: GP-T-13-04 |
| Client: Yukon Government - AAM | Northing (UTM Zone 8, NAD83): 6880600 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Geoprobe | Easting (UTM Zone 8, NAD83): 389379 | Elevation (m): 1096 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| ▼ | | Water | | | Coordinates from handheld GPS, elevation obtained from LiDAR information | |
| 1 | | SILT, very soft, non plastic, pale brown, wet. [TAILINGS] | | | | 1095 |
| | | SAND, fine grained, silty, very loose, brown, wet. [TAILINGS] | | | | |
| 2 | | SILT, trace sand, very sot to soft, low plastic, grey-brown to light yellow-brown, wet. [TAILINGS] | | | | 1094 |
| 3 | | | | C1 | | 1093 |
| 4 | | | | | At 4.25 m, sampler started to encounter slight resistance in the soil. Very loose, unconsolidated soil above this point. | 1092 |
| 5 | | | | | | 1091 |
| | | | | | Gravel - 0.0% Sand - 3.5% Fines - 96.5% | |
| 6 | | | | C2 | | 1090 |
| | | | | C3 | | |
| 7 | | | | | | 1089 |
| | | | | C4 | | |
| 8 | | | | | | 1088 |
| | | | | C5 | | |
| 9 | | | | | | 1087 |
| | | | | C6 | | |

| | | |
|---|---|---|
| Start Date: 2013-10-05 2:30:00 PM | Logged By: D. Piccininni | |
| Completion Date: 2013-10-05 4:30:00 PM | Reviewed By: R. Wood | |
| Completion Depth: 11.25 m | Page 1 of 2 | |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

VM00605E NANSEN GEOPROBE LOGS REV JAN 15.GPJ 14-02-26 11:20 AM (TEST PIT LOG)

| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Storage Facility - Pond | Borehole No: GP-T-13-04 |
|---|---|---|
| Client: Yukon Government - AAM | Northing (UTM Zone 8, NAD83): 6880600 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Geoprobe | Easting (UTM Zone 8, NAD83): 389379 | Elevation (m): 1096 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| | | SILT, trace sand, very sot to soft, low plastic, grey-brown to light yellow-brown, wet. [TAILINGS] *(continued)* | | | | |
| 11 | | SAND, fine to medium grained, trace gravel, trace silt, compact to dense, dark grey to black, wet. [IN SITU] | | C7 | Gravel - 2.1% Sand - 93.1% Fines - 4.8% | 1085 |
| | | End of hole @ 11.25 m.<br>No installation. | | | | |
| 12 | | | | | | 1084 |
| 13 | | | | | | 1083 |
| 14 | | | | | | 1082 |
| 15 | | | | | | 1081 |
| 16 | | | | | | 1080 |
| 17 | | | | | | 1079 |
| 18 | | | | | | 1078 |
| 19 | | | | | | 1077 |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| Start Date: 2013-10-05 2:30:00 PM | Logged By: D. Piccininni |
|---|---|
| Completion Date: 2013-10-05 4:30:00 PM | Reviewed By: R. Wood |
| Completion Depth: 11.25 m | Page 2 of 2 |

| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Storage Facility - Pond | Borehole No: GP-T-13-10 |
|---|---|---|
| Client: Yukon Government - AAM | Northing (UTM Zone 8, NAD83): 6880630 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Geoprobe | Easting (UTM Zone 8, NAD83): 389400 | Elevation (m): 1096 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| 0 | | Water | | | Coordinates from handheld GPS, elevation obtained from LiDAR information | |
| 1 | | | | C1 | | 1095 |
| 2 | | SAND, fine grained, silty, loose, brown, wet. [TAILINGS] | | | | 1094 |
| | | SILT, trace sand, soft, low plastic, yellow-brown, moist to wet. [TAILINGS] | | C2 | | |
| 3 | | | | | | 1093 |
| | | | | C3 | | |
| 4 | | | | | | 1092 |
| | | | | | Gravel - 0.0% Sand - 1.8% Fines - 98.2% | |
| | | | | C4 | | |
| 5 | | | | | | 1091 |
| | | SAND, silty, fine grained, loose to compact, grey-brown, moist to wet. [TAILINGS] | | C5 | | |
| 6 | | SILT, some sand, soft, low plastic, yellow-brown, moist to wet. (TAILINGS) | | | | 1090 |
| | | | | C6 | | |
| 7 | | | | | | 1089 |
| | | | | C7 | | |
| 8 | | | | | | 1088 |
| | | At 8.5 m to 8.6 m SAND, fine grained, silty, loose, grey-brown, wet. [TAILINGS] | | | Gravel - 0.0% Sand - 8.1% Fines - 91.9% | |
| | | From 8.6 m change to trace sand. | | C8 | | |
| 9 | | | | | | 1087 |
| | | SILT, soft, low plastic, black, trace rootlets, visible ice coatings on particles ($V_c$), strong organic odour. [IN SITU/ PERMFROST] | | | | |
| | | End of Hole @ 9.25 m due to refusal in permafrost. No installation. | | | | |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| Start Date: 2013-10-02 10:00:00 AM | Logged By: D. Piccininni |
|---|---|
| Completion Date: 2013-10-02 12:00:00 PM | Reviewed By: R. Wood |
| Completion Depth: 9.25 m | Page 1 of 1 |

VM00605E NANSEN GEOPROBE LOGS REV JAN 15.GPJ 14-02-26 11:20 AM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Storage Facility- Tailings | Borehole No: GP-T-13-18 |
| Client: Yukon Government - AAM | Northing (UTM Zone 8, NAD83): 6880550 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Geoprobe | Easting (UTM Zone 8, NAD83): 389324 | Elevation (m): 1096 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| 0 | | SAND, fine grained, silty, loose, medium orange-brown, wet. [TAILINGS] | | C1 | Coordinates from handheld GPS, elevation obtained from LiDAR information<br>Gravel - 0.0% Sand - 65.6% Fines - 34.4% | 1096 |
| 1 | | SILT, trace fine sand, very soft, non to low plastic, yellow-brown with grey-brown bands, moist to wet. [TAILINGS] | | C2 | From 1 m to 2.25 m, drilling is very soft, can push in with just the weight of the drill rods | 1095 |
| 2 | | | | | | 1094 |
| 3 | | | | C3 | | 1093 |
| 4 | | | | C4 | | 1092 |
| 5 | | SAND, fine grained, black, trace organics, wet, faint organic odour, possible slight hydrocarbon odour. [IN SITU] | | | At 4.75 m pushing drill rods became hard, needed to start hammering.<br>At 4.8 m, soil appears to be caving and filling core barrel without advancing drill | 1091 |
| 6 | | SAND, medium grained, trace gravel, trace silt, poorly graded, compact, black, wet. [IN SITU] | | C5 | Gravel - 2.1% Sand - 92.2% Fines - 5.7% | 1090 |
| 7 | | End of hole @ 6.25 m. Vibration from drill causing soil to liquify.<br>No installation.<br>Hole sloughed in upon completion. | | | | 1089 |
| 8 | | | | | | 1088 |
| 9 | | | | | | 1087 |

VM00605E NANSEN GEOPROBE LOGS REV JAN 15.GPJ 14-02-26 11:20 AM (TEST PIT LOG)

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-30 8:45:00 AM | Logged By: D. Piccininni |
| Completion Date: 2013-09-30 10:00:00 AM | Reviewed By: R. Wood |
| Completion Depth: 6.25 m | Page 1 of 1 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Storage Facility- Tailings | Borehole No: GP-T-13-21 |
| Client: Yukon Government - AAM | Northing (UTM Zone 8, NAD83): 6880509 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Geoprobe | Easting (UTM Zone 8, NAD83): 389377 | Elevation (m): 1098 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| 0 | | SAND, fine grained, trace to some silt, loose to compact, medium brown with some orange tint, moist to wet. [TAILINGS] | | C1 | Coordinates from handheld GPS, elevation obtained from LiDAR information | 1098 |
| 1 | | SAND, fine to medium grained, some silt, loose to compact, medium brown, damp to moist. [IN SITU] | | C2 | Gravel - 0.3% Sand - 85.2% Fines - 14.5% | 1097 |
| 2 | | SAND, fine to medium grained, trace gravel, trace silt, dense, medium brown, frozen with visible ice particles within the soil. [IN SITU] | | C3 | Gravel - 2.2% Sand - 87.3% Fines - 10.5% | 1096 |
| 3 | | End of borehole @ 3.25 m due to refusal in permafrost.<br>No installation.<br>Hole sloughed in upon completion. | | | | 1095 |
| 4 | | | | | | 1094 |
| 5 | | | | | | 1093 |
| 6 | | | | | | 1092 |
| 7 | | | | | | 1091 |
| 8 | | | | | | 1090 |
| 9 | | | | | | 1089 |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-09-29 5:30:00 PM | Logged By: D. Piccininni |
| Completion Date: 2013-09-29 6:30:00 PM | Reviewed By: R. Wood |
| Completion Depth: 3.25 m | Page 1 of 1 |

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Storage Facility- Tailings | Borehole No: GP-T-13-22 |
| Client: Yukon Government - AAM | Northing (UTM Zone 8, NAD83): 6880750 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Geoprobe | Easting (UTM Zone 8, NAD83): 389256 | Elevation (m): 1098 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| 0 | | SAND, fine grained, trace to some silt, loose to compact, medium brown with some orange tint, moist to wet. [TAILINGS] | | | Coordinates from handheld GPS, elevation obtained from LiDAR information | 1098 |
| | | SILT, sandy, soft to firm, darm brown, trace organics, damp. [IN SITU] | | C1 | | 1097 |
| 1 | | | | | | |
| | | SAND, medium grained, trace gravel, trace silt, poorly graded, compact, dark brown to grey brown, wet. [IN SITU] | | | | 1096 |
| | | From 1.5 m becoming grey-brown. | | C2 | | |
| 2 | | | | | | 1095 |
| | | | | | Gravel - 4.9% Sand - 93.4% Fines - 1.7% | |
| 3 | | | | C3 | | 1094 |
| | | | | | Gravel - 2.9% Sand - 89.8% Fines - 7.3% | |
| 4 | | | | C4 | | 1093 |
| 5 | | At 4.95 m some angular gravel. | | C5 | Sand appears to be caving and is filling geoprobe core barrel before advancing. | 1092 |
| | | End of hole @ 5.1 m due to refusal.<br>No installation.<br>Hole sloughed in upon completion. | | | | |
| 6 | | | | | | 1091 |
| 7 | | | | | | 1090 |
| 8 | | | | | | 1089 |
| 9 | | | | | | 1088 |

| | | |
|---|---|---|
| Start Date: 2013-09-30 1:30:00 PM | Logged By: D. Piccininni | |
| Completion Date: 2013-09-30 2:30:00 PM | Reviewed By: R. Wood | |
| Completion Depth: 5.10 m | Page 1 of 1 | |

amec | Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

VM00605E NANSEN GEOPROBE LOGS REV JAN 15.GPJ 14-02-26 11:20 AM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Tailings Storage Facility- Tailings | Borehole No: GP-T-13-23 |
| Client: Yukon Government - AAM | Northing (UTM Zone 8, NAD83): 6880723 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Geoprobe | Easting (UTM Zone 8, NAD83): 389408 | Elevation (m): 1097 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| 0 | | SAND, fine grained, some silt, poorly graded, loose to compact, dark brown, damp. [TAILINGS] | | C1 | Coordinates from handheld GPS, elevation obtained from LiDAR information | 1097 |
| 1 | | | | | | 1096 |
| 2 | | | | C2 | | 1095 |
| 2.5 | | SILT, soft, no plastic, black, some organics, moist. [IN SITU] | | | | 1094.5 |
| 3 | | SAND, trace gravel, trace silt, fine to medium grained, poorly graded, dense, medium brown to grey, moist. [IN SITU] | | C3 | | 1094 |
| 3.75 | | From 3.75 m becoming loose to compact, wet. | | | At 3.75m easier drilling | 1093.25 |
| 4 | | | | C4 | | 1093 |
| 5 | | | | C5 | | 1092 |
| 6 | | From 6.25 m becoming loose. | | | | 1091 |
| 6.25 | | | | C6 | | 1090.75 |
| 7 | | | | | At 7.5m caving soil filling core barrel before advancement | 1090 |
| 8 | | | | C7 | | 1089 |
| 8.75 | | End of hole @ 8.75m due to refusal.<br>No installation.<br>Hole sloughed in upon completion. | | | | 1088.25 |
| 9 | | | | | | 1088 |
| | | | | | | 1087 |

| | | |
|---|---|---|
| Start Date: 2013-09-29 1:45:00 PM | Logged By: D. Piccininni | |
| Completion Date: 2013-09-29 4:30:00 PM | Reviewed By: R. Wood | |
| Completion Depth: 8.75 m | Page 1 of 1 | |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

VM00605E NANSEN GEOPROBE LOGS REV JAN 15.GPJ 14-02-26 11:21 AM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Sand Borrow Area | Borehole No: HA-BA-13-01 |
| Client: Yukon Government - AAM | Northing (UTM Zone 8, NAD83): 6880716 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Hand Auger | Easting (UTM Zone 8, NAD83): 388945 | Elevation (m): 1114 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| 0 | | SAND, fine to medium grained, compact, grey-brown, damp. [IN SITU] | | G1 | | 1114 |
| 1 | | | | | | 1113 |
| 2 | | | | G2 | | 1112 |
| 3 | | | | G3 | | 1111 |
| | | End of Hole @ 3 m.<br>No installation.<br>Sloughed in upon completion. | | | | |
| 4 | | | | | | 1110 |
| 5 | | | | | | 1109 |
| 6 | | | | | | 1108 |
| 7 | | | | | | 1107 |
| 8 | | | | | | 1106 |
| 9 | | | | | | 1105 |
| | | | | | | 1104 |

amec | Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-10-08 | Logged By: D. Piccininni |
| Completion Date: 2013-10-08 | Reviewed By: R. Wood |
| Completion Depth: 3.00 m | Page 1 of 1 |

VM00605E NANSEN GEOPROBE LOGS REV JAN 15.GPJ 14-02-26 11:21 AM (TEST PIT LOG)

| | | |
|---|---|---|
| Project: Mount Nansen 2013 Site Investigation | Area: Sand Borrow Area | Borehole No: HA-BA-13-02 |
| Client: Yukon Government - AAM | Northing (UTM Zone 8, NAD83): 6880702 | Project No: VM00605E |
| Contractor & Method: Dark Side Drilling, Hand Auger | Easting (UTM Zone 8, NAD83): 389017 | Elevation (m): 1109 |

SAMPLE TYPE: Shelby Tube | Core | SPT (N) | Grab Sample

BACKFILL TYPE: Bentonite Chips | Bentonite Grout | Bentonite Pellets | Cement Grout | Drill Cuttings | Sand | Slough

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | OTHER TESTS, COMMENTS | ELEVATION (m) |
|---|---|---|---|---|---|---|
| 0 | | SAND, fine to medium grained, compact, grey-brown, damp. [IN SITU] | | G1 | | 1109 |
| 1 | | | | | | 1108 |
| 2 | | | | G2 | | 1107 |
| 3 | | End of Hole @ 3 m.<br>No installation.<br>Sloughed in upon completion. | | G3 | | 1106 |
| 4 | | | | | | 1105 |
| 5 | | | | | | 1104 |
| 6 | | | | | | 1103 |
| 7 | | | | | | 1102 |
| 8 | | | | | | 1101 |
| 9 | | | | | | 1100 |
| | | | | | | 1099 |

amec | Associated Engineering — GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | |
|---|---|
| Start Date: 2013-10-08 | Logged By: D. Piccininni |
| Completion Date: 2013-10-08 | Reviewed By: R. Wood |
| Completion Depth: 3.00 m | Page 1 of 1 |

VM00605E NANSEN GEOPROBE LOGS REV JAN 15.GPJ 14-02-26 11:21 AM (TEST PIT LOG)

## Appendix A5

## CPT Logs

Mount Nansen Remediation Project
2013 Site Investigation Data Report
Appendix C5

Summary of CPT Locations and Dissipation Tests

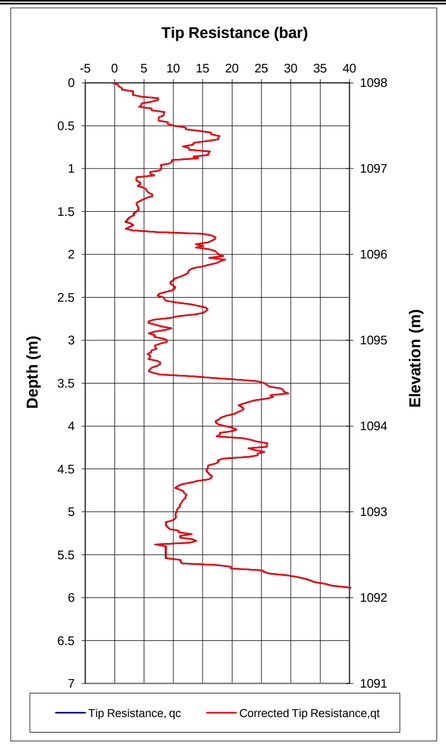
| CPT ID | Easting | Northing | CPT Conducted on Pond Surface | Elevation of Top of CPT Trace | CPT Total Depth | Dissipitation Test Depth | [1] Dissipation Achieved | Estimated Hydrostatic Pore Pressure |
|---|---|---|---|---|---|---|---|---|
| | UTM Zn 8 NAD 83 | UTM Zn 8 NAD 83 | Y/N | (m) | (m) | (m) | % | (m) |
| CPT-T-13-1 | 389,196 | 6,880,711 | N | 1098 | 5.92 | 1.9 | 123.89% | 1 |
| | | | | | | 5.4 | -10.78% | 4.4 |
| CPT-T-13-2 | 389,240 | 6,880,700 | N | 1097.3 | 3.92 | 1.9 | 46.36% | 1 |
| CPT-T-13-3 | 389,333 | 6,880,679 | Y | 1096.1 | 3.4 | 2.8 | 88.31% | 2.5 |
| CPT-T-13-4 | 389,391 | 6,880,690 | Y | 1096.1 | 2.98 | 3 | -1.24% | 2.7 |
| CPT-T-13-5 | 389,426 | 6,880,672 | N | 1099.7 | 4.96 | 3 | -6.13% | 2 |
| CPT-T-13-6 | 389,205 | 6,880,639 | N | 1097.2 | 4.02 | 1.5 | 44.55% | 0.5 |
| CPT-T-13-7(A) | 389,236 | 6,880,661 | N | 1096.6 | 4.16 | 4.10 | -4021.19% | 3 |
| CPT-T-13-7(B) | 389,236 | 6,880,661 | N | 1096.6 | 1.94 | 2 | 34.46% | 1 |
| CPT-T-13-8(A) | 389,307 | 6,880,654 | Y | 1096.1 | 4.06 | 4.1 | 55.81% | 3.8 |
| CPT-T-13-8(B) | 389,307 | 6,880,654 | Y | 1096.1 | 4.04 | 4.1 | 39.85% | 3.8 |
| CPT-T-13-9 | 389,383 | 6,880,661 | Y | 1096.1 | 4.88 | 4.8 | -0.46% | 4.6 |
| CPT-T-13-10(A) | 389,400 | 6,880,630 | Y | 1096.1 | 8.7 | Not Completed | | |
| CPT-T-13-10(B) | 389,400 | 6,880,630 | Y | 1096.1 | 7.64 | 2.9 | 20.51% | 2.7 |
| | | | | | | 7.7 | 68.49% | 7.5 |
| CPT-T-13-11 | 389,176 | 6,880,607 | N | 1101.1 | 0.48 | Not Completed | | |
| CPT-T-13-12 | 389,239 | 6,880,596 | N | 1097.2 | 4.32 | 3.8 | 64.95% | 2.8 |
| CPT-T-13-13 | 389,308 | 6,880,592 | Y | 1096.1 | 8.18 | 4.2 | 7.80% | 3.2 |
| | | | | | | 7.2 | 26.94% | 6.9 |
| | | | | | | 8.2 | 70.58% | 7.9 |
| CPT-T-13-14 | 389,378 | 6,880,602 | Y | 1096.1 | 9.72 | 3.5 | 51.44% | 3.3 |
| | | | | | | 5.5 | 94.91% | 5.3 |
| | | | | | | 8 | 95.02% | 7.7 |
| CPT-13-15 | 389,399 | 6,880,550 | N | 1096.8 | 8.56 | 5.1 | 100.62% | 3.4 |
| CPT-T-13-16 | 389,209 | 6,880,568 | N | 1098.6 | 4.66 | Not Completed | | |
| CPT-T-13-17 | 389,249 | 6,880,554 | N | 1097.3 | 3.4 | 2 | 46.98% | 1 |
| CPT-T-13-18 | 389,307 | 6,880,553 | Y | 1096.1 | 6.6 | 6.2 | 53.77% | 5.9 |
| CPT-T-13-19 | 389,378 | 6,880,547 | N | 1096.7 | 7.66 | 3.8 | 8.45% | 2.7 |
| | | | | | | 5.8 | 99.37% | 4.5 |
| CPT-T-13-20 | 389,418 | 6,880,524 | N | 1099.7 | 6.8 | Not Completed | | |

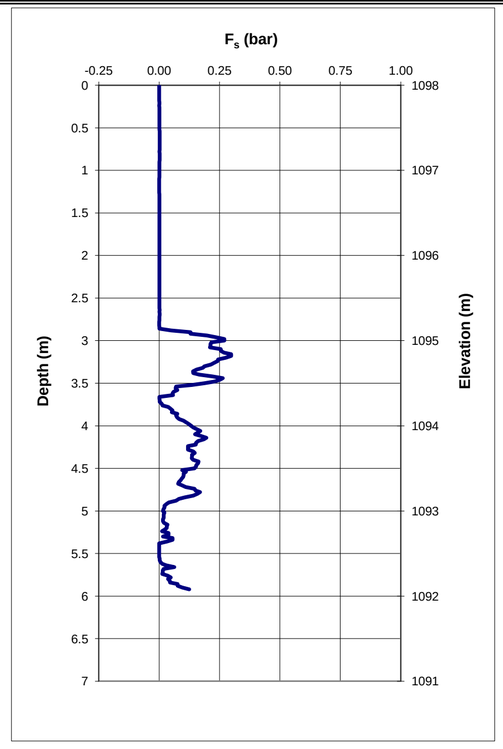
NOTES:

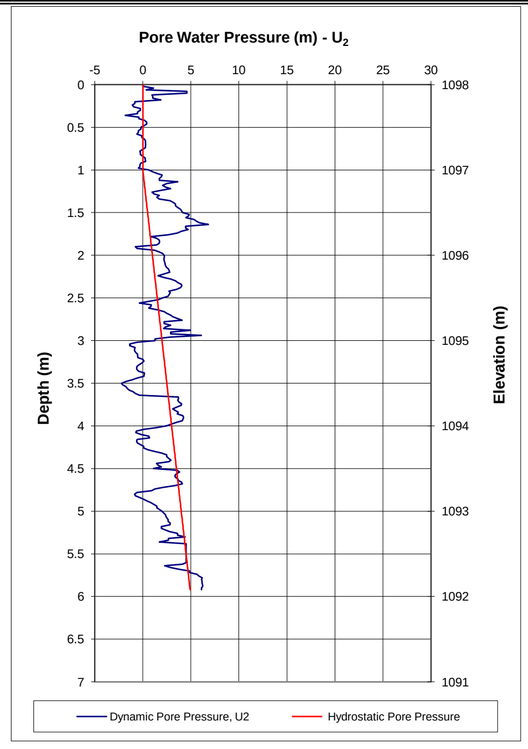
1. Dissipation Cells Highlighted Grey did not Reach Equilibrium or had Pore Pressure Below Hydrostatic (-ve values) and therefore data for these tests is not included.

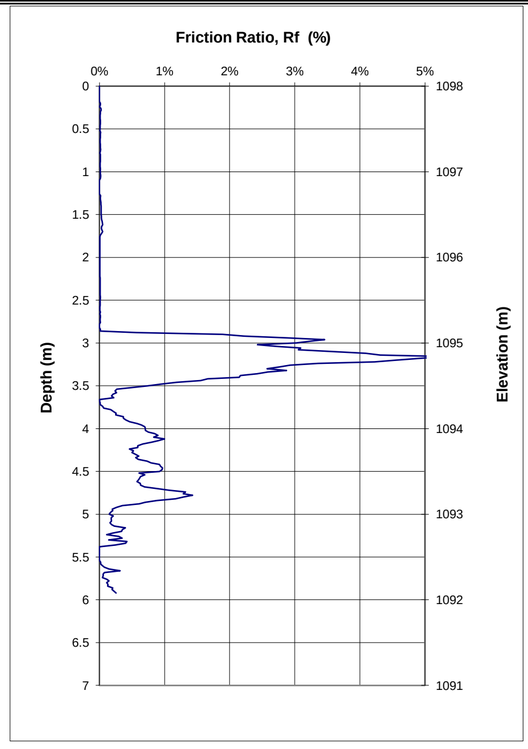
# CPT-T-13-01

Tailings




PROJECT: VM00605E

CPT DATE: October 7, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

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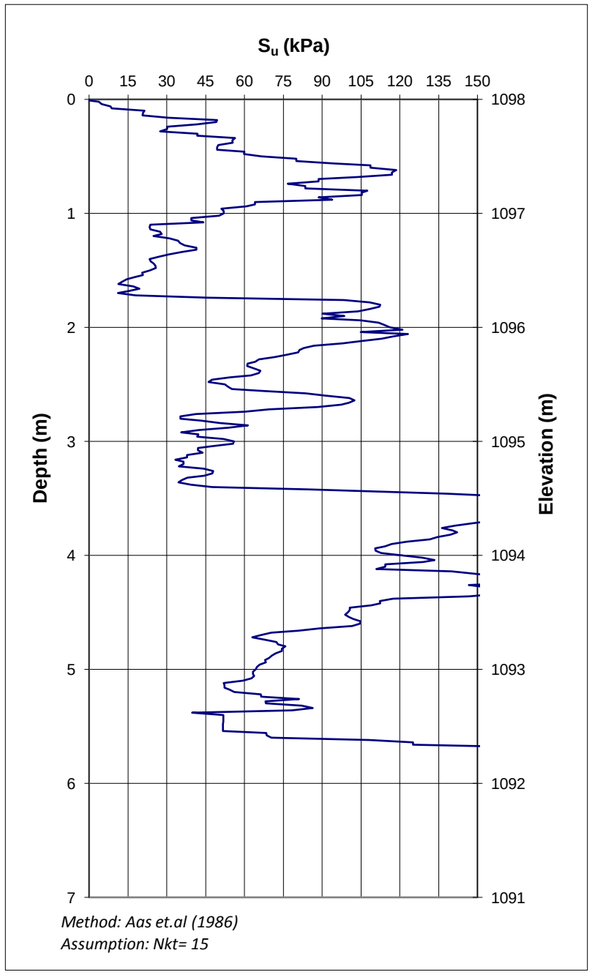
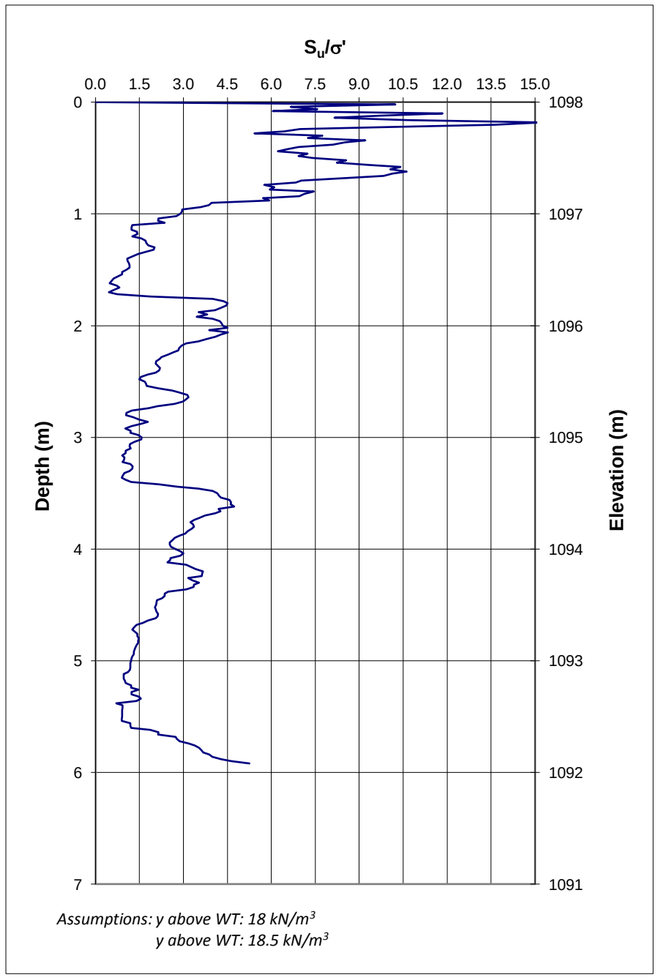
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-01**

# CPT-T-13-01




*Method: Aas et.al (1986)*
*Assumption: Nkt= 15*




*Assumptions: y above WT: 18 kN/m³*
*y above WT: 18.5 kN/m³*

PROJECT: VM00605E

| | | | |
|---|---|---|---|
| CPT DATE: | October 7, 2013 | Prepared by: | Ewelina Halyno |
| DATE: | March 7, 2014 | Reviewed by: | Renata Wood |

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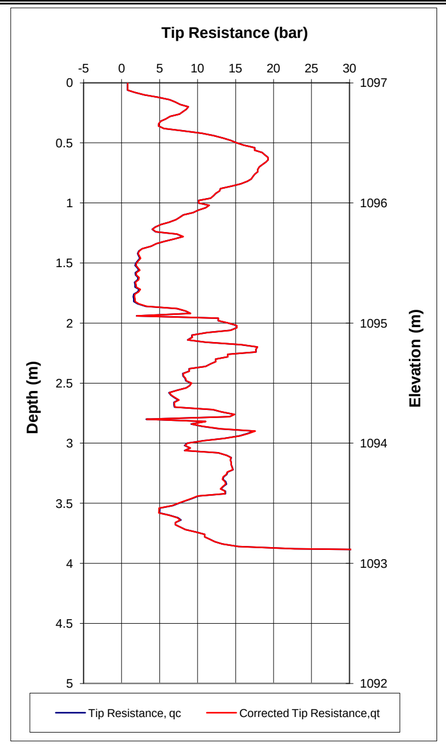
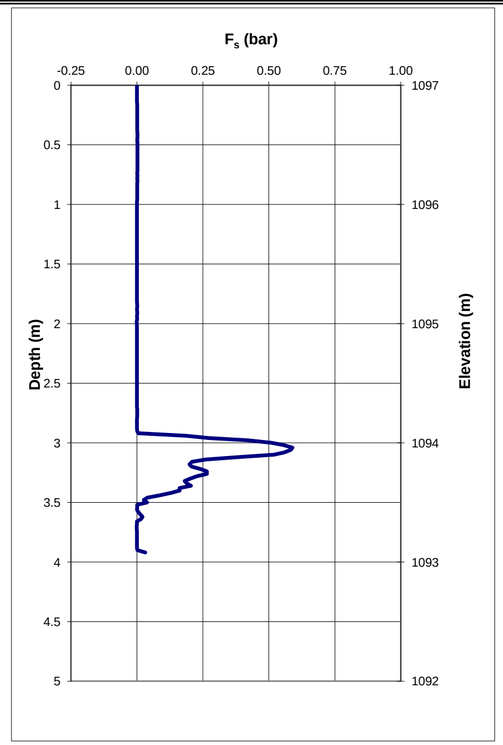
**MOUNT NANSEN**
**CPT INTERPERTATION**

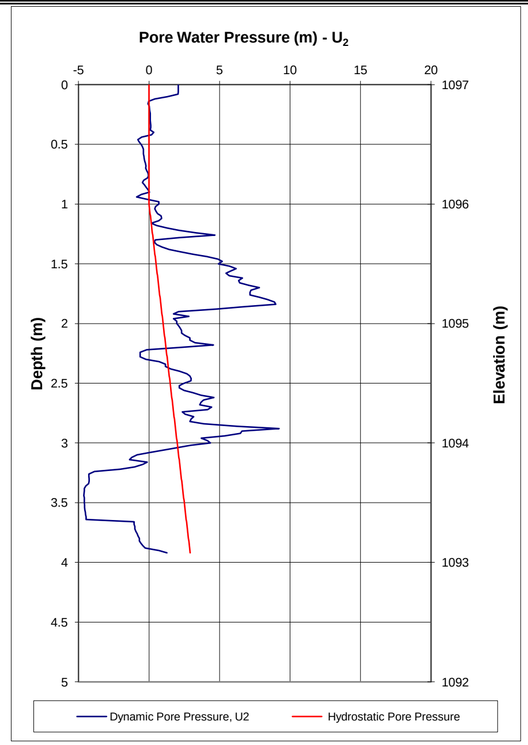
**CPT-T-13-01**

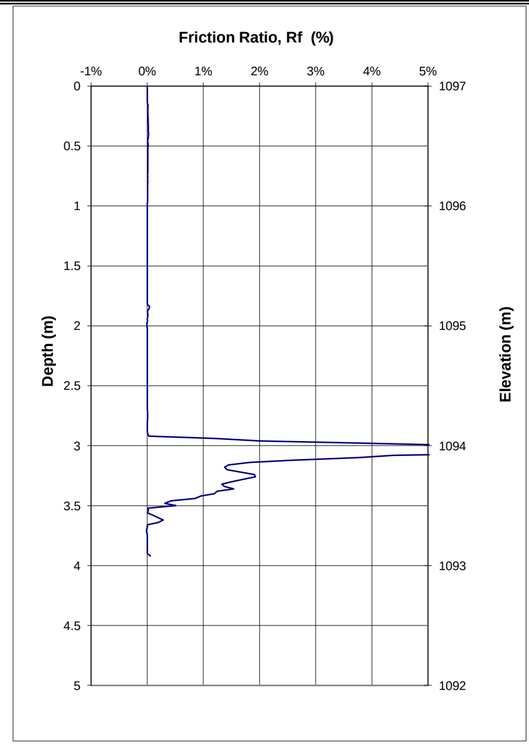
# CPT-T-13-02

Tailings




PROJECT: VM00605E

CPT DATE: October 7, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

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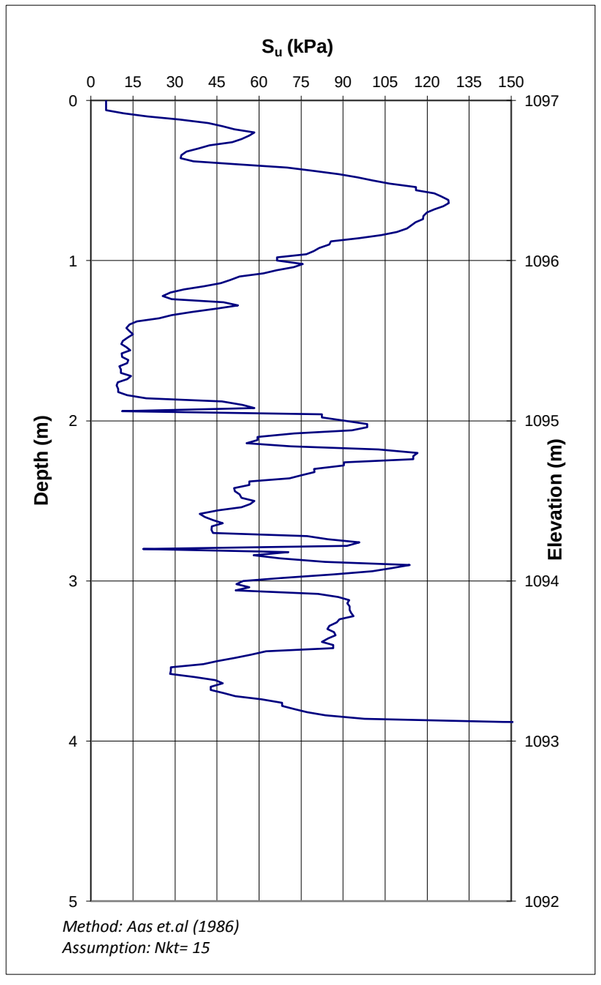
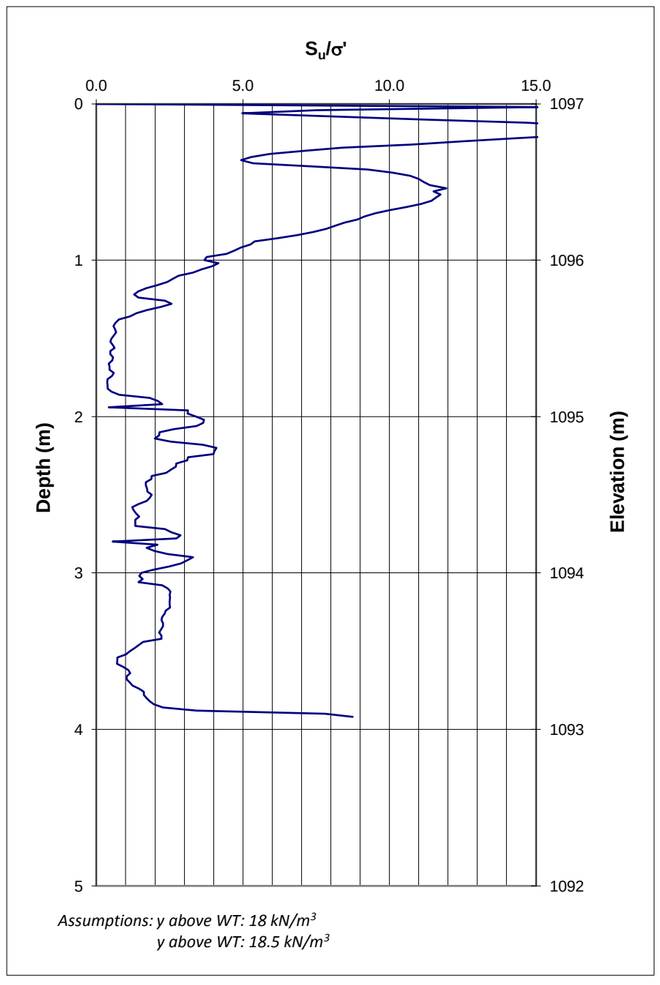
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-02**

# CPT-T-13-02




*Method: Aas et.al (1986)*
*Assumption: Nkt= 15*




*Assumptions: y above WT: 18 kN/m$^3$*
*y above WT: 18.5 kN/m$^3$*

PROJECT: VM00605E

CPT DATE: October 7, 2013 Prepared by: Ewelina Halyno
DATE: March 7, 2014 Reviewed by: Renata Wood

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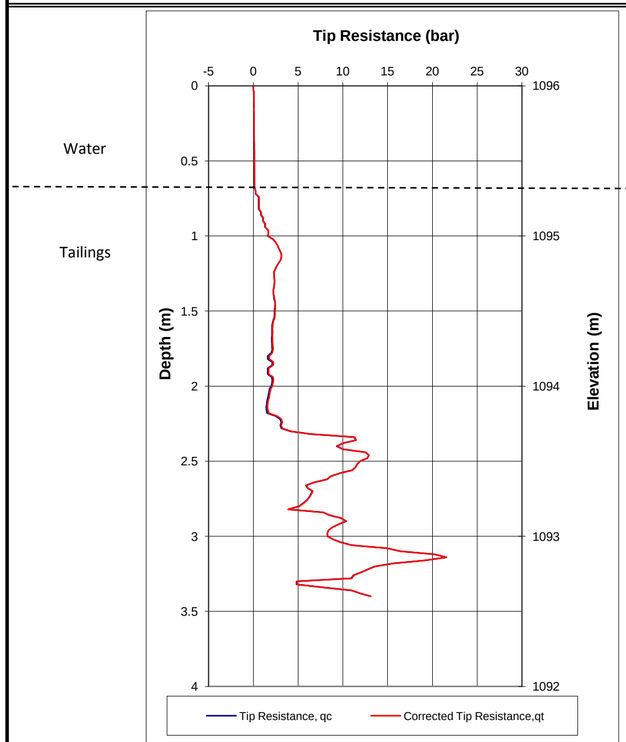
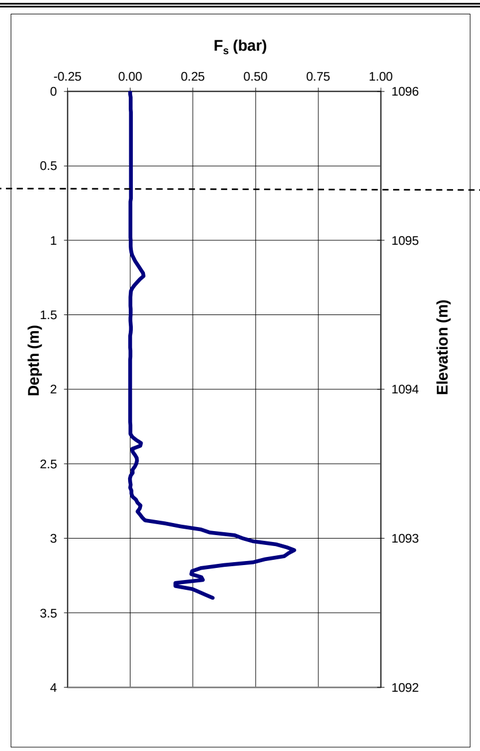
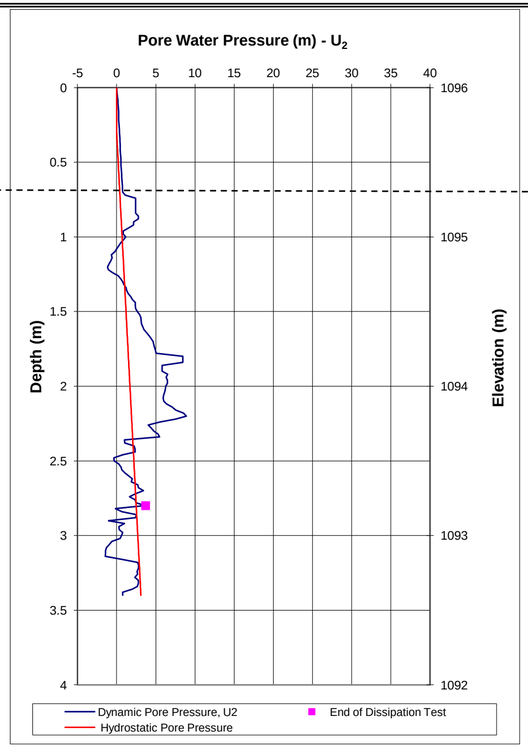
**MOUNT NANSEN**
**CPT INTERPERTATION**

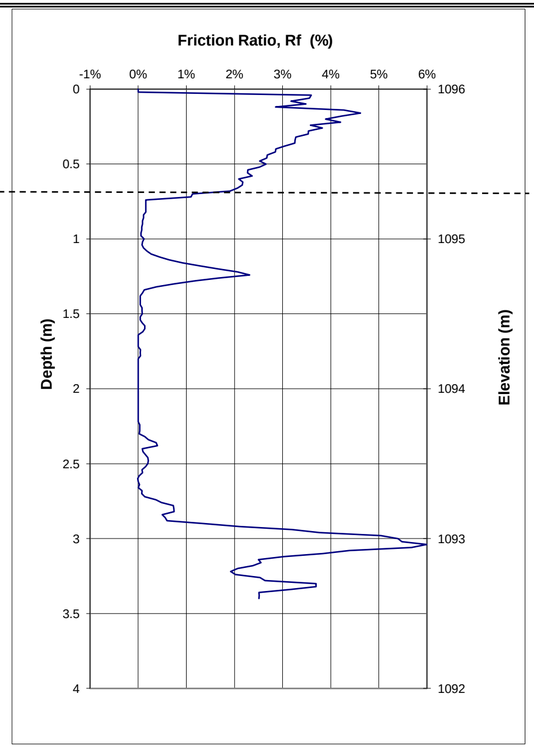
**CPT-T-13-02**

# CPT-T-13-03




PROJECT: VM00605E

NOTE:

CPT DATE: October 4, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

1. Depth Measured Relative to Barge Deck Elevation

2. Pond Elevation of 1095.8m Provided by AAM

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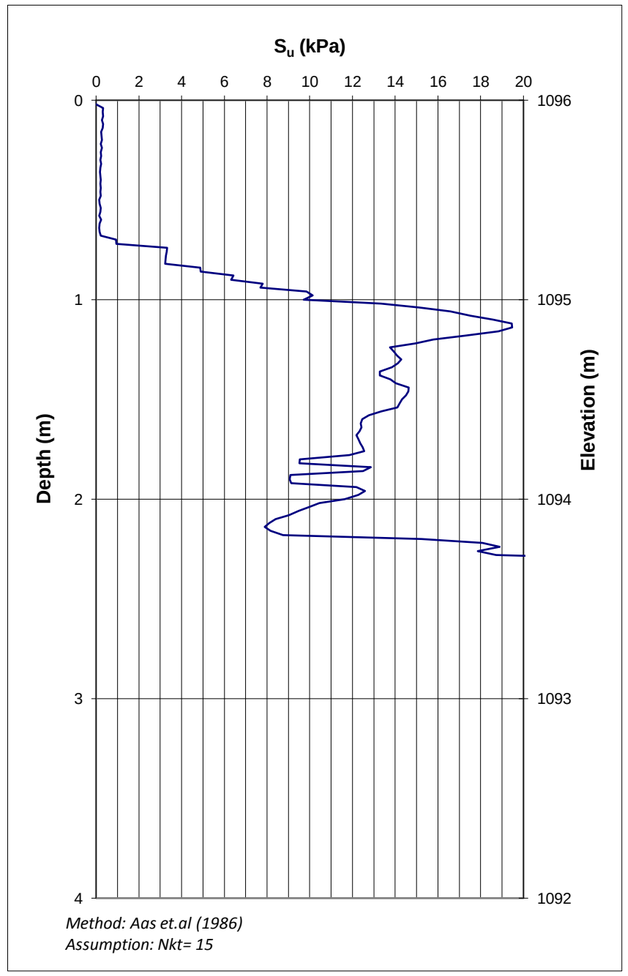
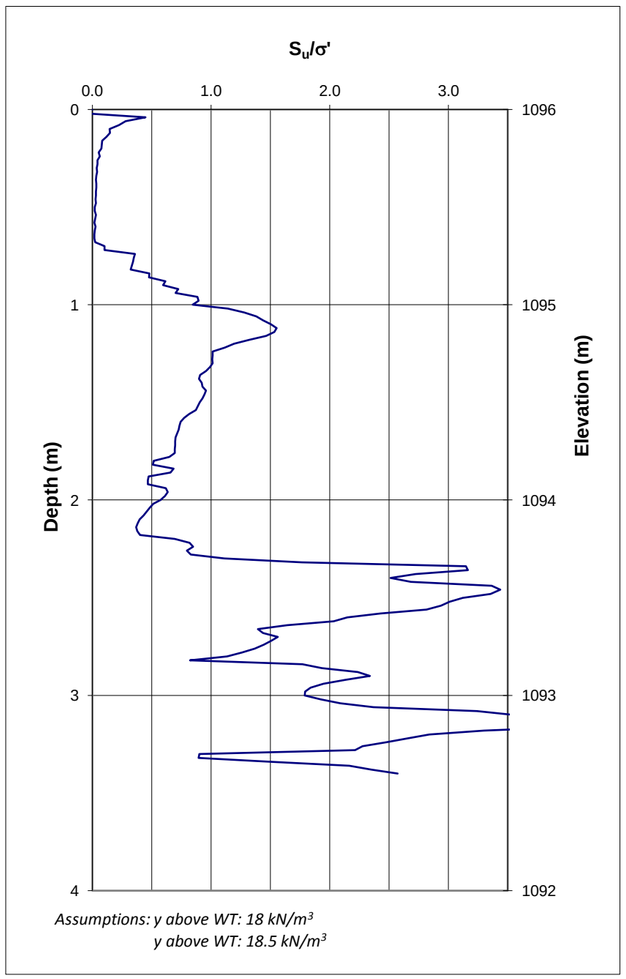
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-03**

# CPT-T-13-03




*Method: Aas et.al (1986)*
*Assumption: Nkt= 15*




*Assumptions: y above WT: 18 kN/m$^3$*
*y above WT: 18.5 kN/m$^3$*

PROJECT: VM00605E

| | | | |
|---|---|---|---|
| CPT DATE: | October 4, 2013 | Prepared by: | Ewelina Halyno |
| DATE: | March 7, 2014 | Reviewed by: | Renata Wood |

NOTE:

1. Depth Measured Relative to Barge Deck Elevation
2. Pond Elevation of 1095.8m Provided by AAM

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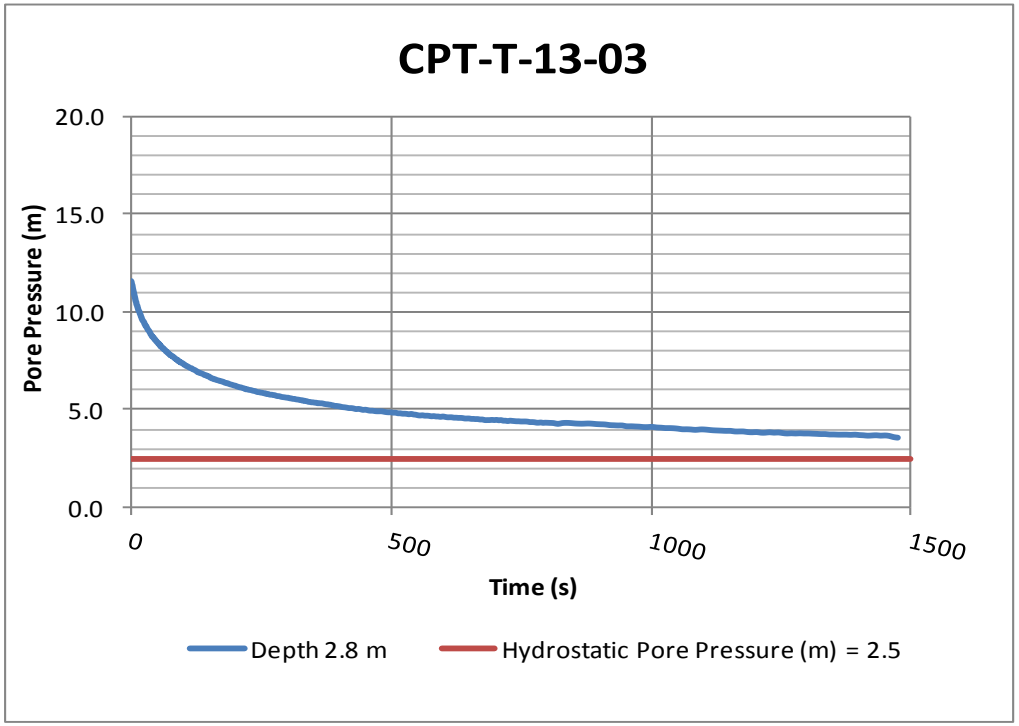
**MOUNT NANSEN**
**CPT INTERPERTATION**

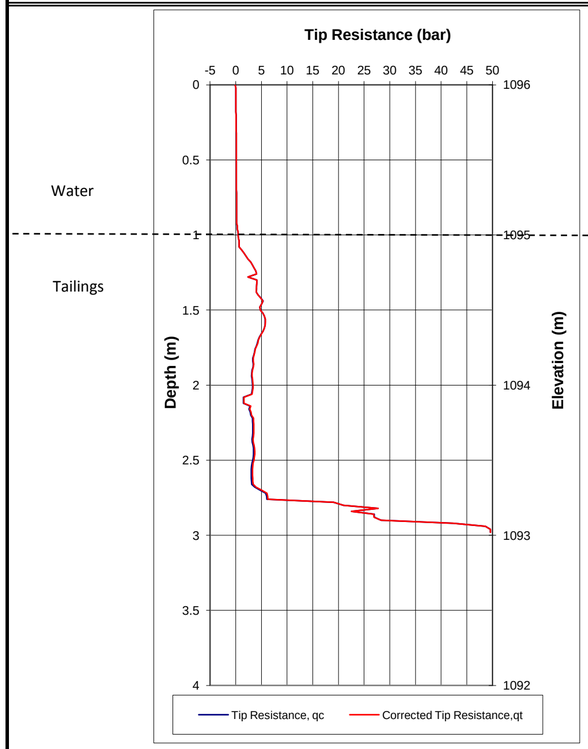
**CPT-T-13-03**

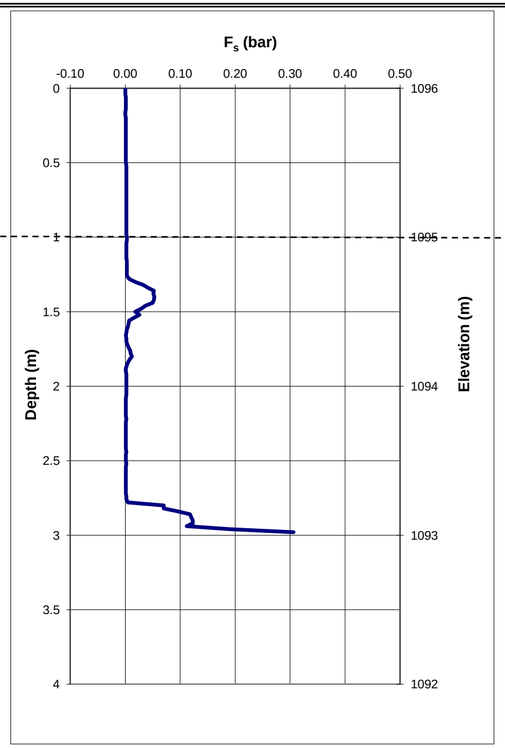


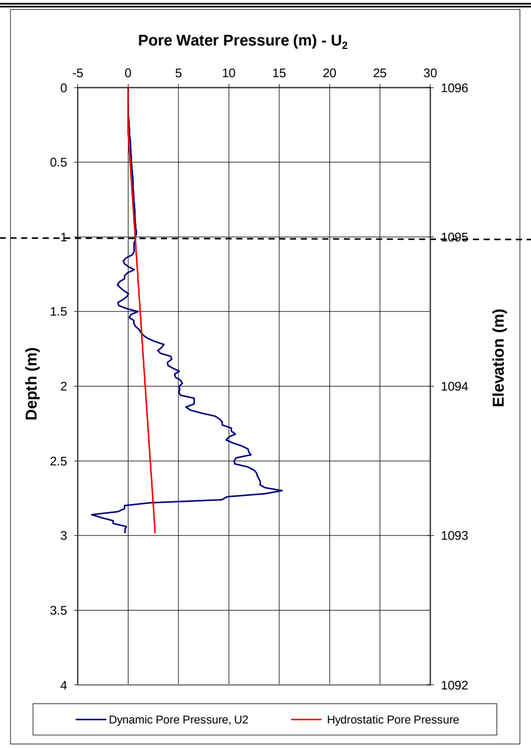

| | | | | | |
|---|---|---|---|---|---|
| CLIENT | Yukon Energy, Mines and Resources | DWN BY: | EH | PROJECT | MOUNT NANSEN<br>CPT INTERPERTATION |
| | | CHK'D BY: | RW | | |
| | | DEPTH 1: | 2.8m | TITLE | CPT-T-13-03<br>Dissipation |
| | | DEPTH 2:: | N/A | | |
| | | DEPTH 3: | N/A | | |

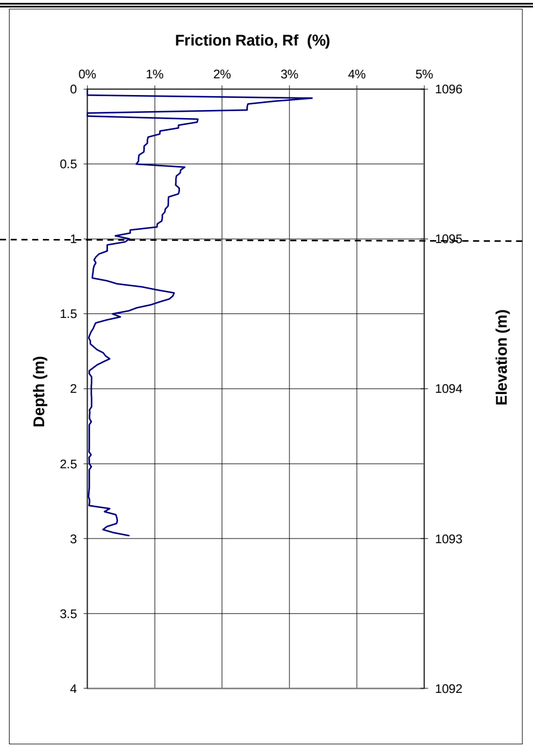
| | |
|---|---|
| DATE: | Feb-14 |
| CPT DATE: | 4-Oct-13 |
| PROJECT NO: | VM00605E |
| FIGURE NO: | 1 |

# CPT-T-13-04




PROJECT: VM00605E

CPT DATE: October 4, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

NOTE:

1. Depth Measured Relative to Barge Deck Elevation
2. Pond Elevation of 1095.8m Provided by AAM

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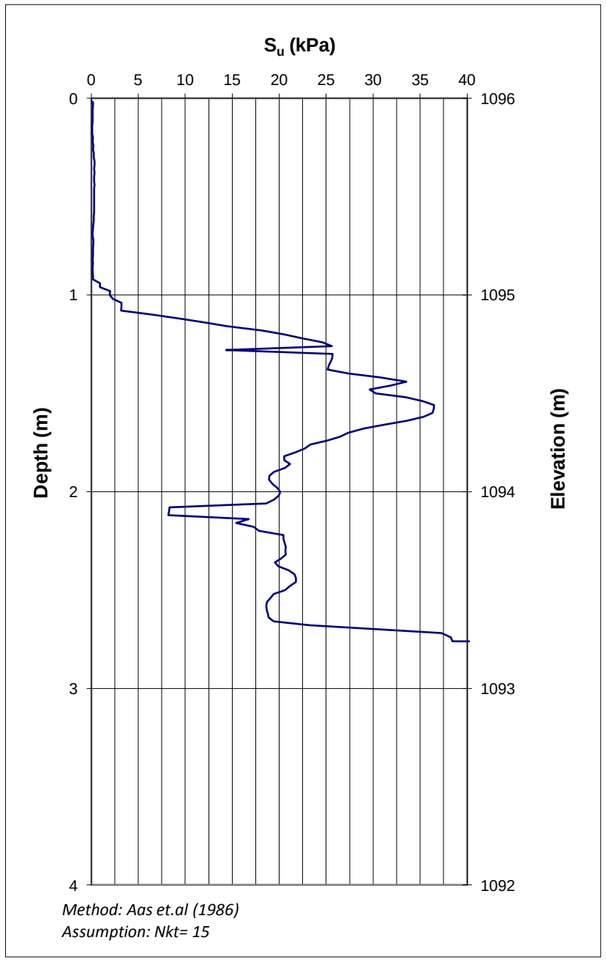
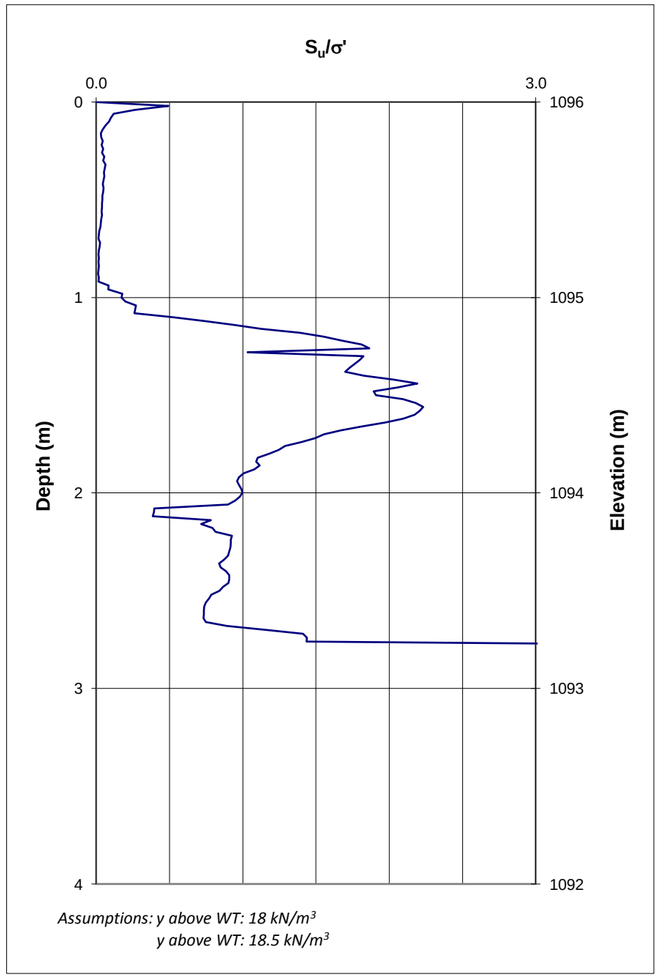
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-04**

# CPT-T-13-04




PROJECT: VM00605E

| | | | |
|---|---|---|---|
| CPT DATE: | October 4, 2013 | Prepared by: | Ewelina Halyno |
| DATE: | March 7, 2014 | Reviewed by: | Renata Wood |

NOTE:

1. Depth Measured Relative to Barge Deck Elevation
2. Pond Elevation of 1095.8m Provided by AAM

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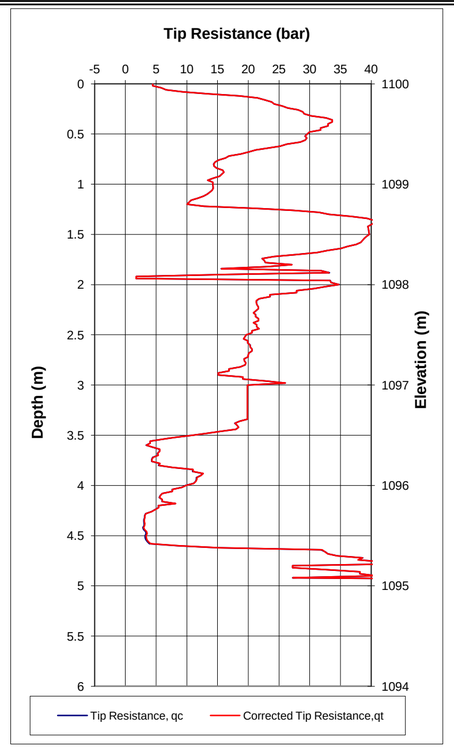
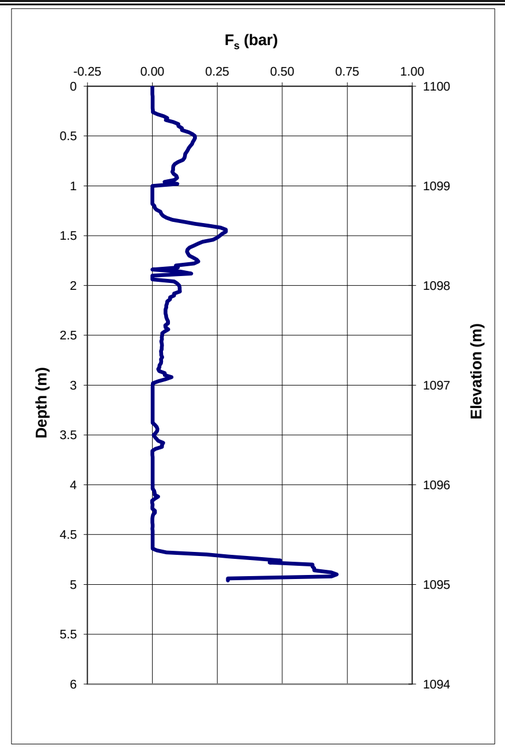
**MOUNT NANSEN**
**CPT INTERPERTATION**

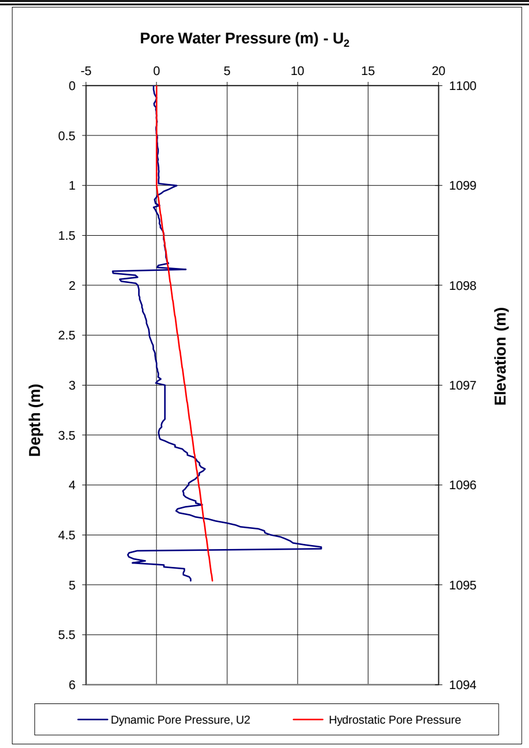
**CPT-T-13-04**

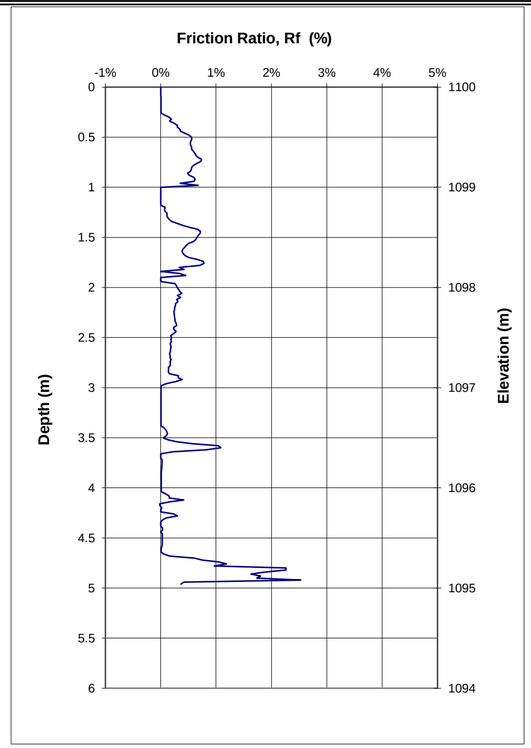
# CPT-T-13-05

Tailings

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CPT DATE: October 7, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

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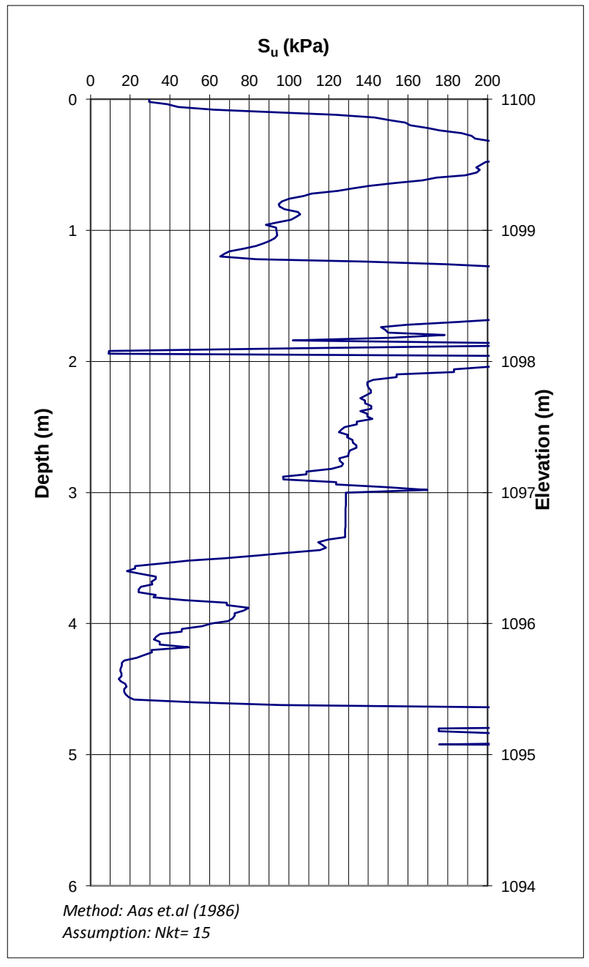
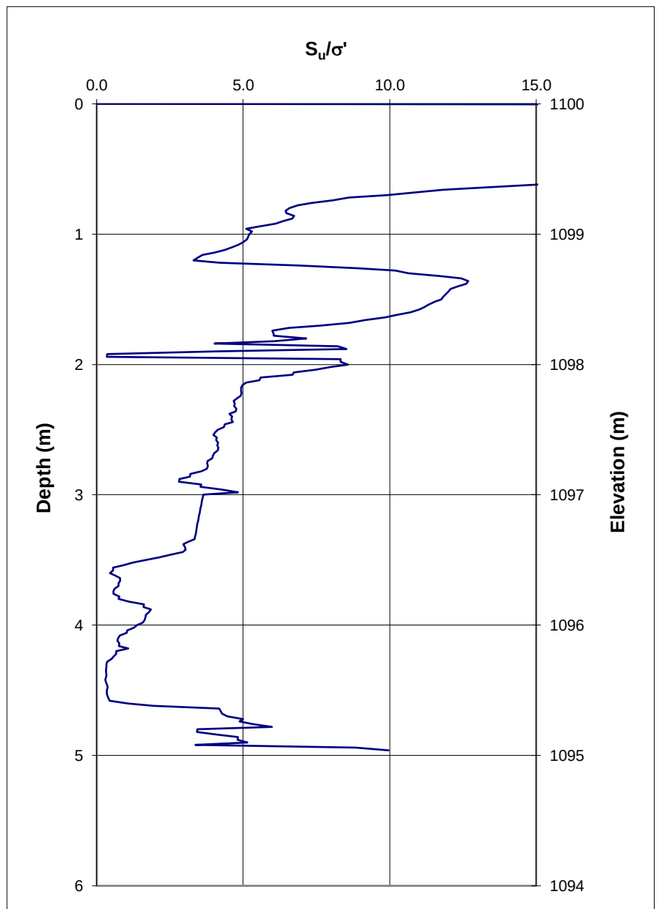
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-05**

# CPT-T-13-05




*Method: Aas et.al (1986)*
*Assumption: Nkt= 15*




*Assumptions: y above WT: 18 kN/m³*
*y above WT: 18.5 kN/m³*

| | | | | |
|---|---|---|---|---|
| PROJECT: | VM00605E | | | |
| | CPT DATE: | October 7, 2013 | Prepared by: | Ewelina Halyno |
| | DATE: | March 7, 2014 | Reviewed by: | Renata Wood |

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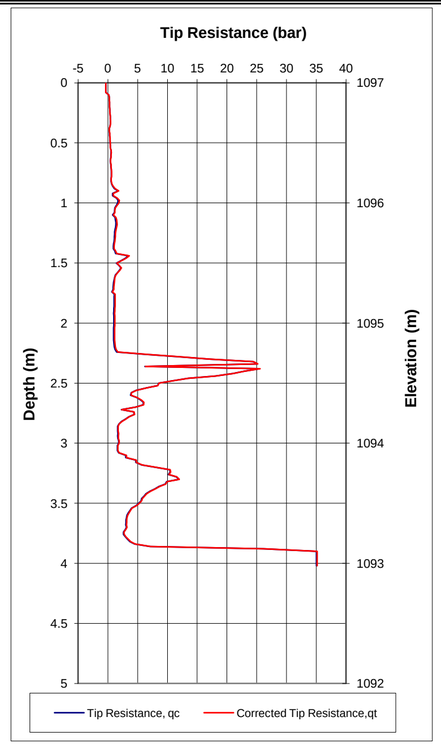
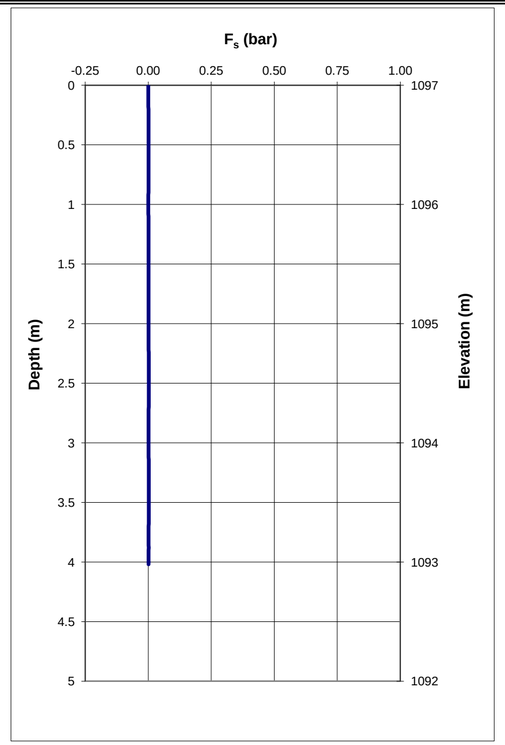
**MOUNT NANSEN**
**CPT INTERPERTATION**

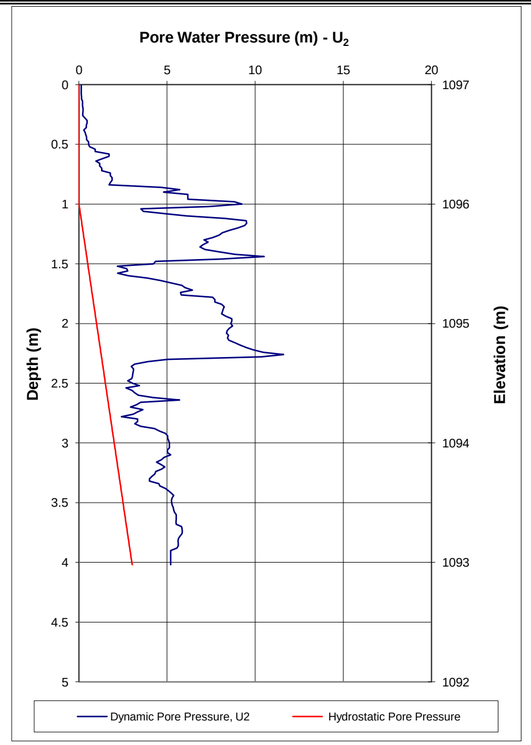
**CPT-T-13-05**

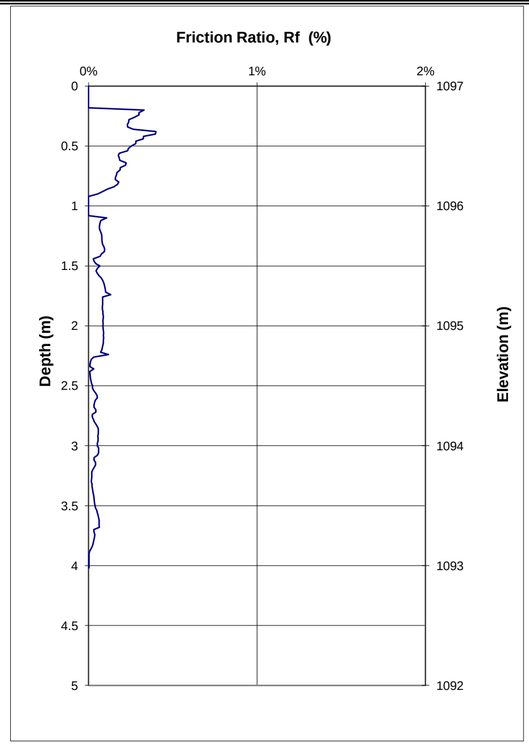
# CPT-T-13-06

Tailings

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CPT DATE: October 7, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

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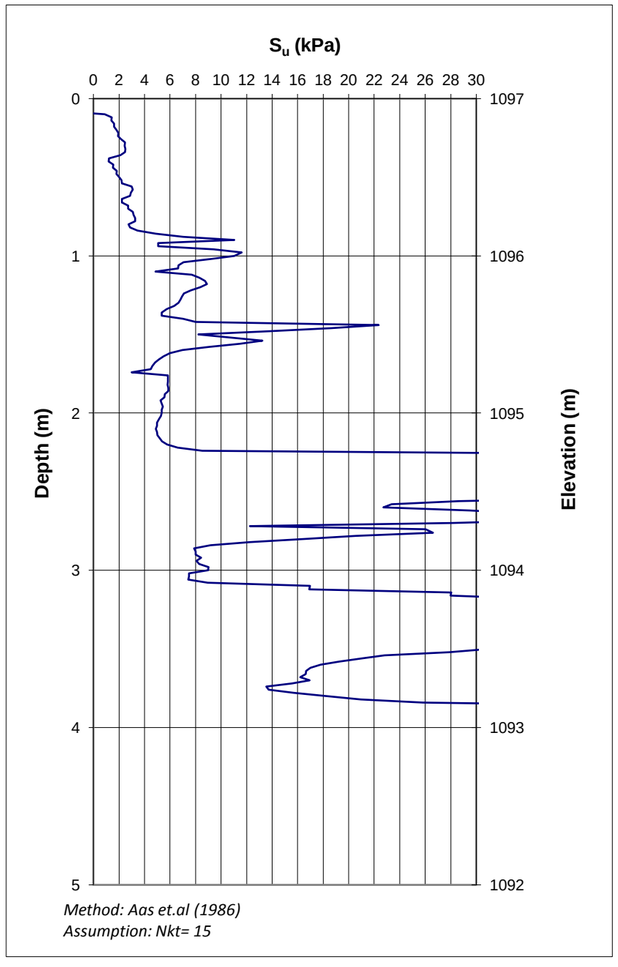
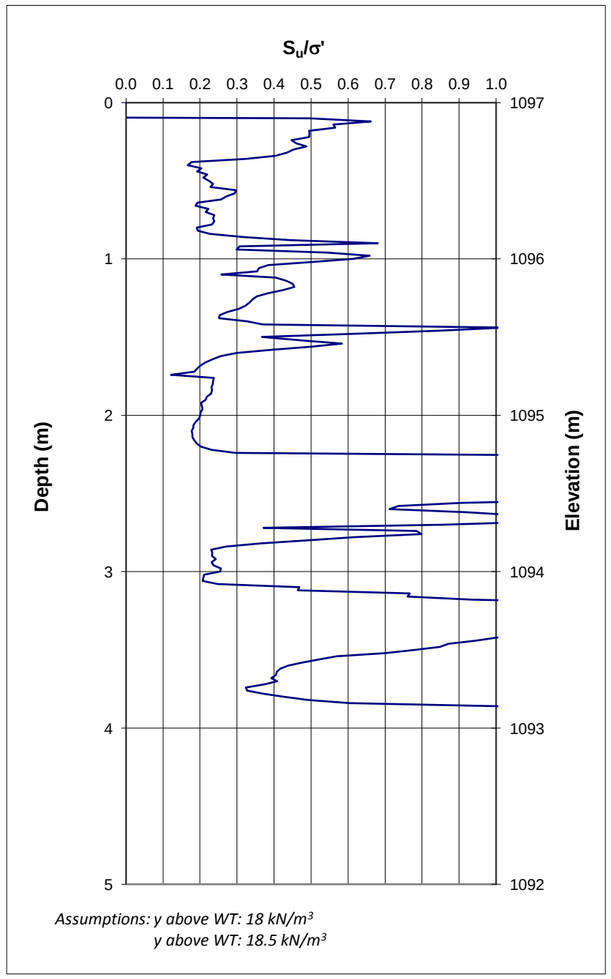
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-06**

# CPT-T-13-06

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CPT DATE: October 7, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

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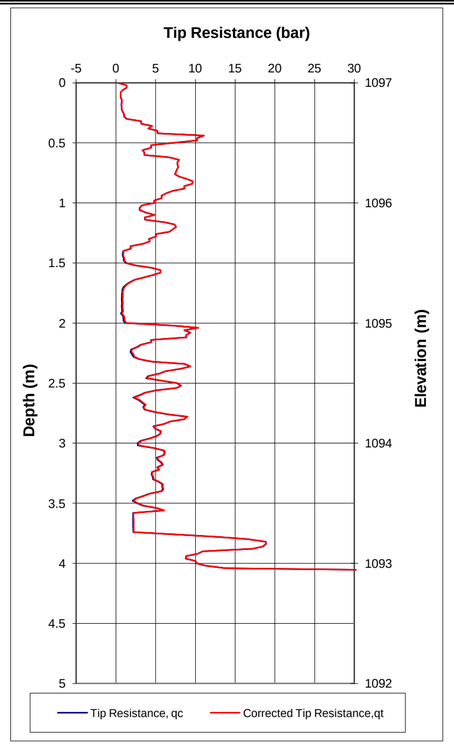
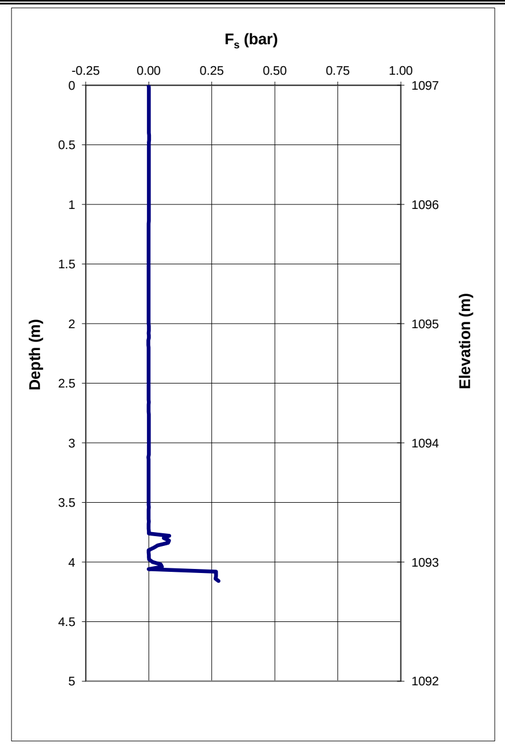
**MOUNT NANSEN**
**CPT INTERPERTATION**

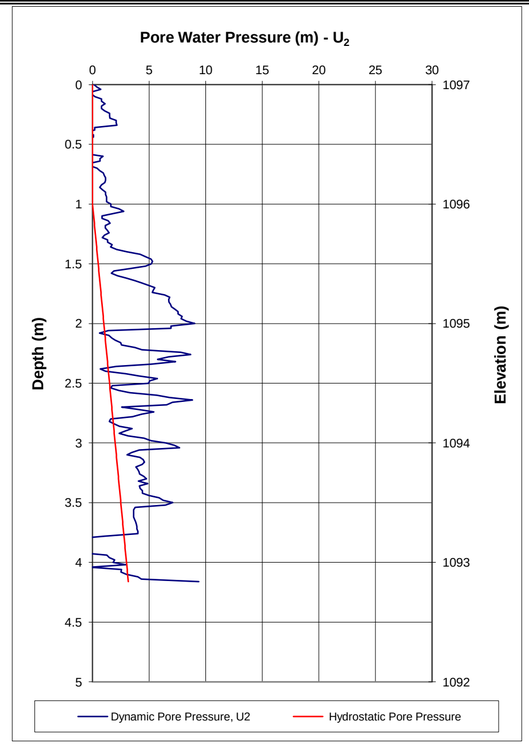
**CPT-T-13-06**

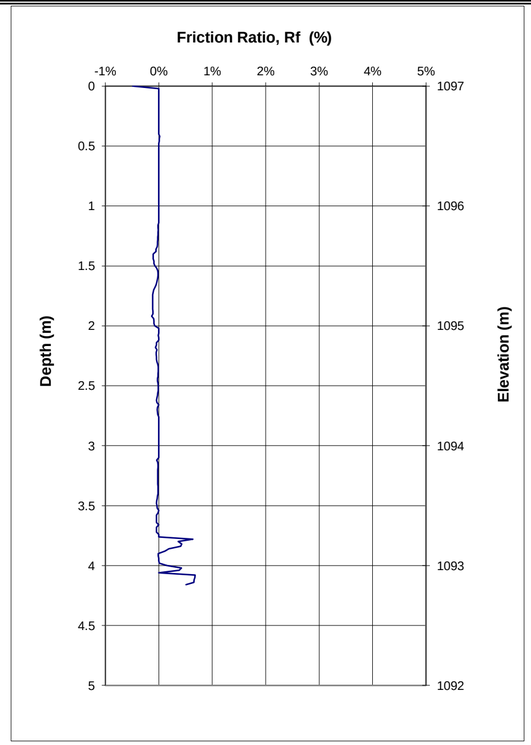
# CPT-T-13-07 (A)

Tailings




PROJECT: VM00605E

CPT DATE: October 7, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

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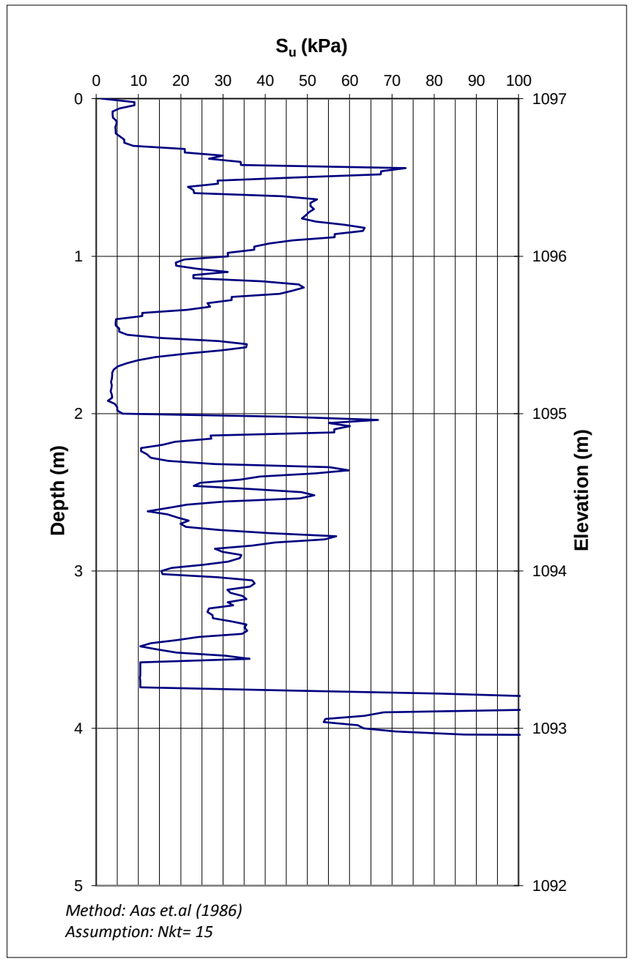
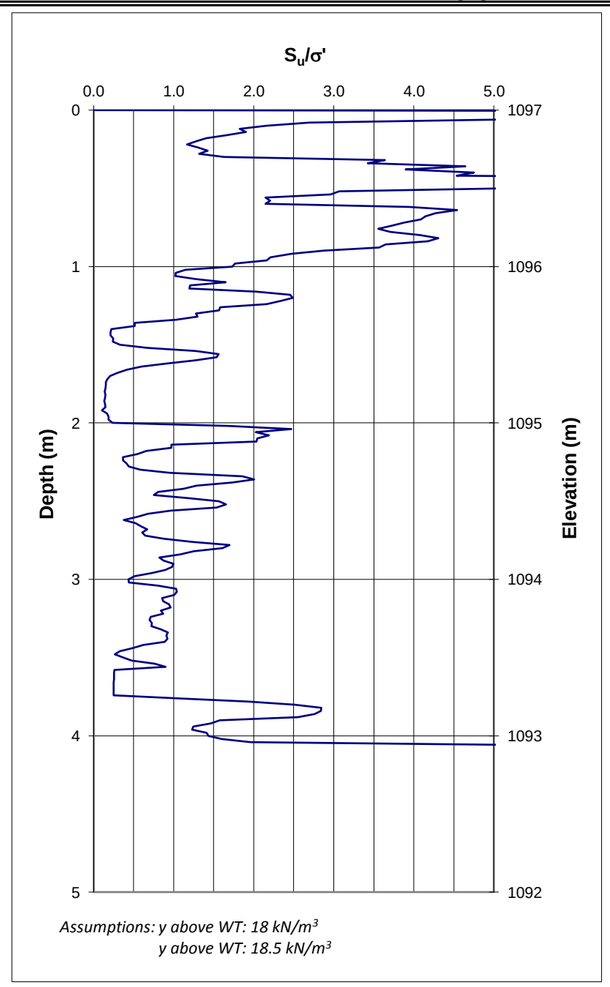
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-07 (A)**

# CPT-T-13-07 (A)




*Method: Aas et.al (1986)*
*Assumption: Nkt= 15*




*Assumptions: y above WT: 18 kN/m³*
*y above WT: 18.5 kN/m³*

PROJECT: VM00605E

| | | | |
|---|---|---|---|
| CPT DATE: | October 7, 2013 | Prepared by: | Ewelina Halyno |
| DATE: | March 7, 2014 | Reviewed by: | Renata Wood |

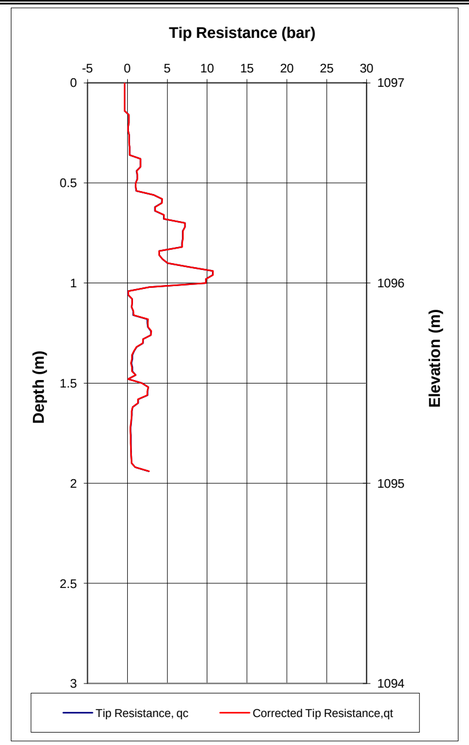
Associated Engineering | amec | Yukon Energy, Mines and Resources

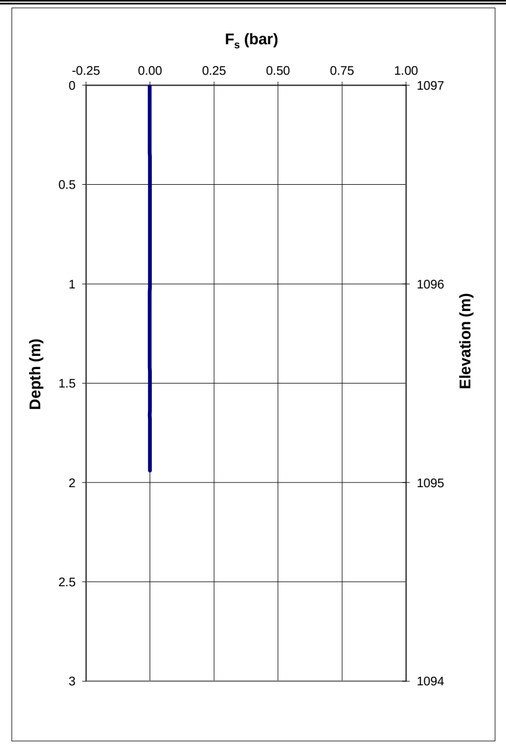
**MOUNT NANSEN**
**CPT INTERPERTATION**

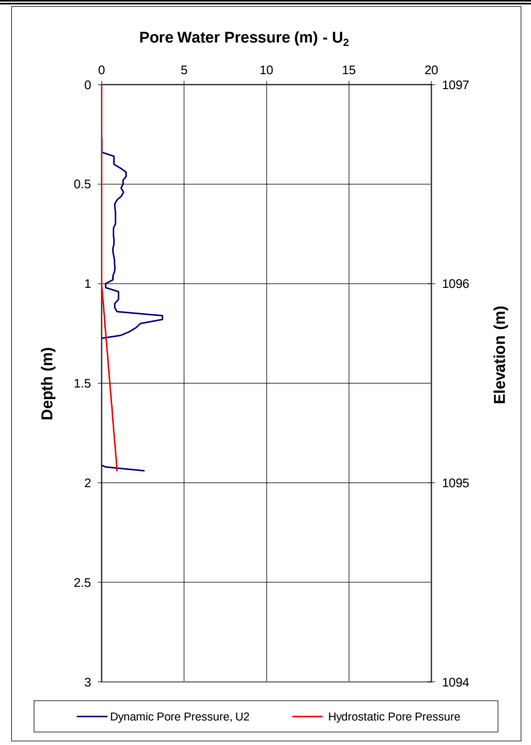
**CPT-T-13-07 (A)**

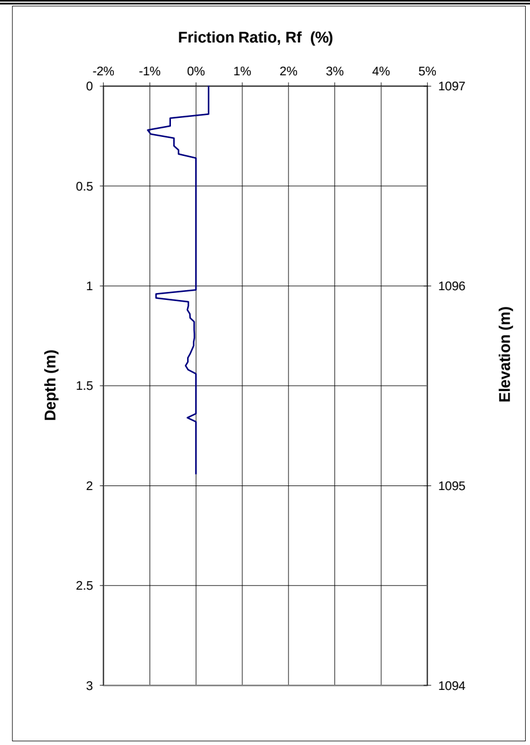
# CPT-T-13-07 (B)

Tailings




PROJECT: VM00605E

CPT DATE: October 7, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

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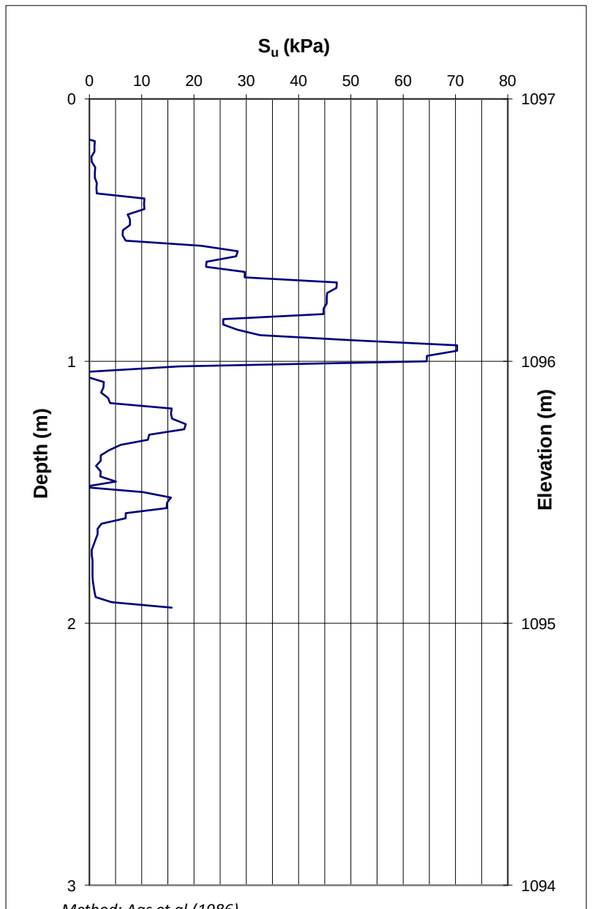
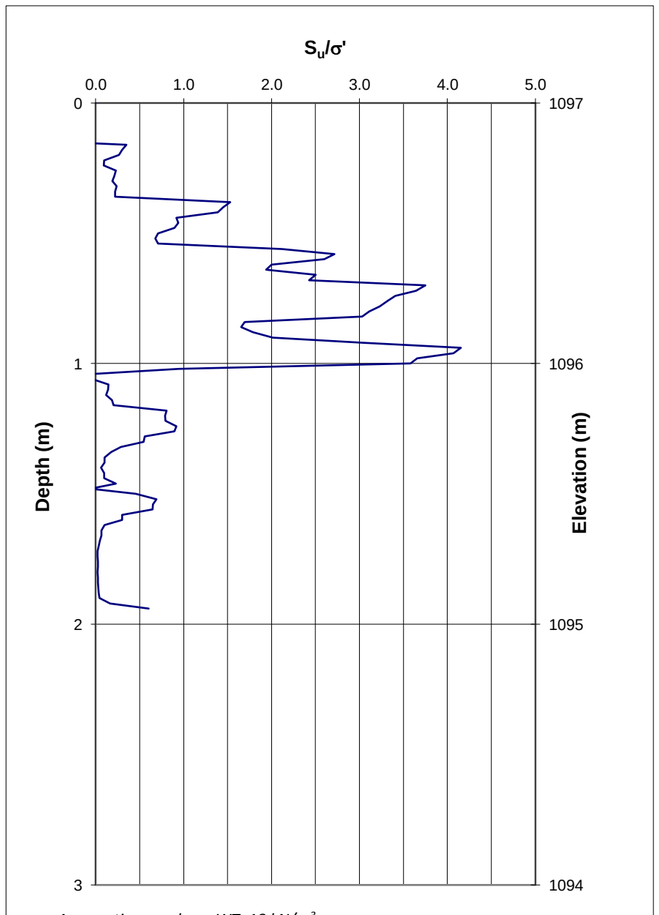
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-07 (B)**

# CPT-T-13-07 (B)




*Method: Aas et.al (1986)*
*Assumption: Nkt= 15*




*Assumptions: y above WT: 18 kN/m³*
*y above WT: 18.5 kN/m³*

PROJECT: VM00605E

| | | | |
|---|---|---|---|
| CPT DATE: | October 7, 2013 | Prepared by: | Ewelina Halyno |
| DATE: | March 7, 2014 | Reviewed by: | Renata Wood |

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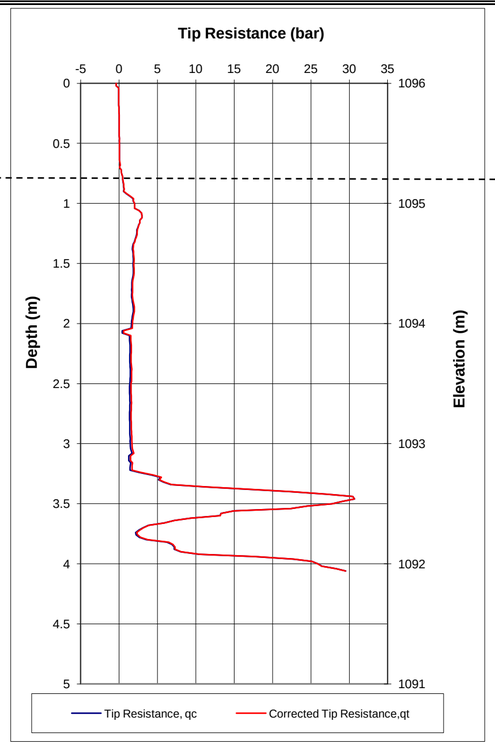
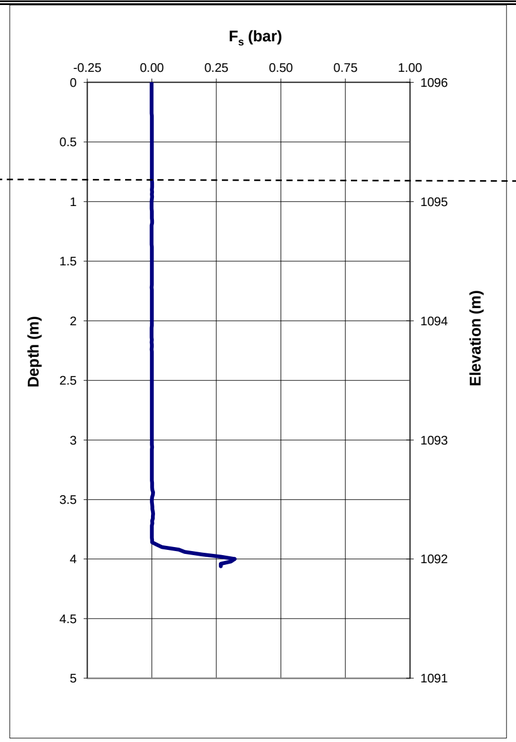
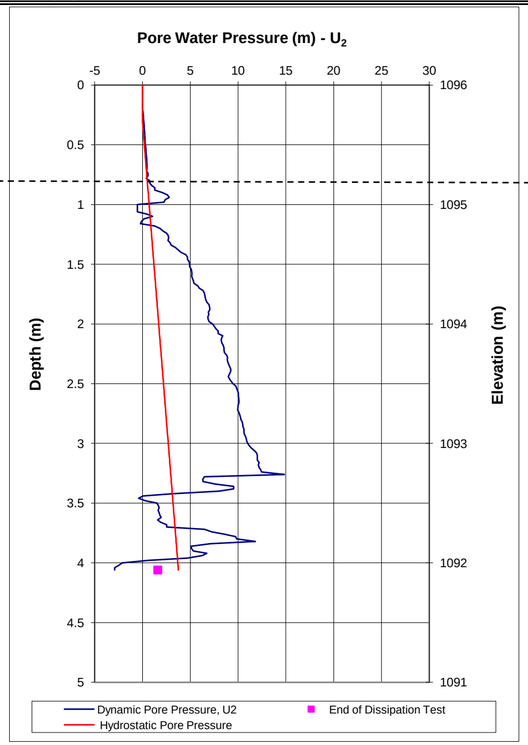
**MOUNT NANSEN**
**CPT INTERPERTATION**

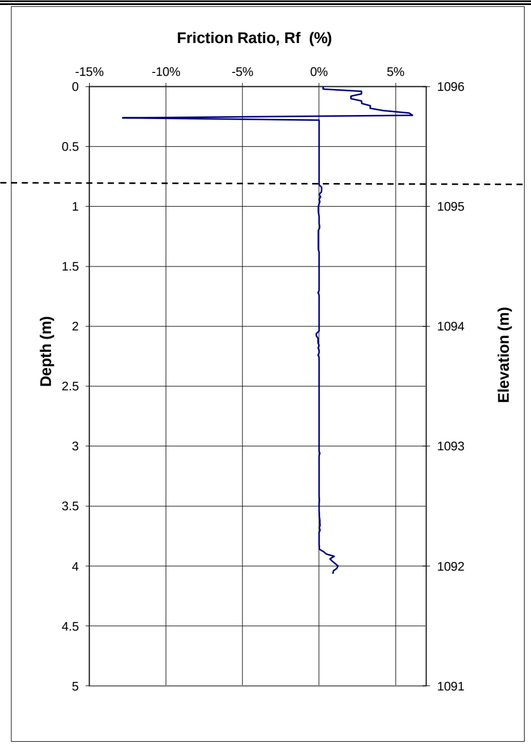
**CPT-T-13-07 (B)**

# CPT-T-13-08 (A)




PROJECT: VM00605E

CPT DATE: October 4, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

NOTE:

1. Depth Measured Relative to Barge Deck Elevation

2. Pond Elevation of 1095.8m Provided by AAM

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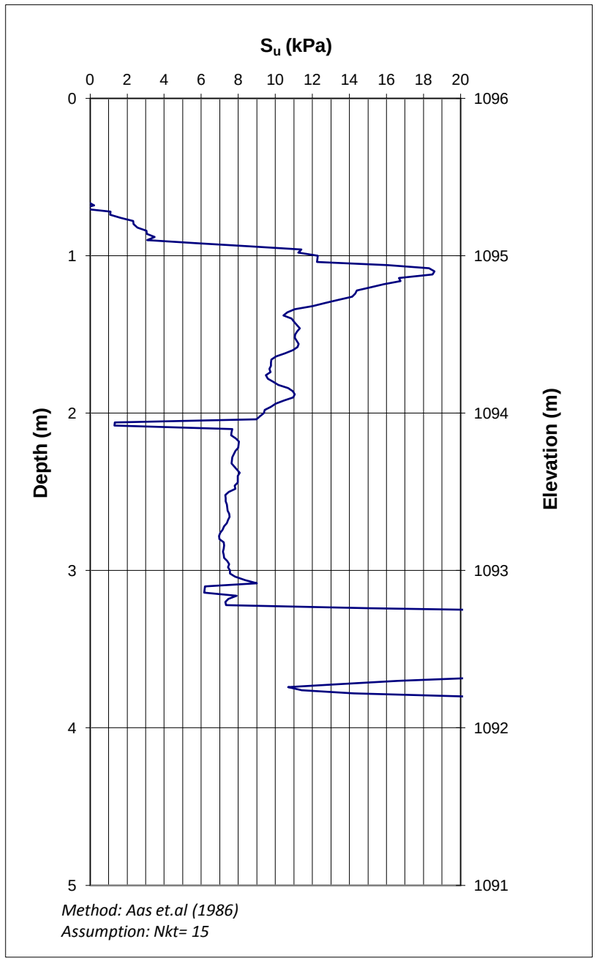
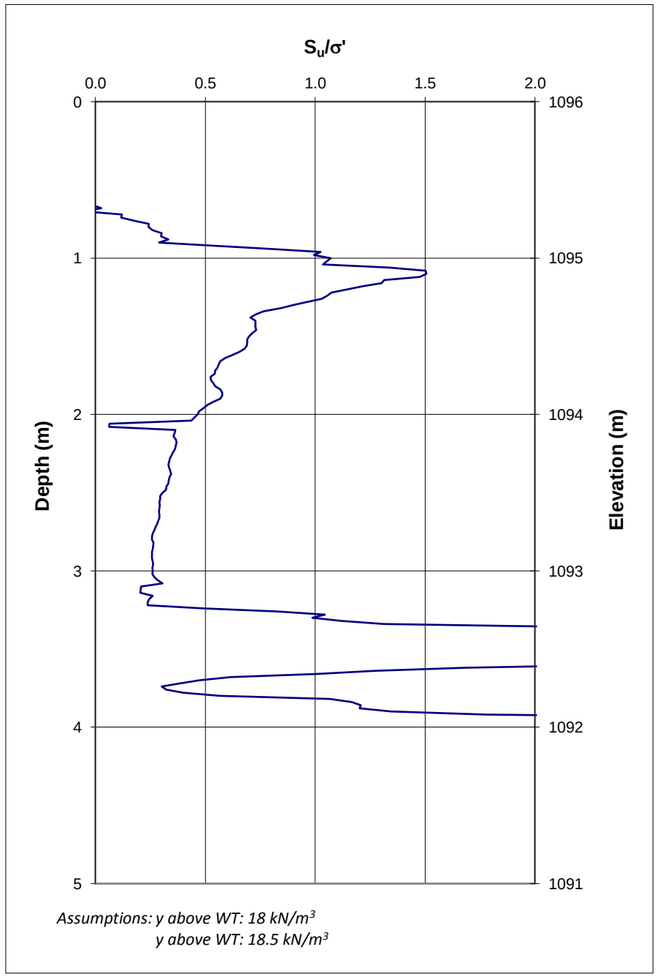
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-08 (A)**

# CPT-T-13-08 (A)




PROJECT: VM00605E

| | | | |
|---|---|---|---|
| CPT DATE: | October 4, 2013 | Prepared by: | Ewelina Halyno |
| DATE: | March 7, 2014 | Reviewed by: | Renata Wood |

NOTE:

1. Depth Measured Relative to Barge Deck Elevation
2. Pond Elevation of 1095.8m Provided by AAM

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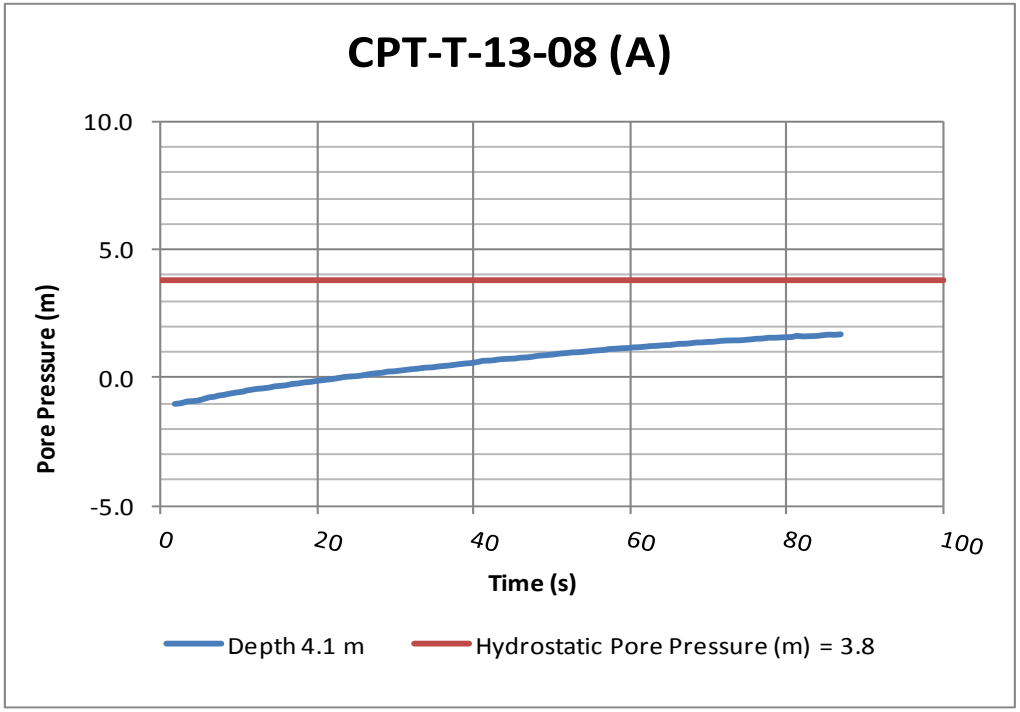
**MOUNT NANSEN**
**CPT INTERPERTATION**

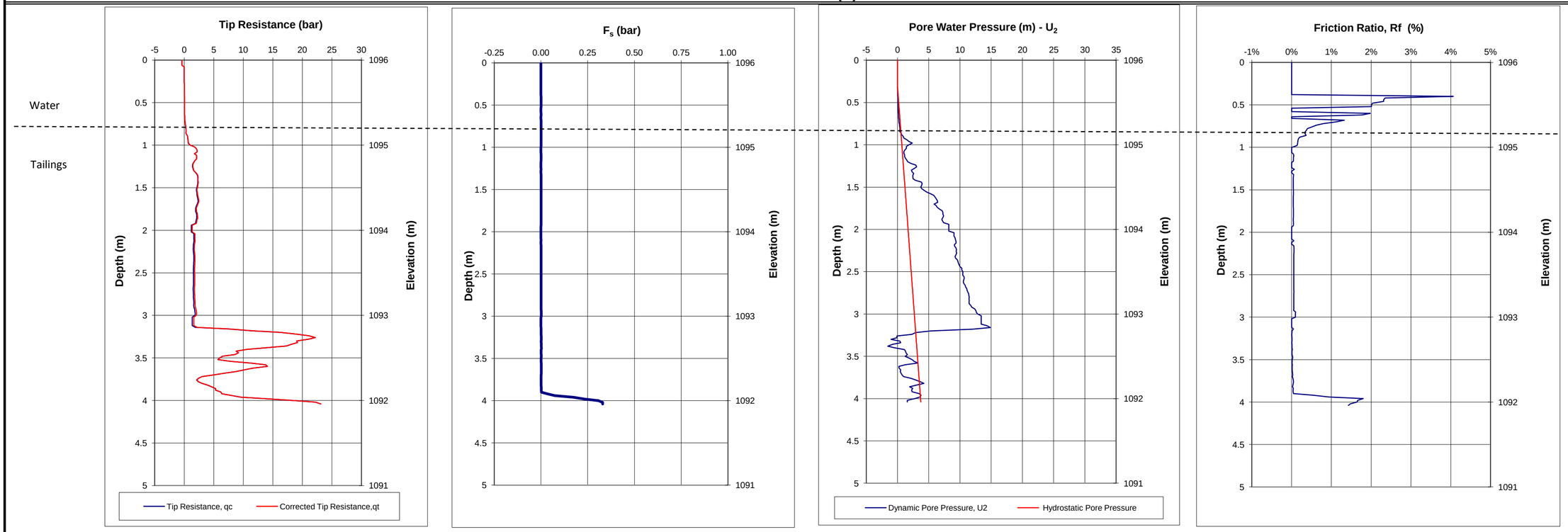
**CPT-T-13-08 (A)**




| | | | | | |
|---|---|---|---|---|---|
| CLIENT | Yukon Energy, Mines and Resources | DWN BY: | EH | PROJECT | MOUNT NANSEN<br>CPT INTERPERTATION |
| | | CHK'D BY: | RW | | |
| | | DEPTH 1: | 4.1m | TITLE | CPT-T-13-08(A)<br>Dissipation |
| | | DEPTH 2:: | N/A | | |
| | | DEPTH 3: | N/A | | |

| | |
|---|---|
| DATE: | Feb-14 |
| CPT DATE: | 4-Oct-13 |
| PROJECT NO: | VM00605E |
| FIGURE NO: | 2 |

# CPT-T-13-08 (B)




PROJECT: VM00605E

NOTE:

CPT DATE: October 4, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

1. Depth Measured Relative to Barge Deck Elevation
2. Pond Elevation of 1095.8m Provided by AAM

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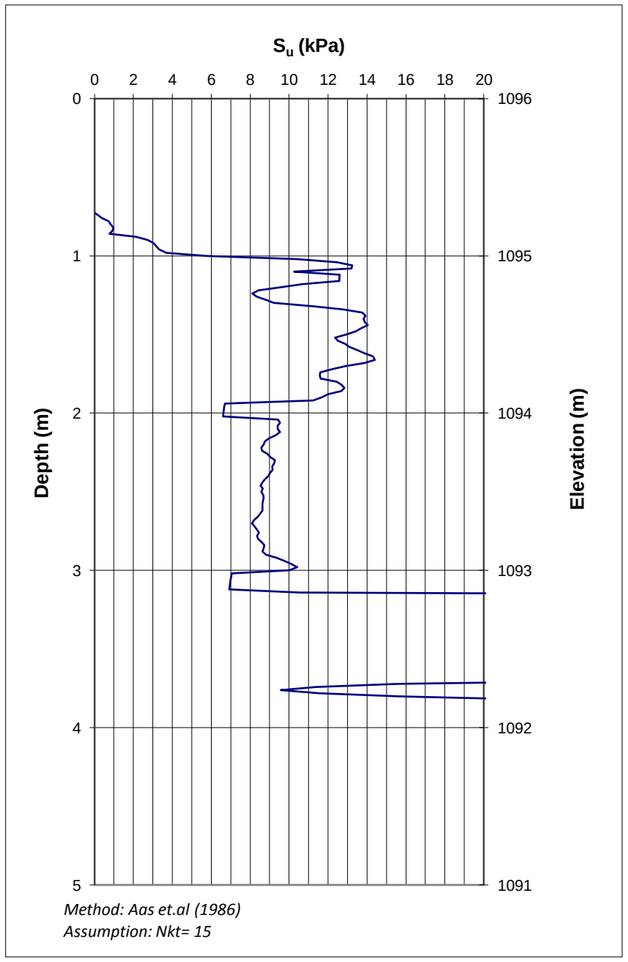
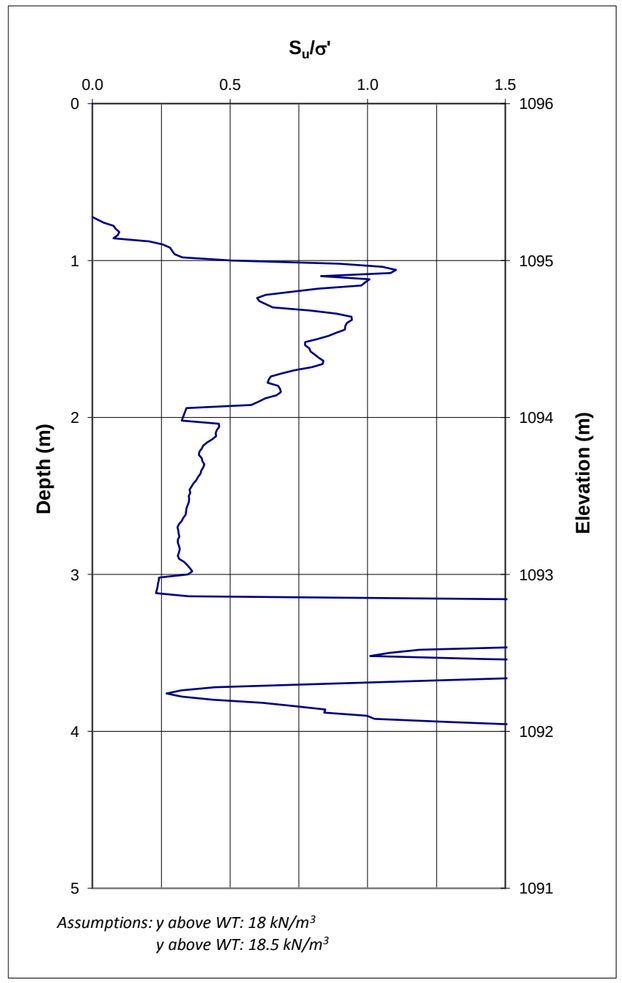
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-08 (B)**

# CPT-T-13-08 (B)




PROJECT: VM00605E

CPT DATE: October 4, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

NOTE:

1. Depth Measured Relative to Barge Deck Elevation
2. Pond Elevation of 1095.8m Provided by AAM

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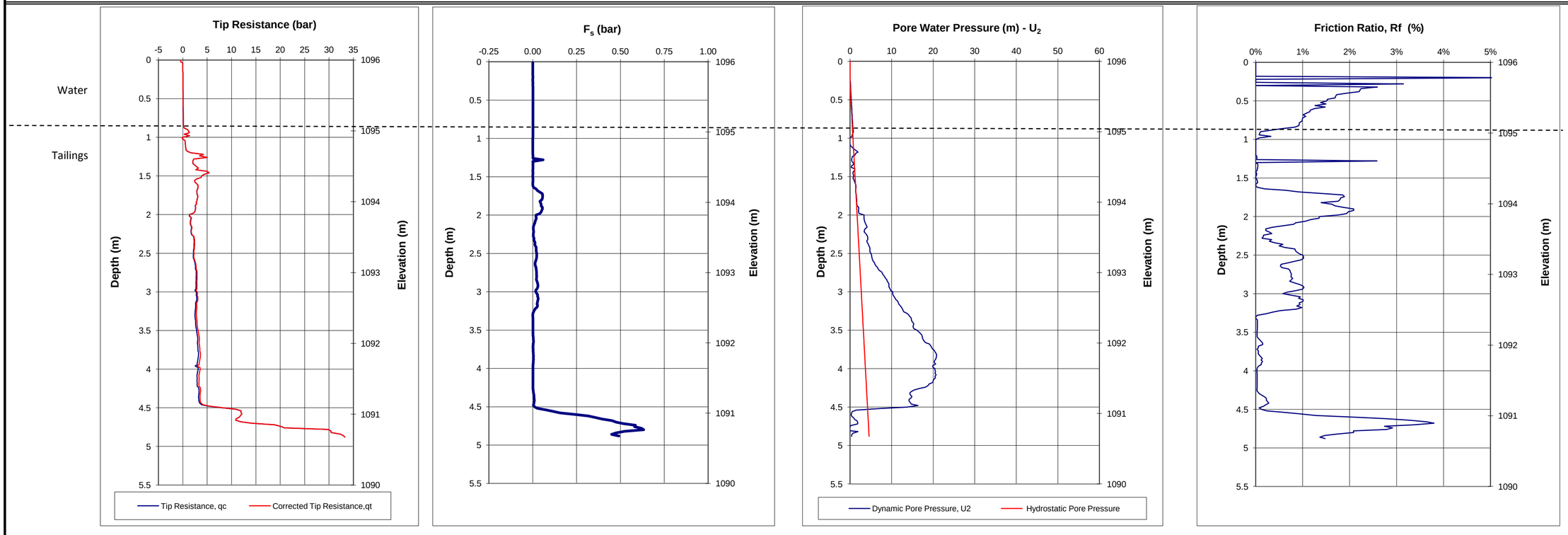
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-08 (B)**

# CPT-T-13-09




PROJECT: VM00605E

NOTE:

CPT DATE: October 4, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

1. Depth Measured Relative to Barge Deck Elevation

2. Pond Elevation of 1095.8m Provided by AAM

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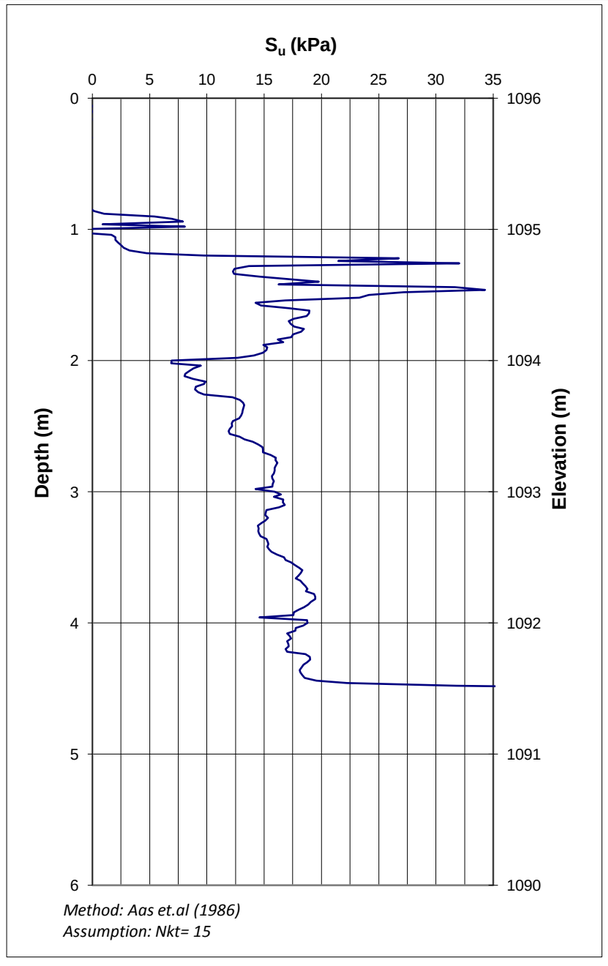
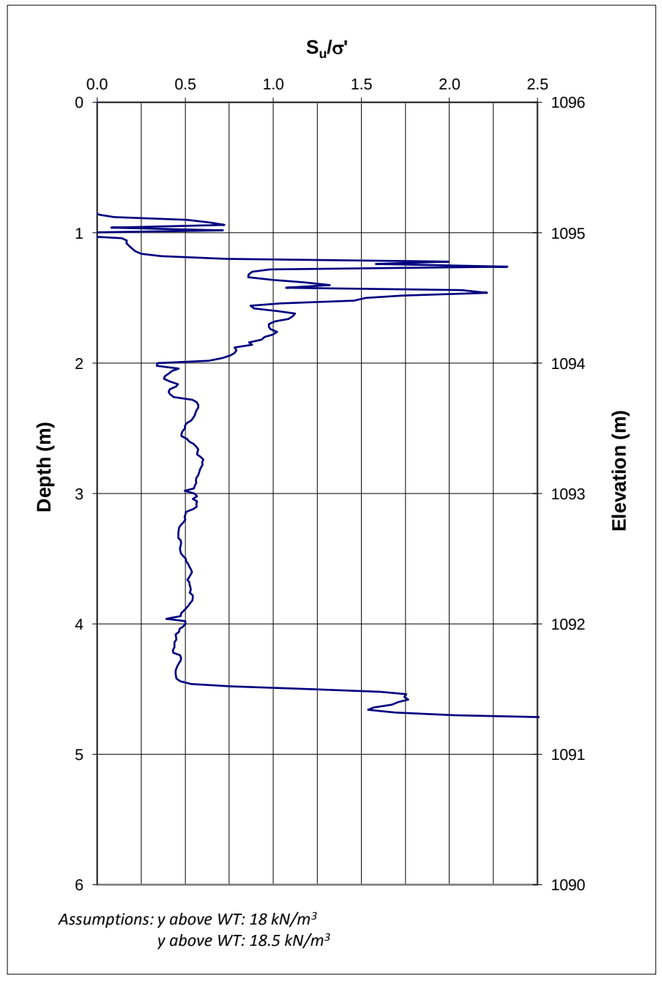
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-09**

# CPT-T-13-09




PROJECT: VM00605E

| | | | |
|---|---|---|---|
| CPT DATE: | October 4, 2013 | Prepared by: | Ewelina Halyno |
| DATE: | March 7, 2014 | Reviewed by: | Renata Wood |

NOTE:

1. Depth Measured Relative to Barge Deck Elevation
2. Pond Elevation of 1095.8m Provided by AAM

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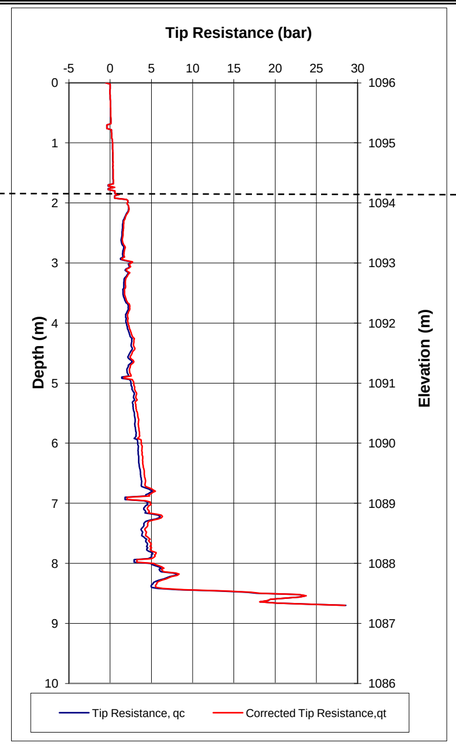
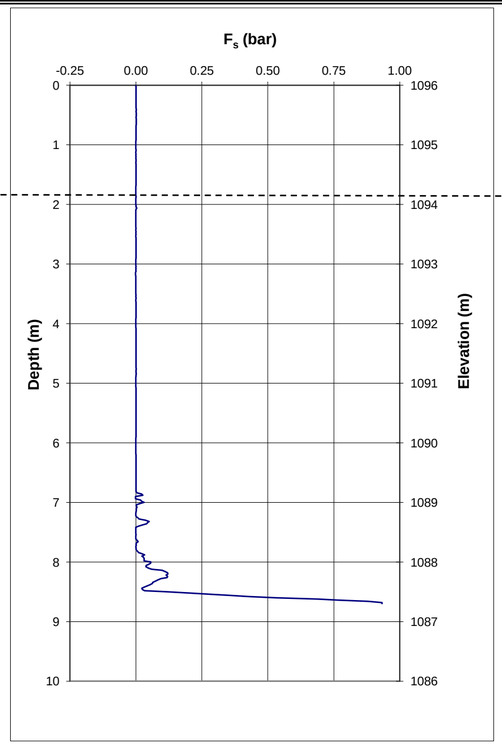
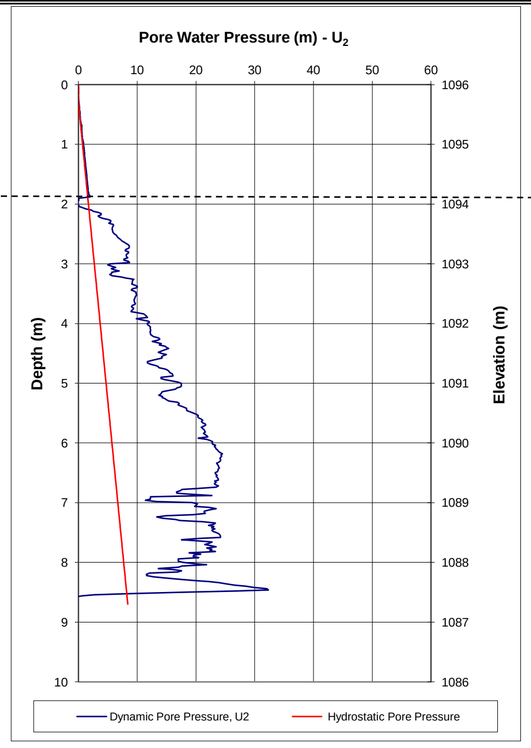
**MOUNT NANSEN**
**CPT INTERPERTATION**

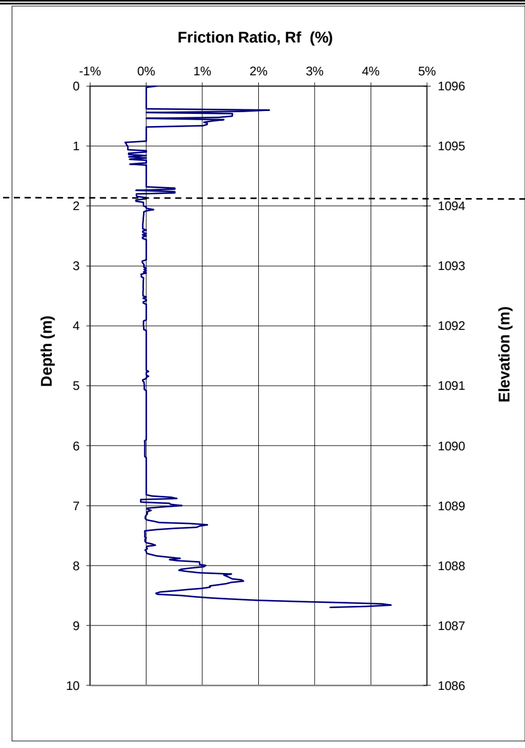
**CPT-T-13-09**

# CPT-T-13-10 (A)




PROJECT: VM00605E

CPT DATE: October 4, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

NOTE:

1. Depth Measured Relative to Barge Deck Elevation

2. Pond Elevation of 1095.8m Provided by AAM

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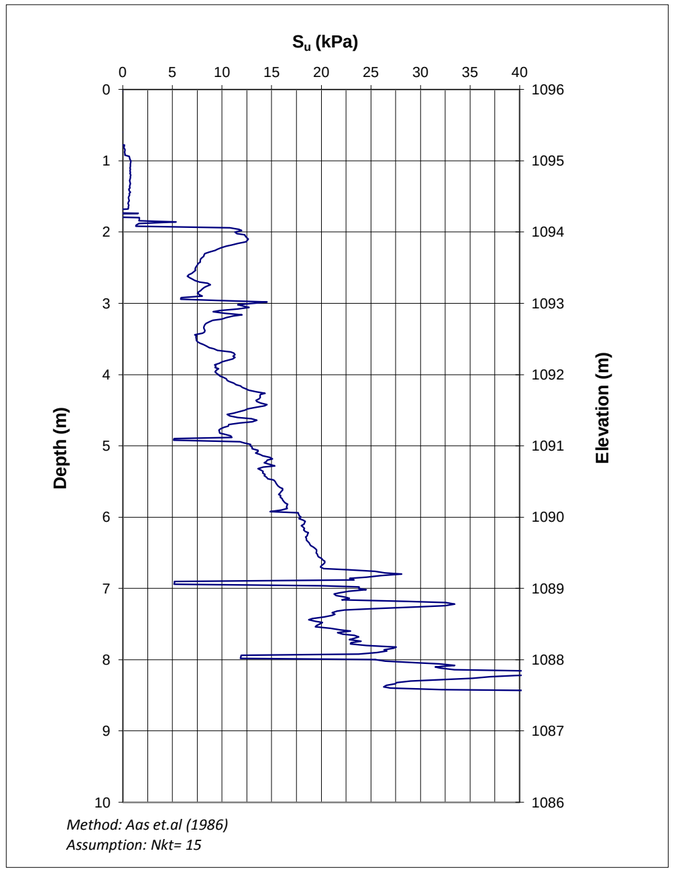
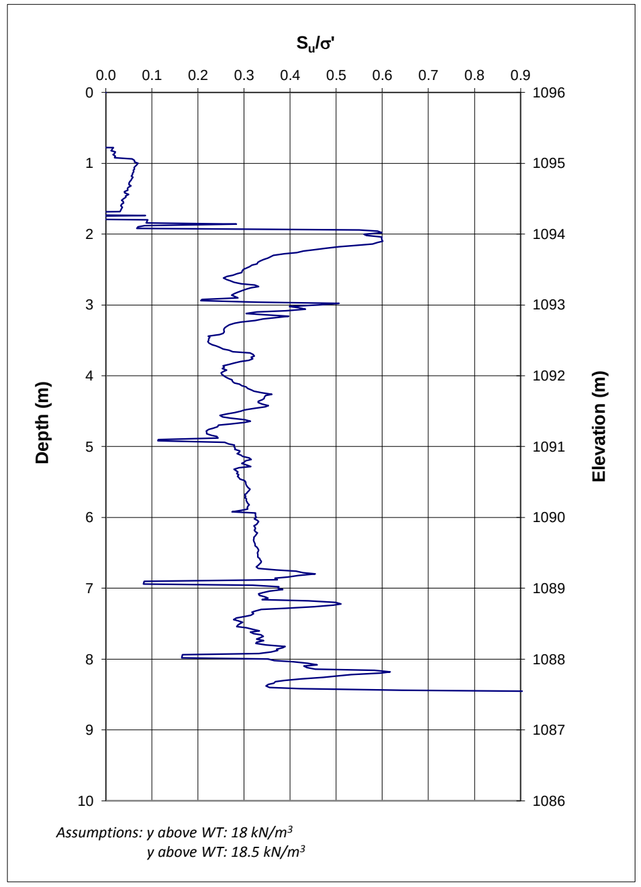
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-10 (A)**

# CPT-T-13-10 (A)




PROJECT: VM00605E
CPT DATE: October 4, 2013
DATE: March 7, 2014

Prepared by: Ewelina Halyno
Reviewed by: Renata Wood

NOTE:
1. Depth Measured Relative to Barge Deck Elevation

2. Pond Elevation of 1095.8m Provided by AAM

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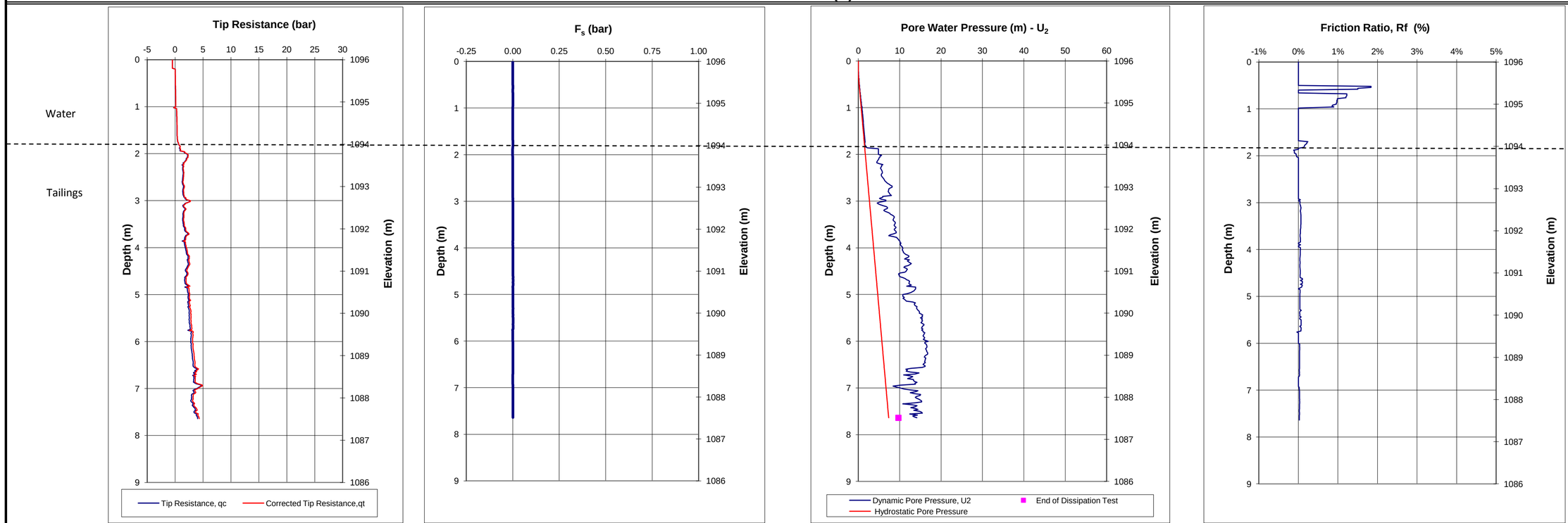
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-10 (A)**

# CPT-13-10 (B)




PROJECT: VM00605E

NOTE:

CPT DATE: October 4, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

1. Depth Measured Relative to Barge Deck Elevation

2. Pond Elevation of 1095.8m Provided by AAM

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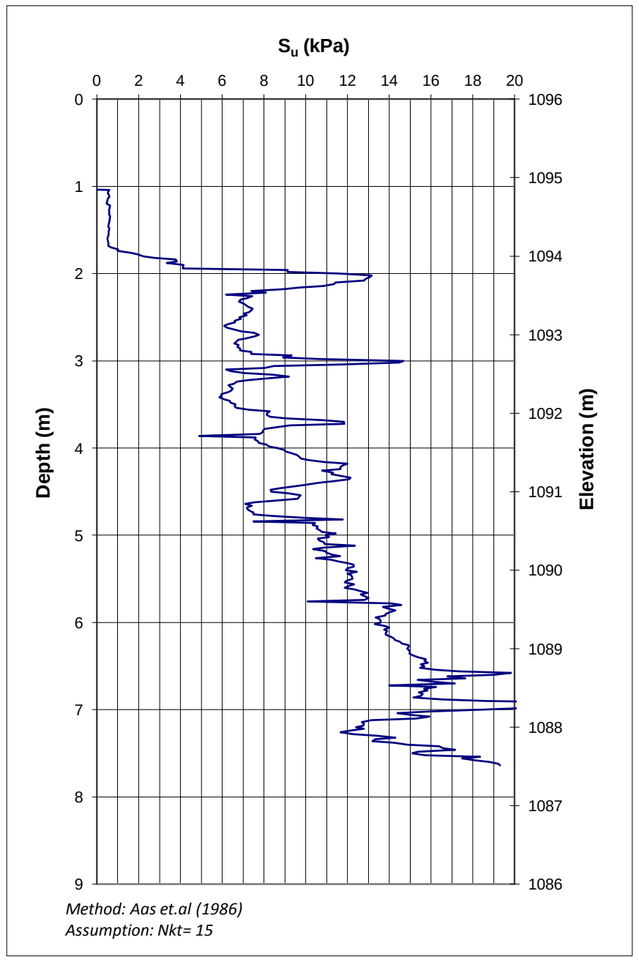
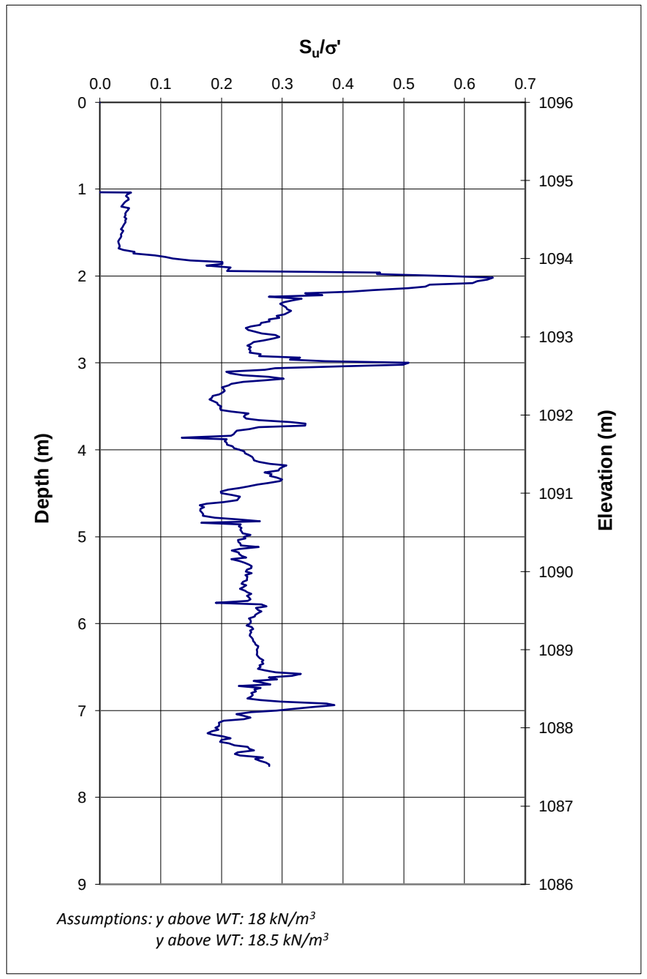
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-13-10 (B)**

# CPT-13-10 (B)




PROJECT: VM00605E

| | | | |
|---|---|---|---|
| CPT DATE: | October 4, 2013 | Prepared by: | Ewelina Halyno |
| DATE: | March 7, 2014 | Reviewed by: | Renata Wood |

NOTE:

1. Depth Measured Relative to Barge Deck Elevation

2. Pond Elevation of 1095.8m Provided by AAM

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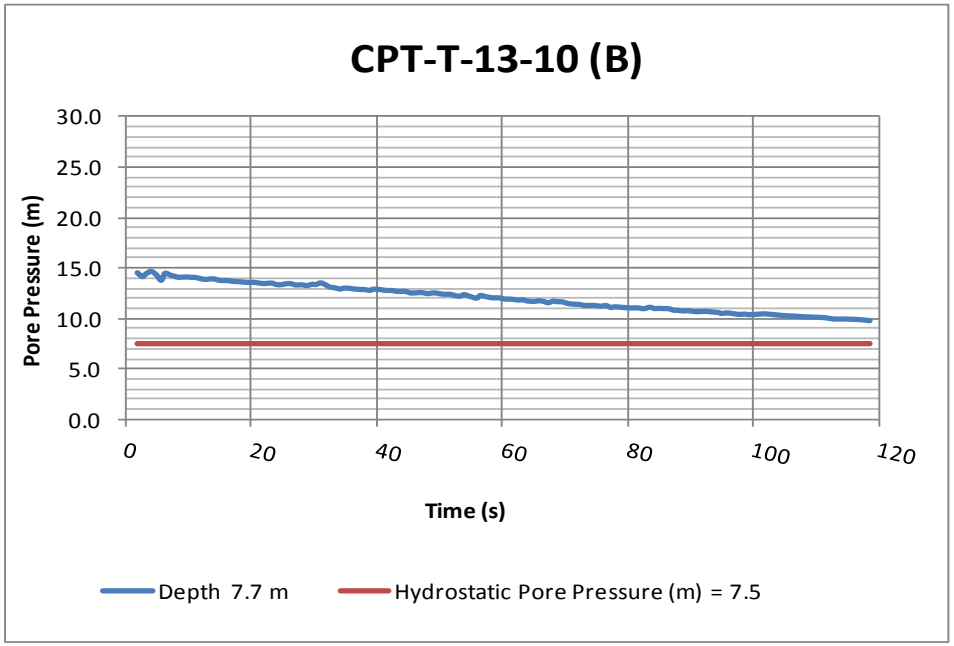
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-13-10 (B)**

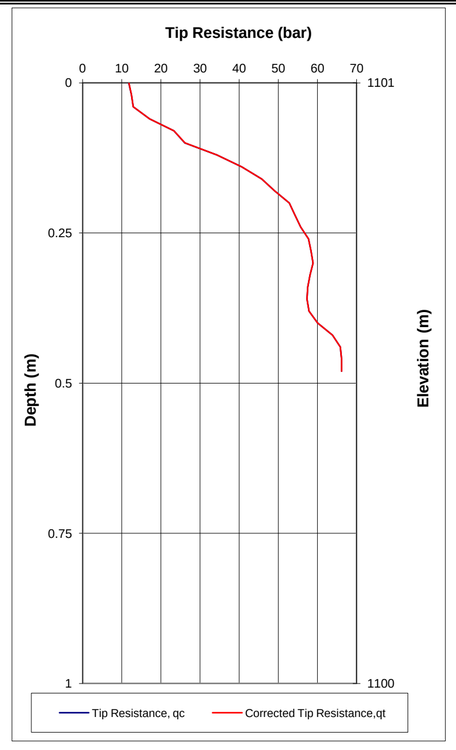


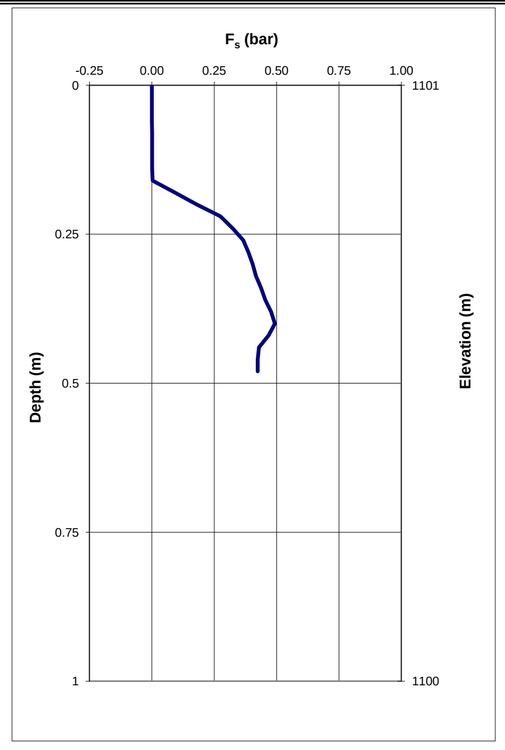

| | | | | | |
|---|---|---|---|---|---|
| CLIENT | Yukon Energy, Mines and Resources | DWN BY: | EH | PROJECT | MOUNT NANSEN<br>CPT INTERPERTATION |
| | | CHK'D BY: | RW | | |
| | | DEPTH 1: | 7.7m | TITLE | CPT-T-13-10 (B)<br>Dissipation |
| | | DEPTH 2:: | N/A | | |
| | | DEPTH 3: | N/A | | |

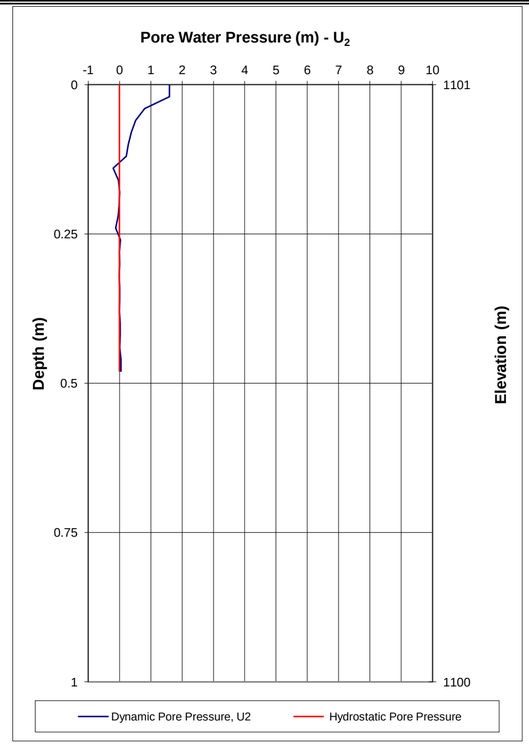
| | |
|---|---|
| DATE: | Feb-14 |
| CPT DATE: | 4-Oct-13 |
| PROJECT NO: | VM00605E |
| FIGURE NO: | 3 |

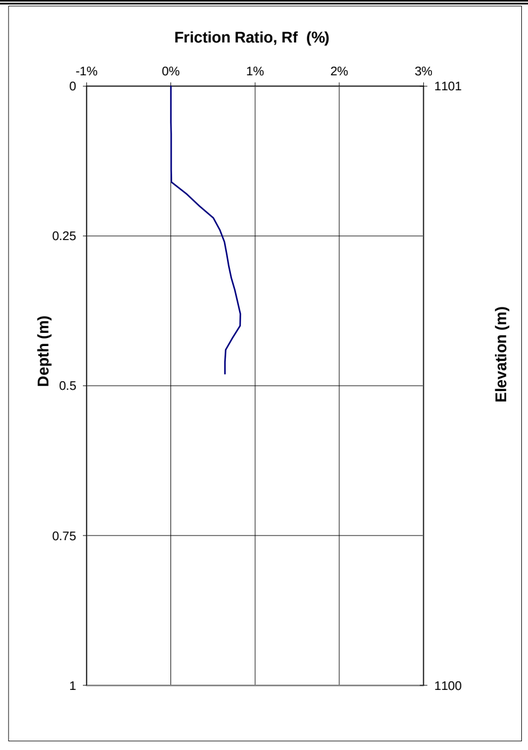
## CPT-T-13-11

Tailings




PROJECT: VM00605E

CPT DATE: October 7, 2013 Prepared by: Ewelina Halyno
DATE: March 7, 2014 Reviewed by: Renata Wood

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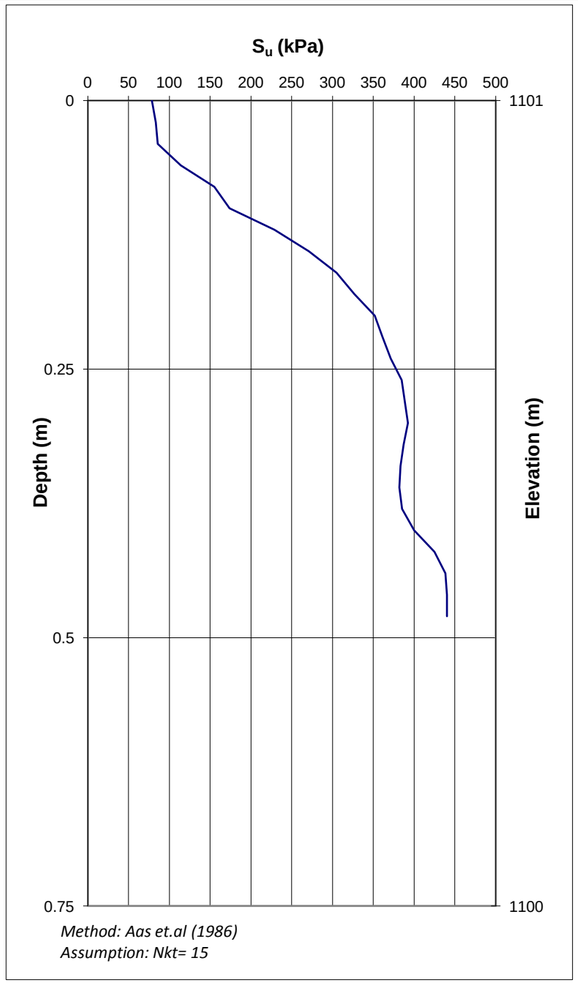
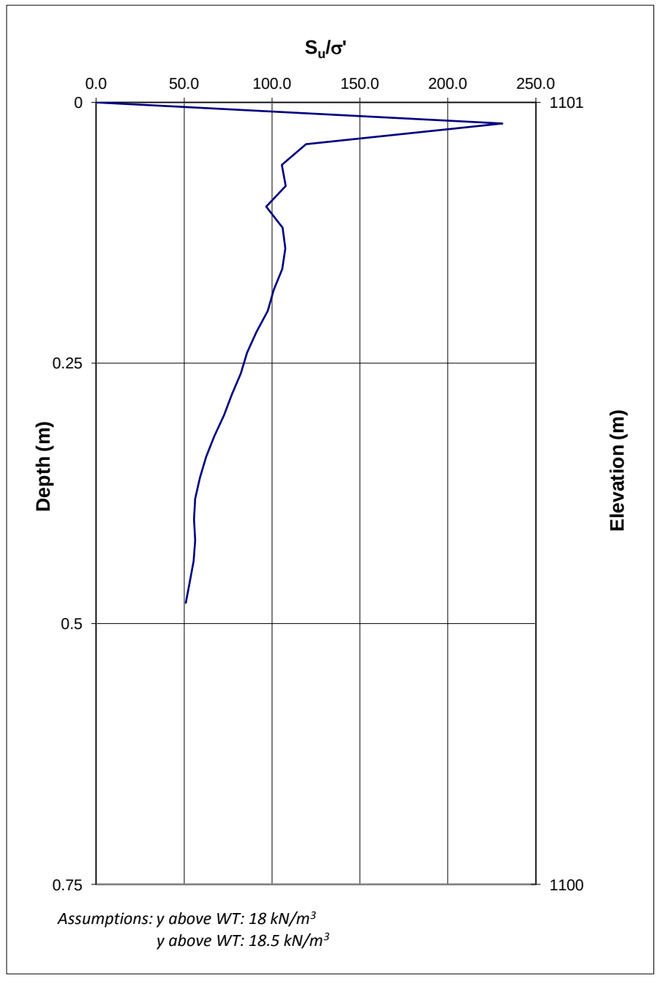
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-11**

# CPT-T-13-11




*Method: Aas et.al (1986)*
*Assumption: Nkt= 15*




*Assumptions: y above WT: 18 kN/m³*
*y above WT: 18.5 kN/m³*

PROJECT: VM00605E

| | | | |
|---|---|---|---|
| CPT DATE: | October 7, 2013 | Prepared by: | Ewelina Halyno |
| DATE: | March 7, 2014 | Reviewed by: | Renata Wood |

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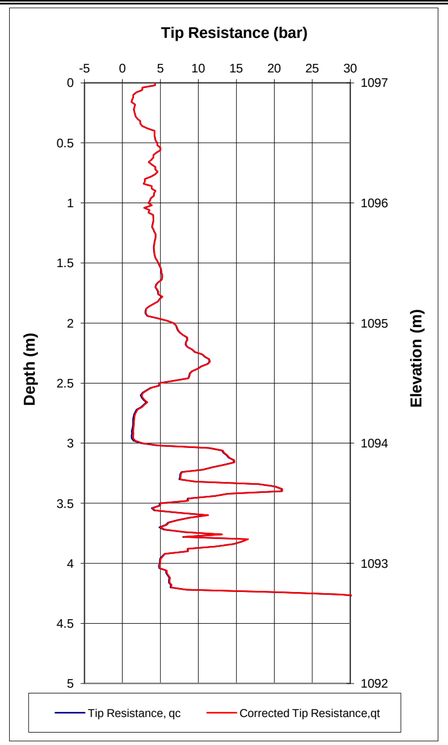
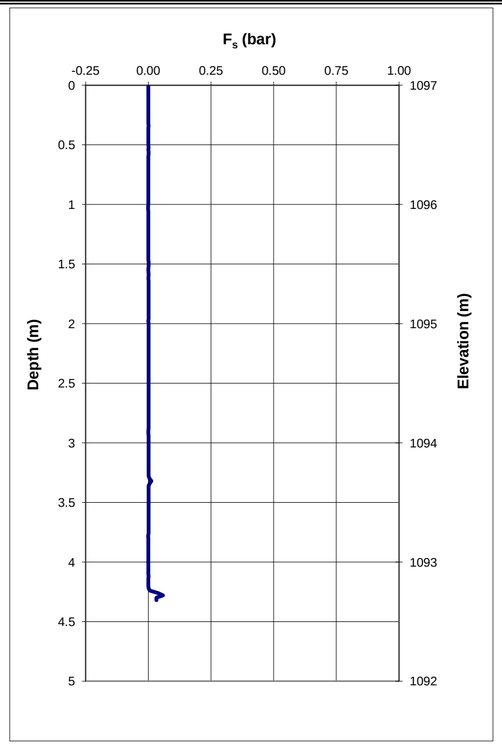
**MOUNT NANSEN**
**CPT INTERPERTATION**

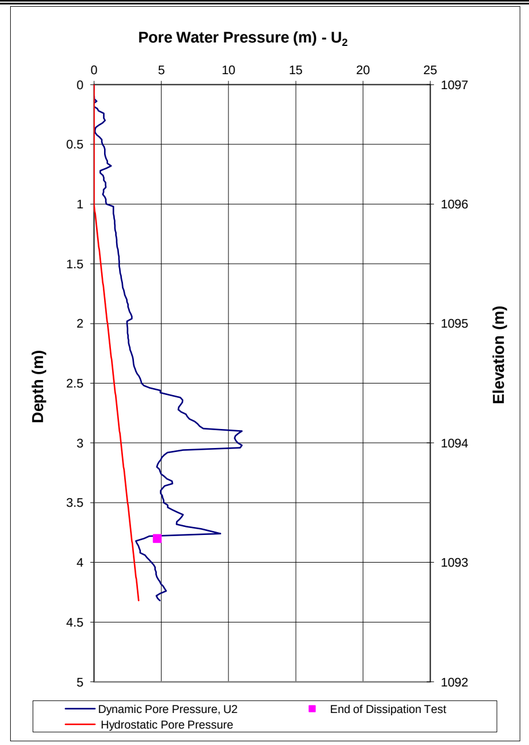
**CPT-T-13-11**

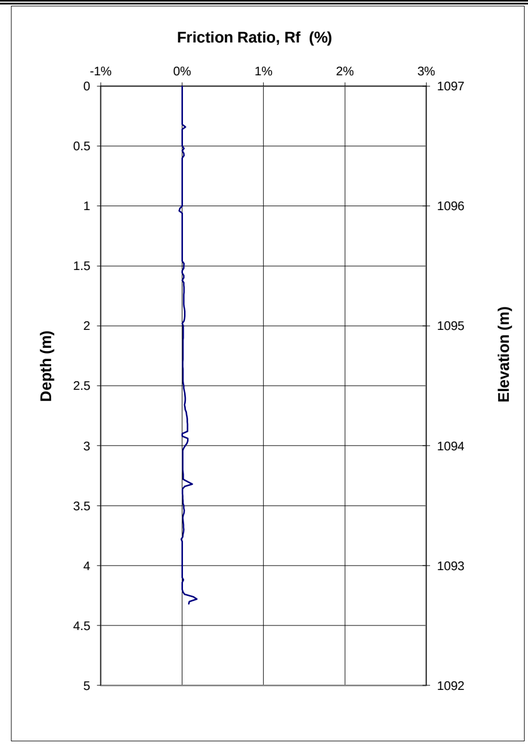
# CPT-T-13-12

Tailings




PROJECT: VM00605E

CPT DATE: October 6, 2013 Prepared by: Ewelina Halyno

DATE: 07/03/201 Reviewed by: Renata Wood

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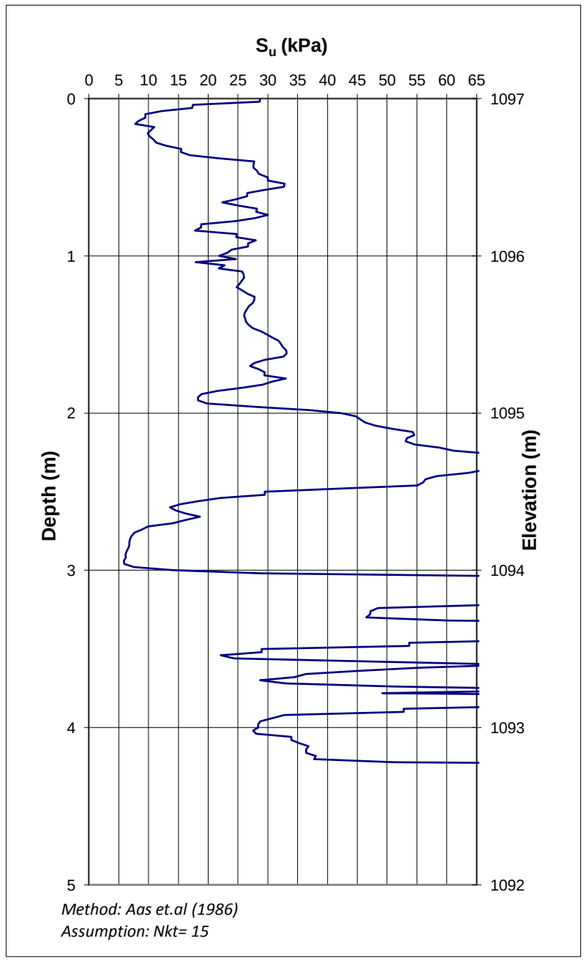
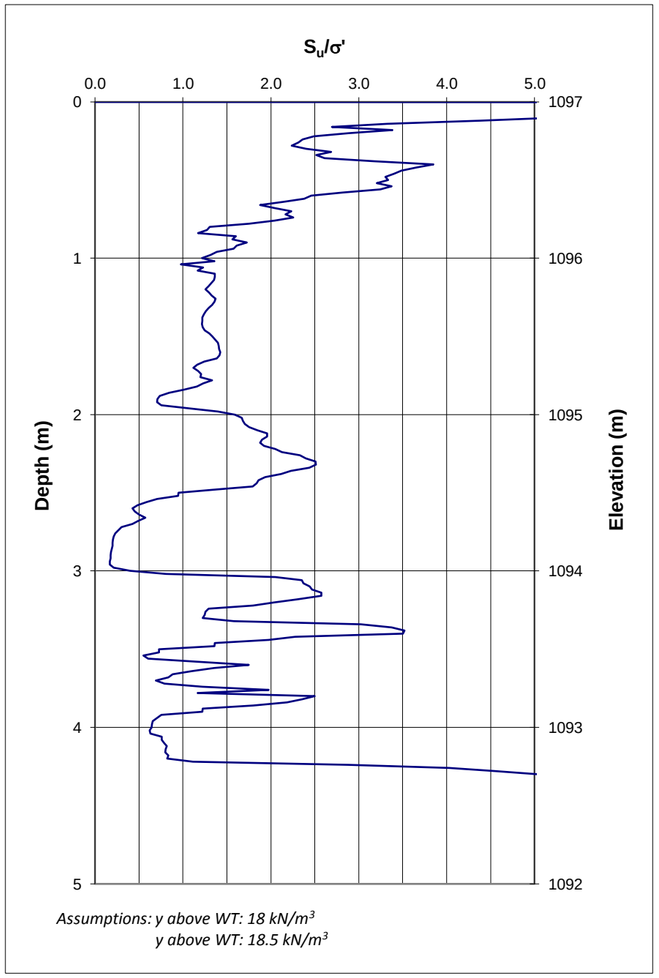
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-12**

# CPT-T-13-12




*Method: Aas et.al (1986)*
*Assumption: Nkt= 15*




*Assumptions: y above WT: 18 kN/m³*
*y above WT: 18.5 kN/m³*

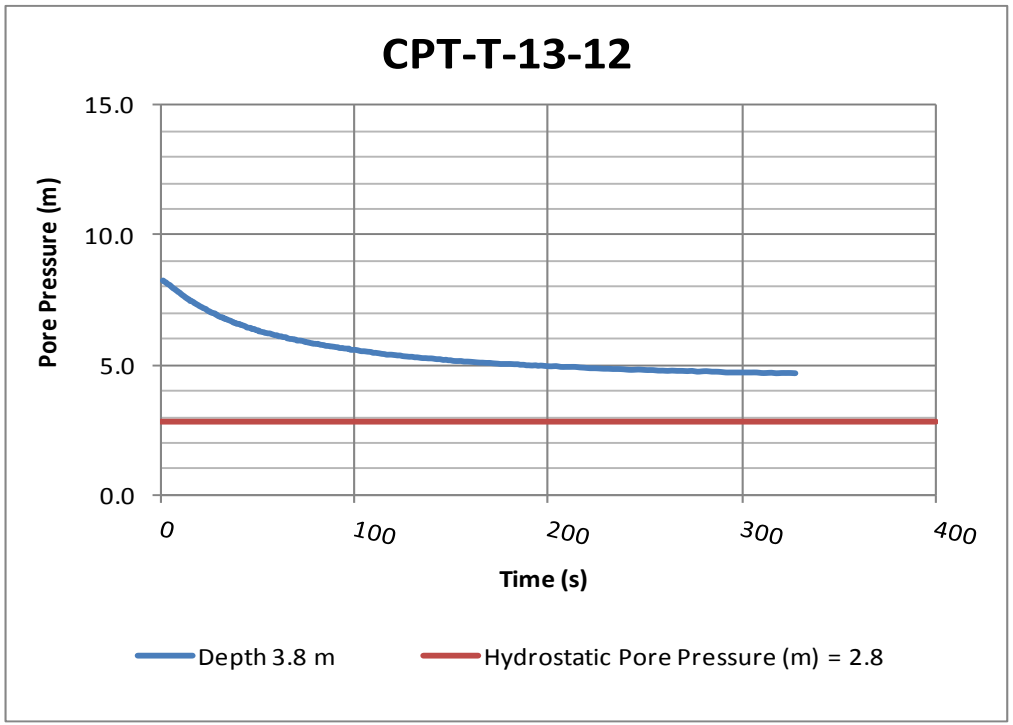
PROJECT: VM00605E

| | | | |
|---|---|---|---|
| CPT DATE: | October 6, 2013 | Prepared by: | Ewelina Halyno |
| DATE: | 07/03/201 | Reviewed by: | Renata Wood |

Associated Engineering | amec | Yukon Energy, Mines and Resources

**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-12**

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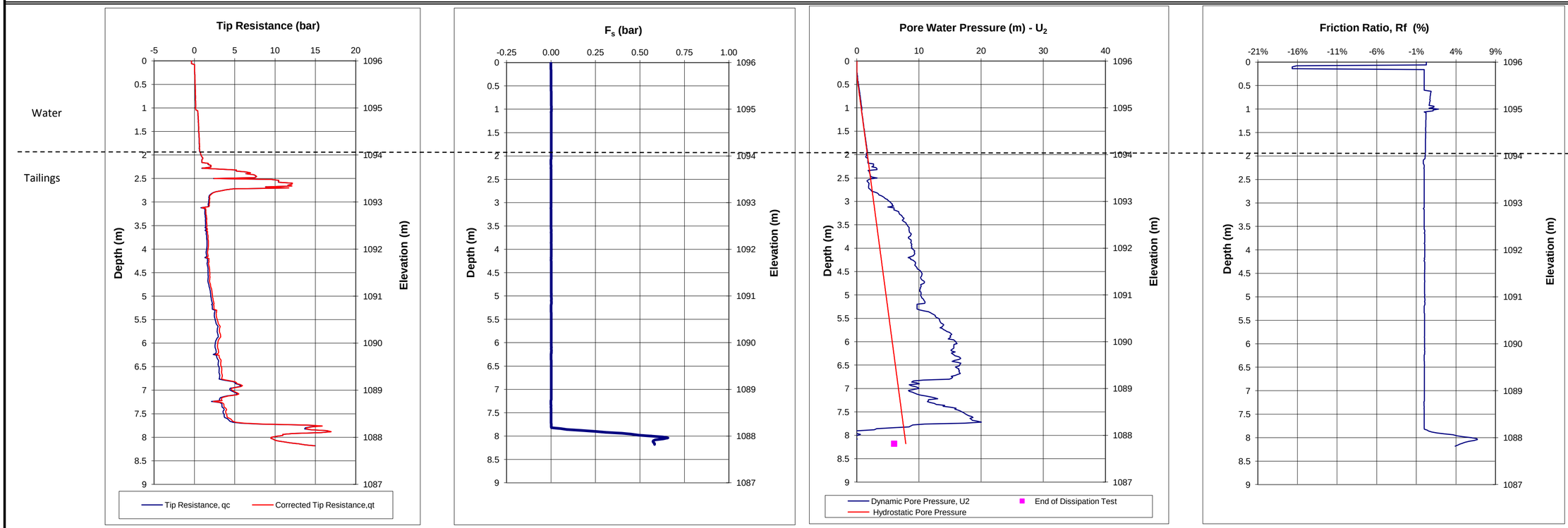
|---|---|---|---|---|---|
| CLIENT | Yukon Energy, Mines and Resources | DWN BY: | EH | PROJECT | MOUNT NANSEN<br>CPT INTERPERTATION | DATE: | Feb-14 |
| | | CHK'D BY: | RW | | | CPT DATE: | 6-Oct-13 |
| Associated Engineering / amec / Yukon Energy, Mines and Resources | | DEPTH 1: | 3.8m | TITLE | CPT-T-13-12<br>Dissipation | PROJECT NO: | VM00605E |
| | | DEPTH 2:: | N/A | | | FIGURE NO: | 4 |
| | | DEPTH 3: | N/A | | | | |

# CPT-T-13-13




PROJECT: VM00605E

NOTE:

CPT DATE: October 4, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

1. Depth Measured Relative to Barge Deck Elevation
2. Pond Elevation of 1095.8m Provided by AAM

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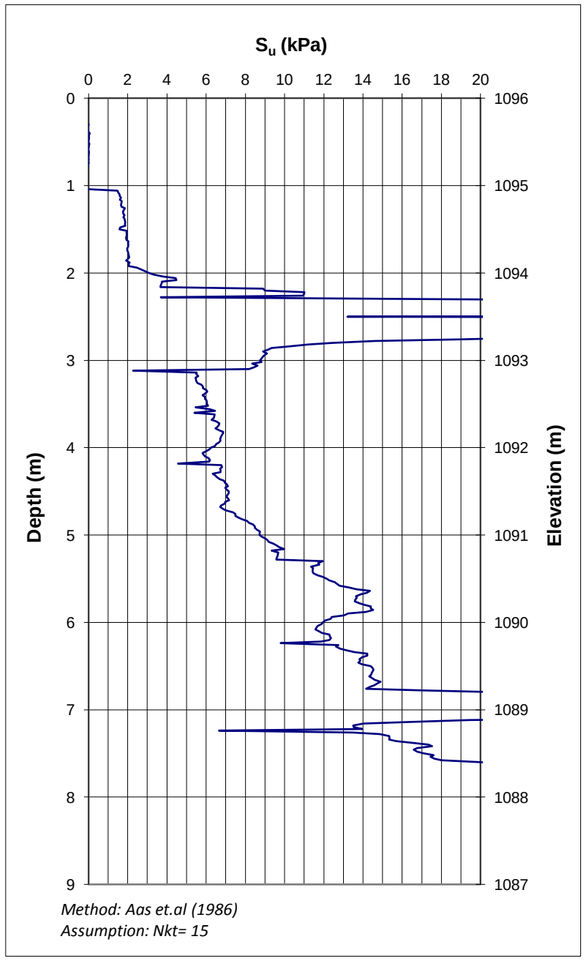
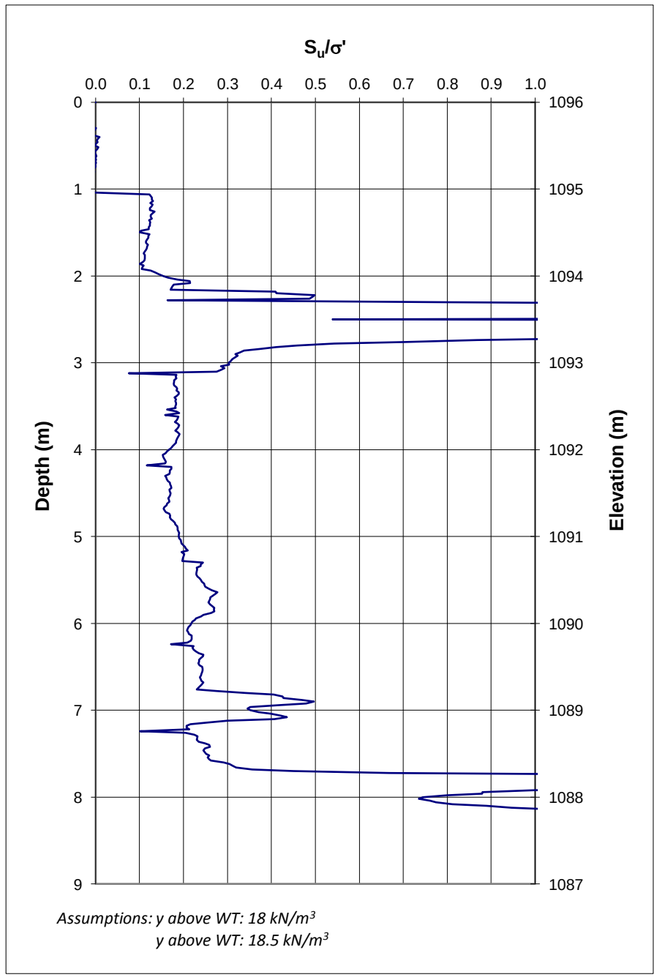
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-13**

# CPT-T-13-13




PROJECT: VM00605E

CPT DATE: October 4, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

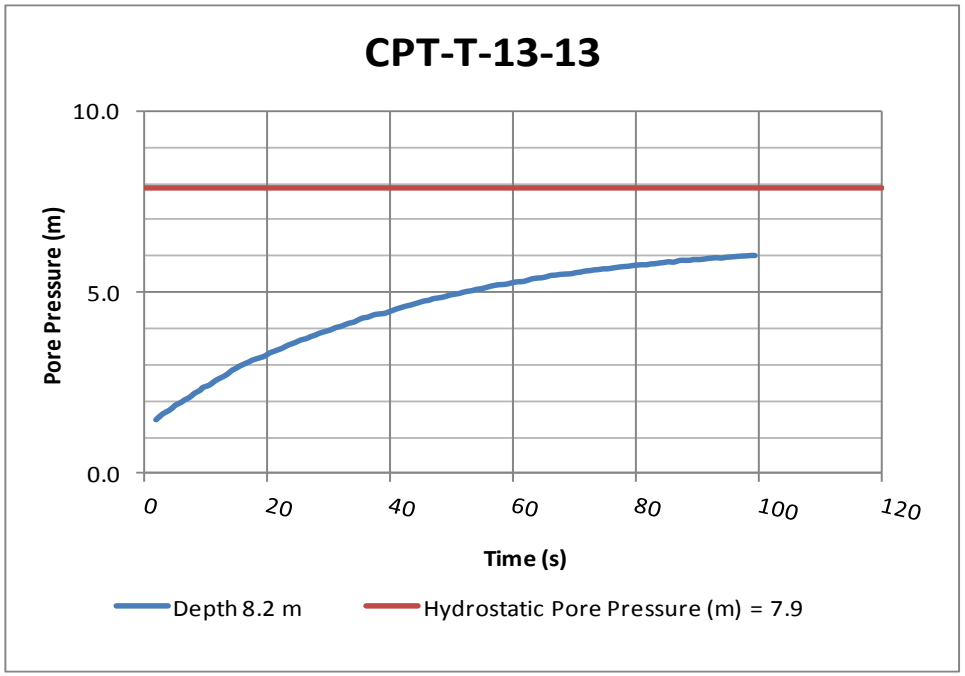
NOTE:

1. Depth Measured Relative to Barge Deck Elevation
2. Pond Elevation of 1095.8m Provided by AAM

Associated Engineering | amec | Yukon Energy, Mines and Resources

**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-13**

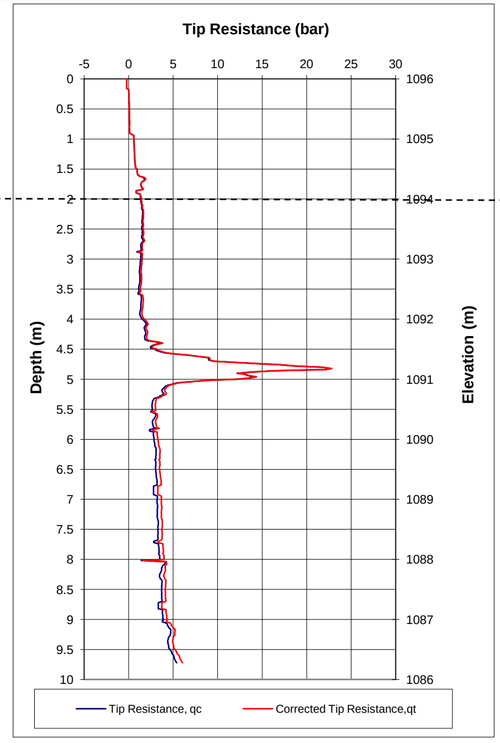


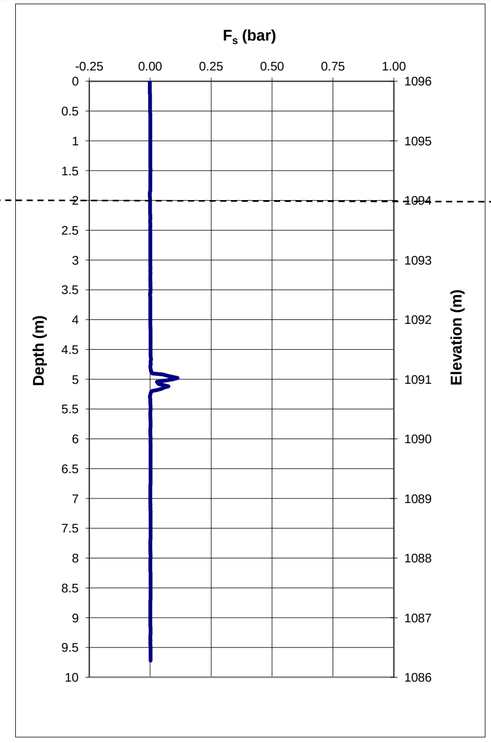

| | | | | | |
|---|---|---|---|---|---|
| CLIENT | Yukon Energy, Mines and Resources | DWN BY: EH | PROJECT | MOUNT NANSEN<br>CPT INTERPERTATION | DATE: Feb-14 |
| | | CHK'D BY: RW | | | CPT DATE: 4-Oct-13 |
| Associated Engineering / amec / Yukon Energy, Mines and Resources | | DEPTH 1: 8.2m | TITLE | CPT-T-13-13<br>Dissipation | PROJECT NO: VM00605E |
| | | DEPTH 2:: N/A | | | FIGURE NO: 5 |
| | | DEPTH 3: N/A | | | |

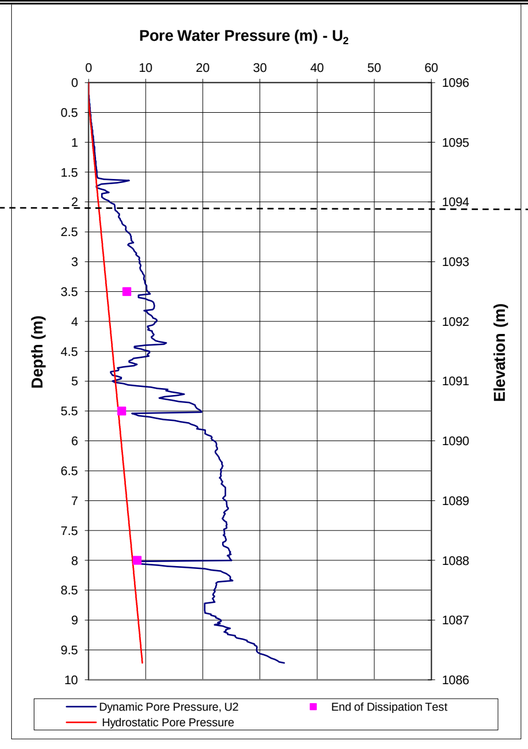
# CPT-T-13-14

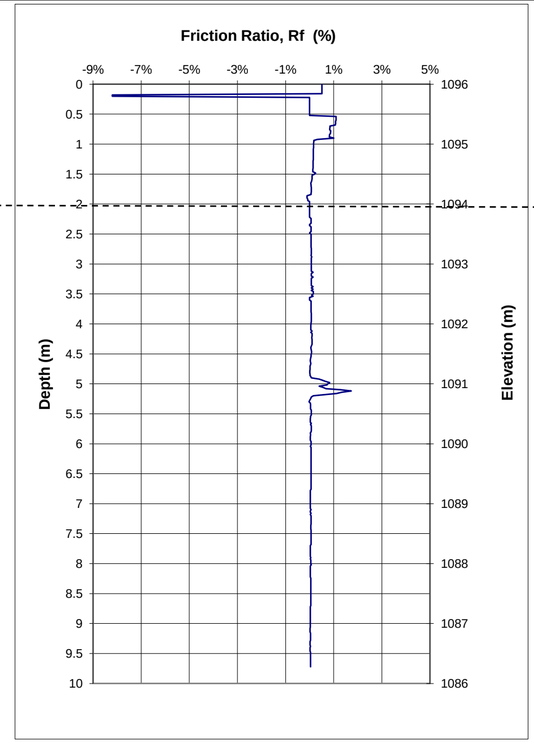
Water

Tailings




PROJECT: VM00605E

CPT DATE: October 6, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2013 Reviewed by: Renata Wood

NOTE:

1. Depth Measured Relative to Barge Deck Elevation

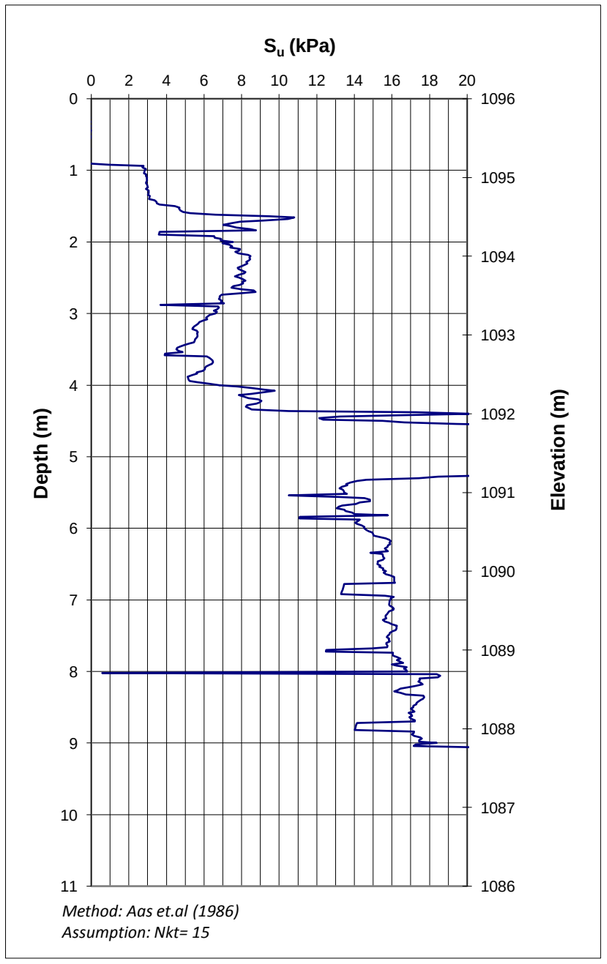
2. Pond Elevation of 1095.8m Provided by AAM

Associated Engineering | amec | Yukon Energy, Mines and Resources

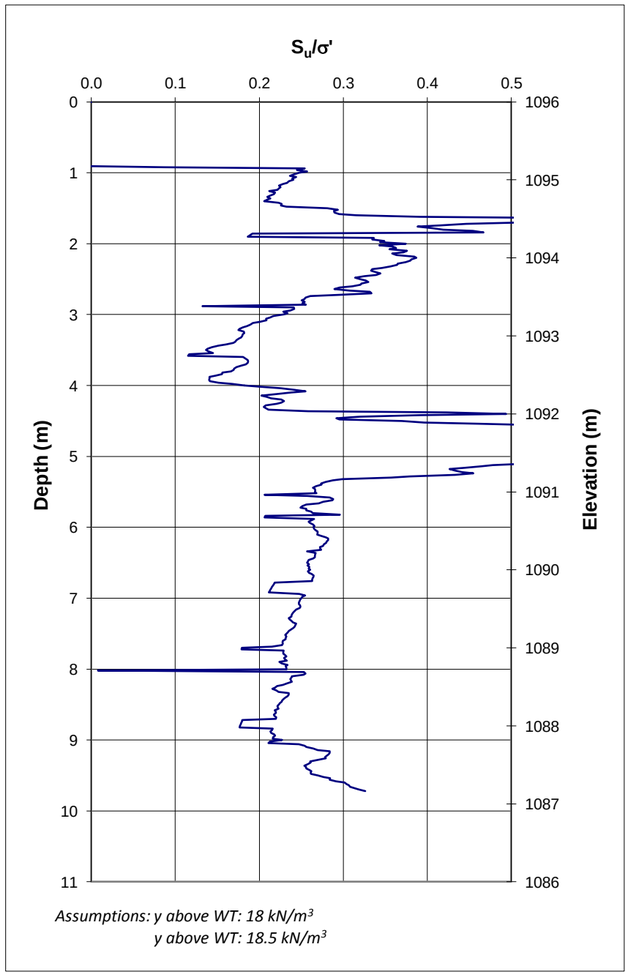
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-14**

# CPT-T-13-14




*Method: Aas et.al (1986)*
*Assumption: Nkt= 15*




*Assumptions: y above WT: 18 kN/m³*
*y above WT: 18.5 kN/m³*

PROJECT: VM00605E

| | | | |
|---|---|---|---|
| CPT DATE: | October 6, 2013 | Prepared by: | Ewelina Halyno |
| DATE: | March 7, 2013 | Reviewed by: | Renata Wood |

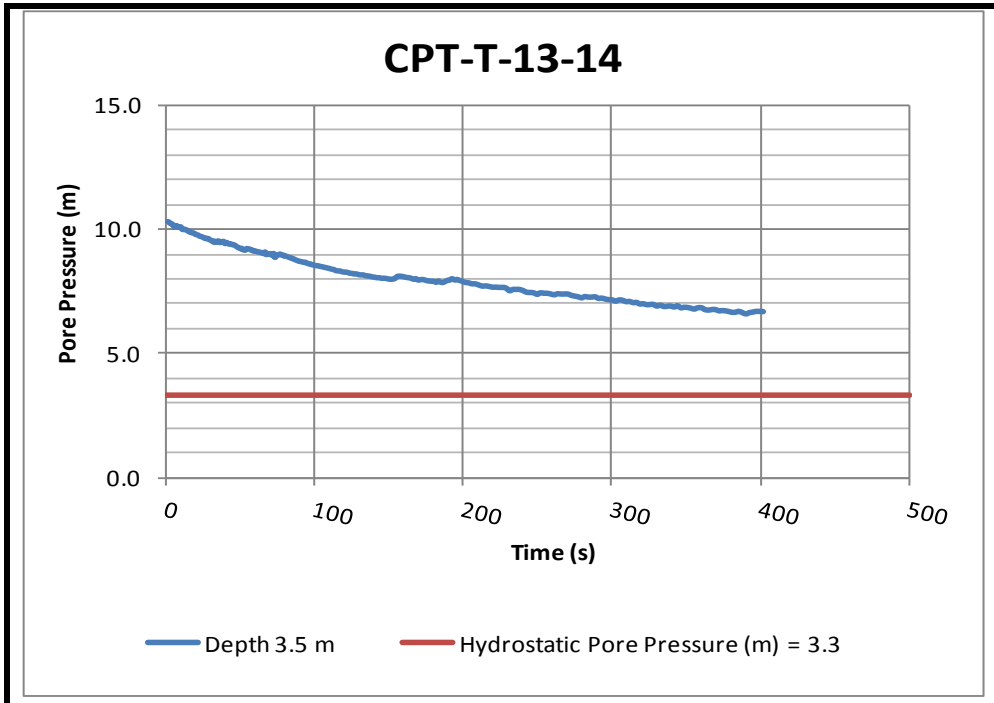
NOTE:

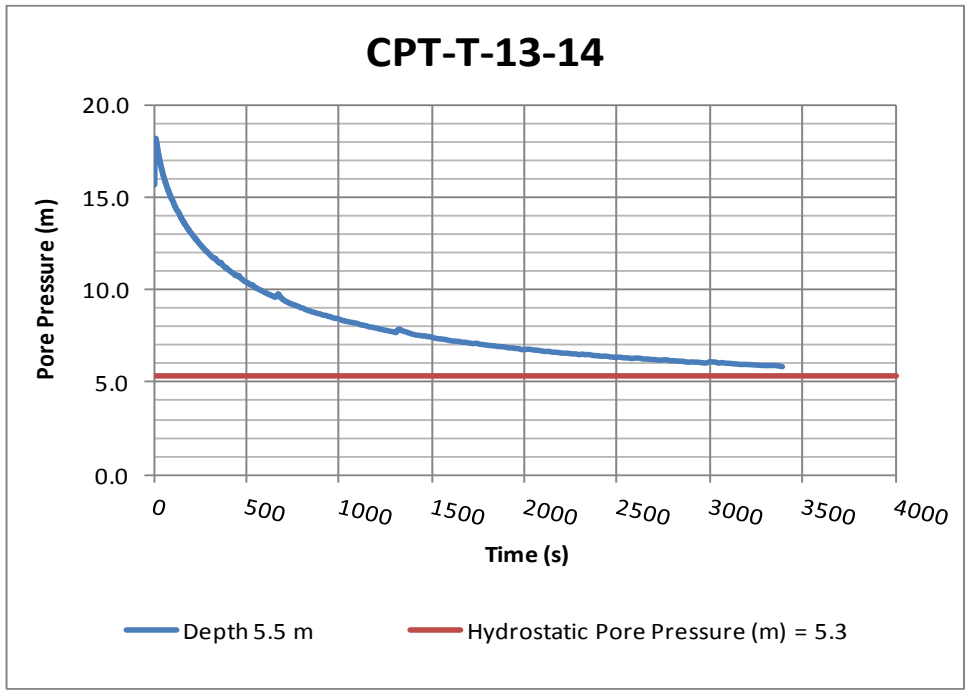
1. Depth Measured Relative to Barge Deck Elevation
2. Pond Elevation of 1095.8m Provided by AAM

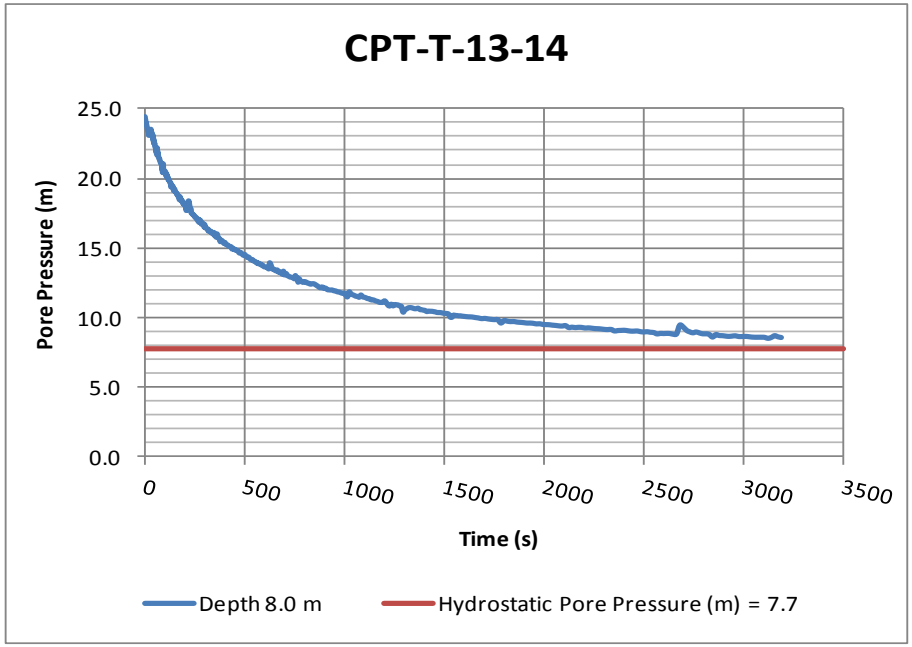
Associated Engineering | amec | Yukon Energy, Mines and Resources

**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-14**



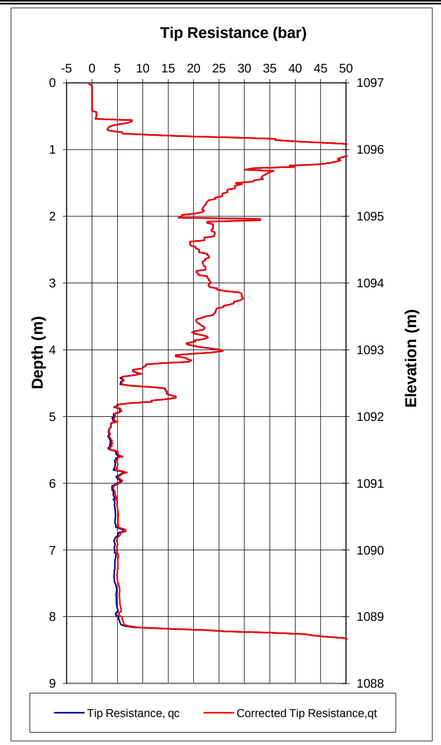



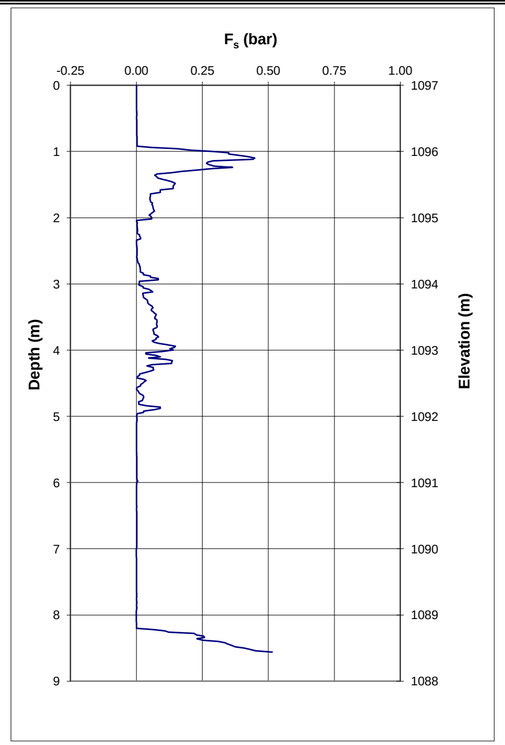



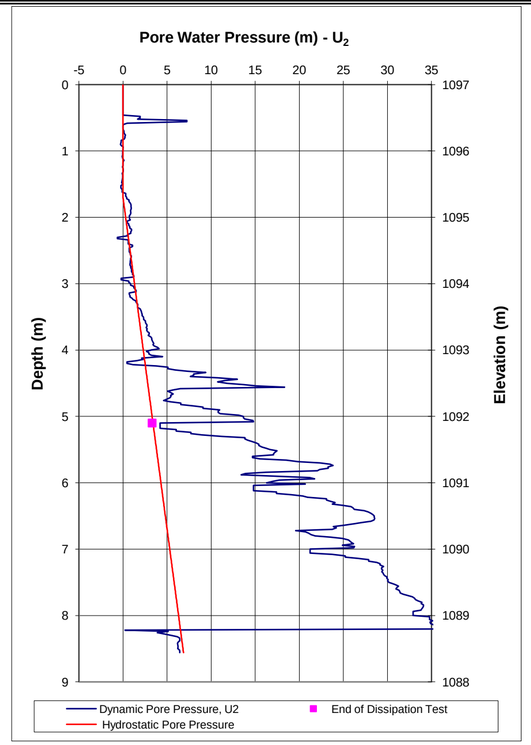

| | | | | | |
|---|---|---|---|---|---|
| CLIENT: Yukon Energy, Mines and Resources | DWN BY: EH | PROJECT: MOUNT NANSEN CPT INTERPERTATION | DATE: Feb-14 | | |
| | CHK'D BY: RW | | CPT DATE: 6-Oct-13 | | |
| Associated Engineering / amec / Yukon Energy, Mines and Resources | DEPTH 1: 3.5m | TITLE: CPT-T-13-14 Dissipation | PROJECT NO: VM00605E | | |
| | DEPTH 2:: 5.5m | | FIGURE NO: 6 | | |
| | DEPTH 3: 8.0m | | | | |

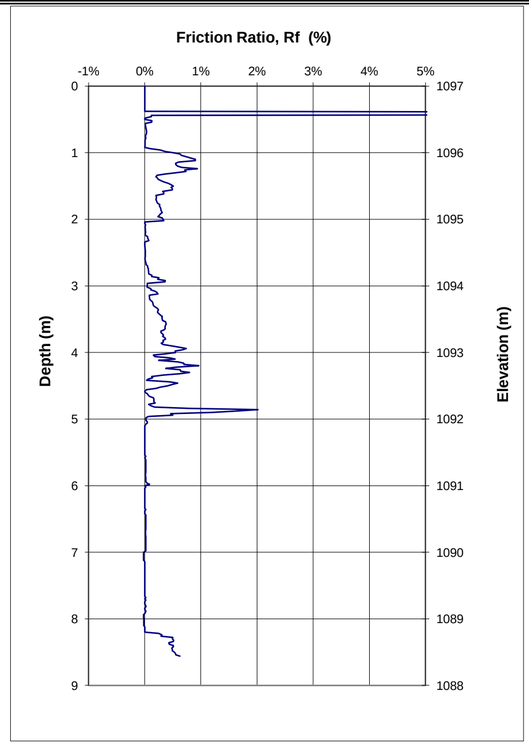
# CPT-T-13-15

Tailings




PROJECT: VM00605E

CPT DATE: October 7, 2013 Prepared by: Ewelina Halyno

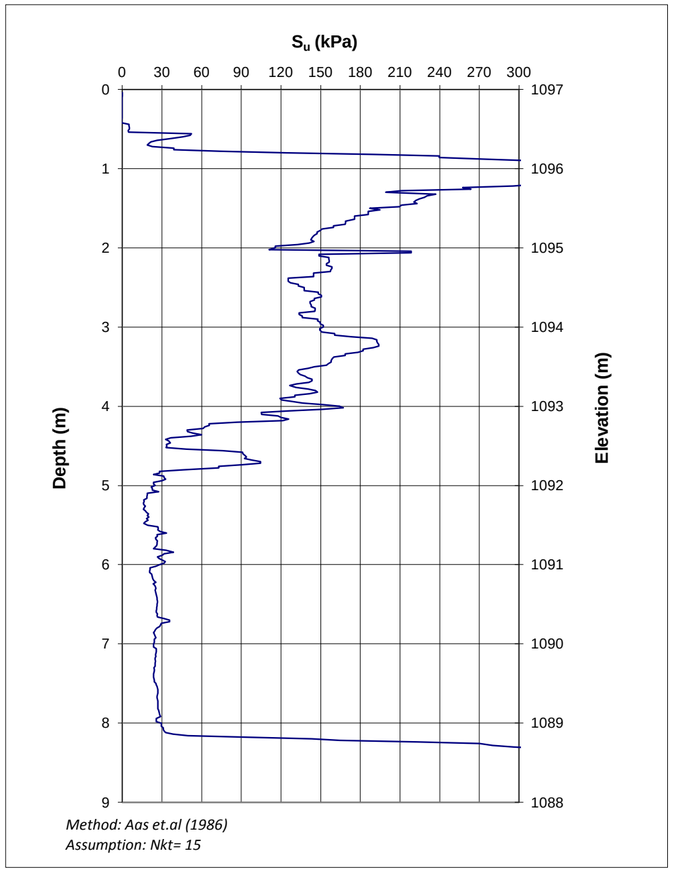
DATE: March 7, 2014 Reviewed by: Renata Wood

Associated Engineering | amec | Yukon Energy, Mines and Resources

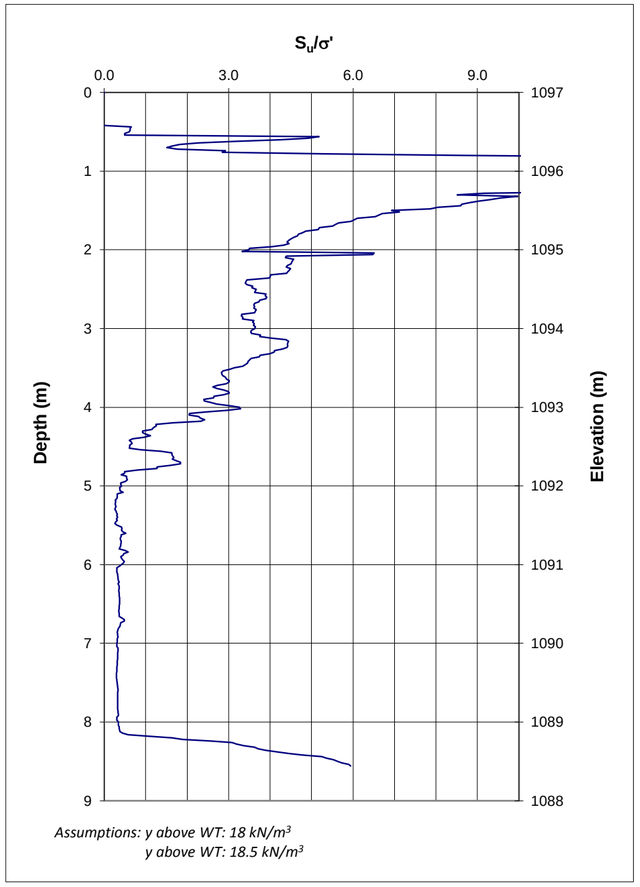
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-15**

# CPT-T-13-15




*Method: Aas et.al (1986)*
*Assumption: Nkt= 15*




*Assumptions: y above WT: 18 kN/m³*
*y above WT: 18.5 kN/m³*

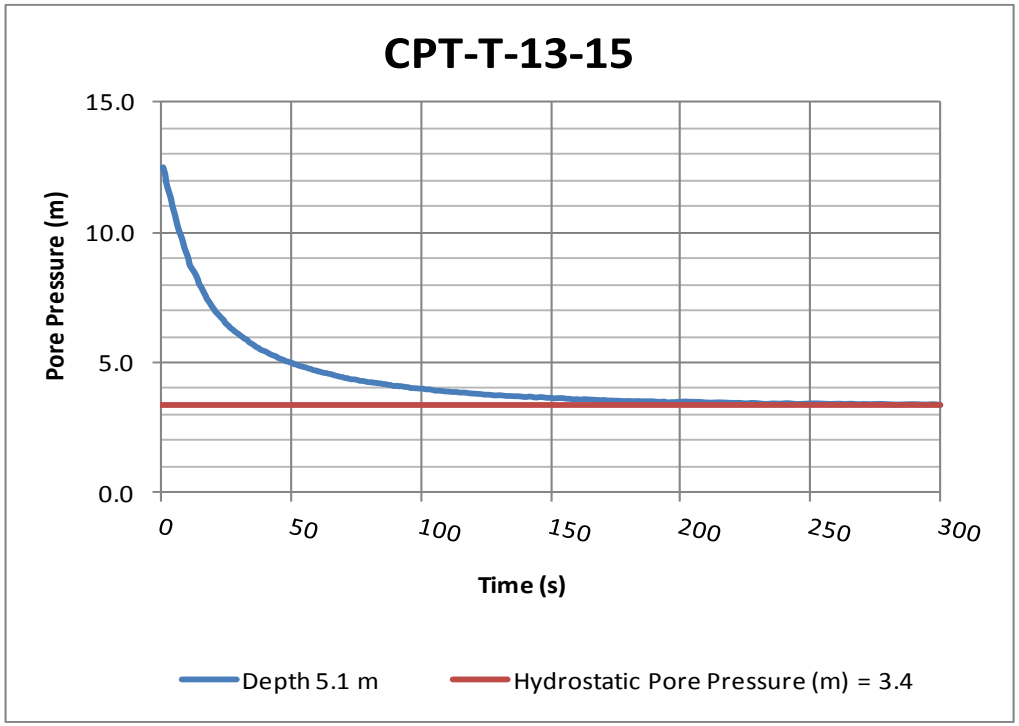
PROJECT: VM00605E
CPT DATE: October 7, 2013
DATE: March 7, 2014

Prepared by: Ewelina Halyno
Reviewed by: Renata Wood

Associated Engineering | amec | Yukon Energy, Mines and Resources

**MOUNT NANSEN**
**CPT INTERPERTATION**

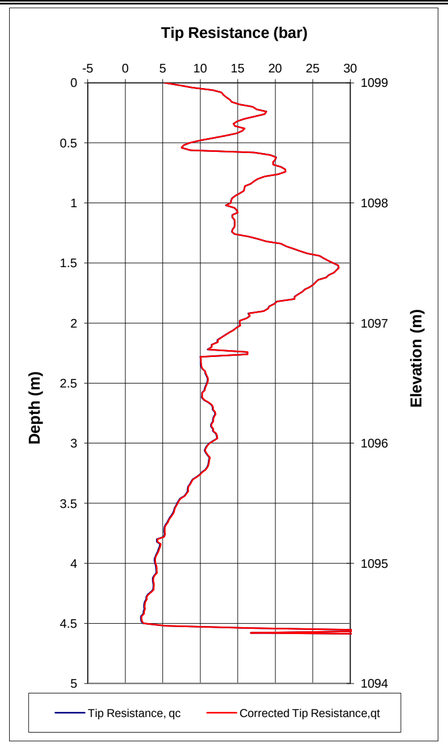
**CPT-T-13-15**

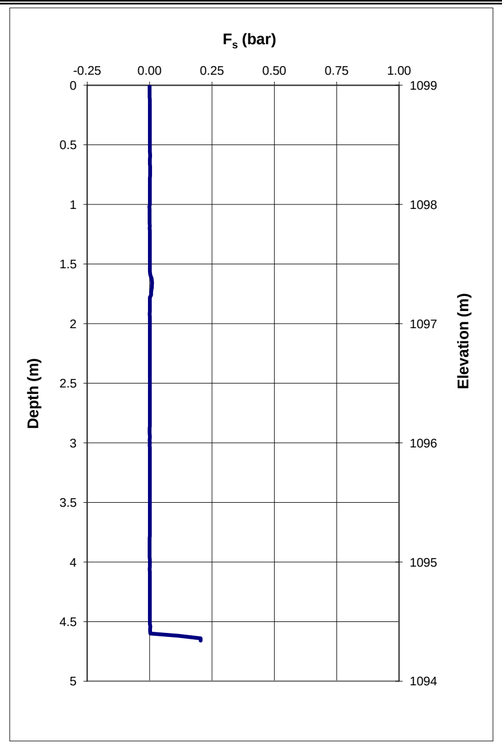


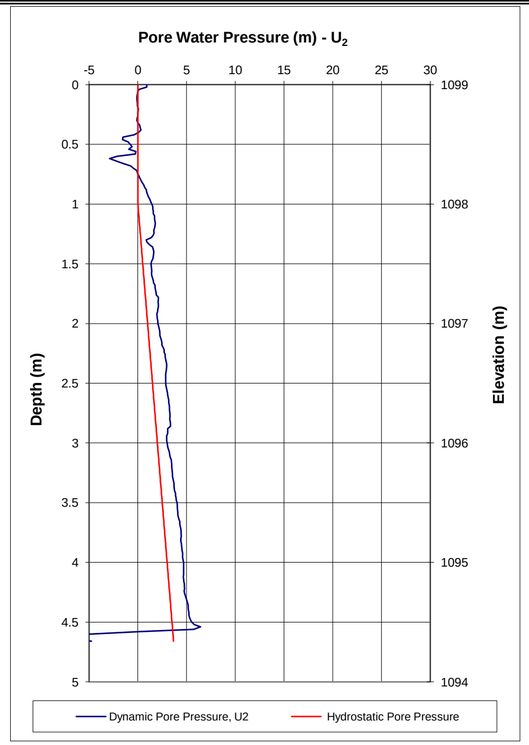

| | | | | | |
|---|---|---|---|---|---|
| CLIENT | Yukon Energy, Mines and Resources | DWN BY: | EH | PROJECT | MOUNT NANSEN<br>CPT INTERPERTATION | DATE: | Feb-14 |
| | | CHK'D BY: | RW | | | CPT DATE: | 6-Oct-13 |
| Associated Engineering / amec / Yukon Energy, Mines and Resources | | DEPTH 1: | 5.1m | TITLE | CPT-T-13-15<br>Dissipation | PROJECT NO: | VM00605E |
| | | DEPTH 2:: | N/A | | | FIGURE NO: | 7 |
| | | DEPTH 3: | N/A | | | | |

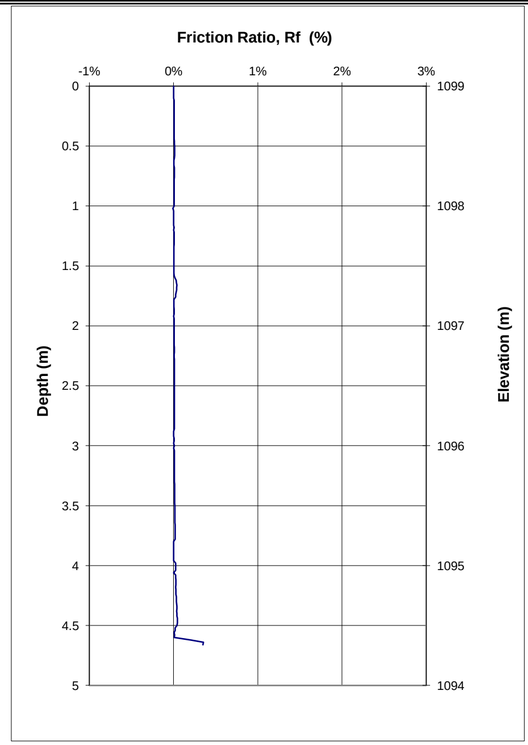
# CPT-T-13-16

Tailings




PROJECT: VM00605E

CPT DATE: October 7, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

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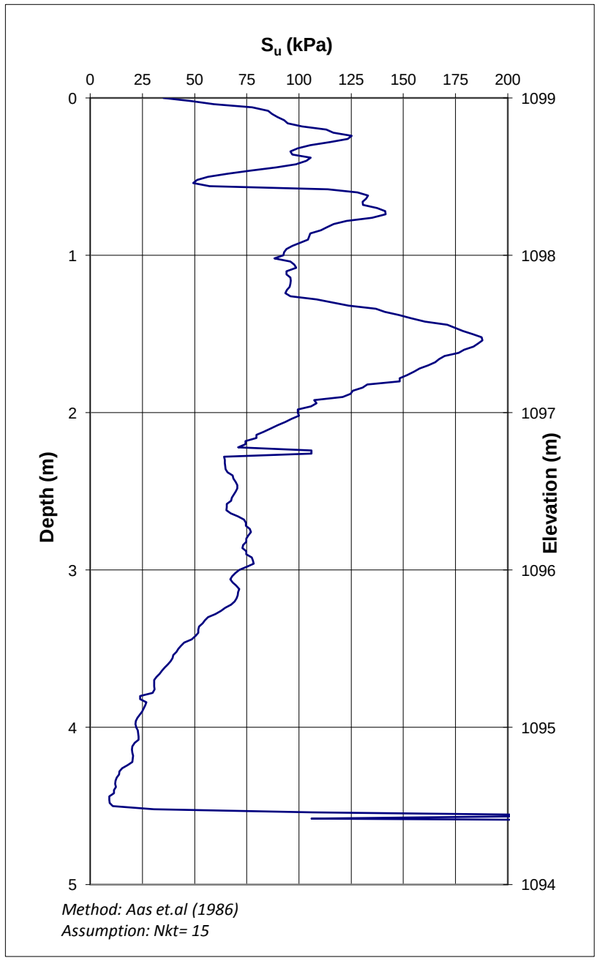
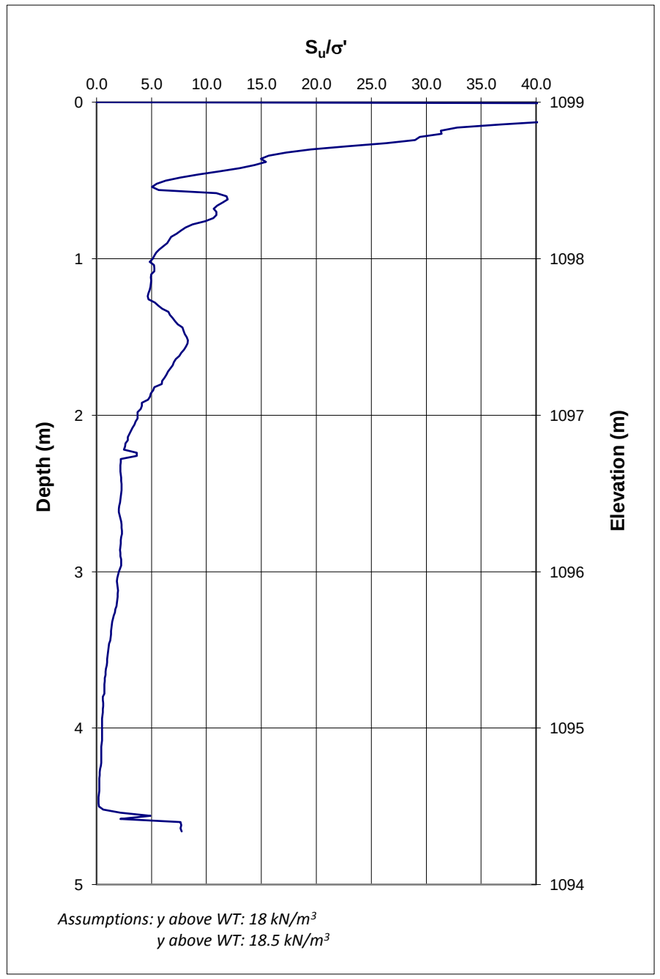
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-16**

# CPT-T-13-16




*Method: Aas et.al (1986)*
*Assumption: Nkt= 15*




*Assumptions: y above WT: 18 kN/m³*
*y above WT: 18.5 kN/m³*

PROJECT: VM00605E

| | | | |
|---|---|---|---|
| CPT DATE: | October 7, 2013 | Prepared by: | Ewelina Halyno |
| DATE: | March 7, 2014 | Reviewed by: | Renata Wood |

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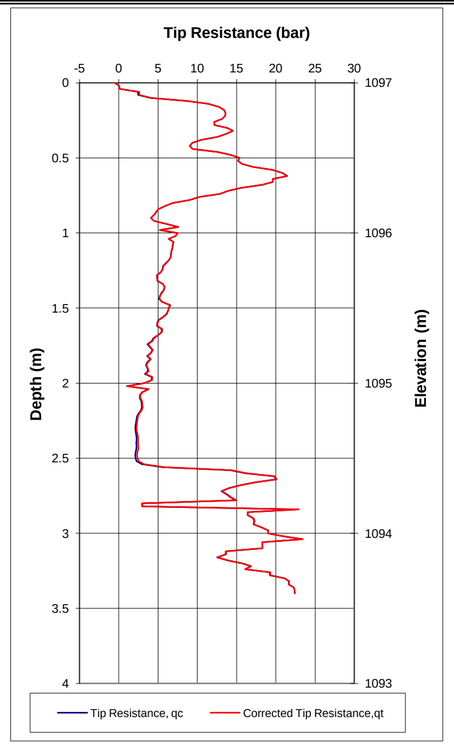
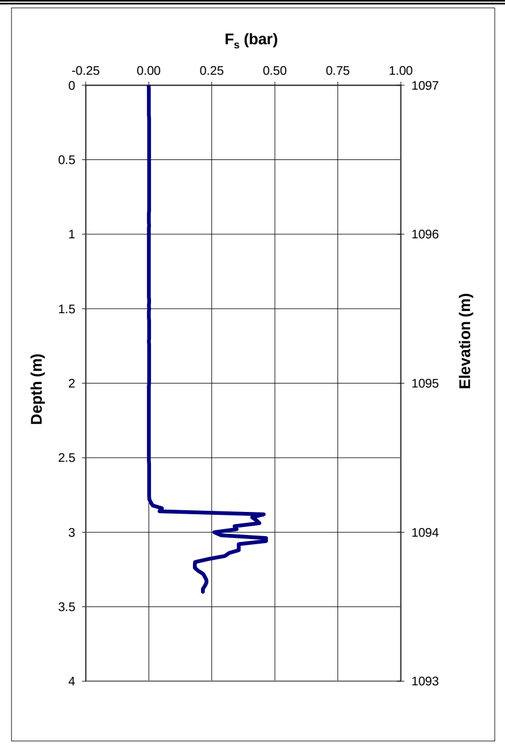
**MOUNT NANSEN**
**CPT INTERPERTATION**

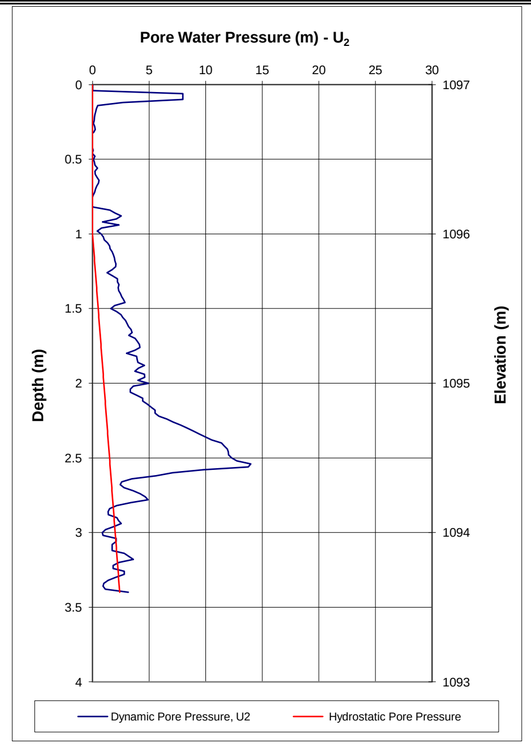
**CPT-T-13-16**

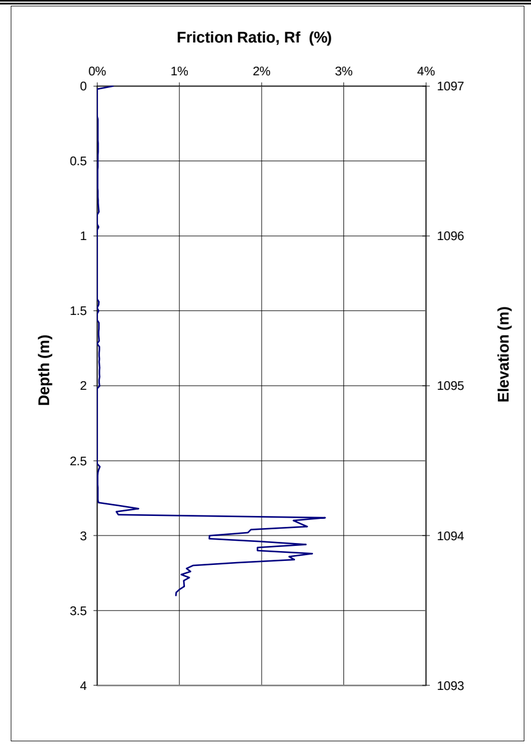
# CPT-T-13-17

Tailings




PROJECT: VM00605E

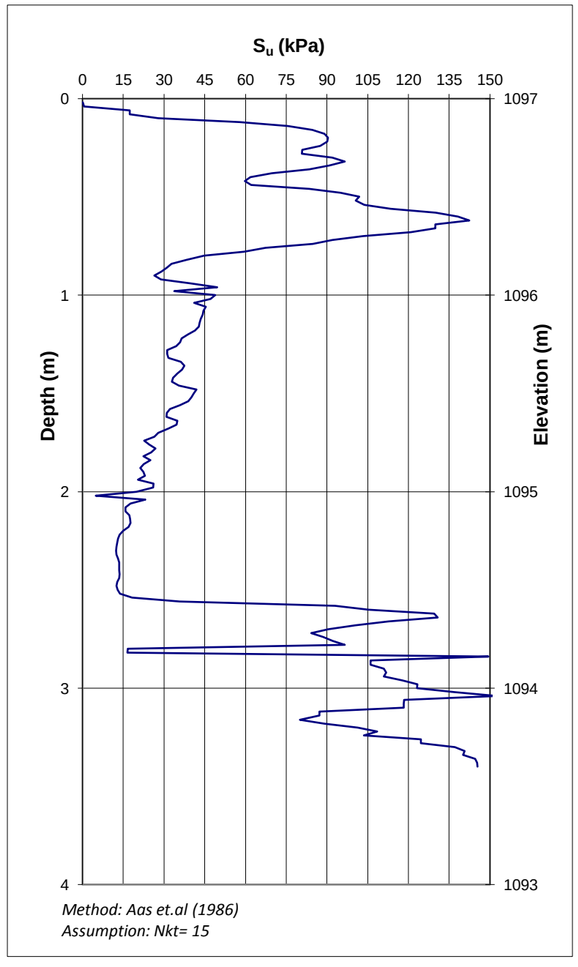
| | | | |
|---|---|---|---|
| CPT DATE: | October 6, 2013 | Prepared by: | Ewelina Halyno |
| DATE: | March 7, 2014 | Reviewed by: | Renata Wood |

Associated Engineering | amec | Yukon Energy, Mines and Resources

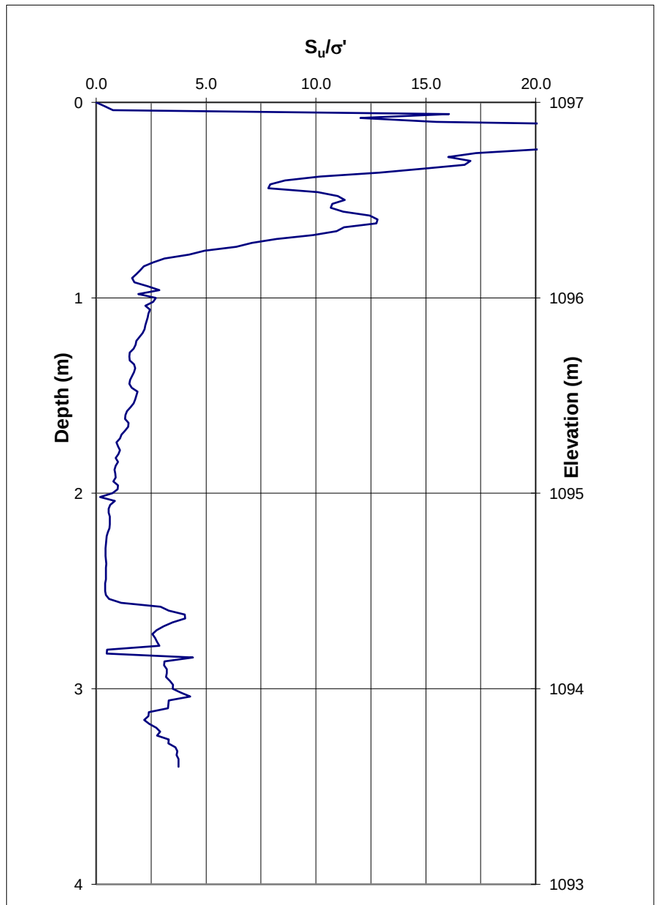
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-17**

# CPT-T-13-17




*Method: Aas et.al (1986)*
*Assumption: Nkt= 15*




*Assumptions: y above WT: 18 kN/m³*
*y above WT: 18.5 kN/m³*

PROJECT: VM00605E

| | | | |
|---|---|---|---|
| CPT DATE: | October 6, 2013 | Prepared by: | Ewelina Halyno |
| DATE: | March 7, 2014 | Reviewed by: | Renata Wood |

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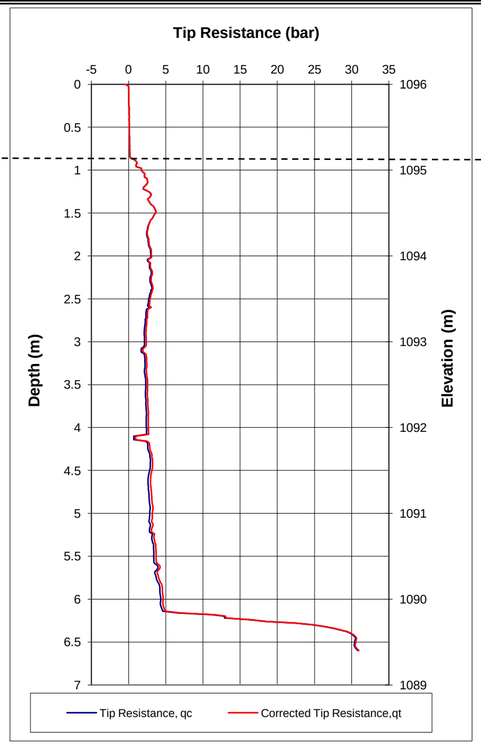
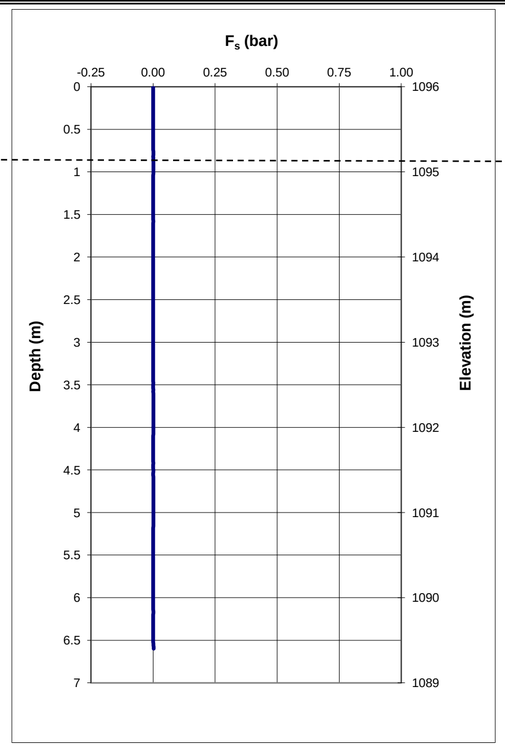
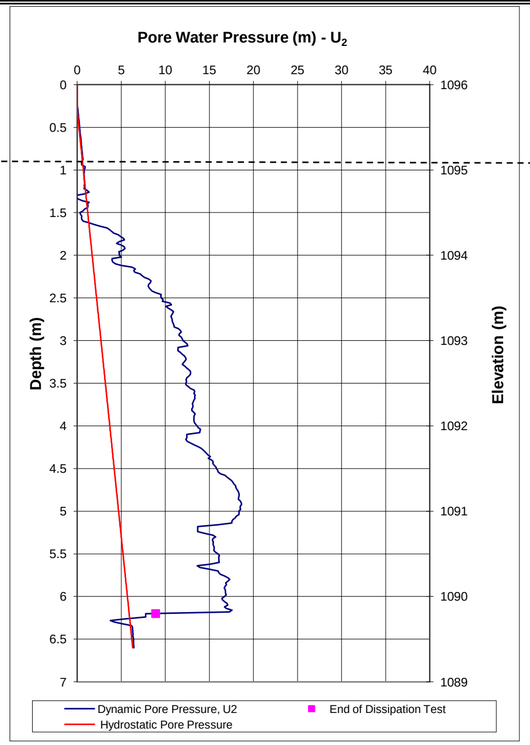
**MOUNT NANSEN**
**CPT INTERPERTATION**

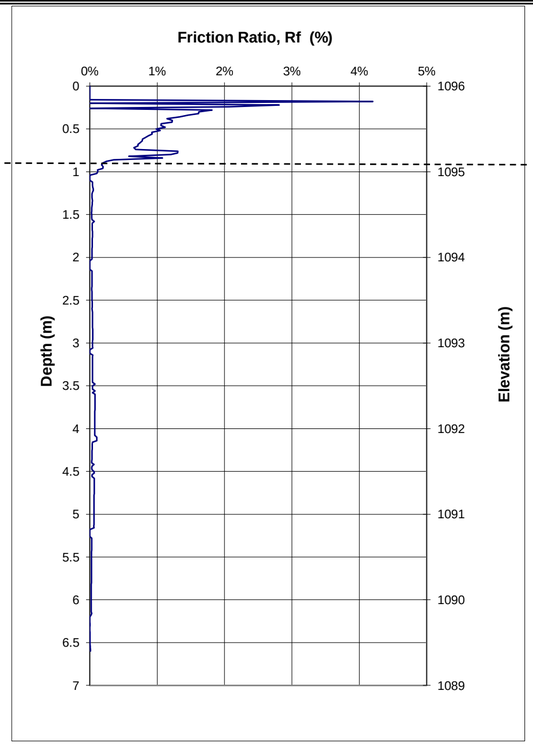
**CPT-T-13-17**

# CPT-T-13-18




PROJECT: VM00605E

CPT DATE: October 4, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

NOTE:

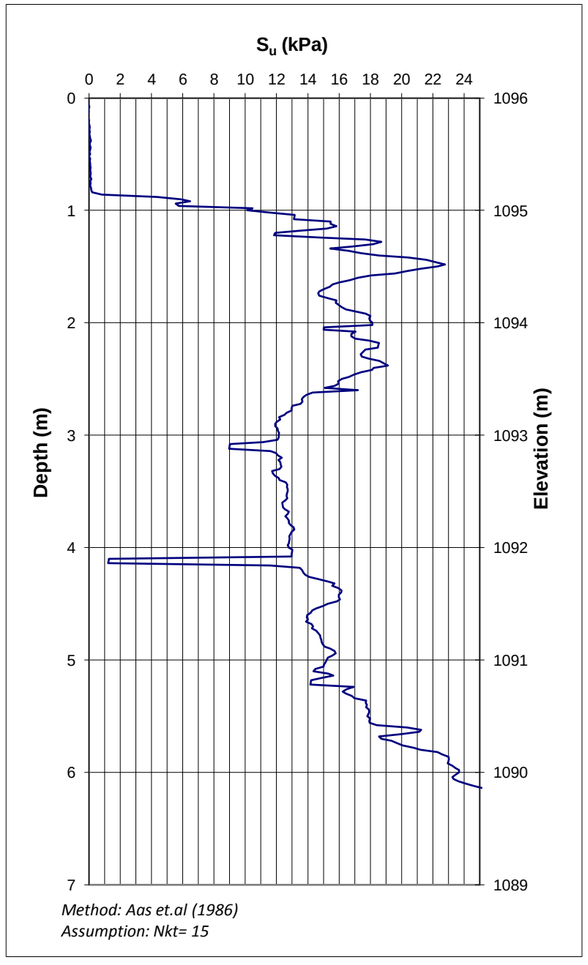
1. Depth Measured Relative to Barge Deck Elevation
2. Pond Elevation of 1095.8m Provided by AAM

Associated Engineering | amec | Yukon Energy, Mines and Resources

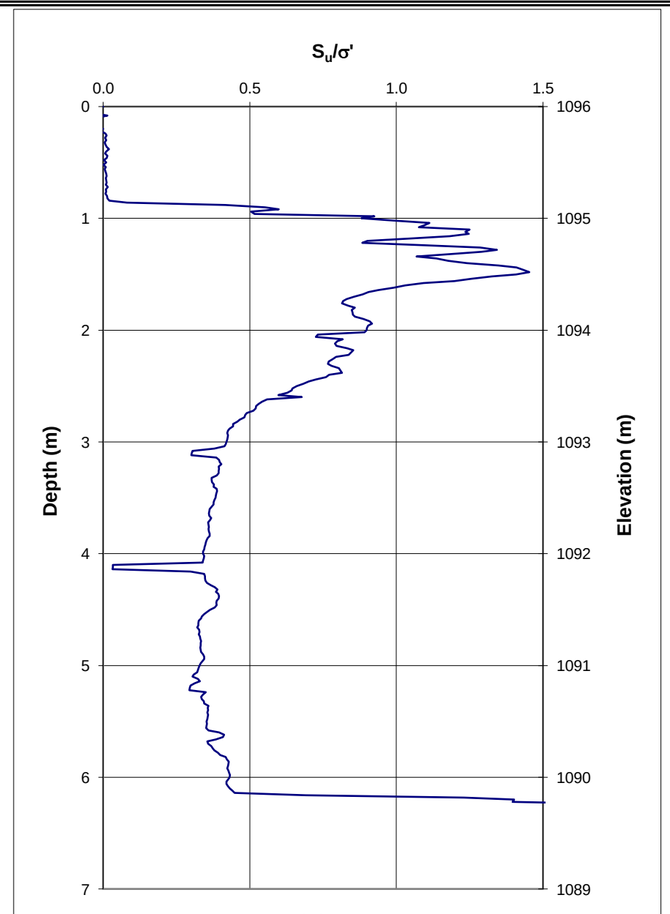
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-18**

# CPT-T-13-18




*Method: Aas et.al (1986)*
*Assumption: Nkt= 15*




*Assumptions: y above WT: 18 kN/m$^3$*
*y above WT: 18.5 kN/m$^3$*

PROJECT: VM00605E

CPT DATE: October 4, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

NOTE:

1. Depth Measured Relative to Barge Deck Elevation
2. Pond Elevation of 1095.8m Provided by AAM

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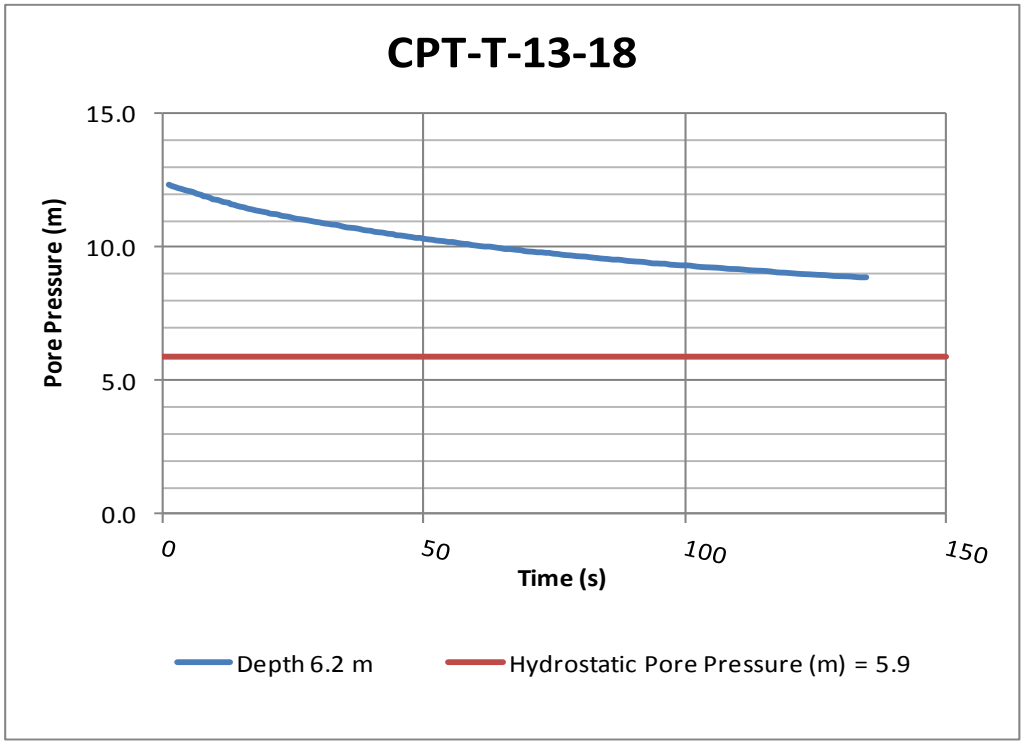
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-18**

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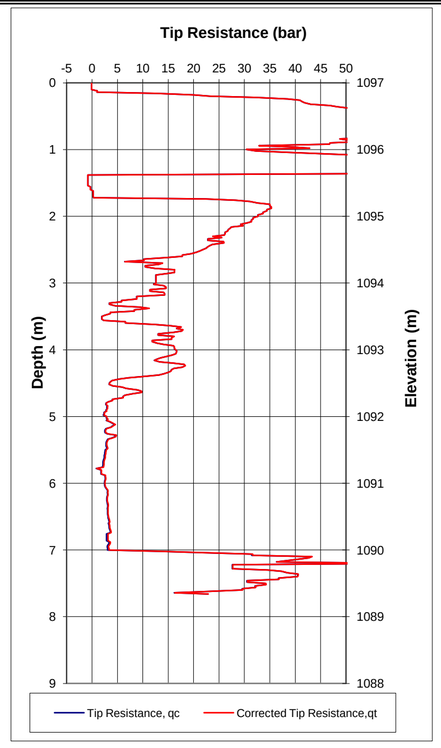
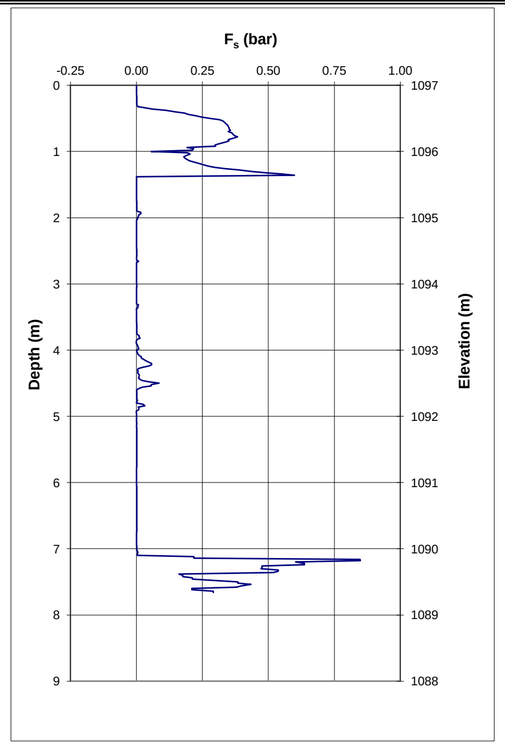
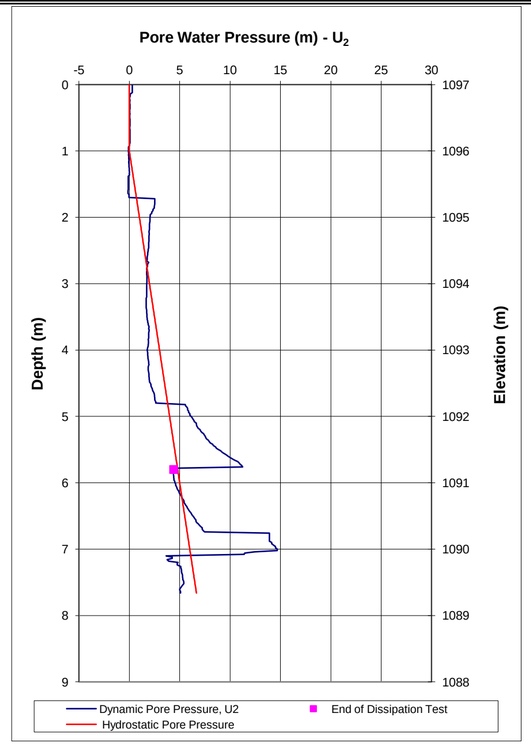
| CLIENT | Yukon Energy, Mines and Resources | DWN BY: | EH | PROJECT | MOUNT NANSEN<br>CPT INTERPERTATION | DATE: | Feb-14 |
| | | CHK'D BY: | RW | | | CPT DATE: | 4-Oct-13 |
| Associated Engineering / amec / Yukon Energy, Mines and Resources | | DEPTH 1: | 6.2m | TITLE | CPT-T-13-18<br>Dissipation | PROJECT NO: | VM00605E |
| | | DEPTH 2:: | N/A | | | FIGURE NO: | 8 |
| | | DEPTH 3: | N/A | | | | |

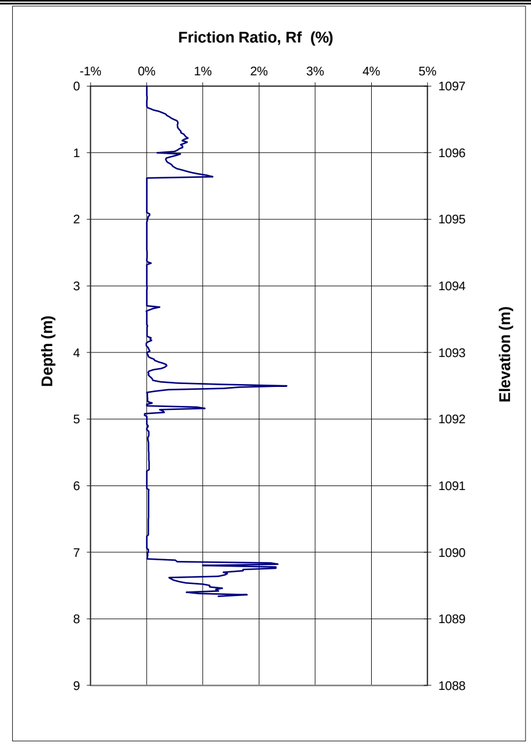
# CPT-T-13-19

Tailings




PROJECT: VM00605E

CPT DATE: October 7, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

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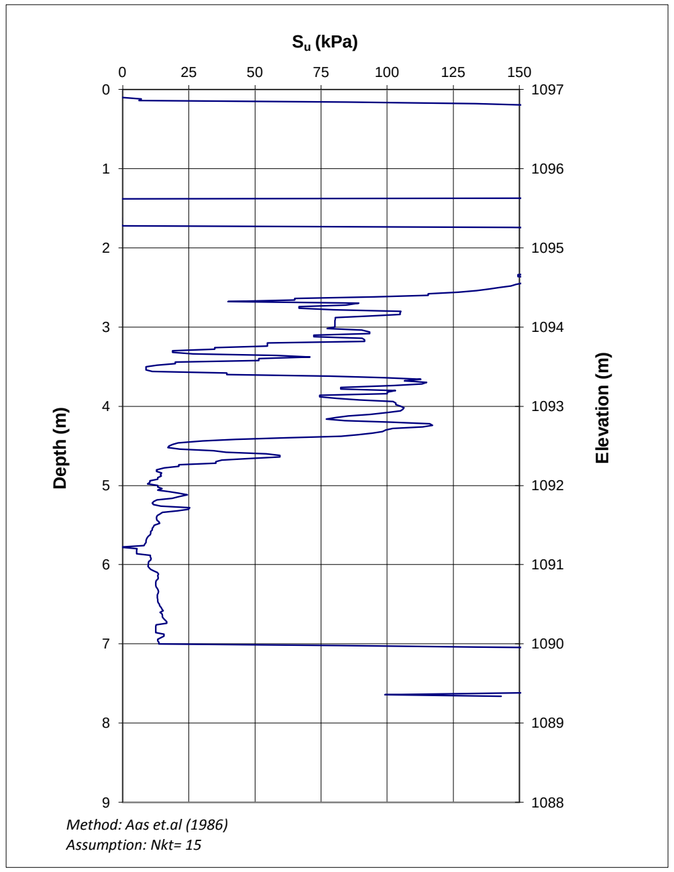
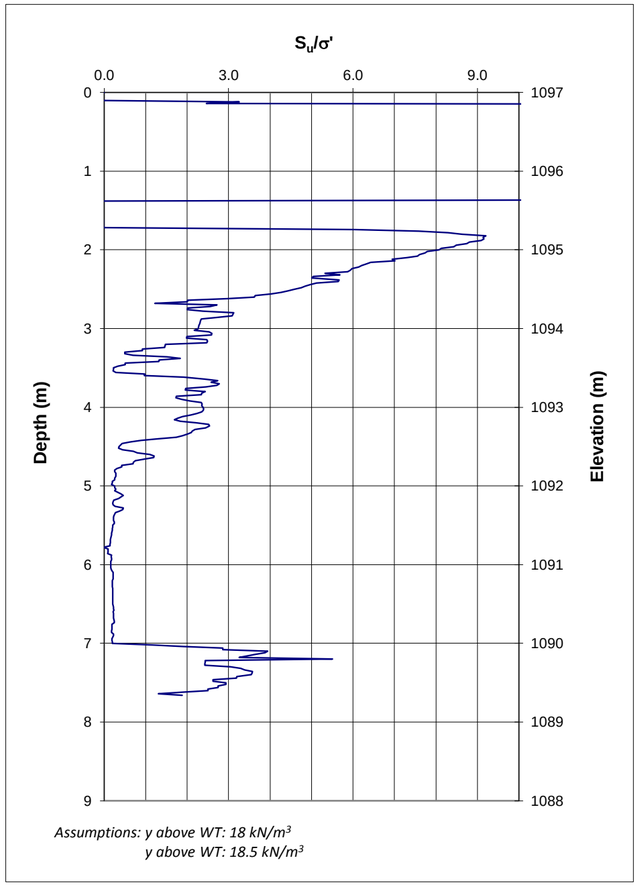
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-19**

# CPT-T-13-19




*Method: Aas et.al (1986)*
*Assumption: Nkt= 15*




*Assumptions: y above WT: 18 kN/m³*
*y above WT: 18.5 kN/m³*

PROJECT: VM00605E
CPT DATE: October 7, 2013
DATE: March 7, 2014

Prepared by: Ewelina Halyno
Reviewed by: Renata Wood

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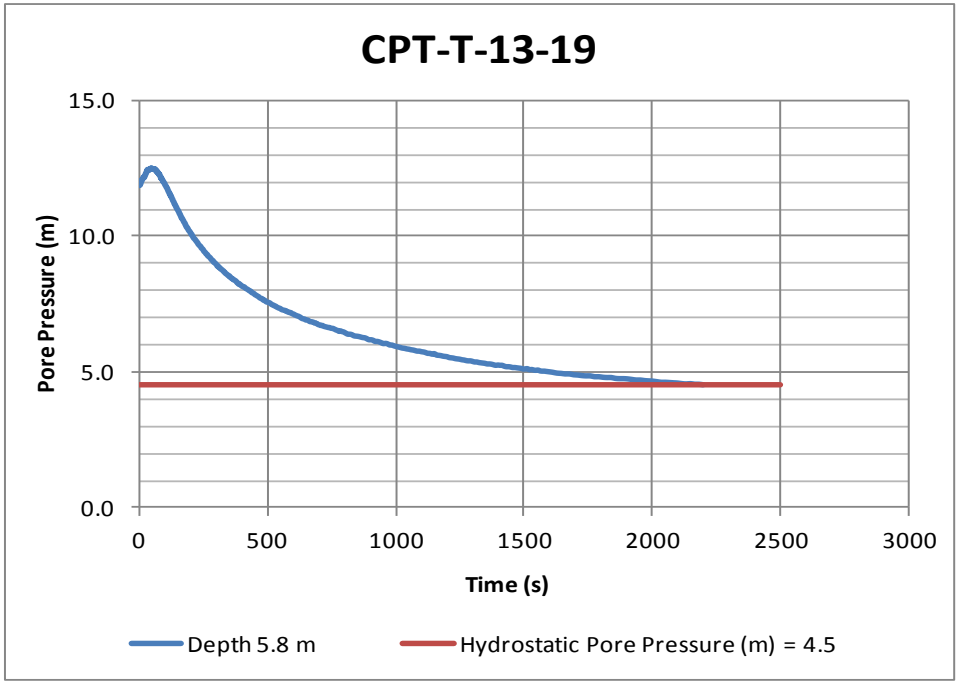
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-19**

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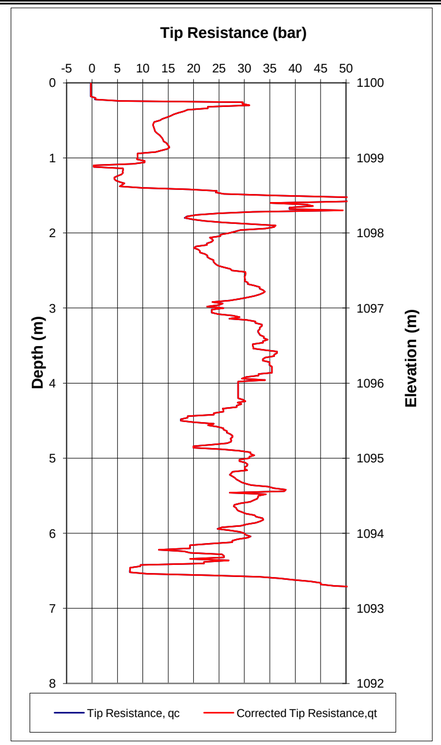
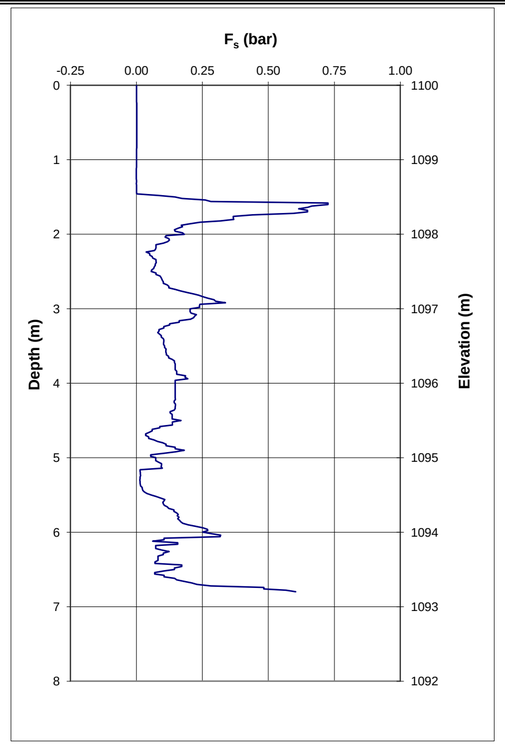
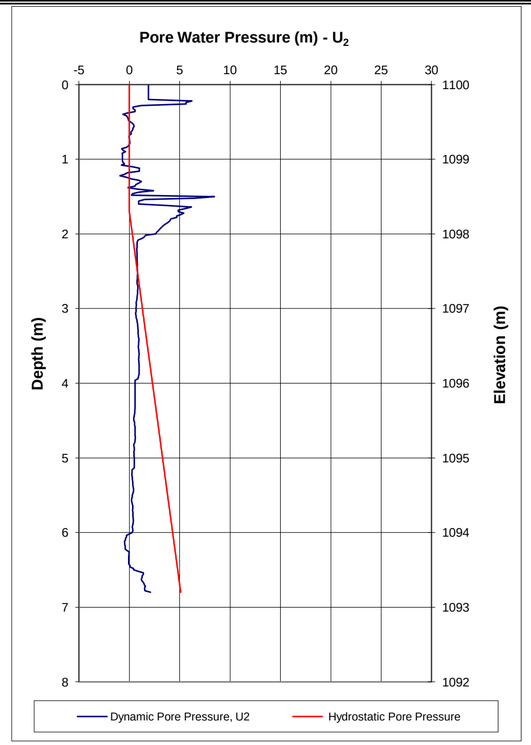
| CLIENT | Yukon Energy, Mines and Resources | DWN BY: | EH | PROJECT | MOUNT NANSEN<br>CPT INTERPERTATION | DATE: | Feb-14 |
| | | CHK'D BY: | RW | | | CPT DATE: | 4-Oct-13 |
| Associated Engineering / amec / Yukon Energy, Mines and Resources | | DEPTH 1: | 5.8m | TITLE | CPT-T-13-19<br>Dissipation | PROJECT NO: | VM00605E |
| | | DEPTH 2:: | N/A | | | FIGURE NO: | 9 |
| | | DEPTH 3: | N/A | | | | |

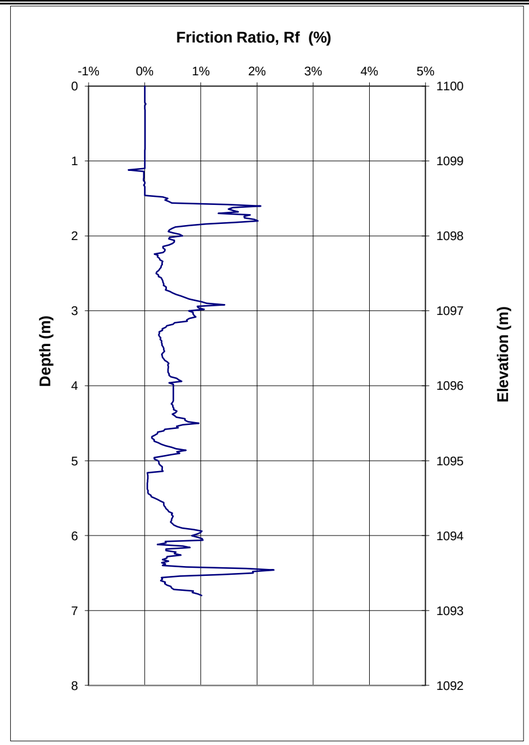
# CPT-T-13-20

Tailings




PROJECT: VM00605E

CPT DATE: October 7, 2013 Prepared by: Ewelina Halyno

DATE: March 7, 2014 Reviewed by: Renata Wood

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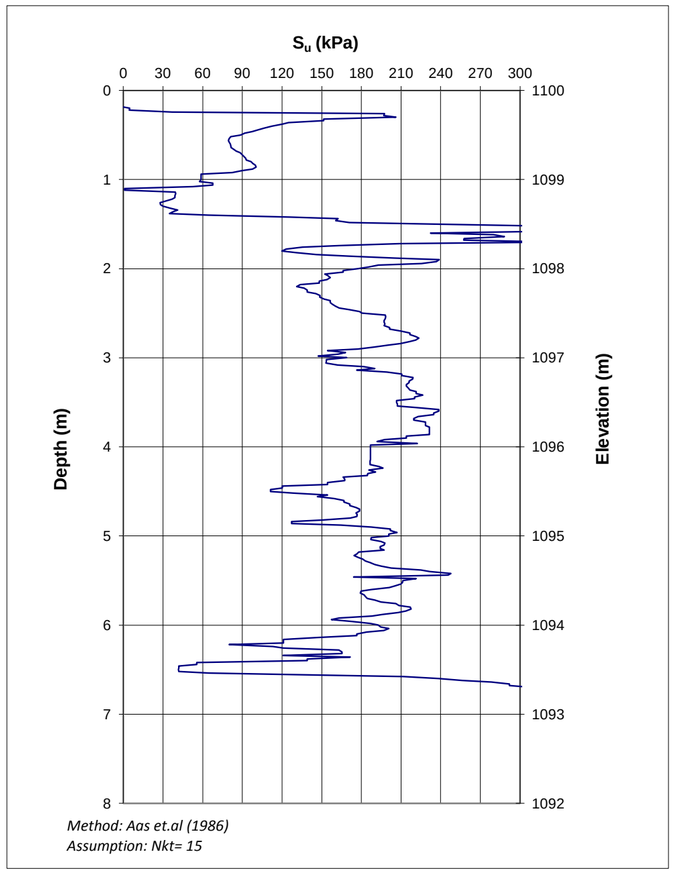
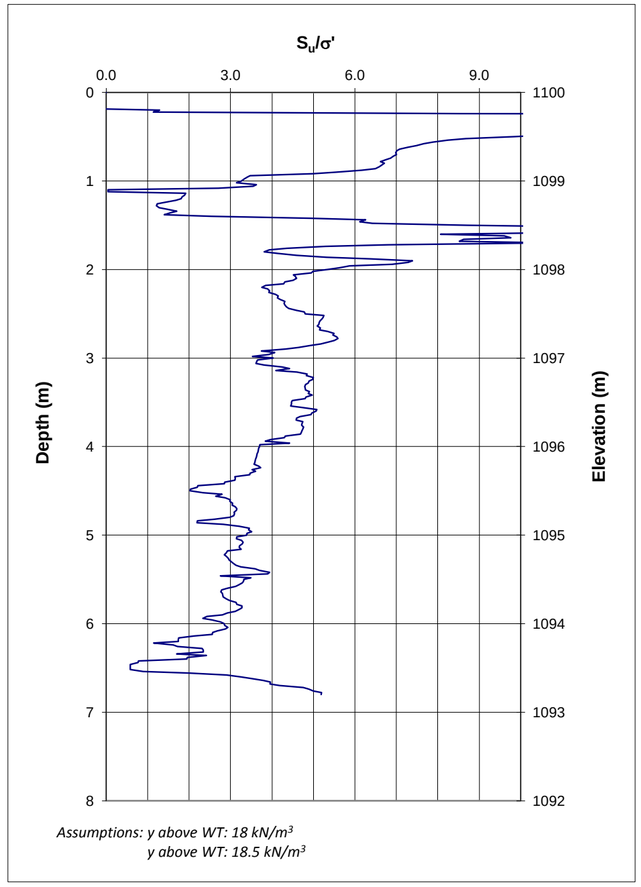
**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-20**

# CPT-T-13-20

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**MOUNT NANSEN**
**CPT INTERPERTATION**

**CPT-T-13-20**

# APPENDIX B

# SUPPORTING FIELD RECONNAISSANCE MEMOS

# Appendix B1

# Hydrotechnical Data Memo

**MEMO**

| | | | |
|---|---|---|---|
| **To** | Brian Geddes/Paul Morton | | |
| **From** | Charles Masala | **Reviewed By:** | |
| **Tel** | 604-294-3811 | **AMEC File No.** | VM00605F.230.2040 |
| **e-mail** | charles.masala@amec.com | **cc** | |
| **Date** | November 26, 2013 | | |

**Subject** **Mount Nansen Remediation Project**
**Hydrotechnical Data Report**

## 1.0 INTRODUCTION

Two main field trips were undertaken as part of the Mount Nansen hydrotechnical site investigation (SI) program. The first trip was undertaken during spring period by Robyn Andrishak from May 21 to 24, 2013. The purpose of the spring trip was to observe and characterize flow during freshet at the site. The second field trip was undertaken during the summer period by Charles Masala from September 5 to 8, 2013. The purpose of the summer trip was to characterize catchments and channels of Dome and Pony Creeks, measure flow and collect sediment samples. Additional field activities relevant for the hydrotechnical evaluation involved longitudinal and cross section survey at selected locations in Dome Creek, which was performed by Yukon Engineering Services (YES).

## 2.0 OBJECTIVES OF THE HYDROTECHNICAL SITE INVESTIGATION PROGRAM

The following are the objectives of the hydrotechnical SI program as identified in SI memo (AMEC, 2013):

- General site reconnaissance during freshet and during summer periods. The freshet represents a period of high flow in the creeks, while late summer represents period of low open water flow.
- Reconnaissance of Dome Creek from upstream of the culvert between the mill and bunkhouse road and ending 500 m downstream of the tailings storage facility. The reconnaissance involved the following activities:
  - characterization of the watershed and channel of Dome Creek to support hydrological modelling;
  - characterization of undisturbed portions of the Dome channel upstream and downstream of the tailings area to support design of reclaimed Dome Creek over the tailings facility;
  - identifying flow patterns and paths of the creeks (concentrated or braided flow); and
  - estimation and measurement of flow at different locations.
- Sampling of bottom soils/sediments along Dome Creek 500 m upstream and 500 m downstream of the tailings impoundment area.

- Detailed cross-section survey of the Dome Creek channel upstream (500 m) and downstream (500 m) of the tailings impoundment area.
- Reconnaissance and flow measurement of the sections of Pony Creek close to the pit - Pony Creek:
  - characterization of the watershed and channel to support hydrological modelling.

## 3.0 FIELD ACTIVITIES AND DATA COLLECTED

### 3.1 SPRING FIELD TRIP

Here is a summary of field activities conducted during the spring field trip:

- Reconnaissance of the site, focusing primarily on Dome and Pony catchment area;
- Flow measurement at selected locations;
- Characterization of the channels and flow; and
- Identification of surface water flow around the waste rock area.

Information and data collected during the spring program is presented in Table HT1.

### 3.2 SUMMER FIELD TRIP

Here is the summary of field activities conducted during the summer field trip:

- Catchment Reconnaissance of Dome Creek - walking the Dome Creek valley starting from near the Bunkhouse, upstream of the road to the mill, adjacent to the mill area, the area between the mill and the tailings storage facility, around the tailings storage facility ending 500 m downstream of the tailings facility. During the walk, a detailed photographical documentation of Dome Creek watershed was conducted at various locations in the watershed and is presented in Appendix C6. Here is the summary of watershed and creek characterization:
  - A moss blanket covers most of the valley floor with the thickness of approximately 5 to 20 cm (sinking 5 to 15 cm when walking). Also shrubs (0.5 to 2.5 m high) cover the valley walls and part of the valley floor. Valley walls and floor are covered +90% with vegetation (see Photo Log Appendix C6).
  - Dome Creek is a braided, with two main channels (south and north) forming the creek upstream of the tailings facility. The channel on the north is better defined, with widths of up to 0.6 m in certain sections. Over some sections the creek disappears and flows below ground (see Photo Log Appendix C6).
  - Downstream of the tailings storage facility the creek is mostly composed of one main channel which is better defined. Within 500 m of the tailings storage facility, the channel is up to 1 m wide in some sections (see Photo Log Appendix C6).

- Twenty sediment samples were collected within 500 m of upstream (10 samples) and downstream (10 samples) of the tailings storage facility. The sediment sampling locations are presented in Table HT2 and Figure 1. The photo log shows the exact location where each sediment sample was collected. The sediment samples were collected from surface to about 15 cm deep. The samples were excavated using a hand shovel shown in the photo log. A total of 1 to 2 kg of sample was collected at each location. The samples were place in a plastic container. Particle size distribution of sediment samples are presented in Appendix D4. Particle size distribution sediments samples was analyzed by ALS (Geochemistry analysis was also done on the samples, the results are included in Appendix D2). The ASTM method was used to measure the particle distribution of the samples.
- Flow was measured at five locations in Dome Creek as presented in Appendix C6 and shown on Figure 1. A photo of each flow monitoring location is presented in the photo log. Two flow measurement methods were used, bucket and stop watch and the Marsh McBiney flow meter.
    - A 20 litre gallon bucket was used. The time it took for the bucket to fill was measured using a stop watch. For each flow measuring station, the bucket was filled at least twice. The average two times it took to fill the bucket was used to estimate flow rate.
    - The procedure for flow measurement using the March McBiney flow meter is based on the Manual of British Columbia Hydrometric Standards, (BC MOE, 2009).
- The reconnaissance of Pony Creek involved catchment characterization and flow measurement. The watershed is also covered by vegetation up to +90%. In Pony Creek flow was measured only at two locations shown on Figure 1 and in the photo log. Flow was measured using the bucket and stop watch method and the results are presented in Appendix HT-1.
- Dome Creek cross-section survey – 500 m upstream (five sections) and 500 m downstream (six sections) – was performed by YES. The results of the Dome Creek cross section surveys are presented in Appendix HT-2.

## 3.3 REFERENCES

AMEC (2013) “Mount Nansen Remediation Project Preliminary 2013 Site Investigation Plan”.
BC MOE, 2009 “Manual of British Columbia Hydrometric Standards”.

Tables

| | |
|---|---|
| Table HT1 | Spring Visit Activities and Findings (appended to memo) |
| Table HT2 | Sediment Samples Location (appended to memo) |

Appendices

| | |
|---|---|
| Appendix C6 | Photographical Documentation (refer to 2013 Site Investigation Report) |
| Appendix D4 | Sediment Samples – Particle Size Distribution and Soil Logging (refer to 2013 Site Investigation Report) |
| Appendix HT-1 | Flow Measurement Dome and Pony Creeks (appended to memo) |
| Appendix HT-2 | Dome Creek Cross Section Survey Results (appended to memo) |

Figures

| | |
|---|---|
| Figure 1 | Overview Site Plan (refer to 2013 Site Investigation Report) |

# Tables

## Table HT1: Spring Site Investigation and Main Findings.

| Freshet Site Visit Item | Findings | Implications for 2013 Site Investigation | Comments and Recommendations (If Applicable) |
|---|---|---|---|
| 1 – Dome Creek | Channel has been modified in the upper reaches and the natural channel is very poorly defined within a wide valley bottom covered by low-lying vegetation and spongy mosses. Water percolates slowly through this plant material and braid or meander very irregularly. | Verify observation as part 2013 SI program | |
| | Strong influence of ice was noted along Dome Creek, where the channel is more "natural". There were various meltwater channels cut into the ice cover and runoff was being conveyed through that system. | | |
| | The stream was braiding through ice meltwater channels both above and below the diversion channel. The reach immediately downstream of the seepage pond outlet was the only segment that was somewhat confined to a more typical channel, but this is likely due to encroachment of the valley bottom on the north side of the creek in this roughly 500 m reach. | Compare spring time braided channels in ice and summer braided channels in soil. And see if there is any similarity in alignment | |
| | Select flow measurements were performed in the diversion channel (Q=0.111 cms) and near the mill building (Q=0.016 cms). Runoff was observed around and below the mill building that would enter Dome Creek below the upstream measurement site. Also the middle pond on the hill below the mill was full to crest and spilling at its outlet. The discharge there could not be measured. | Conduct flow measurement in similar locations during the 2013 for comparison | |
| 2 - Pony Creek | This channel is incised within its local valley at the upper reaches and approximately 500 m before the confluence with Back Creek. At that point it splits into 2 or 3 channels. The dominant channels were to the north; the southern most were not flowing at the time of the site visit, but there was evidence that these channels flow during the peak event. | | |
| 3 - Back Creek and Victoria Creek | Back Creek and Pony Creek near the pumphouse are more well-defined channels with very coarse bed material and large trees right up to the banks. There was a lot of deadfall at the banks and in some cases crossing the entire stream. | | |

| Freshet Site Visit Item | Findings | Implications for 2013 Site Investigation | Comments and Recommendations (If Applicable) |
|---|---|---|---|
| 4 - Tailings Area – water elevation | No equipment, couldn't estimate | Take some water elevation measurement in the tailings pond | During the 2013 SI program, the pond elevation was measured by the site operator and provided to AMEC on a regular basis |
| 5 – Pit Area – water elevation | No equipment, couldn't estimate. Pit wall seepages, some still frozen. | Take some water elevation measurement in the pit pond | During the 2013 SI program, the pond elevation should be measured on a regular basis (daily) to see if there are any changes in the water elevation. – The data loggers in the pit pond were downloaded to provide this information during the 2013 investigation program. |
| 6 – Waste Rock Area | Significant surface flow at DES03 located downhill from the open pit waste rock piles. Sample collected. Very small seepage/standing water observed from hillside at DES02 | Investigate any flows at the same locations during the 2013 SI program | The seeps were not sampled during the fall 2013 program. Although it is not specifically recorded it is thought that there was not significant seepage at these locations at the time of the program. |

## Table HT2: Sediment Samples Locations

| Sample ID | UTM | | Description of Location |
|---|---|---|---|
| | Easting | Northing | |
| SED-DC-1 | 388800 | 6880834 | Dome Creek upstream of the tailings storage facility |
| SED-DC-2 | 388846 | 6880832 | Dome Creek upstream of the tailings storage facility |
| SED-DC-3 | 388894 | 6880826 | Dome Creek upstream of the tailings storage facility |
| SED-DC-4 | 388942 | 6880817 | Dome Creek upstream of the tailings storage facility |
| SED-DC-5 | 388986 | 6880795 | Dome Creek upstream of the tailings storage facility |
| SED-DC-6 | 389027 | 6880770 | Dome Creek upstream of the tailings storage facility |
| SED-DC-7 | 389067 | 6880714 | West Diversion Channel |
| SED-DC-8 | 389079 | 6880752 | Diversion channel |
| SED-DC-9 | 389124 | 6880775 | Diversion channel |
| SED-DC-10 | 389169 | 6880792 | Diversion channel |
| SED-DC-11 | 389693 | 6880561 | Dome Creek downstream of the tailings dam (upstream diversion channel discharge) |
| SED-DC-12 | 389741 | 6880574 | Dome Creek downstream of the tailings dam (upstream diversion channel discharge) |
| SED-DC-13 | 389789 | 6880564 | Dome Creek downstream of the tailings dam (downstream diversion channel discharge |
| SED-DC-14 | 389833 | 6880579 | Dome Creek downstream of the tailings dam (downstream diversion channel discharge |
| SED-DC-15 | 389864 | 6880616 | Dome Creek downstream of the tailings dam (downstream diversion channel discharge |
| SED-DC-16 | 389909 | 6880645 | Dome Creek downstream of the tailings dam (downstream diversion channel discharge |
| SED-DC-17 | 389955 | 6880645 | Dome Creek downstream of the tailings dam (downstream diversion channel discharge |
| SED-DC-18 | 390002 | 6880639 | Dome Creek downstream of the tailings dam (downstream diversion channel discharge |
| SED-DC-19 | 390050 | 6880643 | Dome Creek downstream of the tailings dam (downstream diversion channel discharge |
| SED-DC-20 | 390098 | 6880623 | Dome Creek downstream of the tailings dam (downstream diversion channel discharge |

# Appendix HT1
# Flow Measurement Dome and Pony Creeks

# Appendix HT2
# Dome Creek Cross Section Survey Results

# Flow Measurement Dome and Pony Creeks
# Mount Nansen

***Flow measurem*** ***07-Sep-13***

## *Summary of Flows*

| Flow Station # | ***Dome Creek*** | *Flow L/s* | *Easting* | *Northing* |
|---|---|---|---|---|
| D1 | *Culvert near Bunkhouse* | *0.3* | *387750* | *6881128* |
| D2 | *Culvert near Mill* | *2.5* | *387834* | *6881128* |
| D3 | *Upstream of TSF* | *4.2* | *388973* | *6880806* |
| D4 | *Diversion Ditch* | *8.1* | *389418* | *6880780* |
| D5 | *Seepage ds TSF* | *3.1* | | |
| | *Ds TSF Combined flow* | *13.7* | *389938* | *6880644* |
| | ***Pony Creek*** | | | |
| P1 | *Culvert under access to Pony Creek* | *2.4* | | |
| P2 | *Culvert accessing Pony Creek Adit* | *1.3* | | |

## Dome Creek

**Culvert between the Bunkhouse and Mill**

Bucket and Stop watch method

| | | | |
|---|---|---|---|
| Bucket volume | 20 | litres | |
| Time to fill the bu | 1st attempt | 2nd attempt | average |
| | 63 | 62 | 62.5 |
| Flow L/s | 0.3 | | |

**Culvert between mill and powerline road**

Bucket and Stop watch method

| | | | | | |
|---|---|---|---|---|---|
| Bucket volume | 20 | | litres | | |
| Time to fill the bu | 1st attempt | | 2nd attempt | 3rd attempt | Average |
| time | | 8.1 | 8.4 | 7.9 | 8.1 |
| Flow (L/s) | | 2.5 | | | |

**Upstream of tailings dam**

| Station # | Depth (m) | Width (m) | Vel. (m/s) | Vel. (m/s) | | |
|---|---|---|---|---|---|---|
| | | | RL | LR | Average (m/s) | |
| 1 | 0.025 | 0.03 | 0.08 | 0.04 | | Flow (m3/s) |
| 2 | 0.04 | 0.03 | 0.07 | 0.09 | 0.08 | 0.00011 |
| 3 | 0.045 | 0.03 | 0.11 | 0.13 | 0.12 | 0.00018 |
| 4 | 0.05 | 0.03 | 0.12 | 0.14 | 0.13 | 0.00020 |
| 5 | 0.05 | 0.03 | 0.12 | 0.16 | 0.14 | 0.00021 |
| 6 | 0.05 | 0.03 | 0.16 | 0.2 | 0.18 | 0.00027 |
| 7 | 0.05 | 0.03 | 0.22 | 0.21 | 0.22 | 0.00032 |
| 8 | 0.05 | 0.03 | 0.2 | 0.2 | 0.20 | 0.00027 |
| 9 | 0.045 | 0.03 | 0.18 | 0.17 | 0.18 | 0.00024 |
| 10 | 0.045 | 0.03 | 0.15 | 0.16 | 0.16 | 0.00021 |
| 11 | 0.045 | 0.03 | 0.13 | 0.12 | 0.13 | 0.00017 |
| 12 | 0.045 | 0.03 | 0.16 | 0.18 | 0.17 | 0.00026 |
| 13 | 0.05 | 0.03 | 0.16 | 0.15 | 0.16 | 0.00026 |
| 14 | 0.055 | 0.03 | 0.13 | 0.15 | 0.14 | 0.00025 |
| 15 | 0.06 | 0.03 | 0.13 | 0.16 | 0.15 | 0.00026 |
| 16 | 0.06 | 0.03 | 0.14 | 0.16 | 0.15 | 0.00027 |
| 17 | 0.06 | 0.03 | 0.16 | 0.12 | 0.14 | 0.00025 |
| 18 | 0.06 | 0.03 | 0.16 | 0.11 | 0.14 | 0.00024 |
| 19 | 0.06 | 0.03 | 0.15 | 0.15 | 0.15 | 0.00027 |
| 20 | 0.06 | 0.03 | 0 | 0 | 0.00 | 0 |
| | | | | | Flow (m3/s) | **0.004** |
| | | | | | Flow (L/s) | 4.2 |

**Diversion Ditch (by TSF)**

| Station # | Depth (m) | Width (m) | Vel. (m/s) | Vel. (m/s) | | |
|---|---|---|---|---|---|---|
| | | | RL | LR | Average (m/s) | |
| 1 | 0 | 0 | | | | Flow (m3/s) |
| 2 | 0.04 | 0.05 | 0.13 | 0.14 | 0.14 | 0.00034 |
| 3 | 0.05 | 0.05 | 0.14 | 0.15 | 0.15 | 0.00044 |
| 4 | 0.06 | 0.05 | 0.16 | 0.17 | 0.17 | 0.00056 |
| 5 | 0.068 | 0.05 | 0.17 | 0.18 | 0.18 | 0.00061 |
| 6 | 0.07 | 0.05 | 0.18 | 0.19 | 0.19 | 0.00065 |
| 7 | 0.07 | 0.05 | 0.19 | 0.2 | 0.20 | 0.00068 |
| 8 | 0.07 | 0.05 | 0.2 | 0.21 | 0.21 | 0.00072 |
| 9 | 0.07 | 0.05 | 0.19 | 0.2 | 0.20 | 0.00066 |
| 10 | 0.068 | 0.05 | 0.19 | 0.2 | 0.20 | 0.00059 |
| 11 | 0.06 | 0.05 | 0.18 | 0.18 | 0.18 | 0.00045 |
| 12 | 0.05 | 0.05 | 0.18 | 0.17 | 0.18 | 0.00039 |
| 13 | 0.045 | 0.05 | 0.19 | 0.18 | 0.19 | 0.00042 |
| 14 | 0.045 | 0.05 | 0.18 | 0.18 | 0.18 | 0.00041 |
| 15 | 0.045 | 0.05 | 0.16 | 0.15 | 0.16 | 0.00039 |
| 16 | 0.05 | 0.05 | 0.14 | 0.17 | 0.16 | 0.00039 |
| 17 | 0.05 | 0.05 | 0.13 | 0.16 | 0.15 | 0.00029 |
| 18 | 0.04 | 0.05 | 0.11 | 0.11 | 0.11 | 0.00017 |
| 19 | 0.03 | 0.05 | 0.1 | | 0.05 | 0.00000 |
| | | | | | Flow (m3/s) | 0.0081365 |
| | | | | | Flow (L/s) | **8.137** |

**Seepage pumping from downstream of the tailings dam**

188 L/min 3.13

**Downstream of the - tailings dam**

| Station # | Depth (m) | Width (m) | Vel. (m/s) | Vel. (m/s) | | |
|---|---|---|---|---|---|---|
| | | | RL | LR | Average (m/s) | |
| 1 | 0 | 0 | 0 | | | Flow (m3/s) |
| 2 | 0.05 | 0.05 | 0.03 | 0.09 | 0.06 | 0.00015 |
| 3 | 0.06 | 0.05 | 0.09 | 0.16 | 0.13 | 0.00038 |
| 4 | 0.065 | 0.05 | 0.13 | 0.18 | 0.16 | 0.00050 |
| 5 | 0.07 | 0.05 | 0.15 | 0.18 | 0.17 | 0.00058 |
| 6 | 0.07 | 0.05 | 0.15 | 0.17 | 0.16 | 0.00056 |
| 7 | 0.075 | 0.05 | 0.16 | 0.12 | 0.14 | 0.00053 |
| 8 | 0.065 | 0.05 | 0.17 | 0.12 | 0.15 | 0.00047 |
| 9 | 0.07 | 0.05 | 0.15 | 0.15 | 0.15 | 0.00053 |
| 10 | 0.09 | 0.05 | 0.14 | 0.18 | 0.16 | 0.00072 |
| 11 | 0.12 | 0.05 | 0.14 | 0.19 | 0.17 | 0.00099 |
| 12 | 0.14 | 0.05 | 0.2 | 0.19 | 0.20 | 0.00137 |
| 13 | 0.16 | 0.05 | 0.18 | 0.1 | 0.14 | 0.00112 |
| 14 | 0.165 | 0.05 | 0.15 | 0.04 | 0.10 | 0.00078 |
| 15 | 0.166 | 0.05 | 0.04 | 0.04 | 0.04 | 0.00033 |
| 16 | 0.17 | 0.05 | 0.04 | 0.04 | 0.04 | 0.00034 |
| 17 | 0.19 | 0.05 | 0.07 | 0.06 | 0.07 | 0.00062 |
| 18 | 0.2 | 0.05 | 0.07 | 0.09 | 0.08 | 0.00080 |
| 19 | 0.2 | 0.05 | 0.1 | 0.07 | 0.09 | 0.00085 |
| 20 | 0.15 | 0.05 | 0.16 | 0.13 | 0.15 | 0.0010875 |
| 21 | 0.13 | 0.05 | 0.15 | 0.15 | 0.15 | **0.001** |
| 22 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | Flow (m3/s) | 0.01366825 |
| | | | | | Flow (L/s) | 13.66825 |

**Note: there is a bit more discrepancy with the velocity, site not very suitable, but the best found**

**Culvert under access to Pony Creek**

Bucket and Stop watch method

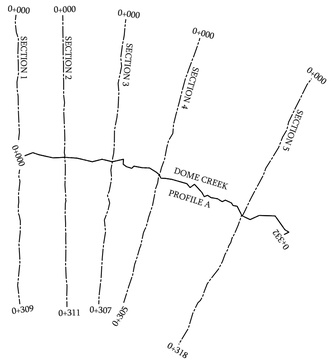
| | | | |
|---|---|---|---|
| Bucket volume | 20 | litres | |
| Time to fill the bu | 1st attempt | 2nd attempt | average |
| | 8.3 | 8.3 | 8.3 |
| Flow L/s | 2.4 | | |

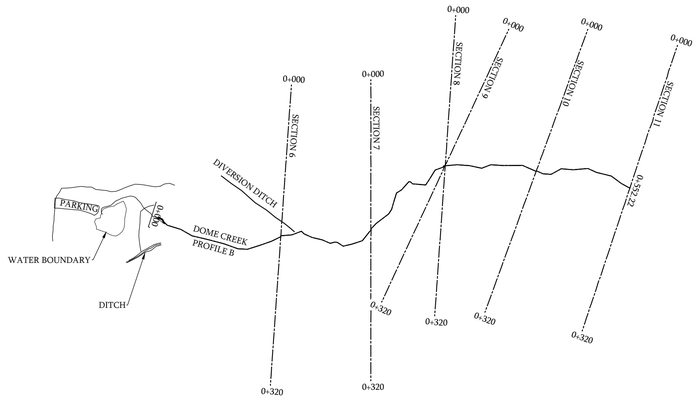
**Culvert accessing Pony Creek Adit**

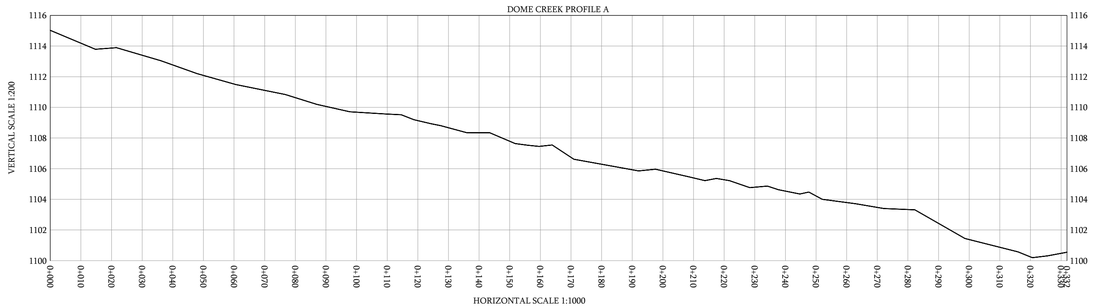
Bucket and Stop watch method

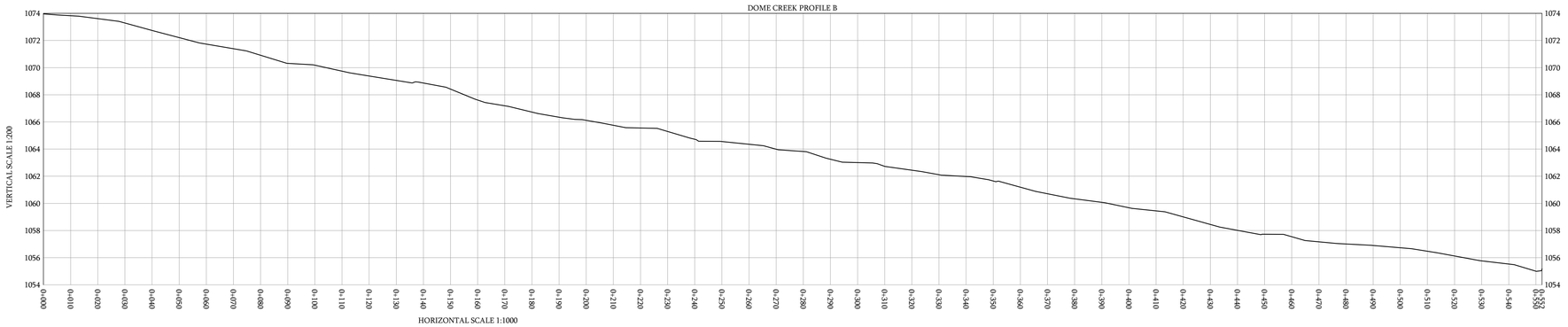
| | | | |
|---|---|---|---|
| Bucket volume | 8 | litres | |
| Time to fill the bu | 1st attempt | 2nd attempt | Average |
| time | 6 | 6 | 6.0 |
| Flow (L/s) | 1.3 | | |

**Note: Only half the bucket was filled each time. It was not possible to fill the whole bucket**

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YUKON ENGINEERING SERVICES

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PROJECT:

MOUNT NANSEN
REMEDIATION PROJECT

PROJECT NUMBER: E13038

SHEET TITLE:

SITE PLAN &
DOME CREEK PROFILE

DATE: OCT 25, 2013 | HORIZONTAL SCALE: 1:1000

DRAWN: RSC | VERTICAL SCALE: 1:200

APEY Permit to Practice: PP013

DESIGN:

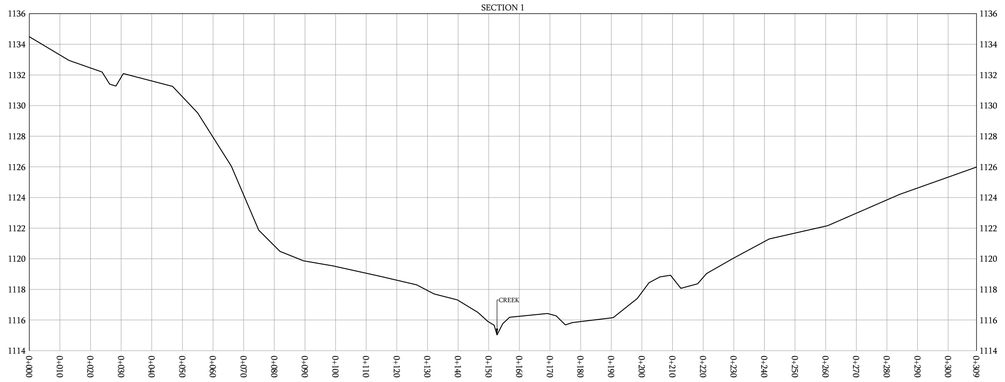
CHECKED:

APPROVED:

DRAWING NAME: E13038.dwg | SHEET 1 of 3

DO NOT SCALE DRAWING - USE FIGURED DIMENSIONS ONLY

SECTION 1

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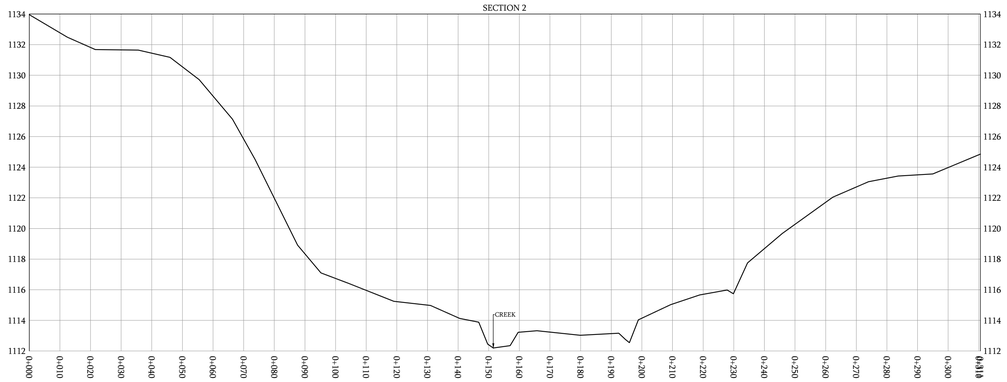


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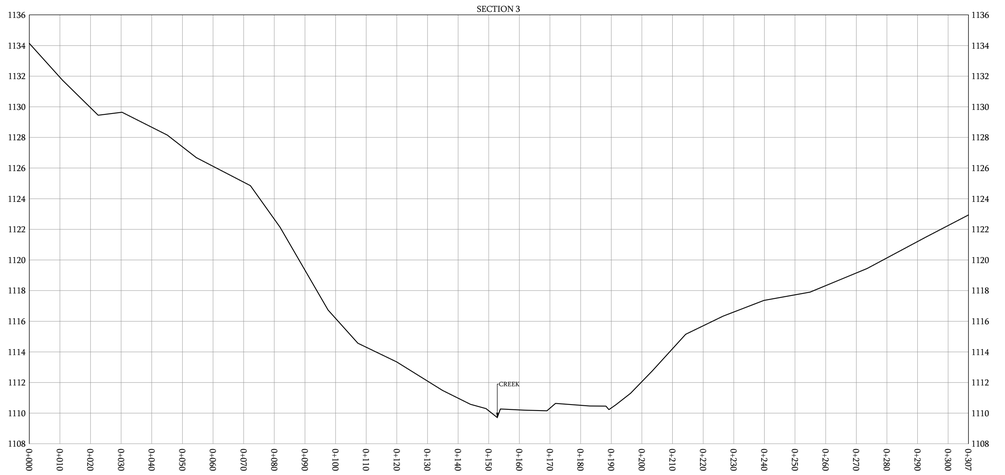


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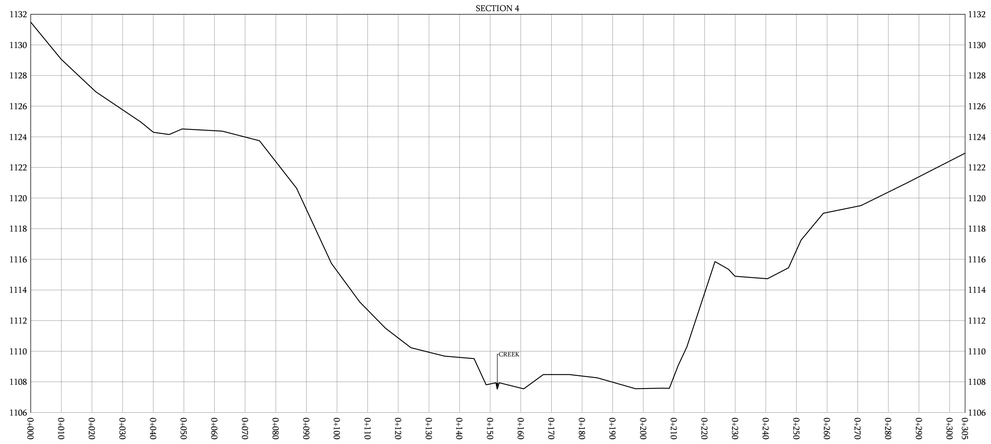


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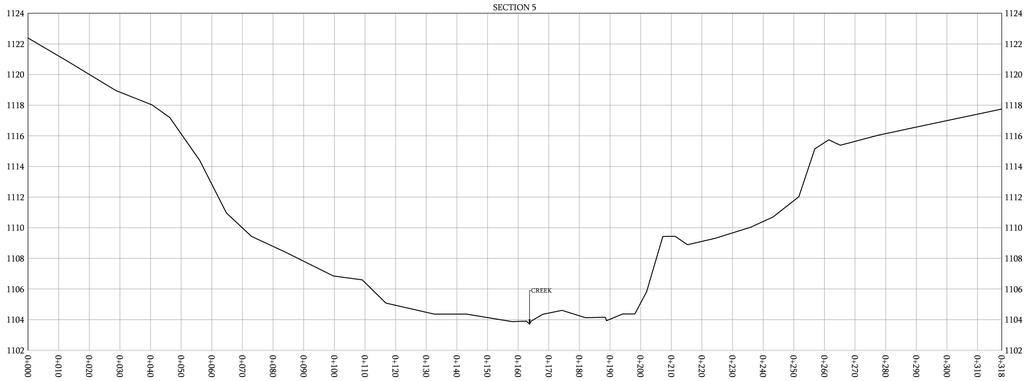


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PROJECT:

MOUNT NANSEN
REMEDIATION PROJECT

PROJECT NUMBER: E13038

SHEET TITLE:

WEST SECTIONS

DATE: OCT 25, 2013 | HORIZONTAL SCALE: 1:1000

DRAWN: RSC | VERTICAL SCALE: 1:200

APEY Permit to Practice: PP013

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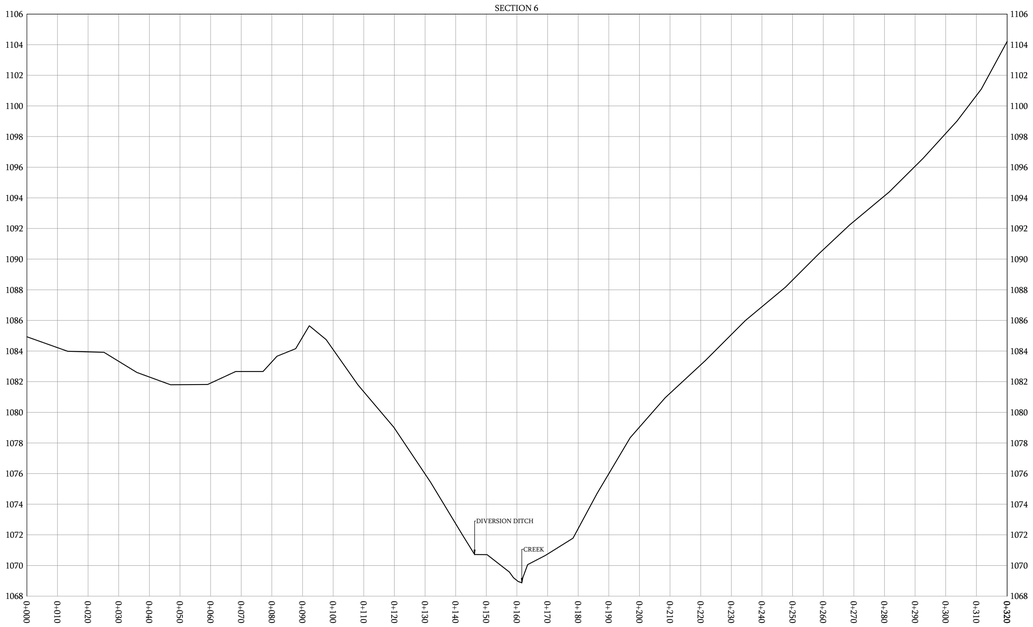
DRAWING NAME: E13038.dwg | SHEET 2 of 3

DO NOT SCALE DRAWING

SECTION 6

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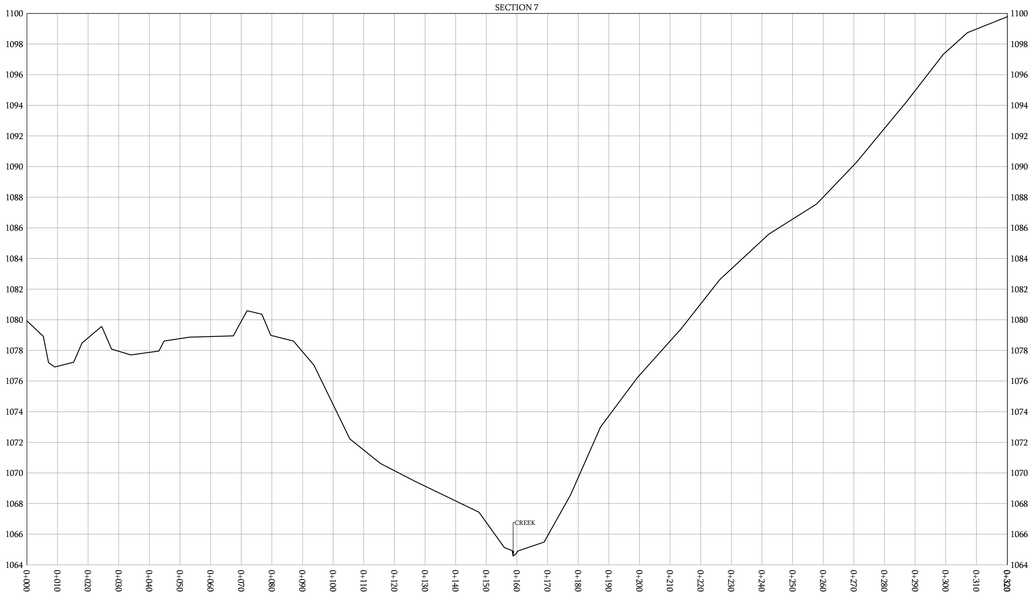


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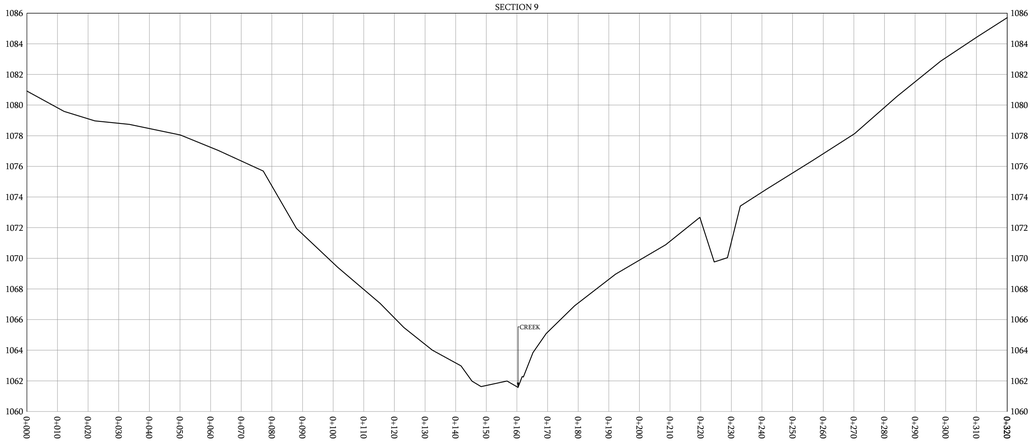


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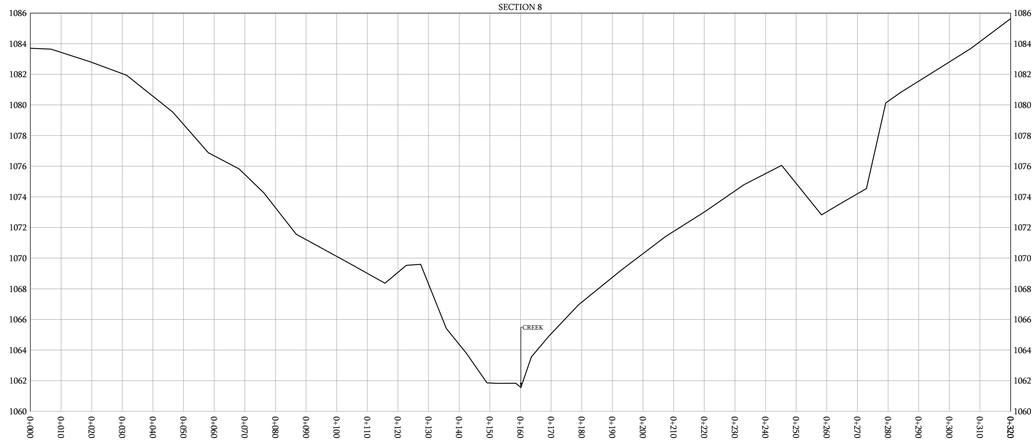


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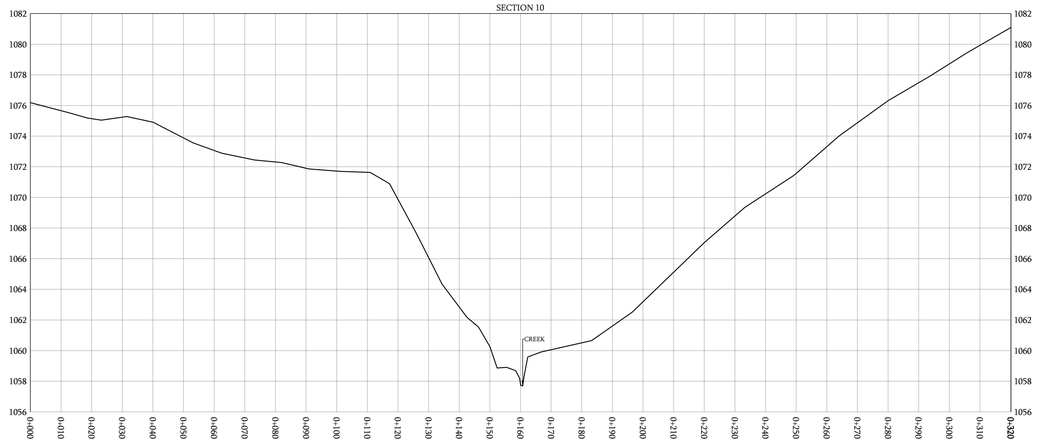


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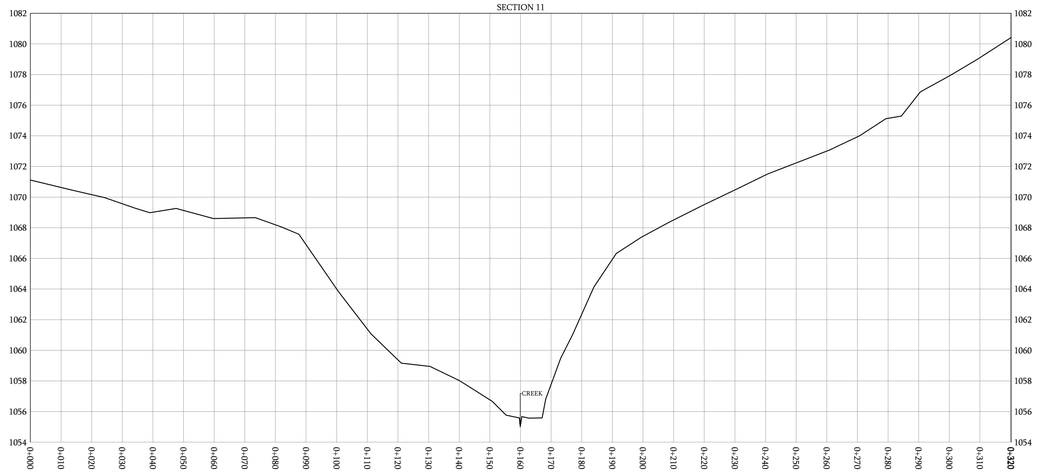


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PROJECT:

MOUNT NANSEN
REMEDIATION PROJECT

PROJECT NUMBER: E13038

SHEET TITLE:

EAST SECTIONS

DATE: OCT 25, 2013 | HORIZONTAL SCALE: 1:1000

DRAWN: RSC | VERTICAL SCALE: 1:200

APEY Permit to Practice: PP013

DESIGN:

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APPROVED:

DRAWING NAME: E13038.dwg | SHEET 3 of 3

# Appendix B2

# Geohazard and Borrow Memo

# Field Memorandum

FROM: Dan Piccininni, EIT (AMEC) ref: VM00605E
TO: file

DATE: November 18, 2013
SUBJECT: **General Observations Regarding Geohazard and Borrow Material– Mount Nansen, YT Rev 1**

During the 2013 field program at Mount Nansen, an effort was made to observe the geohazard potential around the site, as well as the potential for various borrow material sources around the site. This memo provides a summary of the observations that were made. The reconnaissance was a relatively informal exercise. Relevant pictures were taken, with accompanying notes, as well as slope angle or other measurements, where they were warranted.

In general, the Mount Nansen site consists of moderately to steeply sloped, hilly terrain, with several creeks cutting through the property. There appears to be shallow permafrost in some areas, particularly on north facing slopes, although there was no extensive test pitting to validate presence or absence of permafrost on a site wide scale. Vegetation on the site is similarly also affected by the slope aspect. Mosses and low lying shrubs are located on north slopes, whereas evergreen and aspen trees grow on south facing slopes. The creek valleys often contain dense willow growth. This is generally illustrated in Photos 1 and 2 below.

**Photo 1: Mill Site and Camp Area, with exploration trenches highlighted by the snow**

**Photo 2: Looking East from the Tailings Dam. Thinly Vegetated North facing slope on the right, thickly treed south facing slope on the left.**

**Observations Related to Geohazards**

The specific hazard potential on site that was considered was avalanche hazard, solifluction, and general slope failure, especially on road cuts.

**Avalanche hazard**

Avalanche hazards around site appeared to be minimal. Slopes are generally not big enough or steep enough for snow to build up enough to be a significant hazard. Informal observations from Jeff Moore, with AAM, also indicate that any bare slopes around the site generally get wind scoured before avalanche hazards can build up. The one area that could potentially have an avalanche slide hazard is the slope immediately above the pony creek adit. This is a fairly steep slope with a northeast aspect and thin vegetation cover, and is generally on the leeward side of the dominant wind direction. This combination could cause a cornice or wind slab to build up for a minor avalanche hazard.

**Solifluction**

Solifluction is the slow downslope movement of waterlogged soil over underlying frozen soil. It is generally triggered by freeze thaw action and slides occur along a permafrost surface which acts as impermeable layer and a slide surface. Some of the permafrost slopes around the Mount Nansen Site could be susceptible to solifluction. The north facing slope immediately downstream of the tailings dam and diversion channel (see Photo 3) and the slope southwest of the mill (Photo 1) and the camp are north facing and likely to have reasonably shallow permafrost. They are also slightly steeper than other slopes in the area (approximately 35°). These two areas appear to be the most likely areas for solifluction processes.

**Photo 3: potential site for solifluction, downstream of the seepage pond, above dome creek**

**Slope instability**

No obvious headscarps were observed and the topography and geologic conditions do not appear to indicate the potential for a large landslide.

Some small debris flows appear to be present on various slopes around the site (see example in Photos 4 and 6). Some of these appear to be washout from the large exploration trenches that have been dug around the site.

On some of the cut slopes on the site roads, it was observed that slope erosion has caused the exposed cut soil to slough away from and undercut the organic and root mat. These road cuts are typically at an angle of 35° - 45°. There is not very much vegetation covering to stabilize or prevent erosion of the exposed slopes (see Photo 5). Most of these cuts are not very tall, generally ranging from 1 to 2 m tall. It is possible that on a large enough cut, a heavy rain event could cause a road washout, or any large trees to be undercut enough that they fall across the road.

**Photo 4: Slope south of the mill, small potential debris flow feature on left**

**Photo 5: Road cut with erosion potential**

**Photo 6: Steep Slope with potential debris flow North of Pony Creek**

**Observations Related to Borrow**

The potential for fine grained borrow on site has already been assessed as very unlikely. The sand borrow areas have been investigated through a test pit program and has been documented as part of dam construction. The observations made with regards to on site borrow as part of this reconnaissance focused on the potential for competent rock material. An effort was made to identify potential rip rap sources, and gravel sources on site, as summarized below. In order to completely assess the quantity and quality of borrow material on site it would be necessary to know the expected application of the material, especially regarding the required gradation. Depending on the borrow requirements that are developed a more detailed and targeted reconnaissance including sampling and laboratory testing may be warranted.

**Rip Rap**

A source of competent, durable rip rap was not overly evident around the site, however, there were multiple areas around the tailings dam where some rip rap had been stockpiled. There are several small bedrock outcrops around the site, particularly near drill hole CH-P-13-02, but these appear to consist of weak, weathered bedrock with closely spaced fractures. The majority of the rock in the waste rock pile near the pit was weathered, easily broken rock that would not likely have the suitable durability for rip rap use. Some waste rock was fresh, granitic rock that would be suitable for rip rap, depending on the size and volume required. However there was not a significant amount of this material and it was mixed in with the rest of the waste rock. This granitic rock presumably originated from the pit and some of the drilling around the pit (particularly CH-P-13-04) did encountered competent rock. Although the exposed pit slopes show weathered, fractured rock a detailed review of historic information may indicate specific zones of more competent rock that could be a source of rip rap. There is some competent rip rap near the tailings area (see Photo 7) and just north of the dam. Some of the rip rap is part of the diversion and

some is stockpiled for emergency repair. This is the best quality rip rap that was observed on site, and includes large, fresh, granitic boulders. This material was reportedly sourced from the spillway slopes, previously stockpiled material and the waste rock area near the open pit (EBA 2003[1]).

**Gravel Borrow**

Very few gravel resources were evident on site; with the exception of the 2 borrow areas existing near the tailings storage facility (termed the "shale borrow areas"), see Photo 8. Each of these sites is currently approximately 50 m x 30 m x 7 m tall. These borrow sites would continue to be a good source of angular granular material, depending on the utilization. It is likely that similar areas could be developed on site. Like the majority of the rock evident on site, this gravel appears to be susceptible to weathering, and may not be suitable for applications that require long term durability. It appears to be the source of the erosion protection surface on the tailings dam.

The sediment present in Pony Creek is quite coarse, and the soil visible in road cuts appears to be a potentially good gravel source (see Photo 9). The thickness of such soil is likely limited however and there would be issues to consider with any borrow operations in creek areas.

There is another existing borrow area at Victoria Creek, off of the property; however, snow conditions did not allow for an accurate evaluation of the soil conditions present here.

**Photo 7: Rip Rap stockpiled near tailings dam and diversion channel**

[1] EBA. 2003, "Construction Report Mount Nansen Seepage Control Dyke and Spillway Upgrading", Report submitted to Department of Indian Affairs and Northern Development, Report number 0201-00-14618, March 2003.

**Photo 8: One of the two shale/gravel borrow pits near the tailings facility**

**Photo 9: Gravelly soil in road cut at head of Pony Creek**

# Appendix B3

# Reclamation Site Investigation Memo

SUMMIT ENVIRONMENTAL CONSULTANTS INC.
A Member of the Associated Engineering Group of Companies

| | | | |
|---|---|---|---|
| **Date:** | October 2, 2013 | **File:** | 2013-2333 |
| **To:** | Brian Geddes | | |
| **From:** | Melanie Piorecky, B.Sc., P.Ag. | | |
| **Project:** | Mount Nansen Reclamation Task | | |
| **Subject:** | Reclamation Site Investigation Results | | |

# MEMO

This memo summarizes the results of our site investigation at the Mount Nansen mine site from a reclamation and landform perspective. The purpose of this site investigation was to gather baseline information to support the development of a successful reclamation plan, and provide input to landform engineering for Mount Nansen. Information is required to determine limitations to reclamation, options for landform engineering, and baseline conditions prior to disturbance based on the adjacent undisturbed areas.

**Methods**

On September 12, 13 and 14, Summit Environmental Consultants Inc. (Summit) and Associated Engineering (AE) completed an overview survey of the disturbances and adjacent undisturbed areas at the mine site. Our small crew consisted of:

- Katarina Glavas, a Summit soil scientist,
- Gene Mazza, an AE landform specialist, and
- Melanie Piorecky, a Summit vegetation ecologist and the reclamation and restoration lead.

*Background Information Review*

Prior to the trip to Mount Nansen, we reviewed the Mount Nansen Reclamation Terrain Mapping and Materials Search completed by EBA Engineering Consultants (2009). The terrain mapping was completed at 1:20,000 scale over a broad regional study area to identify potential borrow sources for reclamation.

Also prior to going to the mine site, we obtained the vegetation species lists for areas around the Mount Nansen disturbance documented by Ecological Logistics & Research Ltd. (ELR). This information was collected by ELR to be used in the ecosystem classification of the surrounding landscape.

Melanie attended the Conservation and Land Reclamation Association conference in Whitehorse in September 2013. This was timely as it provided a background about what reclamation approaches and research is being done in the Yukon.

*Site Inspection Methods*

The landform engineering component of the site investigation was at both a landscape scale (10 km or all you can see from one vantage point) and a landform scale (1 km). The reclamation component was at a landform scale. The site investigation included the following components:

- Site orientation,
- Survey of disturbance,
- Survey of undisturbed areas, and
- Trial planting assessment.

Once onsite, the crew oriented themselves by hiking up the hill to the north of the camp for a landscape view, and to observe landforms within the small valley. Dominant vegetation cover was documented in the high elevation areas.

After getting an overview of the site, we surveyed the following disturbance areas within the Order in Council (OIC) boundary:

1. Dome Creek,
2. Tailings Pond and Dam,
3. Brown-McDade Pit,
4. Waste Rock Dump,
5. Mill Complex,
6. Mine Camp,
7. Roads,
8. Exploration Lines, and
9. Victoria Creek Wellhouse.

Our survey of disturbance documented existing site conditions of the areas listed above, including:

- various soil substrates found throughout the disturbed areas (% and size of coarse fragments),
- the extent of disturbance, and
- naturally occurring revegetation to identify species adaptation and success of re-colonization.

Surveys of undisturbed areas were at a reconnaissance level, documenting vegetation, terrain and soil characteristics. The undisturbed areas assessed are adjacent to the mine and will provide information on baseline soil and vegetation conditions in the area. A total of four new soil plots were hand-dug to a depth of 1 m. Numerous hand-augered holes were also drilled to identify parent material, coarse fragment content, soil depth and depth to permafrost. Site, vegetation and soil conditions were described at each plot using the Field Manual for Describing Ecosystems in the Field data sheets (BC Ministry of Forests and Range and BC Ministry of Environment, 2010) and Soil Classification System of Canada (Soil Classification Working Group, 1998). We also referenced the ELR species lists from plots completed the areas assessed. A specific system of ecosystem classification does not currently exist for the Yukon; however ELR is in the process of completing ecosystem classification for the area.

In addition to this, Melanie and Katarina conducted reconnaissance level vegetation, terrain and soil survey of potential fine-grained soil borrow sources approximately one hour east of the OIC along the Mount Nansen Road. This site is also undisturbed.

Three previous trial plantings installed by EBA Engineering Consultants were assessed. They are located north-west of the mill site, south of the tailings dam, and along the cleared bank at Back Creek. The sites were assessed for percent planting survival and photo-documented, also noting substrate compositions and evidence of ground preparation for planting.

**Results**

From a landform perspective, the focus of the Mount Nansen project is to restore the natural landform, which in turn leads to natural function. Topographic mapping shows original contours of Dome Creek through the valley. The areas adjacent to the other disturbances have remnant edges and interrupted landforms that provide a clue to the landform prior to

disturbance, as do the loess deposits located in the valley bottom near Dome Creek and the tailings. These can provide a picture of what the natural landform was prior to mining disturbance.

*Survey of Disturbance*

In the disturbed areas within the OIC the level and timing of disturbance varies, but the common theme is: in areas where topsoil was removed, the vegetation has very limited success in becoming re-established. Naturally occurring revegetation in disturbed areas range from 0% to 20% cover. The waste rock and overburden surfaces are mainly comprised of compacted, coarse rock containing very little fines (typically less than 30%). This material generally does not support vegetation growth. The areas where vegetation has become established is when a microsite has been created, usually resulting from a depression. Vegetation becoming established in depressions is due to moisture collecting, seeds becoming trapped, and germinating, growing and decomposing, which initiates nutrient cycling. Nutrient cycling eventually supports more complex plant communities.

On the exploration lines, soils and subsoils have been side-cast with depths below ground surface measuring over 1 m, exposing the nutrient poor substrates. Many of these exploration lines have become preferential paths for water courses, which has resulted in formation of minor erosion rills. Vegetation growth is generally very poor in the troughs; however, willow growth on side cast material is vigorous.

*Undisturbed areas*

The slopes of the Dome Creek Valley are north and south facing with aspects with slopes ranging from 25 to 35%. The natural vegetative cover of the north and south facing slopes are markedly different, this is primarily due to depth of a permafrost table.

The dominant vegetation on North facing slopes consists of dwarf birch (*Betula nana*), willow (*Salix* sp.), sedges (*Carex* sp.) and extensive moss cover. The presence of these hydrophilic species is primarily due to the presence of a permafrost table that is approximately 30 to 60 cm below ground surface. The permafrost table results in a perched water table and poorly drained soils. The soils are comprised of approximately 20 cm of fibric (poorly decomposed) material over eolian sand.

The dominant vegetation on the south facing slopes are white spruce (*Picea glauca*) in the overstory, willow and Labrador tea (*Ledum groenlandacum*) in the understory, and crowberry (*Empetrum nigrum*), caribou lichens (*Cladina* spp.), and red-stemmed feather moss (*Pleurozium schreberi*) as the ground cover. Based on the size of the trees, the short growing period and limited soil nutrient availability, the trees are likely at least 200 years old, although tree cores were not taken but a fallen tree was found and tree rungs counted. There is no permafrost on these south facing slopes, resulting in much drier soil condition. Soils are generally comprised of 10 cm of forest duff, over approximately 13 cm of tephra (volcanic ash). This is underlain by colluvial material consisting of a thin topsoil layer (2 cm) of dark brown sandy clay loam with approximately 10% angular coarse fragments. This is underlain by 13 cm of dark olive brown sandy clay loam with 10% coarse fragments grading to weathered bedrock with approximately 70% coarse fragment. Soils are considered moderately well drained.

On the tops of the Tors, which are distinctive features of non-glaciated mountain tops outside of the OIC, there is little vegetation cover. What vegetation cover becomes established would be considered pioneer species, and is dominated by dryas (*Dryas* spp.), a nitrogen fixing plant.

The potential fine-grained borrow soils located one hour east of the OIC is comprised of silty clay loam glaciolacustrine sediments located in the western margins of the Pleistocene glaciation. A permafrost table was encountered at approximately 40 cm below ground surface. The location of this material is approximately 800 m from the Mount Nansen road, through undulating terrain. This area was forested as well, with trees that are upwards of 200 years (again based counting tree rings on a fallen tree).

The trial plantings observed were unsuccessful. The percent survival is approximately 5% or less at all sites. The exposed hill side above the mill is a convex surface, with no microsites, and it is very hard packed. This is consistent with the trial planting near Back Creek, except for the one site where the substrate was mounded, loosening the soil and allowing a space for the cuttings to develop roots. The plantings in the area south of the mine tailings were stuck into organic substrate that is blackened due to overflow from the tailings. The cuttings were inserted horizontally, but none of them were observed to have survived.

**Reclamation Planning**

Although the overarching goals for Mount Nansen remediation and reclamation have been determined, the objectives or small steps to reach those goals have not. For instance, the goal of reclaiming the landscape to reflect its original form, traditional and pre-mining land use, and natural appearance in a way that protects the environment, could mean re-establishing berry picking areas, restoring the natural aesthetic, creating caribou habitat or all three. Once more detailed objectives are determined, options for reclamation can be better defined. The objectives make it possible to include measurable targets in the reclamation plan that would be assessed to determine success.

Reclamation options will consider the natural vegetation cover and landscape, natural ecology of the surrounding area, potential soil amendments and their sources, appropriate vegetation species, seed sources, potential seed increaser programs, and macro and micro landform engineering, and other factors as they are determined. Based on this information and the costing of the suggested options, the most desirable option will be chosen.

It is our understanding that soil tests are being completed of material found at the Mount Nansen site. We recommend that the soil samples should be taken within disturbed and undisturbed areas. The samples should be tested to determine general fertility status (as a potential soil amendment source). Soil testing should include:

- pH,
- Electrical Conductivity,
- Sodium Absorption Ratio,
- Cation Exchange Capacity,
- Total metals,
- Particle size analysis (using USDA soil classes and not the Unified soil classes – e.g. Sandy loam vs. silty sand, loamy sand vs. clean sand),
- Cyanide (as needed),
- Estimated volumes of material, and
- For the organics, characterize decomposition using the Von Post scale.

After the landscape has been reformed, an additional landform site investigation will be necessary in order to complete a detailed reclamation plan, including reclamation prescriptions specific to the newly created sites.

**Summary**

From our reclamation and landform site investigation we are able to understand the main limitations to reclamation currently existing at the Mount Nansen site. Limitations from a revegetation perspective include soil nutrient availability, drainage, available growing days, local or regional seed sources, topsoil sources and detailed objectives for the end land use. From a landform perspective, available pre-disturbance landform information can be interpreted so will direct the end landform design.

Reclamation success of the Mount Nansen site will be dependent on creating appropriate macro landforms, and micro-sites within those landforms, i.e. the landform engineering aspect working with the reclamation planning aspect. In general, based on observations landforms should not be made convex and they should not be compacted, because both of these cause water to shed. Rough and loose surfaces are essential for revegetation success.

The reclamation of the Mount Nansen site will require a creative approach and patience.

**References**

British Columbia Ministry of Forests and Range and British Columbia Ministry of Environment. 2010. Field manual for describing terrestrial ecosystems. 2nd ed. Forest Science Program, Victoria, B.C. Land Manag. Handb. No. 25.

EBA Engineering Consultants. 2009. Mt. Nansen Reclamation Terrain Mapping and Materials Search.

Soil Classification Working Group. 1998. The Canadian System of Soil Classification, 3rd ed. Agriculture and Agri-Food Canada Publication 1646, 187 pp.

**Summit Plot Data for Site Investigation/Reconnaissance, September 2013**

| Plot # | UTM | Elevation (m) | General Location | Ecosystem | Slope | Aspect | Percent vegetation cover | Parent Material | Soil Characteristics | Drainage | Water Table (cm) | Permafrost Table (cm) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 388888 E, 6881443 N | 1214 | Waste Rock Dump | Anthropogenic | level | none | 15 | Anthropogenic | 80% coarse fragments (crushed gravel), sandy clay loam | Well | None | None | Natural revegetation varies. Sandy substrate is supporting higher density of vegetation growth. |
| 2 | 389438 E, 6880471 N | 1105 | South of Tailings Pond | Shrubby snowpatch fen[1] | 25% | North | 100 | Organic veneer / Eolian | 20 cm poorly decomposed (fibric) material / 45 cm sand, | Poor | 30* | 45* | Permafrost table at 35 cm upslope |
| 3 | 387560 E, 6880965 N | 1275 | Adjacent to exploration line located west of Mine | Shrubby snowpatch fen[1] | 20% | Northeast (38$^{o}$) | 100 | Organic veneer / Collvium | 12 cm poorly (fibric) to moderately (mesic) decomposed material / 65 cm gravelly sandy loam | Imperfect to Poor | 40* | 65* | Comparison of ecotype for adjacent excavation line |
| 4 | 389488 E, 6881001 N | 1154 | North of Tailings Pond | Forested upland | 27% | Southeast (150$^{o}$) | 100 | Colluvium | Sandy clay loam, colluvial material | Well | None | None | Deep tephra (approximately 13 cm) |
| 5 | 389309 E, 6881412 N | 1219 | East of Pit | Shrubby snowpatch fen[1] | 20% | Northeast (44$^{o}$) | N/A | Organic | Organic, moderately well to well decomposed (mesic to humic) | Poor | Frozen | 30 | Hummocky mounded terrain |
| 6 | 391539 E, 6880871 N | 1024 | Victoria Creek pumphouse | Forested Upland | level | none | 70 | Eolian | Sand | Well | None | None | Victoria Creek pumphouse |
| 7 | 411006 E, 6886033 N | 916 | 40 km east of mine | Forested snowpatch fen[1] | 10% | Southeast (150$^{o}$) | 100 | Glaciolacustrine | Silty clay | Imperfect | 30* | 40* | Glaciated area |

*Water table and permafrost tables are measured below ground surface which is defined as the surface of the mineral layer. Any organic layers are considered above ground surface.

Site Investigation Locations for Reclamation – Survey Plots

| Location | Species Planted | % Success | Comments |
|---|---|---|---|
| Below seepage pond | Willow and balsam poplar | 0% | Blackened vegetation from tailings/ seepage pond overflow |
| North west of mill site | Balsam poplar | 0% | Bare ground, very compacted |
| Adjacent to Back Creek | Willow and balsam poplar | <5% | Mounded location has some growth |

Wildlife sign observed within or directly adjacent to the Mount Nansen site:

- Six ptarmigan in shrub regrowth to the west above the Mill Site
- Detached caribou leg north of the camp, on the undisturbed hillside
- Moose antlers in the regrowth shrub to the west above the Mill Site
- Wolf tracks and scat to the west of the Mill Site, on the track through the undisturbed hillside

[1] Warner, B.G., and C.D.A. Rubec. 1997. The Canadian Wetland Classification System. Second edition. By the Wetlands Research Centre, University of Waterloo, Ontario.

N
W
E
S

Plot 1
Plot 5
Plot 3
Plot 4
Plot 6
Plot 2

**Legend**

- Field plots
- OIC boundary

**Disturbance**

- Outside of OIC (44.3 ha)
- Within OIC (82.7 ha)

Meters
0 100 200 400 600 800

# Appendix B4

# Mill Area Site Investigation Memo

## FIELD MEMO

| | | | |
|---|---|---|---|
| **To** | Renata Wood | | |
| **From** | Shane Magnusson | **Reviewed By:** | Renata Wood |
| **Tel** | 604-294-3811 | **AMEC File No.** | VM00605E |
| **e-mail** | | **cc** | |
| **Date** | 18 September 2013 | | |

**Subject** **Mount Nansen Remediation Project**
**Mill Area Site Reconnaissance**

---

### 1.0 INTRODUCTION

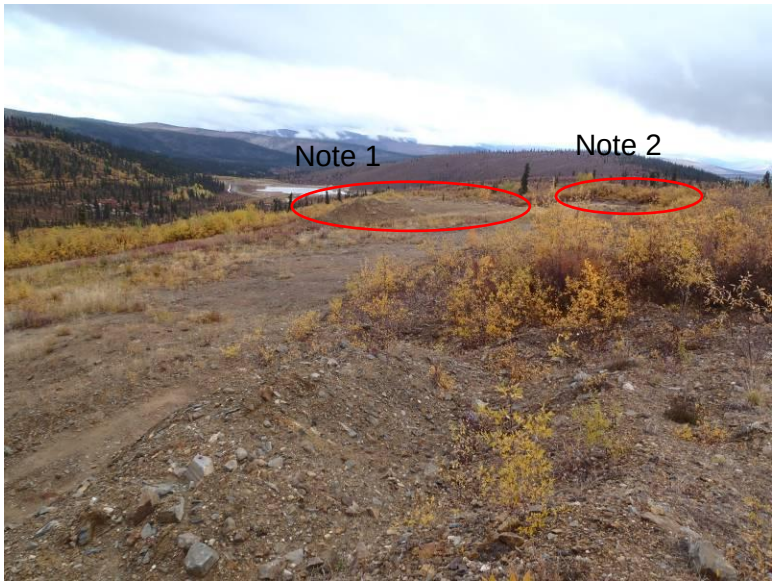
A brief field reconnaissance was completed at the Mount Nansen mill area on September 17, 2013 to provide a general overview of the area, specifically for the purpose of better understanding the spatial extents and characteristics of fill/natural soil. Patricia Randell with Yukon Government Assessment and Abandoned Mines (AAM) accompanied AMEC to provide assistance in the history of the site. This memo summarizes the findings, and photographs taken. The attached plan of the mill area shows the waypoints visited.

## 1.1 The Upper bench

The upper bench above the mill may have been used for stockpiling low grade ore. AAM understands this was moved about 10-15 years ago to the open pit and placed at the south entrance ramp in the Brown McDade pit. There appears to be small amounts of ore mixed with native material or waste rock on surface. Photographs of the area of interest within the upper mill bench are provided below with relevant notes. Locations are shown in the attached plan.

Waypoint Mill-1

*Photograph 1: Looking northwest to the mill* – appears to be native material that has been regraded in the foreground.




*Photograph 2: Looking southeast to the TSF*

Note 1: A long, narrow waste rock pile was noted at the southern edge – characterized by red coloured weathering and higher levels of silt/clay content compared to the native sands in the area (approximately >20% fines).

Note 2: Some yellow sandy tailings were found, refer to *Photograph **3***.

*Photograph 3: Sand dominated yellow tailings*

Waypoint Mill-2

*Photograph 4: Cleared bedrock on upper bench*

Note 1: A pile at the toe of this bedrock cut is likely waste rock, due to the degree of weathering and it is an unlikely location for native material to be placed.

This area in *Photograph **4*** has been excavated to the bedrock surface. The fill from this was probably used as a cut-and-fill slope to build the flat platform. The soil near the bedrock appears to be a combination of the native soil (often characterized by silty sand (maybe 15% fines) and some angular cobble sized pieces of unweathered grey meta-sedimentary rock. It is not known to what depth this fill extends to.

*Photograph 5: Upper bench fill slope, above existing filler bins*

*Photograph **5*** shows the fill slope to the north of Waypoint Mill-2. The fill slope of this upper bench appears to be a mix of ore and waste rock around the foundations and fill slope for the filler bins. The ore is likely on surface and a result from spill over as the rock trucks brought ore material to this area for processing.

## 1.2 Huestis Working Area

AAM indicated that a dozer pushed overburden soil from upper areas, to the lower bench surface. The soil on surface appears to be waste rock, and likely used as a running surface for vehicle access. The depth of this possible waste rock was not assessed.

Waypoint Mill-3

*Photograph 6: Mill-3 waypoint, looking northward* – combination of regraded native material and waste rock

## 1.3 Mid-bench (mill level)

Waypoint Mill-4

*Photograph 7: Clearing around the north side of the clarifier tank*

Around the clarifier tank, bedrock is noted on the native cut slopes

Waypoint Mill-5

*Photograph 8: Waypoint 5*

Waypoint Mill-5 is a continuation of Waypoint Mill-4. This area at the north part of the mill complex appears to be native soil, with shallow bedrock. AAM does not have documentation of mill workings happening here.

Waypoint Mill-6

*Photograph 9: Former seepage location*

Seepage has historically been observed at this location on the lower bench for an unknown duration (nicknamed “Louis” by AAM/DES). Concrete footings and timber cribbing are present here, and AAM understands the old mill building may have been located here. This hole

stopped seeping when the Sonic drill advanced a hole nearby (BH-M-13-04). Groundwater flow was intersected when drilling nearby borehole BH-M-13-04. Upon removal of the drill rods, flowing water was visible and audible at the bottom of the hole. This flow shows up as an active seep on the face of the slope a short distance east of the hole (draining into the impoundments area). It appears that this is an area of groundwater flow through voids / random uncompacted fill.

*Photograph 10: Old buried foundations and fill slope near seeping hole.*

The fill on the mid-bench appears to be a combination of native and waste rock.

### 1.4 The Landfill Area

*Photograph 11: Landfill area, looking north*

*Photograph 12: Landfill area, looking south*

In the Landfill area, south of the generators is understood by AAM to be a pile of tailings mixed with garbage as photographed above. The soil appears to be mostly sand, with little silt, similar to the sand tailings. The colour is dark brown in areas, with an odour of hydrocarbons.

### 1.5 Lower bench

Generally, the lower bench (at the level of the lined sediment pond) is a mixture of garbage (steel, wood, fibreglass) and waste rock. A few metres of fill are envisioned on this bench level (Altura's test pits reached native organics around 2 m depth on the north side). The south side is likely closer to native ground or may be a cut slope, so shallower depths of fill are expected.

Waypoint Mill-10

*Photograph 13: Lower area, with drainage ditch highlighted yellow, looking northwest.*

A small drainage trench/swale was cut by DES. Water is intersected by the ditch and is flowing at about 0.1 L/s.

*Photograph 14: Lined Pond #3 looking southeast*

The lined Pond #3 has a fill slope of about 2 m on the east side and probably consists of waste rock, appearing coarse-grained, red/orange coloured and oxidized. Little to no garbage observed in the fill slope.

*Photograph 15: Overflow pipe from Pond #3*

An overflow pipe is present on the south side, leading to a 1 m diameter culvert. This culvert spills to the ground between Pond #3 and #2 and likely reports to Dome Creek. Angular armour rock is at the base of the culvert. No water was observed flowing at the time of visit.

*Photograph 16: Pipe between Pond #3 and Pond #2*

A small 6” rusty metal pipe is present on the northwest edge of Pond 2 (adjacent to *Photograph **15***). The pipe is separated into segments and covered with vegetation. It likely reported to Pond #1 or #2, but does not appear to be active. No water was observed flowing through the pipe.

### 1.6 Sedimentation ponds

Waypoint Mill-8

*Photograph 17: Pond #2*

AAM indicated that their understanding is that Pond #2 and #1 do not have any pipes feeding water into or out of them, water is kept naturally at those levels. The above pipe from Photograph 16 does not appear to feed to this pond. Pond #2 has abundant algae growing on the bottom of the pond, and the water is very still. The vegetation on the banks suggest the water has been approximately 30 cm higher than observed today. No wildlife noted.

Waypoint Mill-9

*Photograph 18: Pond #1*

Ponds #1 and #2 appear to be dug into native soil, with little to no fill placed. There is a lot of algae/vegetation on surface in Pond #1 (the furthest from the mill). The pond substrate was not visible. Shrubs and vegetation have grown in around the pond.

Mount Nansen Mill Area Reconnaisance

N

Mill-3

Huestis
Working Area

Mid Bench

Mill-5

Mill-6

Mill-10

Mill-4

Lower Bench

Sedimentation
Pond #3

Mill-8

Mill-9

Mill-7

Sedimentation
Pond #2

Sedimentation
Pond #1

Upper Bench

Mill-2

Landfill Area

Mill-1

Landfill Area
GRAVEL-ROAD
Waypoint

0 m 50 m 100 m 150 m 200 m

September 17, 2013

# Appendix B5

# Summary of Geotechnical Field Observations of Tailings Facility Area

# FIELD MEMO

| | | | |
|---|---|---|---|
| **To** | Renata Wood | | |
| **From** | Shane Magnusson | **Reviewed By:** | Renata Wood |
| **Tel** | 604-294-3811 | **AMEC File No.** | VM00605 |
| **e-mail** | | **cc** | |
| **Date** | 06 March 2014 | | |
| **Subject** | **Mount Nansen Remediation Project**<br>**Summary of Geotechnical Field Observations – Tailings Facility Area, Rev 1** | | |

## 1.0 INTRODUCTION

AMEC in conjunction with Associated Engineering is currently undertaking a site investigation program at the Mount Nansen Site. Several disciplines are working on characterizing the site conditions in support of designing a remediation plan. This memo was originally written on September 16, 2013 to summarize the geotechnical observations made at the tailings facility during the test pitting and sonic drilling programs. It has been re-issued as Rev 1 to address comments raised by AAM. It has not been updated to incorporate new information available since the memo was originally written. The memo was written in the field with the intent of presenting high level general impressions and observations regarding excavation, trafficability and general understanding of geotechnical conditions. It was not indented to be a complete geotechnical characterization. Detailed discussions of material properties will be included in the site characterization report.

## 2.0 WORK COMPLETED TO DATE

AMEC mobilized to site on September 3, 2013 to carry out the field investigation program. At the time of writing on September 16, 2013, the following components have been completed at the site as shown in Figure 1.

- 3 test pits in the shale borrow area
- 3 test pits in the sand borrow area, to the east of the Tailings Facility
- 3 test pits in the tailings dam
- 7 test pits on the tailings surface
- 4 sonic boreholes on the tailings surface
- 1 sonic borehole through the tailings dam

Test pits were completed with a CAT 324 D excavator provided by Boreal Engineering.

Sonic boreholes were completed with a small tracked sonic rig provided by Dark Side Drilling.

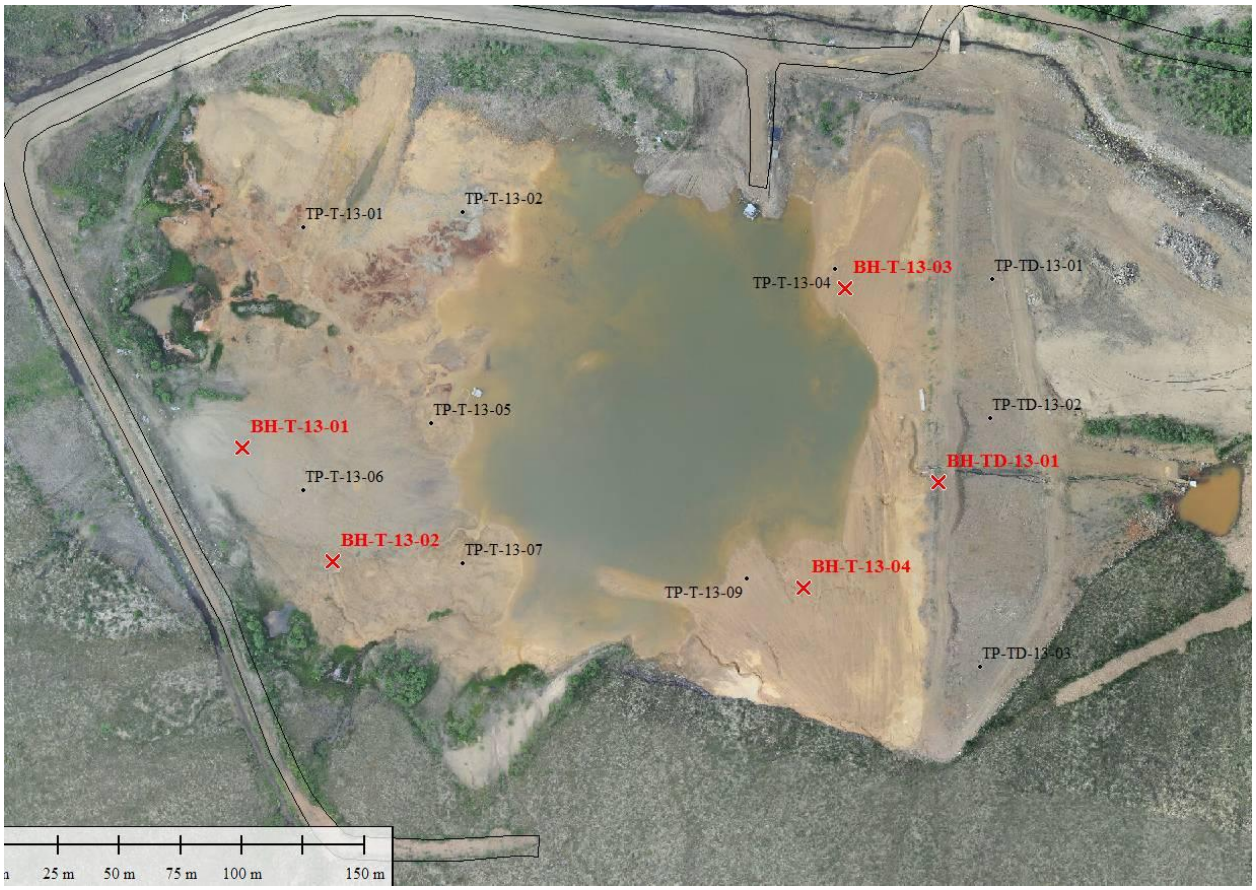



**Figure 1: General layout of approximate test locations – note imagery is from 2012.**

## 3.0 TAILINGS AREA - EXCAVATION CONDITIONS

Seven test pits were completed on the tailings beaches to assess the behaviour of the tailings when excavated. In addition the material was sampled and characterized with regards to geotechnical properties. That information is presented and discussed. Observations made during test pit excavation are summarized below. Also some test pits were left open overnight to provide some indication of long term stand-up behaviour. It should also be noted that these conditions are likely reflective of relatively good behaviour because test pits could only be completed where the excavator could traffic (see discussion in Section 4.0)

- TP-T-13-04 and 09 were located on the tailings beach on the east side of the pond and the tailings performed in a similar manner.
    - The test pits were generally damp and dry in the top portion until the water table or original ground/organics were reached (approximately 3-4 m depth).
    - The dry material sloughed in a lot until a round test pit formed. Tension cracks formed at the pit rim and the edges of the pit sloughed in vertical slabs approximately 6” to 12” thick.
    - The pit walls were generally vertical in the top meter or two, then it sloped approximately 2H:1V into the base of the pit.

- Test pits were completed to about 4 m depth, and the excavation was about 6-8 m wide and round at surface.
  - Left open overnight, the pits enlarged another 1 m in diameter.
- No water was seeping / observed into the test pits during excavation even though the tailings pond level was above the bottom of the hole.
  - Left open overnight, the pits filled with water.
  - TP-T-13-04 had water at 2.3 m depth 1 day after excavation, with a wet zone at 2.0 m depth
    - The tailings pond was about 10 m away, and 1.2 m below the rim of the pit
  - TP-T-13-09 had water at 1.6 m depth 1 day after excavation, with a wet zone at 1.3 m depth.
    - The tailings pond was 7-10 m away, and 0.7 m below the rim of the pit.

**Photograph 1: TP-T-13-09 left open overnight.**

Test pits completed on the west side of the tailings facility

- More slimes/fine grained material than on east
- They were completed to a shallow depth as the surface became very soft causing concerns about excavator stability safety

- Tension cracks and lots of sloughing occurred.
- Organics were found at shallow depth
- TP-T-13-01 found:
    - Tailings from 0 to 2.1 m, fine grained on surface, coarser sand grained at depth
    - Below the tailings, native open-graded sand, cobbles and gravel were found with free water, test pit filled with water,
    - Abandoned at 2.7 m for stability

**Photograph 2: TP-T-13-01 cobbles and boulders below tailings**

- TP-T-13-02 found:
    - Sandy tailings at surface, and silty fine grained tailings below.
    - Organics/original ground was found at depth, then sand
    - Water flowing in to the bottom (seepage near top of native material)

**Photograph 3: TP-T-13-02**

- TP-T-13-05
  - Unstable surface for access, only reached 2.6 m.
  - Tailings were coarser grained, but very wet.

**Photograph 4: TP-T-13-05 excavated, lots of sloughing, water entering**

**Photograph 5: Sand boils at TP-T-13-05 after backfilling**

- After backfilling TP-T-13-05, the excavator tapped the surface with the excavator bucket about a dozen times to liquefy the backfill. Sand boils came up and it flooded with water. Visiting on Sept 15, the tailings were still very soft and difficult/unsafe to walk across the middle.
- TP-T-13-06
    - Tailings to 2 m depth
    - Sand with dark laminations from 2 to 4 m depth.
    - Left open overnight to assess stability

**Photograph 6: TP-T-13-06 left overnight had 1.6 m depth to water, 1.3 m depth to top of seepage zone, 7 m diameter.**

- TP-T-13-07
    - Tailings encountered in entire TP to 3.4 m
    - Groundwater level about 1.0 m
    - Left open overnight to assess stability. The next day the following was observed:
        - Depth of water from surface: 1.4 m,
        - Depth to saturated zone: 1.2 m,
        - Height of water from the bottom of the test pit: 0.5 m,
        - Depth of the tailings pond from the TP edge: 1.0 m.
        - Test pit diameter about the same, 7 m (i.e. no further sloughing of sides above water table)

A general summary of the observed response of the tailings to test pit excavation is:

- The top meter or so of tailings are above the ground water table. It is fairly dry and stands near vertical when excavated.
- The saturated depth of tailings is where the side walls tend to slump into the pit, and form a slope of approximately 2H:1V.
- Water will usually not immediately seep into the excavation if you are in the tailings unit (not sure of behaviour <8 m from the pond).
- Water will often seep into the excavation from the interface between the native soil and tailings (where encountered). Seepage was observed to be greater on the north side of the facility, probably because there appears to be less permafrost (south facing slope) and the diversion channel/hill slope may be contributing more water to the area.
- The steady state horizontal surface dimension of a test pit is about twice its depth
- When backfilling tailings with saturated material, excess pore pressures are generated and they liquefy. In the coarser beach sand near the tailings dam, usually the next day the surface is drained and stable enough to walk over. If they liquefy to depth in the fine grained tailings, it may take several days for pore pressures to dissipate to allow a machine or person to walk across it.
- The tailings are not very deep in the western portion of the facility, about 2 to 4 m depth.
- No frozen/permafrost tailings were encountered.

The underlying native material below the tailings:

- A dark coloured layer of sand with trace organics is present under much of the tailings facility. It is of variable thickness from 0.1 to over 1.0 m thick.
- Under the dark coloured layer is a layer of fine to medium grained sand, with thin dark laminations, no to little gravel, trace silt to silty, compact to dense, dark grey and wet. This appears to be similar to the sand that was observed in the borrow area – except the colour is brown/grey in the borrow area and dark grey/blue colour below the tailings.
- TP-T-13-01 encountered boulders and large cobbles with free water below the tailings. This was the only TP completed in the northwest corner of the TSF due to trafficability. These large rocks may be from shallow weathered bedrock. It is noted that the diversion channel is just upstream of this test pit location.
- Permafrost was usually encountered in the native unit, if at all. Frozen tailings were not encountered. Permafrost was encountered in locations on the south side of the facility only and typically near the top of the native sand layer, to a few meters below it. Per ASTM D4083 permafrost logging convention – this is an $N_{bn}$ – as having no excess ice that occupies space in excess of the original voids of the soil. The soil is well bonded. The ice crystals are approximately 1 mm in size and are usually seen by crystalline reflections. The ice is usually visible in the organic layers, and not seen in the sand material. The material is well bonded and hard. A hammer and chisel/trowel is usually required to break open the core. When the sonic core comes out of the core barrel, the outer 5 mm is usually melted.

- This material could be considered thaw stable. Left overnight in the core box, it retains its shape. Getting trucked to the core storage area by the camp bunkhouse results in some liquefaction/falling apart, but the core is still intact usually.
- Some zones of ice were encountered with water contents up to 90%. They were encountered at depth 3-8 m below the top of permafrost.
- Core left in the corebox at the drill site for 2 days holds its shape as core. It can be broken by hand, as compact density (thawed).
- Little to no water pooling in the core box (except for the ice-lens pieces)
- Core transported to the core racks at the bunkhouse (a few kilometres along a gravel road) resulted in a few pieces liquefying. Generally ¼ of the core from BH-T-13-01 liquefied. These pieces were
    - Saturated tailings below the water table
    - Some pieces of thawed sand. These were generally saturated and had high amounts of water to begin with. The top of each Sonic drill run usually has a higher water content, and these pieces liquefied.

## 4.0 TAILINGS AREA: TRAFFICABILITY

Trafficability was assessed by observing the response of the tailings beach to a CAT 324D tracked excavator walking across the tailings surface. In addition observations were made during pickup truck traffic, drill rig traffic and foot traffic. Generally:

1. The coarser grained the tailings, the better they performed.
2. The higher the elevation above the tailings pond (even a decametre), the better they performed for walking on.
    - Figure 2 below with the aerial image approximately reflects the size of the pond at the time of trafficability. Test pits around the pond perimeter were completed as close as possible to the pond as the excavator could safely walk around.
    - The tailings beach close to the tailings dam performed the best for trafficability.
        - Pickup trucks were able to drive approximately half way from the edge of the facility to the edge of the pond.
        - After several passes on the upper beach areas with the excavator the tailings surface remained firm with minimal rutting.
    - The northwest corner is very soft.
        - Higher areas (maybe 6” higher) with horsetail/fireweed vegetation were firmer, and that’s where the test pits occurred.
        - Tailings are finer-grained and saturated. The excavator had difficulty with stability at the rim of the test pits. The excavator sank until the bottom of the undercarriage hit the ground.
        - After one or two passes with the excavator, the ground was rutted and soft. Unsafe for additional equipment passes.
    - The mid-area on the west side (marked as marshy on the map) is probably the most soft.

- A small creek/trickle of water flows in this area, probably from the interceptor ditch and/or the Dome Creek diversion channel or possibly as result of shallow groundwater seepage.
- The area has grasses on it, and areas of red coloured tailings/oxidation
- No vehicles attempted to cross this area, even walking on foot was dangerous.

- The Southwest corner where the 2 drill holes were located was fairly firm on surface, however drilling did result in softening of the tailings and did limit the depth of the investigations.
  - Coarser-grained tailings were present here, and the area is raised
  - Pickup trucks could make it up to BH-T-13-01, but the soil was dry and loose, required 4WD, and that is probably as far as a pickup truck could make it.
- The peripheral edge of the Southwest corner (in yellow) was marginal for the excavator
  - Large, deep tracks were left in the sand, and the tailings surface was soft when walking on foot in the tracks
  - A few passes with the excavator is probably the maximum amount of traffic.
- Areas within about 5 m of the tailings pond (where it has recently lowered in water elevation) are very soft, and walking to the water edge is difficult.

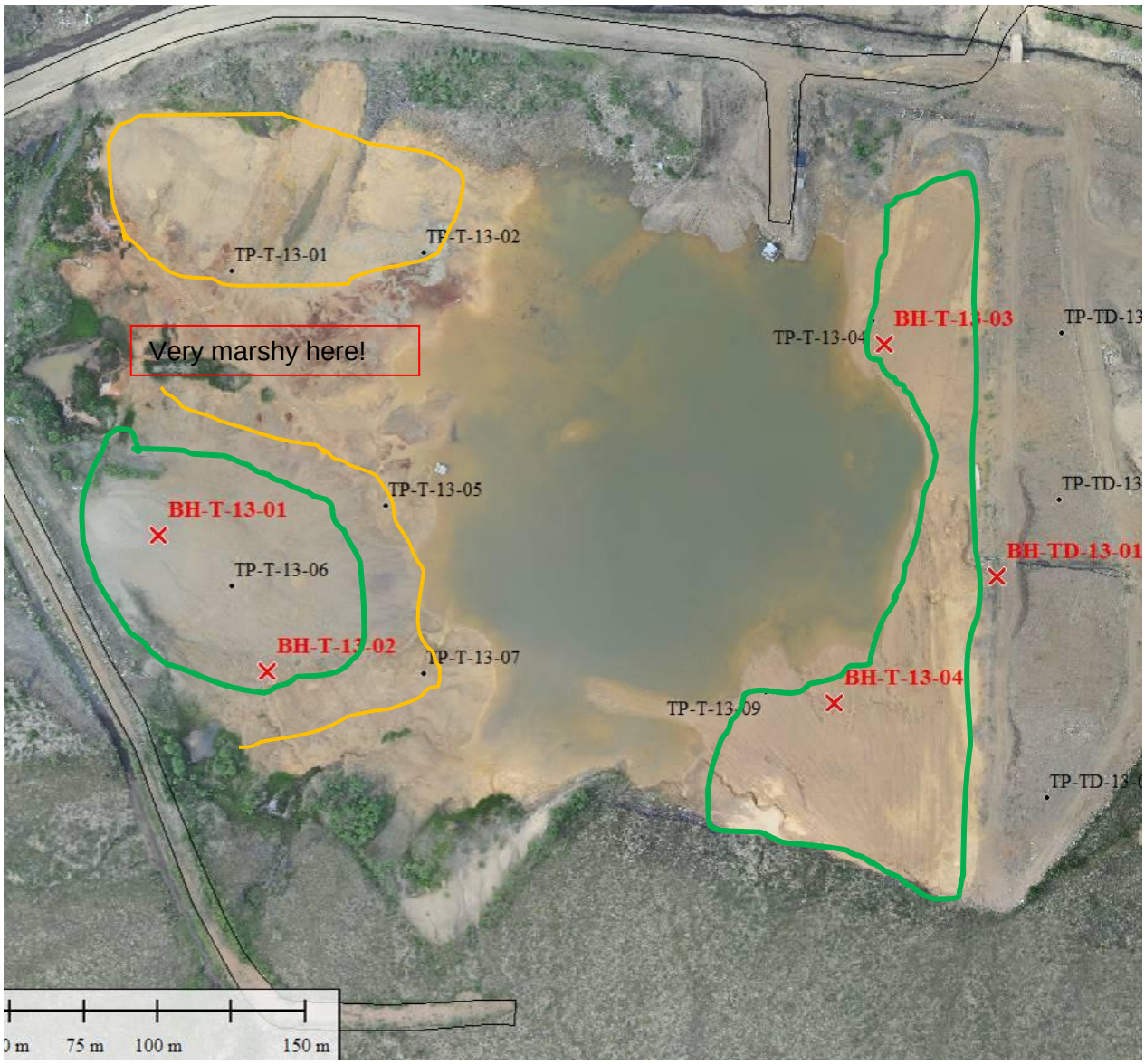



**Figure 2: Summary of tailings beach trafficability observations**

Note:

1. Green outline indicates firm areas where the excavator and sonic drill could make it safely.
2. Orange areas are marginal, where the excavator had difficulty accessing.
3. Areas outside these green and orange areas are very soft, where walking on foot was deemed marginal, and machinery did not walk around.

**Photograph 7: Excavator walking from TP-T-13-02 northward to the access road.**

## 5.0 TAILINGS DAM

Three test pits were completed on the downstream face of the dam, approximately 5 m vertically below the crest of the dam. One borehole was completed on the crest at the deepest part of the dam (see Figure 3).

- TP-TD-13-01 was completed on the northern portion of the tailings dam, at its lowest height.
    - About 1 foot of rock armouring was present
    - Immediately below the armouring, sand similar to that observed in the sand borrow was present. Thin laminations were present near surface too.
    - This portion of the dam appears to be native material, with little dam construction completed (or at least at the elevation of the test pit). The elevation matches the neighbouring borrow area. Part of the downstream face of the dam appears to have been formed by excavation and the material was probably used for other parts of the dam, resulting in the 2.5H:1V face.
- No permafrost encountered in the test pits in the mid to northern portion of the dam. This is the south facing portion of the dam, receiving more sunlight compared to the south end of the dam.
- TP-TD-13-02 hit native sand at 2 m depth, and did not hit permafrost. No organics noted.

- TP-TD-13-03 hit organics at 4.5 m depth for 0.3 m. Then native sand to depth. Potential permafrost at 6 m depth. No groundwater intersected.
- BH-TD-13-01 was located on the tailings dam crest, at the maximum height of the dam.
    - Sand fill to 17 m depth.
    - Groundwater table at 12 m
    - 17 to 25 m is sand with organic laminations. No thick layer of organic root mat from OG
    - Permafrost at 22 m depth
    - Drilled to 25 m, no well/ instrument install.
- The test pit observations are consistent with the understood tailings dam construction; the organics were stripped on the north side of the dam, until somewhere between BH-TD-13-01 and TP-TD-13-03 (see Figure 3).
- Permafrost was observed in the southern part of the dam below the tailings dam, a few meters below the original ground surface (see Figure 3). Classification is Nbn. No permafrost noted in the test pits on the northern part of the dam. This appears consistent with the geophysics survey results.
- The groundwater table is at a low elevation through the dam. Only the borehole in the middle of the dam intersected groundwater at a depth of 12 m (approximately 5 m above original ground).

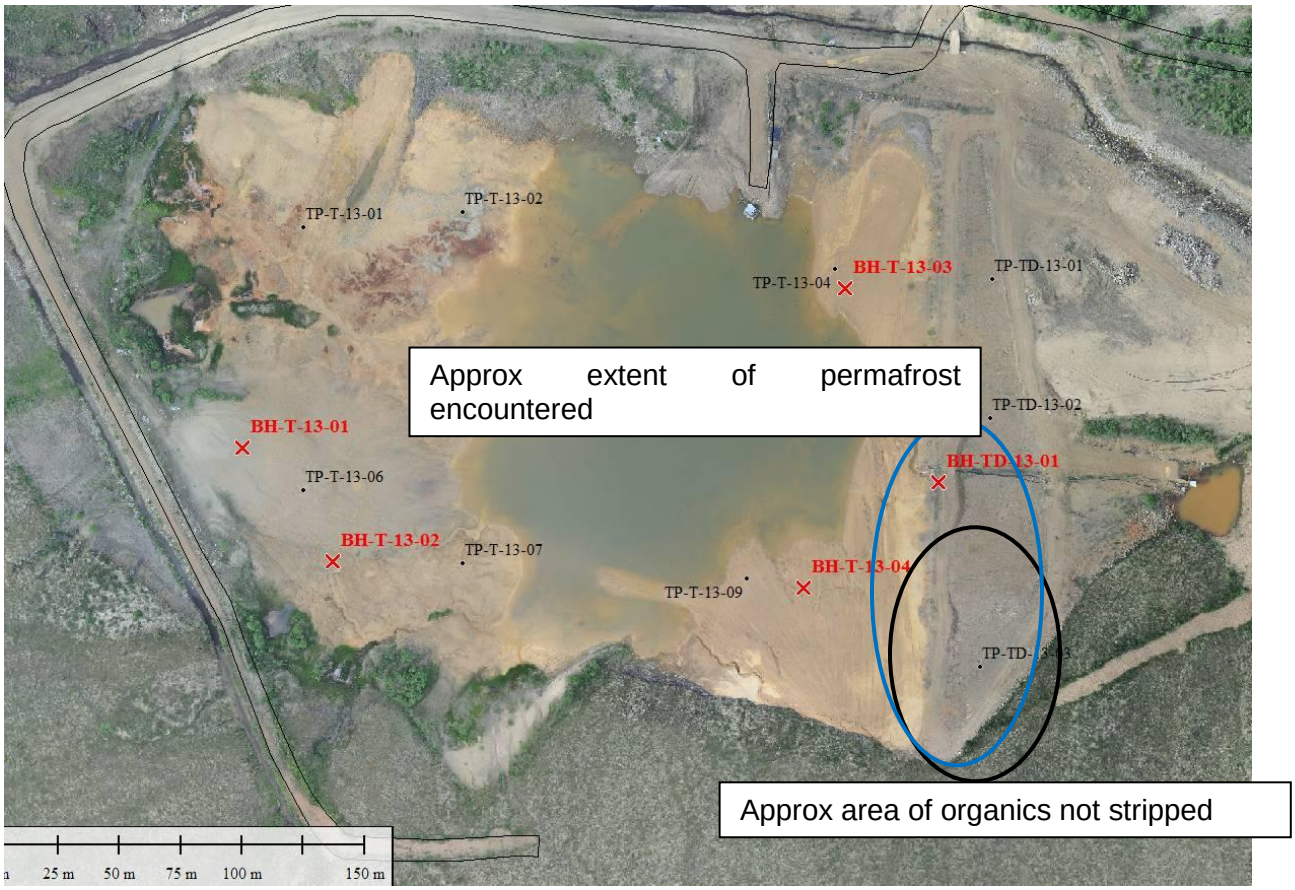



**Figure 3: Summary of observations in tailings dam investigations**

## 6.0 SAND BORROW

Test pits were completed in the sand borrow to the east (downstream) of the tailings facility. Over the depth and spatial extent observed, the sand is consistent in characteristics.

- The sand is characterized as being fine to medium grained, with trace silt, grey to brown, damp.
- Permafrost was encountered at approximately 4 to 5 m depth in TP-BA-13-03 and 04 excavated in the sand borrow area downstream of the tailings dam. Permafrost was not encountered in TP-BA-05 which was excavated to a depth of 5.3 m.
- Trace angular coarse gravel was noted throughout the sand. The gravel was about 25 to 75 mm and gap graded (no fine gravel to coarse sand sized particles observed). The gravel was typically oxidized on surface, and a meta-sedimentary rock.
- The ground water table is approximately at a depth of 4 m.
- Thin (1 to 5 mm thick) dark laminations are present throughout this deposit. Spacing varies from a few millimetres to a few centimetres.
    - Above the water table from test pit observations, these layers appear dark coloured with little to no chemical breakdown/alteration

- Test pit stability was a concern. With the low water table, the loose sand experienced a lot of sloughing. Test pits completed to 5 m generally had a surface diameter of 10 m and round shaped. The top half of the excavation was generally vertical or very steep, and the bottom half slumped in.
- Once the excavator hit permafrost, it was difficult digging (especially at depth). Bucket-tooth marks were visible on the walls. Permafrost was noted to be Nbn.
    - TP-BA-13-03 hit permafrost at 4.4 m depth
    - TP-BA-13-04 hit permafrost at 5.3 m depth
    - TP-BA-13-05 potentially hit permafrost at 5.3 m, no sample retrieved.
- The excavator was unable to access the planned locations for TP-BA-13-03 and 04 in the sand borrow area upstream of the tailings facility. These are scheduled to be completed with a hand auger or hand test pits with a shovel. Based on observations of the material on surface and past project documentation, it is expected that this west borrow area is similar to the east borrow area.

# Appendix B6

# Infrastructure Site Reconnaissance Memo

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

| | | | |
|---|---|---|---|
| **Date:** | October 18, 2013 | **File:** | 132333 |
| **To:** | AMEC: Brian Geddes, PM,<br>AE: Steve Bartsch, PM & Ray Korpela, Lead | | |
| **From:** | George De Ridder, P.Eng. | | |
| **Project:** | MOUNT NANSEN REMEDIATION PROJECT | | |
| **Subject:** | SITE INSPECTION OCT 3-4 2013 REPORT | | |

# MEMO

**Date and Purpose of Inspections**

Inspections were conducted on Thursday, October 3 and Friday, October 4 of the remaining buildings, to closely identify:

- structural configurations
- content of buildings
- materials and potential breakdown of deconstructed stream (recycle, salvage or disposed)
- potential hazardous materials

**Team**

George de Ridder of AE, accompanied by SUMAS Environmental team of three, lead by Alan Avery.

**Work Plan**

The pre-developed Work Plan by AE of September 2013 was followed; however, some smaller buildings were already demolished.

All buildings were accessible on foot, interior and exterior. No inspections were done on roofs requiring a ladder.

**Preliminary conclusions**

1. Mill Complex & Workshop:

   Structures were in good-to fair condition with high potential of re-use (salvage) of heavier steel components, expected 75+%. Advanced corrosion was present to a limited extent on columns and roof purlins in the zones between agitator tanks and ball mills. Steel cladding generally poor-fair, with corrosion near floors and on ceilings and ice damage on overhangs and gables. Expect 20-30% salvage/reuse, balance to recycle.

   The primarily steel framing is of good design and general good condition, painted (possibly but unlikely lead & pcbs?) cladded with galvanized steel sheeting, including limited quantities of tin sheeting on walls and possibly also on roofs.

   Interior of the complex is highly congested with residual process equipment: steel tanks, wood stave tanks, steel and PVC and HDPE pipes, mezzanine flooring, cable racks, electrical boards, instrumentation and cabling, racking, wood office cubicles and tool stores. Some cable racks were stripped of heavier gauge cabling.

   Large steel agitator tanks were drained but not cleaned from residual sludge. These tanks appeared to be second-hand units with old scratch damage and worn coatings. Expect low potential for salvage; however, 100% recycling as scrap. Building shell will have to be removed before deconstructing the larger tanks.

   Large wood stave bins for raw materials feeding the ball mills have potential of salvage or recycle of the wood. Some smaller wood stave mixing tanks are severely saturated with wet sludge and will probably be classified as hazardous disposed waste.



CANADA'S BEST MANAGED COMPANIES

Base concrete floors are staggered in three mezzanine steps with retaining walls. Multiple machine bases and tank pedestals in concrete appears to be contaminated with oil and process spillage (arsenic?). Testing is planned by SUMAS to assess the hazardous potential of the sludge spillage on concrete base floors.

It is possible that ground is contaminated under the building footprint of the heavy process zones. Groundwater was seeping into the west tank zone of building.

The most feasible deconstruction method appears to be systematic dismantling for salvage and recycling of materials, largely steel and concrete. Roofs and wall cladding go first to open up for the retrieval of tanks and miscellaneous process equipment. Primary frames go after dismantling of secondary girts, purlins and flooring. Large tanks go after complete removal of the building shell, followed by demolition of the concrete floors, machine foundations and lastly retaining walls. We expect many of the concrete can crushed on site and be recycled for road building and rehabilitation of the site, depending on the hazardous substance assessment.

2. Bunkhouse, Camp Shed and Cookhouse

The wood framed, wood sided and gypsum board interiors with steel cladded roofing will likely be deconstructed by removing steel roofing and interior fittings (doors, windows, bathroom and kitchen) for recycling and disposal (gypsum) before push-over demolition with a machine. Bunkhouse has salvageable laminated beams in the floor structure.

Woods will likely be recycled with low potential of disposed waste on site. Small quantities of concrete pad foundations are expected to be recycled as crushed fill on site. Potential hazardous substances are lead paint and creosote in the floor support structure, and pcbs in fluorescent light units. The buildings were energized with electric power.

3. Small Pump Houses

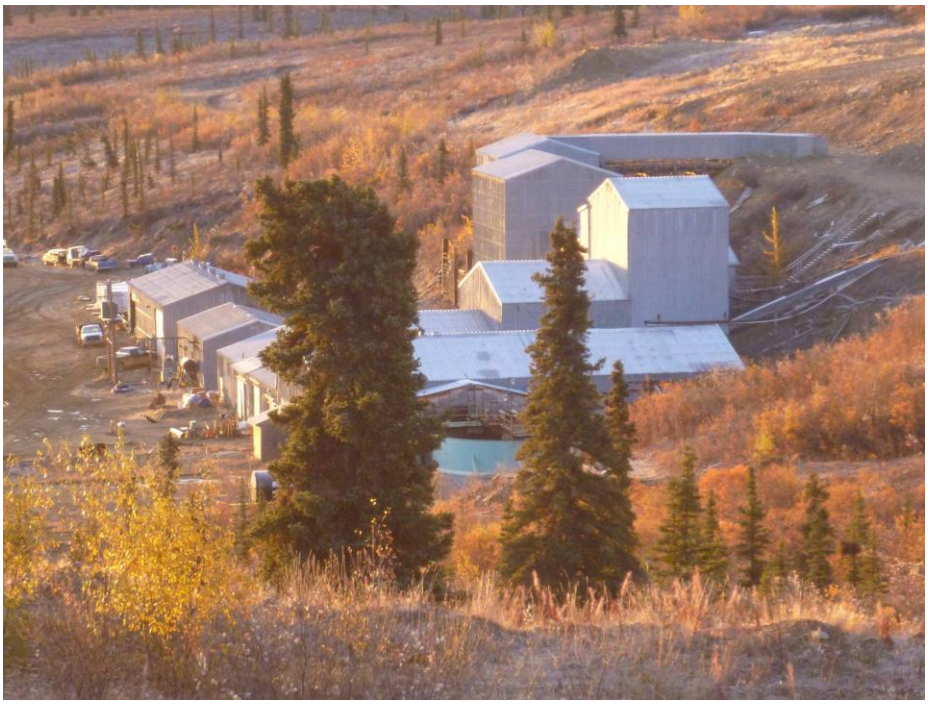
Wooden constructions for the Victoria Creek wellhouse, the seepage pond pump and the electrical transfer station will be pushed over after removal of electrical and mechanical fittings for recycling. Small amount of concrete and steel components could be recycled, with low potential of hazardous substances involved.

**Further work for Phase 1**

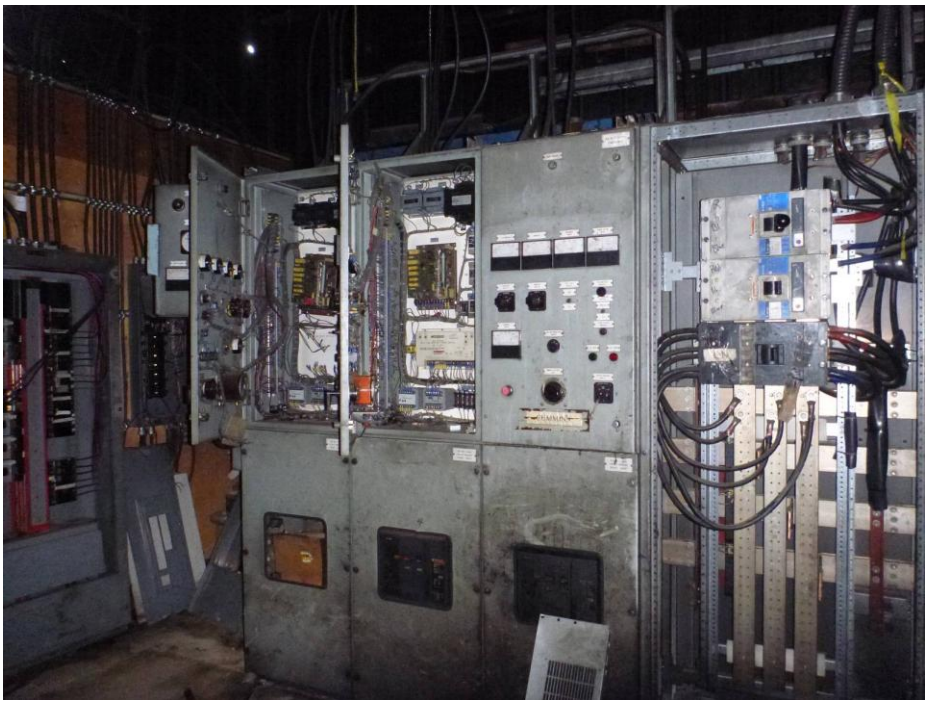
The available drawings of the mill building and sketches of the wood buildings are not sufficiently detailed and lack dimensions and, therefore, cannot be used to develop reliable material or quantity estimates. A follow-up Stage 2 inspection and survey is recommended, as per our Work Plan. This inspection will include a detail inventory of materials.

The hazard material assessment from SUMAS should include identification of paints and sludge waste on the floors and in tanks of the mill complex. This information should enable realistic estimates of hazardous waste and classifications for recyclable steel, wood and concrete.

# PHOTOS

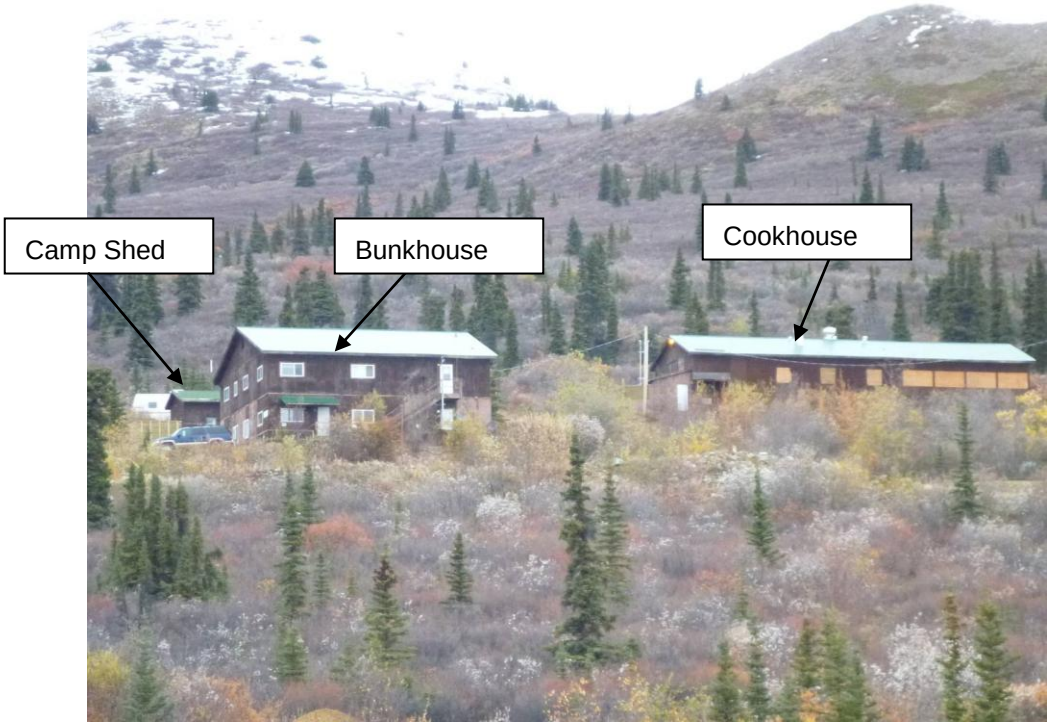


**Photograph 1: Mill Complex**



**Photograph 2: Electrical Equipment**

**Photograph 3: Ball Mill Zone**

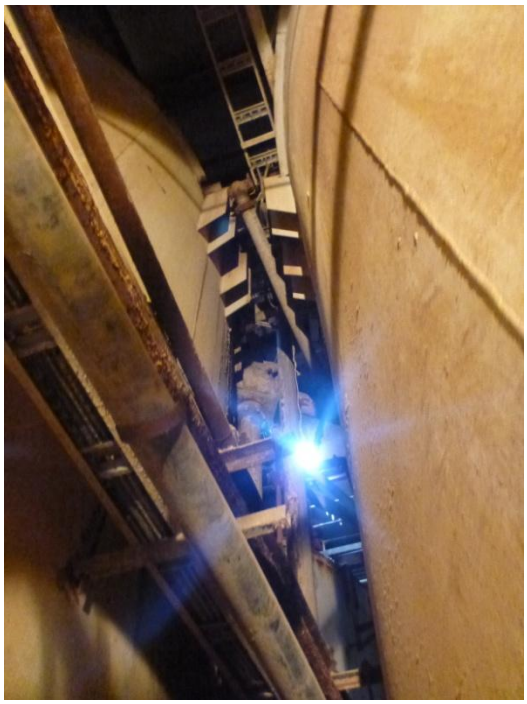



**Photograph 4: Camp Area**

**Photograph 5: Cookhouse**

**Photograph 6: Bunkhouse**

**Photograph 7: Steel Mezzanine, Mill**



**Photograph 8: Agitator Tanks, Mill**

# Appendix B7

# Water Sampling Methods Memo

# Appendix B7

# Water Sampling and Field Data Collection Memo

Addendum 1 – Water Data Tables

Addendum 2 – Information Sheets from ALS Regarding Cyanide Sampling in Sulphidic Waters

## Introduction

Water samples were collected from the following locations:

1. Groundwater from existing and newly installed monitoring wells.
2. Groundwater from drive point monitoring wells installed as part of the creek monitoring program.
3. Surface water sampled at the SEEP sampling location and from the open pit.

Most of the sampling completed by AMEC and AE was focused on groundwater as long term surface water sampling at the Site is being completed by EDI.

Chemical analyses of the water samples were completed by ALS Environmental at their labs in Whitehorse and Burnaby, BC. ALS is accredited by the Canadian Association for Laboratory Accreditation (CALA) for the analyses completed, and the analytical methods used by ALS are consistent with the Yukon Contaminated Sites Regulation (CSR).

Data tables summarizing the water elevations, field data are presented in Addendum 1 to this Appendix B7, and copies of the laboratory reports are included in Appendix D3 of the main report.

The following sub-sections discuss the methods and rationale used for the water sampling.

### *a) Sampling Locations and Dates*

Groundwater samples were collected from the monitoring wells listed on Table 1, Addendum 1. The depth to water and groundwater elevations are listed on Table 2, Addendum 1.

Tables 1 and 2 list the available monitoring locations that were sampled along with the survey coordinates for these locations.

The existing monitoring wells were sampled on 17-19 September 2013. The drive point monitoring wells and corehole monitoring wells were sampled on 27-30 September 2013. Two monitoring wells in the tailings dam area were sampled for a limited analytical suite on 16 May 2013. Five monitoring wells in the tailings dam area were sampled for dissolved gas analyses on 16 November 2013.

### *b) Sample Collection*

The groundwater samples were collected using one of three different methods: 1) regular Waterra inertial lift pumps (1/2" diameter) in most monitoring wells, 2) small diameter (3/16") Waterra micro-purge inertial lift pumps for the small diameter monitoring wells, and 3) standard disposable weighted bailers for deeper monitoring wells where Waterra pumps were impractical. These sample collection devices were left in the monitoring wells for future sampling.

Minimal well purging was completed prior to sampling to minimize potential changes to the redox chemistry of the water. For the sampling completed with the Waterra pumps, enough water was purged to clear the tubing and samples were then collected directly from the tubing discharge. For the sampling completed with the weighted bailers, a minimum of two bailers full of water were removed from the well prior to sample collection. These groundwater sampling protocols are considered appropriate as the potential contaminants of concern at the Site are primarily metals and cyanides which are typically not volatile.

The monitoring wells were not developed prior to groundwater sampling as the contaminants of concern would be largely unaffected by the removal of fine grained sediments, and due to the fact that well development can alter the redox conditions around the well resulting in a sampling bias. In particular, well development on shallow water table wells can provide atmospheric oxygen which can alter the redox conditions near the well screen. Well development would not improve the sampling results, and may actually introduce a bias for oxygen reactive parameters such as sulphide. Based on these considerations, and the fact that well development would likely double the time required to sample each monitoring well, AMEC chose to use minimal purging prior to sample collection.

### c) Field Data Collection

After confirming the sampling location based on location and/or survey coordinates, field data was collected at each monitoring well in the following sequence:

- gas concentrations in the well headspace (i.e. above the water level);
- depth to water (DTW) measured from the top of casing (TOC);
- depth to bottom (DTB) to be used to confirm the well ID;
- sulphide measured using a field test kit[1];
- minimal purging of Waterra tubing or the removal of two bailers of water; and,
- measurement of field water quality parameters[2] using a flow through cell to minimize the exposure of the water to atmospheric oxygen.

Gas concentrations in the monitoring well headspace were measured to determine concentrations of biogenic gases including methane which is a known breakdown product of cyanide degradation. Gas measurements were taken on two occasions using two different

[1] Sulphide test kit used was from Chemetrics Ltd., model K-9510. This test kit has a method detection limit of 0.05 mg/L sulphide, and can measure up to 10 mg/L of sulphide. The sulphide test kit uses the same methylene blue method that is used in analytical laboratories to measure sulphide.

[2] Field water quality parameters were measured with a YSI Professional Plus multi-parameter instrument (or equivalent) measuring temperature, pH, electrical conductivity (EC), dissolved oxygen (DO), and redox potential.

instruments. During the initial groundwater sampling in September 2013, an RKI Eagle instrument measuring methane ($CH_4$), carbon monoxide (CO), oxygen ($O_2$) and hydrogen sulphide ($H_2S$) was used. The results of this monitoring were considered suspect as all of the oxygen readings were 20.9% which is the atmospheric oxygen concentration. The RKI Eagle had a short (approximately 20 cm) intake hose and it was interpreted that the gas being sampled near the top of the well was simply air. Additionally, carbon monoxide is not a useful environmental parameter. Based on these considerations, a GEM 2000 Plus landfill gas instrument was used in early October to re-monitor the gas concentrations. This instrument had an approximately 1.5 m long hose which was fully inserted into the monitoring well to measure the gas concentrations. The GEM 2000 Plus measured methane, carbon monoxide, carbon dioxide, oxygen, hydrogen sulphide, and hydrogen. The remaining gas to make up 100% is referred to as the balance and this value is also provided by the instrument. The composition of the balance of the gases is unquantified, but is likely almost entirely nitrogen gas ($N_2$) which is also present as 78% of the atmosphere.

Field data was recorded for water quality parameters some of which are considered unstable and not appropriate for laboratory analysis. Standard field parameters include temperature, pH, electrical conductivity (EC), dissolved oxygen and redox potential. Sulphide was measured in the field because it is difficult to collect and preserve a representative sulphide sample for laboratory analysis.

Due to access restrictions and the cold weather conditions during the sampling of the drive point monitoring wells as part of the creek study, these locations were not monitored for gases and the only field water quality measurements were for temperature, pH and EC. These changes minimized the amount of instrumentation that had to be transported to each sampling location while still providing key field data as needed.

### d) Standard Water Sampling Protocols

Standard water sampling and analysis procedures were applied. Samples were collected directly from the Waterra tubing (or bailer), preserved as needed, and stored in a cooler with ice packs. The sample bottles were provided by the laboratory along with pre-made bottle labels to facilitate sample collection and handling in the field.

Table A, below, summarizes the sample bottles and preservatives used for the specified groundwater analyses.

**Table A: Summary of Laboratory Sample Bottles and Standard Preservations**

| Laboratory Analysis | Sample Bottle | Preservation |
|---|---|---|
| General Chemistry | 500 mL Poly | None |
| Dissolved Metals | 250 mL Poly | 0.45 micron filter and acidified with nitric acid ($HNO_3$) |
| Total Inorganic Carbon (TIC), ammonia, Total Kjeldahl Nitrogen (TKN) | 125 mL Glass | Sulphuric acid ($H_2SO_4$) |
| Cyanide | 140 mL Poly | Sodium hydroxide (NaOH) |
| Thiocyanate | 140 mL Poly | Sodium hydroxide (NaOH) |
| Sulphide | 100 mL Poly | Zinc acetate and NaOH |

The preservations applied are considered standard. It should be noted that ALS recently changed the preservative to be applied to thiocyanate samples from NaOH to nitric acid. Historically, samples for thiocyanate analysis at Mount Nansen were preserved with NaOH. To evaluate the affect of this change in preservation method, AMEC collected samples using both preservatives.

In addition to the standard sampling protocols, AMEC also collected samples for selected parameters using modified sampling protocols to address potential limitations of the standard methods.

## e) Modified Water Sampling Protocols

Specific modifications to the standard sampling protocols were used to address the possible presence of sulphide in groundwater (which refers to hydrogen sulphide, $H_2S$, and bisulphide, $HS^-$). The presence of sulphide was expected by AMEC based on the analytical results presented in previous reports, and the likely presence of sulphate reducing bacteria (SRB) which form sulphide during the oxidation of organic matter. Lorax (2012) acknowledged sulphide in groundwater as a key parameter at the Site, but sampling for sulphide was not completed as part of their investigations.

Sulphide is highly reactive and volatile which means that laboratory testing for this parameter is subject to a strong negative bias. The collection and preservation of a representative sulphide sample for laboratory analysis is very difficult and it is common to not detect sulphide in laboratory analyses even though it may be present at significant concentrations in the groundwater. Preservation of sulphide in a groundwater sample for laboratory analysis requires the use of two preservatives added in the correct order: 1) zinc acetate to precipitate the sulphide as zinc sulphide, and 2) sodium hydroxide (NaOH) to raise the pH. Adding these two preservatives at the same time or in reverse order will likely not stabilize the sulphide and the laboratory will likely report a non-detect. Limited laboratory analyses for sulphide were completed previously at Mount Nansen, and the results were low which could indicate the lack of sulphide at the Site, or a negative sampling bias which caused the sulphide concentrations to be under-estimated.

Because sulphide is difficult to sample and preserve for laboratory analysis, the US Environmental Protection Agency (EPA) and other regulators recommend that sulphide be measured in the field. AMEC used a field sulphide test kit from Chemetrics Inc. of Midland, Virginia, to measure sulphide in the field. This test kit uses the same colourimetric methylene blue analytical method that is used to quantify sulphide in the laboratory. The chemical reagents are in evacuated ampoules which are snapped open to draw the water sample into the ampoule. The resulting colour change is then compared to standards to quantify sulphide concentrations from 0.05 mg/L to 10 mg/L.

The potential presence of sulphide can interfere with standard water sampling protocols for cyanide and thiocyanate. The cyanide method listed in the BC Laboratory Methods Manual states on page B-46 under the heading Interferences and Precautions:

> **Sulfides:** *It is preferred that sulfide treatment be carried out before preservation, but it can be done after preservation.* Sulfides can interfere by two mechanisms: 1.) Oxidized products of sulfide rapidly convert cyanide to thiocyanate, especially at high pH (APHA). Therefore, if sulfides are present at time of NaOH preservation, free cyanide may not be detected by the method. 2.) Hydrogen sulfide distills over with cyanide, and interferes with colourimetric, titrimetric, and electrode procedures.

When sulphide is present in water that also contains cyanide, the use of standard sampling protocols can lead to the under-estimation of cyanide ($CN^-$), and the over-estimation of thiocyanate ($SCN^-$). To address this potential negative bias for cyanide, and corresponding positive bias for thiocyanate, AMEC measured sulphide in the field using test kits, and removed sulphide from the water samples using lead acetate according to a sampling method developed by ALS in Australia. Two information sheets from ALS describing these protocols are included in Appendix C for reference. In summary, a 500 mL sample of water was collected, and approximately 5 grams of lead acetate was added to promote the formation of lead sulphide as a precipitate. The sample was left to settle for approximately 10 minutes and the clear supernatant water was drawn into a syringe and then filtered using 0.45 micron filter discs. This filtration step was necessary as thiocyanate can catalytically form if the lead sulphide precipitate is not removed from the water sample. The resulting samples for cyanide and thiocyanate were collected in 140 mL poly bottles. The resulting cyanide and thiocyanate samples were preserved with NaOH.

The presence of sulphide in a water sample being preserved with nitric acid can also create a strong negative bias for arsenic. Unlike most metal sulphides which precipitate at neutral to high pH values, arsenic is stable in water containing sulphide until nitric acid is added to lower the pH. As shown by Smieja and Wilkins (2003)[3], the resulting precipitation of arsenic sulphides at low pH causes the arsenic to be removed from the water sample. This can result in as much as a two order of magnitude under estimation of the arsenic concentration. To address this potential sampling limitation for arsenic, AMEC collected unpreserved dissolved metals samples in parallel with the normal dissolved metals samples that were preserved with nitric acid.

[3] Smieja and Wilkins, *Preservation of Sulfidic Waters Containing Dissolved As(III)*, Journal of Environmental Monitoring, Royal Society of Chemistry, 2003.

In summary, AMEC measured sulphide in the field, and modified three separate water sampling protocols to evaluate potential biases related to the presence of sulphide in groundwater.

1. Alternate Preservation #1: Preservation of thiocyanate (SCN-) using nitric acid.
2. Alternate Preservation #2: Sulphide removed from cyanide and thiocyanate samples using lead acetate.
3. Alternate Preservation #3: Unacidified metals samples to account for the possible loss of arsenic from sulphide rich waters when preserved with nitric acid.

The possible presence of sulphide can affect sampling results for groundwater which is not exposed to atmospheric oxygen. Surface water would be expected to be relatively unaffected by these processes as sulphide will oxidize upon exposure to atmospheric oxygen. However, the partial oxidation of sulphide to polysulphide ($S_8$) would promote the formation of thiocyanate from cyanide upon the addition of NaOH as the standard preservative. This is why the standard preservative for thiocyanate has been changed from NaOH to $HNO_3$.

Leslie Hardy, M.Sc., P.Eng.
Senior Hydrogeologist

3 December 2013

**Table 1: Monitored Wells - 2013**

| Well ID | Area | Northing | Easting | Ground Surface Elevation | Top of Casing Elevation |
|---|---|---|---|---|---|
| | | (m) | (m) | (mASL) | (mASL) |
| CH-13-03 | open pit | 6881108 | 389145 | 1184.0 | 1184.5 |
| CH-13-04 | open pit | 6881471 | 389138 | 1225.5 | 1226.2 |
| CH-13-05 | open pit | 6881469 | 388958 | 1185.0 | 1185.9 |
| GLL07-02 | open pit | 6881703 | 389072 | 1183.3 | 1184.6 |
| GLL07-03 | open pit | 6881477 | 388961 | 1184.8 | 1185.9 |
| GSI-DC-01-A | Dome Ck | 6881123 | 387676 | 1218.7 | 1219.6 |
| GSI-DC-02-A | Dome Ck | 6881128 | 387840 | 1196.6 | 1197.5 |
| GSI-DC-03-A | Dome Ck | 6881078 | 388107 | 1170.0 | 1170.7 |
| GSI-DC-05-A | Dome Ck | 6880836 | 388723 | 1119.2 | 1120.1 |
| GSI-DC-06-A | Dome Ck | 6880568 | 389791 | 1066.6 | 1067.5 |
| GSI-DC-07-A | Dome Ck | 6880639 | 390066 | 1056.7 | 1057.6 |
| GSI-DC-09-A | Dome Ck | 6880493 | 390615 | 1037.0 | 1037.8 |
| GSI-DC-10-A | Dome Ck | 6880449 | 390863 | 1030.6 | 1031.3 |
| GSI-PC-01-A | Pony Ck | 6881918 | 388720 | 1224.1 | 1224.8 |
| GSI-PC-02-A | Pony Ck | 6881785 | 388909 | 1202.5 | 1203.1 |
| GSI-PC-05-A | Pony Ck | 6881660 | 389713 | 1116.5 | 1117.1 |
| GSI-HA-01-A | Mill - Heustis | 6881132 | 387844 | 1196.7 | 1197.7 |
| GSI-HA-02-A | Mill - Heustis | 6881130 | 387863 | 1195.9 | 1197.2 |
| GSI-HA-03-A | Mill - Heustis | 6881130 | 387881 | 1194.0 | 1194.9 |
| GSI-HA-04-A | Mill - Heustis | 6881130 | 387918 | 1190.0 | 1190.5 |
| GSI-HA-05-A | Mill - Heustis | 6881124 | 387898 | 1192.4 | 1193.1 |
| MP09-04 | TSF | 6880609 | 389576 | 1078.4 | |
| MP09-05 | TSF | 6880591 | 389550 | 1078.0 | 1079.1 |
| MP09-09 | TSF-Tailings | 6880681 | 389240 | 1097.1 | |
| MP09-10 | TSF-Tailings | 6880682 | 389240 | 1097.1 | 1098.9 |
| MP09-11 | TSF-Tailings | 6880614 | 389221 | 1097.8 | 1099.3 |
| MP09-12 | TSF-Tailings | 6880613 | 389221 | 1097.8 | 1099.3 |
| MW09-01 | TSF-Tailings | 6880558 | 389395 | 1096.5 | 1097.3 |
| MW09-02 | TSF-Tailings | 6880559 | 389396 | 1096.5 | 1097.2 |
| MW09-03 | TSF-Tailings | 6880556 | 389421 | 1096.6 | 1096.9 |
| MW09-04 | TSF-Tailings | 6880558 | 389421 | 1096.4 | 1096.8 |
| MW09-07 | TSF-Tailings | 6880699 | 389324 | 1096.0 | 1097.0 |
| MW09-08 | TSF | 6880578 | 389620 | 1074.2 | 1075.2 |
| MW09-16 | Mill | 6881095 | 387992 | 1182.5 | 1183.5 |
| MW09-17 | Mill | 6880971 | 388077 | 1177.7 | 1178.6 |
| MW09-18 | Mill | 6880985 | 388055 | 1178.7 | 1179.6 |
| MW09-19 | Mill | 6881016 | 388053 | 1176.5 | 1177.5 |
| MW09-21 | TSF | 6880577 | 389536 | 1081.0 | 1081.6 |
| MW09-22 | TSF-Dam | 6880549 | 389497 | 1088.6 | 1089.4 |
| MW09-23 | TSF-Dam | 6880555 | 389460 | 1098.7 | 1099.6 |
| MW09-24 | TSF | 6880623 | 389561 | 1087.6 | 1088.3 |
| W1410383-BH02 | TSF | 6880668 | 389561 | 1091.6 | |
| W1410383 BH03 | TSF | 6880732 | 389132 | 1099.0 | |

**Table 2A: Field Data Collected During Water Sampling**

| Parameter | Units | MP09-01 | MP09-02 | MP09-03 | MP09-04 | MP09-05 | MP09-09 | MP09-10 | MP09-11 | MP09-12 | MP09-14 | MW09-01 | MW09-02 | MW09-03 | MW09-04 | MW09-07 | MW09-08 | MW09-11 | MW09-13 | MW09-14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Gases in Well Head Space** | | | | | | | | | | | | | | | | | | | | |
| Oxygen ($O_2$) | % | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 |
| Methane ($CH_4$) | ppm | 0 | 0 | 0 | 0 | 0 | 75 | 55 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Carbon Monoxide (CO) | ppm | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hydrogen Sulphide ($H_2S$) | ppm | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Field Well Parameters** | | | | | | | | | | | | | | | | | | | | |
| Sulphide | mg/L | -- | -- | -- | <0.05 | <0.05 | 0.1 | 0.1 | 0.1 | 0.1 | -- | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | -- | - | -- |
| Temperature | °C | - | - | - | 3.92 | 3.85 | 4.26 | 4.90 | 5.70 | 6.30 | -- | 3.80 | 8.30 | 6.30 | 8.50 | 9.20 | 5.53 | -- | - | - |
| pH | pH | - | - | - | 7.18 | 6.81 | 8.96 | 9.45 | 7.66 | 7.45 | -- | 7.41 | 7.08 | 7.33 | 8.97 | 7.03 | 6.64 | -- | - | - |
| Electrical Conductivity | mS/cm | - | - | - | 1569 | 2196 | 674 | 421 | 1080 | 723 | -- | 1974 | 3041 | 2805 | 2674 | 365 | 515 | -- | - | - |
| Dissolved Oxygen | mg/L | - | - | - | 6 | 3 | 2 | 1 | 0 | 1 | -- | 3 | 1 | 1 | 5 | 7 | 2 | -- | - | - |
| Depth to Water | m BTOP | Too narrow | Too narrow | Too narrow | 1.964 | 1.431 | 2.390 | 2.210 | 1.535 | 1.775 | Too narrow | 4.165 | 1.822 | 3.495 | 2.020 | 1.772 | 1.200 | Dry | Frozen at 8.992 | 3.969 with Waterra frozen in place |
| Depth to Bottom | m BTOP | - | - | - | 3.08 | 1.82 | 5.63 | 5.28 | 4.96 | 4.22 | - | 10.96 | 5.68 | 10.00 | 7.70 | 3.40 | 3.92 | Not measured | - | 6.449 Frozen |

m BTOP m Below top of pipe

Note: Gases were monitored during the water sampling program using an RKI Eagle measuring methane, carbon monoxide, oxygen and hydrogen sulphide.

**Table 2A: Field Data Collected During Water Sampling (Continued)**

| Parameter | Units | MW09-15 | MW09-16 | MW09-17 | MW09-18 | MW09-19 | MW09-20 | MW09-21 | MW09-22 | MW09-23 | MW09-24 | W1410383-BH01 | W1410383-BH02 | W1410383-BH03 | W1410383-BH04 | W14103083-01 | GLL07-01 | GLL07-02 | GLL07-03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Gases in Well Head Space** | | | | | | | | | | | | | | | | | | | |
| Oxygen ($O_2$) | % | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | 20.9 | - | 20.9 | 20.9 | 20.9 |
| Methane ($CH_4$) | ppm | 0 | 0 | 0 | 0 | 0 | 0 | 2300 | 0 | 50,250 | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 |
| Carbon Monoxide (CO) | ppm | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 |
| Hydrogen Sulphide ($H_2S$) | ppm | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 |
| **Field Well Parameters** | | | | | | | | | | | | | | | | | | | |
| Sulphide | mg/L | -- | <0.05 | <0.05 | <0.05 | 0.2 | - | <0.05 | <0.05 | <0.05 | <0.05 | -- | <0.05 | <0.05 | -- | | - | <0.05 | 0.4 |
| Temperature | °C | - | 5.61 | 0.34 | 0.43 | 3.34 | - | 2.66 | 2.45 | 0.69 | 0.48 | 1.15 | 1.14 | 4.19 | 1.18 | 5.90 | - | 1.08 | 3.16 |
| pH | pH | - | 6.65 | 6.80 | 7.02 | 6.82 | - | 6.59 | 6.07 | 6.97 | 7.18 | 7.83 | 7.71 | 6.52 | 7.97 | 6.51 | - | 6.72 | 6.23 |
| Electrical Conductivity | mS/cm | - | 1574 | 2279 | 1963 | 1619 | - | 1542 | 1238 | 2179 | 1096 | 1269 | 1138 | 1053 | 661 | 933 | - | 535 | 1354 |
| Dissolved Oxygen | mg/L | - | 4 | 2 | 4 | 2 | - | 2 | 3 | 3 | 10 | 8 | 9 | 2 | 8 | 1 | - | 3 | 2 |
| Depth to Water | m BTOP | 13.945 | 1.565 | 5.100 | 4.813 | 2.720 | Dry | 1.760 | 3.489 | 10.711 | 9.205 | 6.549 | 6.182 | 1.585 | 6.207 | 1.590 | Frozen | 6.401 | 4.118 |
| Depth to Bottom | m BTOP | 14.002 Frozen | 1.689 | 5.645 | 7.790 | 5.880 | 3.68 | 3.59 | 5.26 | 15.88 | 11.18 | 6.72 | 7.73 | | 6.78 | 5.88 | - | 7.119 | 11.755 |

m BTOP m Below top of pipe

Note: Gases were monitored during the water sampling program using an RKI Eagle measuring methane, carbon monoxide, oxygen and hydrogen sulphide.

**Table 2B: Gas Monitoring Using Gem 2000 Plus**

| Well ID | Oxygen ($O_2$) | Methane ($CH_4$) | Carbon Dioxide ($CO_2$) | Carbon Monoxide (CO) | Hydrogen Sulphide ($H_2S$) | Hydrogen (H2) | Balance |
|---|---|---|---|---|---|---|---|
| MW09-11 | 21.8 | 0.0 | 0.1 | - | 0.0 | 0.0 | 78.1 |
| MP09-04 | 22.5 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 | 77.1 |
| MP09-05 | 22.6 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 77.3 |
| MP09-07 | 22.9 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 77.1 |
| MP09-09 | 21.2 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 78.8 |
| MP09-10 | 21.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 78.7 |
| MP09-11 | 18.0 | 30.2 | 1.2 | 0.0 | 0.0 | 0.0 | 50.6 |
| MP09-12 | 21.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 78.0 |
| MP09-13 | 22.5 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 77.1 |
| MP09-14 | 22.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 77.9 |
| MW09-01 | 21.7 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 78.2 |
| MW09-02 | 21.6 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 77.9 |
| MW09-03 | 22.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 77.9 |
| MW09-04 | 22.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 77.9 |
| MW09-05 | 21.3 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 78.5 |
| MW09-06 | 21.7 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 78.2 |
| MW09-07 | 21.7 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 78.2 |
| MW09-08 | 19.9 | 0.8 | 1.8 | 0.0 | 0.0 | 0.0 | 77.5 |
| MW09-20 | 22.2 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 77.6 |
| MW09-21 | 20.5 | 2.1 | 1.1 | 0.0 | 0.0 | 0.0 | 76.4 |
| MW09-22 | 22.3 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 77.3 |
| MW09-23 | 18.6 | 7.3 | 0.6 | 0.0 | 0.0 | 0.0 | 73.5 |
| MW09-24 | 22.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 77.2 |
| W1410383-BH01 | 22.6 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 77.3 |
| W1410383-BH04 | 22.3 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 77.2 |

Gas concentrations were measured with a GEM 2000 Plus
Note: Atmosphere contains 20.9% Oxygen and 78% Nitrogen
"Balance" refers to the remainder to make 100%.
"Balance" gases were not characterized, but are almost entirely nitrogen ($N_2$)
Oxygen, methane, carbon dioxide and balance concentrations are in Percent
Hydrogen Sulphide, Carbon Monoxide and Hydrogen are in PPM

**Table 3: Volatile Organics and Dissolved Gases in Groundwater**

| Parameter | Well ID | MW09-02 | MW09-03 | MW09-04 | MW09-22 | MW09-23 |
|---|---|---|---|---|---|---|
| **Sampling Date** | **Units** | **2013-11-16** | **2013-11-16** | **2013-11-16** | **2013-11-16** | **2013-11-16** |
| Carbon Disulphide | mg/L (ppm) | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Chloromethane | mg/L (ppm) | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Vinyl Chloride | mg/L (ppm) | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 |
| Bromomethane | mg/L (ppm) | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| Chloroethane | mg/L (ppm) | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Trichlorofluoromethane | mg/L (ppm) | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| 1,1-Dichloroethene | mg/L (ppm) | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 |
| Dichloromethane | mg/L (ppm) | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| Tr-1,2-dichoroethene | mg/L (ppm) | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| 1,1-Dichloroethane | mg/L (ppm) | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| Cis-1,2-dichloroethene | mg/L (ppm) | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| Chloroform | mg/L (ppm) | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| 1,1,1-Trichloroethane | mg/L (ppm) | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| Carbon tetrachloride | mg/L (ppm) | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 |
| Benzene | mg/L (ppm) | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| 1,2-Dichloroethane | mg/L (ppm) | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| Trichloroethene | mg/L (ppm) | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| 1,2-Dichloropropane | mg/L (ppm) | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| Bromodichloromethane | mg/L (ppm) | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| Cis-1,3-dichloropropene | mg/L (ppm) | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| Toluene | mg/L (ppm) | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| Tr-1,3-dichloropropene | mg/L (ppm) | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| 1,1,2-Trichloroethane | mg/L (ppm) | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Tetrachloroethene (Perc) | mg/L (ppm) | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| Dibromochloromethane | mg/L (ppm) | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| Chlorobenzene | mg/L (ppm) | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 |
| Ethylbenzene | mg/L (ppm) | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| m+p-xylene | mg/L (ppm) | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| o-Xylene | mg/L (ppm) | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| Styrene | mg/L (ppm) | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| Bromoform | mg/L (ppm) | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| 1,1,2,2 Tetrachloroethane | mg/L (ppm) | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| 1,3-Dichlorobenzene | mg/L (ppm) | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| 1,4-Dichlorobenzene | mg/L (ppm) | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| 1,2-Dichlorobenzene | mg/L (ppm) | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 |
| Nitrous Oxide | mg/L (ppm) | ND | ND | ND | ND | ND |
| Methane | mg/L (ppm) | ND | ND | ND | 0.19 | 8.1 |

VOCs were analyzed by the AMEC Analytical Laboratory.
Carbon disulphide was detected using open scan GC-MS, but the concentration is below the relatively high limit of quantitation of 0.05 mg/L.
Nitrous Oxide and Methane were analyzed at Dr. Lisa Stein's laboratory at the University of Alberta Biology Department.
The detection limits for nitrous oxide and methane in water are not quantified.

# Appendix B8

# Site Characterization Methodology

SUMMIT ENVIRONMENTAL CONSULTANTS INC.
A Member of the Associated Engineering Group of Companies

| | | | |
|---|---|---|---|
| **Date:** | March 7, 2013 | **File:** | 2013-2333.000 |
| **To:** | Brian Geddes | | |
| **From:** | Nicole Jacques | | |
| **Project:** | Mount Nansen Reclamation Task | | |
| **Subject:** | Reclamation Site Investigation Results | | |

# MEMO

## 1. Site Characterization Purpose

Based on our review of historical reports made available by YG-AAM, and anecdotal accounts offered by YG-AAM and Denison Environmental Services we identified areas of potential environmental concern. These areas included the Ketza Shop Area, Mill Area, roadways and the historical explosives storage area (Figure 1). The Site Characterization component of the Mount Nansen Remediation Plan focused on identifying potential contamination including metals, hydrocarbons, anti-freeze, land-fill parameters, cyanide, and hydrocarbons.

## 2. Summary of Investigations Completed

The Site Characterization component consisted of soil sampling from test-pits and boreholes at the Ketza Shop Area, the Mill Area, and the roadways. Soil samples were collected at 0.5 m intervals, and samples were sent for analysis to ALS Laboratory in Whitehorse. At each borehole and test-pit location, laboratory packaging methods were followed and packaged site-specific for the relevant potential contaminations of concern (PCoCs). The locations and summary of the soil sampling included:

- **Ketza Shop Area**: Due to historic spills at this location, the PCoCs include hydrocarbons and metals. Two boreholes were advanced using a sonic drill rig to 3.5 – 4.0 metres below ground surface (mbgs) and three test-pits were advanced with a backhoe to 2.0 mbgs.
- **Mill Area**: Due to the variety of hazardous chemicals that were stored and used in this location, the PCoCs include metals, antifreeze parameters, cyanide, landfill parameters and hydrocarbons. Nine boreholes were advanced to 3.0 - 5.5 mbgs, and five test-pits were advanced to 2.0 - 5.0 mbgs.
- **Roadways:** Due to uncertainty about contaminated materials (i.e., hydrocarbons and waste rock) used during road construction and maintenance, the PCoCs include hydrocarbons, and metals. Five test-pits were advanced to depths of 1.9 - 2.0 mbgs.
- **Former Explosive Storage Area:** Due to storage of explosives in this location, the PCoCs include nutrients. Four surface samples (0.1-0.2 mbgs) were collected. Three of them were within the former explosives area clearing, and one was collected approximately 200 m up gradient of the site for background concentrations.

A hazardous materials inventory and investigation was conducted in order to identify and characterize the hazardous materials that remain at the Project Area.

## 3. Sonic Drilling

Boreholes were advanced by Kryotek Arctic Innovations Inc. using a sonic drill rig. Stuart Van Bibber of Associated Engineering conducted the field work onsite from September 9 – 13, 2013. Soil samples were collected in 0.5 m intervals, and observations noting the presence or absence of pyrite, limestone, and rust staining, grain size composition, moisture content, and odours were recorded. Additionally, readings were measured for each sample using an RKI Eagle 2 Photo-ionization detector (PID). Depending on the nature and extent of contamination that was expected for each borehole, target depths varied. Samples were submitted to the laboratory for the PCoCs identified by the sample depth and location, as well as the field screening indicators noted. Site Characterization boreholes were advanced at the Ketza Shop and the Mill Areas.

**4. Test Pitting**

Test-pits were advanced with a track mounted backhoe by Boreal Engineering Ltd. Stuart Van Bibber of Associated Engineering conducted the field work onsite from September 9 – 13. Soil samples were collected in 0.5 m intervals from the test-pit faces, and observations involving the presence or absence of pyrite, limestone, rust staining, grain size composition, moisture content, and odours were recorded. Additionally, PID readings were measured from each sample. Depending on the nature and extent of contamination that was expected at each location, target test-pit depths varied. Samples were submitted to the laboratory for the PCoCs identified by the sample depth and location, as well as the field screening indicators noted. Site Characterization test-pits were dug at the Ketza Shop Area, the Mill Area, and along the roadways.

**5. Grab Sampling**

Grab samples were collected by Associated Engineering onsite between September 9 – 13. These were collected by manually scrapping the topsoil (up to 10 cm) off at each sample location, then by collecting a grab sample using a trowel. Samples were submitted to the laboratory for the PCoCs identified by the sample depth and location. Grab samples were collected in the Former Explosives Storage Area.

**5.1 Sampling Protocols**

Sample collection procedures followed laboratory sampling protocols. The soil samples that were collected were put in chemically inert 125 mL glass jars or sealed plastic bags. As directed by ALS Laboratory, certain samples were packaged with no headspace. Samples were placed in a cooler, and submitted to the ALS Laboratory in Whitehorse, Yukon. The samples were collected in accordance with the *Yukon Environment Act 2002/171* Contaminated Sites Regulation (CSR) Protocol No. 3 (YG 2012b).

In order to collect quality data, duplicate soil samples were collected at a rate of 10%, and comprehensive quality assurance/quality control (QA/QC) measures proposed by BCMOE (2003) were used as guidelines, and included:

- wearing a new pair of disposable nitrile gloves for collecting and handling each soil sample;
- using laboratory supplied jars according to the laboratory's recommendations;
- keeping the sealed samples in a cooler filled with ice;
- shipping the samples on time, respecting the samples' holding time requirements proposed through the laboratory QA/QC measures;
- collecting field duplicates for laboratory QA/QC. Field duplicates of soil samples were collected by splitting the soil sample into two separate containers; and
- decontaminating all reusable sampling equipment that was used between locations to prevent cross contamination.

**5.2 Laboratory Methods**

Soil samples were delivered to the ALS Laboratory in Whitehorse, then repackaged and shipped to their ALS Laboratory in Burnaby, which is a Canadian Association for Laboratory Accreditation accredited facility. The samples were analyzed for PCoCs, and the methods used were compliant with the CSR Protocol No. 2 (YG 2012a) and with Protocol No. 5 (YG 2011). Laboratory methods are explained in detail in the analytical reports (Appendix D5), and are summarized below:

- total organic carbon by the organic carbon combustion method;
- chlorinated hydrocarbons in soil by gas chromatography–mass spectrometry;

- chlorinated phenols by tumbler/ gas chromatography–mass spectrometry;
- chromium trivalent and hexavalent;
- cyanide;
- dioxins and furans HR 1613B;
- extractable petroleum hydrocarbons (EPH) in solids by tumbler/ gas chromatography–mass spectrometry;
- glycols (waste anti-freeze) in soil by wrist shaker gas chromatogram by flame ionization detector;
- mercury in soil by cold vapour atomic fluorescence spectroscopy;
- moisture for CSR Metals Calculations;
- light and heavy extractable petroleum hydrocarbons (LEPH/HEPH) subtraction method;
- metals in soil by collision reaction cell Inductively coupled plasma mass spectrometry;
- metals by inductively coupled plasma atomic emission spectroscopy (toxicity characteristic leaching procedure);
- mercury by cold vapour atomic fluorescence spectroscopy (toxicity characteristic leaching procedure);
- phenolics by tumbler gas chromatography–mass spectrometry;
- polycyclic aromatic hydrocarbons (PAH) by rotary extraction;
- polychlorinated biphenyls (PCBs)by extraction with gas chromatogram with electron capture detector;
- total PCBs in soil;
- pH in soil 1:2 soil: water extraction;
- volatile hydrocarbons (VH) in soil by headspace gas chromatography–mass spectrometry;
- volatile petroleum hydrocarbons (VPH) VH minus select aromatics;
- volatile organic compounds (VOC) 7 and/or VOC surrogates for soils;
- volatile petroleum hydrocarbons (VPH) VH minus BTEX/nC6/nC10;
- benzene, ethylbenzene, toluene, xylene (BTEX);
- VPH subtraction methods; and
- sum of xylenes isomer concentrations.

## 6. Mill Area

### 6.1 Objectives and Scope

Around the Mill Area there was a variety of historic potential contaminant sources each with their PCoCs. The purpose of the Site Characterization field work in the Mill Area was to identify and delineate this potential historical contamination, and to conduct a hazardous materials inventory. The field work around the mill consisted of eight boreholes, five test-pits, and a hazardous materials investigation (Figure 5).

#### 6.1.1 Borehole Purpose and Objectives

The purpose and objective for each borehole in the Mill Area was unique, illustrated on Figure 5, and summarized as follows:

- **BH-M-13-01** was drilled in order to delineate potential contamination that may have resulted from landfill seepage, as well as the potential use of waste-rock. The PCoCs included hydrocarbons, and metals, as well as PCBs, glycols, chlorinated hydrocarbons, phenolics, dioxins and furans, (commonly referred to as landfill parameters).
- **BH-M-13-02** was drilled in order to delineate potential contamination that may have resulted from landfill seepage, the potential use of waste-rock. The PCoCs included hydrocarbons, and leachable metals.

- **BH-M-13-03, BH-M-13-04**, and **BH-M-13-05** were drilled in order to characterize materials, which may have been contaminated by two historic fuel spills, and to characterize materials to determine if waste-rock were used in the construction of the area. Additionally, BH-M-13-03 was drilled to determine if contamination may have resulted from the waste oil barrel storage at this location, and BH-M-13-04 and BH-M-13-05 were drilled to characterize spills near a transformer storage area. PCoCs included hydrocarbons, PCBs metals and cyanide for BH-M-13-05.
- **BH-M-13-06** was drilled in order to characterize materials that may have been contaminated from reportedly two historic spills, to determine if waste-rock were used in the construction of the area, to determine if potential contamination from waste oil storage has reached this location, and to determine if there is contamination from the above ground storage oil tank (AST) at this location. PCoCs include hydrocarbons and metals.
- **BH-M-13-07** was drilled in order to characterize materials from two reported historic fuel spills, to characterize materials in order to determine if waste-rock were used in the construction of the area, to characterize potential contamination in front of the generator building, and to determine if contamination from fuel storage and spills in the generator building have extended to this location. PCoCs include metals, cyanide and hydrocarbons. PCoCs for BH-M-13-07 also included antifreeze parameters.
- **BH-M-13-08** was drilled in order to characterize materials from reportedly two historic fuel spills, to characterize materials in order to determine if waste-rock was used in the construction of the area, and to determine if possible spills from in front of the mill building have extended to this location. PCoCs include metals, cyanide and hydrocarbons. PCoCs for BH-M-13-07 also include antifreeze parameters.

### 6.1.2 Test-Pit Purpose and Objectives

The purpose and objective for each test-pit in the Mill Area (Figure 5) was unique and are summarized as follows:

- **TP-M-13-01** was excavated in order to characterize materials which may have been contaminated by two reported historic fuel spills, and to determine if waste rock was used in the construction of the area. The PCoCs for this location were metals, cyanide and hydrocarbons.
- **TP-M-13-02, TP-M-13-03**, and **TP-M-13-04** were excavated in order to characterize materials which may have been contaminated reportedly by two historic fuel spills, to characterize spills near the transformer storage area, and to characterize materials to determine if waste rock was used in the construction of the area. The PCoCs were metals, cyanide, and hydrocarbons.
- **TP-M-13-05** was excavated in order to delineate vertical hydrocarbon contamination from a reportedly previous spill. The PCoCs for this location were metals, cyanide and hydrocarbons.

### 6.1.3 Hazardous Materials Inventory Purpose and Objectives

A hazardous materials inventory was conducted at the Mill Area in order to classify and quantify the existing hazardous materials. The scope of the hazardous materials inventory included an investigation of the old rail car tank, a site reconnaissance, collecting samples, and materials analyses.

## 6.2 Summary of Results

A summary of the results from the field screening and observations, along with a description of the samples that were submitted to the laboratory for analyses are outlined below for each borehole or test-pit, also illustrated on Figure 5. Analytical results from the Mill Area are summarized in Appendix D5 and borehole logs are available in Appendix A. Analytical results from duplicate samples and from some samples collected from Mill Area test-pits are not yet available.

### 6.2.1 Borehole Results

**BH-M-13-01**

- BH-M-13-01 extended to 3.0 mbgs. The field screening results from this borehole included PID readings of 0 ppm with no observed odours for the entire length of the borehole. From 0 – 1.0 mbgs, assorted garbage was found but there was not sufficient soil to sample. Soil samples were collected from 1.1 – 3.0 mbgs. Some garbage was still observed between 1.1 – 1.5 mbgs, and garbage and woody debris were noted from 2.5 – 3.0 mbgs. Rust staining was present in samples from 1.1 – 3.0 mbgs, and there was no indication of pyrite observed at any depths throughout the borehole. Possible signs of limestone were noted at 2.1 – 2.5 mbgs and indications of galena were noted from 1.6 – 2.5 mbgs. The soil in this borehole is consistent and best described as damp gravel and sand with trace amounts of silt. Drilling refusal (i.e., drilling termination due to underlying boulder or bedrock stratigraphy) was encountered at 3.0 mbgs due to a boulder.
- PCoCs analyzed included: Metals and EPH analyses on the samples from 1.1 – 2.5 mbgs. Additionally, the sample from 1.1 – 1.5 was analyzed for LEPH/HEPH, total organic carbon, BTEX, VPH, PAH, landfill parameters and leachable metals.

**BH-M-13-02**

- BH-M-13-02 extended to 3.5 mbgs. The field screening from this borehole included PID readings of 0 ppm and no observed odours for the boreholes' entire depth of 3.5 mbgs. Rust staining was observed in samples from 2.1 – 3.5 mbgs, and there was no indication of pyrite or limestone observed at any depths throughout the borehole. The soil at this location is relatively consistent and best described as damp sand with some gravel. Moisture content in the sample collected from 3.1-3.5 mbgs was saturated. Additionally, organics were observed in the top 1.0 mbgs, and trace cobbles were observed at depths greater than 2.1 mbgs.
- PCoCs analyzed from the 3.1 – 3.5 mbgs sample included: total organic carbon, metals, BTEX, VPH, PAH, LEPH/HEPH, EPH, PCBs, glycols, chlorinated hydrocarbons, phenolics, and dioxins and furans. Arsenic was analyzed for the sample from 1.6-2.0 mbgs.

**BH-M-13-03**

- BH-M-13-03 extended to 4.1 mbgs. The field screening results from this borehole included PID readings of 0 ppm and no observed odours for the borehole's entire depth of 4.0 mbgs. Rust staining was observed in samples from 0.6 – 2.5 mbgs, and there was no indication of pyrite or limestone throughout the borehole. The soil at this location is best described as damp gravelly sand. Additionally, some clay was observed from 0.6 – 1.0 mbgs, an aluminum can was found at 0.75 mbgs, some silt was observed from 2.1 – 3.0 mbgs, and trace organics were found from 3.0 – 3.3 mbgs. Refusal was encountered at 4.1 mbgs where cobble was encountered.
- PCoCs analyzed included: cyanide, metals, BTEX, LEPH/HEPH, EPH, PAH, VPH and leachable metals for samples from 0.0 – 0.5 mbgs. Metals were analyzed on samples from 0.0 – 0.5 mbgs, 1.1 – 1.5 mbgs.

**BH-M-13-04**

- Due to refusal at 2.0 mbgs, the first attempt at drilling this borehole was abandoned and it was relocated to an adjacent location. BH-M-13-04 was advanced to 4.5 mbgs. The field screening for this borehole indicated methane concentrations of 270 ppm at 1.1 – 1.5 mbgs, and that there are no observed odours for the entire 4.5 mbgs depth of this borehole. No samples were recovered from 1.6 – 3.0 mbgs due to an air pocket. Soils from

this borehole are relatively consistent and described as sand and gravel with trace amounts of silt. There was also trace amounts of clay noted from 3.1 – 4.5 mbgs.

- PCoCs for samples from 0.0 – 0.5 mbgs and 1.1 – 1.5 mbgs were analyzed for cyanide, metals, BTEX, LEPH/HEPH, EPH, PAH and VPH. Additionally, the sample from 0.0 – 0.5 mbgs was analyzed for leachable metals and the sample from 31.-3.5 mbgs for metals.

**BH-M-13-05**

- Due to refusal at 2.0 mbgs, the first attempt at drilling this borehole was abandoned and it was relocated to an adjacent location. BH-M-13-05 was advanced to 5.5 mbgs. Other than a faint, indistinguishable odour at 0.6 – 1.0 mbgs, field screening results from this borehole's second location included no observed odours for its entire depth. Except for the sample from 1.1 – 1.5 mbgs which had a hydrocarbon vapour reading of 3 ppm, PID readings showed PID readings of 0 ppm. Methane concentrations of 10 – 55 ppm were observed between 0.6 – 2.0 mbgs. Rust staining was observed in all of the samples except those from 3.6 – 4.5 mbgs, and no indicates of pyrite or limestone were observed throughout the entirety of the borehole. The soil at this location is best described as gravel and sand with trace amounts of silt. Some cobbles were observed sporadically throughout the borehole, and some organics were observed between 3.6 – 4.2 mbgs. The soil was generally observed to be dry until approximately 2.6 mbgs where it was damp, and groundwater was encountered at 5.2 mbgs.
- PCoCs analyzed included: Metals on samples from 0.0 – 2.5 mbgs. Additionally, BTEX, LEPH/HEPH, EPH, PAH and VPH were analyzed on samples from 0.0 – 0.5 mbgs, and from 1.1 – 1.5 mbgs. Leachable metals and PCBs were analyzed on the sample from 1.1 – 1.5 mbgs.

**BH-M-13-06**

- BH-M-13-06 was extended to 4.5 mbgs. The field screening results include no observed odours, and PID readings of 0 ppm for the entire borehole depth. Rust staining was observed in the first 2.0 mbgs only, and no indications of limestone or pyrite were observed in this borehole. The soil at this location is best described as gravelly sand from 0.0 – 2.5 mbgs, with some clay also observed from 1.1 – 2.5 mbgs. From 2.6 – 4.5 mbgs, the soil is best described as silt with some sand, and trace gravels. The moisture content of the soil was wet at the surface and otherwise damp until 3.3 – 3.6 mbgs, where a permafrost layer was encountered. A second permafrost layer was encountered from 4.0 – 4.3 mbgs.
- No soil samples were sent to the laboratory for analysis from this location due to the lack of contamination indication through field screening.

**BH-M-13-07**

- The first attempt at drilling this borehole was abandoned at 4.5 mbgs due to groundwater at 2.0 mbgs that compromised sample collection. The second attempt at this borehole extended to a depth of 3.0 mbgs. No samples were collected from 1.6 – 2.5 mbgs due to groundwater at this depth. Field screening results indicated that odours were present from 0.4 – 1.5 mbgs and from 2.6 – 3.0 mbgs. PID readings between 43 – 168 ppm were observed. Rust staining was observed from 0.0 – 0.5 mbgs, and from 2.6 – 3.0 mbgs only, and no indications of pyrite or limestone were observed. The soil from this borehole is relatively consistent and is best described as moist sand and gravel with trace silts. Groundwater was encountered from 1.6 – 2.5 mbgs with unsaturated soil beneath this depth.

- PCoCs analyzed included metals from 0.0 – 1.5 mbgs and 2.6 – 3.0 mbgs for metals (with leachable metals analyzed for samples from 0.0 – 1.0 mbgs). Furthermore, samples from 0.0-1.5 mbgs were analyzed for BTEX, LEPH/HEPH, EPH, PAH and VPH.

**BH-M-13-08**

- The first attempt at drilling this borehole was abandoned due to refusal from a clay layer at 2.0 mbgs. The second attempt at this borehole extended to 4.0 mbgs. The field screening results from this borehole included PID readings of 0 ppm from 0.0 – 3.0 mbgs, and 21 - 35 between 3.1 – 4.0 mbgs. No odours were observed in any samples from the entire 4.0 m depth of this borehole. Rust staining was observed at depths greater than 0.6 mbgs, and no indications of pyrite or limestone were observed. Soil at this location is described as saturated sand with some gravel and trace silt for the first 0.5 mbgs. From 0.6 – 1.5 mbgs, the soil is comprised of damp gravel and sand with trace silt, and from 1.6 – 2.0, it consists of clay with some silt and traces of sand and gravel. From 2.1 – 4.0 mbgs, the soil generally consists of relatively equal amounts of damp gravel, sand, silt, and clay.
- PCoCs analyzed in soils from 0.0 – 0.5 mbgs, and from 2.6 – 4.0 mbgs included metals BTEX, LEPH/HEPH, EPH, PAH and VPH. Additionally, samples from 2.6 – 3.5 mbgs were analyzed for leachable metals and the sample from 3.1 – 3.5 mbgs was analyzed for cyanide.

### 6.2.2 Test-Pit Results

**TP-M-13-01**

- TP-M-13-01 was extended to a depth of 3.5 mbgs. The field screening results from this test-pit included PID readings of 0 ppm, and no observed odours for the entire depth of the test-pit. Rust staining was observed in samples from 0 – 2.5 mbgs, and pyrite was observed in samples from 0.0 – 1.0 mbgs, and 1.6 – 2.0 mbgs. There were no indications of limestone throughout the borehole. The soil at this borehole is relatively consistent and is best described as damp sand with some gravel, cobbles, and organics, and trace silts. No observations of geochemical indicators or soil compositions were made beyond 2.5 mbgs.
- PCoC included metals, analyzed on three soil samples at this location.

**TP-M-13-02**

- The first attempt at this test pit was abandoned due to a pipe which was encountered at 1.4 mbgs that compromised sample collection. A test pit was excavated adjacent to the location to a depth of 2.0 mbgs. The field screening results from this test-pit included PID readings of 0 ppm, and no observed odours for the entire depth of the test-pit. Indications of rust staining were observed in the soil, and there were no signs of limestone or pyrite for the entire test-pit. The soil is best described as damp sand with some gravel and cobbles, and trace of silts.
- PCoC included metals at two soil samples from this location.

**TP-M-13-03**

- TP-M-13-03 was extended to 5.0 mbgs. The field screening results from this test-pit included PID readings of 0 ppm, and no observed odours from 0.0 – 2.0 mbgs. From 2.1- 4.0 mbgs, odours were observed and PID readings between 2 – 25 ppm were recorded. From 4.1 – 5.0 mbgs, PID readings of 0 ppm were observed, and possible faint odours were noted in the soil. Indications of rust staining and pyrite, and no indications of limestone were observed in the soil to a depth of 2.5 mbgs. No geochemical observations were made between 2.6 – 3.5 mbgs; however, from 3.6 – 5.0 mbgs, there were no signs of rust staining, pyrite, or limestone in the soil. From 0 – 3.5 mbgs, the soil can be described as sand with some gravel, and trace silts, cobbles, and organics. From 3.6 – 5.0 mbgs, the soil is comprised of sand with some silts and trace organics. The moisture content of the soil was damp until 4.8 mbgs, where groundwater was encountered.
- Four soil samples are being analyzed for metals from this location.

**TP-M-13-04**

- This test-pit was extended to 2.0 mbgs. The field screening results from this test-pit included PID readings of 0 ppm, and no observed odours for the entire 2.0 mbgs depth of the test-pit. Pyrite and rust staining was observed to a depth of 1.0 mbgs and 1.5 mbgs, respectively. No signs of limestone were noted in the soil from 0.0 – 1.5 mbgs.
- No soil samples were sent to the laboratory for analysis from this location.

**TP-M-13-05**

- TP-M-13-05 was extended to a depth of 2.0 mbgs. The field screening results from this test-pit included PID readings of 0 ppm, and no observed odours for the entire depth of the test-pit. Rust staining was observed throughout the samples collected, and pyrite was observed from 0.6 – 1.5 mbgs only. There was no evidence of limestone throughout the test-pit. The soil at this location is best described as damp sand with some gravel and cobbles, with the addition of trace silts from 1.6 – 2.0 mbgs.
- No soil samples were sent to the laboratory for analysis from this location.

### 6.2.3 Hazardous Materials Inventory Results

The following is a summary of the hazardous materials inventory that was completed at the Mill Area (Figure 5):

**Rail Car Tank**

Sumas Environmental Services Inc. was tasked to identify the contents of the rail car tank located at the northwest end of the Mill Area. A process sheet was found in the Mill building lab included a diagram that indicated the rail car tank contained sulphur dioxide. After opening a valve at the manifold on top of the rail car tanker, and a valve at the pressure gauge box, a small “puff” of gas exited the tank. From this off-gassing, the field monitor measured 70 ppm of sulphur dioxide. More valves were opened, but no measurable sulphur dioxide was released. A manifold valve on top of the tank was removed, and three holes were drilled in the side of the tank. A tube with a small hand pump was inserted into the tank to collect a liquid sample from the bottom of the tank. No sample was retrieved as it was dry. From our reconnaissance, we found the rail car to be empty and we believe that it historically contained sulphur dioxide.

**Thickener and Clarifier Tanks**

Located west of the rail car tank are the thickener and clarifier tanks. The area under the tanks contains a significant pile of mill sludge. This area was flooded by surface run-off as it travels through the building and floods the berms around Tanks 1 – 6. The mill sludge pile was sampled for hazardous materials characterization. The contents of the tanks were not sampled.

**South of the Mill**

At the south end of the mill, past the generators and fuel storage area, there was a landfill which contained three above ground storage tanks (two approximately 1,000 L and one 3,000 L tanks). Each of these tanks was found to contain approximately 100 L of diesel fuel.

**West of the Mill**

West of the mill, there was a collection of battered drums, mostly in poor condition, which contained oil, grease, dirt, rags, and rain water. Adjacent to this was a field containing mostly electrical debris. During the hazardous material survey of this field, the visual observations found no PCB ballasts, capacitors, or transformers.

**East of the Mill**

On the east side of the mill there were two ASTs containing diesel. Between the generator room and Dennison Environmental Services workshop was a full propane bottle storage rack shop. The bottles appeared to be well maintained, and in use by Dennison Environmental Services.

**Inside the Mill Building**

During the hazardous materials survey, samples were collected and inventoried within the mill building.

- Tanks 1-6 were found to contain sludge and solids. The tanks had holes cut in them, and the bermed area around them was flooded with water run-off and process sludge, which was sampled. The ground water flowed through the bermed area and migrated to the east wall of the building. The refined process sludge will be analyzed in order to categorize this material.
- Twelve tote sacks of lime and 5.5 skids of flocculants, sodium metabisulphite, and ferric chloride were found in the ball mill. These appeared to be unused and still in their original packaging. Approximately 5 $m^3$ of lime appeared to have been spilled on the floor surrounding the tote sacks.
- The other mill tanks appeared empty, except for some dried residue on the bottom of the tanks. This material was sampled, analyzed, and documented in historic reports.
- The coarse ore bin and the two fine ore bins in the Mill Building were found to be mostly empty, except for some residue material that remains in each of them. A sample of fine ore residue was collected but it has not been analyzed as there is material can be classified from the historical use of these bins.

## 7. Ketza Shop Area

### 7.1 Objectives and Scope

The objectives of the site characterization at the Ketza Shop were to identify and delineate previous hydrocarbon spills, and to determine if geochemical contamination resulting from waste rock is present at this location. The scope of the site characterization investigations at the Ketza Shop comprised of two boreholes and three test-pits, as well as a hazardous materials inventory, as described below (Figure 5).

### 7.1.1 Borehole Purpose and Objectives

Two boreholes were advanced at the Ketza Shop Area to delineate hydrocarbon contamination from previous spills. BH-KZ-13-01 was drilled near the area where a spill occurred from a former AST, and BH-KZ-13-02 was drilled near the location of a previous spill beneath the former Ketza shop. The PCoCs for these boreholes included metals, cyanide and hydrocarbons.

### 7.1.2 Test-Pit Purpose and Objectives

Three test-pits were dug at the Ketza Shop location to delineate hydrocarbon contamination that occurred from spills within the shop, to the west of the shop, and to the south of the shop. TP-KZ-13-01 was dug north of the expected contamination, TP-KZ-13-02 was west of the expected contamination, and TP-KZ-13-03 was dug southwest of the expected contamination. The PCoCs for these locations were metals, cyanide and hydrocarbons.

### 7.1.3 Hazardous Materials Inventory Purpose and Objectives

A hazardous materials inventory was conducted at the Ketza Shop Area to classify and quantify the hazardous materials that remain at this location. The scope of the hazardous materials inventory included a site reconnaissance, collecting samples, and analyses of samples for categorizing hazardous materials.

## 7.2 Summary of Results

Analytical results from the Ketza Shop are available in Appendix D5 and borehole logs are available in Appendix A. A summary of the results from the field screening and observations, along with a description of the samples that were submitted to the laboratory for analyses are outlined for each borehole or test-pit below:

### 7.2.1 Borehole Results

**BH-KZ-13-01**

- BH-KZ-13-01 was extended to 4.0 mbgs. The field screening results from BH-KZ-13-01 indicated PID readings < 50 ppm for the first 1.0 mbgs, and below 10 ppm for the other samples. Hydrocarbon odours were observed from 3.1 – 3.5 mbgs. Some methane (1720 ppm) was observed in the first 0.5 mbgs, but was not at depths greater than this. Rust staining was observed in samples from 1.1 – 3.5 mbgs only, and there was no indication of pyrite or limestone observed at any depths throughout the borehole. The soil at this location is best described as damp sandy gravel or gravelly sand with trace cobbles, with the addition of some clay between 0.6 – 2.0 mbgs. Refusal was encountered at 4.0 mbgs.
- PCoCs included: cyanide, BTEX, EPH, and PAHs which were analyzed in soil collected from the first 1.0 mbgs. Leachable metals were analyzed on the sample from the first 0.5 mbgs, and total metals were analyzed on all of the samples from the first 1.5 mbgs. Arsenic was also analyzed from samples collected from 2.1 – 2.5 mbgs, and 3.1 – 3.5 mbgs.

**BH-KZ-13-02**

- BH-KZ-13-02 was extended to 3.5 mbgs. The field screening from this borehole included PID readings of 0 ppm, no observed odours, and no observations of pyrite or limestone for the entire borehole depth of 3.5 mbgs. Some rust staining was observed in soil samples from 2.1 – 2.5 mbgs only. The soil at this location is best described as damp sand, with trace to some gravels, and the addition of trace cobbles at 2.1 - 3.0 mbgs.

- PCoCs included: cyanide, and leachable metals analyzed in samples from 0 – 0.5 mbgs. BTEX, LEPH/HEPH, and PAH were also analyzed in samples from 1.0 – 1.5 mbgs, and total metals were analyzed in samples from 0.0 – 0.5, 1.0 – 1.5, and 2.0 – 2.5 mbgs.

### 7.2.2 Test-Pit Results

**TP-KZ-13-01**

- TP-KZ-13-01 was extended to 2.0 mbgs. The field screening from this test-pit included PID readings of 0 ppm, and no observed odours for the borehole's entire depth. Rust staining was observed throughout the test-pit, and there were no indications of pyrite or limestone. The soil at this location is best described as dry to damp gravel and sand with some boulders and cobbles from 0.0 – 1.0 mbgs, and as damp sand with some gravel, and traces of silt and cobbles from 1.0 – 2.0 mbgs.
- No soil samples were analyzed at the laboratory from this test-pit.

**TP-KZ-13-02**

- TP-KZ-1302 was extended to 2.0 mbgs. The field screening from this test-pit included PID readings of 0 ppm, and no observed odours for the borehole's entre depth. Pyrite and indications of limestone were observed from 0.0 – 1.0 mbgs and rust staining was observed through in of the samples in this test-pit. The soil at this location is best described as dry gravel and sand from 0.0 – 1.0 mbgs, and as damp sand with some cobbles, gravel, and silt from 1.0 – 2.0 mbgs.
- No soil samples were analyzed at the laboratory from this test-pit.

**TP-KZ-13-03**

- TP-KZ-13-03 was advanced to 2.0 mbgs. The field screening results from this test-pit does not include PID results, and the presence or absence of odours is not noted for its entire depth of 2.0 mbgs. Rust staining and no indications of pyrite or limestone were observed in soil throughout the entire depth of this test-pit. The soil at this location is described as damp, and a relatively equal mixture of gravel, sand and cobble for the first 0.0 – 1.0 mbgs. From 1.0 – 2.0 mbgs, the soil is described as moist sand and cobbles with some gravel.
- No soil samples were analyzed at the laboratory from this test-pit.

### 7.2.3 Hazardous Materials Inventory Results

Although the shop has been removed, hazardous materials remain in this area. The materials observed include:

- five yellow sealed containers labelled as copper sulphate also contain dirt. This may be from a spill clean-up;
- two drums and nine pails contain solvents, oils and antifreeze; and
- approximately 30 wooden poles or piles are piled beside the drums under a tarp. These appear to be treated with a "creosote-like" wood preservative.

## 8. Roadways

### 8.1 Objectives and Scope

The objectives of the Site Characterization field work along the roadways were to determine if these were constructed with waste rock or if this material may have been contaminated from the use of oil as a dust suppressant. The PCoCs for these samples included: metals, cyanide and hydrocarbons. The scope of the work along the roadways included five test-pits (Figure 5).

### 8.2 Summary of Results

Analytical results from the Roadways are available in Appendix D5 and borehole logs are available in Appendix A. Soil sample and duplicate sample analytical results collected from the roadways are not yet available. A summary of the results from the field screening and observations, along with a description of the samples that were submitted to the laboratory for analyses is outlined for each test-pit, illustrated on Figure 5 and described below:

**TP-R-13-01**

- TP-R-13-01 was advanced to 1.9 mbgs. The field screening results from this test-pit included PID readings of 0 ppm, and no observed odours for its entire depth, where cobble was encountered at 1.9 mbgs. Rust staining was observed in samples throughout the test-pit, and indications of pyrite were observed from 0.6 – 1.9 mbgs. No limestone was observed at this location. The soil at this test-pit can generally be described as damp sand with some gravel, cobbles, and boulders, and trace amounts of silt.
- Four soil samples are being analyzed for metals, and one additional sample is being analyzed for leachable metals from this test-pit.

**TP-R-13-02**

- TP-R-13-02 was extended to 2.0 mbgs. The field screening results from this test-pit included PID readings of 0 ppm, and no observed odours for its entire depth of 1.5 mbgs. Rust staining was observed in samples throughout the test-pit, pyrite was observed from 0.6 – 1.0 mbgs and no indications of limestone were observed. The soil at this test-pit is best described as damp gravelly-sand, with some cobbles and trace boulders.
- Four soil samples are being analyzed for metals, and one soil sample is being analyzed for leachable metals.

**TP-R-13-03**

- TP-R-13-03 extended to 2.0 mbgs. The field screening results from this test-pit included PID readings of 0 ppm, and no observed odours for its entire depth. Rust staining and pyrite were observed were observed throughout the entire test-pit, and no indications of limestone were observed. The soil at this test-pit is best described as damp gravelly-sand, with some cobbles and trace boulders.
- Two soil samples are being analyzed for metals, and one for leachable metals.

**TP-R-13-04**

- TP-R-13-04 was extended to 2.0 mbgs. The field screening results from this test-pit included no observed odours for its entire depth of 2.0 mbgs. There are no PID results recorded for this test-pit. Rust staining was observed throughout the test-pit, and there are no indications of pyrite or limestone for this location. The soil at this location is best described as damp gravel with some sand and cobbles, and trace silts in the first 0.5 m, and as gravelly sand with some cobbles from 0.6 – 2.0 mbgs. Additionally, trace silts were observed between 1.1 – 1.5 mbgs.
- No soil samples were analyzed at the laboratory from this location.

**TP-R-13-05**

- TP-R-13-05 was extended to 2.0 mbgs. The field screening results from this test-pit included PID readings of 0 ppm, and no observed odours for its entire depth. Rust staining and pyrite were observed throughout the test-pit, and there were no indications of limestone were noted. The soil at this location is best described as damp gravel and sand with trace silts in the top 1.0 mbgs. From 1.1 – 2.0 mbgs, the soil is described as damp sand with some gravel and trace silts.

- No soil samples were analyzed at this location.

## 9. Bunkhouse Area

### 9.1 Objectives and Scope

A hazardous materials inventory was conducted at the bunkhouse area (Figure 5) in order to classify and quantify the hazardous materials that remain at this location. The scope of the hazardous materials inventory included a site reconnaissance, collecting samples and hazardous materials categorizing.

### 9.2 Summary of Results

The hazardous materials survey identified the following concerns near the bunkhouse:

- three propane tanks located behind the cookhouse are still in use;
- one gas tank by the bunkhouse is still in use;
- one drum containing grease, debris, and water; and
- a large pile of garbage bags containing insulation.

## 10. Former Explosives Storage Area

### 10.1 Objectives and Scope

Sample and analyses of soil from the former explosives storage area was conducted (Figure 1) in order to classify and quantify the hazardous materials that remain at this location.

The objective of the Site Characterization field work around the Former Explosives Storage Area was to determine if contamination from the explosives may be present. The PCoCs for these samples included: total Kjeldahl Nitrogen, available ammonium (as N), nitrate + nitrite (as N), nitrate (as N) and nitrite (as N). The scope of the work for this area included four grab samples.

### 10.2 Summary of Results

Analytical results from the Former Explosives Storage Area are available in Appendix D5. The three samples from the area and the one background samples were analyzed for the PCoCs associated with explosives. They were also analyzed for metals concentrations to further understand the distribution of metals concentration with the Mount Nansen area.

## References

British Columbia Ministry of Environment (BCMOE). 2003. British Columbia Field Sampling Manual. January 2003.

Yukon Government (YG). 2011. Protocol No. 5: Petroleum Hydrocarbon Analytical Methods and Standards. *Yukon Environment Act O.I.C. 2002/171.*

Yukon Government (YG). 2012a. Protocol No. 2: Analysis of Samples Taken in Relation to the Contaminated Sites Regulation. *Yukon Environment Act O.I.C. 2002/171.*

Yukon Government (YG). 2012b. Protocol No. 3: Soil Sampling Procedures at Contaminated Sites. *Yukon Environment Act O.I.C. 2002/171.*

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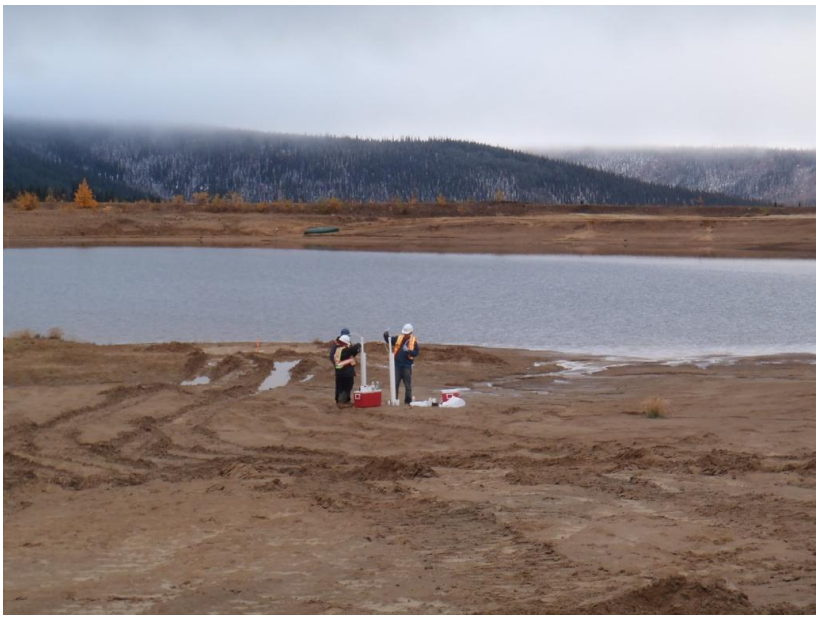

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PHOTO 4: BH-T-13-01, 6.0-7.5 m, left at the drill site overnight.

PHOTO 5: BH-T-13-01, 6.0-7.5 m, transported to the core racks in a pickup truck shortly after the previous photo was taken.

PHOTO 6: BH-T-13-01, 7.5 to 13.5 m, EOH.

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PHOTO 8: BH-T-13-01, 12.0 to 13.5 m, after transported to core racks in a pickup truck.

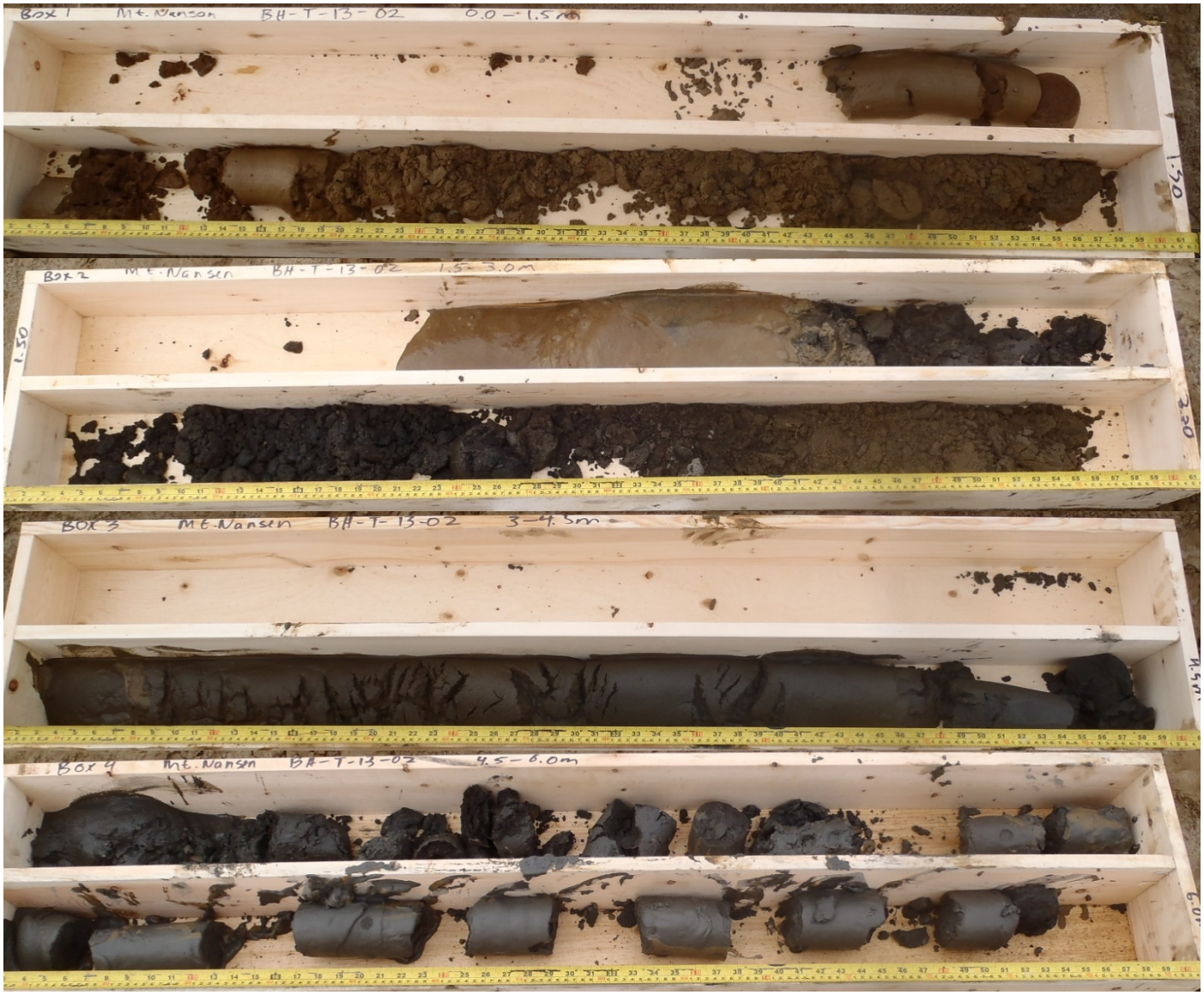


PHOTO 9: BH-T-13-02, 0.0 to 6.0 m.

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Missing photo of Box 7.

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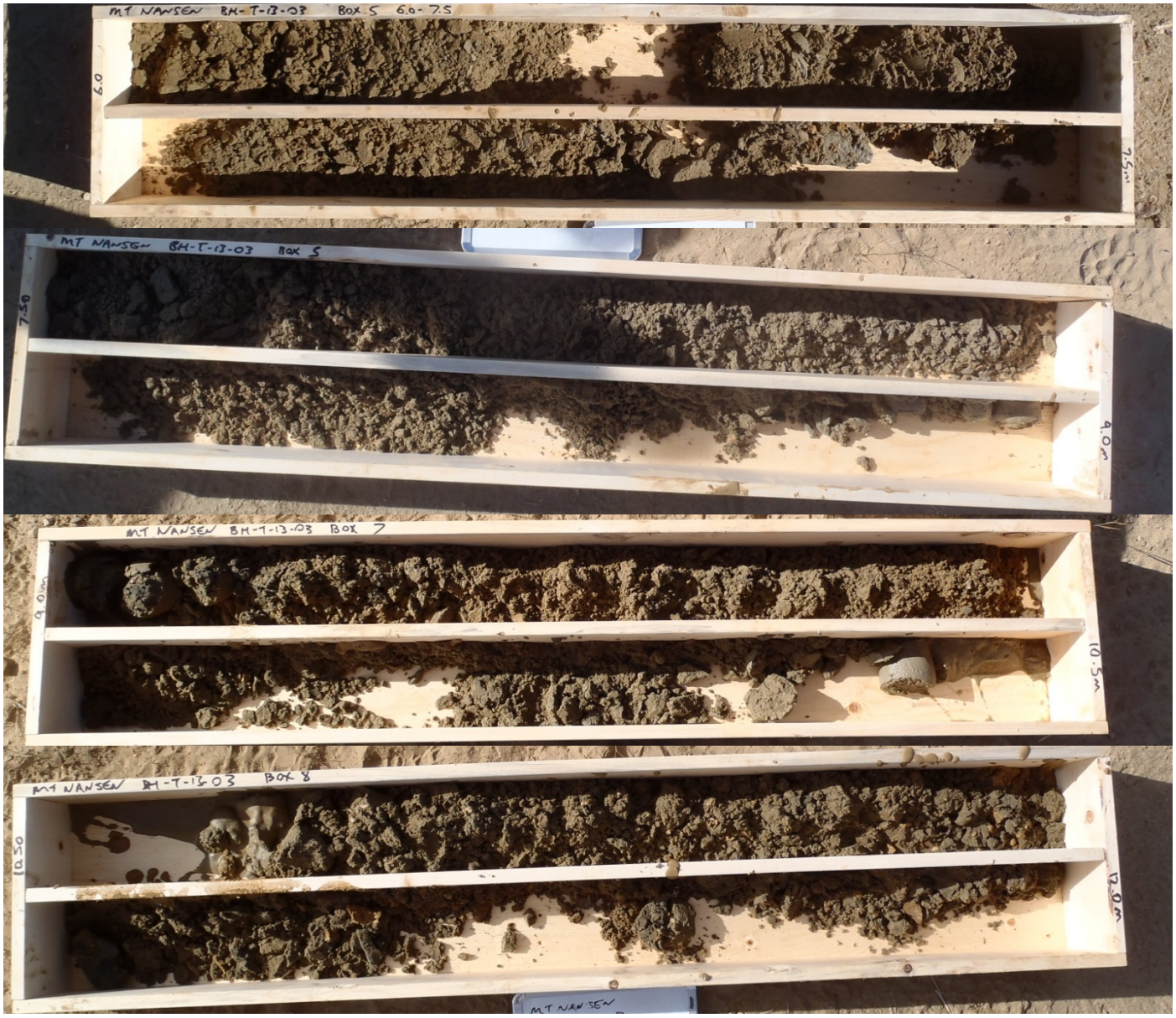


PHOTO 13: BH-T-13-03, 6.0-12.0 m.

PHOTO 14: BH-T-13-03, 12.0-16.5 m, EOH.

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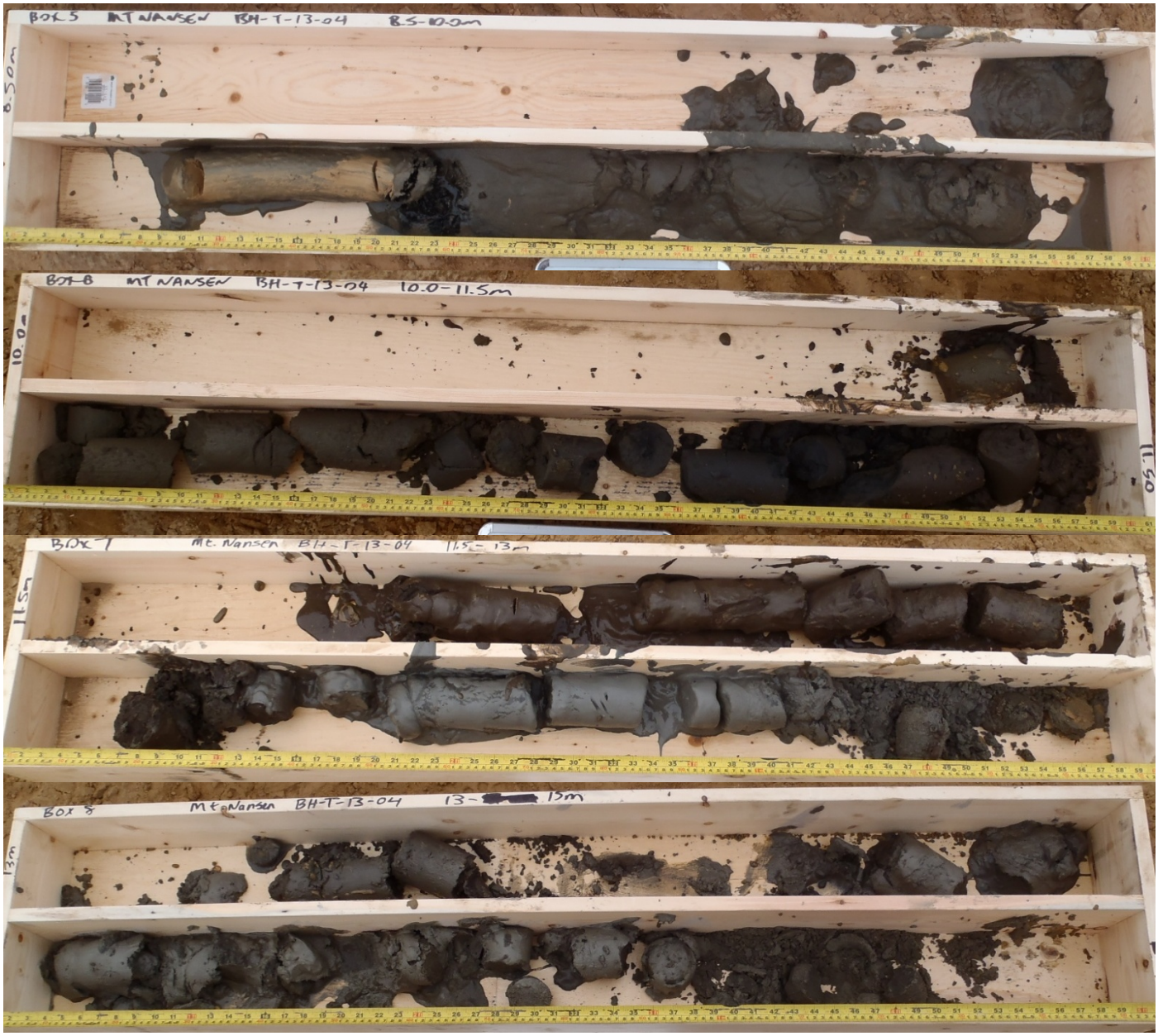


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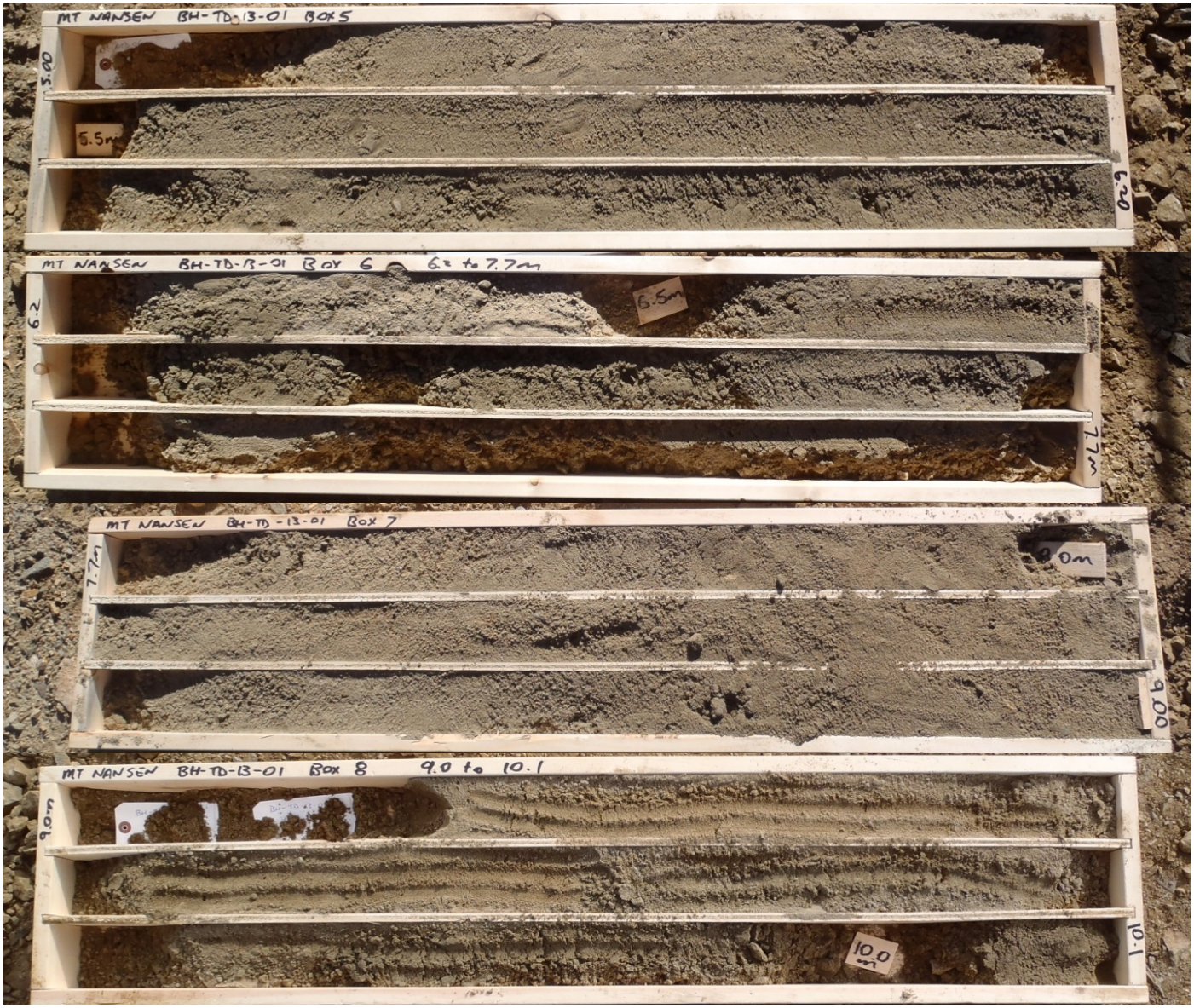


PHOTO 21: BH-TD-13-01, 5.0-10.1 m.

PHOTO 22: BH-TD-13-01, 10.1-16.5 m.

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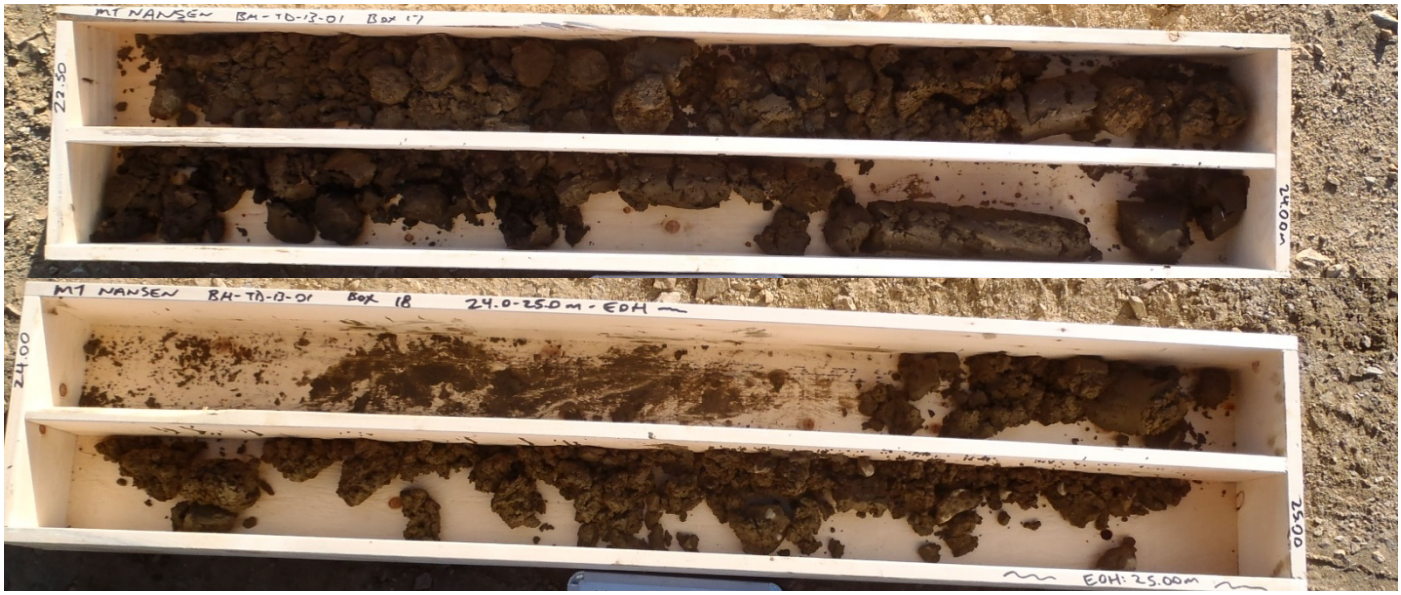


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Time Zero

2 Hours Later

5 Hours Later

2 Days Later

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PHOTO 3: TP-BA-13-03 Below 4.4 m: Dense permafrost soil below.

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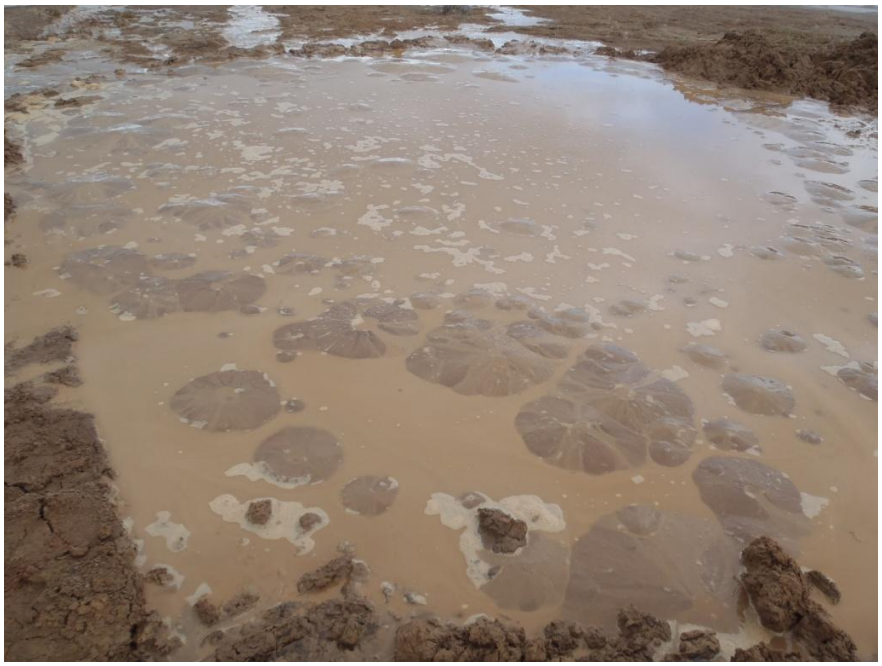

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PHOTO 50: TP-T-13-06: Sand tailings overlying native sand at 2 m depth.

PHOTO 51: TP-T-13-06: Native sand at 4 m depth.

PHOTO 52: TP-T-13-06: Test pit sloughed at completion.

PHOTO 53: TP-T-13-06: Test pit filled with water and circular after being left open overnight.

PHOTO 54: TP-T-13-07: One pass with the excavator to the test pit.

PHOTO 55: TP-T-13-07: Test pit at about 1 m depth.

PHOTO 56: TP-T-13-07: Test pit at completion.

PHOTO 57: TP-T-13-07: Test pit filled with water after being left open overnight.

PHOTO 58: TP-T-13-09: Five passes with the excavator on the tailings surface.

PHOTO 59: TP-T-13-09: Test pit at about 1.5 m depth.

PHOTO 60: TP-T-13-09: Tailings sample at 4 m depth.

PHOTO 61: TP-T-13-09: Test pit at completion.

PHOTO 62: TP-T-13-09: Sloughed and filled with water after being left open overnight.

**Photos of Test Pits in Waste Rock Area**

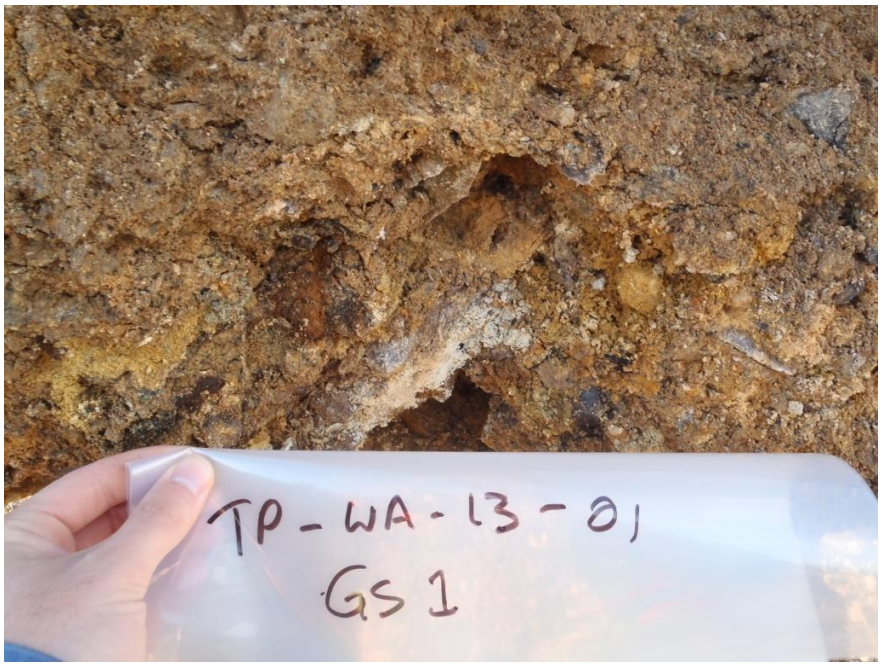


PHOTO 63: TP-WA-13-01: Highly oxidized waste rock at 1 m depth.

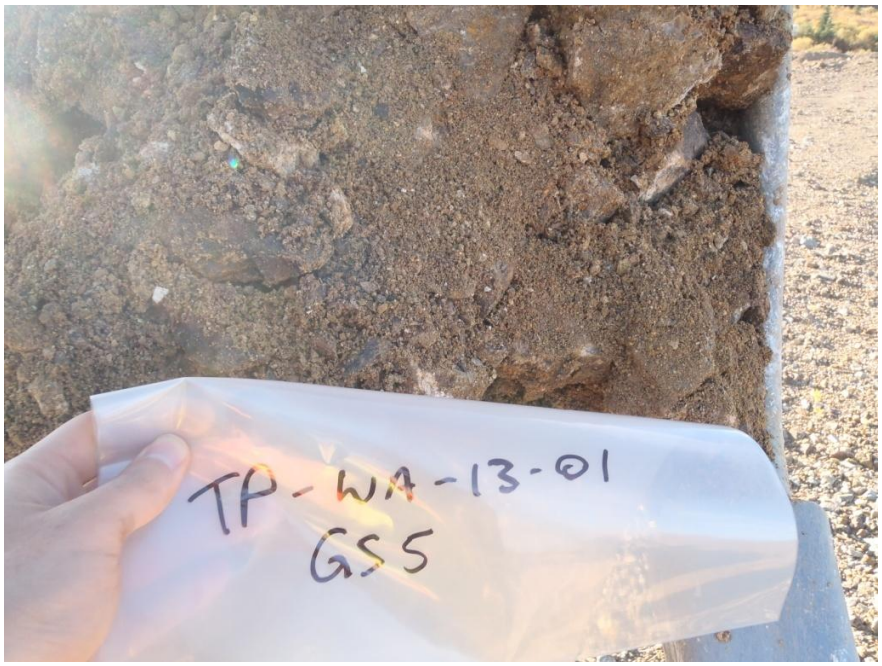


PHOTO 64: TP-WA-13-01: Low oxidized waste rock at 4 m depth.

PHOTO 65:  TP-WA-13-01: Test pit at completion.

PHOTO 66:  TP-WA-13-02: Moist waste rock sample at 1 m depth.

PHOTO 67:  TP-WA-13-02: Thin layer of organics at 1.9 m separating 2 layers of waste rock.

PHOTO 68:  TP-WA-13-02: Native sand at 4.2 m depth.

PHOTO 69: TP-WA-13-02: Weathered bedrock at 5.2 m depth.

PHOTO 70: TP-WA-13-02: Test pit at completion.

PHOTO 71: TP-WA-13-02: Weathered bedrock and native sand at bottom of test pit.

PHOTO 72: TP-WA-13-03: Waste rock sample at 2 m depth.

PHOTO 73: TP-WA-13-03: Layer of organics between waste rock at 2.6 m depth.

PHOTO 74: TP-WA-13-03: Low level oxidation waste rock, lots of oversize particles at 2.9 m depth.

PHOTO 75: TP-WA-13-03: Test pit at completion.

PHOTO 76: TP-WA-13-04: Moderate level of oxidation waste rock at 2 m depth.

PHOTO 77: TP-WA-13-04: Example of a highly weathered piece of granitic rock, can crumble in hand, about 1 m depth.

PHOTO 78: TP-WA-13-04: Test pit at completion.

PHOTO 79: TP-WA-13-05: Waste rock sample with about 70% oversize 25 mm, at 3 m depth.

PHOTO 80: TP-WA-13-05: Test pit at completion, sloughing in.

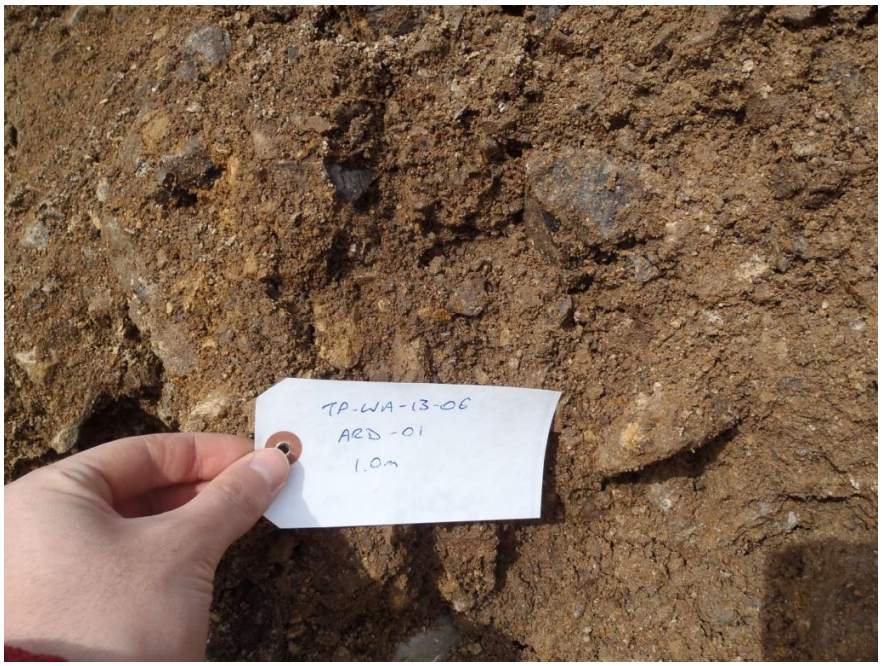


PHOTO 81: TP-WA-13-06: Moderately weathered waste rock sample with about 45 % oversize 25 mm at 1 m depth.

PHOTO 82: TP-WA-13-06: 300 mm thick waste rock stratified layers in upper meter.

PHOTO 83: TP-WA-13-06: Oxidized waste rock sample at 4 m depth, about 60% oversize 25 mm.

PHOTO 84: TP-WA-13-06: Test pit at completion.

PHOTO 85: TP-WA-13-07: Moist waste rock at 1 m depth, about 40% oversize 25 mm.

PHOTO 86: TP-WA-13-07: Test pit at about 2 m depth.

PHOTO 87: TP-WA-13-07: Test pit at completion.

PHOTO 88: TP-WA-13-08: Waste rock sample at 2 m depth.

PHOTO 89:  TP-WA-13-08: Test pit at completion.

PHOTO 90:  TP-WA-13-08: Weathered bedrock at 4 m depth.

PHOTO 91: TP-WA-13-09: Excavator building access to test pit site.

PHOTO 92: TP-WA-13-09: Test pit at 2 m depth.

PHOTO 93: TP-WA-13-09: Waste rock sample at 4 m depth, about 80% oversize 25 mm.

PHOTO 94: TP-WA-13-09: Test pit at completion.

PHOTO 95: TP-WA-13-10: Spoil pile at completion, over 70% oversize 25 mm.

PHOTO 96: TP-WA-13-10: Waste rock sample at 3 m depth.

PHOTO 97: TP-WA-13-10: Test pit at completion.

PHOTO 98: TP-WA-13-11: Test pit to about 2 m depth, lots of boulders and cobbles.

PHOTO 99: TP-WA-13-11: Waste rock sample at 4 m depth, with high level of weathering.

PHOTO 100: TP-WA-13-11: Test pit at completion.

# Appendix C4

# GeoProbe Drill Core Photographs

# Mount Nansen 2013 Site Investigation

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PHOTO 2: GP-T-13-03, 0-9m End of Hole; GP-T-13-04, 0 to 11.5 m. End of Hole. ..... 2
PHOTO 3: GP-T-13-10, 0 to 9.5 m End of Hole; GP-T-13-18, 0-6.25, End of Hole. ..... 3
PHOTO 4: GP-T-13-22, 0 to 5.1 m. End of Hole. ..... 4

**Photos of Geoprobe Core**

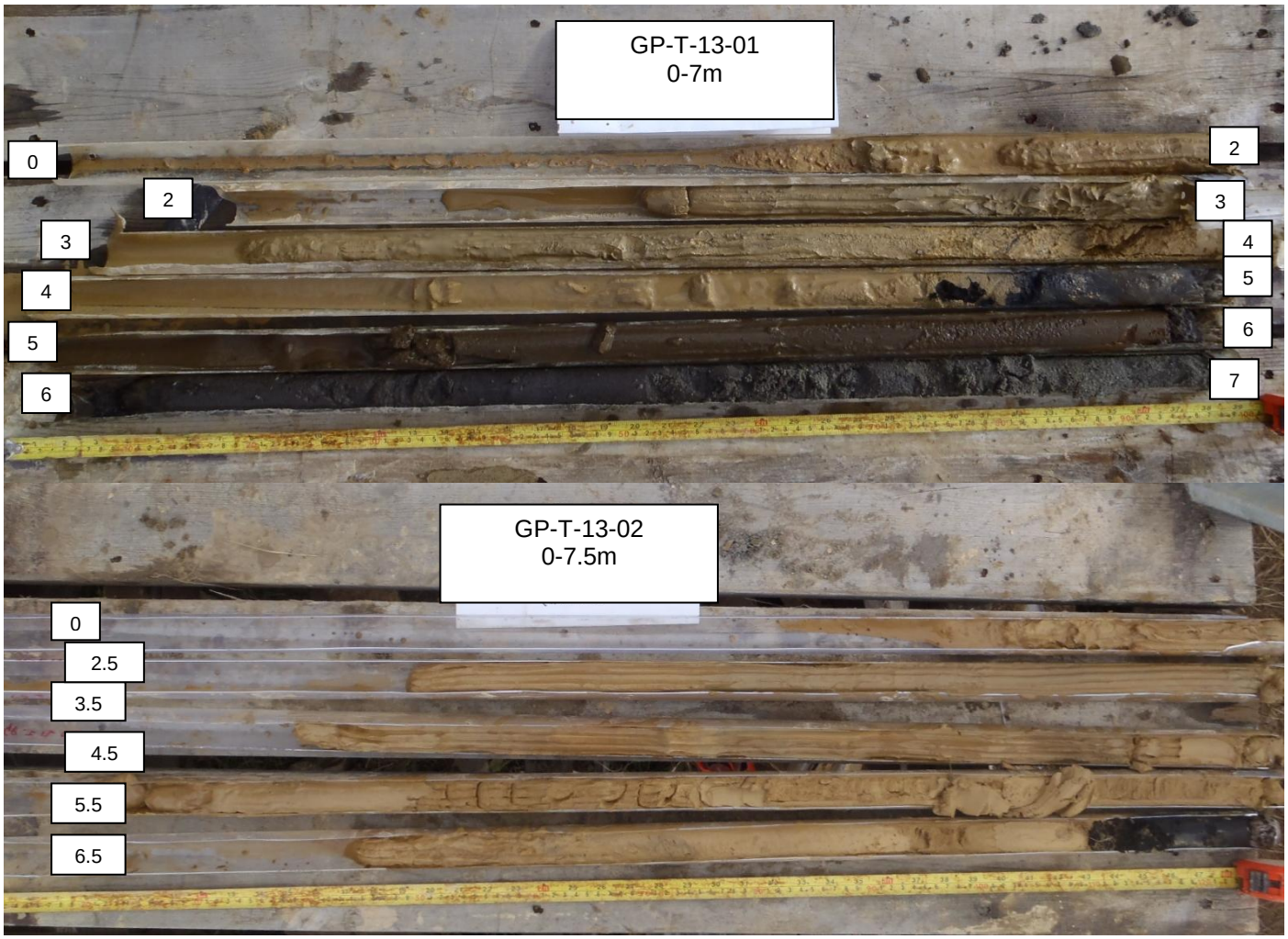


PHOTO 1: GP-T-13-01, 0-7m End of Hole; GP-T-13-02, 0-7.5m End of Hole.

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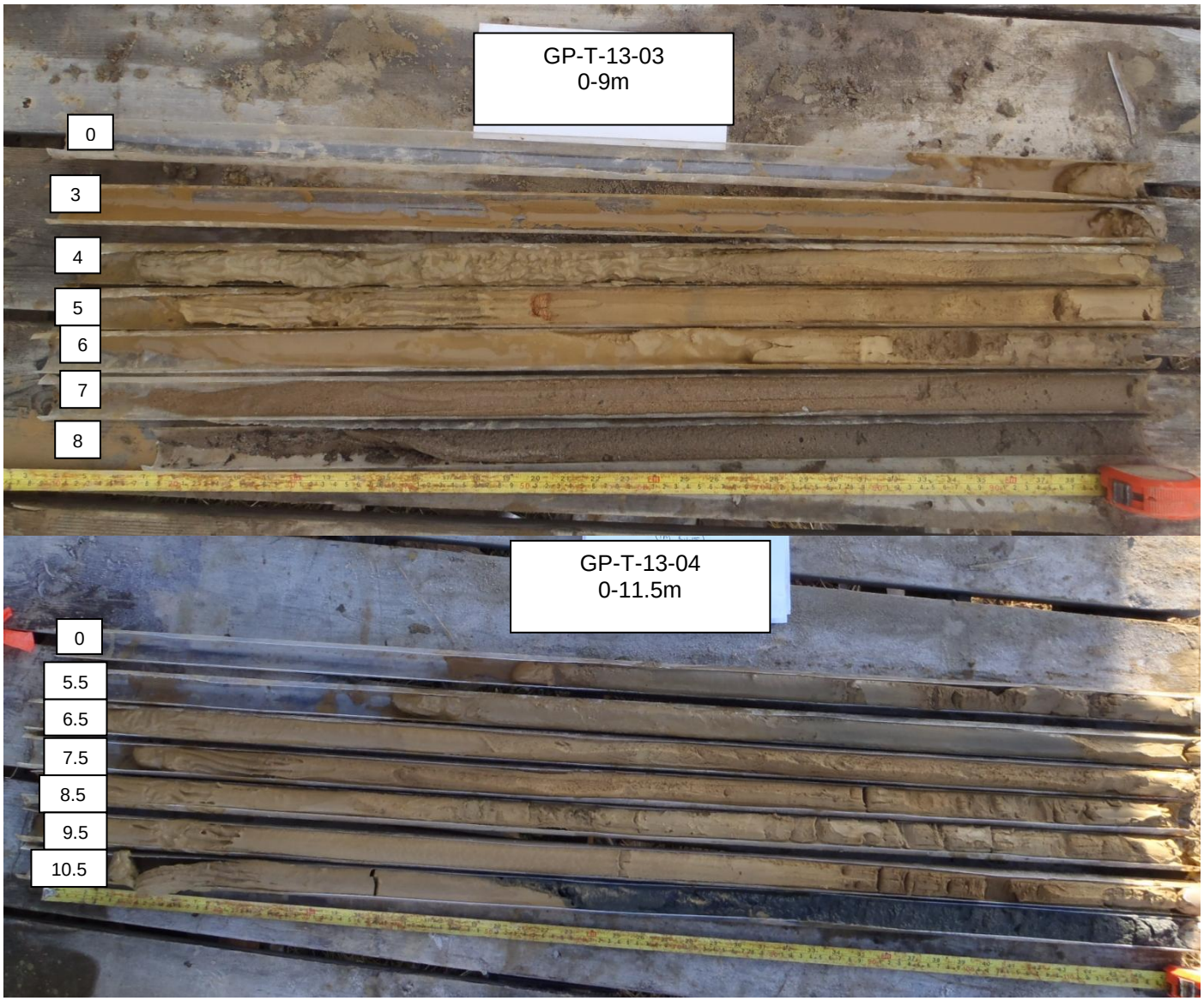


PHOTO 2: GP-T-13-03, 0-9m End of Hole; GP-T-13-04, 0 to 11.5 m. End of Hole.

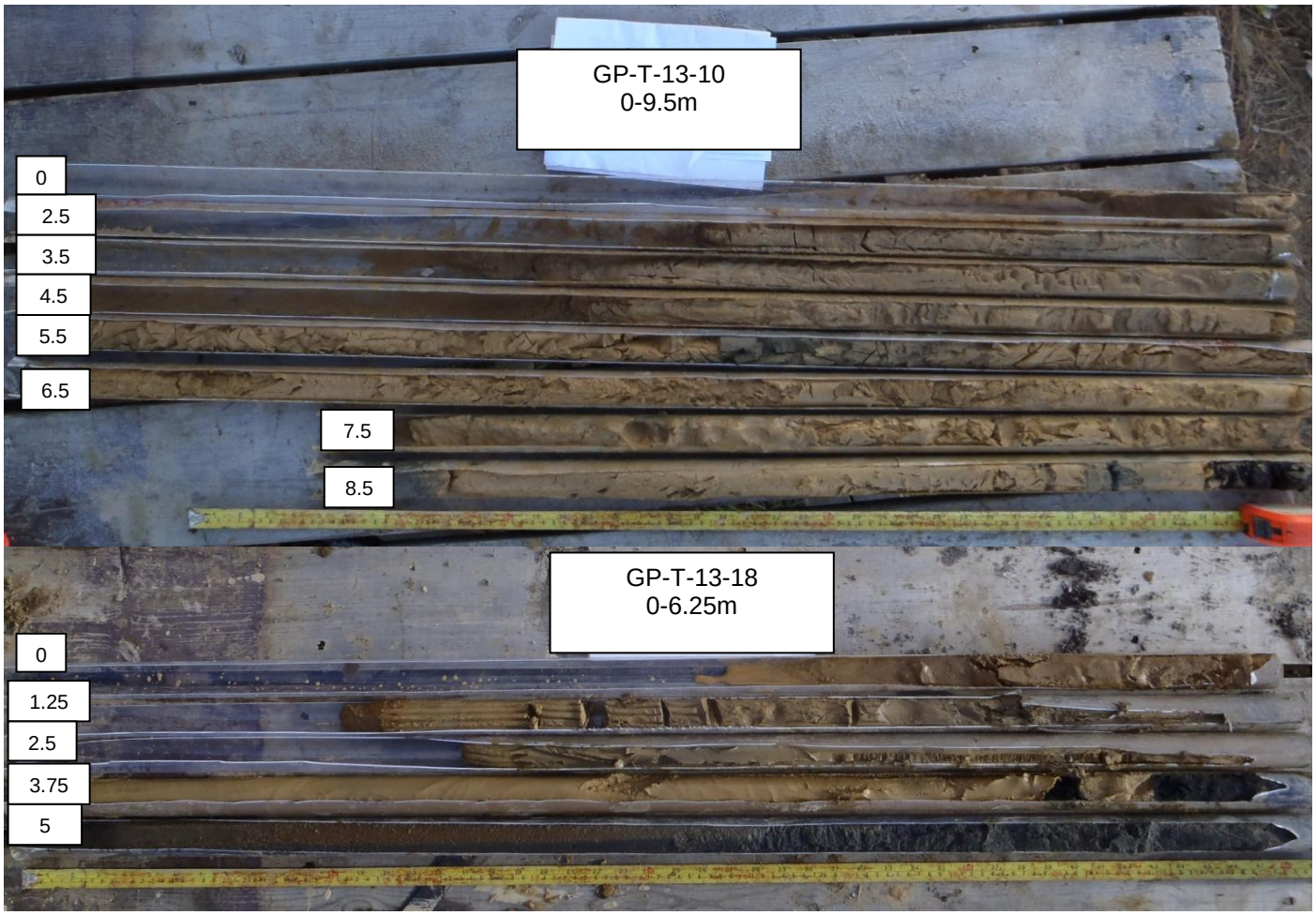


PHOTO 3: GP-T-13-10, 0 to 9.5 m End of Hole; GP-T-13-18, 0-6.25, End of Hole.

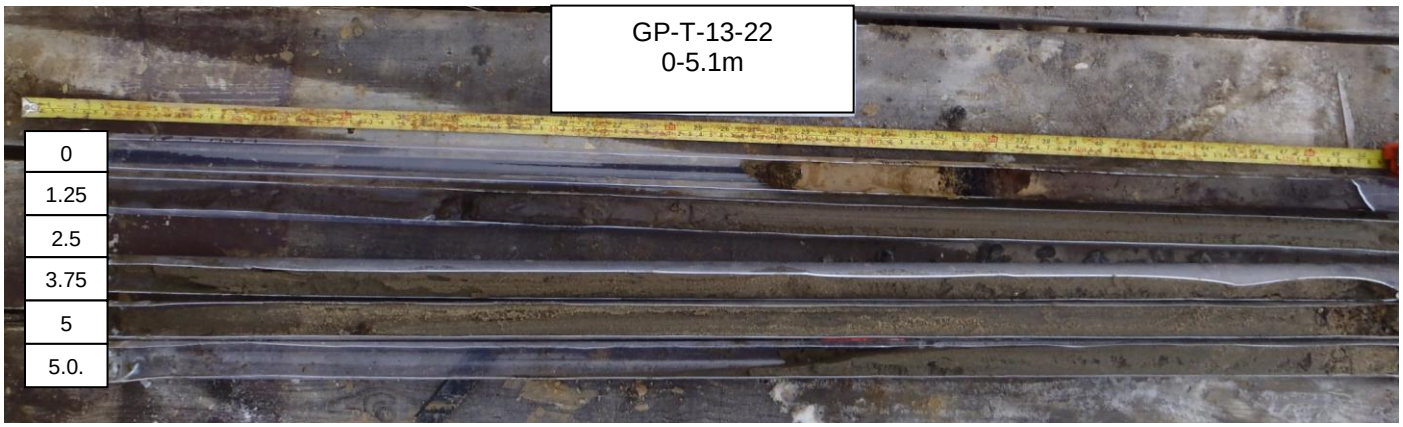


PHOTO 4: GP-T-13-22, 0 to 5.1 m. End of Hole.

NOTE: No photos available for GP-T-13-21 and GP-T-13-23.

# Appendix C5

# Diamond Drill Core Photographs

# Mount Nansen 2013 Site Investigation

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PHOTO 3: 7_CH-P-13-01_Box 3_13-16m_Sept 6, 2013. ..... 1
PHOTO 4: 10_CH-P-13-01_Box 4_16-20m_Sept 7, 2013. ..... 2
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PHOTO 6: 16_CH-P-13-01_Box 6_24-28m_Sept 7, 2013. ..... 2
PHOTO 7: 19_CH-P-13-01_Box 7_28-32m_Sept 7, 2013. ..... 3
PHOTO 8: 22_CH-P-13-01_Box 8_32-37m_Sept 7, 2013. ..... 3
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PHOTO 13: 4_CH-P-13-02 (Box 7 and 8) 27.7 to 34 mbgs_Oct 5, 2013. ..... 5
PHOTO 14: 5_CH-P-13-02 (Box 9 and 10) 34 to 40mbgs_Oct 5, 2013. ..... 6
PHOTO 15: 6_CH-P-13-02 (Box 11 and 12) 40 to 50mbgs_Oct 5, 2013. ..... 6

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PHOTO 17: 4_CH-P-13-03_Box 2_8-12m_Sept 11, 2013. ..... 7
PHOTO 18: 7_CH-P-13-03_Box 1 and 2_0-12m_Sept 11, 2013. ..... 8
PHOTO 19: 8_CH-P-13-03_Box 3_12-16m_Sept 12, 2013. ..... 8
PHOTO 20: 11_CH-P-13-03_Box 4_16-20m_Sept 12, 2013. ..... 9
PHOTO 21: 14_CH-P-13-03_Box 3 and 4_12-20m_Sept 12, 2013. ..... 9
PHOTO 22: 15_CH-P-13-03_Box 5_20-24m_Sept 12, 2013. ..... 10
PHOTO 23: 18_CH-P-13-03_Box 6_24-28m_Sept 12, 2013. ..... 10
PHOTO 24: 21_CH-P-13-03_Box 5 and 6_20-28m_Sept 12, 2013. ..... 11
PHOTO 25: 22_CH-P-13-03_Box 7 and 8_28-36m_Sept 12, 2013. ..... 11
PHOTO 26: 25_CH-P-13-03_Box 9 and 10_36-44m_Sept 13, 2013. ..... 12
PHOTO 27: 28_CH-P-13-03_Box 11 and 12_44-50m_Sept 13, 2013. ..... 12

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PHOTO 29: 4_CH-P-13-04_Box 2_7-10m_Sept 15, 2013. ..... 13
PHOTO 30: 7_CH-P-13-04_Box 3_10-15m_Sept 15, 2013. ..... 13
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PHOTO 33: 16_CH-P-13-04_Box 6_23-27m_Sept 15, 2013. ..... 14
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PHOTO 35: 22_CH-P-13-04_Box 8_31-35m_Sept 16, 2013. ..... 15
PHOTO 36: 25_CH-P-13-04_Box 9_35-39m_Sept 16, 2013. ..... 15
PHOTO 37: 28_CH-P-13-04_Box 10_39-43m_Sept 16, 2013. ..... 16
PHOTO 38: 31_CH-P-13-04_Box 11_43-47m_Sept 16, 2013. ..... 16
PHOTO 39: 34_CH-P-13-04_Box 12_47-50m_Sept 16, 2013. ..... 16

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PHOTO 41: 4_CH-P-13-05_Box 3 and 4_12-19m_Sept 22, 2013. ..... 17
PHOTO 42: 7_CH-P-13-05_Box 5 and 6_19-26m_Sept 22, 2013. ..... 18
PHOTO 43: 10_CH-P-13-05_Box 7 and 8_26-33m_Sept 22, 2013. ..... 18
PHOTO 44: 13_CH-P-13-05_Box 9 and 10_33-40m_Sept 22, 2013. ..... 19
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PHOTO 46: 19_CH-P-13-05_Box 13_47-50m_Sept 23, 2013. ..... 20

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PHOTO 47: 1_CH-P-13-06_Box 1 and 2_0-12m_Sept 23, 2013. ..... 21
PHOTO 48: 4_CH-P-13-06_Box 3 and 4_12-20m_Sept 24, 2013. ..... 21
PHOTO 49: 7_CH-P-13-06_Box 5 and 6_20-27m_Sept 24, 2013. ..... 22
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PHOTO 51: 13_CH-P-13-06_Box 9 and 10_34-42m_Sept 26, 2013. ..... 23
PHOTO 52: 16_CH-P-13-06 (Box 10 and 11) 37 to 46 mbgs_Sept 27, 2013. ..... 23
PHOTO 53: 17_CH-P-13-06 (Box 12 and 13) 46 to 52 mbgs_Sept 27, 2013. ..... 24
PHOTO 54: 18_CH-P-13-06 (Box 14 and 15) 52 to 60 mbgs_Sept 27, 2013. ..... 24

**Photos of CH-P-13-01**

PHOTO 1: 1_CH-P-13-01_Box 1_0-9m_Sept 6, 2013.

PHOTO 2: 4_CH-P-13-01_Box 2_9-13m_Sept 6, 2013.

PHOTO 3: 7_CH-P-13-01_Box 3_13-16m_Sept 6, 2013.

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PHOTO 4: 10_CH-P-13-01_Box 4_16-20m_Sept 7, 2013.

PHOTO 5: 13_CH-P-13-01_Box 5_20-24m_Sept 7, 2013.

PHOTO 6: 16_CH-P-13-01_Box 6_24-28m_Sept 7, 2013.

PHOTO 7: 19_CH-P-13-01_Box 7_28-32m_Sept 7, 2013.

PHOTO 8: 22_CH-P-13-01_Box 8_32-37m_Sept 7, 2013.

PHOTO 9: 25_CH-P-13-01_Box 9_37-40m_Sept 7, 2013.

**Photos of CH-P-13-02**

PHOTO 10: 1_CH-P-13-02 (Box 1 and 2) 8 to 12.8 mbgs_Oct 5, 2013.

PHOTO 11: 2_CH-P-13-02 (Box 3 and 4) 12.8 to 18.7 mbgs_Oct 5, 2013.

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PHOTO 12: 3_CH-P-13-02 (Box 5 and 6) 18.7 to 27.7 mbgs_Oct 5, 2013.

PHOTO 13: 4_CH-P-13-02 (Box 7 and 8) 27.7 to 34 mbgs_Oct 5, 2013.

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PHOTO 14: 5_CH-P-13-02 (Box 9 and 10) 34 to 40mbgs_Oct 5, 2013.

PHOTO 15: 6_CH-P-13-02 (Box 11 and 12) 40 to 50mbgs_Oct 5, 2013.

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**Photos of CH-P-13-03**

PHOTO 16: 1_CH-P-13-03_Box 1_0-8m_Sept 11, 2013.

PHOTO 17: 4_CH-P-13-03_Box 2_8-12m_Sept 11, 2013.

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PHOTO 18: 7_CH-P-13-03_Box 1 and 2_0-12m_Sept 11, 2013.

PHOTO 19: 8_CH-P-13-03_Box 3_12-16m_Sept 12, 2013.

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PHOTO 20: 11_CH-P-13-03_Box 4_16-20m_Sept 12, 2013.

PHOTO 21: 14_CH-P-13-03_Box 3 and 4_12-20m_Sept 12, 2013.

PHOTO 22: 15_CH-P-13-03_Box 5_20-24m_Sept 12, 2013.

PHOTO 23: 18_CH-P-13-03_Box 6_24-28m_Sept 12, 2013.

PHOTO 24: 21_CH-P-13-03_Box 5 and 6_20-28m_Sept 12, 2013.

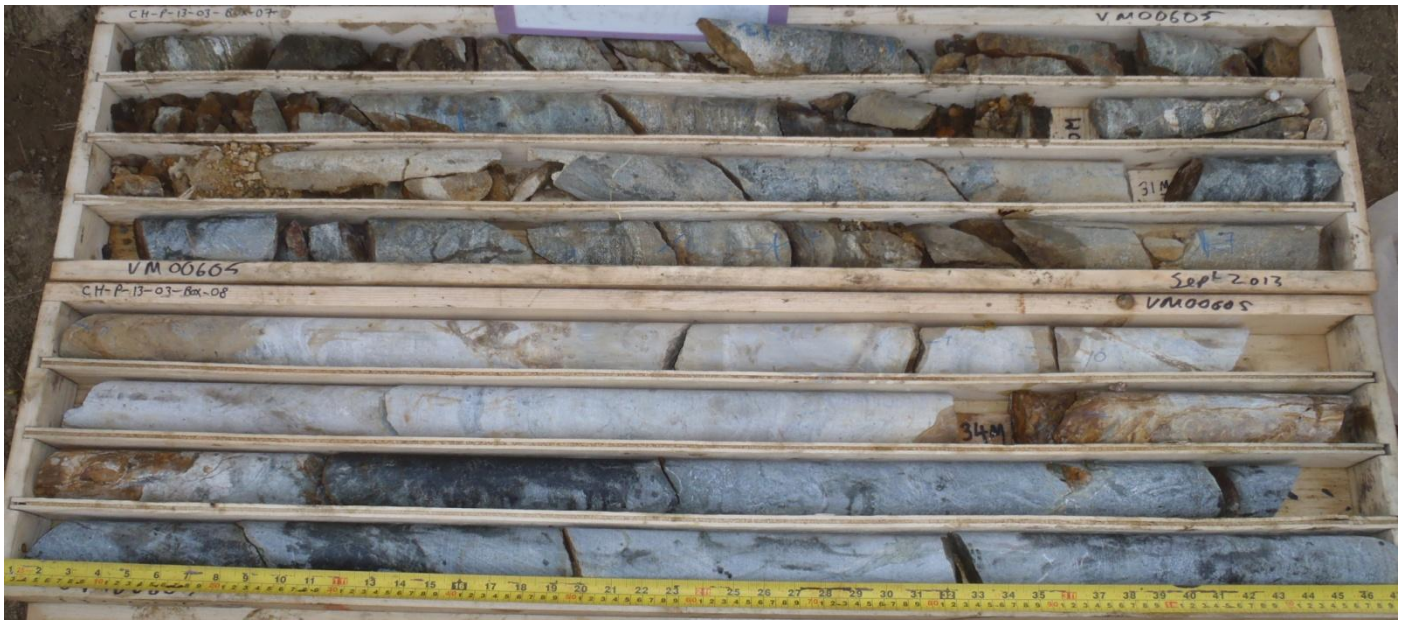


PHOTO 25: 22_CH-P-13-03_Box 7 and 8_28-36m_Sept 12, 2013.

PHOTO 26: 25_CH-P-13-03_Box 9 and 10_36-44m_Sept 13, 2013.

PHOTO 27: 28_CH-P-13-03_Box 11 and 12_44-50m_Sept 13, 2013.

**Photos of CH-P-13-04**

PHOTO 28: 1_CH-P-13-04_Box 1_0-7m_Sept 15, 2013.

PHOTO 29: 4_CH-P-13-04_Box 2_7-10m_Sept 15, 2013.

PHOTO 30: 7_CH-P-13-04_Box 3_10-15m_Sept 15, 2013.

PHOTO 31: 10_CH-P-13-04_Box 4_15-19m_Sept 15, 2013.

PHOTO 32: 13_CH-P-13-04_Box 5_19-23m_Sept 15, 2013.

PHOTO 33: 16_CH-P-13-04_Box 6_23-27m_Sept 15, 2013.

PHOTO 34: 19_CH-P-13-04_Box 7_27-31m_Sept 15, 2013.

PHOTO 35: 22_CH-P-13-04_Box 8_31-35m_Sept 16, 2013.

PHOTO 36: 25_CH-P-13-04_Box 9_35-39m_Sept 16, 2013.

PHOTO 37: 28_CH-P-13-04_Box 10_39-43m_Sept 16, 2013.

PHOTO 38: 31_CH-P-13-04_Box 11_43-47m_Sept 16, 2013.

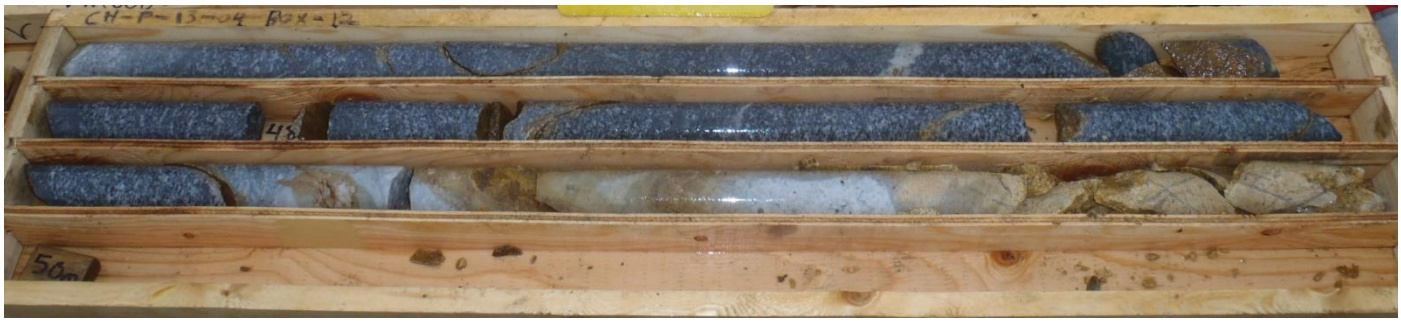


PHOTO 39: 34_CH-P-13-04_Box 12_47-50m_Sept 16, 2013.

**Photos of CH-P-13-05**

PHOTO 40: 1_CH-P-13-05_Box 1 and 2_0-12m_Sept 21, 2013.

PHOTO 41: 4_CH-P-13-05_Box 3 and 4_12-19m_Sept 22, 2013.

PHOTO 42: 7_CH-P-13-05_Box 5 and 6_19-26m_Sept 22, 2013.

PHOTO 43: 10_CH-P-13-05_Box 7 and 8_26-33m_Sept 22, 2013.

PHOTO 44: 13_CH-P-13-05_Box 9 and 10_33-40m_Sept 22, 2013.

PHOTO 45: 16_CH-P-13-05_Box 11 and 12_40-47m_Sept 23, 2013.

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PHOTO 46: 19_CH-P-13-05_Box 13_47-50m_Sept 23, 2013.

**Photos of CH-P-13-06**

PHOTO 47: 1_CH-P-13-06_Box 1 and 2_0-12m_Sept 23, 2013.

PHOTO 48: 4_CH-P-13-06_Box 3 and 4_12-20m_Sept 24, 2013.

PHOTO 49: 7_CH-P-13-06_Box 5 and 6_20-27m_Sept 24, 2013.

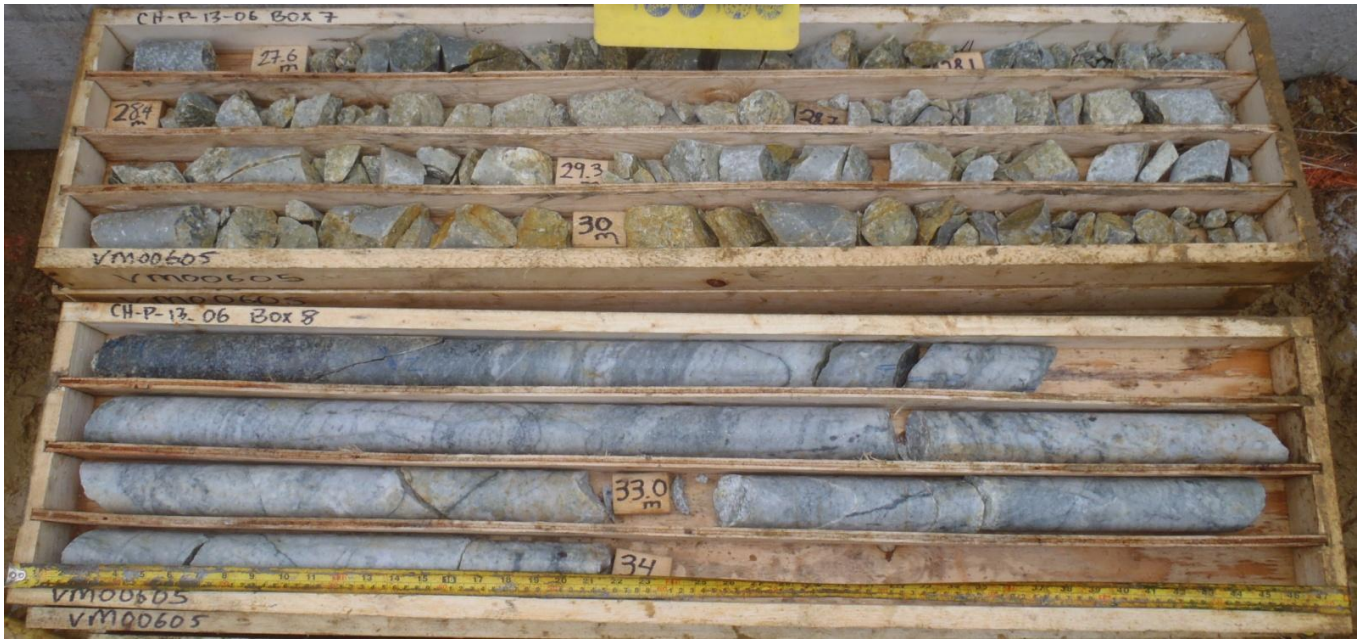


PHOTO 50: 10_CH-P-13-06_Box 7 and 8_27-34m_Sept 26, 2013.

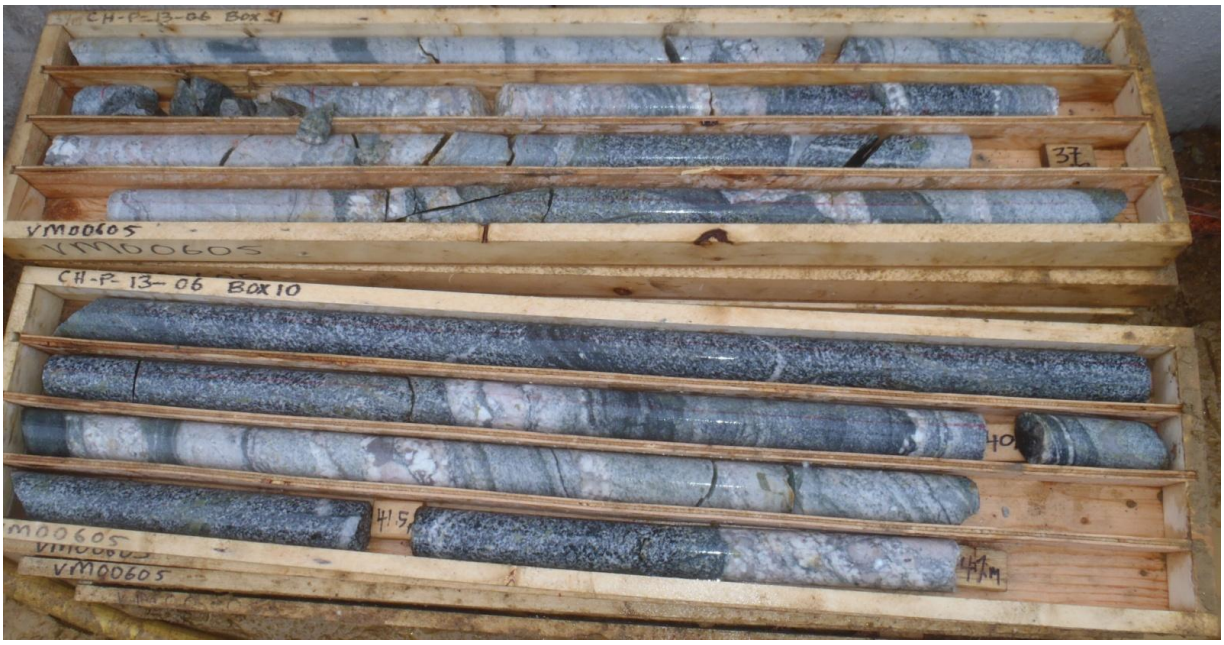


PHOTO 51: 13_CH-P-13-06_Box 9 and 10_34-42m_Sept 26, 2013.

PHOTO 52: 16_CH-P-13-06 (Box 10 and 11) 37 to 46 mbgs_Sept 27, 2013.

PHOTO 53: 17_CH-P-13-06 (Box 12 and 13) 46 to 52 mbgs_Sept 27, 2013.

PHOTO 54: 18_CH-P-13-06 (Box 14 and 15) 52 to 60 mbgs_Sept 27, 2013.

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# Appendix C6

# Hydrotechnical Field Reconnaissance Photographs

# Mount Nansen 2013 Site Investigation

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PHOTO 1: Dome Creek Watershed – From the Mill Area Facing D/S to the Tailings Area. ..... 1
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PHOTO 8: Dome Creek – U/S of the Mill & Bunkhouse Road.

PHOTO 9: Dome Creek – Flow Measurement Location Near Bunkhouse (Bucket and Stopwatch).

PHOTO 10: Dome Creek – Channel at GSI-DC-2.

PHOTO 11: Dome Creek – Flow Measurement Location (Bucket and Stopwatch).

PHOTO 12: Dome Creek – Channel Dried Up U/S of TSF.

PHOTO 13: Dome Creek – TSF Diversion Channel.

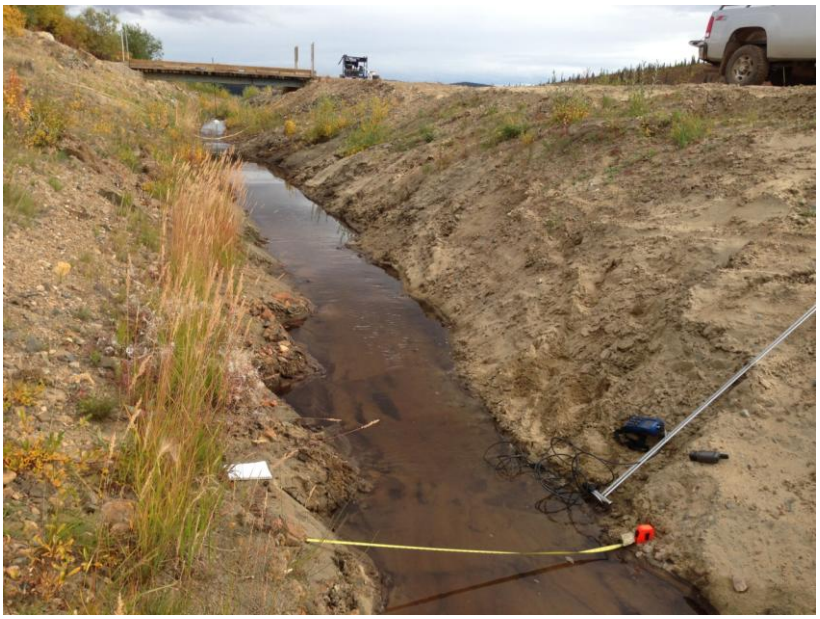

PHOTO 14: Dome Creek – Flow Measurement Location Diversion Channel.

PHOTO 15: Dome Creek – Flow Measuring Location D/S of TSF.

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PHOTO 17: Dome Creek – Flow Measuring Station Culvert Near Bunkhouse.

**Photos of Dome Creek Sediment Sampling**

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PHOTO 20: Dome Creek – SED-DC-2.

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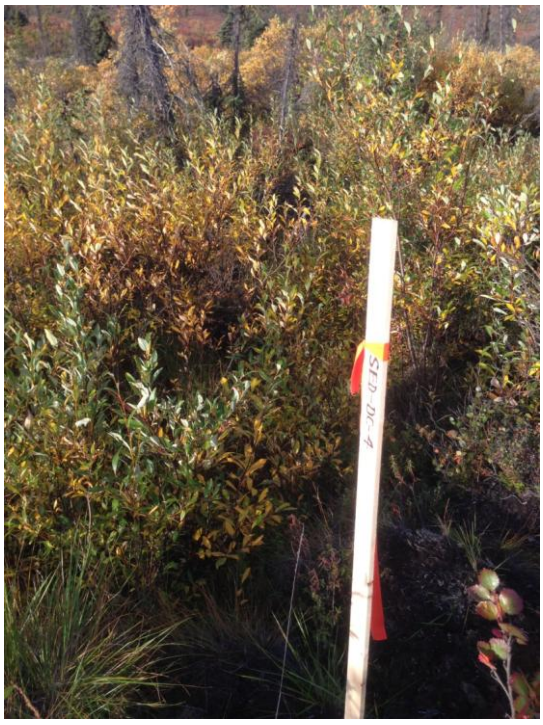

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## Photos of Pony Creek Watershed and Channel

PHOTO 40: Pony Creek Watershed – Facing D/S Near the Open Pit.

PHOTO 41: Pony Creek – Flow Measuring Station.

PHOTO 42: Pony Creek – Flow Measuring Station.

PHOTO 43: Pony Creek – Facing U/S Near the Open Pit.

PHOTO 44: Pony Creek – Flow Measuring Station.

PHOTO 45: Pony Creek – Facing D/S.

PHOTO 46: Pony Creek – Vegetation on the Valley Walls.

PHOTO 47: Pony Creek – Upper Watershed.

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# Mount Nansen 2013 Site Investigation

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PHOTO 8: Site 5 – View Looking North. ..... 4
PHOTO 9: Site 6 – View of Eolian Sand. ..... 5
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**Photos of Reclamation Plots**

PHOTO 1: Site 1 - View of Waste Rock Dump.

PHOTO 2: Site 1 – Test Pit 1.

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PHOTO 3: Site 2 – View Looking Northeast.

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PHOTO 6: Site 4 – Looking North Upslope.

PHOTO 7: Site 4 – Test Pit Profile.

PHOTO 8: Site 5 – View Looking North.

PHOTO 9: Site 6 – View of Eolian Sand.

PHOTO 10: Site 7 – View Looking Northwest Upslope.

# Appendix C8

# Drive Point Piezometer Photographs

# Mount Nansen 2013 Site Investigation

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PHOTO 5: GSI-DC-05. ..... 3
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PHOTO 22: Weighing Water Bladder for Water Volume at End of Seepage Test. ..... 11
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PHOTO 24: GSI-HA-02-A. ..... 12
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PHOTO 27: GSI-HA-05-A. ..... 14

**Photos of Creek Study Piezometer and Seepage Meter Installations**

PHOTO 1: GSI-DC-01.

PHOTO 2: GSI-DC-02.

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PHOTO 3: GSI-DC-03.

PHOTO 4: GSI-DC-04.

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PHOTO 5:  GSI-DC-05.

PHOTO 6:  GSI-DC-06.

PHOTO 7: GSI-DC-07.

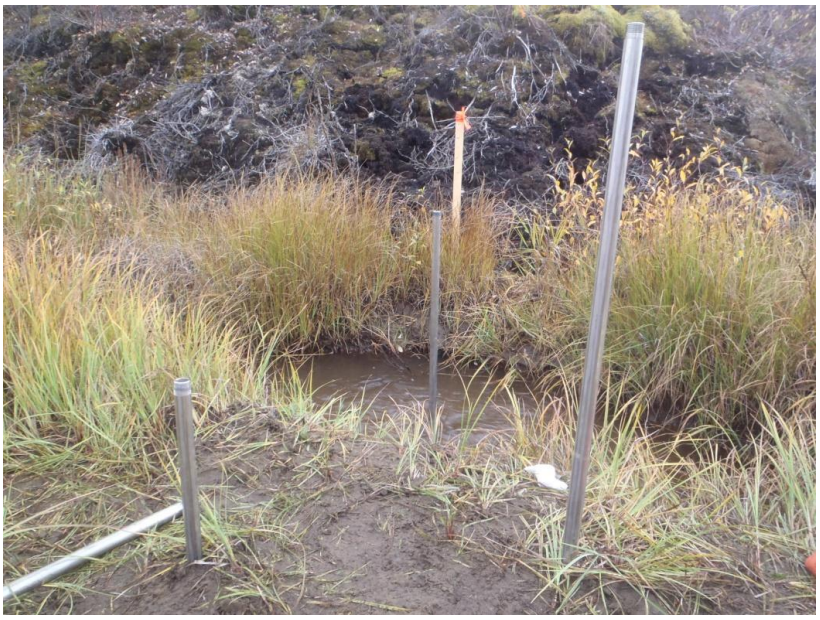

PHOTO 8: GSI-DC-08.

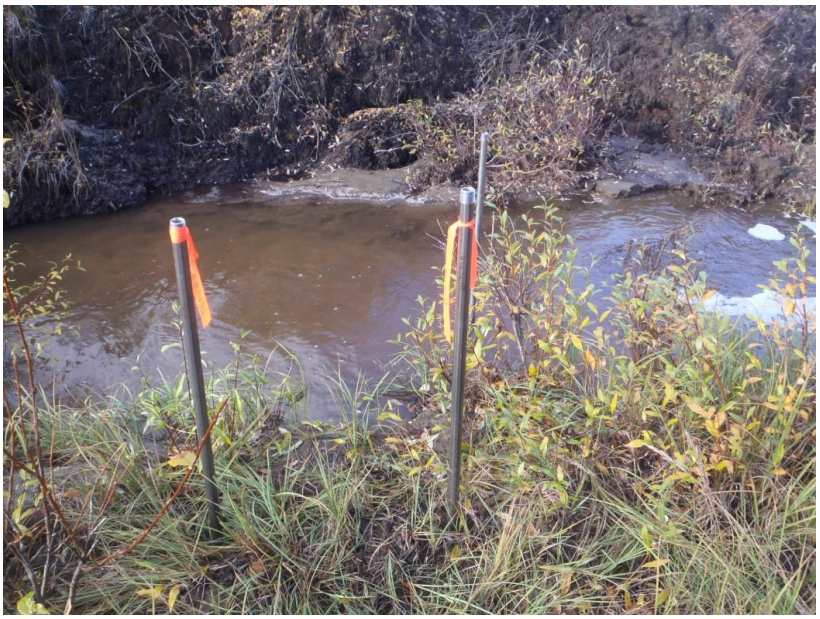

PHOTO 9:  GSI-DC-09.

PHOTO 10:  GSI-DC-10.

PHOTO 11: GSI-PC-01.

PHOTO 12: GSI-PC-02.

PHOTO 13: GSI-PC-03.

PHOTO 14: GSI-PC-04.

PHOTO 15: GSI-PC-05.

PHOTO 16: Drive Point Piezometer Set Up.

PHOTO 17: Using Slide Hammer to Install Drive Point Piezometer.

PHOTO 18: Set Up of Seepage Meter.

PHOTO 19: Typical Installation of Seepage Meter at GSI-PC-02.

PHOTO 20: Seepage Meter Installed at GSI-DC-02.

PHOTO 21: Installation Process of a Seepage Meter.

PHOTO 22: Weighing Water Bladder for Water Volume at End of Seepage Test.

PHOTO 23: GSI-HA-01-A.

PHOTO 24: GSI-HA-02-A.

NOTE: Photos of the completed equipment installs of GSI-HA-01-A to GSI-HA-05-A were not taken. The photos included are of the appropriate locations during field reconnaissance.

PHOTO 25: GSI-HA-03-A.

PHOTO 26: GSI-HA-04-A.

PHOTO 27: GSI-HA-05-A.

# Appendix C9

# Site Characterization Photos

# Mount Nansen 2013 Site Investigation

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PHOTO 2: Drilling at BH-KZ-01 (8 Sep. 2013). ..... 2
PHOTO 3: Borehole BH-M-13-03 (9 Sep. 2013). ..... 3
PHOTO 4: Drilling at Borehole BH-KZ-13-01 (9 Sep. 2013). ..... 4
PHOTO 5: Soil from 2.6-3.0 m in Borehole BH-M-13-08 (10 Sep. 2013). ..... 5
PHOTO 6: Drilling at Borehole BH-M-13-01 (10 Sep. 2013). ..... 6
PHOTO 7: Groundwater surfacing at BH-M-13-04 (10 Sep. 2013). ..... 7
PHOTO 8: Excavation of Testpit TP-R-13-05 (11 Sep. 2013). ..... 8
PHOTO 9: Excavation of Testpit TP-R-13-04 (11 Sep. 2013). ..... 9
PHOTO 10: Completed Testpit TP-R-13-04 (11 Sep. 2013). ..... 10

## Photos of Site Characteristic Test Pits and Sonic Drilling Photos

PHOTO 1: Staining observed near BH-KZ-13-01 (8 Sep. 2013).

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PHOTO 2: Drilling at BH-KZ-01 (8 Sep. 2013).

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PHOTO 3: Borehole BH-M-13-03 (9 Sep. 2013).

PHOTO 4: Drilling at Borehole BH-KZ-13-01 (9 Sep. 2013).

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PHOTO 5: Soil from 2.6-3.0 m in Borehole BH-M-13-08 (10 Sep. 2013).

PHOTO 6: Drilling at Borehole BH-M-13-01 (10 Sep. 2013).

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PHOTO 7: Groundwater surfacing at BH-M-13-04 (10 Sep. 2013).

PHOTO 8: Excavation of Testpit TP-R-13-05 (11 Sep. 2013).

PHOTO 9: Excavation of Testpit TP-R-13-04 (11 Sep. 2013).

PHOTO 10: Completed Testpit TP-R-13-04 (11 Sep. 2013).

# APPENDIX D

# LABORATORY RESULTS

# Appendix D1

# Geotechnical Lab Results

Mount Nansen Remediation Project
2013 Site Investigation Report
Appendix D1
Summary of Geotechnical Lab Lab Tests Conducted

## Geotech

| Geographic Area: | Laboratory Tests | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Sieve/ Hydrometer | Moisture content | Organic Content | Specific Gravity | Atterberg Limits | Proctor Compaction | Permeability | Tempe Cell | Oedometer Consolidation |
| TSF-Tailings | 25 | 24 | | 4 | 13 | 2 | 1 | 2 | 6 |
| TSF-Insitu soils | 42 | 58 | 5 | | 4 | | | | |
| TSF-Tailings Dam Fill | 5 | 1 | 0 | | 0 | | | | |
| TSF-Borrow Area | 2 | | | | | | | | |
| Waste Rock Area | 21 | | | | | | | | |

# Geotechnical Lab Results

Summary of results from 2013 site investigation program

| | | | | | | | | Atterberg Limits | | | | Moisture content | Organic Matter (375°C) | Specific Gravity | Standard Proctor Compaction | | | Permeability | Density | Oedometer | Tempe Cell | Grain Size Analysis (Summary) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Information | | | | | | | | Liquid Limit | Non-Plastic | Plastic Limit | Plasticity Index | % Moisture | Organic Matter | Specific Gravity | Optimum MC | Oversize 4.75 mm | SPDD | Count | In-situ (kg/m3) | Count | Count | %Gravel | %Sand | %Fines |
| SITE | TYPE | SOURCE | LOCATION | SAMPLE | DEPTH | BOTTOM | SOIL TYPE | % | none | % | none | % | % | none | % | % | kg/m3 | | | | | % | % | % |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC2 | 1 | 1.1 | Native | | | | | 3 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC3 | 3 | 3.1 | Native | | | | | 5 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC1 | 0.3 | 0.4 | Tailings | | | | | 11 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC4 | 4 | 4.1 | Native | | | | | 15 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC17 | 10.5 | 10.6 | In Situ | | | | | 17 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC5 | 4.5 | 4.6 | Native | | | | | 18 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC16 | 10 | 10.1 | In Situ | | | | | 18 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC15 | 9.5 | 9.6 | In Situ | | | | | 19 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC6 | 5 | 5.1 | In Situ | | | | | 20 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC18 | 11 | 11.1 | In Situ | | | | | 20 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC22 | 13.4 | 13.5 | In Situ | | | | | 21 | | | | | | | | | | 0 | 98 | 2 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC19 | 11.5 | 11.6 | In Situ | | | | | 22 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC9 | 6.5 | 6.6 | In Situ | | | | | 22 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC14 | 9 | 9.1 | In Situ | | | | | 22 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC11 | 7.5 | 7.6 | In Situ | | | | | 22 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC10 | 7 | 7.1 | In Situ | | | | | 23 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC20 | 12 | 12.1 | In Situ | | | | | 23 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC12 | 8 | 8.1 | In Situ | | | | | 24 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC13 | 8.5 | 8.6 | In Situ | | | | | 25 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC7 | 5.5 | 5.6 | In Situ | | | | | 25 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC8 | 6 | 6.1 | In Situ | | | | | 25 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | MC21 | 12.7 | 12.8 | In Situ | | | | | 88 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | ARD-01 | 1.1 | 1.2 | In Situ | | | | | | | | | | | | | | | 0 | 71 | 29 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | ARD-03 | 5.1 | 5.2 | In Situ | | | | | | | | | | | | | | | 0 | 86 | 14 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-01 | ARD-05 | 8.1 | 8.2 | In Situ | | | | | | | | | | | | | | | 0 | 72 | 28 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | GS1 | 1 | 1.1 | Tailings | | 1 | | | | | | | | | | | | | 0 | 69 | 31 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC20 | 11 | 11.1 | In Situ | | | | | 14 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC19 | 10.5 | 10.6 | In Situ | | | | | 14 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC4 | 3 | 3.1 | In Situ | | | | | 20 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC3 | 2 | 2.1 | Native | | | | | 20 | | | | | | | | | | 0 | 83 | 17 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC16 | 9.3 | 9.4 | In Situ | | | | | 21 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC12 | 8 | 8.1 | In Situ | | | | | 22 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC1 | 0.5 | 0.6 | Tailings | | | | | 22 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC5 | 4 | 4.1 | In Situ | | | | | 23 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC7 | 5.5 | 5.6 | In Situ | | | | | 24 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC2 | 1.5 | 1.6 | Tailings | | | | | 24 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC8 | 6 | 6.1 | In Situ | | | | | 25 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC6 | 5 | 5.1 | In Situ | | | | | 26 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC18 | 10 | 10.1 | In Situ | | | | | 28 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC10 | 7 | 7.1 | In Situ | | | | | 28 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC9 | 6.5 | 6.6 | In Situ | | | | | 28 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC11 | 7.5 | 7.6 | In Situ | | | | | 34 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC17 | 9.7 | 9.8 | In Situ | | | | | 42 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC15 | 8.9 | 9 | In Situ | | | | | 58 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC14 | 8.5 | 8.6 | In Situ | | | | | 89 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | MC13 | 8.3 | 8.4 | In Situ | | | | | 97 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | ARD-01 | 2.1 | 2.2 | In Situ | | | | | | | | | | | | | | | 0 | 68 | 32 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | ARD-02 | 3.5 | 3.6 | In Situ | | | | | | | | | | | | | | | 0 | 49 | 51 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | ARD-04 | 6.5 | 6.6 | In Situ | | | | | | | | | | | | | | | 0 | 53 | 47 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | ARD-06 | 9.5 | 9.6 | In Situ | | | | | | | | | | | | | | | 0 | 72 | 28 |

# Geotechnical Lab Results

Summary of results from 2013 site investigation program

| | | | | | | | | Atterberg Limits | | | | Moisture content | Organic Matter (375°C) | Specific Gravity | Standard Proctor Compaction | | | Permeability | Density | Oedometer | Tempe Cell | Grain Size Analysis (Summary) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Information | | | | | | | | Liquid Limit | Non-Plastic | Plastic Limit | Plasticity Index | % Moisture | Organic Matter | Specific Gravity | Optimum MC | Oversize 4.75 mm | SPDD | Count | In-situ (kg/m3) | Count | Count | %Gravel | %Sand | %Fines |
| SITE | TYPE | SOURCE | LOCATION | SAMPLE | DEPTH | BOTTOM | SOIL TYPE | % | none | % | none | % | % | none | % | % | kg/m3 | | | | | % | % | % |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-02 | ARD-07 | 11.1 | 11.2 | In Situ | | | | | | | | | | | | | | | 65 | 32 | 3 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-03 | GS5 | 4.9 | 5 | Native | | 1 | | | 21 | 0.88 | | | | | | | | | 0 | 76 | 23 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-03 | ARD-02 | 6.5 | 6.6 | In Situ | | | | | 12 | | | | | | | | | | 0 | 82 | 18 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-03 | ARD-05 | 10.5 | 10.6 | In Situ | | | | | | | | | | | | | | | 1 | 95 | 4 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-03 | ARD-07 | 13.5 | 13.6 | In Situ | | | | | | | | | | | | | | | 5 | 90 | 5 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-03 | GS4 | 4 | 4.1 | Tailings | | | | | | | | | | | | | | | 0 | 50 | 50 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | GS2 | 8.7 | 8.8 | In Situ | 37 | | 24 | 13 | 49 | 1.90 | | | | | | | | | 0 | 4 | 96 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC15 | 13.9 | 14 | In Situ | | | | | 11 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC1 | 1 | 1.1 | Tailings | | | | | 11 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC16 | 15 | 15.1 | In Situ | | | | | 15 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC14 | 13.4 | 13.5 | In Situ | | | | | 17 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | ARD-06 | 13.6 | 13.7 | In Situ | | | | | 17 | | | | | | | | | | 0 | 96 | 4 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC20 | 18 | 18.1 | In Situ | | | | | 17 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | ARD-08 | 17.1 | 17.2 | In Situ | | | | | 18 | | | | | | | | | | 1 | 90 | 9 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC19 | 17 | 17.1 | In Situ | | | | | 18 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC9 | 11 | 11.1 | In Situ | | | | | 18 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC17 | 15.8 | 15.9 | In Situ | | | | | 18 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC10 | 11.4 | 11.5 | In Situ | | | | | 19 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC18 | 16.5 | 16.6 | In Situ | | | | | 20 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC8 | 9.5 | 9.6 | In Situ | | | | | 21 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC2 | 2 | 2.1 | Tailings | | | | | 22 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC13 | 12.8 | 12.9 | In Situ | | | | | 23 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC5 | 6.5 | 6.6 | Tailings | | | | | 26 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC6 | 8 | 8.1 | Tailings | | | | | 28 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC3 | 5 | 5.1 | Tailings | | | | | 28 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC4 | 5.5 | 5.6 | Tailings | | | | | 29 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | ARD-05 | 12 | 12.1 | In Situ | | | | | 30 | | | | | | | | | | 0 | 61 | 39 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC7 | 8.6 | 8.7 | In Situ | | | | | 36 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC12 | 12.2 | 12.3 | In Situ | | | | | 36 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | MC11 | 11.8 | 11.9 | In Situ | | | | | 39 | | | | | | | | | | | | |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | ARD-02 | 7 | 7.1 | In Situ | | | | | | | | | | | | | | | 0 | 89 | 11 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | ARD-04 | 10.6 | 10.7 | In Situ | | | | | | | | | | | | | | | 0 | 83 | 17 |
| TSF-Tailings | BH | AMEC/AE | BH-T-13-04 | GS1 | 2.5 | 2.6 | Tailings | | | | | | | | | | | | | | | 0 | 85 | 15 |
| TSF-Dam | BH | AMEC/AE | BH-TD-13-01 | ARD-03 | 2 | 2.1 | Fill | | | | | | | | | | | | | | | 2 | 89 | 9 |
| TSF-Dam | BH | AMEC/AE | BH-TD-13-01 | ARD-08 | 7.5 | 7.6 | Fill | | | | | | | | | | | | | | | 1 | 96 | 3 |
| TSF-Dam | BH | AMEC/AE | BH-TD-13-01 | ARD-10 | 10.5 | 10.6 | Fill | | | | | | | | | | | | | | | 4 | 94 | 2 |
| TSF-Dam | BH | AMEC/AE | BH-TD-13-01 | GS14 | 19 | 19.1 | In Situ | | 1 | | | 24 | 1.80 | | | | | | | | | 7 | 65 | 28 |
| TSF-Dam | BH | AMEC/AE | BH-TD-13-01 | ARD-17 | 20.1 | 21.1 | In Situ | | | | | | | | | | | | | | | 8 | 83 | 9 |
| TSF-Dam | BH | AMEC/AE | BH-TD-13-01 | ARD-19 | 23.1 | 23.2 | In Situ | | | | | | | | | | | | | | | 50 | 38 | 12 |
| TSF-Dam | BH | AMEC/AE | BH-TD-13-01 | ARD-20 | 24.6 | 24.7 | In Situ | | | | | | | | | | | | | | | 51 | 37 | 12 |
| Waste Area | BH | AMEC/AE | BH-WA-13-01 | GS2 | 2 | 2.1 | Waste Rock | | | | | | | | | | | | | | | 50 | 43 | 7 |
| Waste Area | BH | AMEC/AE | BH-WA-13-01 | GS5 | 5 | 5.1 | Waste Rock | | | | | | | | | | | | | | | 49 | 46 | 5 |
| Waste Area | BH | AMEC/AE | BH-WA-13-01 | GS8 | 8 | 8.1 | Waste Rock | | | | | | | | | | | | | | | 65 | 32 | 3 |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-01 | 6 - 7 | 6 | 7 | In Situ | | | | | | | | | | | | | | | 0 | 93 | 7 |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-01 | 4 - 4.8 | 4 | 4.8 | Tailings | | | | | | | | | | | | | | | 0 | 51 | 49 |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-03 | 4 - 5 | 4 | 5 | Tailings | 50 | | 28 | 22 | 52.4 | | | | | | | | | | 0 | 3 | 98 |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-03 | 5 - 6 | 5 | 6 | Tailings | 53 | | 32 | 21 | | | | | | | | | | | | | |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-03 | 6 - 7 | 6 | 7 | Tailings | | | | | 26.7 | | | | | | | | | | 0 | 30 | 70 |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-03 | 6 - 7 | 6 | 7 | Tailings | | | | | 27 | | | | | | | | | | | | |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-03 | 4 - 5 | 4 | 5 | Tailings | | | | | 52 | | | | | | | | | | | | |

# Geotechnical Lab Results

Summary of results from 2013 site investigation program

| | | | | | | | | Atterberg Limits | | | | Moisture content | Organic Matter (375°C) | Specific Gravity | Standard Proctor Compaction | | | Permeability | Density | Oedometer | Tempe Cell | Grain Size Analysis (Summary) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Information | | | | | | | | Liquid Limit | Non-Plastic | Plastic Limit | Plasticity Index | % Moisture | Organic Matter | Specific Gravity | Optimum MC | Oversize 4.75 mm | SPDD | Count | In-situ (kg/m3) | Count | Count | %Gravel | %Sand | %Fines |
| SITE | TYPE | SOURCE | LOCATION | SAMPLE | DEPTH | BOTTOM | SOIL TYPE | % | none | % | none | % | % | none | % | % | kg/m3 | | | | | % | % | % |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-03 | 8 - 9 | 8 | 9 | In Situ | | | | | | | | | | | | | | | 0 | 91 | 9 |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-04 | 5.5 - 6.5 | 5.5 | 6.5 | Tailings | 23 | | 37 | 14 | 36 | | | | | | | | | | 0 | 4 | 97 |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-04 | 10.5 - 11.5 | 10.5 | 11.5 | In Situ | | | | | | | | | | | | | | | 2 | 94 | 5 |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-10 | 8.6 - 9.4 | 8.6 | 9.4 | Tailings | 38 | | 22 | 16 | | | | | | | | | | | | | |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-10 | 4.5 - 5.5 | 4.5 | 5.5 | Tailings | 45 | | 29 | 17 | | | | | | | | | | | 0 | 2 | 98 |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-10 | 4.5 - 5.5 | 4.5 | 5.5 | Tailings | | | | | 44 | | | | | | | | | | | | |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-10 | 8.5 - 9.5 | 8.5 | 9.5 | Tailings | | | | | | | | | | | | | | | 0 | 8 | 92 |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-10 | 8.6 - 9.4 | 8.6 | 9.4 | Tailings | | | | | | | | | | | | | | | 0 | 11 | 59 |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-18 | 5 - 6.25 | 5 | 6.25 | In Situ | | | | | | | | | | | | | | | 2 | 93 | 6 |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-18 | 0 - 1.25 | 0 | 1.25 | Tailings | | | | | | | | | | | | | | | 0 | 66 | 34 |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-21 | 1.25 - 2.5 | 1.25 | 2.5 | In Situ | | | | | | | | | | | | | | | 0 | 85 | 15 |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-21 | 2.5 - 3.25 | 2.5 | 3.25 | In Situ | | | | | | | | | | | | | | | 2 | 88 | 11 |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-22 | 2.5 - 3.75 | 2.5 | 3.75 | In Situ | | | | | | | | | | | | | | | 5 | 92 | 3 |
| TSF-Tailings | GP | AMEC/AE | GP-T-13-23 | 3.75 - 5 | 3.75 | 5 | In Situ | | | | | | | | | | | | | | | 3 | 90 | 7 |
| TSF-Borrow | HA | AMEC/AE | HA-BA-13-01 | 2-3 m | 2 | 3 | In Situ | | | | | | | | | | | | | | | 0 | 94 | 6 |
| TSF-Borrow | HA | AMEC/AE | HA-BA-13-02 | 0-1 m | 0 | 1 | In Situ | | | | | | | | | | | | | | | 0 | 96 | 4 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-01 | ARD-01 | 2.1 | 2.2 | In Situ | | | | | | | | | | | | | | | 84 | 15 | 1 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-01 | GS1 | 1 | 1.1 | Tailings | | | | | | | | | | | | | | | 0 | 36 | 64 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-02 | GS2-Bulk | 1 | 1.1 | Tailings | 39 | | 23 | 16 | 26 | | 2.87 | | | | | | | | 0 | 2 | 98 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-02 | ARD-02 | 4 | 4.1 | In Situ | | | | | | | | | | | | | | | 2 | 92 | 6 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-02 | ARD-03 | 4.7 | 4.8 | In Situ | | | | | | | | | | | | | | | 55 | 43 | 1 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-04 | GS5-Bulk | 3 | 3.1 | Tailings | 33 | | 25 | 9 | 48 | | 2.808 | 20.5 | 0 | 1660 | 1 | | 2 | 1 | 0 | 2 | 98 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-04 | GS1-Bulk | 1 | 1.1 | Tailings | | 1 | | | 29 | | 2.82 | | | | | | | | 0 | 45 | 55 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-04 | GS6 | 3.4 | 3.5 | In Situ | | 1 | | | 34 | 4 | | | | | | | | | 0 | 67 | 33 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-04 | GS3 | 2.1 | 2.2 | Tailings | | 1 | | | 29 | | | | | | | | | | 0 | 9 | 91 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-04 | ARD-01 | 3.4 | 3.5 | In Situ | | | | | 35 | | | | | | | | | | 0 | 80 | 20 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-04 | ARD-02 | 5 | 5.1 | In Situ | | | | | | | | | | | | | | | 18 | 77 | 5 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-04 | GS4 | 2.5 | 2.6 | Tailings | | | | | | | | | | | | | | | 0 | 88 | 12 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-05 | GS1 | 1 | 1.1 | Tailings | | | | | | | | | | | | | | | 1 | 97 | 2 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-06 | GS1-Bulk | 0.8 | 0.9 | Tailings | | 1 | | | 27 | | 2.77 | 18.00 | 0.00 | 1700 | 1 | | 2 | 1 | 0 | 57 | 43 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-06 | ARD-02 | 2.1 | 2.2 | In Situ | | | | | | | | | | | | | | | 0 | 73 | 27 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-07 | GS3 | 3 | 3.1 | Tailings | | | | | | | | | | | | | | | 0 | 32 | 68 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-09 | GS2 | 2 | 2.1 | Tailings | | 1 | | | | | | | | | | | | | 0 | 15 | 85 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-09 | GS3 | 3 | 3.1 | Tailings | | | | | | | | | | | | | | | 0 | 79 | 21 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-09 | GS1 | 1 | 1.1 | Tailings | | | | | | | | | | | | | | | 0 | 64 | 37 |
| TSF-Tailings | TP | AMEC/AE | TP-T-13-09 | GS4 | 4 | 4.1 | Tailings | | | | | | | | | | | | | | | 0 | 53 | 48 |
| TSF-Dam | TP | AMEC/AE | TP-TD-13-01 | ARD-03 | 1 | 1.1 | In Situ | | | | | | | | | | | | | | | 0 | 84 | 16 |
| TSF-Dam | TP | AMEC/AE | TP-TD-13-02 | ARD-01 | 1.1 | 1.1 | Fill | | | | | | | | | | | | | | | 0 | 95 | 5 |
| TSF-Dam | TP | AMEC/AE | TP-TD-13-02 | ARD-04 | 5 | 5.1 | In Situ | | | | | | | | | | | | | | | 1 | 92 | 7 |
| TSF-Dam | TP | AMEC/AE | TP-TD-13-03 | ARD-03 | 3.5 | 3.6 | Fill | | 1 | | | | 0.27 | | | | | | | | | | | |
| TSF-Dam | TP | AMEC/AE | TP-TD-13-03 | ARD-05 | 4.5 | 4.6 | Fill | | | | | 3 | | | | | | | | | | | | |
| TSF-Dam | TP | AMEC/AE | TP-TD-13-03 | ARD-02 | 2 | 2.1 | Fill | | | | | | | | | | | | | | | 0 | 88 | 12 |
| TSF-Dam | TP | AMEC/AE | TP-TD-13-03 | ARD-06 | 5.8 | 5.9 | In Situ | | | | | | | | | | | | | | | 1 | 89 | 10 |
| Waste Area | TP | AMEC/AE | TP-WA-13-01 | GS3 | 2 | 2.1 | Waste Rock | | | | | | | | | | | | | | | 61 | 34 | 5 |
| Waste Area | TP | AMEC/AE | TP-WA-13-02 | GS4 | 4.2 | 4.3 | Waste Rock | | | | | | | | | | | | | | | 8 | 81 | 11 |
| Waste Area | TP | AMEC/AE | TP-WA-13-02 | ARD-02 | 2.1 | 2.2 | Waste Rock | | | | | | | | | | | | | | | 68 | 29 | 3 |
| Waste Area | TP | AMEC/AE | TP-WA-13-03 | GS4/BULK | 4.5 | 4.6 | Waste Rock | | | | | | | | | | | | | | | 35 | 58 | 7 |
| Waste Area | TP | AMEC/AE | TP-WA-13-03 | ARD-02 | 2 | 2.1 | Waste Rock | | | | | | | | | | | | | | | 73 | 25 | 1 |
| Waste Area | TP | AMEC/AE | TP-WA-13-04 | GS2 | 2 | 2.1 | Waste Rock | | | | | | | | | | | | | | | 68 | 30 | 2 |
| Waste Area | TP | AMEC/AE | TP-WA-13-04 | GS4 | 4 | 4.1 | Waste Rock | | | | | | | | | | | | | | | 70 | 27 | 3 |

# Geotechnical Lab Results

Summary of results from 2013 site investigation program

| | | | | | | | | Atterberg Limits | | | | Moisture content | Organic Matter (375°C) | Specific Gravity | Standard Proctor Compaction | | | Permeability | Density | Oedometer | Tempe Cell | Grain Size Analysis (Summary) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Information | | | | | | | | Liquid Limit | Non-Plastic | Plastic Limit | Plasticity Index | % Moisture | Organic Matter | Specific Gravity | Optimum MC | Oversize 4.75 mm | SPDD | Count | In-situ (kg/m3) | Count | Count | %Gravel | %Sand | %Fines |
| SITE | TYPE | SOURCE | LOCATION | SAMPLE | DEPTH | BOTTOM | SOIL TYPE | % | none | % | none | % | % | none | % | % | kg/m3 | | | | | % | % | % |
| Waste Area | TP | AMEC/AE | TP-WA-13-05 | ARD-02 | 2 | 2.1 | Waste Rock | | | | | | | | | | | | | | | 58 | 42 | 0 |
| Waste Area | TP | AMEC/AE | TP-WA-13-06 | ARD-01 | 1 | 1.1 | Waste Rock | | | | | | | | | | | | | | | 54 | 45 | 1 |
| Waste Area | TP | AMEC/AE | TP-WA-13-06 | ARD-04 | 4 | 4.1 | Waste Rock | | | | | | | | | | | | | | | 66 | 33 | 1 |
| Waste Area | TP | AMEC/AE | TP-WA-13-07 | GS3 | 3 | 3.1 | Waste Rock | | | | | | | | | | | | | | | 53 | 40 | 7 |
| Waste Area | TP | AMEC/AE | TP-WA-13-07 | GS6 | 5.7 | 5.8 | Waste Rock | | | | | | | | | | | | | | | 51 | 40 | 9 |
| Waste Area | TP | AMEC/AE | TP-WA-13-08 | ARD-02 | 2 | 2.1 | Waste Rock | | | | | | | | | | | | | | | 77 | 23 | 0 |
| Waste Area | TP | AMEC/AE | TP-WA-13-09 | GS1 | 0.6 | 0.7 | Waste Rock | | | | | | | | | | | | | | | 45 | 51 | 4 |
| Waste Area | TP | AMEC/AE | TP-WA-13-09 | ARD-04 | 3 | 3.1 | Waste Rock | | | | | | | | | | | | | | | 66 | 32 | 2 |
| Waste Area | TP | AMEC/AE | TP-WA-13-10 | ARD-02 | 2 | 2.1 | Waste Rock | | | | | | | | | | | | | | | 61 | 38 | 1 |
| Waste Area | TP | AMEC/AE | TP-WA-13-11 | ARD-02 | 2 | 2.1 | Waste Rock | | | | | | | | | | | | | | | 60 | 36 | 4 |
| Waste Area | TP | AMEC/AE | TP-WA-13-11 | ARD-05 | 4.9 | 5 | Waste Rock | | | | | | | | | | | | | | | 71 | 28 | 1 |

| | |
|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program |
| **PROJECT No.** | VM00605.523.20 |
| **SAMPLE No** | GS1 |
| **LAB No.** | N/A |
| **BOREHOLE No.** | BH-T-13-02 |
| **DEPTH** | 1.0-1.1 m |
| **REPORTED BY** | MR |
| **DATE** | 07-Nov-13 |

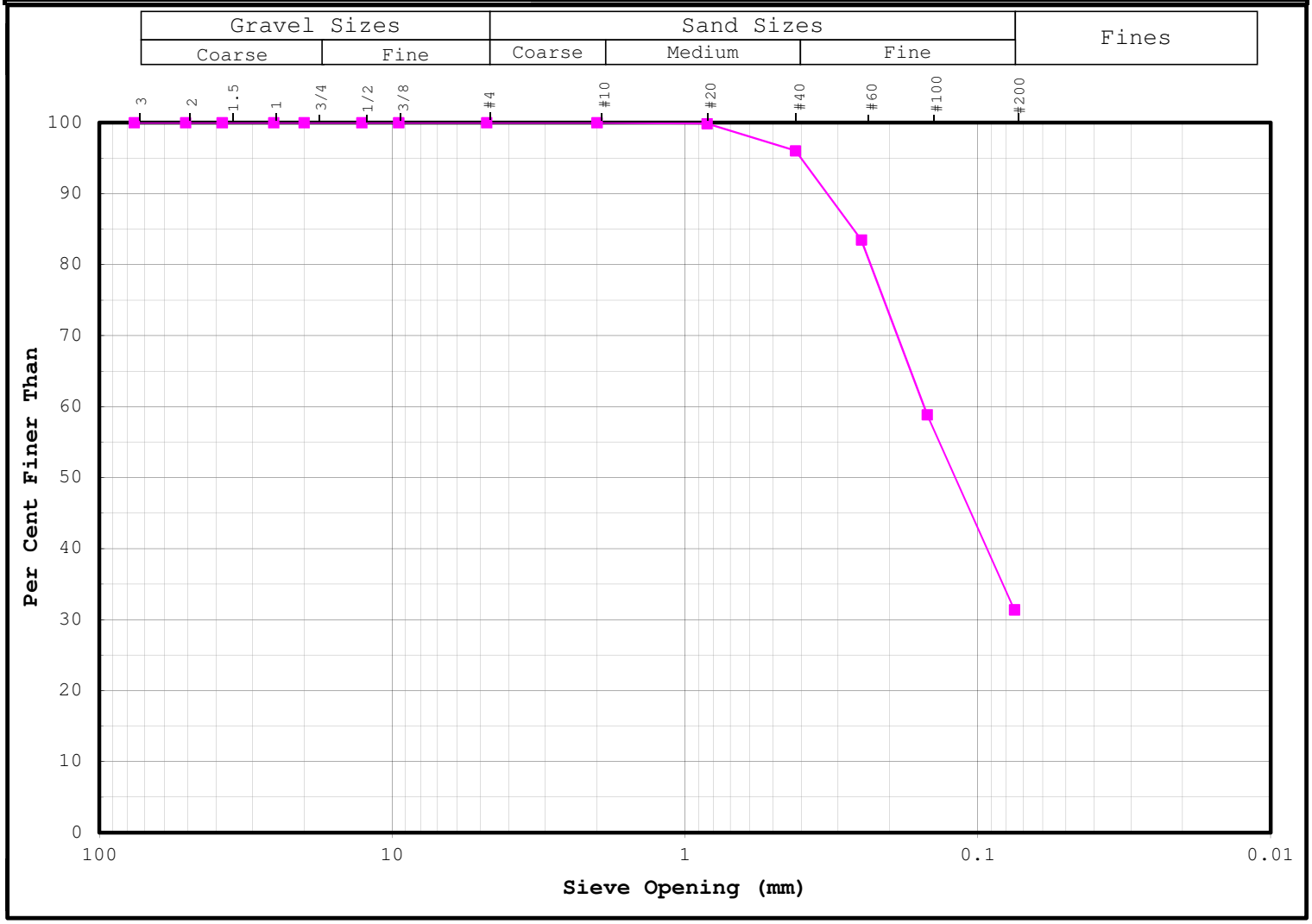
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |
| **Test Sample Details** | |
| Mass Dry Sample + Tare (g) | 302 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 288.3 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 216.7 |
| Mass Dry Sample After Wash (g) | 203 |
| Sample Split on Sieve Size | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 288.3 | | 100.0 |
| 2 | 50 | 50.8 | | 288.3 | | 100.0 |
| 1.5 | 40 | 38.1 | | 288.3 | | 100.0 |
| 1 | 25 | 25.4 | | 288.3 | | 100.0 |
| 3/4 | 20 | 20 | | 288.3 | | 100.0 |
| 1/2 | 12 | 12.7 | | 288.3 | | 100.0 |
| 3/8 | 10 | 9.51 | | 288.3 | | 100.0 |
| #4 | 5 | 4.76 | | 288.3 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 288.3 | | 100.0 |
| #20 | 840 | 0.841 | 0.4 | 287.9 | | 99.9 |
| #40 | 420 | 0.420 | 11 | 276.9 | | 96.0 |
| #60 | 250 | 0.250 | 36.2 | 240.7 | | 83.5 |
| #100 | 150 | 0.149 | 71 | 169.7 | | 58.9 |
| #200 | 80 | 0.075 | 79.2 | 90.5 | | 31.4 |
| Pan | | | 4.9 | 85.6 | | |

**Remarks**

**Classification**



| | |
|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program |
| **PROJECT No.** | VM00605E.523.20 |
| **SAMPLE No** | MC3 |
| **LAB No.** | N/A |
| **BOREHOLE No.** | BH-T-13-02 |
| **DEPTH** | 2.0-2.1 m |
| **REPORTED BY** | MR |
| **DATE** | 07-Nov-13 |

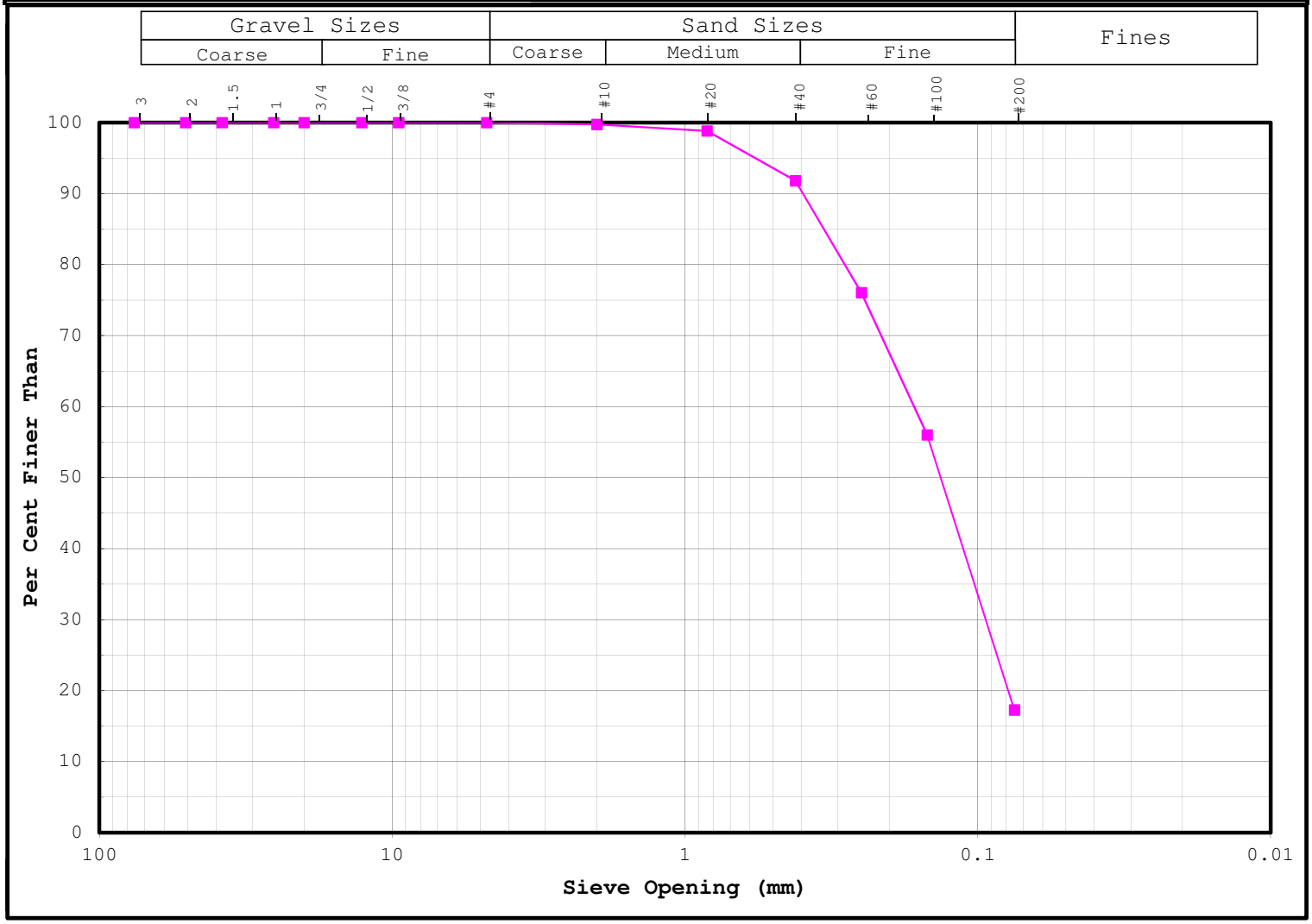
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |
| **Test Sample Details** | |
| Mass Dry Sample + Tare (g) | 381.8 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 368.1 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 326.8 |
| Mass Dry Sample After Wash (g) | 313.1 |
| Sample Split on Sieve Size | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 368.1 | | 100.0 |
| 2 | 50 | 50.8 | | 368.1 | | 100.0 |
| 1.5 | 40 | 38.1 | | 368.1 | | 100.0 |
| 1 | 25 | 25.4 | | 368.1 | | 100.0 |
| 3/4 | 20 | 20 | | 368.1 | | 100.0 |
| 1/2 | 12 | 12.7 | | 368.1 | | 100.0 |
| 3/8 | 10 | 9.51 | | 368.1 | | 100.0 |
| #4 | 5 | 4.76 | | 368.1 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | 0.9 | 367.2 | | 99.8 |
| #20 | 840 | 0.841 | 3.4 | 363.8 | | 98.8 |
| #40 | 420 | 0.420 | 25.8 | 338 | | 91.8 |
| #60 | 250 | 0.250 | 58 | 280 | | 76.1 |
| #100 | 150 | 0.149 | 73.8 | 206.2 | | 56.0 |
| #200 | 80 | 0.075 | 142.6 | 63.6 | | 17.3 |
| Pan | | | 8.4 | 55.2 | | |

**Remarks**

**Classification**

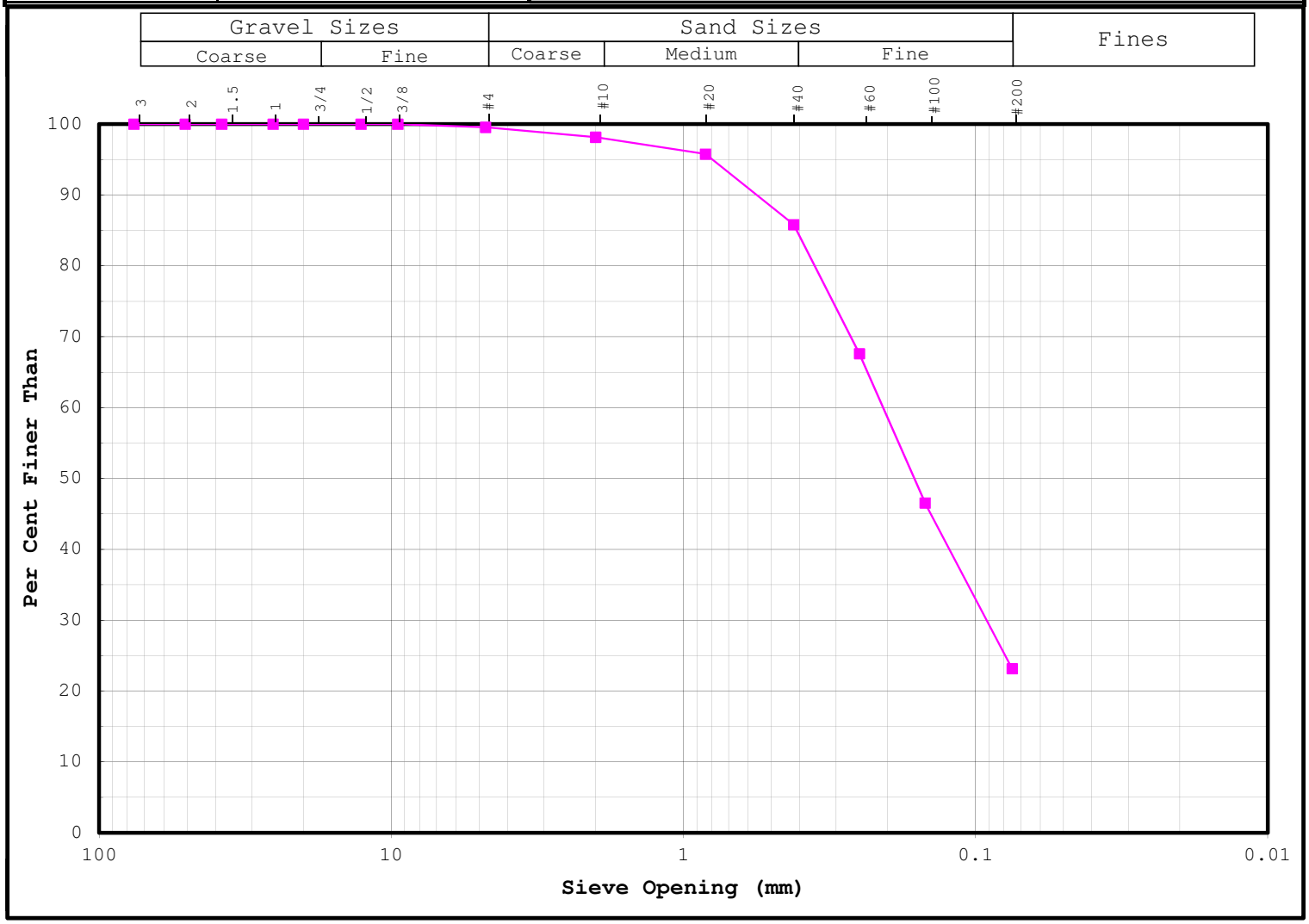


| | |
|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program |
| **PROJECT No.** | VM00605E.523.20 |
| **SAMPLE No** | GS5 |
| **LAB No.** | N/A |
| **BOREHOLE No.** | BH-T-13-03 |
| **DEPTH** | 4.9-5.0 m |
| **REPORTED BY** | MR |
| **DATE** | 07-Nov-13 |

# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |
| **Test Sample Details** | |
| Mass Dry Sample + Tare (g) | 286.1 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 272.4 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 225.8 |
| Mass Dry Sample After Wash (g) | 212.1 |
| Sample Split on Sieve Size | |
| **Remarks** | |
| **Classification** | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 272.4 | | 100.0 |
| 2 | 50 | 50.8 | | 272.4 | | 100.0 |
| 1.5 | 40 | 38.1 | | 272.4 | | 100.0 |
| 1 | 25 | 25.4 | | 272.4 | | 100.0 |
| 3/4 | 20 | 20 | | 272.4 | | 100.0 |
| 1/2 | 12 | 12.7 | | 272.4 | | 100.0 |
| 3/8 | 10 | 9.51 | | 272.4 | | 100.0 |
| #4 | 5 | 4.76 | 1.2 | 271.2 | | 99.6 |
| | | | | | | |
| #10 | 2000 | 2.00 | 3.8 | 267.4 | | 98.2 |
| #20 | 840 | 0.841 | 6.5 | 260.9 | | 95.8 |
| #40 | 420 | 0.420 | 27.1 | 233.8 | | 85.8 |
| #60 | 250 | 0.250 | 49.6 | 184.2 | | 67.6 |
| #100 | 150 | 0.149 | 57.4 | 126.8 | | 46.5 |
| #200 | 80 | 0.075 | 63.7 | 63.1 | | 23.2 |
| Pan | | | 2.6 | 60.5 | | |

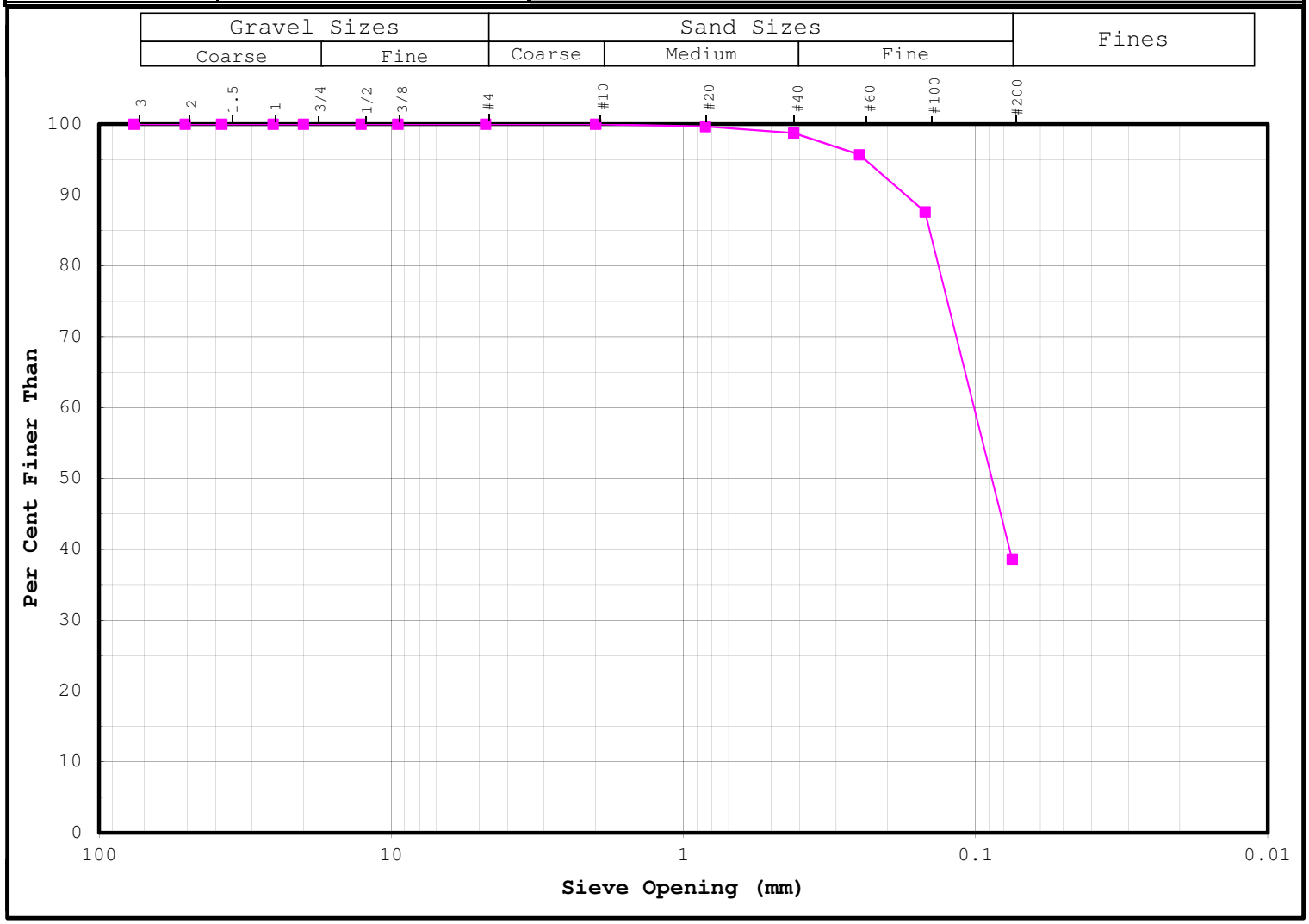


| | |
|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program |
| **PROJECT No.** | VM00605E.523.20 |
| **SAMPLE No** | ARD05 |
| **LAB No.** | N/A |
| **BOREHOLE No.** | BH-T-13-04 |
| **DEPTH** | 12.0-12.1 m |
| **REPORTED BY** | MR |
| **DATE** | 07-Nov-13 |

# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |
| **Test Sample Details** | |
| Mass Dry Sample + Tare (g) | 253.7 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 240 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 174.7 |
| Mass Dry Sample After Wash (g) | 161 |
| Sample Split on Sieve Size | |
| **Remarks** | |
| **Classification** | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 240 | | 100.0 |
| 2 | 50 | 50.8 | | 240 | | 100.0 |
| 1.5 | 40 | 38.1 | | 240 | | 100.0 |
| 1 | 25 | 25.4 | | 240 | | 100.0 |
| 3/4 | 20 | 20 | | 240 | | 100.0 |
| 1/2 | 12 | 12.7 | | 240 | | 100.0 |
| 3/8 | 10 | 9.51 | | 240 | | 100.0 |
| #4 | 5 | 4.76 | | 240 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | 0 | 240 | | 100.0 |
| #20 | 840 | 0.841 | 0.8 | 239.2 | | 99.7 |
| #40 | 420 | 0.420 | 2.2 | 237 | | 98.8 |
| #60 | 250 | 0.250 | 7.3 | 229.7 | | 95.7 |
| #100 | 150 | 0.149 | 19.4 | 210.3 | | 87.6 |
| #200 | 80 | 0.075 | 117.6 | 92.7 | | 38.6 |
| Pan | | | 13.4 | 79.3 | | |



| | |
|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program |
| **PROJECT No.** | VM00605E.523.20 |
| **SAMPLE No** | GS1 |
| **LAB No.** | N/A |
| **BOREHOLE No.** | BH-T-13-04 |
| **DEPTH** | 2.5-2.6 m |
| **REPORTED BY** | MR |
| **DATE** | 07-Nov-13 |

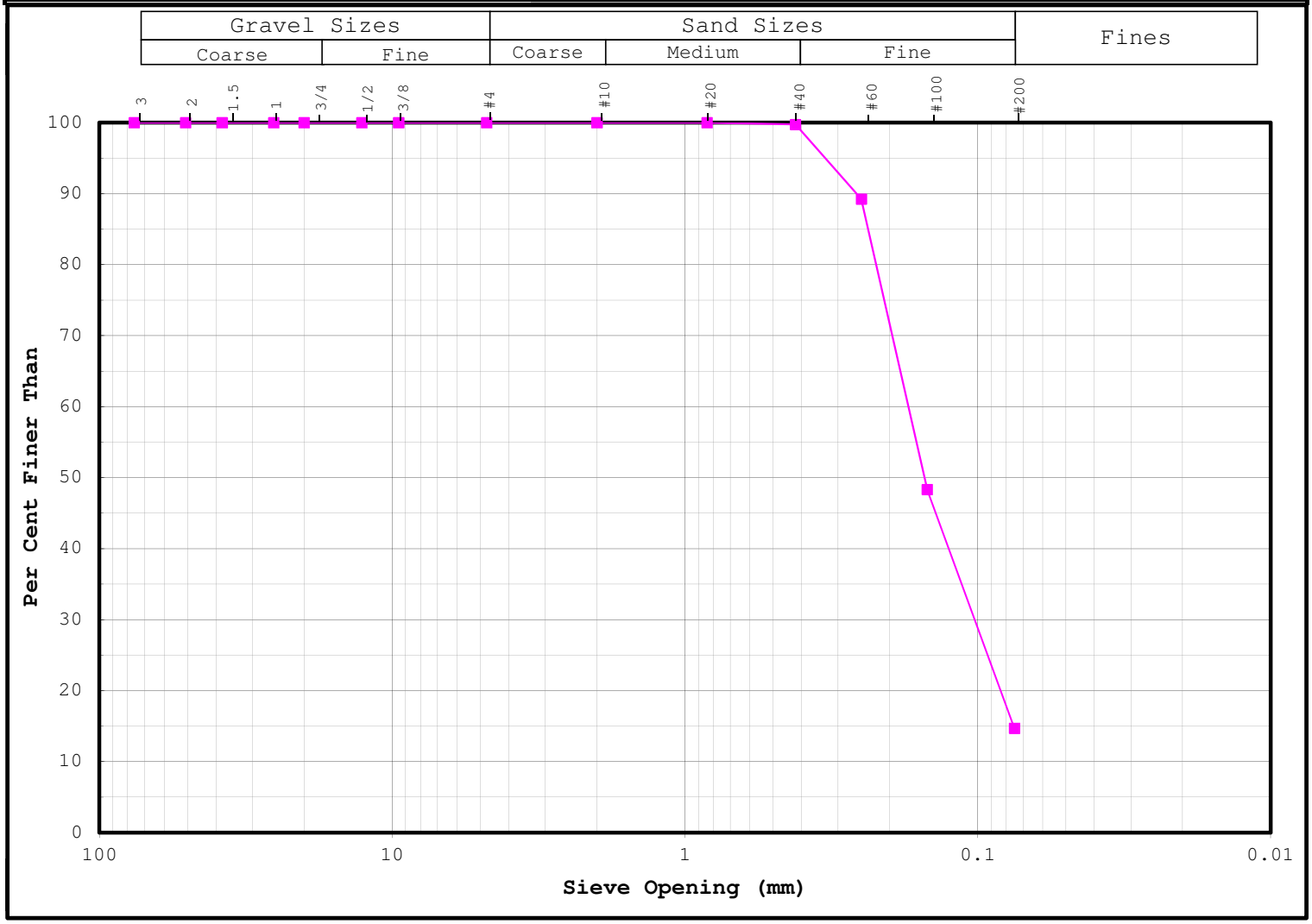
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |
| **Test Sample Details** | |
| Mass Dry Sample + Tare (g) | 325.1 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 311.4 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 284.4 |
| Mass Dry Sample After Wash (g) | 270.7 |
| Sample Split on Sieve Size | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 311.4 | | 100.0 |
| 2 | 50 | 50.8 | | 311.4 | | 100.0 |
| 1.5 | 40 | 38.1 | | 311.4 | | 100.0 |
| 1 | 25 | 25.4 | | 311.4 | | 100.0 |
| 3/4 | 20 | 20 | | 311.4 | | 100.0 |
| 1/2 | 12 | 12.7 | | 311.4 | | 100.0 |
| 3/8 | 10 | 9.51 | | 311.4 | | 100.0 |
| #4 | 5 | 4.76 | | 311.4 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | 0 | 311.4 | | 100.0 |
| #20 | 840 | 0.841 | 0 | 311.4 | | 100.0 |
| #40 | 420 | 0.420 | 0.8 | 310.6 | | 99.7 |
| #60 | 250 | 0.250 | 32.7 | 277.9 | | 89.2 |
| #100 | 150 | 0.149 | 127.4 | 150.5 | | 48.3 |
| #200 | 80 | 0.075 | 104.7 | 45.8 | | 14.7 |
| Pan | | | 4.8 | 41 | | |

**Remarks**

**Classification**



| | | | |
|---|---|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program | | |
| **PROJECT No.** | VM00605E.523.20 | | |
| **SAMPLE No** | GS14 | **LAB No.** | N/A |
| **BOREHOLE No.** | BH-TD-13-01 | **DEPTH** | 19.0-19.1 m |
| **REPORTED BY** | MR | **DATE** | 07-Nov-13 |

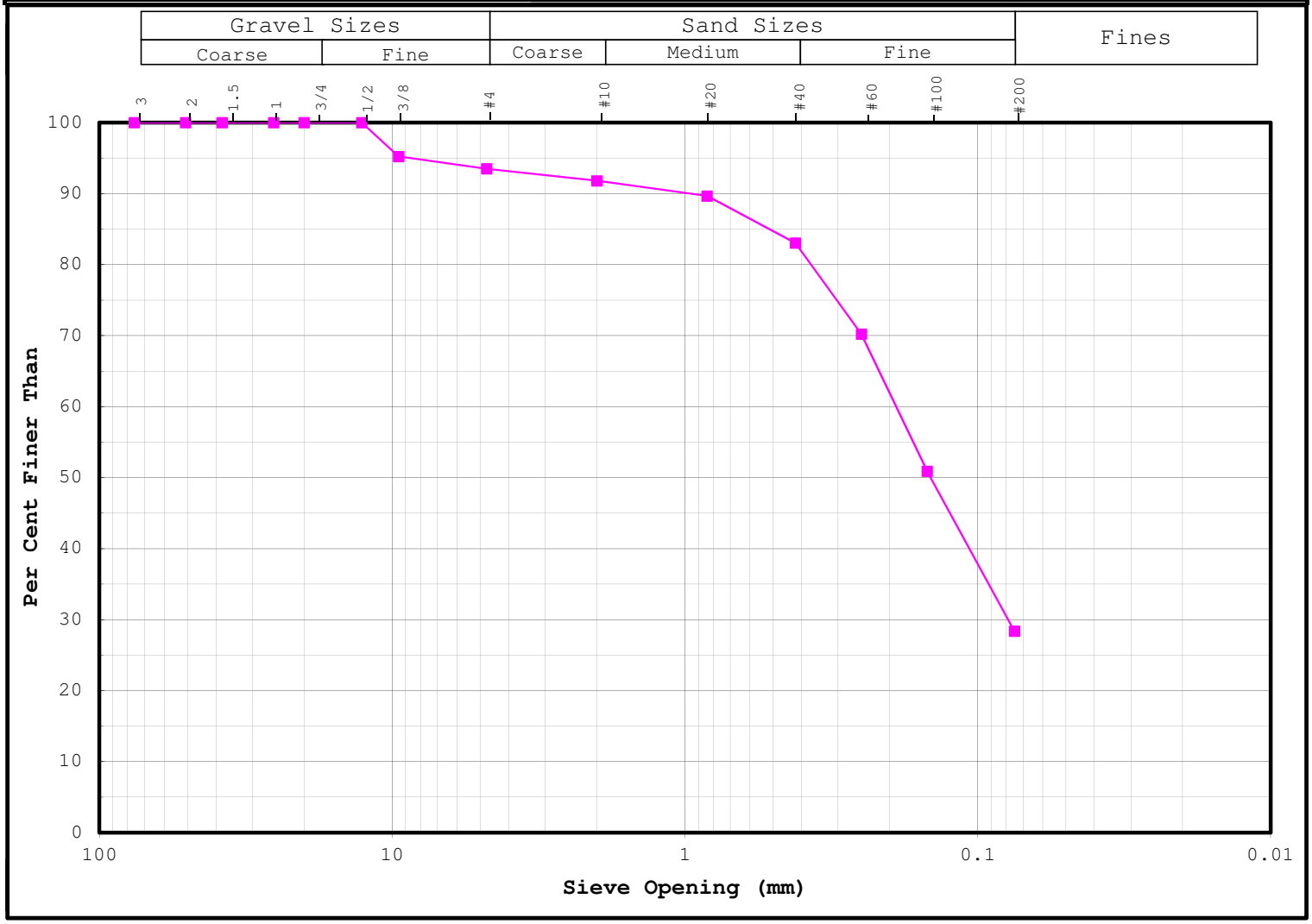
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |
| **Test Sample Details** | |
| Mass Dry Sample + Tare (g) | 250.8 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 237.1 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 187.5 |
| Mass Dry Sample After Wash (g) | 173.8 |
| Sample Split on Sieve Size | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 237.1 | | 100.0 |
| 2 | 50 | 50.8 | | 237.1 | | 100.0 |
| 1.5 | 40 | 38.1 | | 237.1 | | 100.0 |
| 1 | 25 | 25.4 | | 237.1 | | 100.0 |
| 3/4 | 20 | 20 | | 237.1 | | 100.0 |
| 1/2 | 12 | 12.7 | | 237.1 | | 100.0 |
| 3/8 | 10 | 9.51 | 11.3 | 225.8 | | 95.2 |
| #4 | 5 | 4.76 | 4.1 | 221.7 | | 93.5 |
| | | | | | | |
| #10 | 2000 | 2.00 | 4.0 | 217.7 | | 91.8 |
| #20 | 840 | 0.841 | 5.1 | 212.6 | | 89.7 |
| #40 | 420 | 0.420 | 15.7 | 196.9 | | 83.0 |
| #60 | 250 | 0.250 | 30.4 | 166.5 | | 70.2 |
| #100 | 150 | 0.149 | 45.8 | 120.7 | | 50.9 |
| #200 | 80 | 0.075 | 53.4 | 67.3 | | 28.4 |
| Pan | | | 3.8 | 63.5 | | |

**Remarks**

**Classification**



| | |
|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program |
| **PROJECT No.** | VM00605E.523.20 |
| **SAMPLE No** | N/A |
| **LAB No.** | N/A |
| **BOREHOLE No.** | GP-T-13-21 |
| **DEPTH** | 1.25-2.5 m |
| **REPORTED BY** | MR |
| **DATE** | 07-Nov-13 |

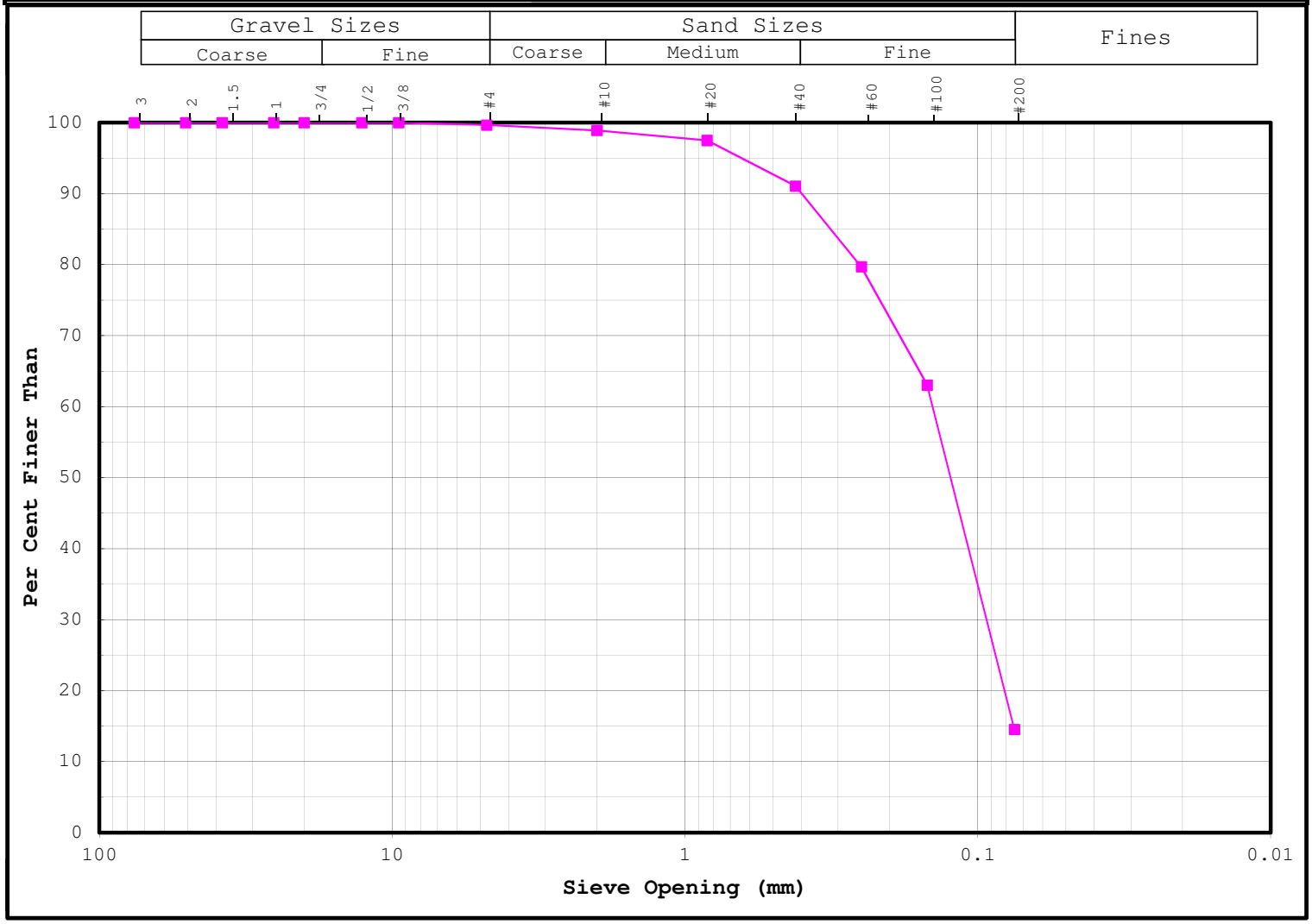
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |
| **Test Sample Details** | |
| Mass Dry Sample + Tare (g) | 290.2 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 276.5 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 260.7 |
| Mass Dry Sample After Wash (g) | 247 |
| Sample Split on Sieve Size | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 276.5 | | 100.0 |
| 2 | 50 | 50.8 | | 276.5 | | 100.0 |
| 1.5 | 40 | 38.1 | | 276.5 | | 100.0 |
| 1 | 25 | 25.4 | | 276.5 | | 100.0 |
| 3/4 | 20 | 20 | | 276.5 | | 100.0 |
| 1/2 | 12 | 12.7 | | 276.5 | | 100.0 |
| 3/8 | 10 | 9.51 | | 276.5 | | 100.0 |
| #4 | 5 | 4.76 | 0.9 | 275.6 | | 99.7 |
| | | | | | | |
| #10 | 2000 | 2.00 | 2.1 | 273.5 | | 98.9 |
| #20 | 840 | 0.841 | 3.9 | 269.6 | | 97.5 |
| #40 | 420 | 0.420 | 17.8 | 251.8 | | 91.1 |
| #60 | 250 | 0.250 | 31.4 | 220.4 | | 79.7 |
| #100 | 150 | 0.149 | 46.1 | 174.3 | | 63.0 |
| #200 | 80 | 0.075 | 134.1 | 40.2 | | 14.5 |
| Pan | | | 10.5 | 29.7 | | |

**Remarks**

**Classification**



| | | | |
|---|---|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program | | |
| **PROJECT No.** | VM00605E.523.20 | | |
| **SAMPLE No** | GS4 | **LAB No.** | N/A |
| **BOREHOLE No.** | TP-T-13-04 | **DEPTH** | 2.5-2.6 m |
| **REPORTED BY** | MR | **DATE** | 07-Nov-13 |

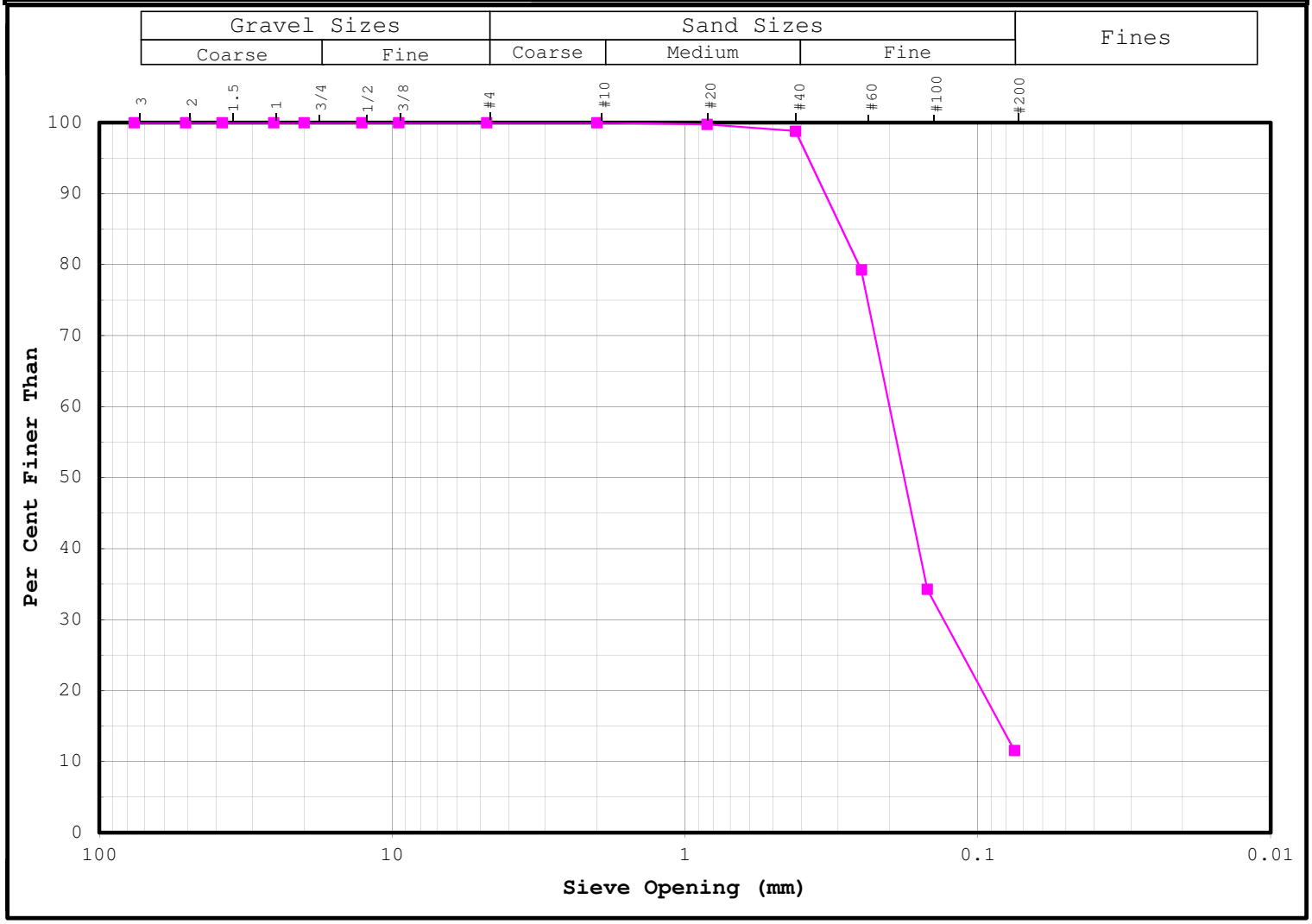
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |
| **Test Sample Details** | |
| Mass Dry Sample + Tare (g) | 264.7 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 251 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 237.6 |
| Mass Dry Sample After Wash (g) | 223.9 |
| Sample Split on Sieve Size | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 251 | | 100.0 |
| 2 | 50 | 50.8 | | 251 | | 100.0 |
| 1.5 | 40 | 38.1 | | 251 | | 100.0 |
| 1 | 25 | 25.4 | | 251 | | 100.0 |
| 3/4 | 20 | 20 | | 251 | | 100.0 |
| 1/2 | 12 | 12.7 | | 251 | | 100.0 |
| 3/8 | 10 | 9.51 | | 251 | | 100.0 |
| #4 | 5 | 4.76 | | 251 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | 0 | 251 | | 100.0 |
| #20 | 840 | 0.841 | 0.6 | 250.4 | | 99.8 |
| #40 | 420 | 0.420 | 2.4 | 248 | | 98.8 |
| #60 | 250 | 0.250 | 49 | 199 | | 79.3 |
| #100 | 150 | 0.149 | 112.9 | 86.1 | | 34.3 |
| #200 | 80 | 0.075 | 57 | 29.1 | | 11.6 |
| Pan | | | 1.8 | 27.3 | | |

**Remarks**

**Classification**



| | | | |
|---|---|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program | | |
| **PROJECT No.** | VM00605E.523.20 | | |
| **SAMPLE No** | GS6 | **LAB No.** | N/A |
| **BOREHOLE No.** | TP-T-13-04 | **DEPTH** | 3.4-3.5 m |
| **REPORTED BY** | MR | **DATE** | 07-Nov-13 |

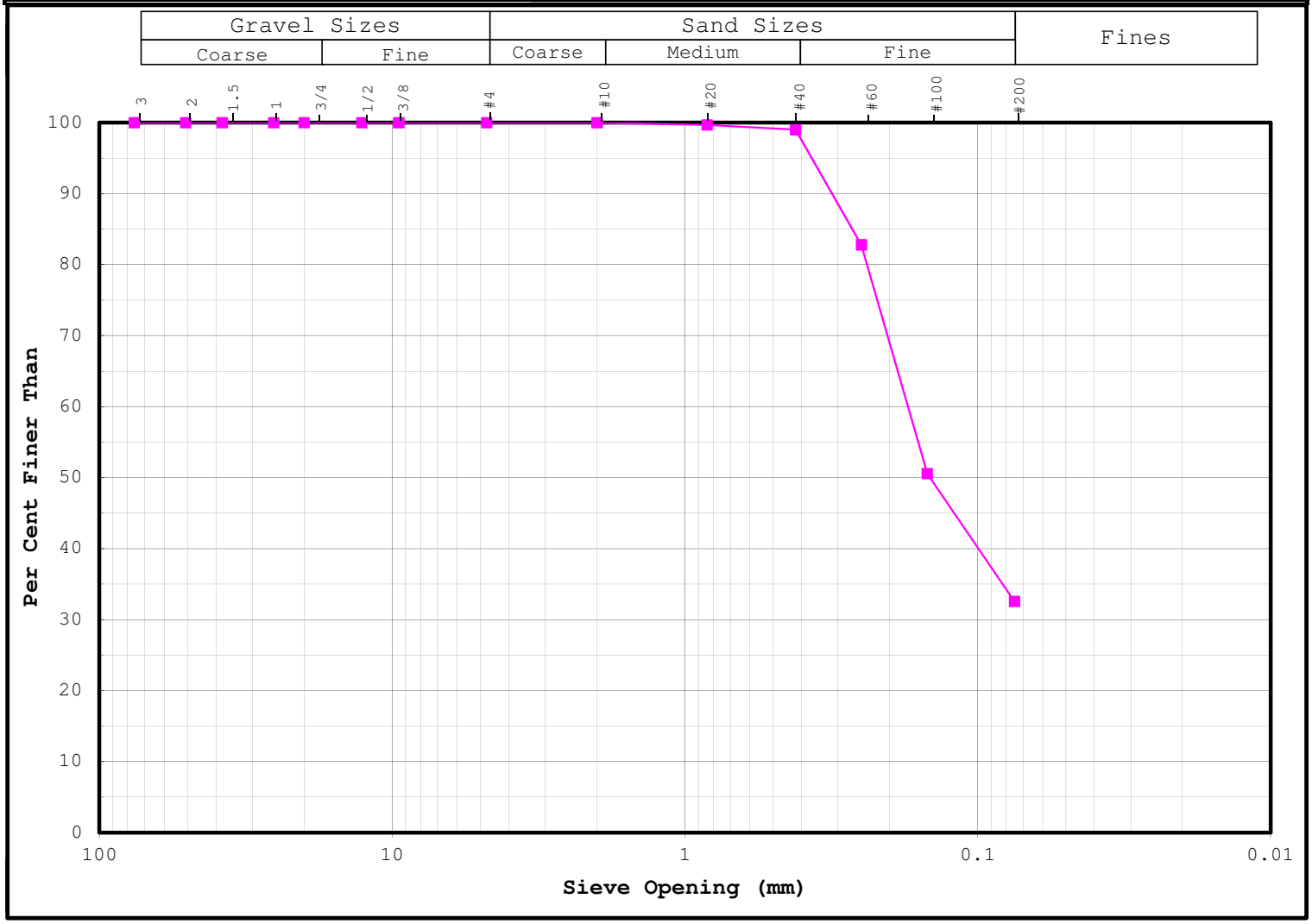
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |
| **Test Sample Details** | |
| Mass Dry Sample + Tare (g) | 205.6 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 191.9 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 144.3 |
| Mass Dry Sample After Wash (g) | 130.6 |
| Sample Split on Sieve Size | |

**Remarks**

**Classification**

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 191.9 | | 100.0 |
| 2 | 50 | 50.8 | | 191.9 | | 100.0 |
| 1.5 | 40 | 38.1 | | 191.9 | | 100.0 |
| 1 | 25 | 25.4 | | 191.9 | | 100.0 |
| 3/4 | 20 | 20 | | 191.9 | | 100.0 |
| 1/2 | 12 | 12.7 | | 191.9 | | 100.0 |
| 3/8 | 10 | 9.51 | | 191.9 | | 100.0 |
| #4 | 5 | 4.76 | | 191.9 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 191.9 | | 100.0 |
| #20 | 840 | 0.841 | 0.6 | 191.3 | | 99.7 |
| #40 | 420 | 0.420 | 1.3 | 190 | | 99.0 |
| #60 | 250 | 0.250 | 31.1 | 158.9 | | 82.8 |
| #100 | 150 | 0.149 | 61.8 | 97.1 | | 50.6 |
| #200 | 80 | 0.075 | 34.6 | 62.5 | | 32.6 |
| Pan | | | 0.9 | 61.6 | | |

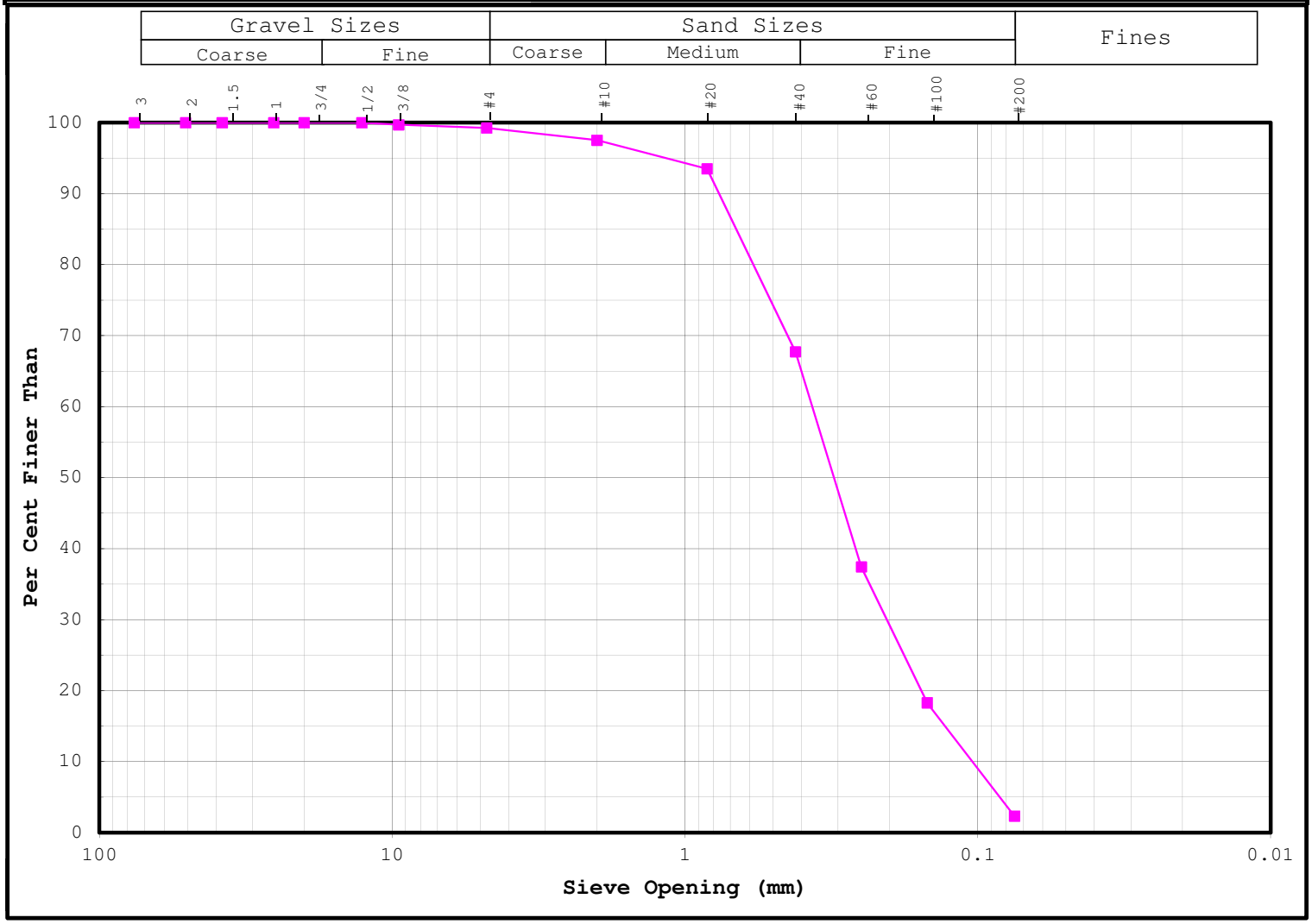


| | |
|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program |
| **PROJECT No.** | VM00605E.523.20 |
| **SAMPLE No** | GS1 |
| **LAB No.** | N/A |
| **BOREHOLE No.** | TP-T-13-05 |
| **DEPTH** | 1.0-1.1 m |
| **REPORTED BY** | MR |
| **DATE** | 07-Nov-13 |

# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |
| **Test Sample Details** | |
| Mass Dry Sample + Tare (g) | 487.8 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 474.1 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 478.1 |
| Mass Dry Sample After Wash (g) | 464.4 |
| Sample Split on Sieve Size | |
| **Remarks** | |
| **Classification** | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 474.1 | | 100.0 |
| 2 | 50 | 50.8 | | 474.1 | | 100.0 |
| 1.5 | 40 | 38.1 | | 474.1 | | 100.0 |
| 1 | 25 | 25.4 | | 474.1 | | 100.0 |
| 3/4 | 20 | 20 | | 474.1 | | 100.0 |
| 1/2 | 12 | 12.7 | | 474.1 | | 100.0 |
| 3/8 | 10 | 9.51 | 1.4 | 472.7 | | 99.7 |
| #4 | 5 | 4.76 | 2.1 | 470.6 | | 99.3 |
| | | | | | | |
| #10 | 2000 | 2.00 | 8.2 | 462.4 | | 97.5 |
| #20 | 840 | 0.841 | 19.1 | 443.3 | | 93.5 |
| #40 | 420 | 0.420 | 122.2 | 321.1 | | 67.7 |
| #60 | 250 | 0.250 | 143.6 | 177.5 | | 37.4 |
| #100 | 150 | 0.149 | 90.8 | 86.7 | | 18.3 |
| #200 | 80 | 0.075 | 75.6 | 11.1 | | 2.3 |
| Pan | | | 1.2 | 9.9 | | |



| | |
|---|---|
| PROJECT | Mt Nansen TA5 2013 SI Program |
| PROJECT No. | VM00605E.523.20 |
| SAMPLE No | GS4 |
| LAB No. | S - 9985 |
| BOREHOLE No. | BH-T-13-03 |
| DEPTH | 4.0 - 4.1m |
| REPORTED BY | CR/MR |
| DATE | 17-Nov-13 |

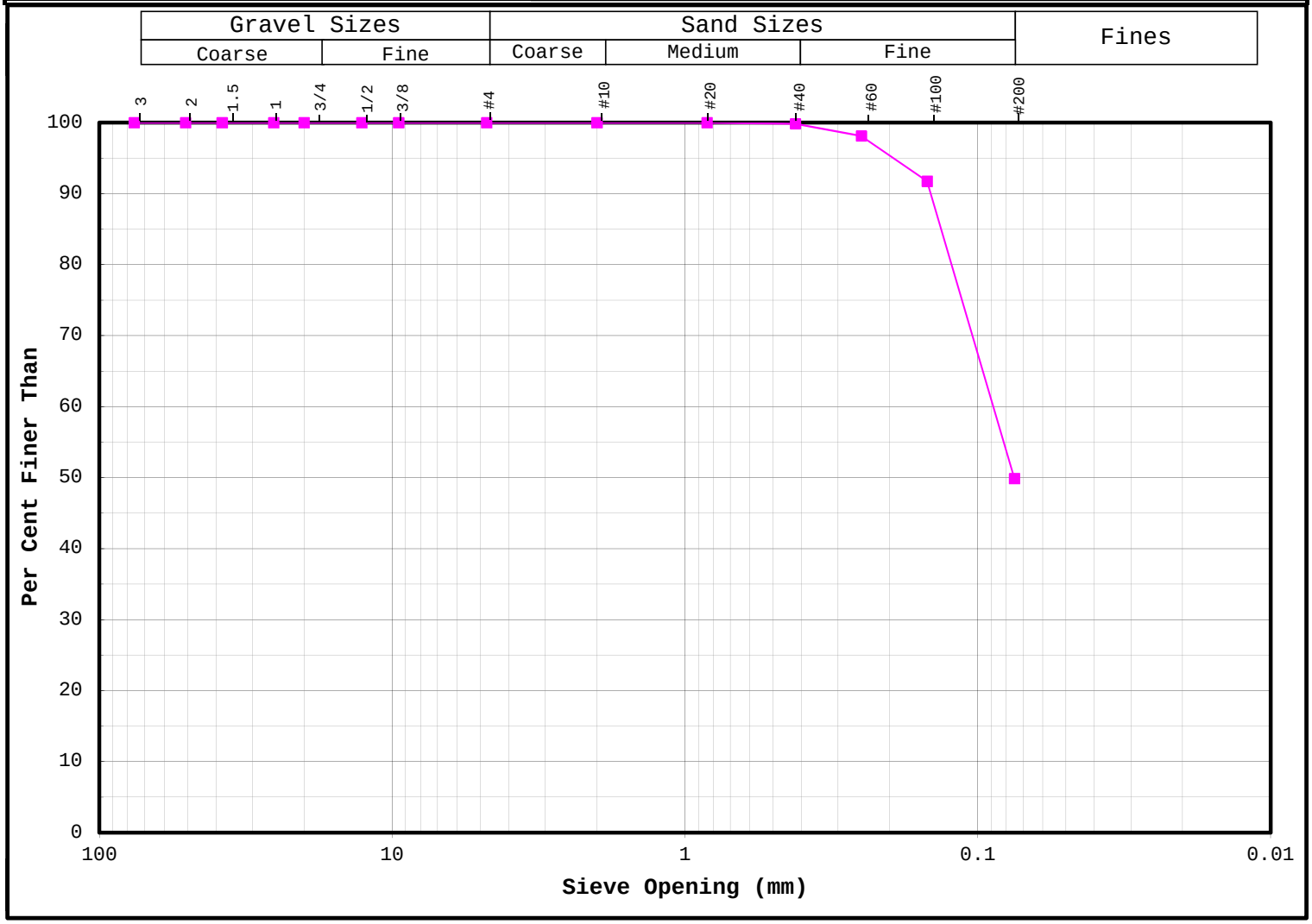
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |

| Test Sample Details | |
|---|---|
| Mass Dry Sample + Tare (g) | 286.2 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 272.5 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 164 |
| Mass Dry Sample After Wash (g) | 150.3 |
| Sample Split on Sieve Size | |

| Remarks | |
|---|---|
| Classification | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 272.5 | | 100.0 |
| 2 | 50 | 50.8 | | 272.5 | | 100.0 |
| 1.5 | 40 | 38.1 | | 272.5 | | 100.0 |
| 1 | 25 | 25.4 | | 272.5 | | 100.0 |
| 3/4 | 20 | 20 | | 272.5 | | 100.0 |
| 1/2 | 12 | 12.7 | | 272.5 | | 100.0 |
| 3/8 | 10 | 9.51 | | 272.5 | | 100.0 |
| #4 | 5 | 4.76 | | 272.5 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 272.5 | | 100.0 |
| #20 | 840 | 0.841 | | 272.5 | | 100.0 |
| #40 | 420 | 0.420 | 0.4 | 272.1 | | 99.9 |
| #60 | 250 | 0.250 | 4.7 | 267.4 | | 98.1 |
| #100 | 150 | 0.149 | 17.4 | 250 | | 91.7 |
| #200 | 80 | 0.075 | 114.1 | 135.9 | | 49.9 |
| Pan | | | 13.4 | 122.5 | | |



| | |
|---|---|
| PROJECT | Mt Nansen TA5 2013 SI Program |
| PROJECT No. | VM00605E.523.20 |
| SAMPLE No | GS2 |
| LAB No. | S - 9985 |
| BOREHOLE No. | BH-T-13-04 |
| DEPTH | 8.7 - 8.8m |
| REPORTED BY | CR/MR |
| DATE | 17-Nov-13 |

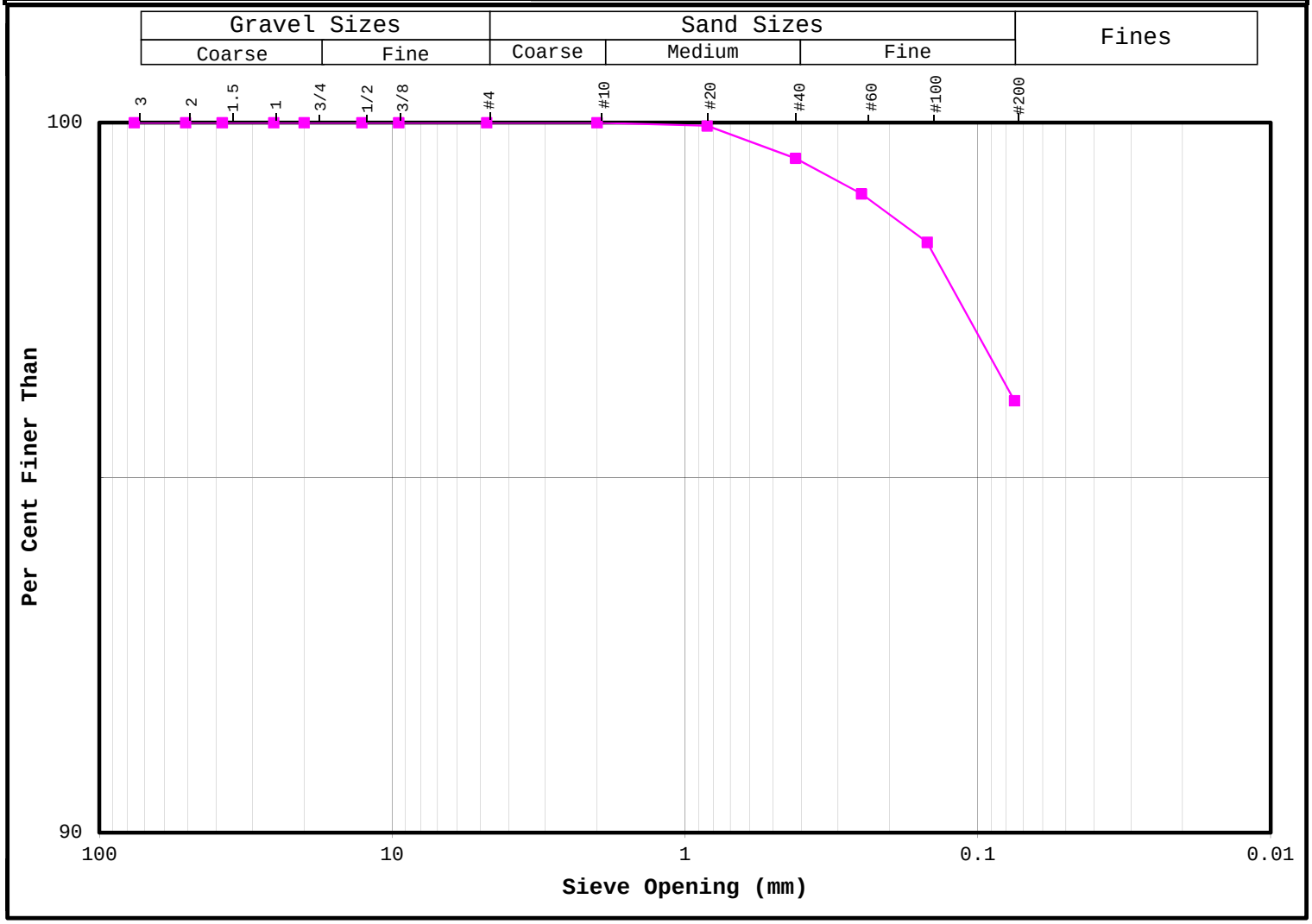
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |

| Test Sample Details | |
|---|---|
| Mass Dry Sample + Tare (g) | 233.3 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 219.6 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 22.7 |
| Mass Dry Sample After Wash (g) | 9 |
| Sample Split on Sieve Size | |

| Remarks | |
|---|---|
| Classification | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 219.6 | | 100.0 |
| 2 | 50 | 50.8 | | 219.6 | | 100.0 |
| 1.5 | 40 | 38.1 | | 219.6 | | 100.0 |
| 1 | 25 | 25.4 | | 219.6 | | 100.0 |
| 3/4 | 20 | 20 | | 219.6 | | 100.0 |
| 1/2 | 12 | 12.7 | | 219.6 | | 100.0 |
| 3/8 | 10 | 9.51 | | 219.6 | | 100.0 |
| #4 | 5 | 4.76 | | 219.6 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 219.6 | | 100.0 |
| #20 | 840 | 0.841 | 0.1 | 219.5 | | 100.0 |
| #40 | 420 | 0.420 | 1 | 218.5 | | 99.5 |
| #60 | 250 | 0.250 | 1.1 | 217.4 | | 99.0 |
| #100 | 150 | 0.149 | 1.5 | 215.9 | | 98.3 |
| #200 | 80 | 0.075 | 4.9 | 211 | | 96.1 |
| Pan | | | 0.4 | 210.6 | | |



| | | | |
|---|---|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program | | |
| **PROJECT No.** | VM00605E.523.20 | | |
| **SAMPLE No** | GS1 | **LAB No.** | S-9985 |
| **BOREHOLE No.** | GP-T-13-01 | **DEPTH** | 4.0 - 4.8 m |
| **REPORTED BY** | CR/MR | **DATE** | 17-Nov-13 |

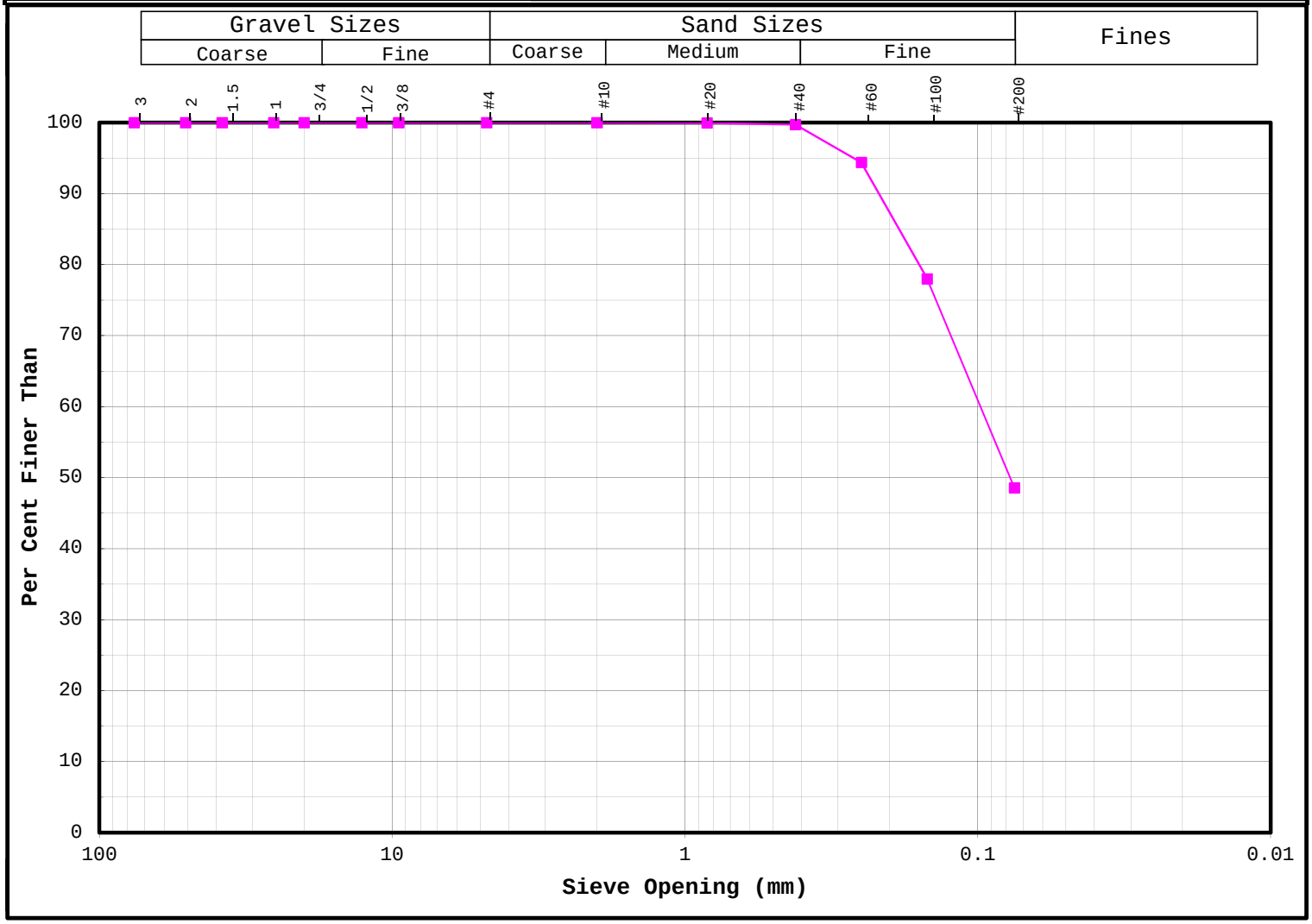
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |

| Test Sample Details | |
|---|---|
| Mass Dry Sample + Tare (g) | 307 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 293.3 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 171.4 |
| Mass Dry Sample After Wash (g) | 157.7 |
| Sample Split on Sieve Size | |

| | |
|---|---|
| **Remarks** | |
| **Classification** | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 293.3 | | 100.0 |
| 2 | 50 | 50.8 | | 293.3 | | 100.0 |
| 1.5 | 40 | 38.1 | | 293.3 | | 100.0 |
| 1 | 25 | 25.4 | | 293.3 | | 100.0 |
| 3/4 | 20 | 20 | | 293.3 | | 100.0 |
| 1/2 | 12 | 12.7 | | 293.3 | | 100.0 |
| 3/8 | 10 | 9.51 | | 293.3 | | 100.0 |
| #4 | 5 | 4.76 | | 293.3 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 293.3 | | 100.0 |
| #20 | 840 | 0.841 | 0.1 | 293.2 | | 100.0 |
| #40 | 420 | 0.420 | 0.7 | 292.5 | | 99.7 |
| #60 | 250 | 0.250 | 15.6 | 276.9 | | 94.4 |
| #100 | 150 | 0.149 | 48.1 | 228.8 | | 78.0 |
| #200 | 80 | 0.075 | 86.4 | 142.4 | | 48.6 |
| Pan | | | 6.6 | 135.8 | | |

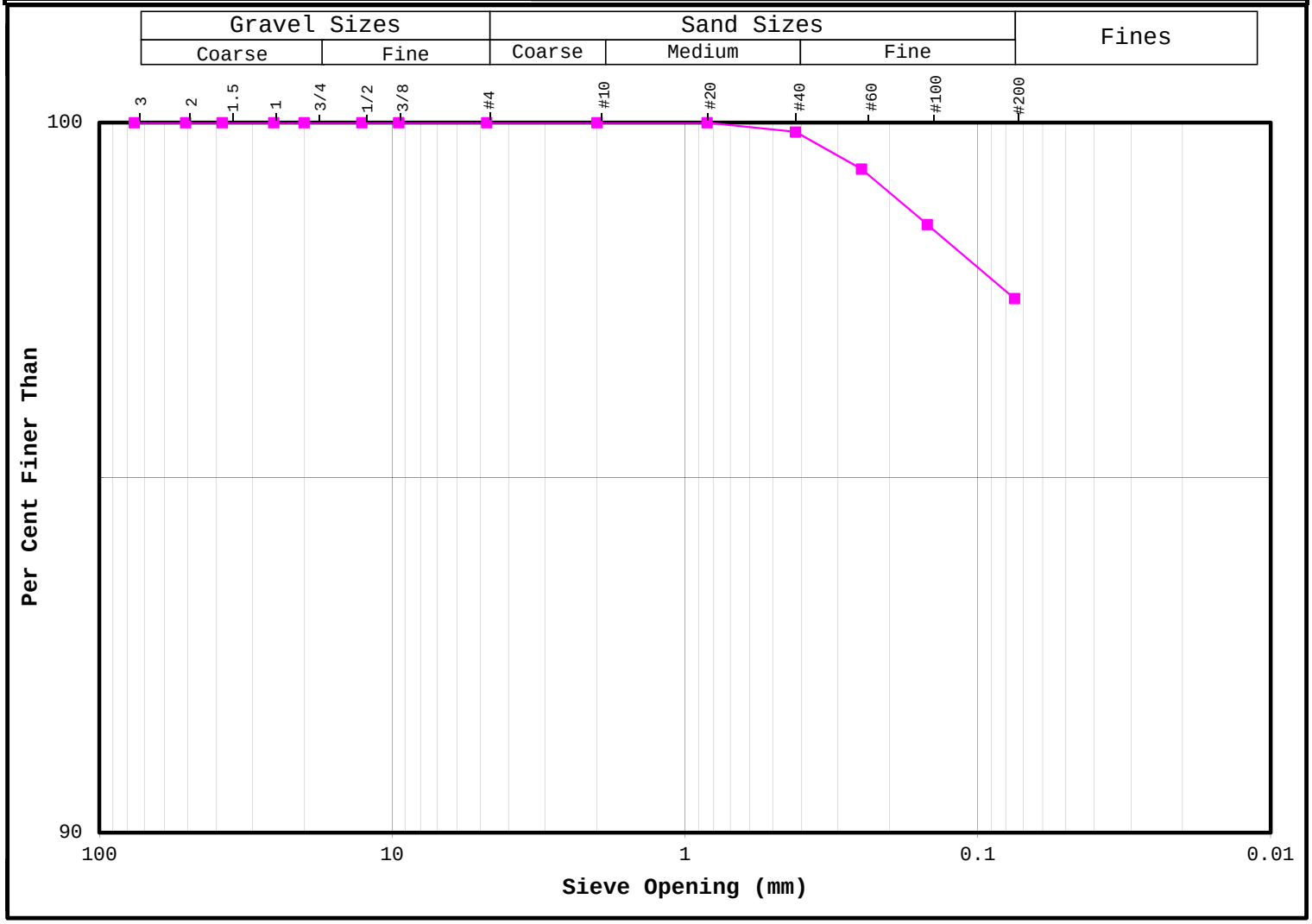


| | | | |
|---|---|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program | | |
| **PROJECT No.** | VM00605E.523.20 | | |
| **SAMPLE No** | N/A | **LAB No.** | S - 9985 |
| **BOREHOLE No.** | GP-T-13-03 | **DEPTH** | 4.0 - 4.5m |
| **REPORTED BY** | CR/MR | **DATE** | 17-Nov-13 |

# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |
| **Test Sample Details** | |
| Mass Dry Sample + Tare (g) | 320.6 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 306.9 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 21.6 |
| Mass Dry Sample After Wash (g) | 7.9 |
| Sample Split on Sieve Size | |
| **Remarks** | |
| **Classification** | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 306.9 | | 100.0 |
| 2 | 50 | 50.8 | | 306.9 | | 100.0 |
| 1.5 | 40 | 38.1 | | 306.9 | | 100.0 |
| 1 | 25 | 25.4 | | 306.9 | | 100.0 |
| 3/4 | 20 | 20 | | 306.9 | | 100.0 |
| 1/2 | 12 | 12.7 | | 306.9 | | 100.0 |
| 3/8 | 10 | 9.51 | | 306.9 | | 100.0 |
| #4 | 5 | 4.76 | | 306.9 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 306.9 | | 100.0 |
| #20 | 840 | 0.841 | | 306.9 | | 100.0 |
| #40 | 420 | 0.420 | 0.4 | 306.5 | | 99.9 |
| #60 | 250 | 0.250 | 1.6 | 304.9 | | 99.3 |
| #100 | 150 | 0.149 | 2.4 | 302.5 | | 98.6 |
| #200 | 80 | 0.075 | 3.2 | 299.3 | | 97.5 |
| Pan | | | 0.3 | 299 | | |



| | | | |
|---|---|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program | | |
| **PROJECT No.** | VM00605E.523.20 | | |
| **SAMPLE No** | N/A | **LAB No.** | S - 9985 |
| **BOREHOLE No.** | GP-T-13-03 | **DEPTH** | 6.0 - 7.0m |
| **REPORTED BY** | CR/MR | **DATE** | 17-Nov-13 |

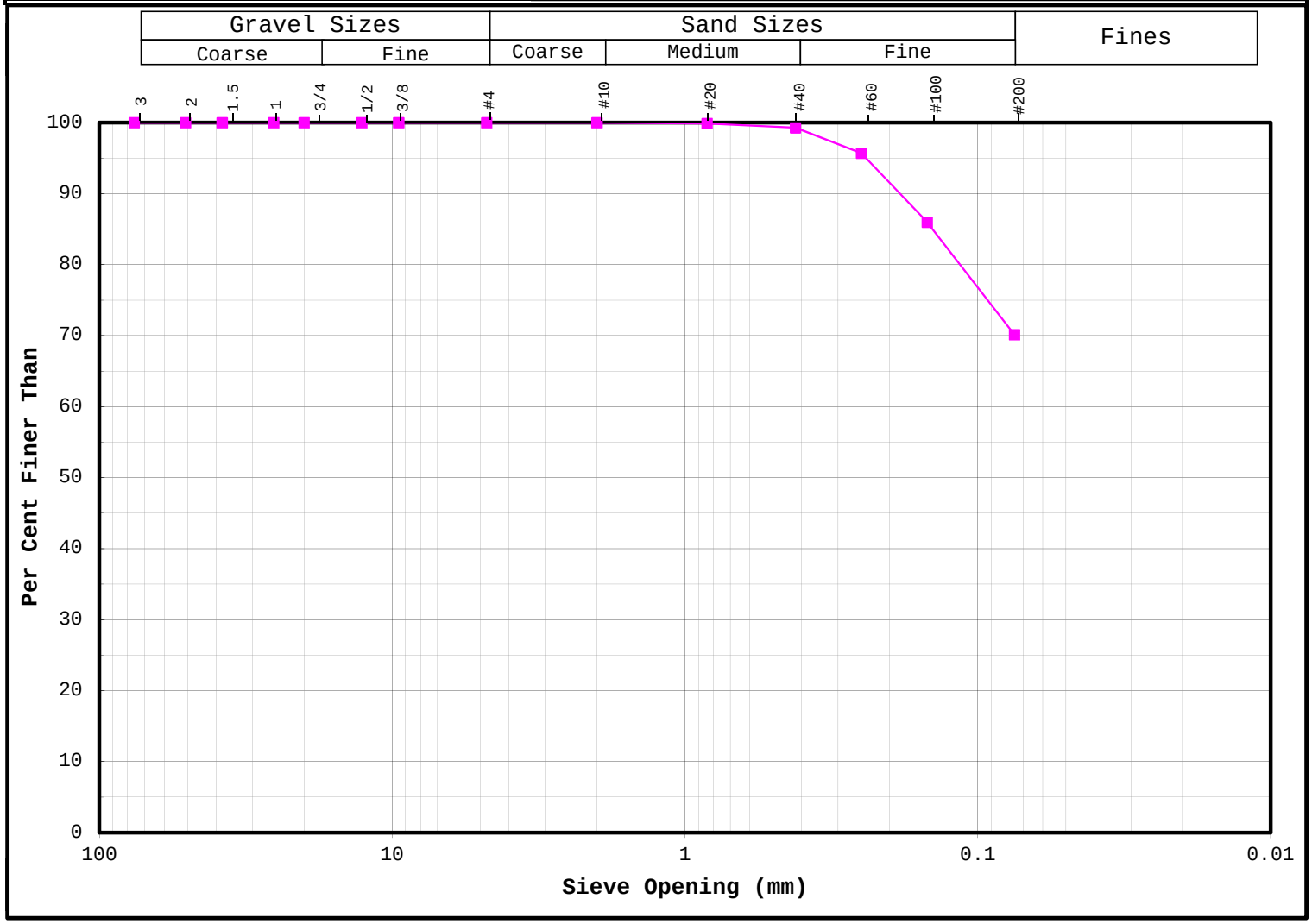
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |

| Test Sample Details | |
|---|---|
| Mass Dry Sample + Tare (g) | 346.2 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 332.5 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 118.4 |
| Mass Dry Sample After Wash (g) | 104.7 |
| Sample Split on Sieve Size | |

| | |
|---|---|
| **Remarks** | |
| **Classification** | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 332.5 | | 100.0 |
| 2 | 50 | 50.8 | | 332.5 | | 100.0 |
| 1.5 | 40 | 38.1 | | 332.5 | | 100.0 |
| 1 | 25 | 25.4 | | 332.5 | | 100.0 |
| 3/4 | 20 | 20 | | 332.5 | | 100.0 |
| 1/2 | 12 | 12.7 | | 332.5 | | 100.0 |
| 3/8 | 10 | 9.51 | | 332.5 | | 100.0 |
| #4 | 5 | 4.76 | | 332.5 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 332.5 | | 100.0 |
| #20 | 840 | 0.841 | 0.4 | 332.1 | | 99.9 |
| #40 | 420 | 0.420 | 2 | 330.1 | | 99.3 |
| #60 | 250 | 0.250 | 11.9 | 318.2 | | 95.7 |
| #100 | 150 | 0.149 | 32.3 | 285.9 | | 86.0 |
| #200 | 80 | 0.075 | 52.7 | 233.2 | | 70.1 |
| Pan | | | 5.2 | 228 | | |

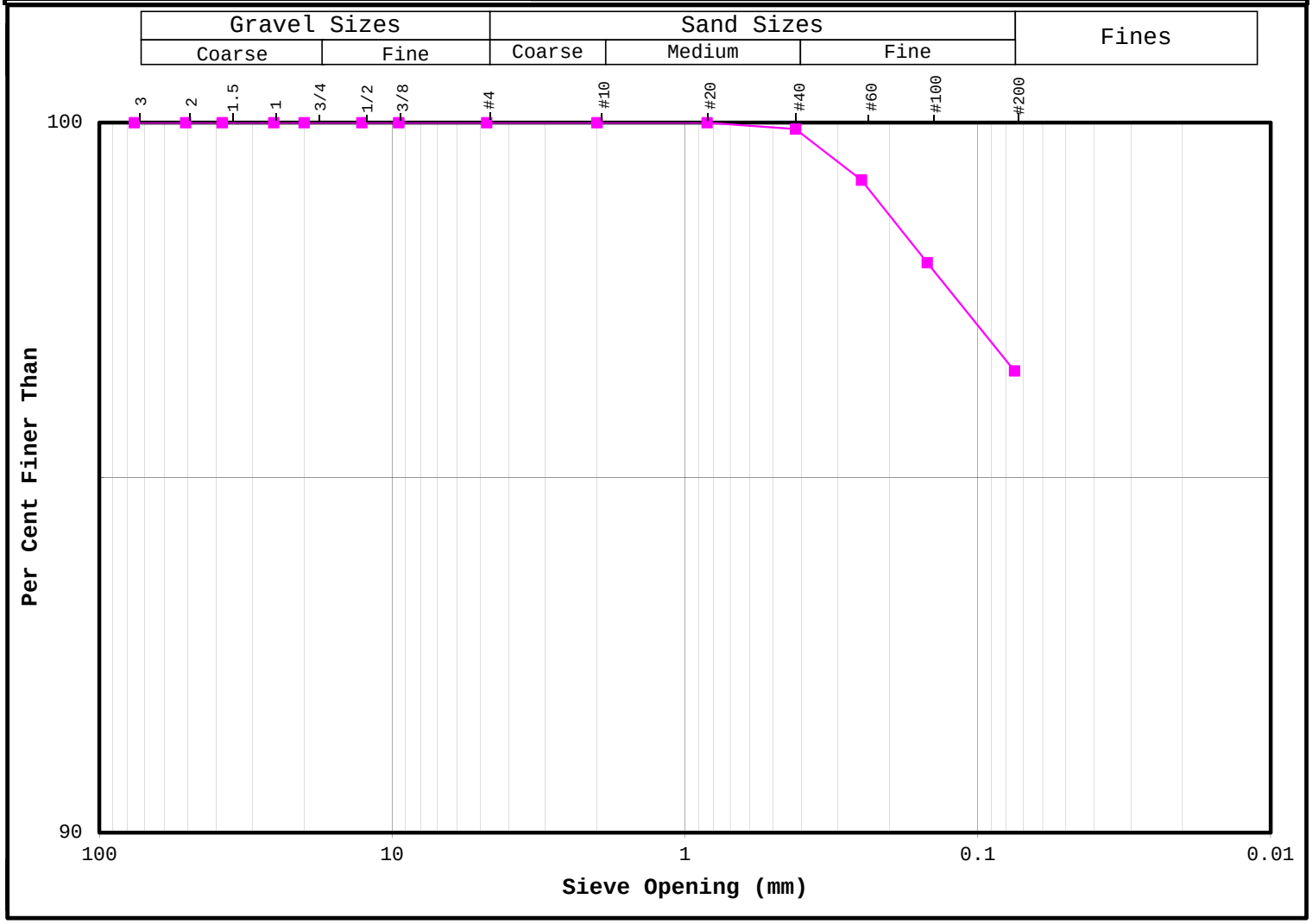


| | | | |
|---|---|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program | | |
| **PROJECT No.** | VM00605E.523.20 | | |
| **SAMPLE No** | N/A | **LAB No.** | S - 9985 |
| **BOREHOLE No.** | GP-T-13-04 | **DEPTH** | 5.5 - 6.5m |
| **REPORTED BY** | CR/MR | **DATE** | 17-Nov-13 |

# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |
| **Test Sample Details** | |
| Mass Dry Sample + Tare (g) | 348.4 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 334.7 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 26.2 |
| Mass Dry Sample After Wash (g) | 12.5 |
| Sample Split on Sieve Size | |
| **Remarks** | |
| **Classification** | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 334.7 | | 100.0 |
| 2 | 50 | 50.8 | | 334.7 | | 100.0 |
| 1.5 | 40 | 38.1 | | 334.7 | | 100.0 |
| 1 | 25 | 25.4 | | 334.7 | | 100.0 |
| 3/4 | 20 | 20 | | 334.7 | | 100.0 |
| 1/2 | 12 | 12.7 | | 334.7 | | 100.0 |
| 3/8 | 10 | 9.51 | | 334.7 | | 100.0 |
| #4 | 5 | 4.76 | | 334.7 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 334.7 | | 100.0 |
| #20 | 840 | 0.841 | 0 | 334.7 | | 100.0 |
| #40 | 420 | 0.420 | 0.3 | 334.4 | | 99.9 |
| #60 | 250 | 0.250 | 2.4 | 332 | | 99.2 |
| #100 | 150 | 0.149 | 3.9 | 328.1 | | 98.0 |
| #200 | 80 | 0.075 | 5.1 | 323 | | 96.5 |
| Pan | | | 0.7 | 322.3 | | |



| | | | |
|---|---|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program | | |
| **PROJECT No.** | VM00605E.523.20 | | |
| **SAMPLE No** | N/A | **LAB No.** | S - 9985 |
| **BOREHOLE No.** | GP-T-13-10 | **DEPTH** | 4.5 - 5.5m |
| **REPORTED BY** | CR/MR | **DATE** | 17-Nov-13 |

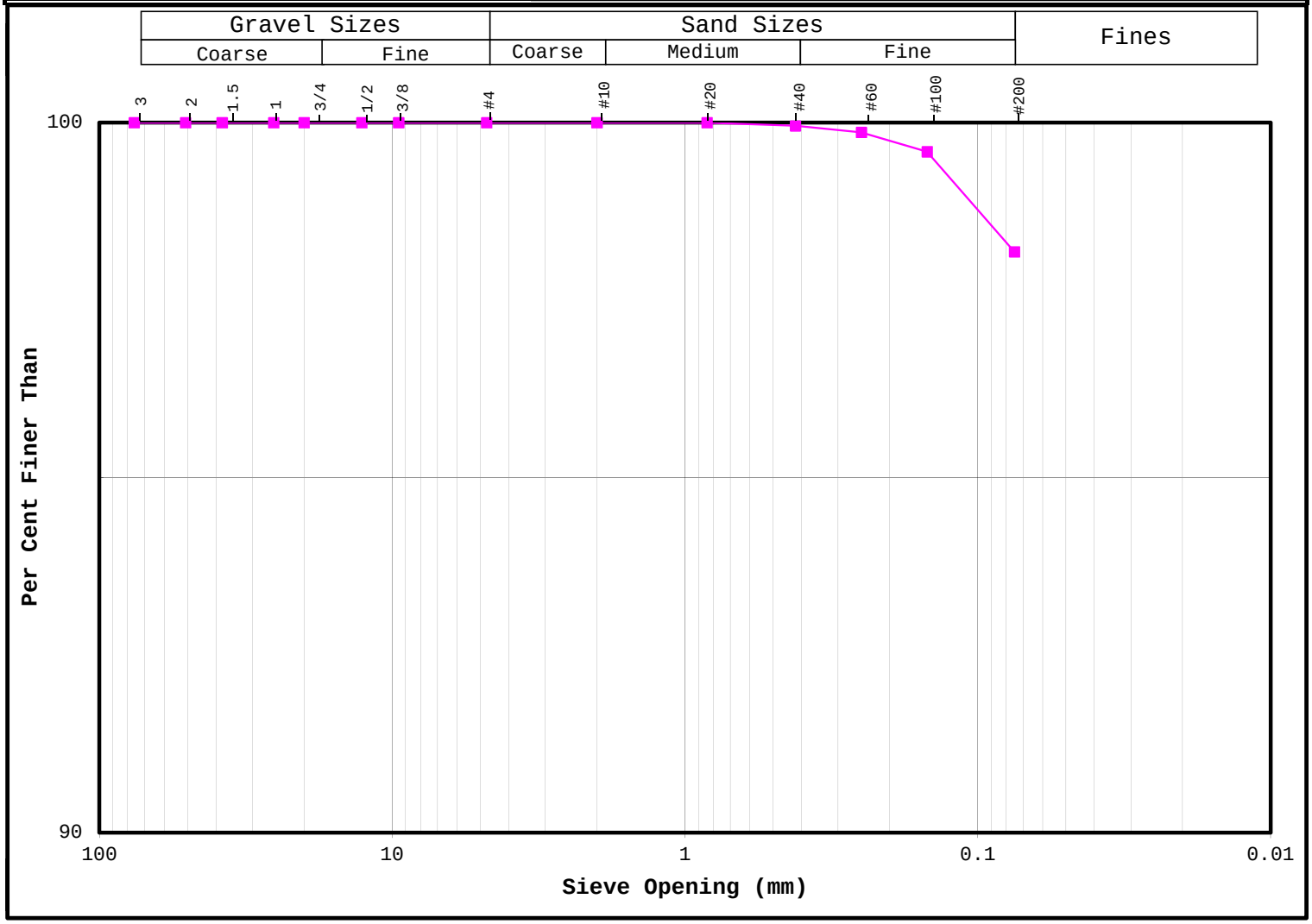
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |

| Test Sample Details | |
|---|---|
| Mass Dry Sample + Tare (g) | 233.6 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 219.9 |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 18.1 |
| Mass Dry Sample After Wash (g) | 4.4 |
| Sample Split on Sieve Size | |

| | |
|---|---|
| **Remarks** | |
| **Classification** | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 219.9 | | 100.0 |
| 2 | 50 | 50.8 | | 219.9 | | 100.0 |
| 1.5 | 40 | 38.1 | | 219.9 | | 100.0 |
| 1 | 25 | 25.4 | | 219.9 | | 100.0 |
| 3/4 | 20 | 20 | | 219.9 | | 100.0 |
| 1/2 | 12 | 12.7 | | 219.9 | | 100.0 |
| 3/8 | 10 | 9.51 | | 219.9 | | 100.0 |
| #4 | 5 | 4.76 | | 219.9 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 219.9 | | 100.0 |
| #20 | 840 | 0.841 | | 219.9 | | 100.0 |
| #40 | 420 | 0.420 | 0.1 | 219.8 | | 100.0 |
| #60 | 250 | 0.250 | 0.2 | 219.6 | | 99.9 |
| #100 | 150 | 0.149 | 0.6 | 219 | | 99.6 |
| #200 | 80 | 0.075 | 3.1 | 215.9 | | 98.2 |
| Pan | | | 0.4 | 215.5 | | |

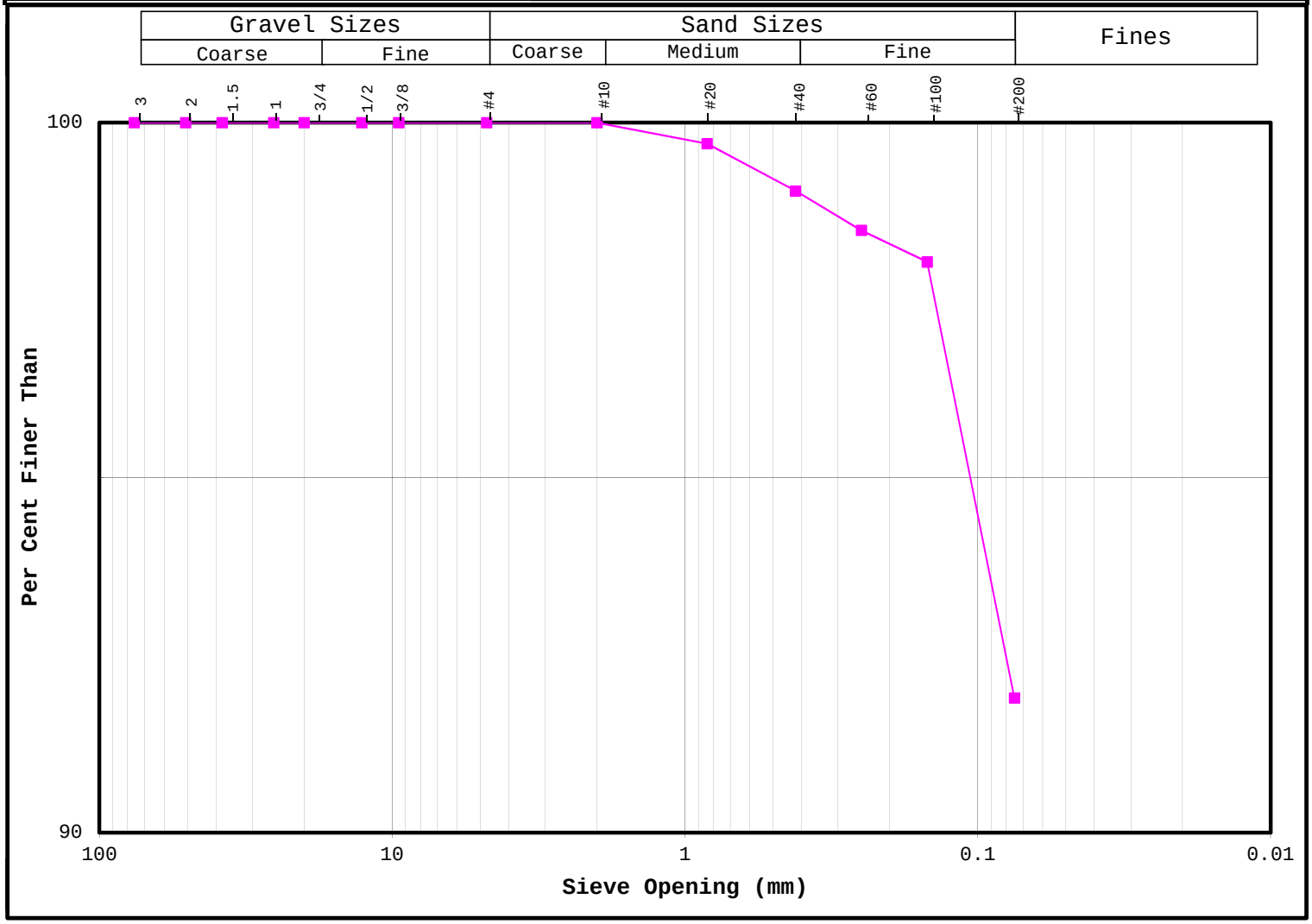


| | | | |
|---|---|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program | | |
| **PROJECT No.** | VM00605E.523.20 | | |
| **SAMPLE No** | N/A | **LAB No.** | S - 9985 |
| **BOREHOLE No.** | GP-T-13-10 | **DEPTH** | 8.5 - 9.5m |
| **REPORTED BY** | CR/MR | **DATE** | 17-Nov-13 |

# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |
| **Test Sample Details** | |
| Mass Dry Sample + Tare (g) | 284 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 270.3 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 39.2 |
| Mass Dry Sample After Wash (g) | 25.5 |
| Sample Split on Sieve Size | |
| **Remarks** | |
| **Classification** | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 270.3 | | 100.0 |
| 2 | 50 | 50.8 | | 270.3 | | 100.0 |
| 1.5 | 40 | 38.1 | | 270.3 | | 100.0 |
| 1 | 25 | 25.4 | | 270.3 | | 100.0 |
| 3/4 | 20 | 20 | | 270.3 | | 100.0 |
| 1/2 | 12 | 12.7 | | 270.3 | | 100.0 |
| 3/8 | 10 | 9.51 | | 270.3 | | 100.0 |
| #4 | 5 | 4.76 | | 270.3 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 270.3 | | 100.0 |
| #20 | 840 | 0.841 | 0.8 | 269.5 | | 99.7 |
| #40 | 420 | 0.420 | 1.8 | 267.7 | | 99.0 |
| #60 | 250 | 0.250 | 1.5 | 266.2 | | 98.5 |
| #100 | 150 | 0.149 | 1.2 | 265 | | 98.0 |
| #200 | 80 | 0.075 | 16.6 | 248.4 | | 91.9 |
| Pan | | | 3.3 | 245.1 | | |



| | |
|---|---|
| PROJECT | Mt Nansen TA5 2013 SI Program |
| PROJECT No. | VM00605E.523.20 |
| SAMPLE No | N/A |
| LAB No. | S - 9985 |
| BOREHOLE No. | GP-T-13-18 |
| DEPTH | 0.0 - 1.25m |
| REPORTED BY | CR/MR |
| DATE | 17-Nov-13 |

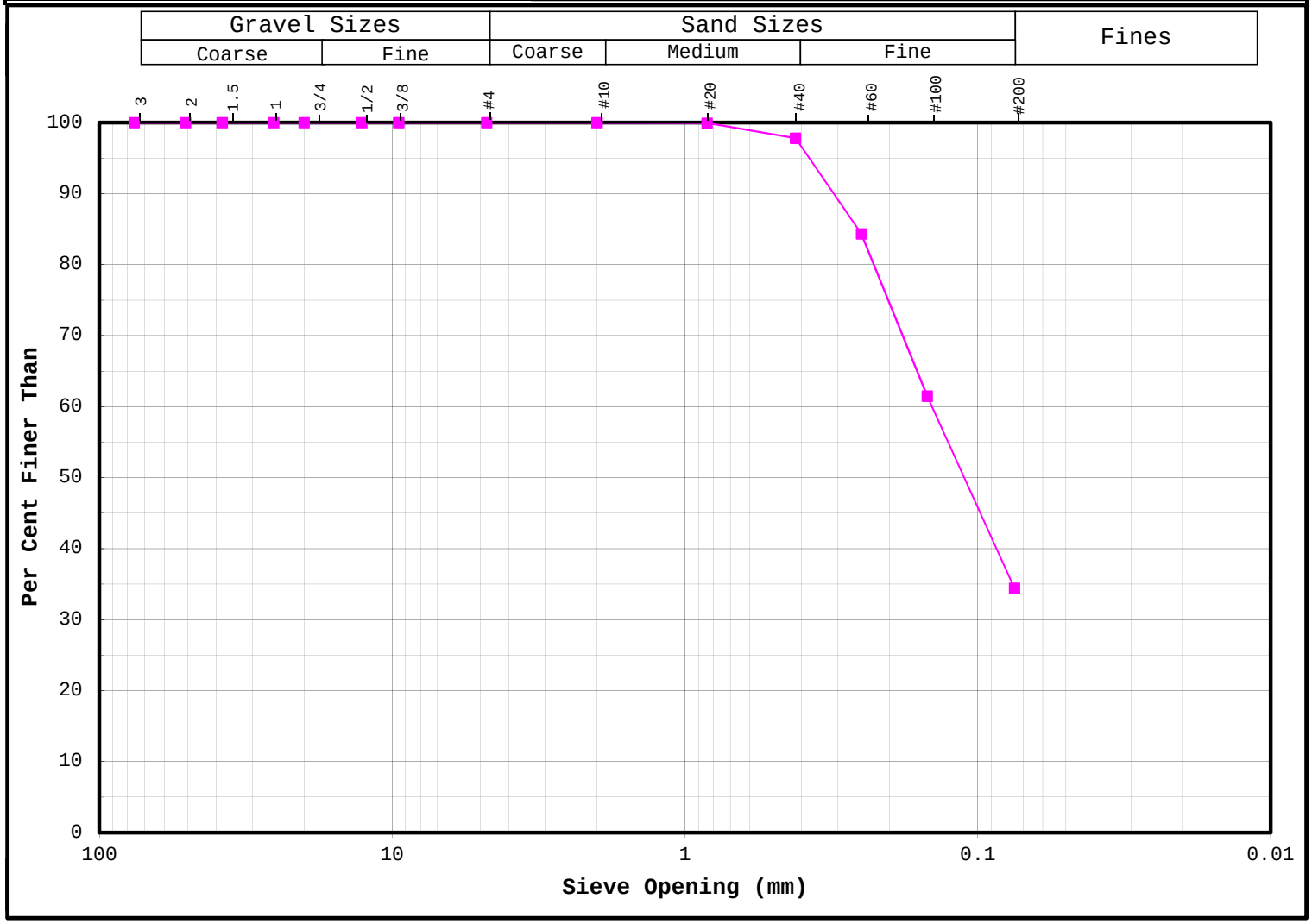
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |

| Test Sample Details | |
|---|---|
| Mass Dry Sample + Tare (g) | 310.8 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 297.1 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 214.6 |
| Mass Dry Sample After Wash (g) | 200.9 |
| Sample Split on Sieve Size | |

| Remarks | |
|---|---|
| Classification | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 297.1 | | 100.0 |
| 2 | 50 | 50.8 | | 297.1 | | 100.0 |
| 1.5 | 40 | 38.1 | | 297.1 | | 100.0 |
| 1 | 25 | 25.4 | | 297.1 | | 100.0 |
| 3/4 | 20 | 20 | | 297.1 | | 100.0 |
| 1/2 | 12 | 12.7 | | 297.1 | | 100.0 |
| 3/8 | 10 | 9.51 | | 297.1 | | 100.0 |
| #4 | 5 | 4.76 | | 297.1 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 297.1 | | 100.0 |
| #20 | 840 | 0.841 | 0.2 | 296.9 | | 99.9 |
| #40 | 420 | 0.420 | 6.3 | 290.6 | | 97.8 |
| #60 | 250 | 0.250 | 40 | 250.6 | | 84.3 |
| #100 | 150 | 0.149 | 67.9 | 182.7 | | 61.5 |
| #200 | 80 | 0.075 | 80.4 | 102.3 | | 34.4 |
| Pan | | | 5.9 | 96.4 | | |



| | |
|---|---|
| PROJECT | Mt Nansen TA5 2013 SI Program |
| PROJECT No. | VM00605E.523.20 |
| SAMPLE No | GS1 |
| LAB No. | N/A |
| BOREHOLE No. | TP-T-13-01 |
| DEPTH | 1.0 - 1.1 m |
| REPORTED BY | CR/MR |
| DATE | 17-Nov-13 |

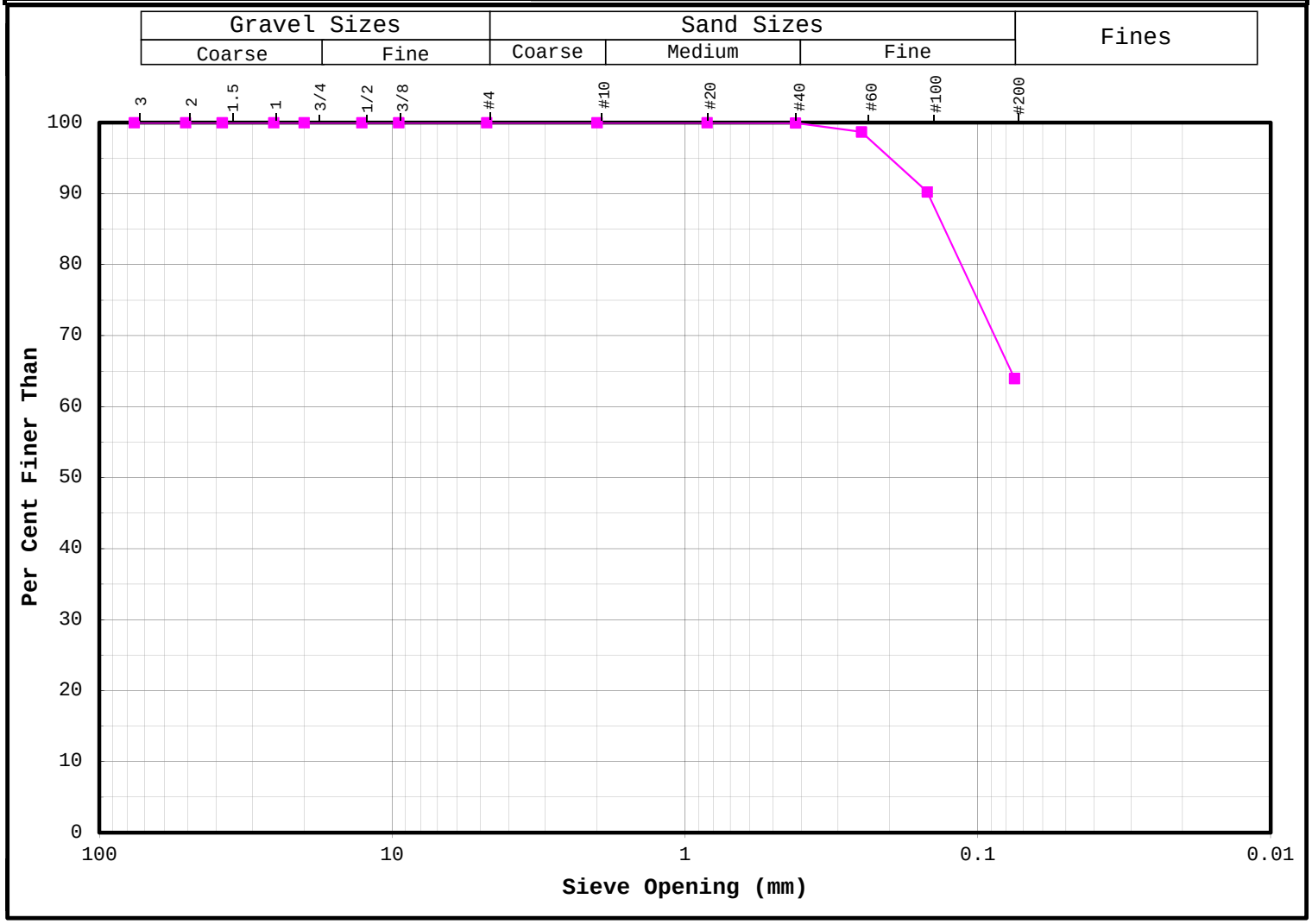
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |

| Test Sample Details | |
|---|---|
| Mass Dry Sample + Tare (g) | 314.4 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 300.7 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 129 |
| Mass Dry Sample After Wash (g) | 115.3 |
| Sample Split on Sieve Size | |

| Remarks | |
|---|---|
| Classification | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 300.7 | | 100.0 |
| 2 | 50 | 50.8 | | 300.7 | | 100.0 |
| 1.5 | 40 | 38.1 | | 300.7 | | 100.0 |
| 1 | 25 | 25.4 | | 300.7 | | 100.0 |
| 3/4 | 20 | 20 | | 300.7 | | 100.0 |
| 1/2 | 12 | 12.7 | | 300.7 | | 100.0 |
| 3/8 | 10 | 9.51 | | 300.7 | | 100.0 |
| #4 | 5 | 4.76 | | 300.7 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 300.7 | | 100.0 |
| #20 | 840 | 0.841 | 0 | 300.7 | | 100.0 |
| #40 | 420 | 0.420 | 0.1 | 300.6 | | 100.0 |
| #60 | 250 | 0.250 | 3.8 | 296.8 | | 98.7 |
| #100 | 150 | 0.149 | 25.4 | 271.4 | | 90.3 |
| #200 | 80 | 0.075 | 79 | 192.4 | | 64.0 |
| Pan | | | 6.8 | 185.6 | | |

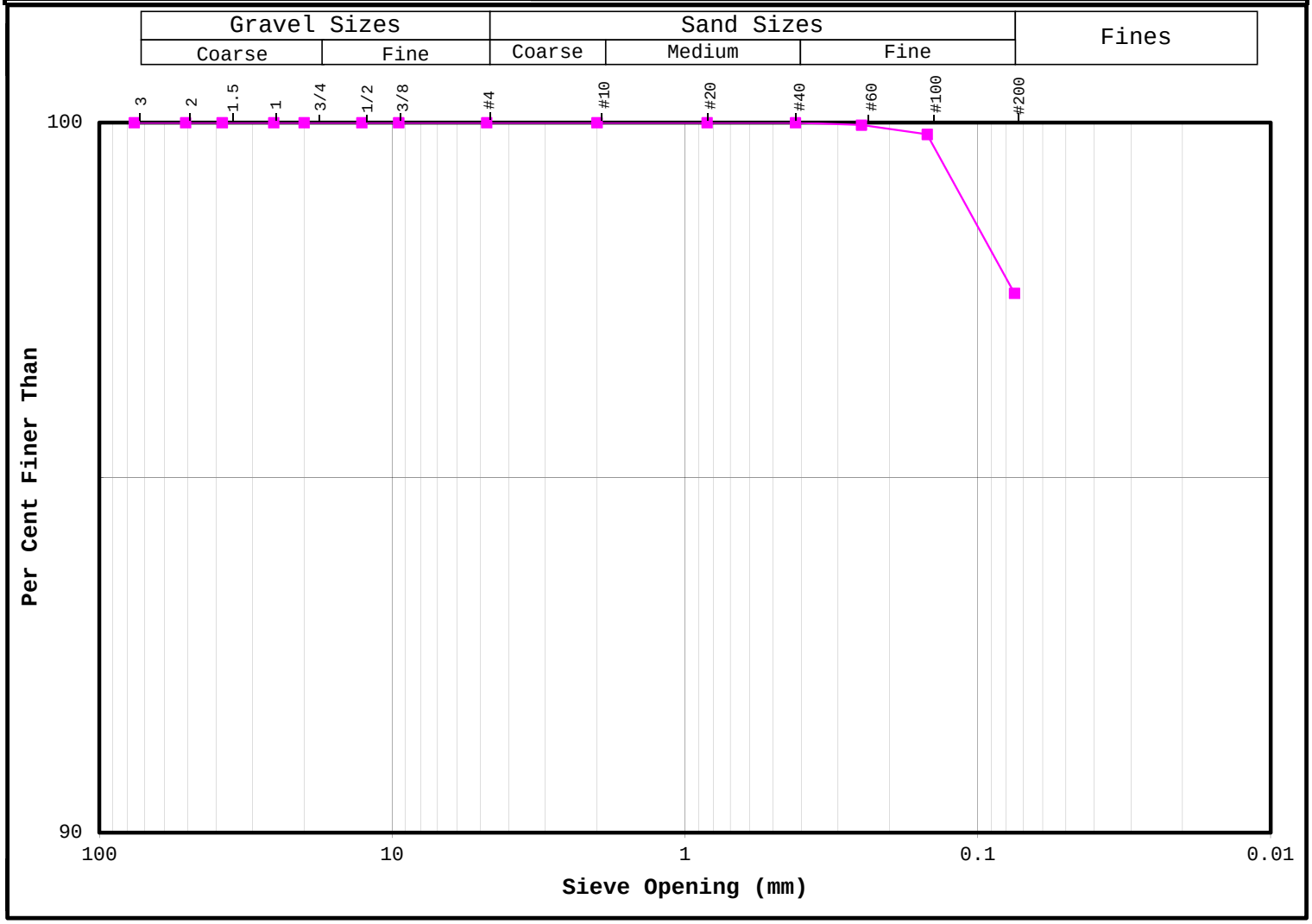


| | | | |
|---|---|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program | | |
| **PROJECT No.** | VM00605E.523.20 | | |
| **SAMPLE No** | GS2 | **LAB No.** | S-9985 |
| **BOREHOLE No.** | TP-T-13-02 | **DEPTH** | 1.0 - 1.1 m |
| **REPORTED BY** | CR/MR | **DATE** | 17-Nov-13 |

# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |
| **Test Sample Details** | |
| Mass Dry Sample + Tare (g) | 317.4 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 303.7 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 21.8 |
| Mass Dry Sample After Wash (g) | 8.1 |
| Sample Split on Sieve Size | |
| **Remarks** | |
| **Classification** | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 303.7 | | 100.0 |
| 2 | 50 | 50.8 | | 303.7 | | 100.0 |
| 1.5 | 40 | 38.1 | | 303.7 | | 100.0 |
| 1 | 25 | 25.4 | | 303.7 | | 100.0 |
| 3/4 | 20 | 20 | | 303.7 | | 100.0 |
| 1/2 | 12 | 12.7 | | 303.7 | | 100.0 |
| 3/8 | 10 | 9.51 | | 303.7 | | 100.0 |
| #4 | 5 | 4.76 | | 303.7 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 303.7 | | 100.0 |
| #20 | 840 | 0.841 | | 303.7 | | 100.0 |
| #40 | 420 | 0.420 | | 303.7 | | 100.0 |
| #60 | 250 | 0.250 | 0.1 | 303.6 | | 100.0 |
| #100 | 150 | 0.149 | 0.4 | 303.2 | | 99.8 |
| #200 | 80 | 0.075 | 6.8 | 296.4 | | 97.6 |
| Pan | | | 0.8 | 295.6 | | |



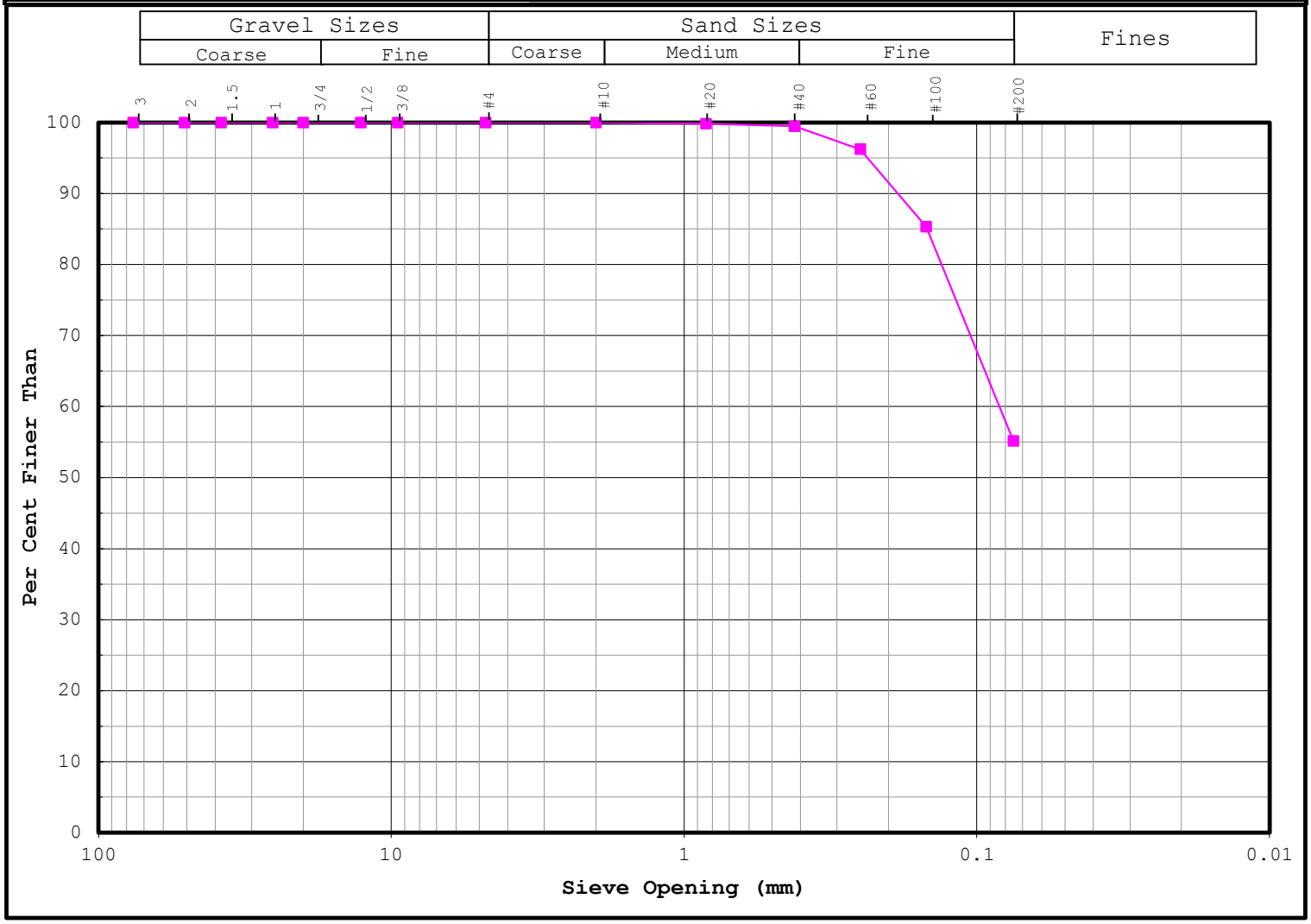
| | | | |
|---|---|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program | | |
| **PROJECT No.** | VM00605E.523.20 | | |
| **SAMPLE No** | GS1 | **LAB No.** | S - 9985 |
| **BOREHOLE No.** | TP-T-13-04 | **DEPTH** | 1.0 - 1.1m |
| **REPORTED BY** | CR/MR | **DATE** | 17-Nov-13 |

# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |
| **Test Sample Details** | |
| Mass Dry Sample + Tare (g) | 404.2 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 390.5 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 207.7 |
| Mass Dry Sample After Wash (g) | 194 |
| Sample Split on Sieve Size | |

| Remarks | |
|---|---|
| **Classification** | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 390.5 | | 100.0 |
| 2 | 50 | 50.8 | | 390.5 | | 100.0 |
| 1.5 | 40 | 38.1 | | 390.5 | | 100.0 |
| 1 | 25 | 25.4 | | 390.5 | | 100.0 |
| 3/4 | 20 | 20 | | 390.5 | | 100.0 |
| 1/2 | 12 | 12.7 | | 390.5 | | 100.0 |
| 3/8 | 10 | 9.51 | | 390.5 | | 100.0 |
| #4 | 5 | 4.76 | | 390.5 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 390.5 | | 100.0 |
| #20 | 840 | 0.841 | 0.6 | 389.9 | | 99.8 |
| #40 | 420 | 0.420 | 1.3 | 388.6 | | 99.5 |
| #60 | 250 | 0.250 | 12.7 | 375.9 | | 96.3 |
| #100 | 150 | 0.149 | 42.6 | 333.3 | | 85.4 |
| #200 | 80 | 0.075 | 117.8 | 215.5 | | 55.2 |
| Pan | | | 18.8 | 196.7 | | |

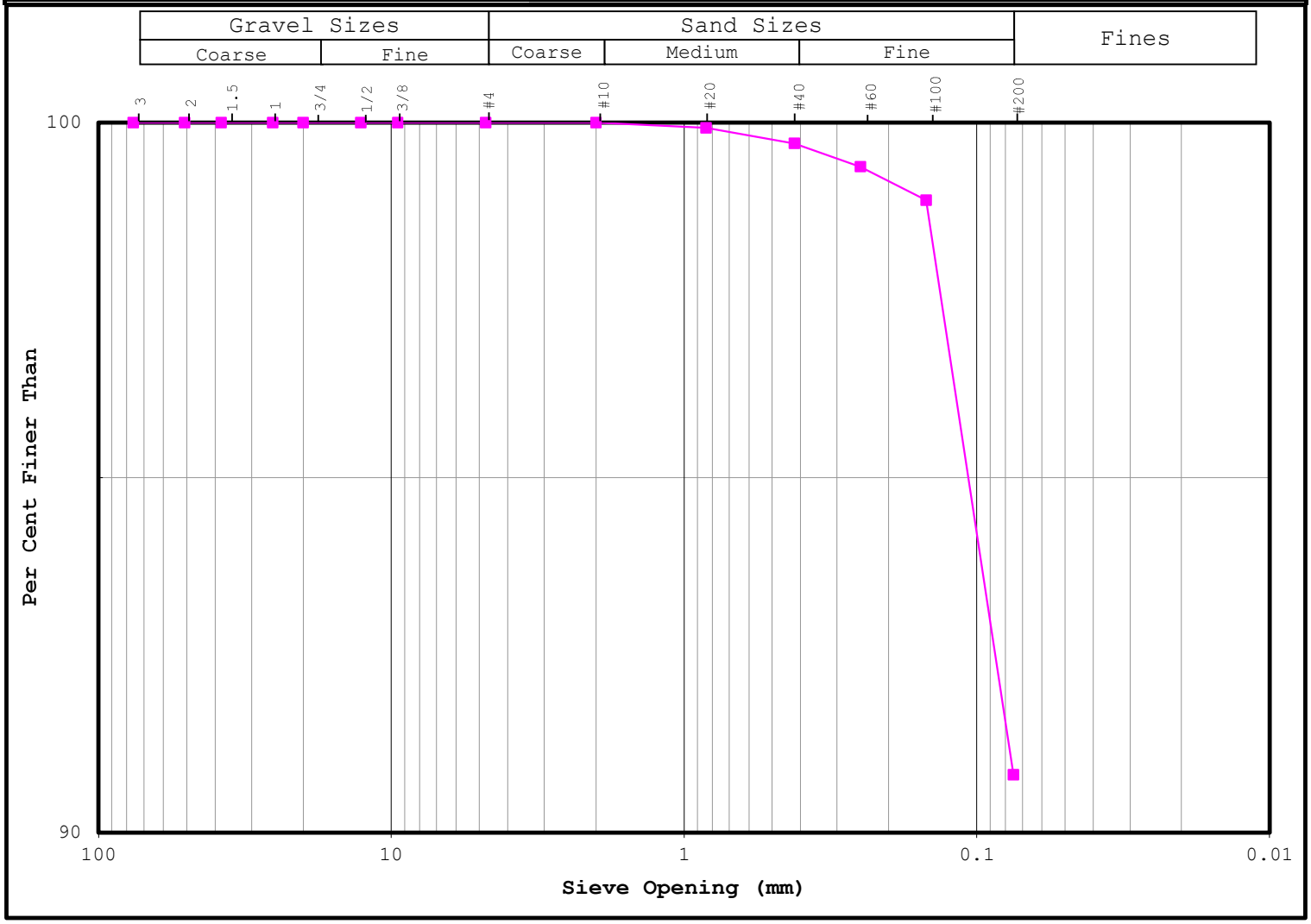


| | |
|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program |
| **PROJECT No.** | VM00605E.523.20 |
| **SAMPLE No** | GS3 |
| **LAB No.** | S - 9985 |
| **BOREHOLE No.** | TP-T-13-04 |
| **DEPTH** | 2.1 - 2.2m |
| **REPORTED BY** | CR/MR |
| **DATE** | 17-Nov-13 |

# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |
| **Test Sample Details** | |
| Mass Dry Sample + Tare (g) | 288.1 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 274.4 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 50 |
| Mass Dry Sample After Wash (g) | 36.3 |
| Sample Split on Sieve Size | |
| **Remarks** | |
| **Classification** | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 274.4 | | 100.0 |
| 2 | 50 | 50.8 | | 274.4 | | 100.0 |
| 1.5 | 40 | 38.1 | | 274.4 | | 100.0 |
| 1 | 25 | 25.4 | | 274.4 | | 100.0 |
| 3/4 | 20 | 20 | | 274.4 | | 100.0 |
| 1/2 | 12 | 12.7 | | 274.4 | | 100.0 |
| 3/8 | 10 | 9.51 | | 274.4 | | 100.0 |
| #4 | 5 | 4.76 | | 274.4 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 274.4 | | 100.0 |
| #20 | 840 | 0.841 | 0.2 | 274.2 | | 99.9 |
| #40 | 420 | 0.420 | 0.6 | 273.6 | | 99.7 |
| #60 | 250 | 0.250 | 0.9 | 272.7 | | 99.4 |
| #100 | 150 | 0.149 | 1.3 | 271.4 | | 98.9 |
| #200 | 80 | 0.075 | 22.2 | 249.2 | | 90.8 |
| Pan | | | 10.8 | 238.4 | | |



| | |
|---|---|
| PROJECT | Mt Nansen TA5 2013 SI Program |
| PROJECT No. | VM00605E.523.20 |
| SAMPLE No | GS5 |
| LAB No. | S - 9985 |
| BOREHOLE No. | TP-T-13-04 |
| DEPTH | 3.0 - 3.1m |
| REPORTED BY | CR/MR |
| DATE | 17-Nov-13 |

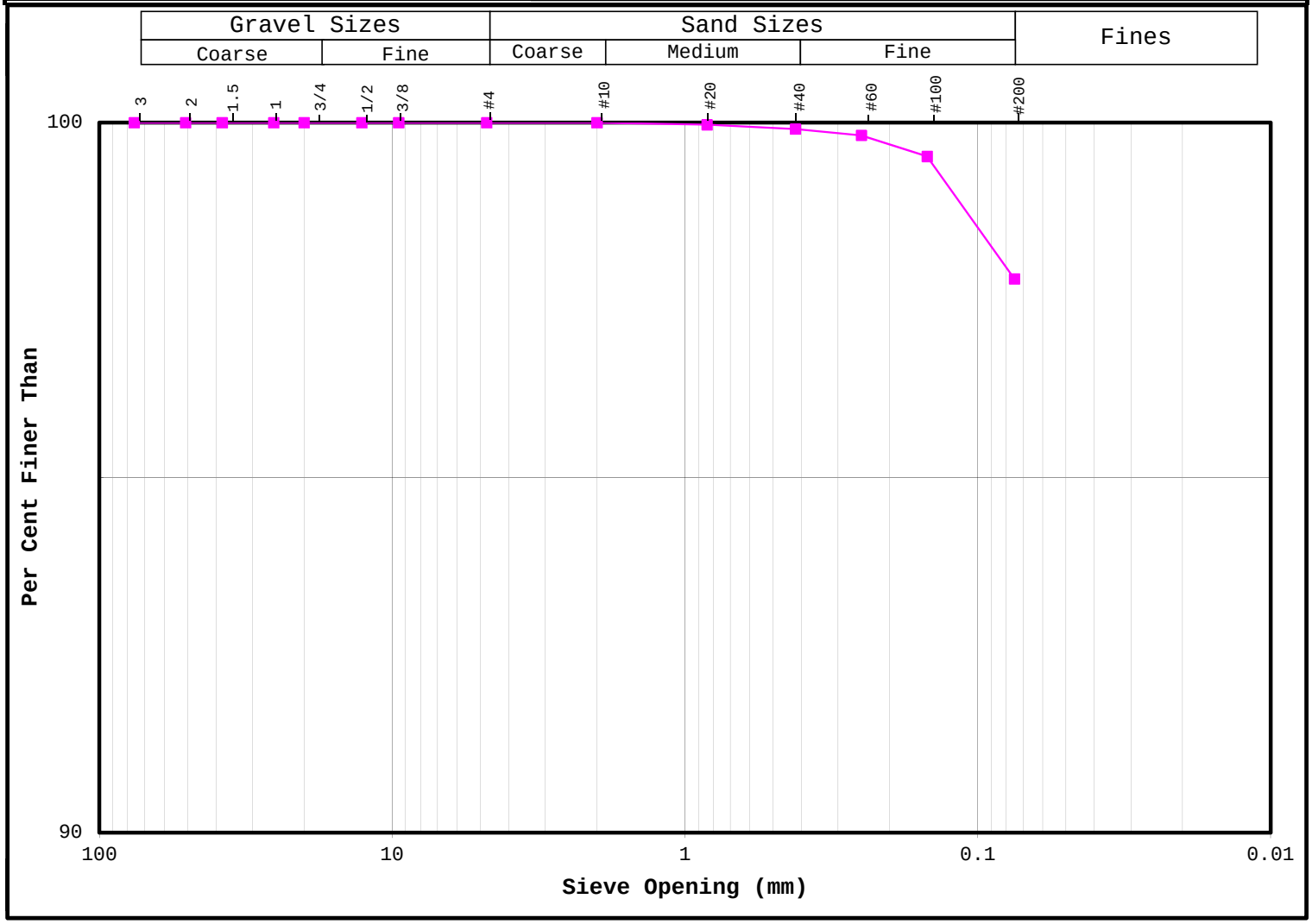
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |

| Test Sample Details | |
|---|---|
| Mass Dry Sample + Tare (g) | 350 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 336.3 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 22.6 |
| Mass Dry Sample After Wash (g) | 8.9 |
| Sample Split on Sieve Size | |

| | |
|---|---|
| **Remarks** | |
| **Classification** | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 336.3 | | 100.0 |
| 2 | 50 | 50.8 | | 336.3 | | 100.0 |
| 1.5 | 40 | 38.1 | | 336.3 | | 100.0 |
| 1 | 25 | 25.4 | | 336.3 | | 100.0 |
| 3/4 | 20 | 20 | | 336.3 | | 100.0 |
| 1/2 | 12 | 12.7 | | 336.3 | | 100.0 |
| 3/8 | 10 | 9.51 | | 336.3 | | 100.0 |
| #4 | 5 | 4.76 | | 336.3 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 336.3 | | 100.0 |
| #20 | 840 | 0.841 | 0.1 | 336.2 | | 100.0 |
| #40 | 420 | 0.420 | 0.2 | 336 | | 99.9 |
| #60 | 250 | 0.250 | 0.3 | 335.7 | | 99.8 |
| #100 | 150 | 0.149 | 1 | 334.7 | | 99.5 |
| #200 | 80 | 0.075 | 5.8 | 328.9 | | 97.8 |
| Pan | | | 1.5 | 327.4 | | |



| | | | |
|---|---|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program | | |
| **PROJECT No.** | VM00605E.523.20 | | |
| **SAMPLE No** | GS1 | **LAB No.** | S - 9985 |
| **BOREHOLE No.** | TP-T-13-06 | **DEPTH** | 0.8 - 0.9m |
| **REPORTED BY** | CR/MR | **DATE** | 17-Nov-13 |

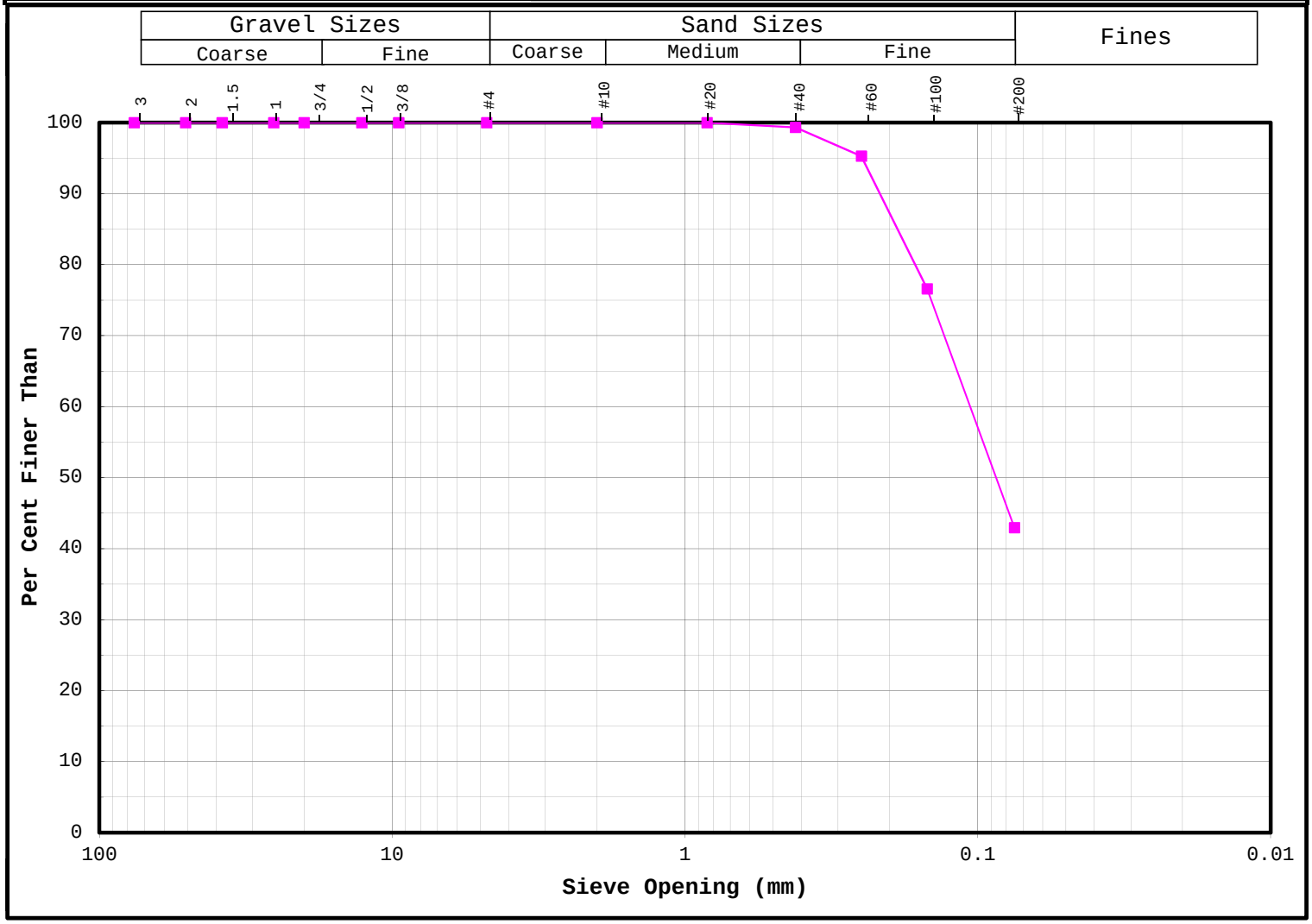
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |

| Test Sample Details | |
|---|---|
| Mass Dry Sample + Tare (g) | 481.6 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 467.9 |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 293.4 |
| Mass Dry Sample After Wash (g) | 279.7 |
| Sample Split on Sieve Size | |

| | |
|---|---|
| **Remarks** | |
| **Classification** | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 467.9 | | 100.0 |
| 2 | 50 | 50.8 | | 467.9 | | 100.0 |
| 1.5 | 40 | 38.1 | | 467.9 | | 100.0 |
| 1 | 25 | 25.4 | | 467.9 | | 100.0 |
| 3/4 | 20 | 20 | | 467.9 | | 100.0 |
| 1/2 | 12 | 12.7 | | 467.9 | | 100.0 |
| 3/8 | 10 | 9.51 | | 467.9 | | 100.0 |
| #4 | 5 | 4.76 | | 467.9 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 467.9 | | 100.0 |
| #20 | 840 | 0.841 | 0 | 467.9 | | 100.0 |
| #40 | 420 | 0.420 | 3.1 | 464.8 | | 99.3 |
| #60 | 250 | 0.250 | 18.9 | 445.9 | | 95.3 |
| #100 | 150 | 0.149 | 87.5 | 358.4 | | 76.6 |
| #200 | 80 | 0.075 | 157.4 | 201 | | 43.0 |
| Pan | | | 12.8 | 188.2 | | |



| | |
|---|---|
| PROJECT | Mt Nansen TA5 2013 SI Program |
| PROJECT No. | VM00605E.523.20 |
| SAMPLE No | GS3 |
| LAB No. | S - 9985 |
| BOREHOLE No. | TP-T-13-07 |
| DEPTH | 3.0 - 3.1m |
| REPORTED BY | CR/MR |
| DATE | 17-Nov-13 |

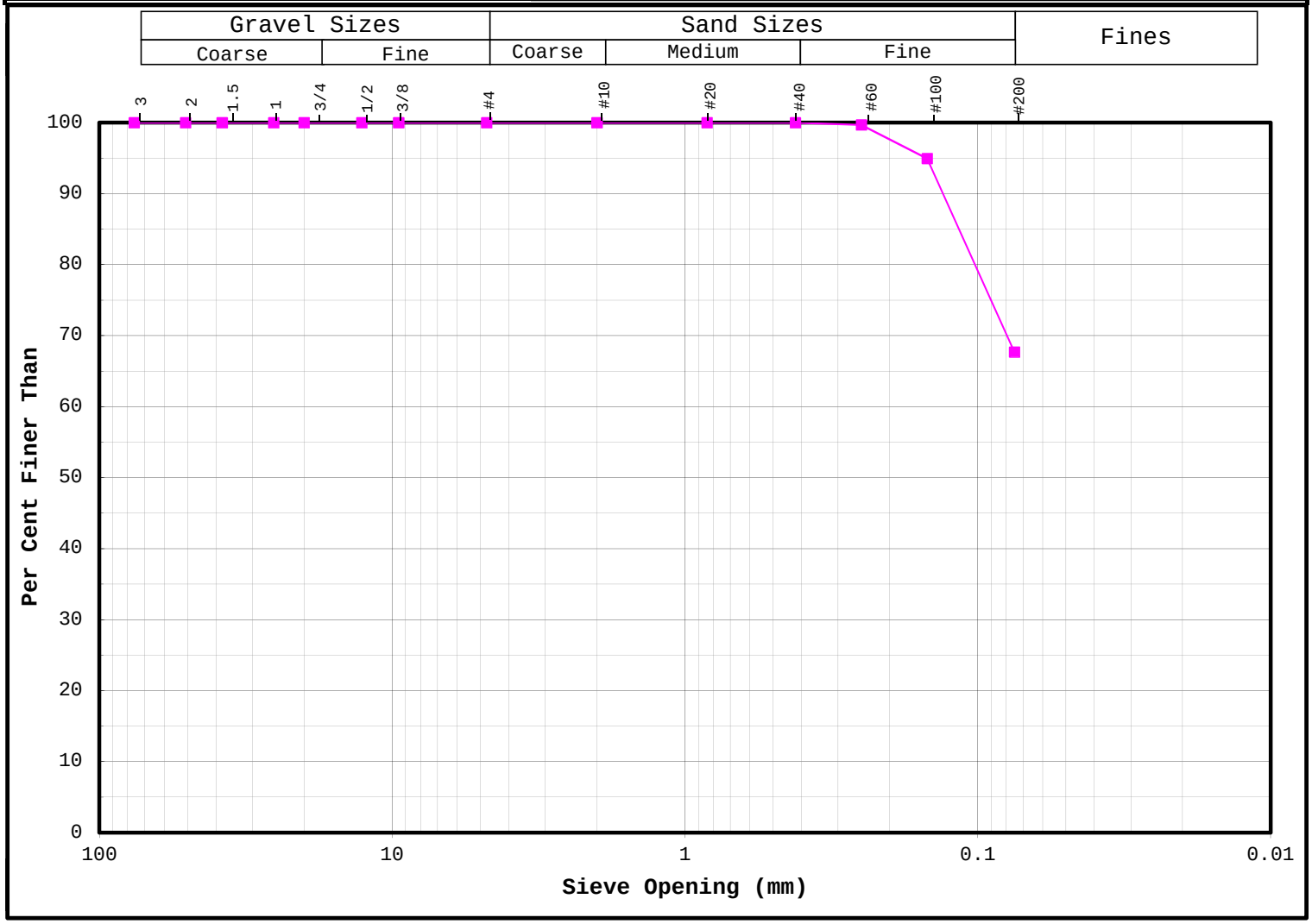
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |

| Test Sample Details | |
|---|---|
| Mass Dry Sample + Tare (g) | 305 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 291.3 |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 119 |
| Mass Dry Sample After Wash (g) | 105.3 |
| Sample Split on Sieve Size | |

| Remarks | |
|---|---|
| Classification | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 291.3 | | 100.0 |
| 2 | 50 | 50.8 | | 291.3 | | 100.0 |
| 1.5 | 40 | 38.1 | | 291.3 | | 100.0 |
| 1 | 25 | 25.4 | | 291.3 | | 100.0 |
| 3/4 | 20 | 20 | | 291.3 | | 100.0 |
| 1/2 | 12 | 12.7 | | 291.3 | | 100.0 |
| 3/8 | 10 | 9.51 | | 291.3 | | 100.0 |
| #4 | 5 | 4.76 | | 291.3 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 291.3 | | 100.0 |
| #20 | 840 | 0.841 | 0 | 291.3 | | 100.0 |
| #40 | 420 | 0.420 | 0 | 291.3 | | 100.0 |
| #60 | 250 | 0.250 | 0.9 | 290.4 | | 99.7 |
| #100 | 150 | 0.149 | 13.8 | 276.6 | | 95.0 |
| #200 | 80 | 0.075 | 79.4 | 197.2 | | 67.7 |
| Pan | | | 11.2 | 186 | | |



| | |
|---|---|
| PROJECT | Mt Nansen TA5 2013 SI Program |
| PROJECT No. | VM00605E.523.20 |
| SAMPLE No | GS2 |
| LAB No. | S - 9985 |
| BOREHOLE No. | TP-T-13-09 |
| DEPTH | 2.0 - 2.1m |
| REPORTED BY | CR/MR |
| DATE | 17-Nov-13 |

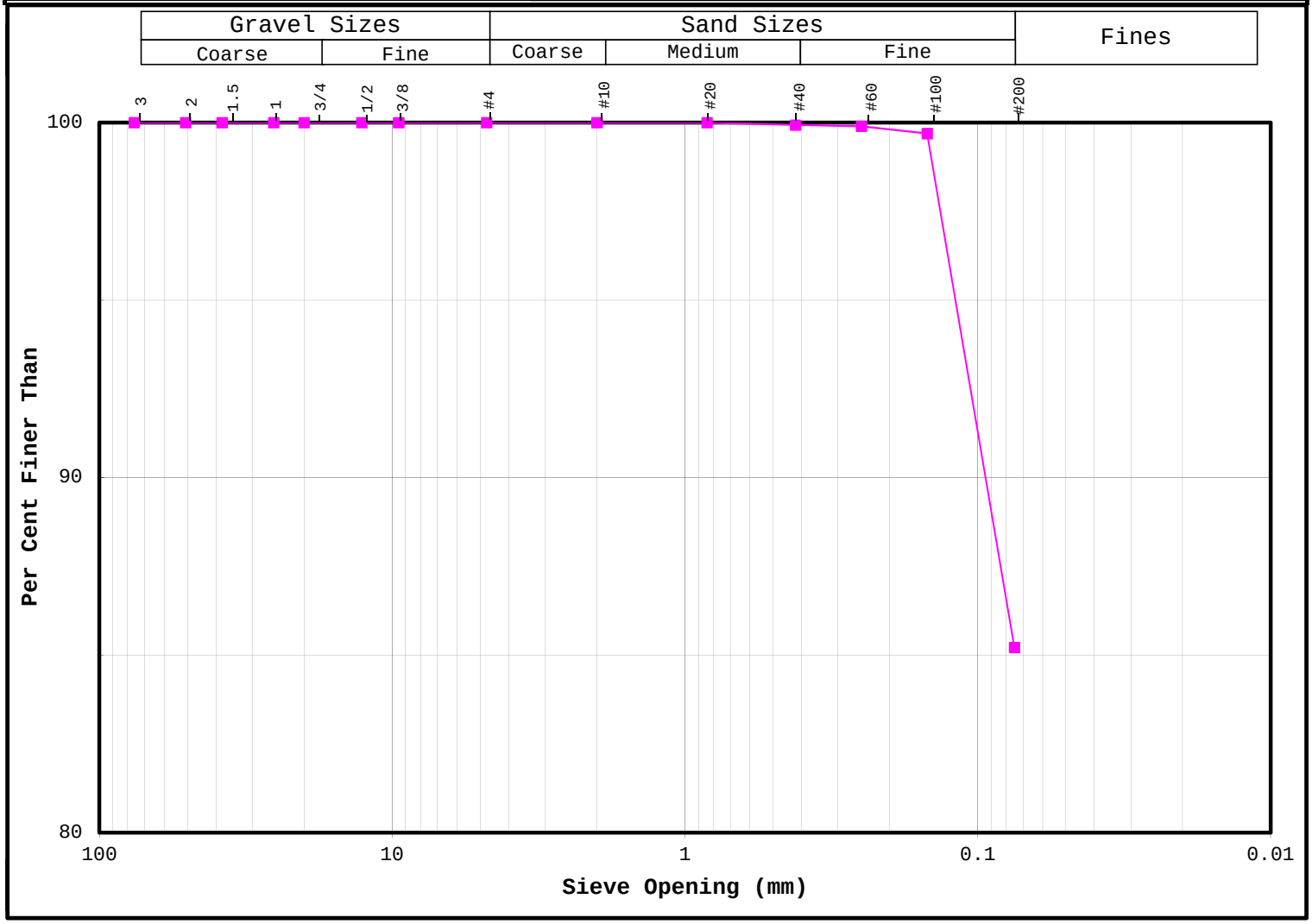
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |

| Test Sample Details | |
|---|---|
| Mass Dry Sample + Tare (g) | 308.6 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 294.9 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 70.8 |
| Mass Dry Sample After Wash (g) | 57.1 |
| Sample Split on Sieve Size | |

| Remarks | |
|---|---|
| Classification | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 294.9 | | 100.0 |
| 2 | 50 | 50.8 | | 294.9 | | 100.0 |
| 1.5 | 40 | 38.1 | | 294.9 | | 100.0 |
| 1 | 25 | 25.4 | | 294.9 | | 100.0 |
| 3/4 | 20 | 20 | | 294.9 | | 100.0 |
| 1/2 | 12 | 12.7 | | 294.9 | | 100.0 |
| 3/8 | 10 | 9.51 | | 294.9 | | 100.0 |
| #4 | 5 | 4.76 | | 294.9 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 294.9 | | 100.0 |
| #20 | 840 | 0.841 | 0 | 294.9 | | 100.0 |
| #40 | 420 | 0.420 | 0.2 | 294.7 | | 99.9 |
| #60 | 250 | 0.250 | 0.1 | 294.6 | | 99.9 |
| #100 | 150 | 0.149 | 0.6 | 294 | | 99.7 |
| #200 | 80 | 0.075 | 42.7 | 251.3 | | 85.2 |
| Pan | | | 13.3 | 238 | | |



| | |
|---|---|
| PROJECT | Mt Nansen TA5 2013 SI Program |
| PROJECT No. | VM00605E.523.20 |
| SAMPLE No | GS4 |
| LAB No. | S - 9985 |
| BOREHOLE No. | TP-T-13-09 |
| DEPTH | 4.0 - 4.1m |
| REPORTED BY | CR/MR |
| DATE | 17-Nov-13 |

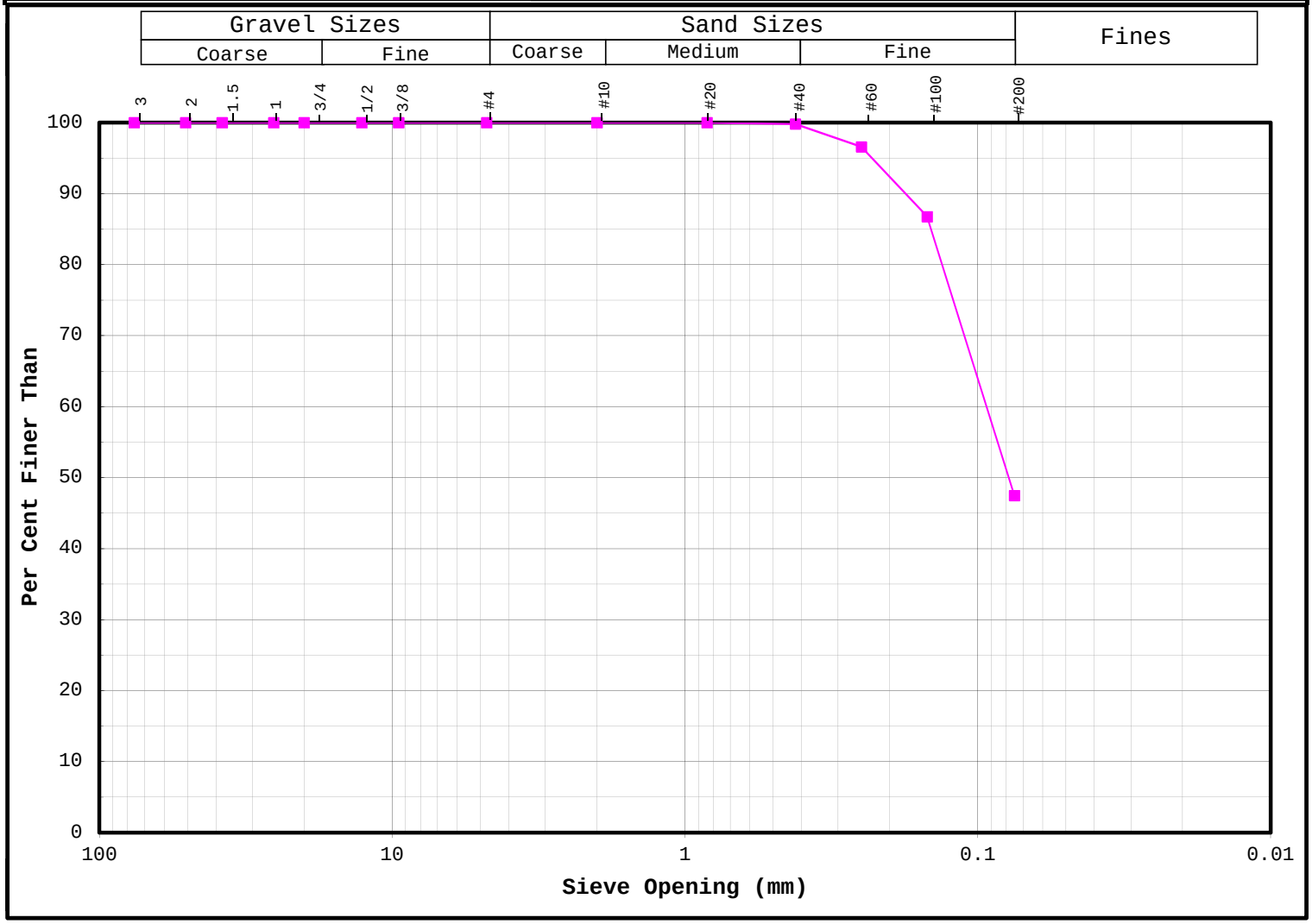
# GRAIN SIZE ANALYSIS

| Sample Details | |
|---|---|
| Mass Wet + Tare (g) | |
| Mass Dry + Tare (g) | |
| Mass Tare (g) | |
| Mass Dry Sample (g) | 0.0 |
| Moisture Content (%) | ###### |

| Test Sample Details | |
|---|---|
| Mass Dry Sample + Tare (g) | 392.2 |
| Mass of Tare (g) | 13.7 |
| Mass Dry Sample (g) | 378.5 |
| | |
| | |
| | |
| Mass Dry Sample + Tare After Wash (g) | 218 |
| Mass Dry Sample After Wash (g) | 204.3 |
| Sample Split on Sieve Size | |

| | |
|---|---|
| Remarks | |
| Classification | |

| Nominal Sieve Size | | Sieve Size Opening (mm) | Mass Retained (g) | Mass Finer Than (g) | | Per Cent Finer Than Total Sample |
|---|---|---|---|---|---|---|
| Imp | Metric | | | | | |
| 3 | 80 | 76.1 | | 378.5 | | 100.0 |
| 2 | 50 | 50.8 | | 378.5 | | 100.0 |
| 1.5 | 40 | 38.1 | | 378.5 | | 100.0 |
| 1 | 25 | 25.4 | | 378.5 | | 100.0 |
| 3/4 | 20 | 20 | | 378.5 | | 100.0 |
| 1/2 | 12 | 12.7 | | 378.5 | | 100.0 |
| 3/8 | 10 | 9.51 | | 378.5 | | 100.0 |
| #4 | 5 | 4.76 | | 378.5 | | 100.0 |
| | | | | | | |
| #10 | 2000 | 2.00 | | 378.5 | | 100.0 |
| #20 | 840 | 0.841 | 0 | 378.5 | | 100.0 |
| #40 | 420 | 0.420 | 0.7 | 377.8 | | 99.8 |
| #60 | 250 | 0.250 | 12.2 | 365.6 | | 96.6 |
| #100 | 150 | 0.149 | 37.2 | 328.4 | | 86.8 |
| #200 | 80 | 0.075 | 148.7 | 179.7 | | 47.5 |
| Pan | | | 5.5 | 174.2 | | |



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **BH-T-13-03**

Sample No. **ARD-05**

Depth **10.5 - 10.6 m**

Location **Tailings Surface**

Date **2013-09-13**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 665 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 0 | 100.0 |
| 3/4" | 19.0 | 0 | 100.0 |
| 1/2" | 12.7 | 0 | 100.0 |
| 1/4" | 6.35 | 5 | 99.2 |
| No. 4 | 4.76 | 2 | 98.9 |
| No. 10 | 2.00 | 5 | 98.2 |
| No. 16 | 1.19 | 4 | 97.6 |
| No. 40 | 0.42 | 108 | 81.4 |

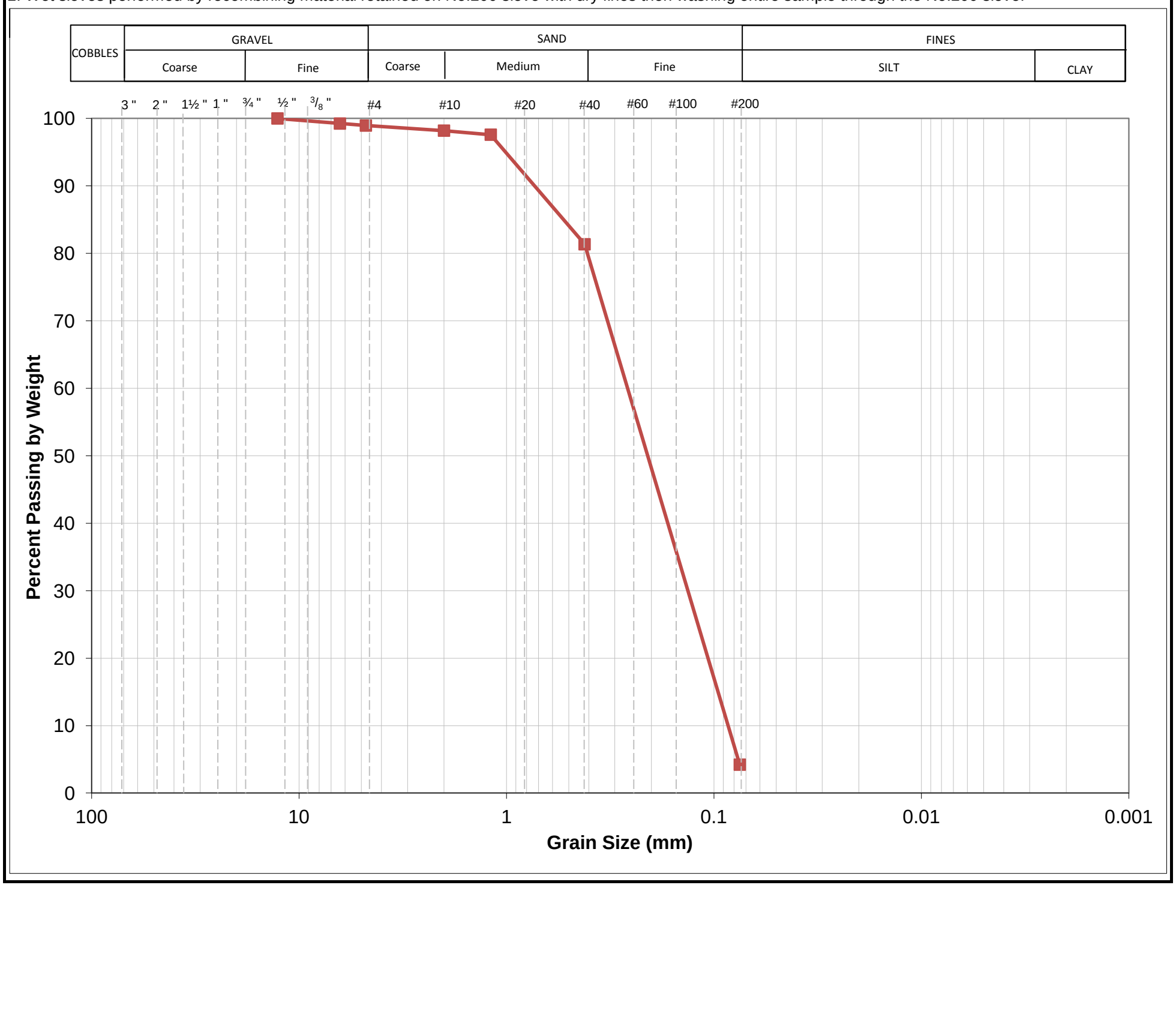
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 513 | 4.2 |
| Fines (g) Wet Sieve | | 28 | |

| | |
|---|---|
| Gravel (%) | 1.1 |
| Sand (%) | 94.7 |
| Fines (%) | 4.2 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **BH-TD-13-01**

Sample No. **ARD-17**

Depth **20.1 - 20.2 m**

Location **Tailings Dam**

Date **2013-09-13**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 696 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 0 | 100.0 |
| 3/4" | 19.0 | 0 | 100.0 |
| 1/2" | 12.7 | 16 | 97.7 |
| 1/4" | 6.35 | 26 | 94.0 |
| No. 4 | 4.76 | 12 | 92.2 |
| No. 10 | 2.00 | 38 | 86.8 |
| No. 16 | 1.19 | 19 | 84.1 |
| No. 40 | 0.42 | 80 | 72.6 |

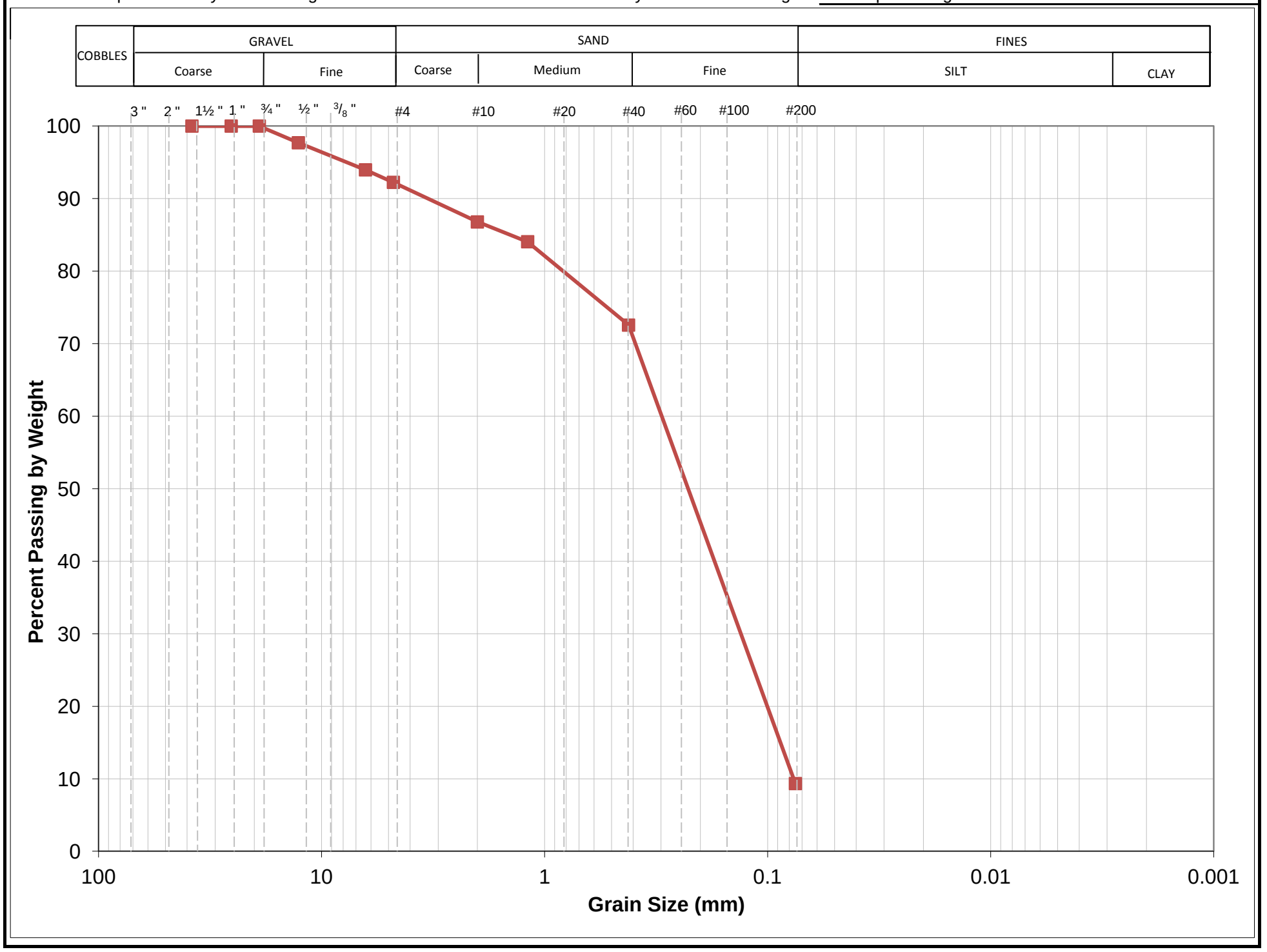
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 440 | 9.3 |
| Fines (g) Wet Sieve | | 65 | |

| | |
|---|---|
| Gravel (%) | 7.8 |
| Sand (%) | 82.9 |
| Fines (%) | 9.3 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **BH-TD-13-01**

Sample No. **ARD-20**

Depth **24.6 - 24.7 m**

Location **Tailings Dam**

Date **2013-09-13**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 484 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 19 | 96.1 |
| 3/4" | 19.0 | 55 | 84.7 |
| 1/2" | 12.7 | 58 | 72.7 |
| 1/4" | 6.35 | 67 | 58.9 |
| No. 4 | 4.76 | 48 | 49.0 |
| No. 10 | 2.00 | 62 | 36.2 |
| No. 16 | 1.19 | 21 | 31.8 |
| No. 40 | 0.42 | 40 | 23.6 |

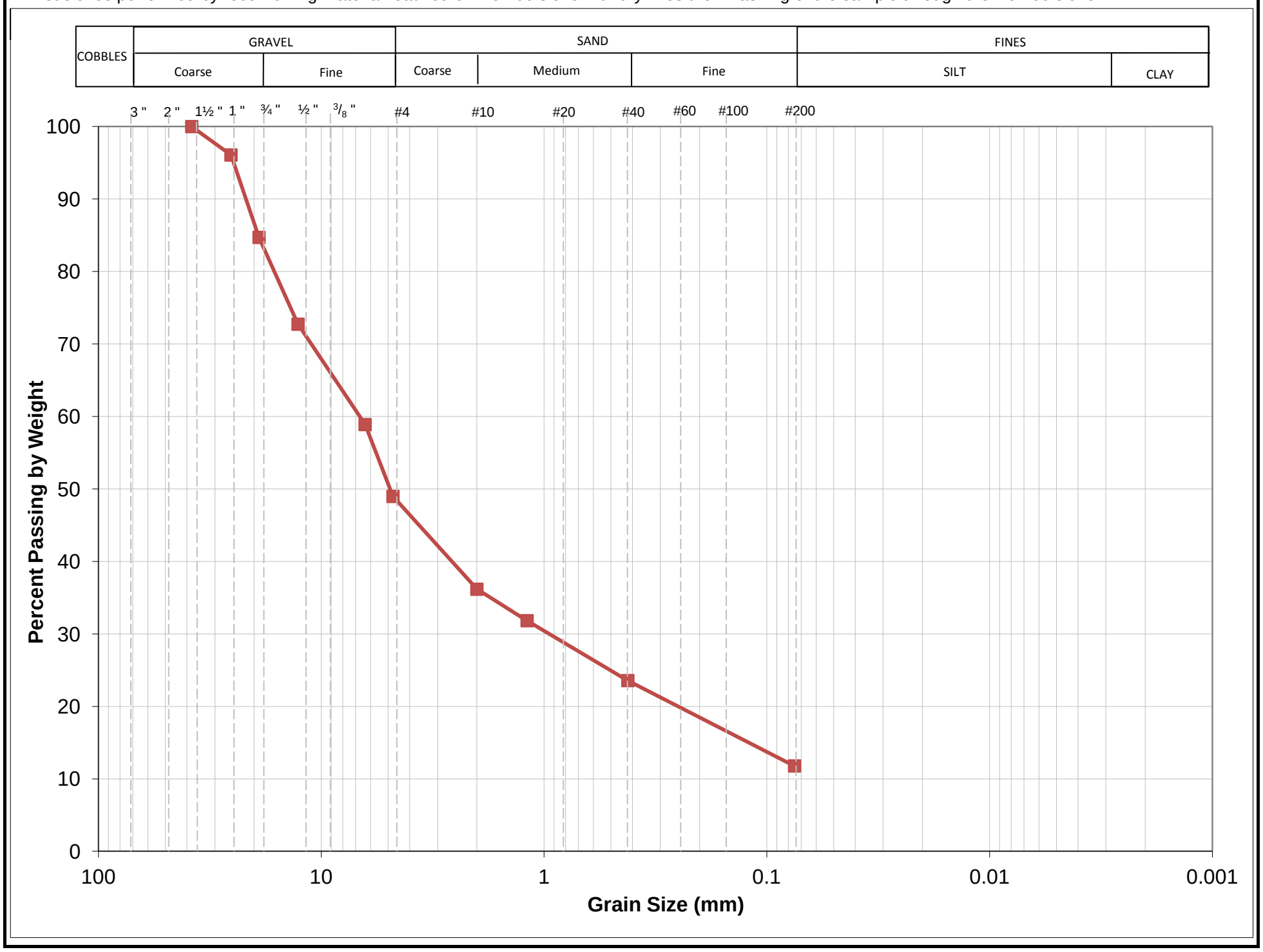
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 57 | 11.8 |
| Fines (g) Wet Sieve | | 57 | |

| | |
|---|---|
| Gravel (%) | 51.0 |
| Sand (%) | 37.2 |
| Fines (%) | 11.8 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **GP-T-13-04**

Sample No. **10.5 - 11.5**

Depth **10.5 - 11.5 m**

Location **Tailings Surface**

Date **2013-09-30**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 618 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 0 | 100.0 |
| 3/4" | 19.0 | 0 | 100.0 |
| 1/2" | 12.7 | 0 | 100.0 |
| 1/4" | 6.35 | 5 | 99.2 |
| No. 4 | 4.76 | 4 | 98.5 |
| No. 10 | 2.00 | 15 | 96.1 |
| No. 16 | 1.19 | 7 | 95.0 |
| No. 40 | 0.42 | 53 | 86.4 |

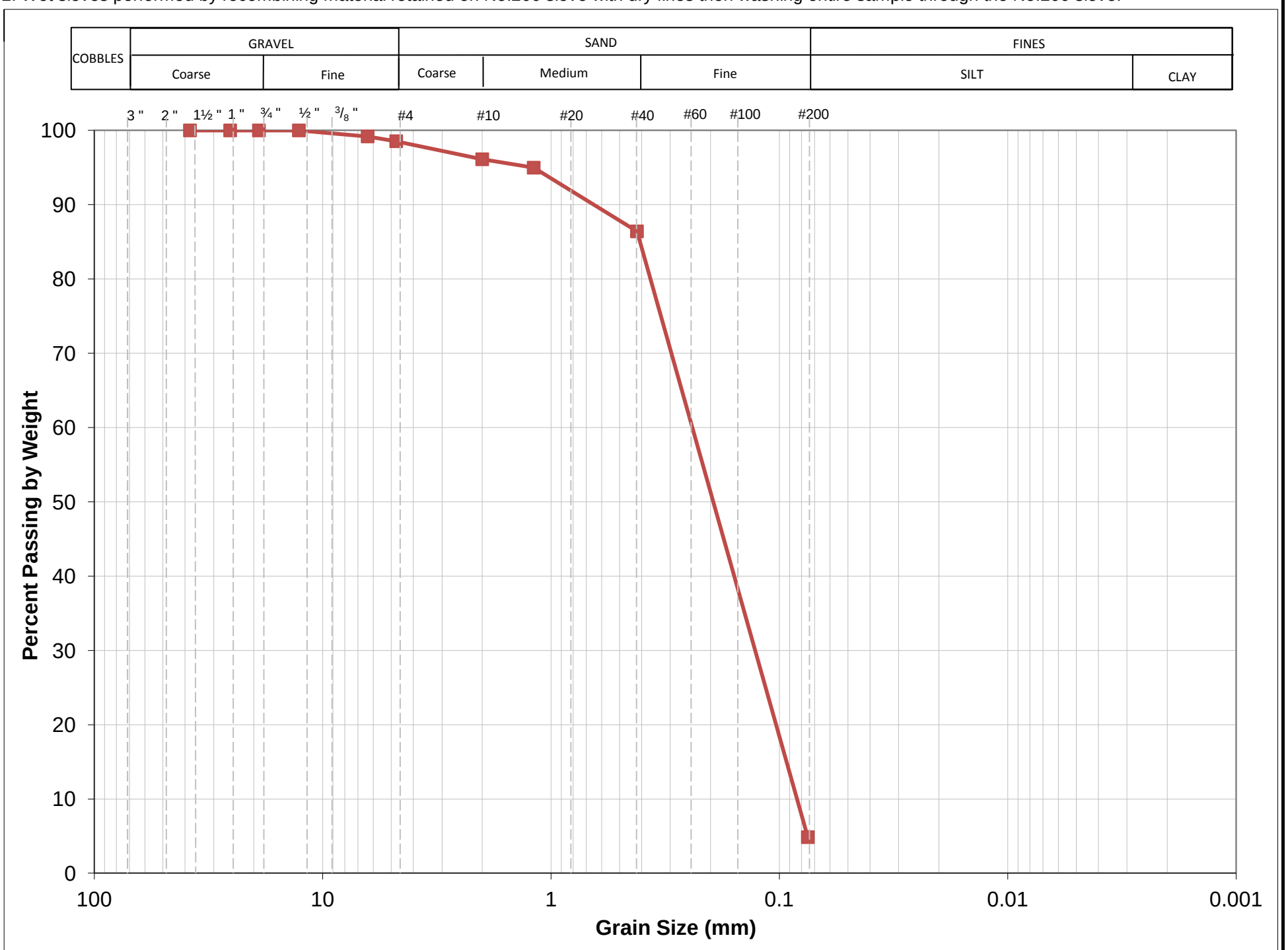
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 504 | 4.9 |
| Fines (g) Wet Sieve | | 30 | |

| | |
|---|---|
| Gravel (%) | 1.5 |
| Sand (%) | 93.7 |
| Fines (%) | 4.9 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **GP-T-13-21**

Sample No. **2.5 - 3.25**

Depth **2.5 - 3.25 m**

Location **Tailings Surface**

Date **2013-09-30**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 963 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 0 | 100.0 |
| 3/4" | 19.0 | 0 | 100.0 |
| 1/2" | 12.7 | 0 | 100.0 |
| 1/4" | 6.35 | 15 | 98.4 |
| No. 4 | 4.76 | 3 | 98.1 |
| No. 10 | 2.00 | 13 | 96.8 |
| No. 16 | 1.19 | 10 | 95.7 |
| No. 40 | 0.42 | 71 | 88.4 |

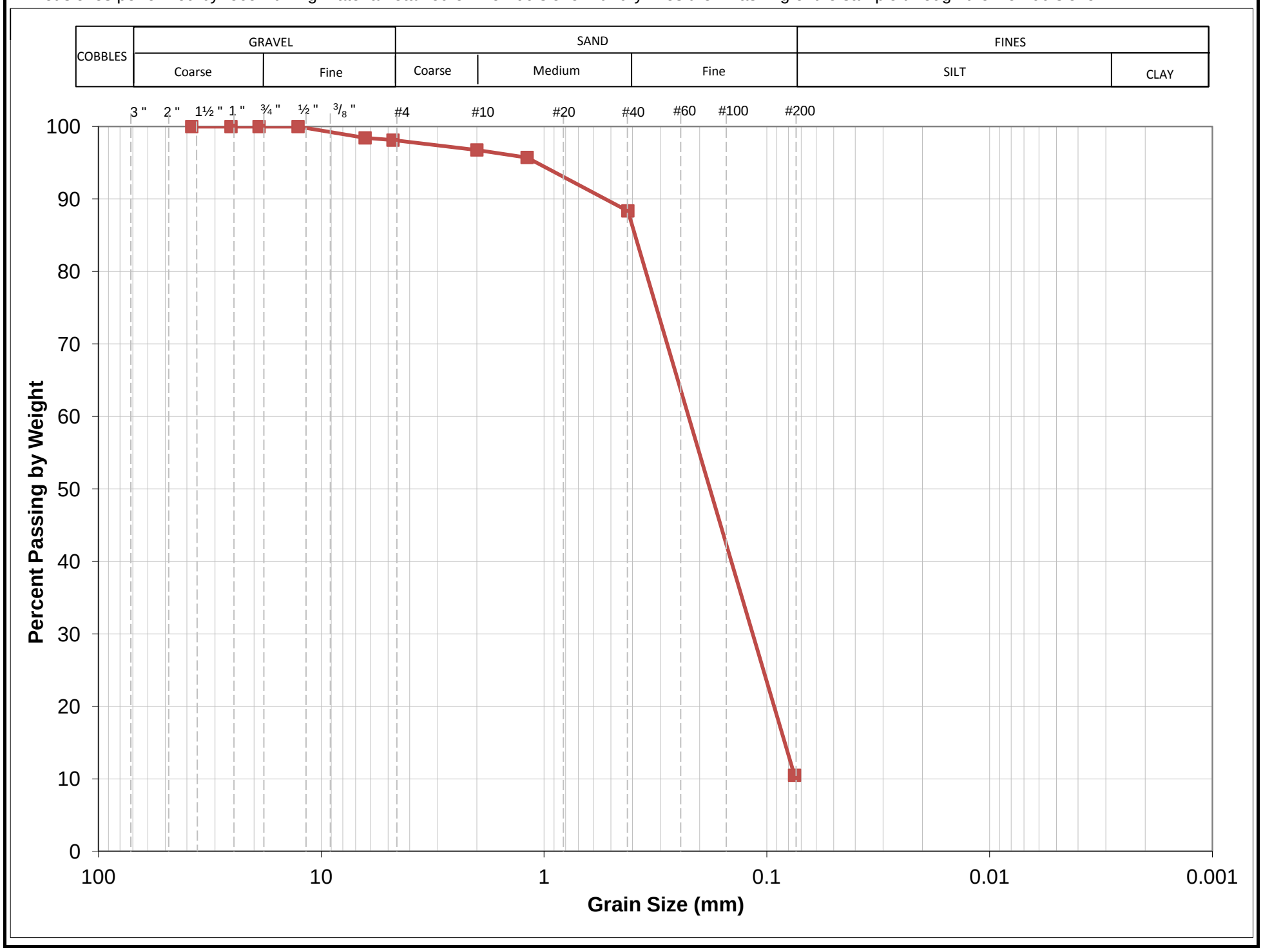
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 750 | 10.5 |
| Fines (g) Wet Sieve | | 101 | |

| | |
|---|---|
| Gravel (%) | 1.9 |
| Sand (%) | 87.6 |
| Fines (%) | 10.5 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **TP-WA-13-03**

Sample No. **GS4/BULK**

Depth **4.5 - 4.6 m**

Location **Waste Rock Area**

Date **2013-09-10**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 834 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 126 | 84.9 |
| 3/4" | 19.0 | 26 | 81.8 |
| 1/2" | 12.7 | 46 | 76.3 |
| 1/4" | 6.35 | 65 | 68.5 |
| No. 4 | 4.76 | 32 | 64.6 |
| No. 10 | 2.00 | 126 | 49.5 |
| No. 16 | 1.19 | 105 | 36.9 |
| No. 40 | 0.42 | 124 | 22.1 |

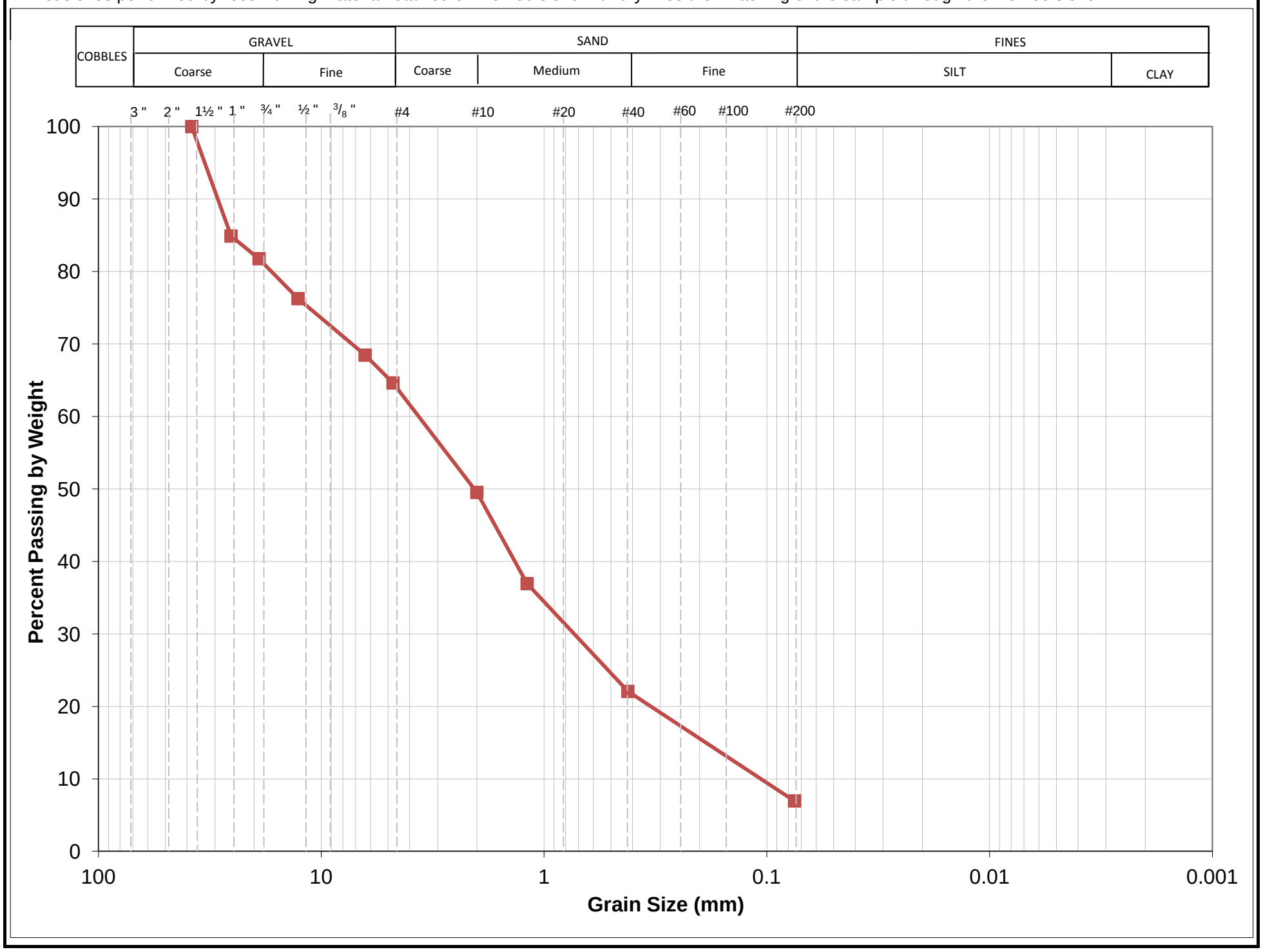
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 126 | 7.0 |
| Fines (g) Wet Sieve | | 58 | |

| | |
|---|---|
| Gravel (%) | 35.4 |
| Sand (%) | 57.7 |
| Fines (%) | 7.0 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **BH-T-13-03**

Sample No. **ARD-07**

Depth **13.5 - 13.6 m**

Location **Tailings Surface**

Date **2013-09-13**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 691 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 0 | 100.0 |
| 3/4" | 19.0 | 14 | 98.0 |
| 1/2" | 12.7 | 0 | 98.0 |
| 1/4" | 6.35 | 63 | 88.9 |
| No. 4 | 4.76 | 12 | 87.1 |
| No. 10 | 2.00 | 22 | 83.9 |
| No. 16 | 1.19 | 12 | 82.2 |
| No. 40 | 0.42 | 154 | 59.9 |

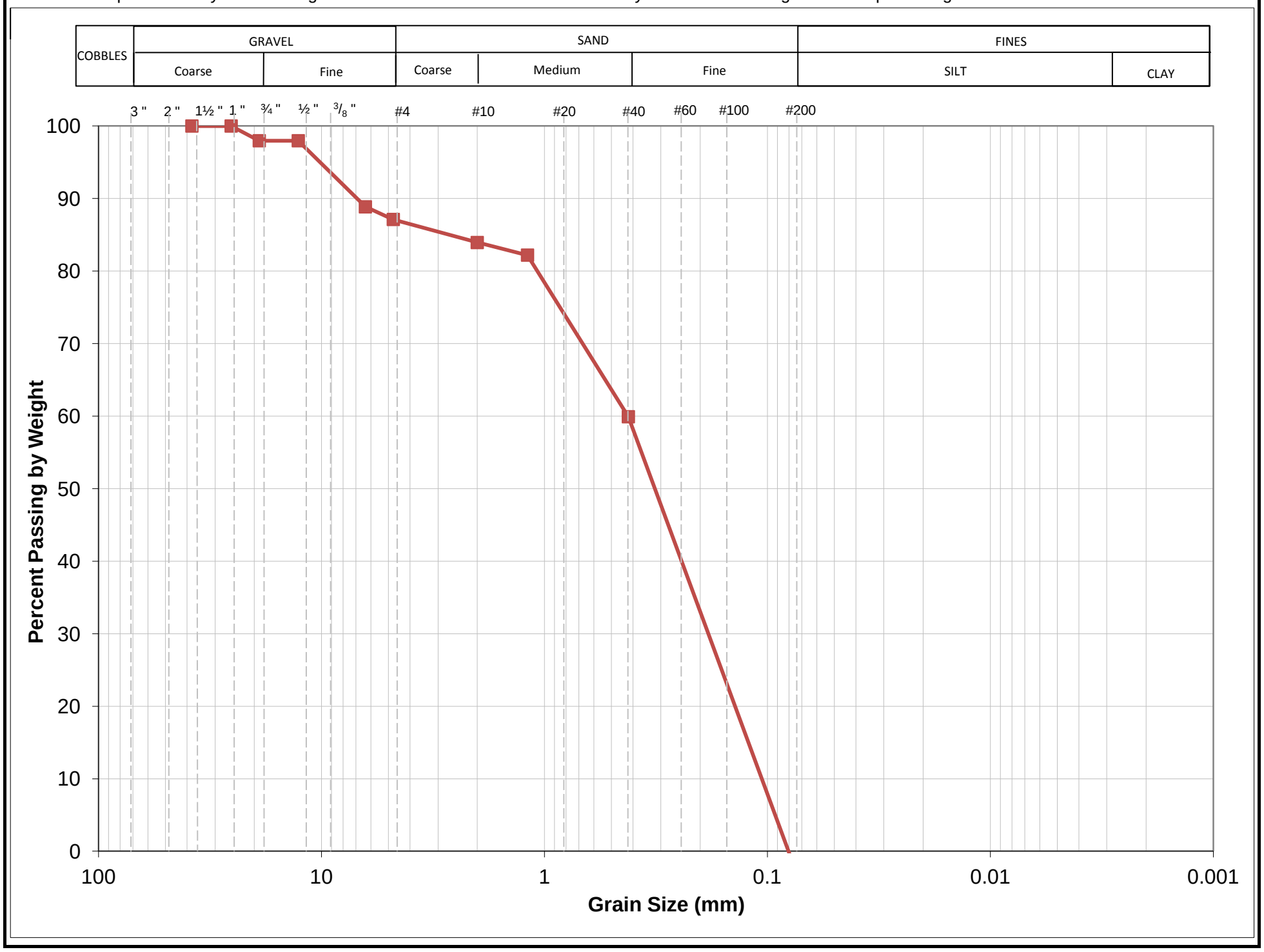
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 431 | -2.5 |
| Fines (g) Wet Sieve | | 37 | |

| | |
|---|---|
| Gravel (%) | 12.9 |
| Sand (%) | 89.6 |
| Fines (%) | 5.4 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



| | |
|---|---|
| Project | **Mount Nansen - 2013 Site Investigation** |
| Project No. | **VM00605** |

**Sample Information**

| | |
|---|---|
| Borehole ID | **BH-TD-13-01** |
| Sample No. | **ARD-19** |
| Depth | **23.1 - 23.2 m** |
| Location | **Tailings Dam** |
| Date | **2013-09-13** |

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| | |
|---|---|
| Sieve Initial weight (g) | 772 |

**Dry Sieve Results**

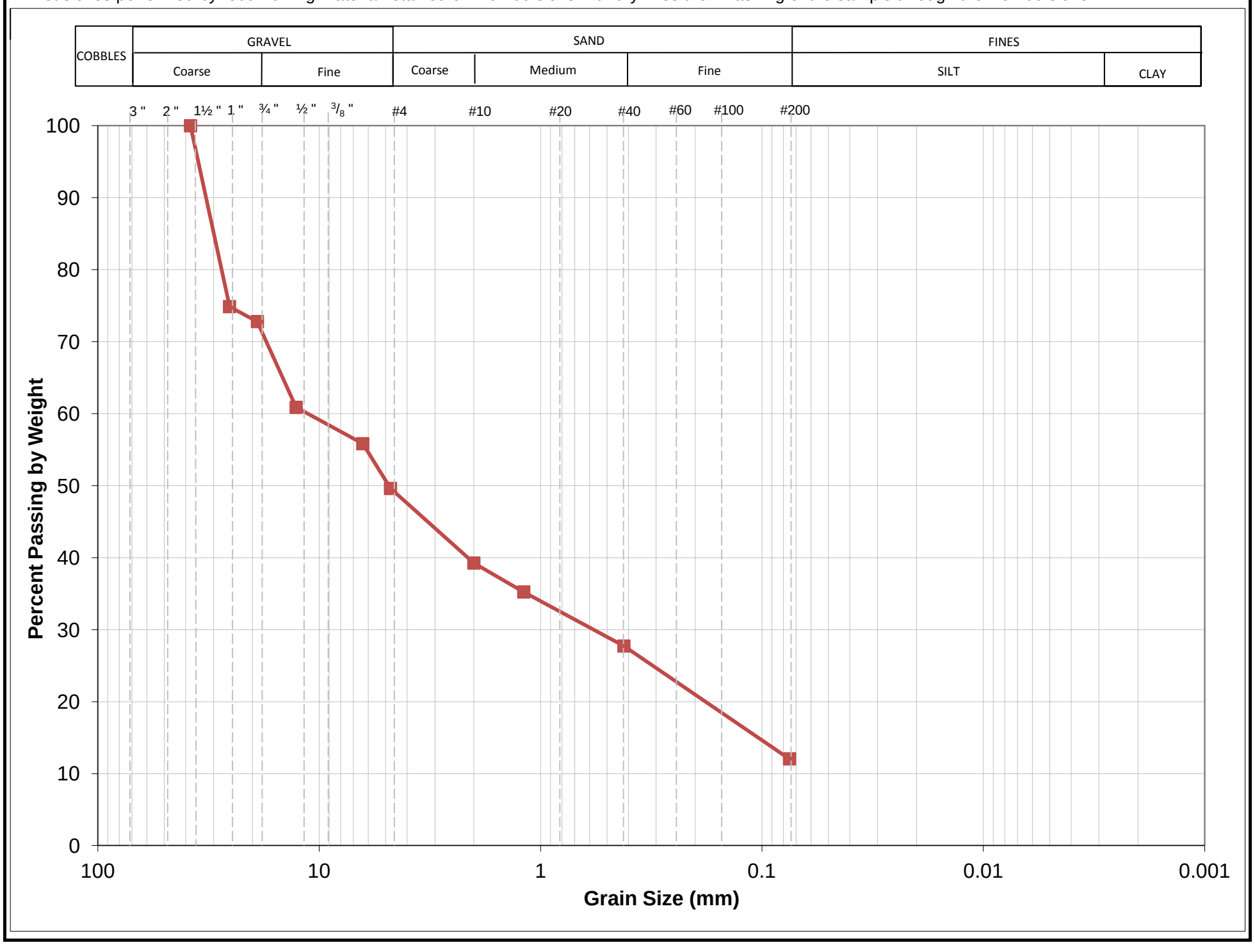
| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 194 | 74.9 |
| 3/4" | 19.0 | 16 | 72.8 |
| 1/2" | 12.7 | 92 | 60.9 |
| 1/4" | 6.35 | 39 | 55.8 |
| No. 4 | 4.76 | 48 | 49.6 |
| No. 10 | 2.00 | 80 | 39.2 |
| No. 16 | 1.19 | 31 | 35.2 |
| No. 40 | 0.42 | 58 | 27.7 |

**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 121 | 12.0 |
| Fines (g) Wet Sieve | | 93 | |

| | |
|---|---|
| Gravel (%) | 50.4 |
| Sand (%) | 37.6 |
| Fines (%) | 12.0 |

Notes:
1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **GP-T-13-18**

Sample No. **5.0 - 6.25**

Depth **5.0 - 6.25 m**

Location **Tailings Surface**

Date **2013-09-30**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 919 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 0 | 100.0 |
| 3/4" | 19.0 | 0 | 100.0 |
| 1/2" | 12.7 | 0 | 100.0 |
| 1/4" | 6.35 | 9 | 99.0 |
| No. 4 | 4.76 | 6 | 98.4 |
| No. 10 | 2.00 | 17 | 96.5 |
| No. 16 | 1.19 | 14 | 95.0 |
| No. 40 | 0.42 | 172 | 76.3 |

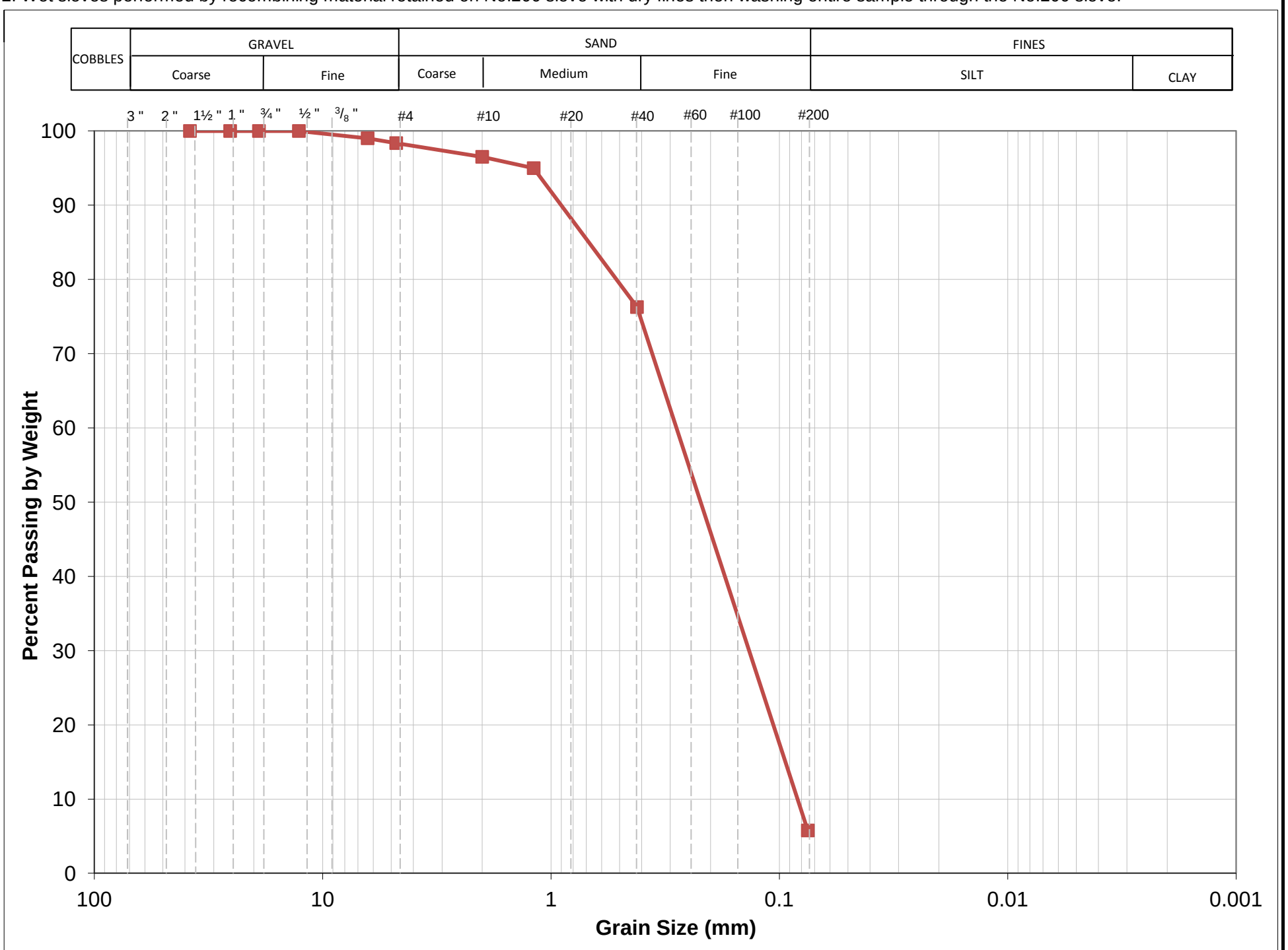
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 648 | 5.8 |
| Fines (g) Wet Sieve | | 53 | |

| | |
|---|---|
| Gravel (%) | 1.6 |
| Sand (%) | 92.6 |
| Fines (%) | 5.8 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **BH-T-13-01**

Sample No. **MC22**

Depth **13.4 - 13.5 m**

Location **Tailings Surface**

Date **2013-09-15**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 531 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 0 | 100.0 |
| 3/4" | 19.0 | 0 | 100.0 |
| 1/2" | 12.7 | 0 | 100.0 |
| 1/4" | 6.35 | 0 | 100.0 |
| No. 4 | 4.76 | 0 | 100.0 |
| No. 10 | 2.00 | 0 | 100.0 |
| No. 16 | 1.19 | 0 | 100.0 |
| No. 40 | 0.42 | 46 | 91.3 |

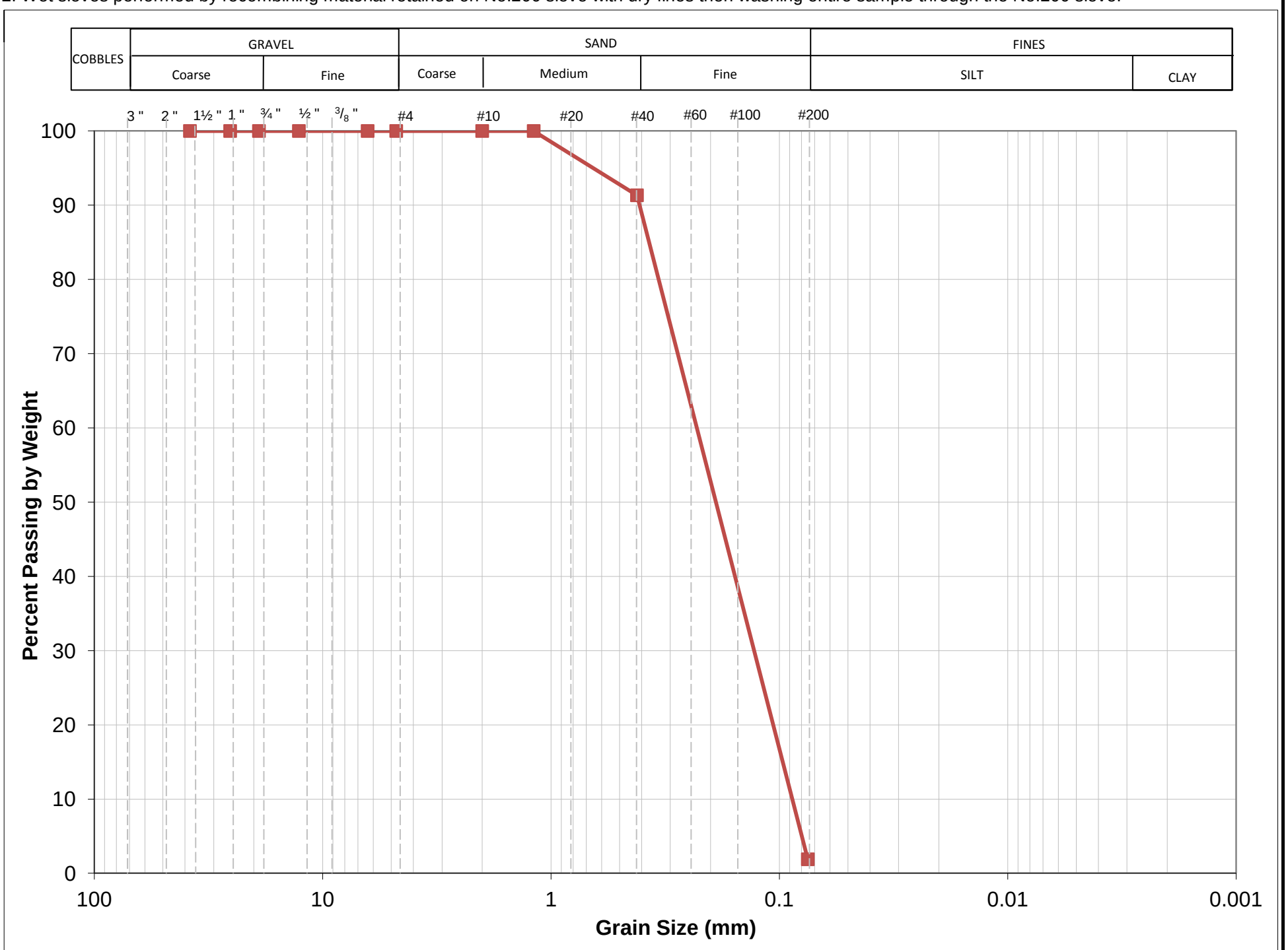
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 475 | 1.9 |
| Fines (g) Wet Sieve | | 10 | |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 98.1 |
| Fines (%) | 1.9 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **BH-WA-13-01**

Sample No. **GS8**

Depth **8.0 - 8.1 m**

Location **Waste Rock Area**

Date **2013-09-11**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 935 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 156 | 83.3 |
| 1" | 25.4 | 47 | 78.3 |
| 3/4" | 19.0 | 150 | 62.2 |
| 1/2" | 12.7 | 65 | 55.3 |
| 1/4" | 6.35 | 130 | 41.4 |
| No. 4 | 4.76 | 60 | 35.0 |
| No. 10 | 2.00 | 143 | 19.7 |
| No. 16 | 1.19 | 60 | 13.3 |
| No. 40 | 0.42 | 65 | 6.3 |

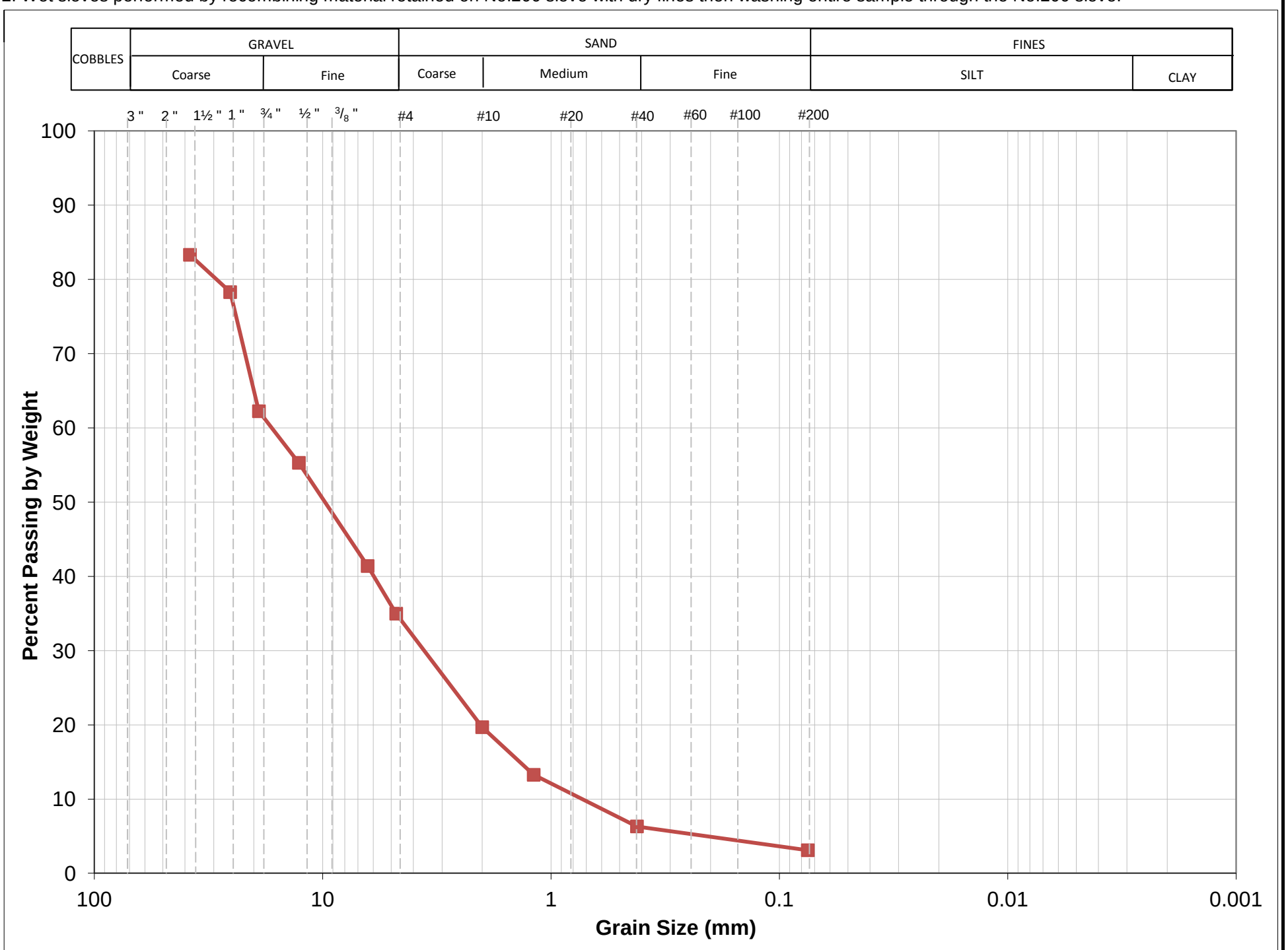
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 30 | 3.1 |
| Fines (g) Wet Sieve | | 29 | |

| | |
|---|---|
| Gravel (%) | 65.0 |
| Sand (%) | 31.9 |
| Fines (%) | 3.1 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **BH-WA-13-01**

Sample No. **GS2**

Depth **2.0 - 2.1 m**

Location **Waste Rock Area**

Date **2013-09-11**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 831 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 120 | 85.6 |
| 1" | 25.4 | 0 | 85.6 |
| 3/4" | 19.0 | 0 | 85.6 |
| 1/2" | 12.7 | 136 | 69.2 |
| 1/4" | 6.35 | 122 | 54.5 |
| No. 4 | 4.76 | 40 | 49.7 |
| No. 10 | 2.00 | 119 | 35.4 |
| No. 16 | 1.19 | 67 | 27.3 |
| No. 40 | 0.42 | 102 | 15.0 |

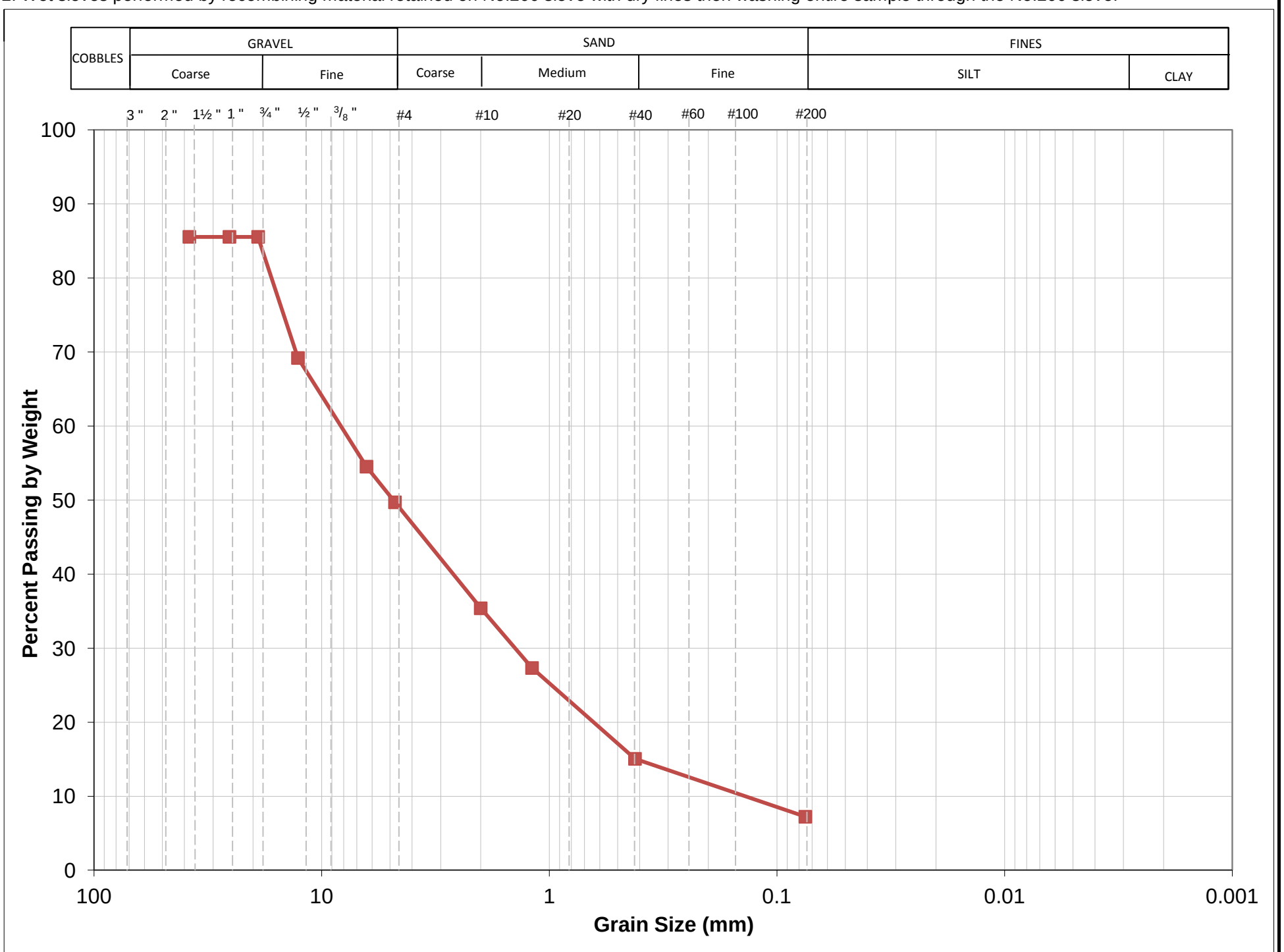
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 65 | 7.2 |
| Fines (g) Wet Sieve | | 60 | |

| | |
|---|---|
| Gravel (%) | 50.3 |
| Sand (%) | 42.5 |
| Fines (%) | 7.2 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **TP-WA-13-09**

Sample No. **GS1**

Depth **0.6 - 0.7 m**

Location **Waste Rock Area**

Date **2013-09-10**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 1102 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 151 | 86.3 |
| 1" | 25.4 | 27 | 83.8 |
| 3/4" | 19.0 | 30 | 81.1 |
| 1/2" | 12.7 | 75 | 74.3 |
| 1/4" | 6.35 | 154 | 60.3 |
| No. 4 | 4.76 | 58 | 55.1 |
| No. 10 | 2.00 | 193 | 37.6 |
| No. 16 | 1.19 | 120 | 26.7 |
| No. 40 | 0.42 | 171 | 11.2 |

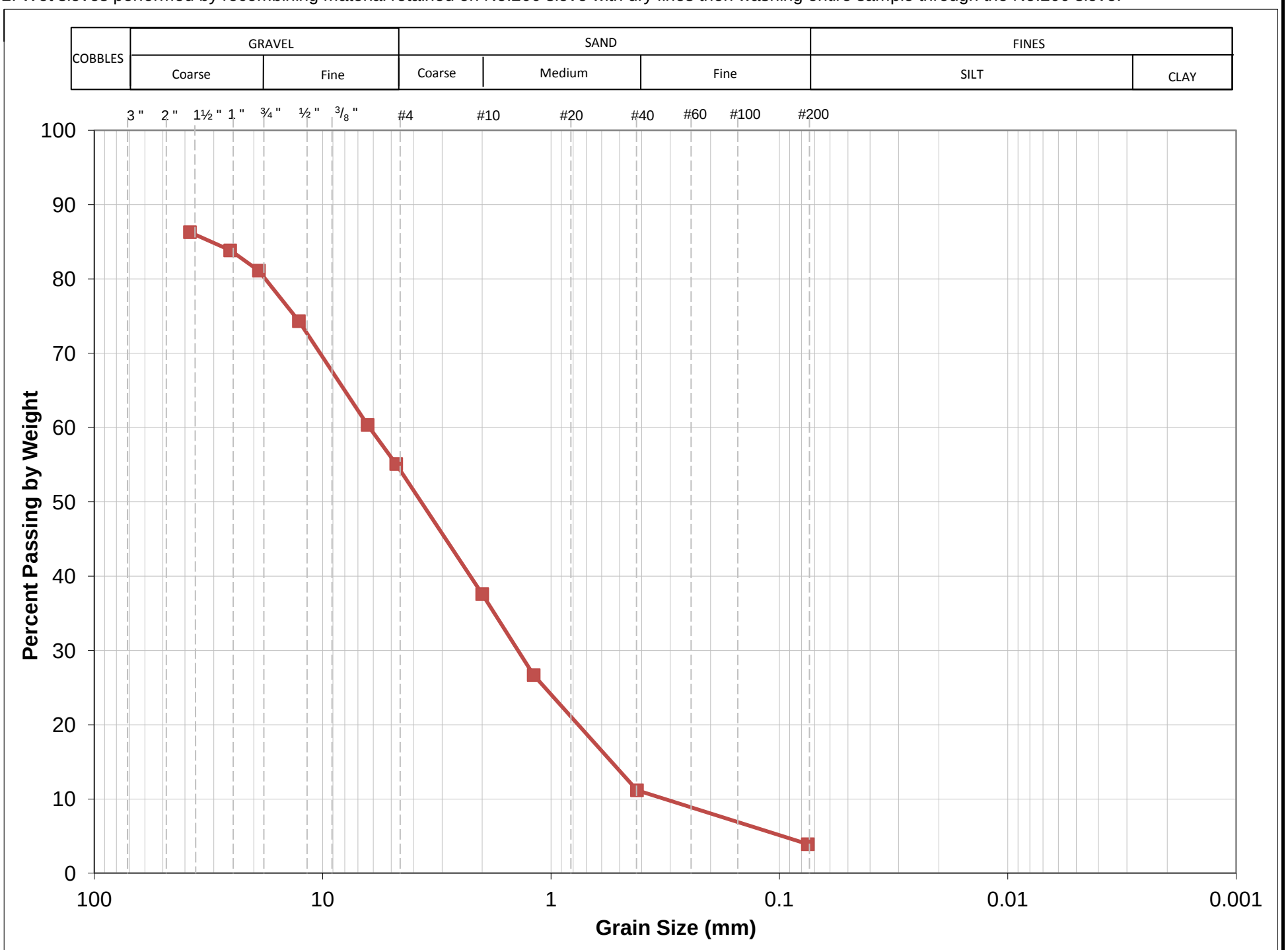
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 80 | 3.9 |
| Fines (g) Wet Sieve | | 43 | |

| | |
|---|---|
| Gravel (%) | 44.9 |
| Sand (%) | 51.2 |
| Fines (%) | 3.9 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **TP-WA-13-04**

Sample No. **GS2**

Depth **2.0 - 2.1 m**

Location **Waste Rock Area**

Date **2013-09-10**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 1302 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 183 | 85.9 |
| 1" | 25.4 | 170 | 72.9 |
| 3/4" | 19.0 | 22 | 71.2 |
| 1/2" | 12.7 | 265 | 50.8 |
| 1/4" | 6.35 | 172 | 37.6 |
| No. 4 | 4.76 | 74 | 32.0 |
| No. 10 | 2 | 170 | 18.9 |
| No. 16 | 1.19 | 86 | 12.3 |
| No. 40 | 0.42 | 100 | 4.6 |

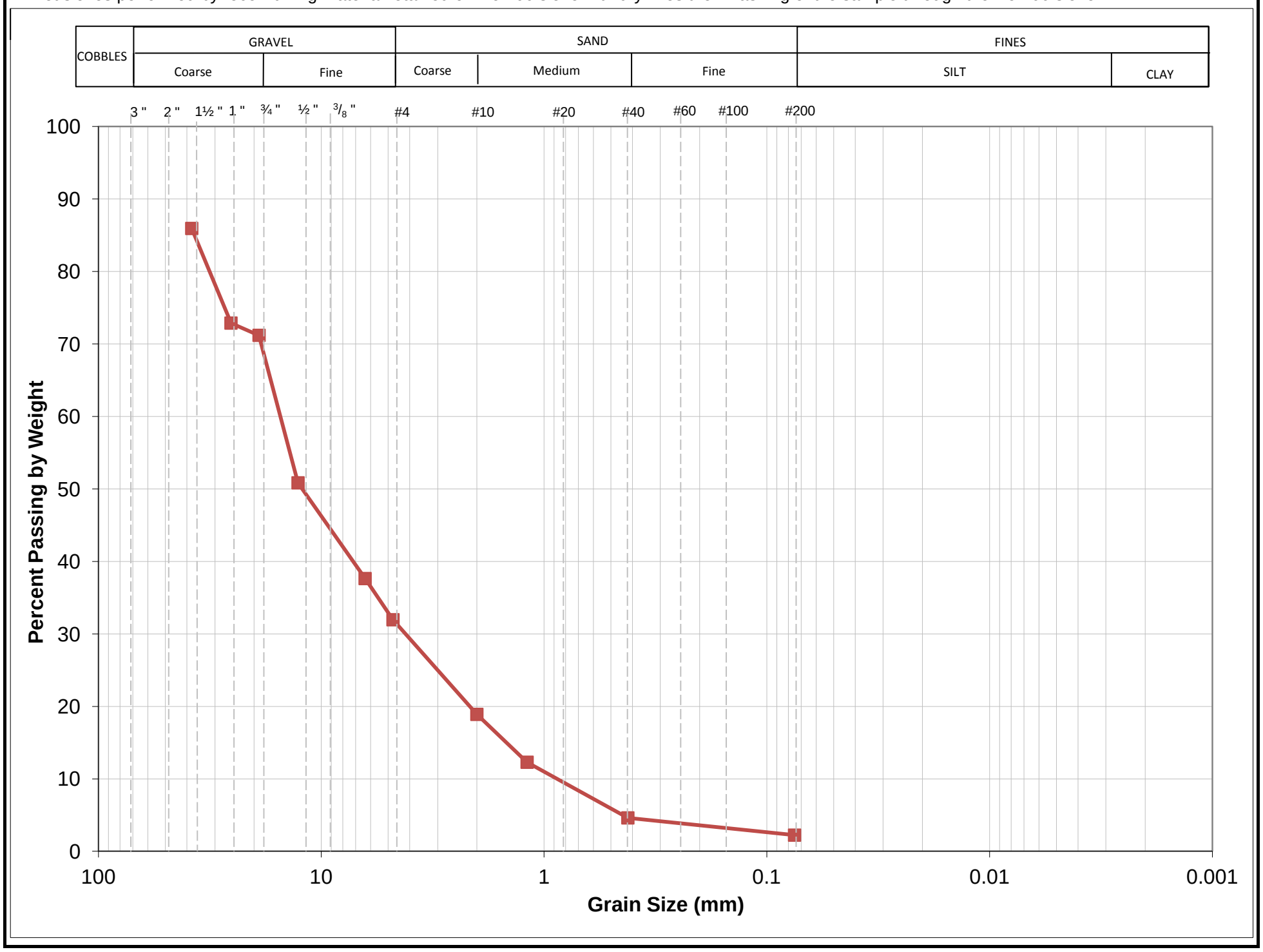
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 31 | 2.2 |
| Fines (g) Wet Sieve | | 29 | |

| | |
|---|---|
| Gravel (%) | 68.0 |
| Sand (%) | 29.7 |
| Fines (%) | 2.2 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **BH-WA-13-01**

Sample No. **GS5**

Depth **5.0-5.15**

Location **Waste Rock Area**

Date **2013-09-10**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 788 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 31 | 96.1 |
| 3/4" | 19.0 | 0 | 96.1 |
| 1/2" | 12.7 | 144 | 77.8 |
| 1/4" | 6.35 | 124 | 62.1 |
| No. 4 | 4.76 | 87 | 51.0 |
| No. 10 | 2 | 180 | 28.2 |
| No. 16 | 1.19 | 73 | 18.9 |
| No. 40 | 0.42 | 77 | 9.1 |

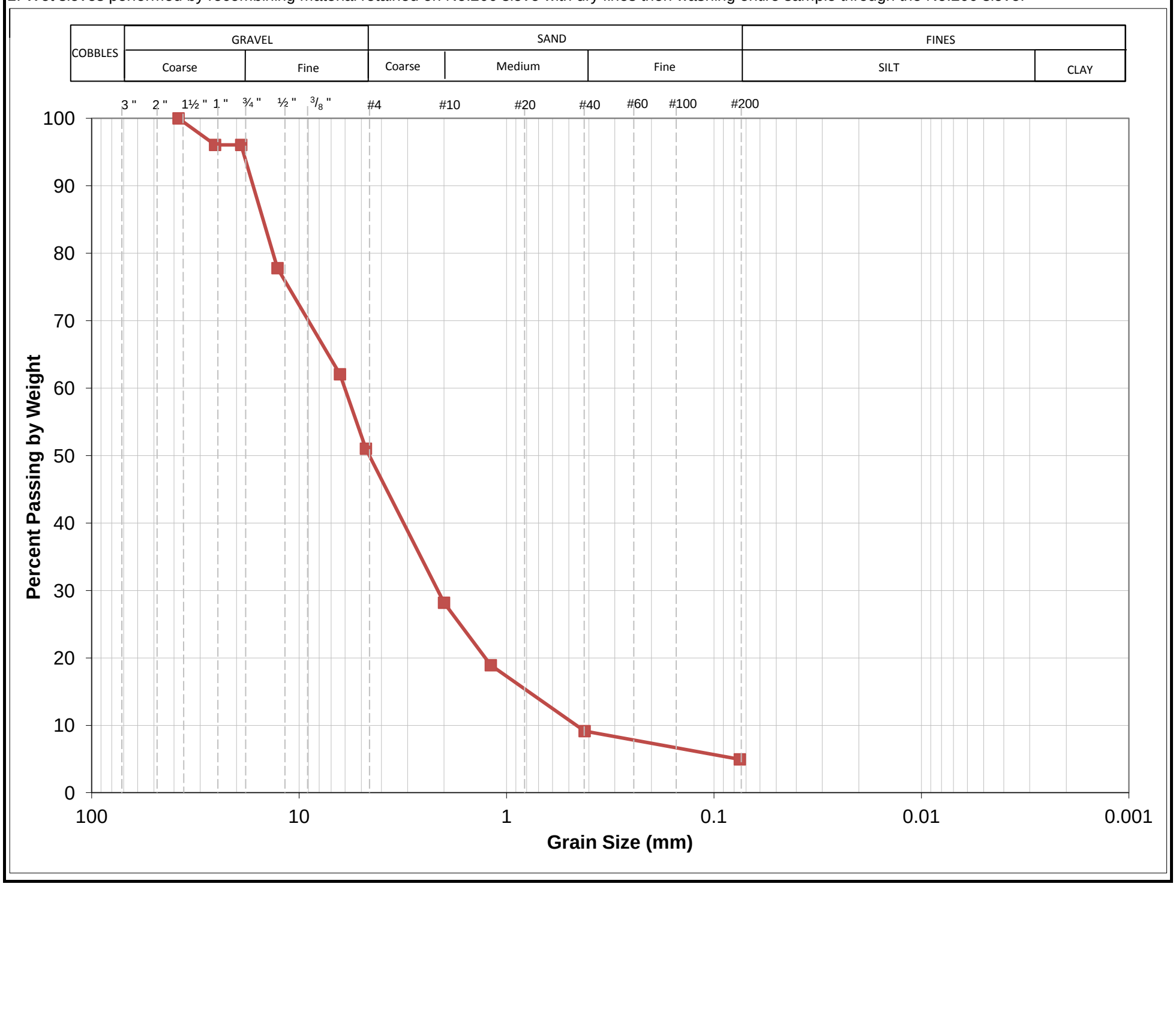
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 33 | 4.9 |
| Fines (g) Wet Sieve | | 39 | |

| | |
|---|---|
| Gravel (%) | 49.0 |
| Sand (%) | 46.1 |
| Fines (%) | 4.9 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **TP-WA-13-01**

Sample No. **GS3**

Depth **2.0 - 2.1 m**

Location **Waste Rock Area**

Date **2013-09-10**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 1057 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 115 | 89.1 |
| 1" | 25.4 | 0 | 89.1 |
| 3/4" | 19.0 | 203 | 69.9 |
| 1/2" | 12.7 | 111 | 59.4 |
| 1/4" | 6.35 | 147 | 45.5 |
| No. 4 | 4.76 | 71 | 38.8 |
| No. 10 | 2 | 159 | 23.7 |
| No. 16 | 1.19 | 73 | 16.8 |
| No. 40 | 0.42 | 82 | 9.1 |

**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 46 | 4.7 |
| Fines (g) Wet Sieve | | 50 | |

| | |
|---|---|
| Gravel (%) | 61.2 |
| Sand (%) | 34.1 |
| Fines (%) | 4.7 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.

Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **TP-WA-13-02**

Sample No. **GS4**

Depth **4.2 - 4.3 m**

Location **Waste Rock Area**

Date **2013-09-10**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 749 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 0 | 100.0 |
| 3/4" | 19.0 | 0 | 100.0 |
| 1/2" | 12.7 | 0 | 100.0 |
| 1/4" | 6.35 | 51 | 93.2 |
| No. 4 | 4.76 | 10 | 91.9 |
| No. 10 | 2.00 | 47 | 85.6 |
| No. 16 | 1.19 | 44 | 79.7 |
| No. 40 | 0.42 | 58 | 72.0 |

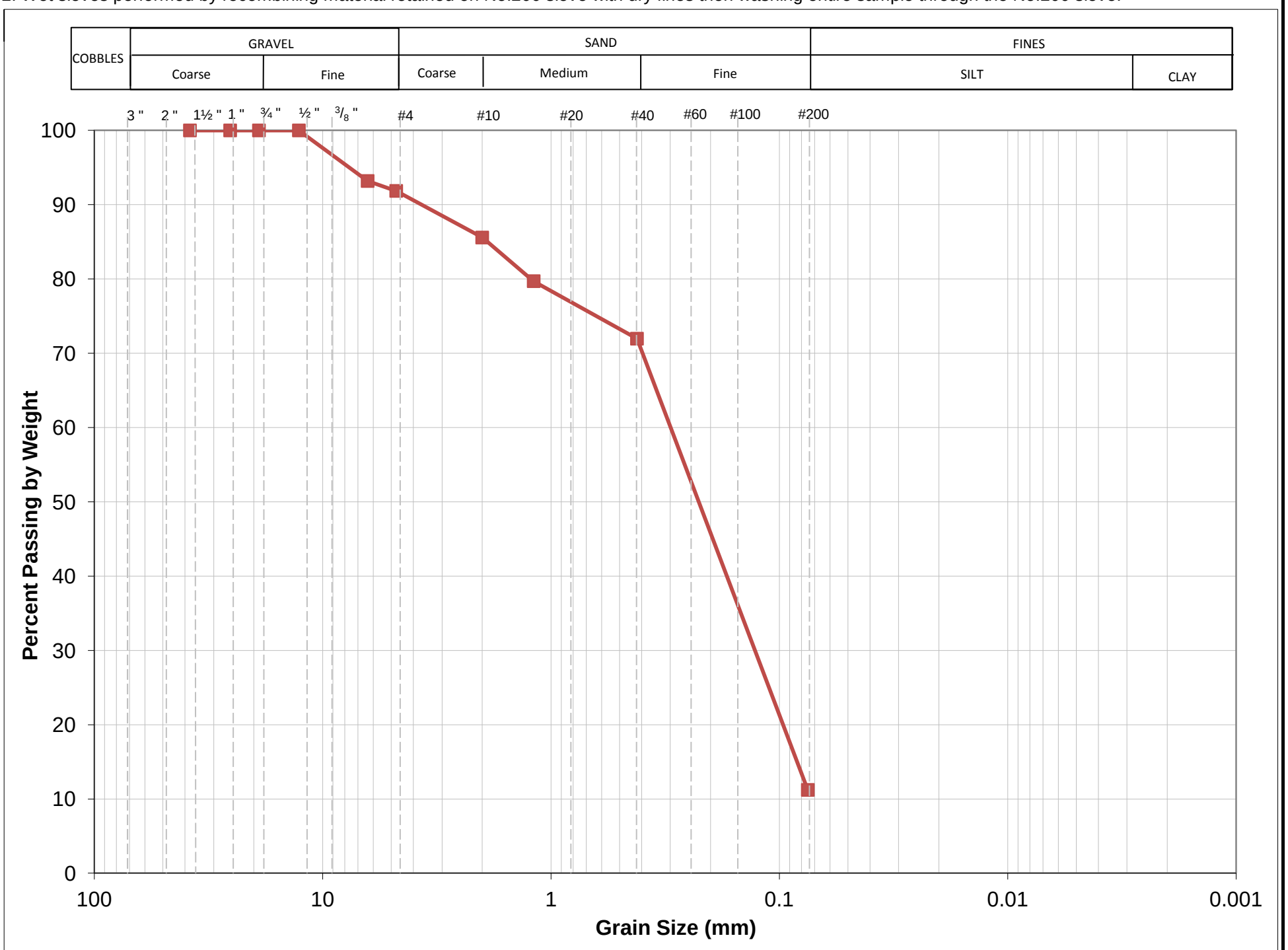
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 455 | 11.2 |
| Fines (g) Wet Sieve | | 84 | |

| | |
|---|---|
| Gravel (%) | 8.1 |
| Sand (%) | 80.6 |
| Fines (%) | 11.2 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **TP-WA-13-04**

Sample No. **GS4**

Depth **4.0 - 4.1 m**

Location **Waste Rock Area**

Date **2013-09-10**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| | |
|---|---|
| Sieve Initial weight (g) | 1290 |

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 221 | 82.9 |
| 1" | 25.4 | 166 | 70.0 |
| 3/4" | 19.0 | 206 | 54.0 |
| 1/2" | 12.7 | 112 | 45.3 |
| 1/4" | 6.35 | 138 | 34.7 |
| No. 4 | 4.76 | 56 | 30.3 |
| No. 10 | 2.00 | 144 | 19.1 |
| No. 16 | 1.19 | 79 | 13.0 |
| No. 40 | 0.42 | 84 | 6.5 |

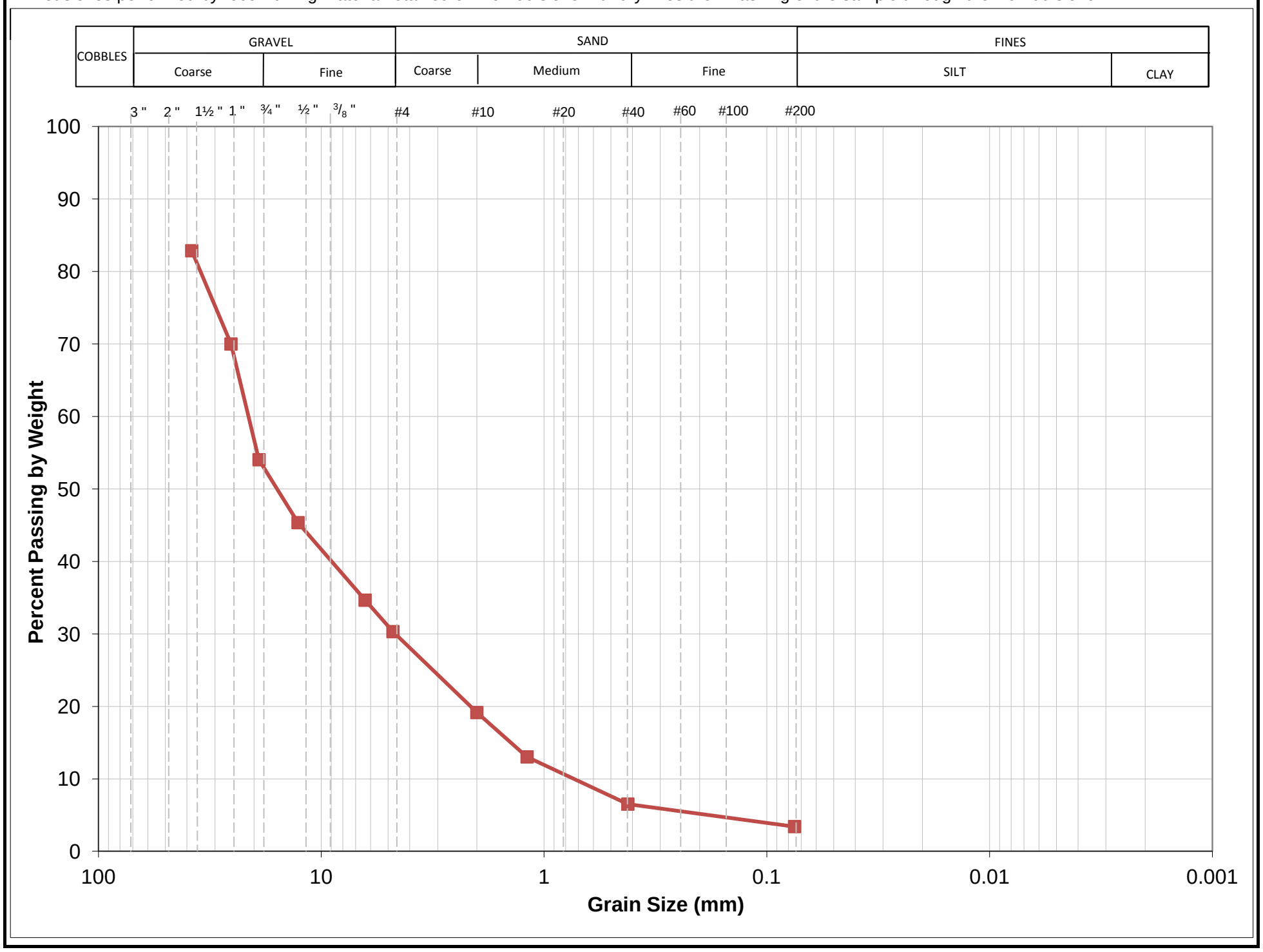
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 40 | 3.4 |
| Fines (g) Wet Sieve | | 44 | |

| | |
|---|---|
| Gravel (%) | 69.7 |
| Sand (%) | 26.9 |
| Fines (%) | 3.4 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **TP-WA-13-07**

Sample No. **GS6**

Depth **5.7 - 5.8 m**

Location **Waste Rock Area**

Date **2013-09-10**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 1159 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 112 | 90.3 |
| 1" | 25.4 | 147 | 77.7 |
| 3/4" | 19.0 | 80 | 70.8 |
| 1/2" | 12.7 | 71 | 64.6 |
| 1/4" | 6.35 | 95 | 56.4 |
| No. 4 | 4.76 | 81 | 49.4 |
| No. 10 | 2.00 | 183 | 33.6 |
| No. 16 | 1.19 | 97 | 25.3 |
| No. 40 | 0.42 | 103 | 16.4 |

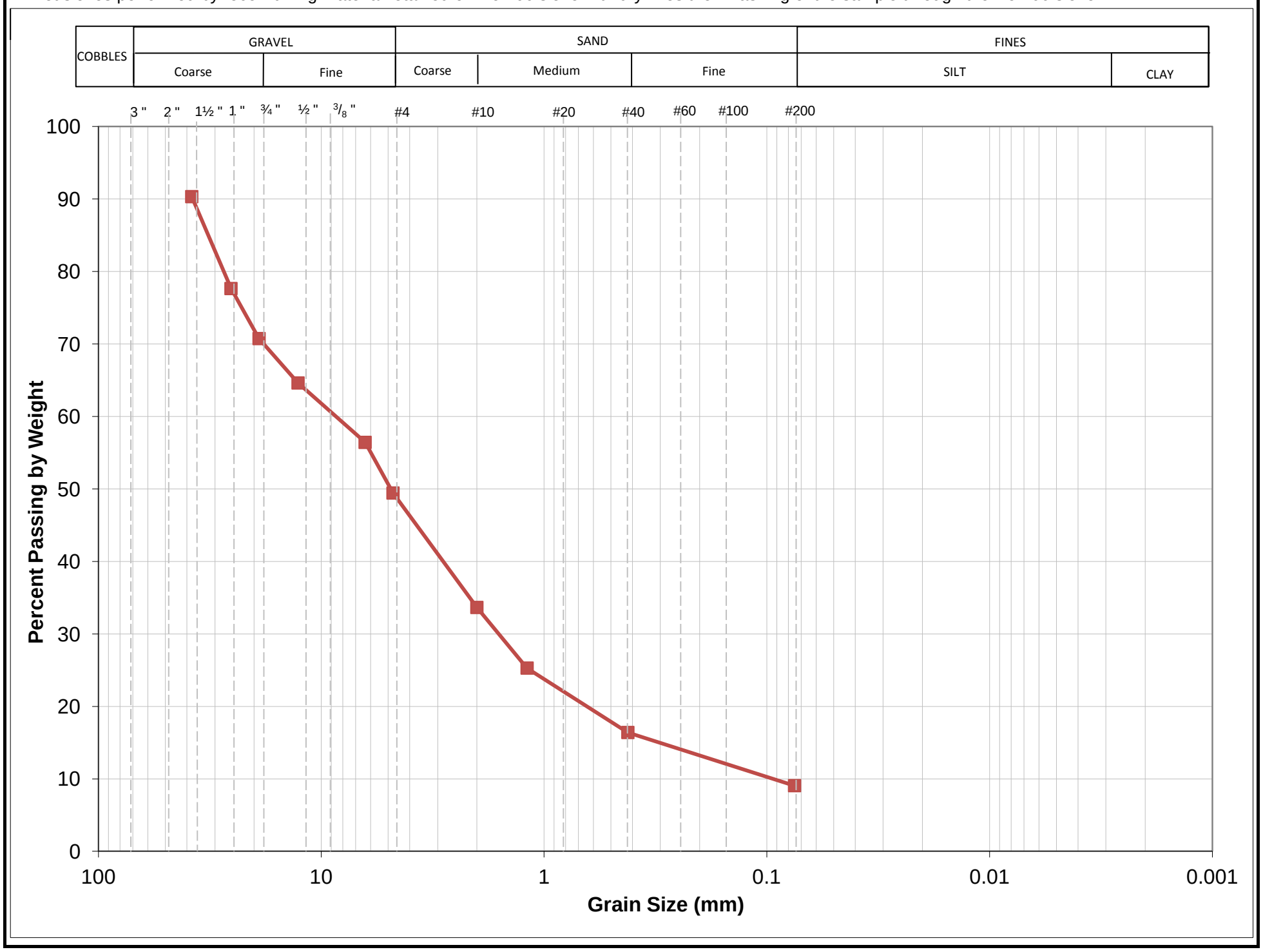
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 85 | 9.1 |
| Fines (g) Wet Sieve | | 105 | |

| | |
|---|---|
| Gravel (%) | 50.6 |
| Sand (%) | 40.4 |
| Fines (%) | 9.1 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **GP-T-13-23**

Sample No. **3.75 - 5.0**

Depth **3.75 - 5.0 m**

Location **Tailings Surface**

Date **2013-09-30**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 790 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 0 | 100.0 |
| 3/4" | 19.0 | 0 | 100.0 |
| 1/2" | 12.7 | 0 | 100.0 |
| 1/4" | 6.35 | 19 | 97.6 |
| No. 4 | 4.76 | 4 | 97.1 |
| No. 10 | 2.00 | 5 | 96.5 |
| No. 16 | 1.19 | 3 | 96.1 |
| No. 40 | 0.42 | 79 | 86.1 |

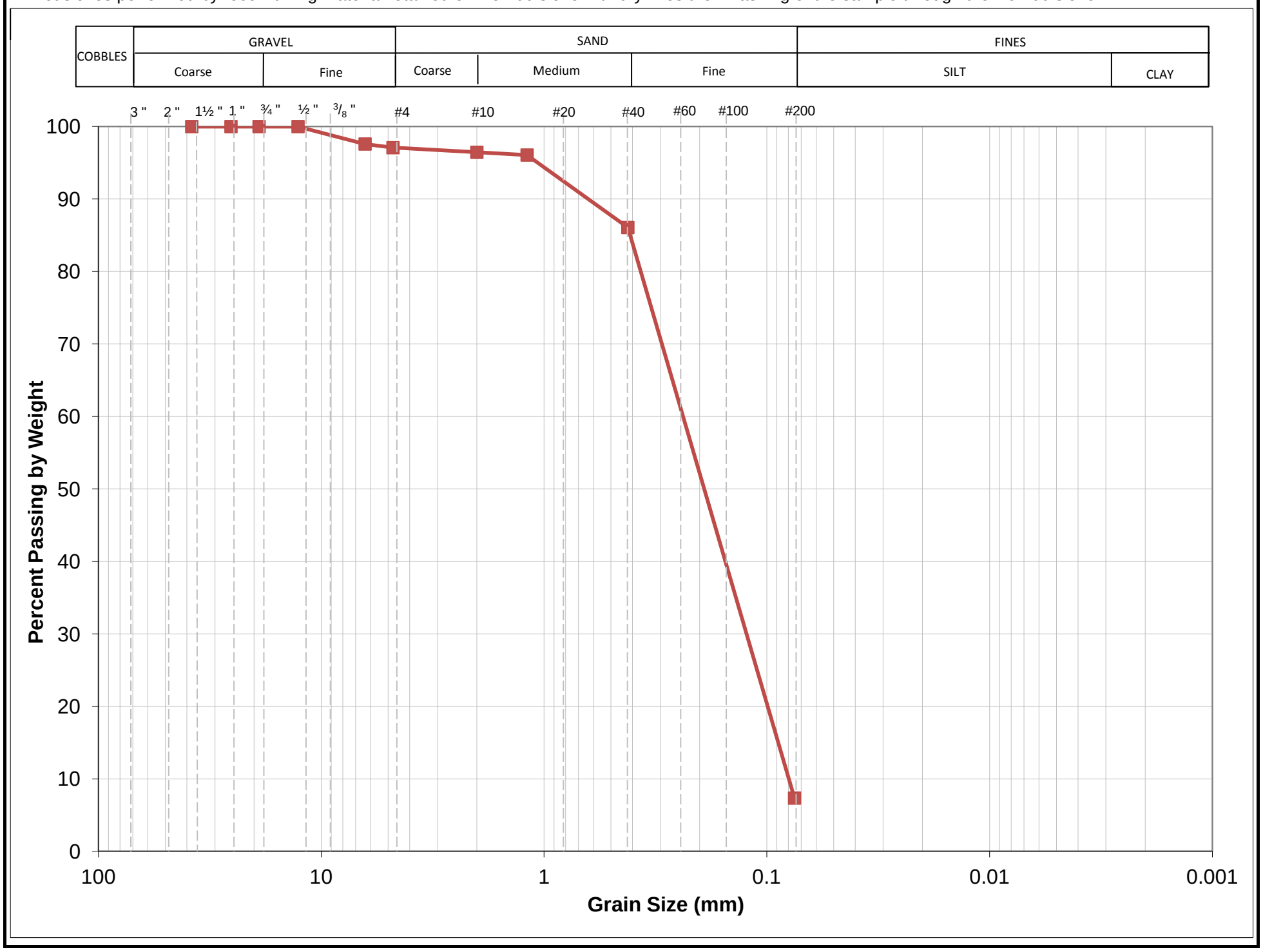
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 622 | 7.3 |
| Fines (g) Wet Sieve | | 58 | |

| | |
|---|---|
| Gravel (%) | 2.9 |
| Sand (%) | 89.7 |
| Fines (%) | 7.3 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **GP-T-13-22**

Sample No. **2.5 - 3.75**

Depth **2.5 - 3.75 m**

Location **Tailings Surface**

Date **2013-09-30**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 928 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 0 | 100.0 |
| 3/4" | 19.0 | 0 | 100.0 |
| 1/2" | 12.7 | 0 | 100.0 |
| 1/4" | 6.35 | 37 | 96.0 |
| No. 4 | 4.76 | 5 | 95.5 |
| No. 10 | 2.00 | 12 | 94.2 |
| No. 16 | 1.19 | 5 | 93.6 |
| No. 40 | 0.42 | 80 | 85.0 |

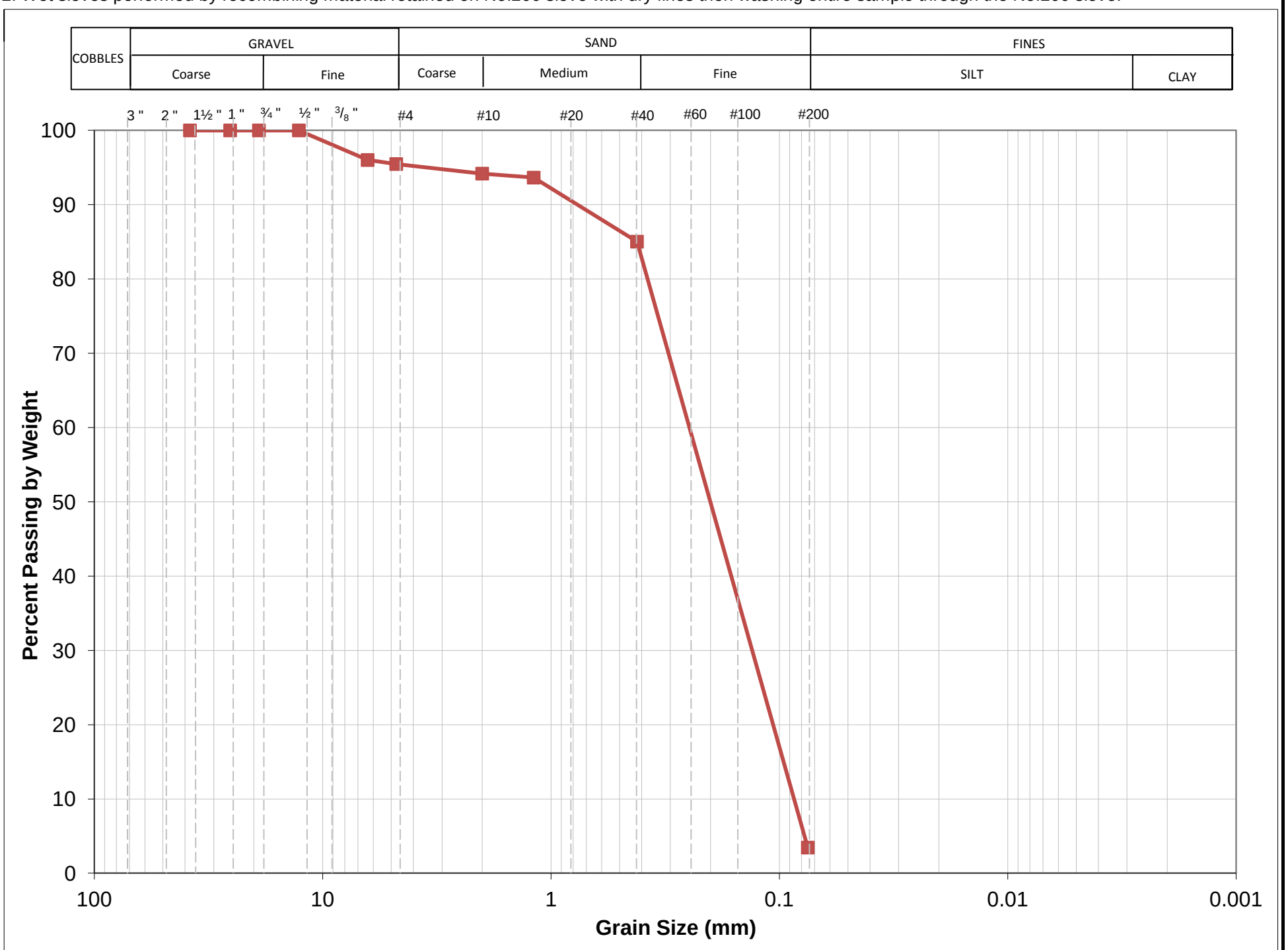
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 757 | 3.4 |
| Fines (g) Wet Sieve | | 32 | |

| | |
|---|---|
| Gravel (%) | 4.5 |
| Sand (%) | 92.0 |
| Fines (%) | 3.4 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **GP-T-13-03**

Sample No. **8.0 - 9.0**

Depth **8.0 - 9.0 m**

Location **Tailings Surface**

Date **2013-09-30**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| | |
|---|---|
| Sieve Initial weight (g) | 674 |

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 0 | 100.0 |
| 3/4" | 19.0 | 0 | 100.0 |
| 1/2" | 12.7 | 0 | 100.0 |
| 1/4" | 6.35 | 0 | 100.0 |
| No. 4 | 4.76 | 0 | 100.0 |
| No. 10 | 2.00 | 0 | 100.0 |
| No. 16 | 1.19 | 0 | 100.0 |
| No. 40 | 0.42 | 45 | 93.3 |

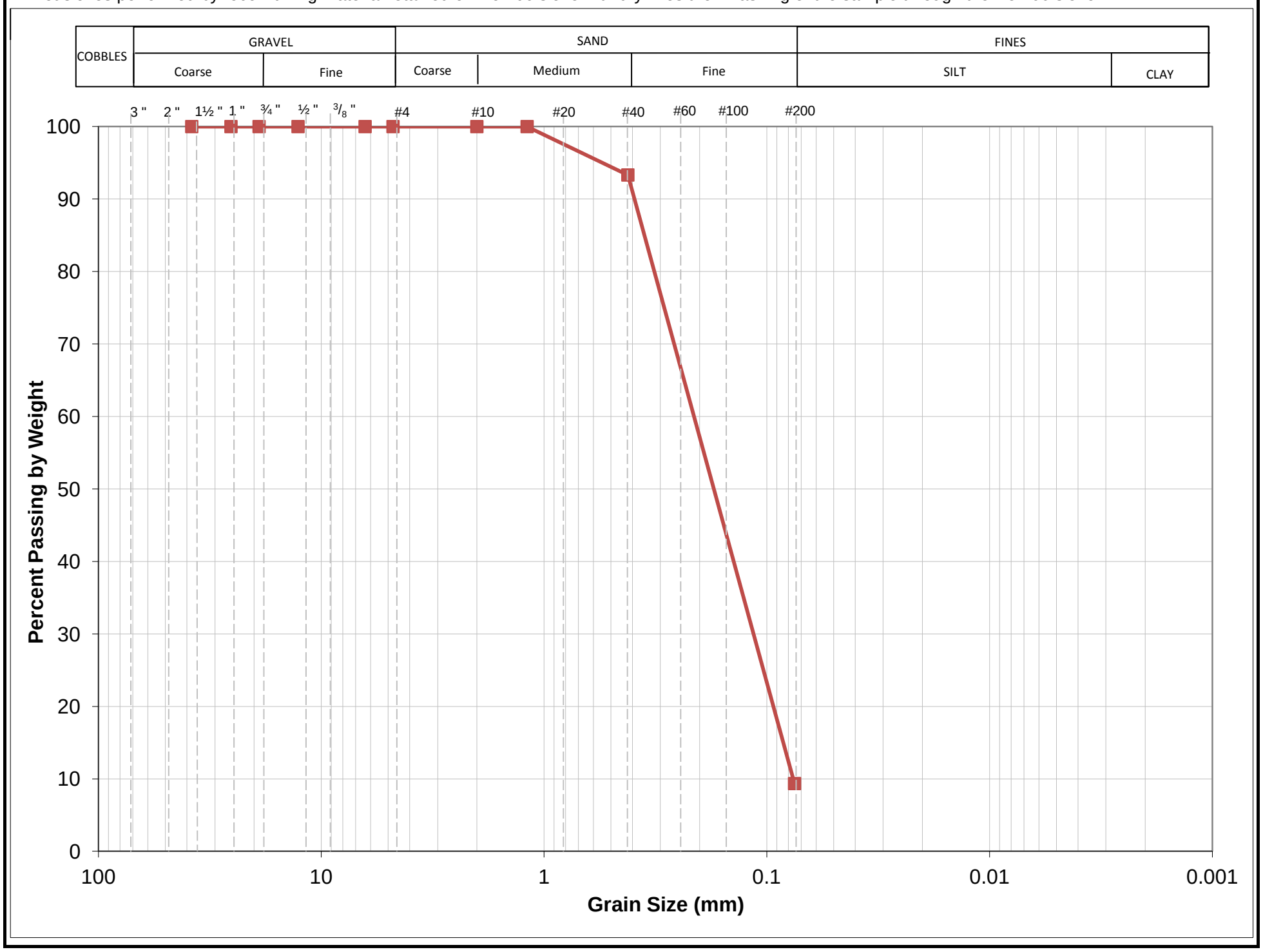
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 566 | 9.3 |
| Fines (g) Wet Sieve | | 63 | |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 90.7 |
| Fines (%) | 9.3 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **TP-WA-13-07**

Sample No. **GS3**

Depth **3.0 - 3.1 m**

Location **Waste Rock Area**

Date **2013-09-10**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 1009 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 0 | 100.0 |
| 3/4" | 19.0 | 58 | 94.3 |
| 1/2" | 12.7 | 128 | 81.6 |
| 1/4" | 6.35 | 266 | 55.2 |
| No. 4 | 4.76 | 79 | 47.4 |
| No. 10 | 2.00 | 187 | 28.8 |
| No. 16 | 1.19 | 76 | 21.3 |
| No. 40 | 0.42 | 91 | 12.3 |

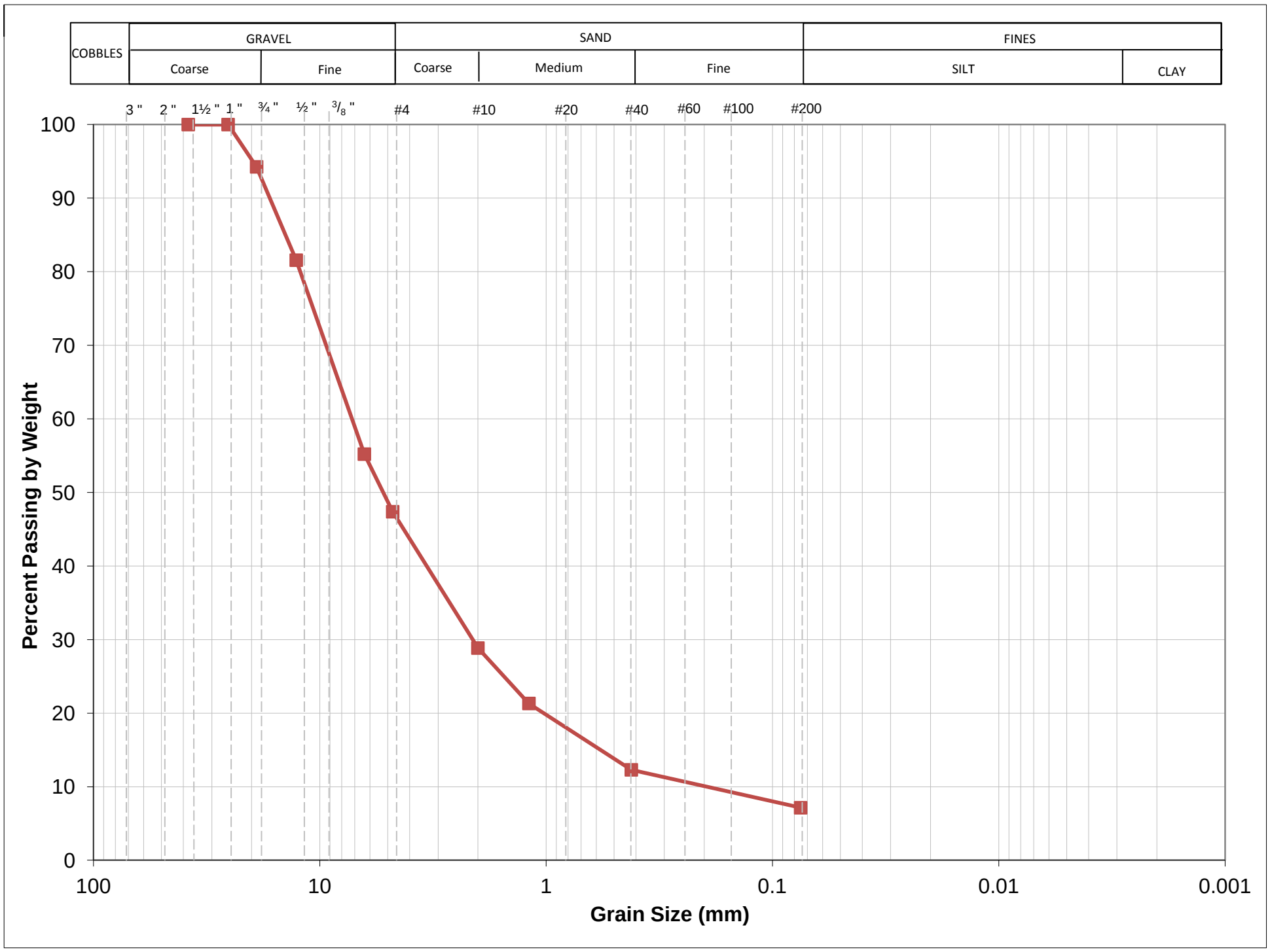
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 52 | 7.1 |
| Fines (g) Wet Sieve | | 72 | |

| | |
|---|---|
| Gravel (%) | 52.6 |
| Sand (%) | 40.2 |
| Fines (%) | 7.1 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **TP-T-13-09**

Sample No. **GS1**

Depth **1.0 - 1.1 m**

Location **Tailings Surface**

Date **2013-09-10**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 721 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 0 | 100.0 |
| 3/4" | 19.0 | 0 | 100.0 |
| 1/2" | 12.7 | 0 | 100.0 |
| 1/4" | 6.35 | 0 | 100.0 |
| No. 4 | 4.76 | 0 | 100.0 |
| No. 10 | 2.00 | 0 | 100.0 |
| No. 16 | 1.19 | 0 | 100.0 |
| No. 40 | 0.42 | 82 | 88.6 |

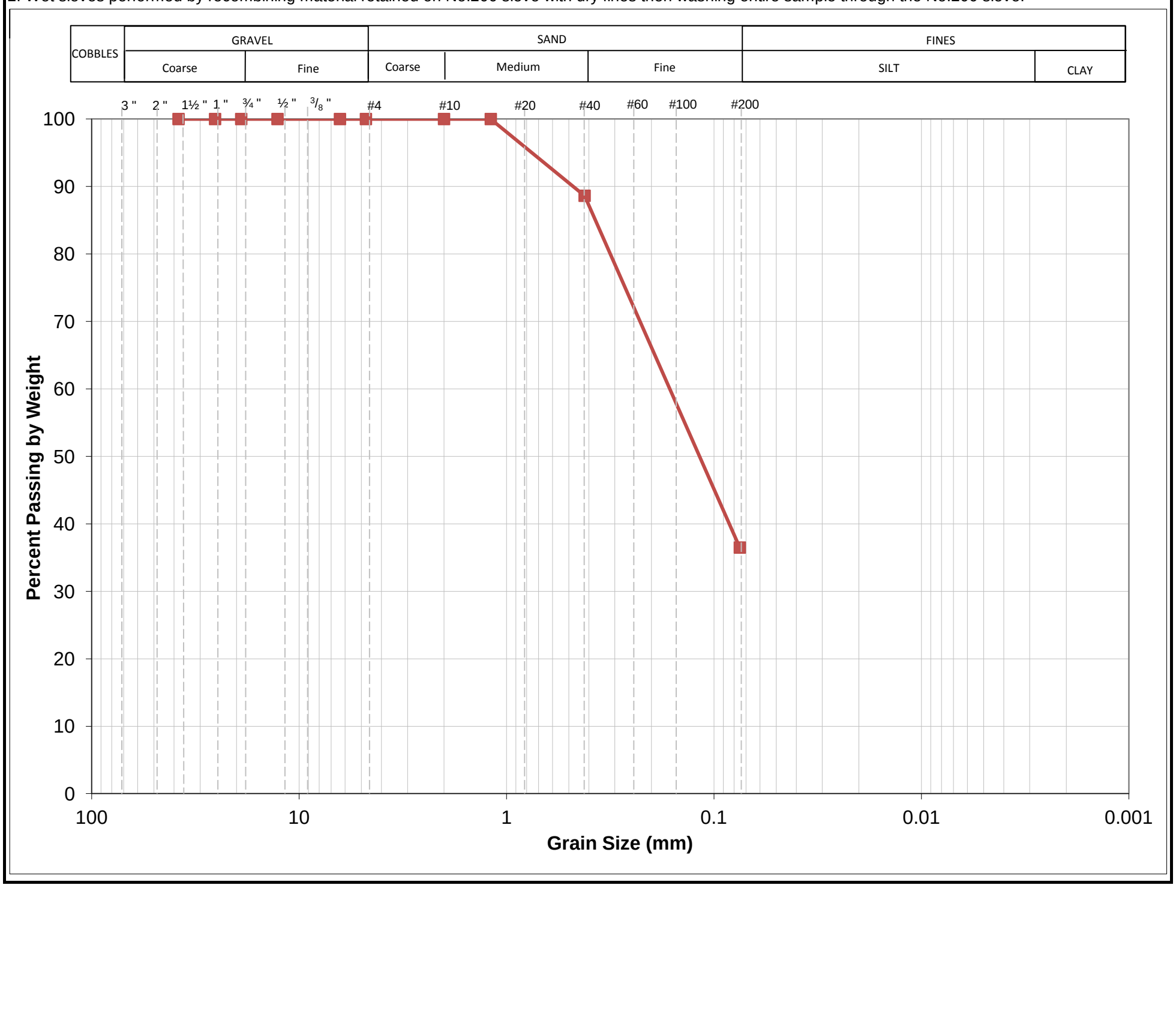
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 376 | 36.5 |
| Fines (g) Wet Sieve | | 263 | |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 63.5 |
| Fines (%) | 36.5 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **GP-T-13-01**

Sample No. **6.0 - 7.0**

Depth **6.0 - 7.0 m**

Location **Tailings Surface**

Date **2013-09-30**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 821 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 0 | 100.0 |
| 3/4" | 19.0 | 0 | 100.0 |
| 1/2" | 12.7 | 0 | 100.0 |
| 1/4" | 6.35 | 2 | 99.8 |
| No. 4 | 4.76 | 0 | 99.8 |
| No. 10 | 2.00 | 2 | 99.5 |
| No. 16 | 1.19 | 2 | 99.3 |
| No. 40 | 0.42 | 65 | 91.4 |

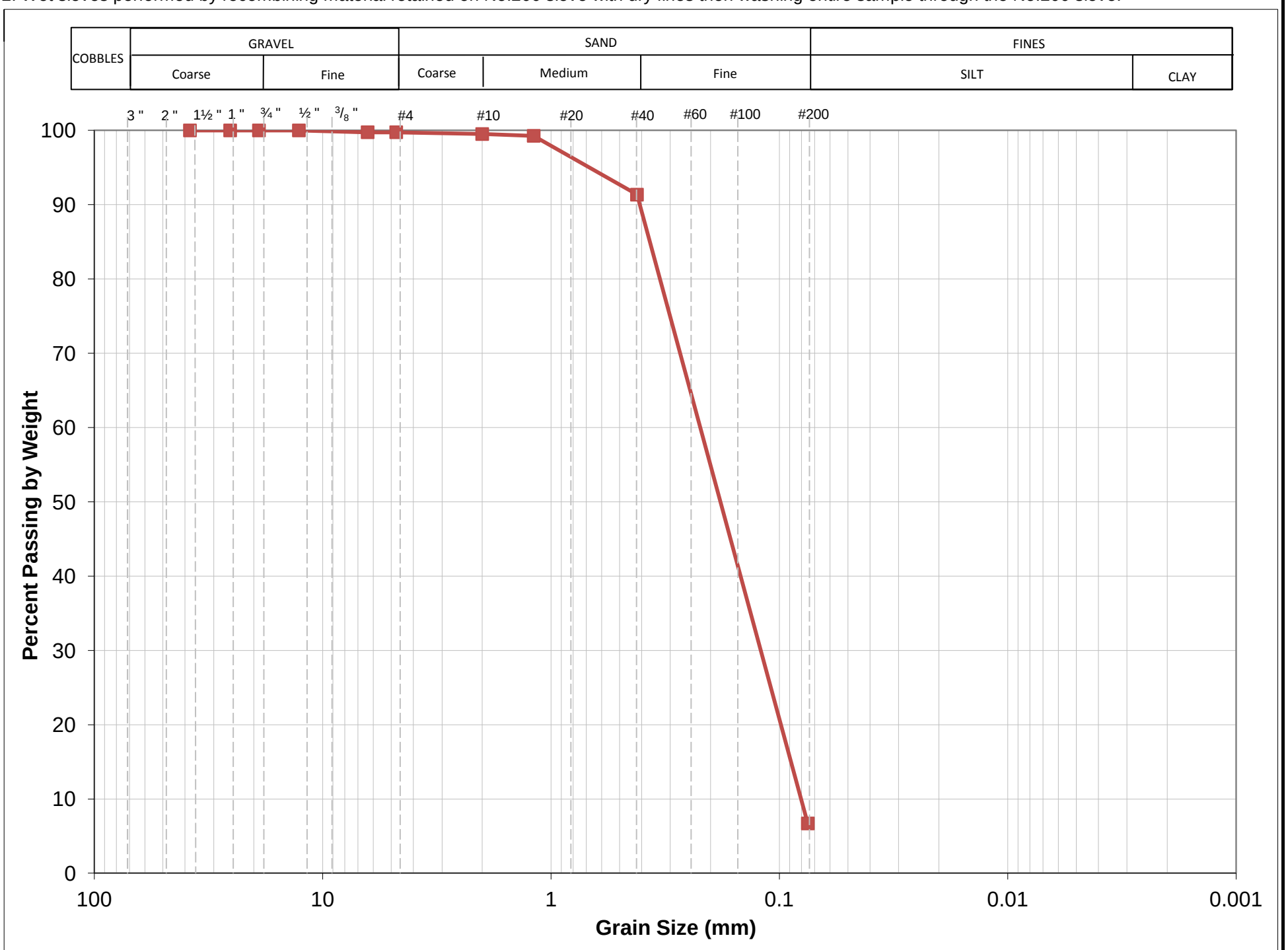
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 695 | 6.7 |
| Fines (g) Wet Sieve | | 55 | |

| | |
|---|---|
| Gravel (%) | 0.2 |
| Sand (%) | 93.1 |
| Fines (%) | 6.7 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **TP-T-13-09**

Sample No. **GS3**

Depth **3.0 - 3.1 m**

Location **Tailings Surface**

Date **2013-09-06**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 766 |
|---|---|

**Dry Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 38.1 | 0 | 100.0 |
| 1" | 25.4 | 0 | 100.0 |
| 3/4" | 19.0 | 0 | 100.0 |
| 1/2" | 12.7 | 0 | 100.0 |
| 1/4" | 6.35 | 0 | 100.0 |
| No. 4 | 4.76 | 0 | 100.0 |
| No. 10 | 2.00 | 0 | 100.0 |
| No. 16 | 1.19 | 0 | 100.0 |
| No. 40 | 0.42 | 0 | 100.0 |

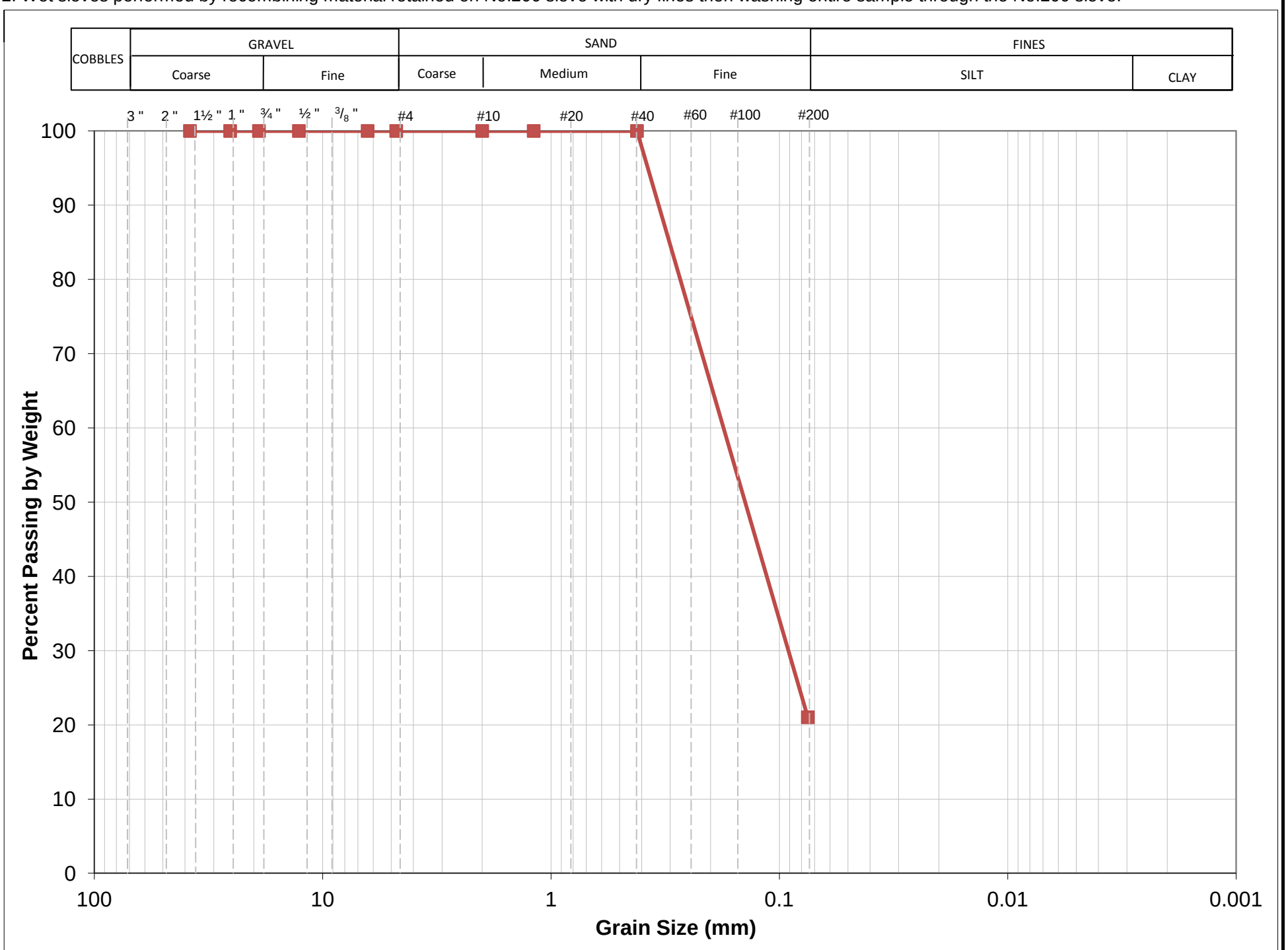
**Wet Sieve Results** [Note 2]

| | | | |
|---|---|---|---|
| Wet No. 200 | 0.075 | 605 | 21.0 |
| Fines (g) Wet Sieve | | 161 | |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 79.0 |
| Fines (%) | 21.0 |

Notes:

1. Sieve test performed by Kryotec Arctic Innovation Inc., presented by AMEC E&I.
2. Wet sieves performed by recombining material retained on No.200 sieve with dry fines then washing entire sample through the No.200 sieve.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **TP-TD-13-01**
Sample No. **ARD-03**
Depth **1.0 m**
Location **TSF-Dam**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

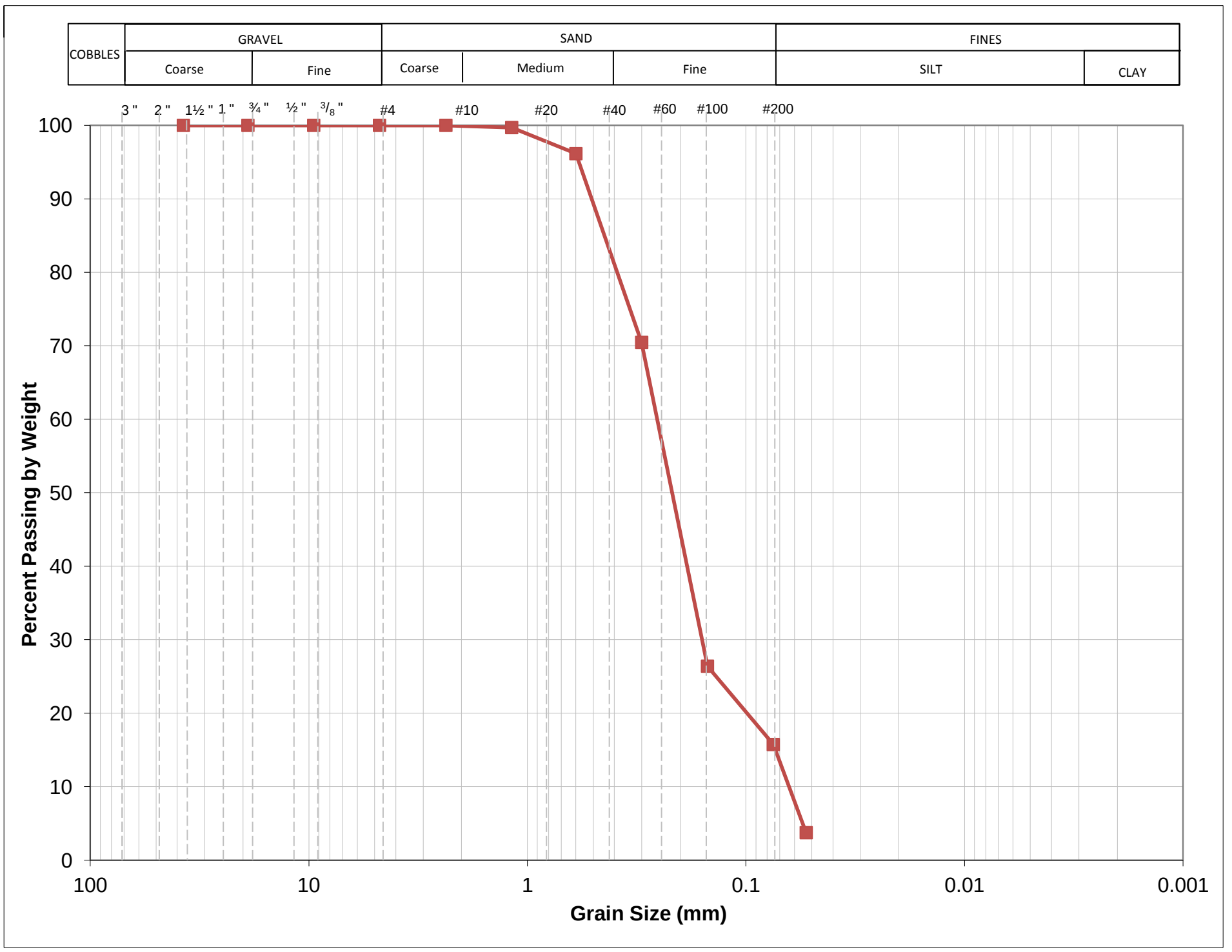
| | |
|---|---|
| Sieve Initial weight (g) | 100 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0 | 100.0 |
| #8 | 2.36 | 0 | 100.0 |
| #14 | 1.18 | 0.3 | 99.7 |
| #30 | 0.6 | 3.55 | 96.2 |
| #48 | 0.3 | 25.69 | 70.5 |
| #100 | 0.15 | 44.07 | 26.4 |
| #200 | 0.075 | 10.66 | 15.7 |
| #270 | 0.053 | 12 | 3.7 |
| Pan | | 3.73 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 84.3 |
| Fines (%) | 15.7 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **TP-TD-13-02**
Sample No. **ARD-01**
Depth **1.1 m**
Location **TSF-Dam**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

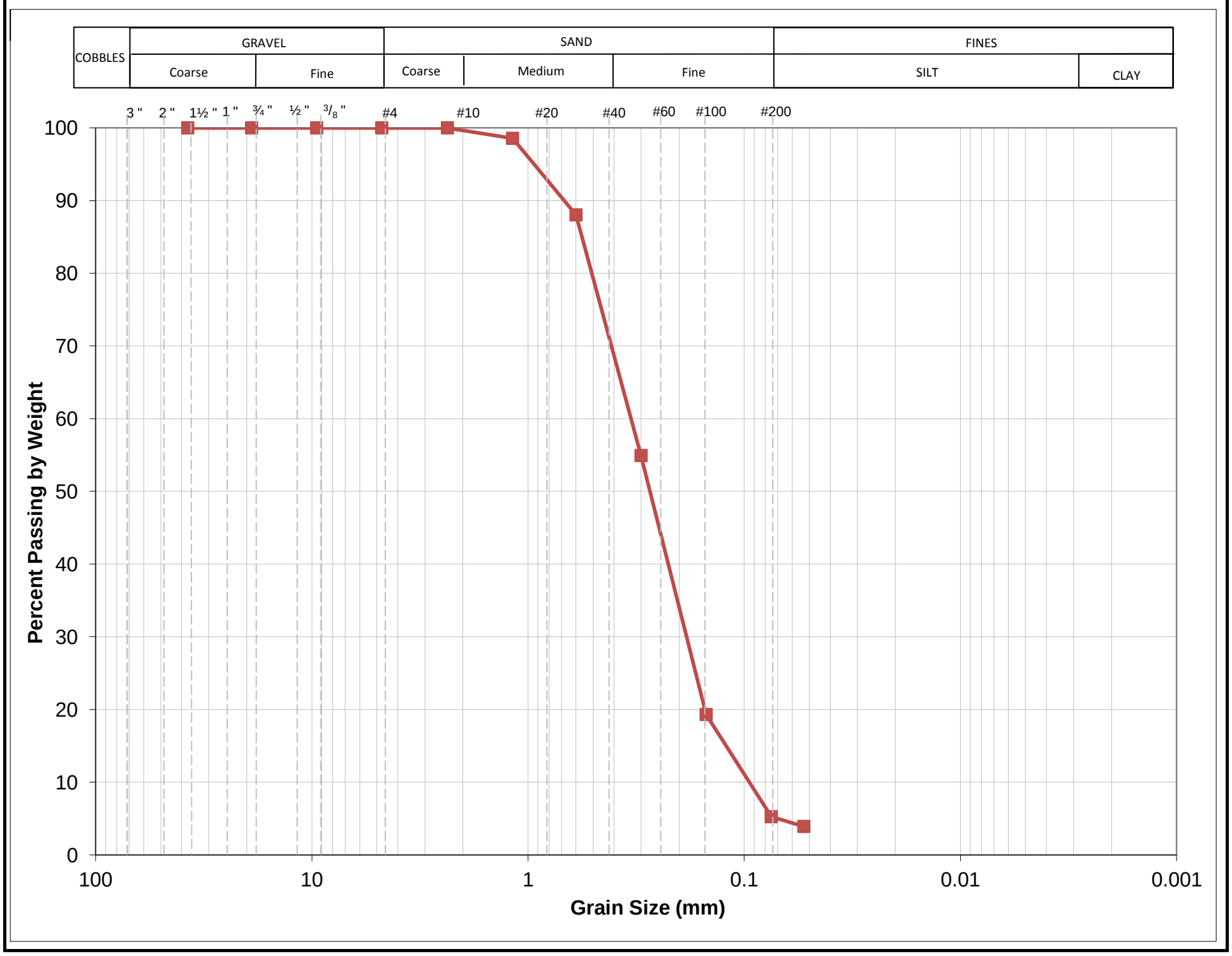
| | |
|---|---|
| Sieve Initial weight (g) | 100 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0 | 100.0 |
| #8 | 2.36 | 0 | 100.0 |
| #14 | 1.18 | 1.44 | 98.6 |
| #30 | 0.6 | 10.53 | 88.0 |
| #48 | 0.3 | 33.1 | 54.9 |
| #100 | 0.15 | 35.62 | 19.3 |
| #200 | 0.075 | 14.06 | 5.3 |
| #270 | 0.053 | 1.34 | 3.9 |
| Pan | | 3.91 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 94.8 |
| Fines (%) | 5.3 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **TP-TD-13-02**
Sample No. **ARD-04**
Depth **5.0 m**
Location **TSF-Dam**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

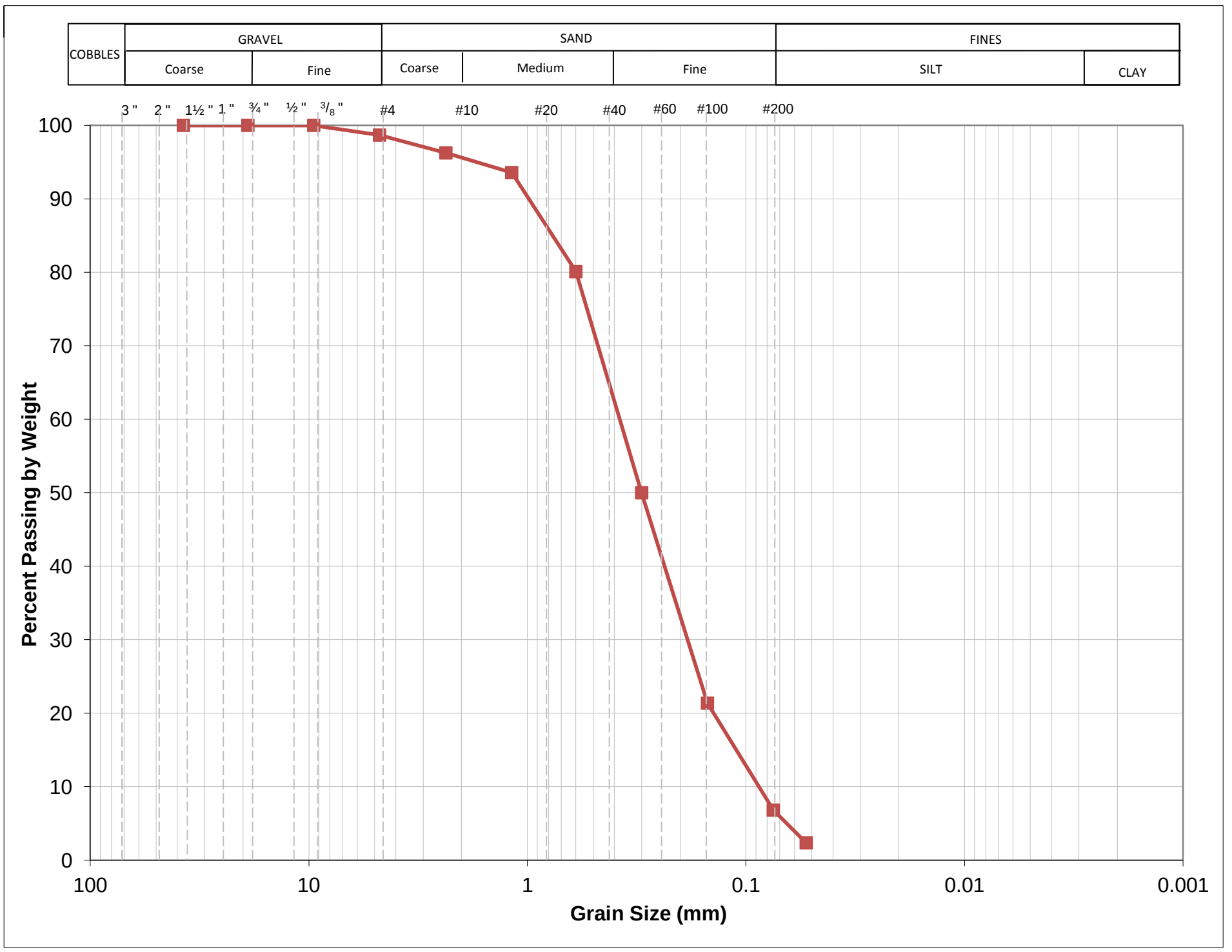
| | |
|---|---|
| Sieve Initial weight (g) | 100 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 1.33 | 98.7 |
| #8 | 2.36 | 2.42 | 96.3 |
| #14 | 1.18 | 2.68 | 93.6 |
| #30 | 0.6 | 13.48 | 80.1 |
| #48 | 0.3 | 30.1 | 50.0 |
| #100 | 0.15 | 28.63 | 21.4 |
| #200 | 0.075 | 14.56 | 6.8 |
| #270 | 0.053 | 4.45 | 2.4 |
| Pan | | 2.35 | 0.0 |

| | |
|---|---|
| Gravel (%) | 1.3 |
| Sand (%) | 91.9 |
| Fines (%) | 6.8 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **TP-TD-13-03**
Sample No. **ARD-02**
Depth **2.0 m**
Location **TSF-Dam**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

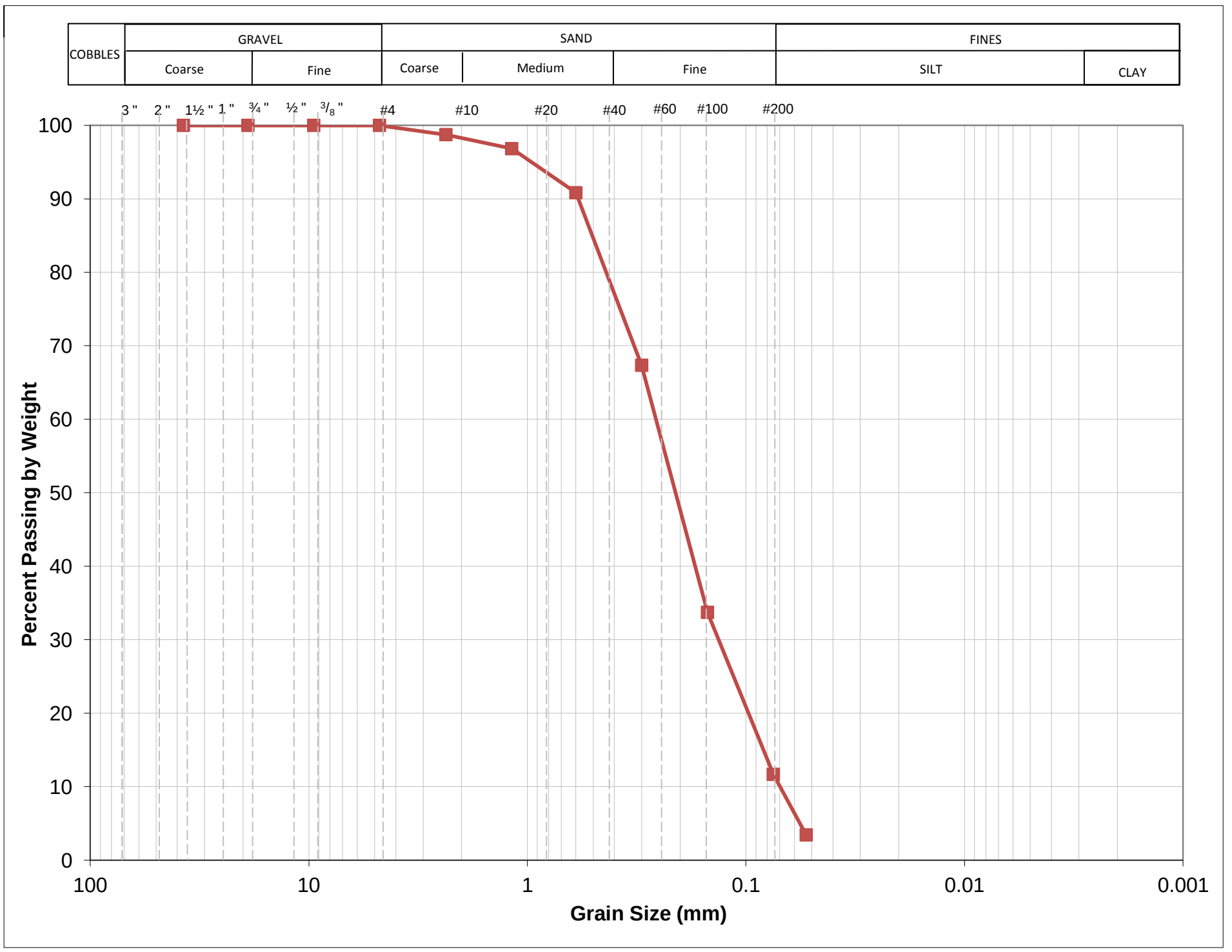
| | |
|---|---|
| Sieve Initial weight (g) | 100 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0 | 100.0 |
| #8 | 2.36 | 1.26 | 98.7 |
| #14 | 1.18 | 1.91 | 96.8 |
| #30 | 0.6 | 6 | 90.8 |
| #48 | 0.3 | 23.48 | 67.4 |
| #100 | 0.15 | 33.63 | 33.7 |
| #200 | 0.075 | 22.05 | 11.7 |
| #270 | 0.053 | 8.24 | 3.4 |
| Pan | | 3.43 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 88.3 |
| Fines (%) | 11.7 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **TP-TD-13-03**
Sample No. **ARD-06**
Depth **5.8 m**
Location **TSF-Dam**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

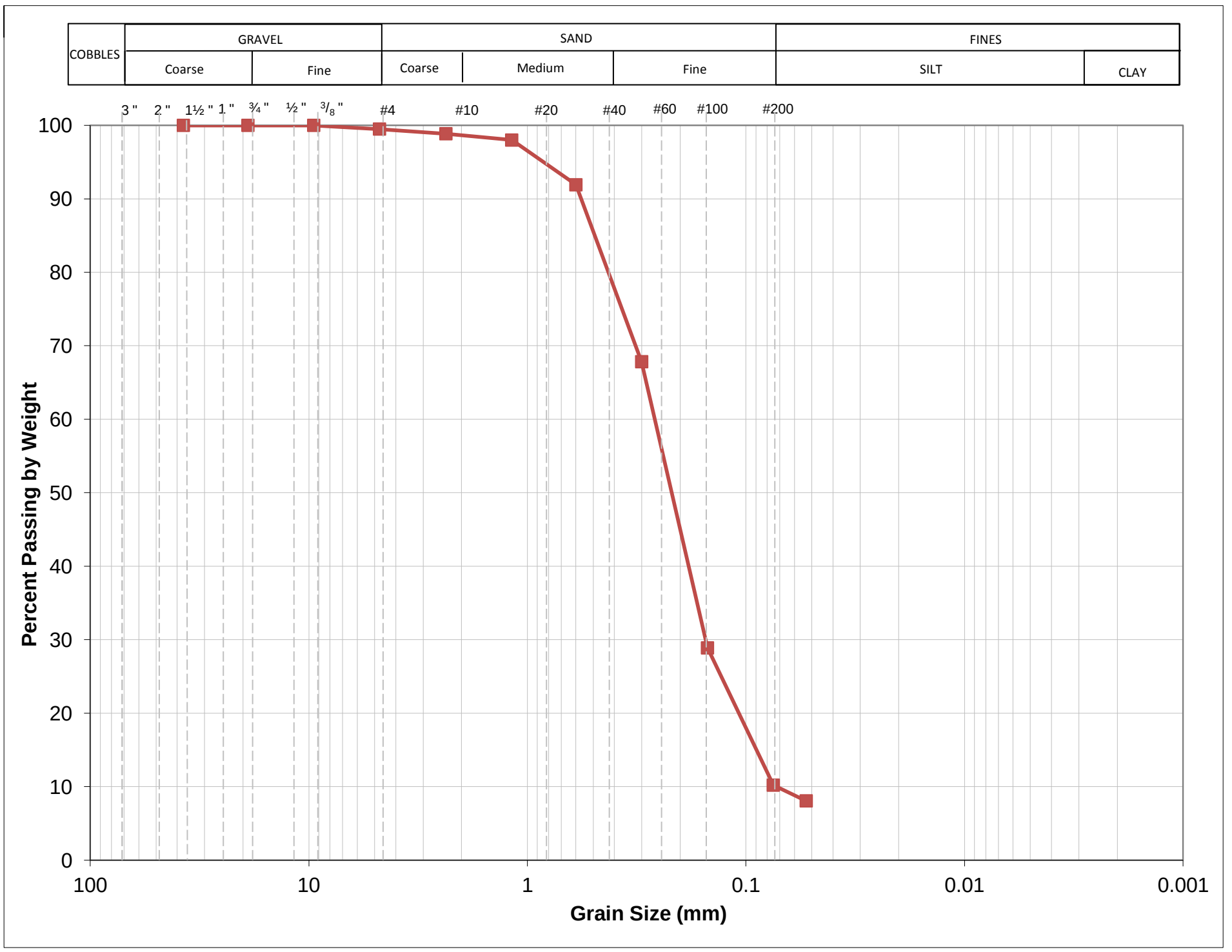
| | |
|---|---|
| Sieve Initial weight (g) | 100 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0.5 | 99.5 |
| #8 | 2.36 | 0.64 | 98.9 |
| #14 | 1.18 | 0.86 | 98.0 |
| #30 | 0.6 | 6.09 | 91.9 |
| #48 | 0.3 | 24.08 | 67.8 |
| #100 | 0.15 | 38.95 | 28.9 |
| #200 | 0.075 | 18.68 | 10.2 |
| #270 | 0.053 | 2.14 | 8.1 |
| Pan | | 8.06 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.5 |
| Sand (%) | 89.3 |
| Fines (%) | 10.2 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **BH-TD-13-01**
Sample No. **ARD-03**
Depth **2.0 m**
Location **TSF-Dam**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

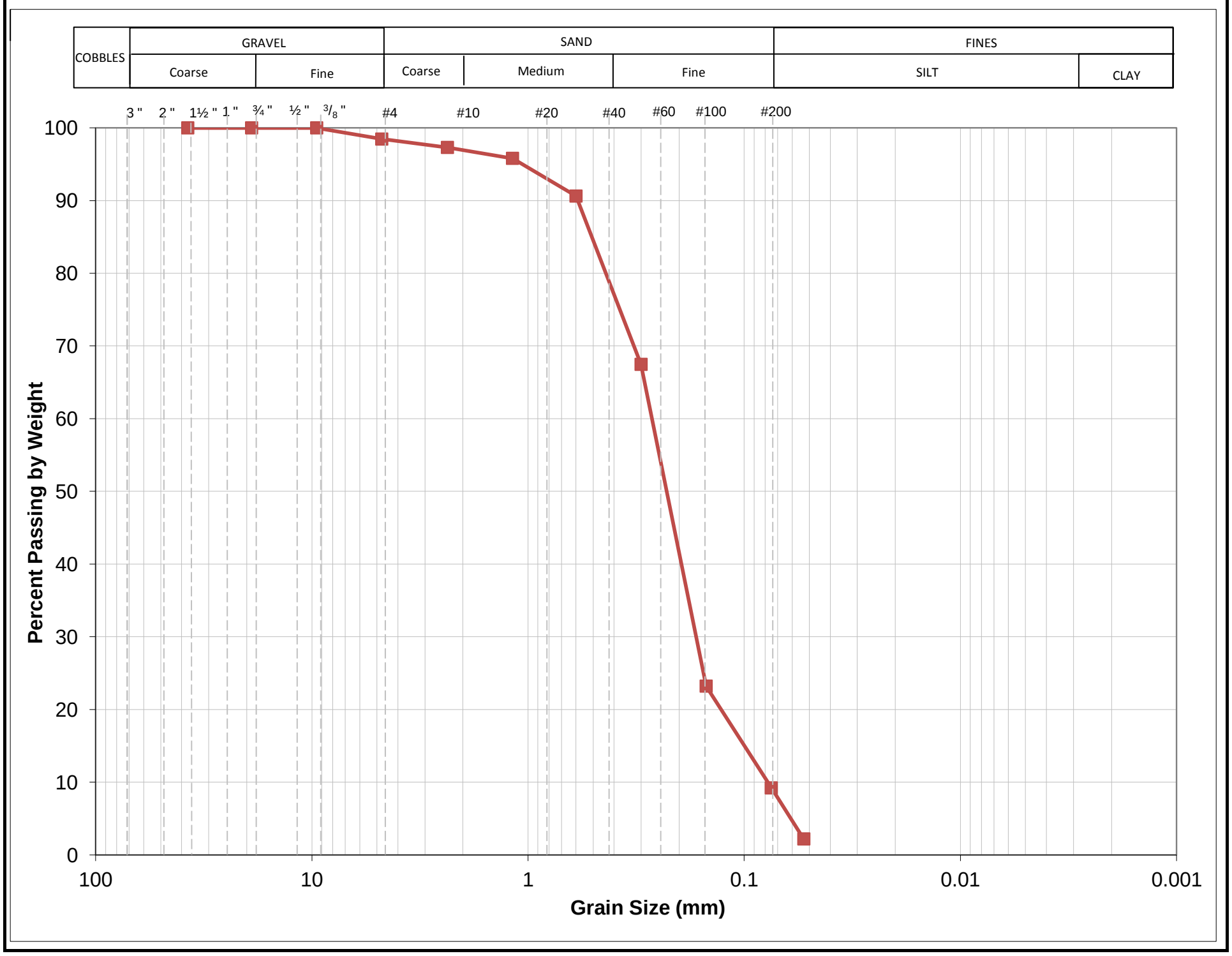
| | |
|---|---|
| Sieve Initial weight (g) | 100 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 1.54 | 98.5 |
| #8 | 2.36 | 1.15 | 97.3 |
| #14 | 1.18 | 1.5 | 95.8 |
| #30 | 0.6 | 5.19 | 90.6 |
| #48 | 0.3 | 23.15 | 67.5 |
| #100 | 0.15 | 44.26 | 23.2 |
| #200 | 0.075 | 14 | 9.2 |
| #270 | 0.053 | 7.02 | 2.2 |
| Pan | | 2.19 | 0.0 |

| | |
|---|---|
| Gravel (%) | 1.5 |
| Sand (%) | 89.3 |
| Fines (%) | 9.2 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **BH-TD-13-01**
Sample No. **ARD-08**
Depth **7.5 m**
Location **TSF-Dam**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

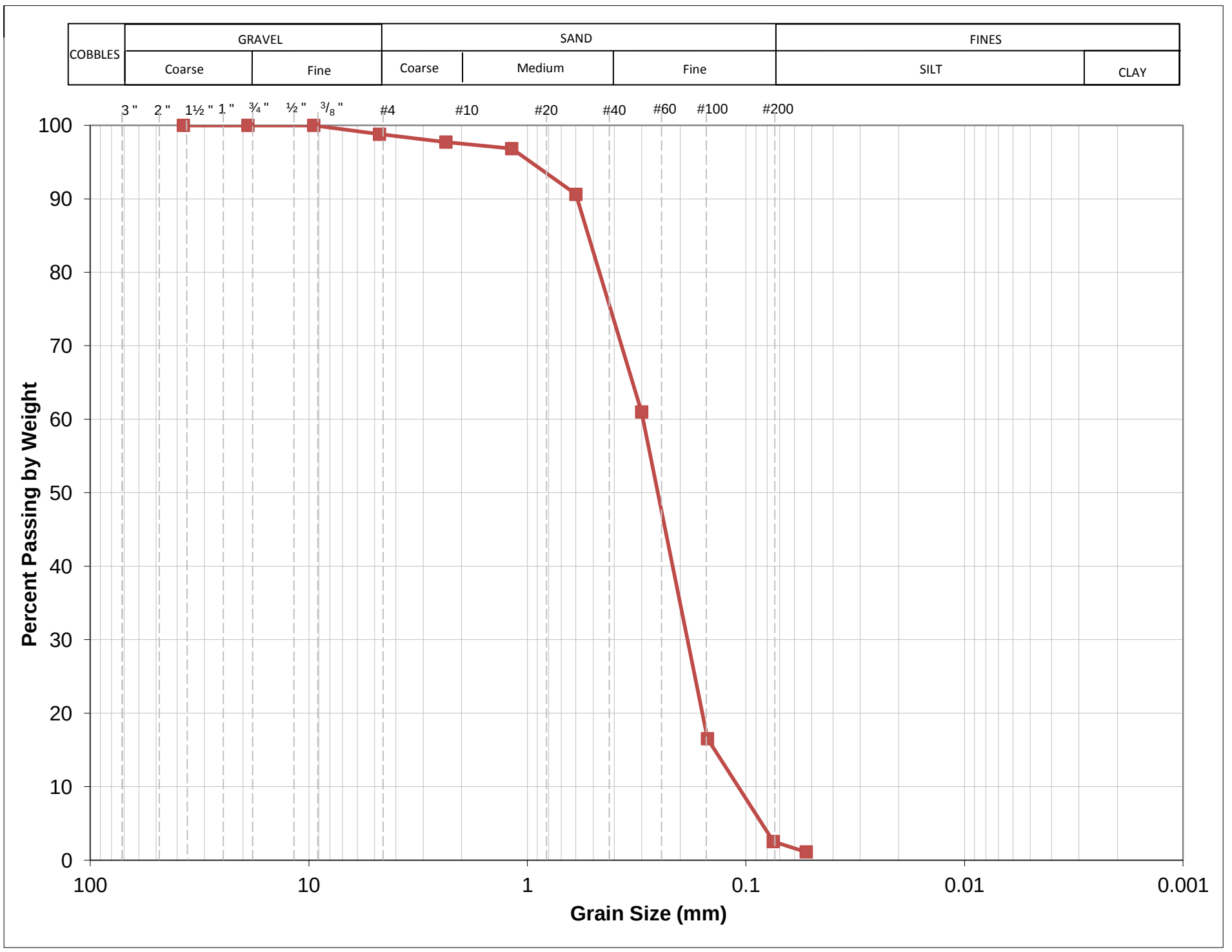
| | |
|---|---|
| Sieve Initial weight (g) | 100 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 1.21 | 98.8 |
| #8 | 2.36 | 1.07 | 97.7 |
| #14 | 1.18 | 0.89 | 96.8 |
| #30 | 0.6 | 6.22 | 90.6 |
| #48 | 0.3 | 29.62 | 61.0 |
| #100 | 0.15 | 44.47 | 16.5 |
| #200 | 0.075 | 14 | 2.5 |
| #270 | 0.053 | 1.41 | 1.1 |
| Pan | | 1.11 | 0.0 |

| | |
|---|---|
| Gravel (%) | 1.2 |
| Sand (%) | 96.3 |
| Fines (%) | 2.5 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **BH-TD-13-01**
Sample No. **ARD-10**
Depth **10.5 m**
Location **TSF-Dam**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

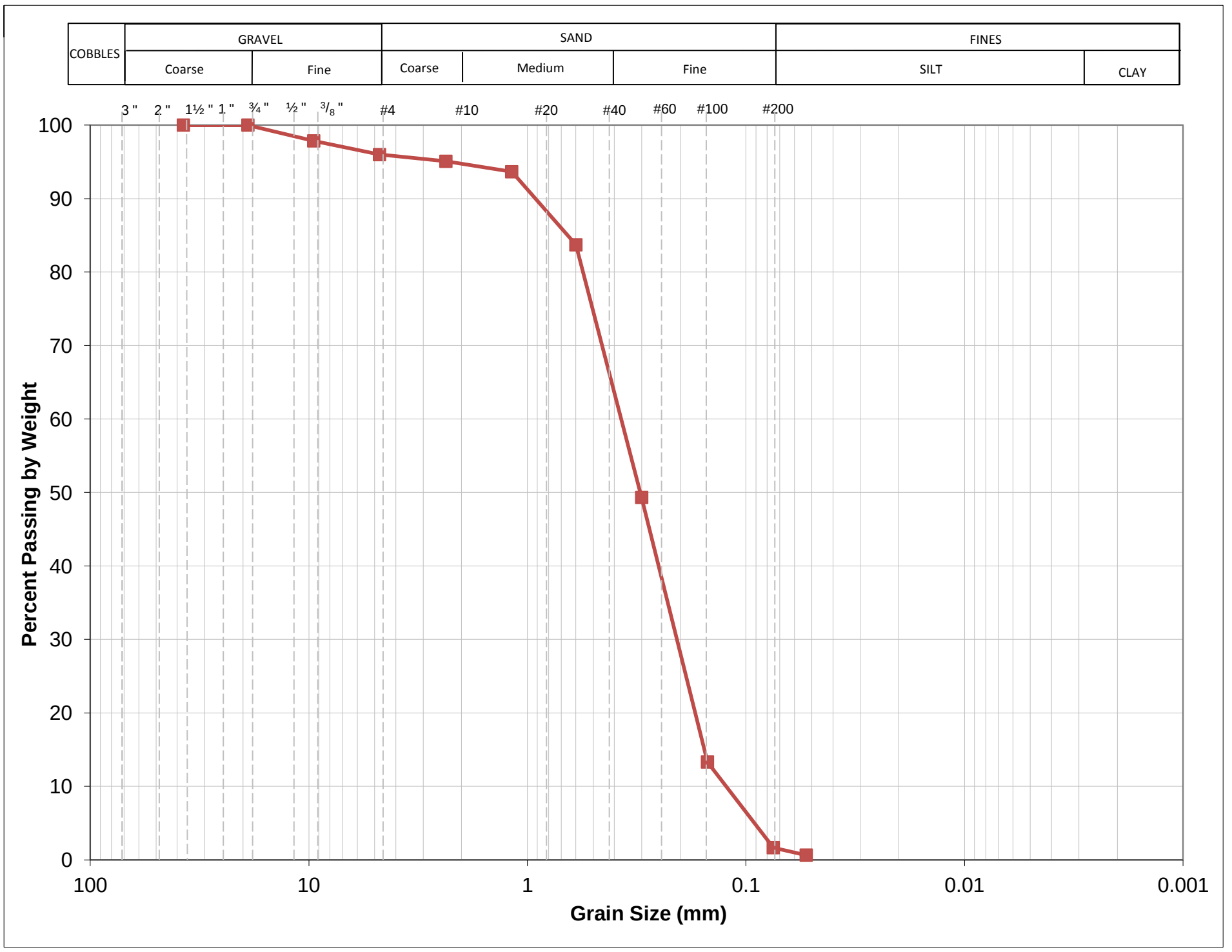
| | |
|---|---|
| Sieve Initial weight (g) | 100 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 2.15 | 97.9 |
| #4 | 4.75 | 1.87 | 96.0 |
| #8 | 2.36 | 0.91 | 95.1 |
| #14 | 1.18 | 1.42 | 93.7 |
| #30 | 0.6 | 9.95 | 83.7 |
| #48 | 0.3 | 34.37 | 49.3 |
| #100 | 0.15 | 36.02 | 13.3 |
| #200 | 0.075 | 11.66 | 1.6 |
| #270 | 0.053 | 1.01 | 0.6 |
| Pan | | 0.64 | 0.0 |

| | |
|---|---|
| Gravel (%) | 4.0 |
| Sand (%) | 94.3 |
| Fines (%) | 1.6 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **TP-T-13-01**
Sample No. **ARD-01**
Depth **2.1 m**
Location **TSF-Tailings**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

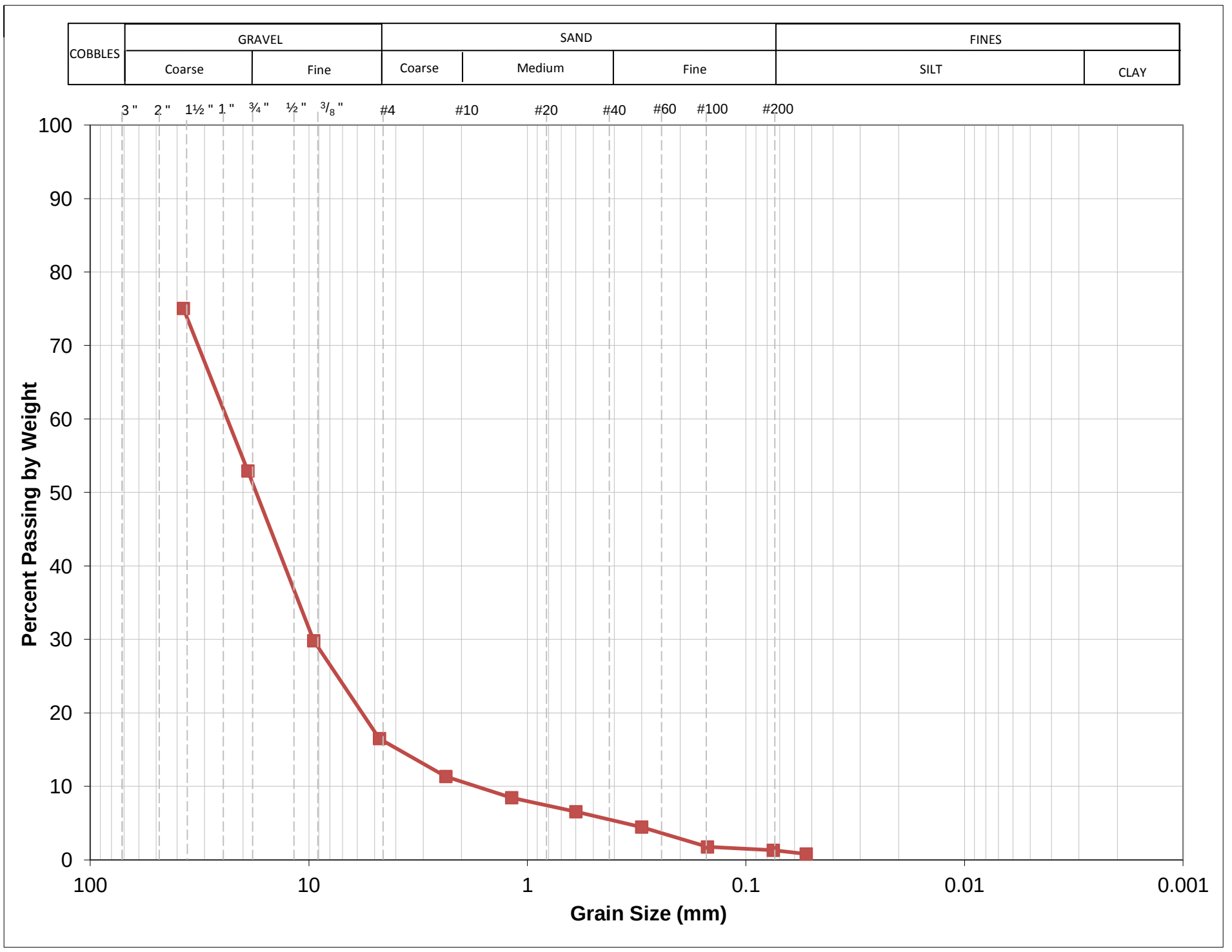
| | |
|---|---|
| Sieve Initial weight (g) | 500 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 124.8 | 75.0 |
| 3/4" | 19 | 110.6 | 52.9 |
| 3/8" | 9.5 | 115.54 | 29.8 |
| #4 | 4.75 | 66.58 | 16.5 |
| #8 | 2.36 | 25.81 | 11.3 |
| #14 | 1.18 | 14.42 | 8.5 |
| #30 | 0.6 | 9.55 | 6.5 |
| #48 | 0.3 | 10.43 | 4.5 |
| #100 | 0.15 | 13.55 | 1.7 |
| #200 | 0.075 | 2.26 | 1.3 |
| #270 | 0.053 | 2.51 | 0.8 |
| Pan | | 3.95 | 0.0 |

| | |
|---|---|
| Gravel (%) | 83.5 |
| Sand (%) | 15.2 |
| Fines (%) | 1.3 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **TP-T-13-02**

Sample No. **ARD-02**

Depth **4.0 m**

Location **TSF-Tailings**

Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| | |
|---|---|
| Sieve Initial weight (g) | 100 |

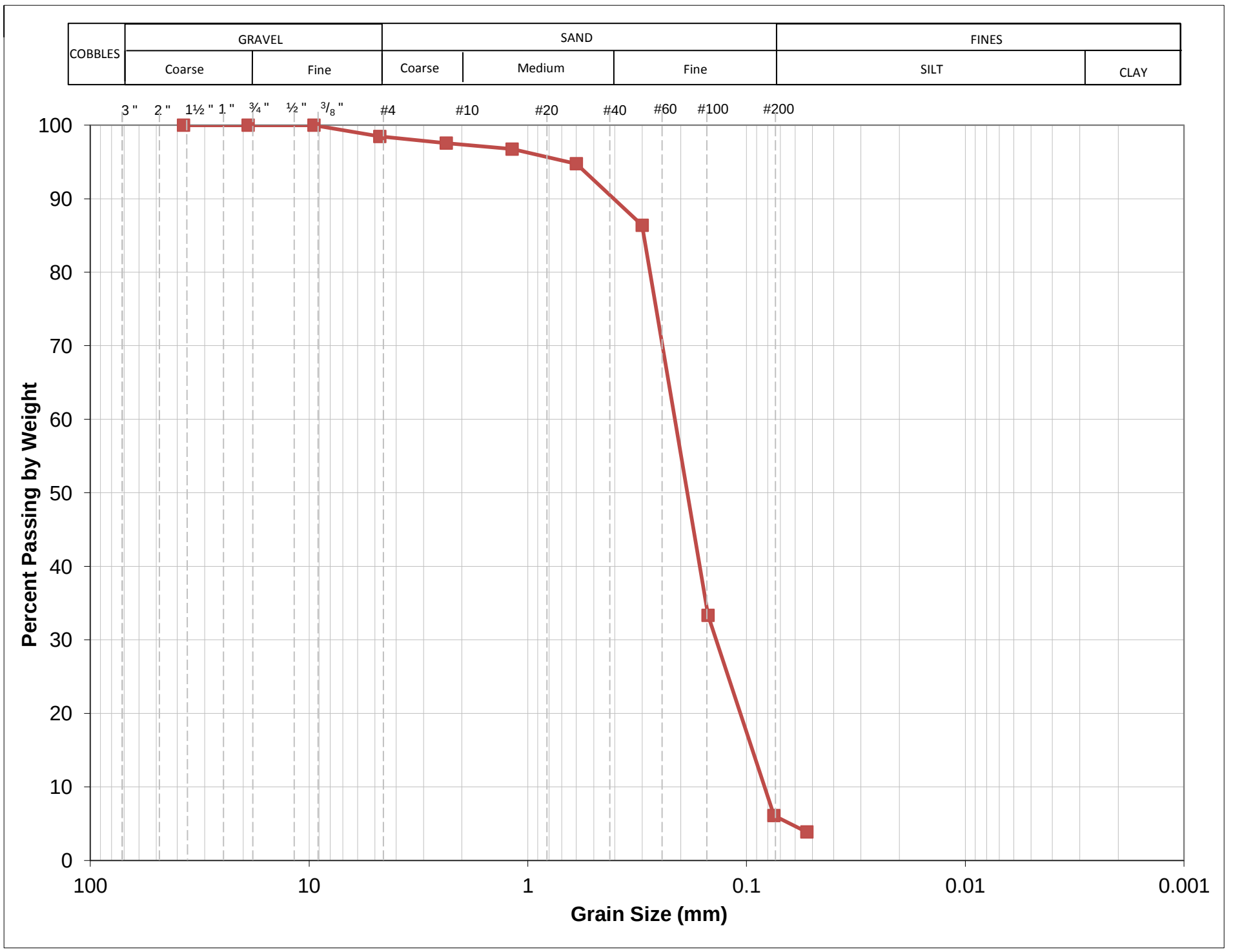
**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 1.54 | 98.5 |
| #8 | 2.36 | 0.9 | 97.6 |
| #14 | 1.18 | 0.82 | 96.7 |
| #30 | 0.6 | 1.98 | 94.8 |
| #48 | 0.3 | 8.38 | 86.4 |
| #100 | 0.15 | 53.05 | 33.3 |
| #200 | 0.075 | 27.23 | 6.1 |
| #270 | 0.053 | 2.23 | 3.9 |
| Pan | | 3.87 | 0.0 |

| | |
|---|---|
| Gravel (%) | 1.5 |
| Sand (%) | 92.4 |
| Fines (%) | 6.1 |

Notes:

1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **TP-T-13-02**

Sample No. **ARD-03**

Depth **4.7 m**

Location **TSF-Tailings**

Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| | |
|---|---|
| Sieve Initial weight (g) | 500 |

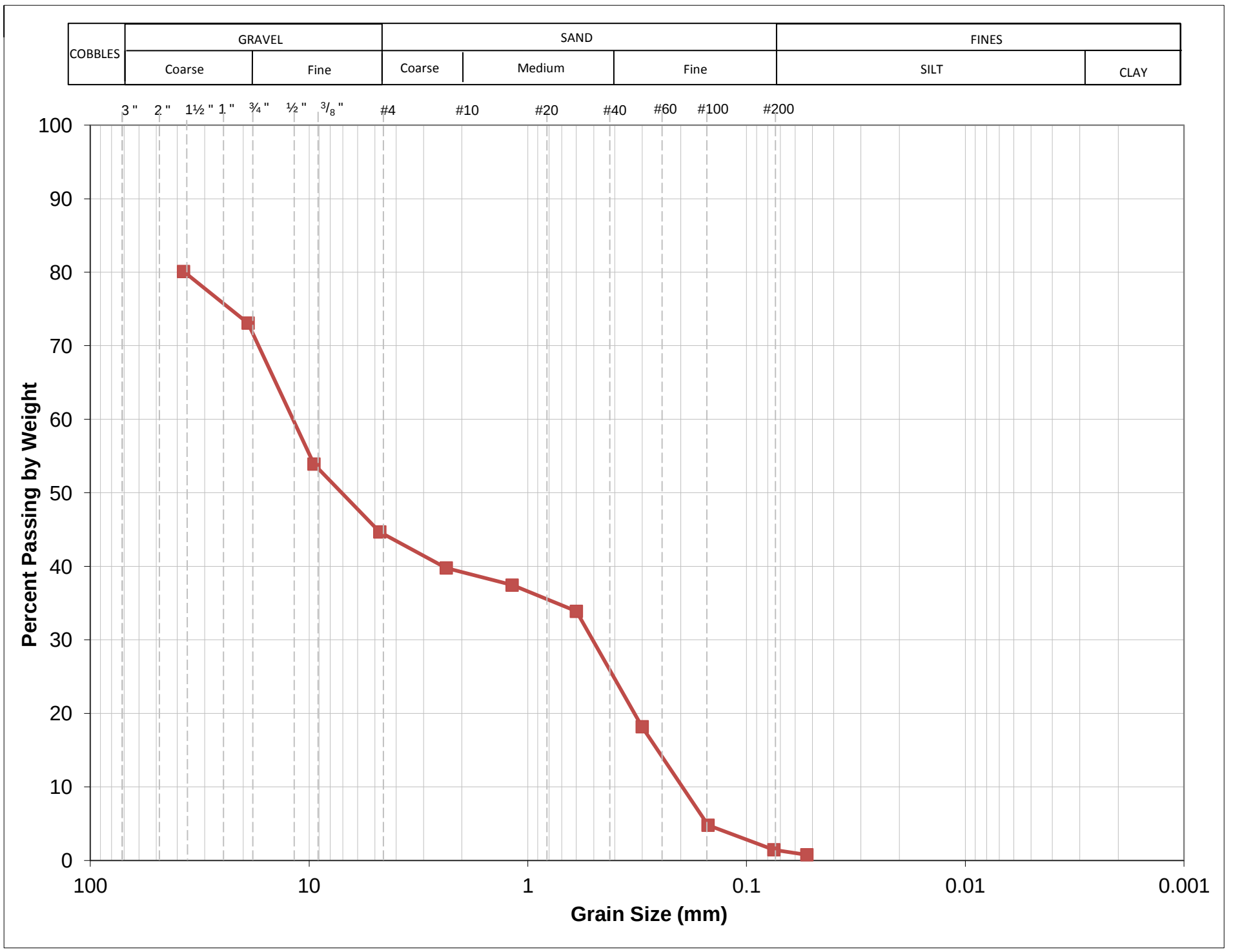
**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 99.53 | 80.1 |
| 3/4" | 19 | 35.08 | 73.1 |
| 3/8" | 9.5 | 95.87 | 53.9 |
| #4 | 4.75 | 46.15 | 44.7 |
| #8 | 2.36 | 24.5 | 39.8 |
| #14 | 1.18 | 11.69 | 37.4 |
| #30 | 0.6 | 17.82 | 33.9 |
| #48 | 0.3 | 78.48 | 18.2 |
| #100 | 0.15 | 66.97 | 4.8 |
| #200 | 0.075 | 16.67 | 1.4 |
| #270 | 0.053 | 3.43 | 0.8 |
| Pan | | 3.81 | 0.0 |

| | |
|---|---|
| Gravel (%) | 55.3 |
| Sand (%) | 43.2 |
| Fines (%) | 1.4 |

Notes:

1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **TP-T-13-04**

Sample No. **ARD-01**

Depth **3.4 m**

Location **TSF-Tailings**

Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| | |
|---|---|
| Sieve Initial weight (g) | 100 |

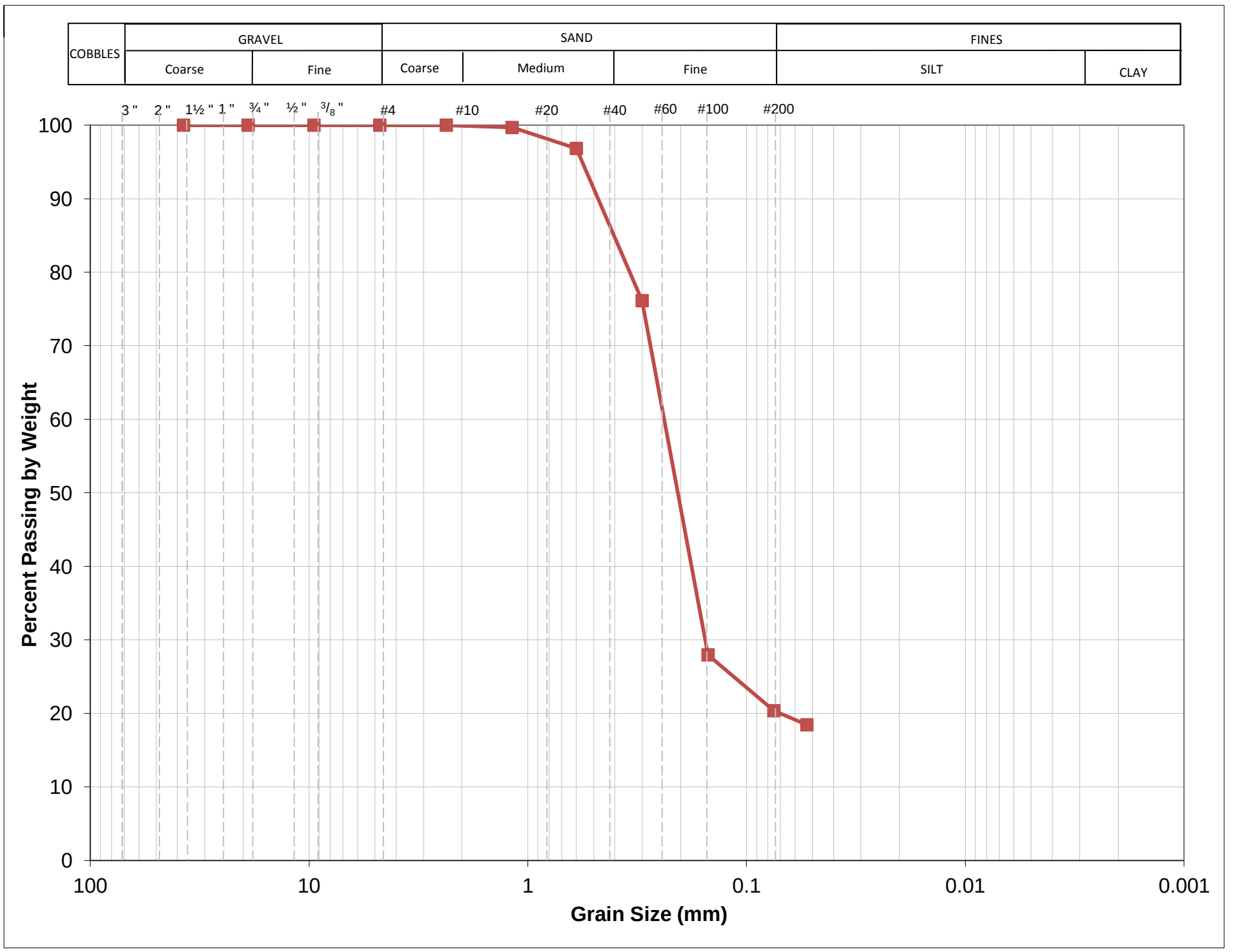
**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0 | 100.0 |
| #8 | 2.36 | 0 | 100.0 |
| #14 | 1.18 | 0.32 | 99.7 |
| #30 | 0.6 | 2.85 | 96.8 |
| #48 | 0.3 | 20.7 | 76.1 |
| #100 | 0.15 | 48.18 | 28.0 |
| #200 | 0.075 | 7.59 | 20.4 |
| #270 | 0.053 | 1.92 | 18.4 |
| Pan | | 18.44 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 79.6 |
| Fines (%) | 20.4 |

Notes:

1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **TP-T-13-04**

Sample No. **ARD-02**

Depth **5.0 m**

Location **TSF-Tailings**

Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| | |
|---|---|
| Sieve Initial weight (g) | 100 |

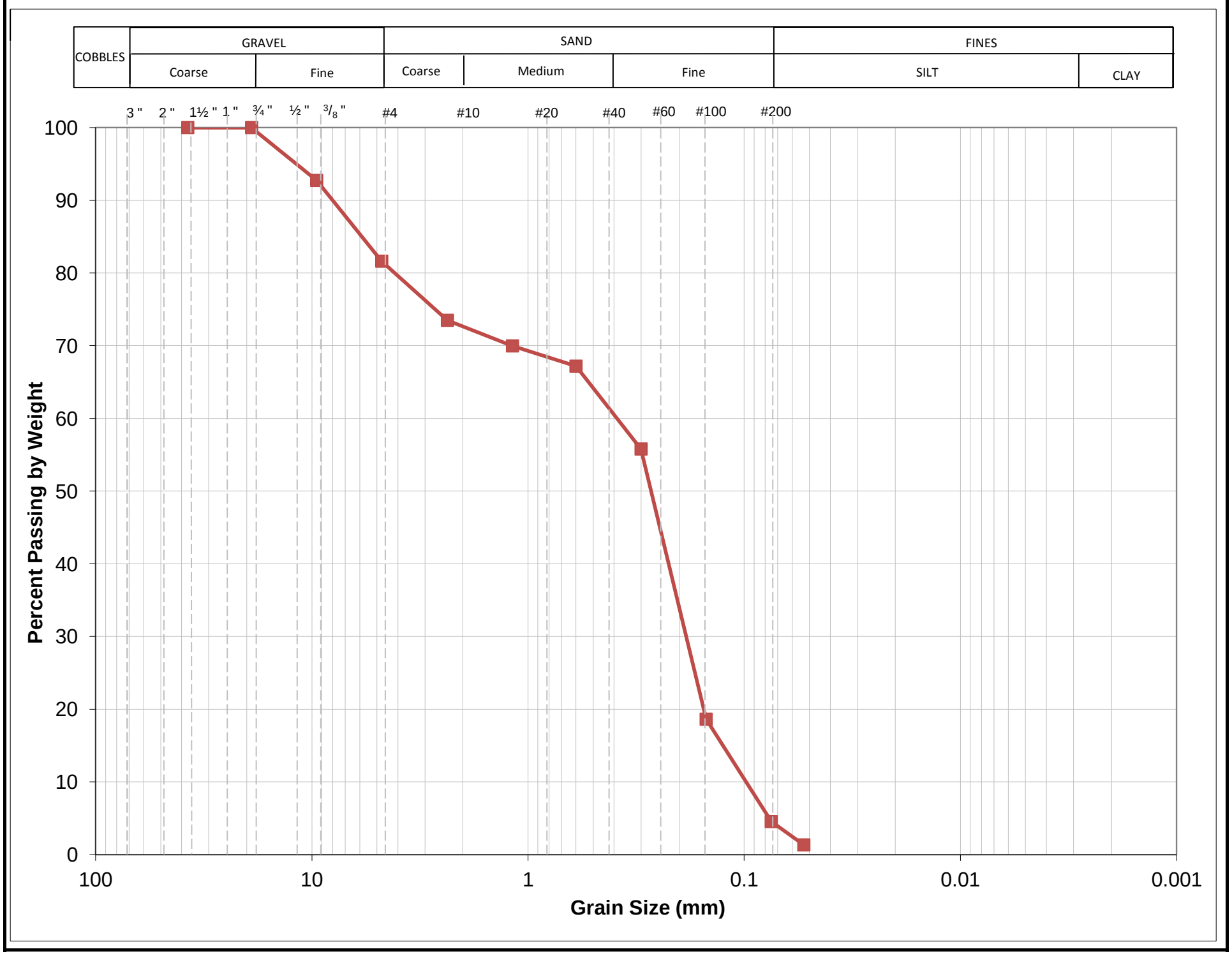
**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 7.27 | 92.7 |
| #4 | 4.75 | 11.11 | 81.6 |
| #8 | 2.36 | 8.13 | 73.5 |
| #14 | 1.18 | 3.52 | 70.0 |
| #30 | 0.6 | 2.79 | 67.2 |
| #48 | 0.3 | 11.39 | 55.8 |
| #100 | 0.15 | 37.17 | 18.6 |
| #200 | 0.075 | 14.08 | 4.5 |
| #270 | 0.053 | 3.21 | 1.3 |
| Pan | | 1.33 | 0.0 |

| | |
|---|---|
| Gravel (%) | 18.4 |
| Sand (%) | 77.1 |
| Fines (%) | 4.5 |

Notes:

1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **TP-T-13-06**
Sample No. **ARD-02**
Depth **2.1 m**
Location **TSF-Tailings**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

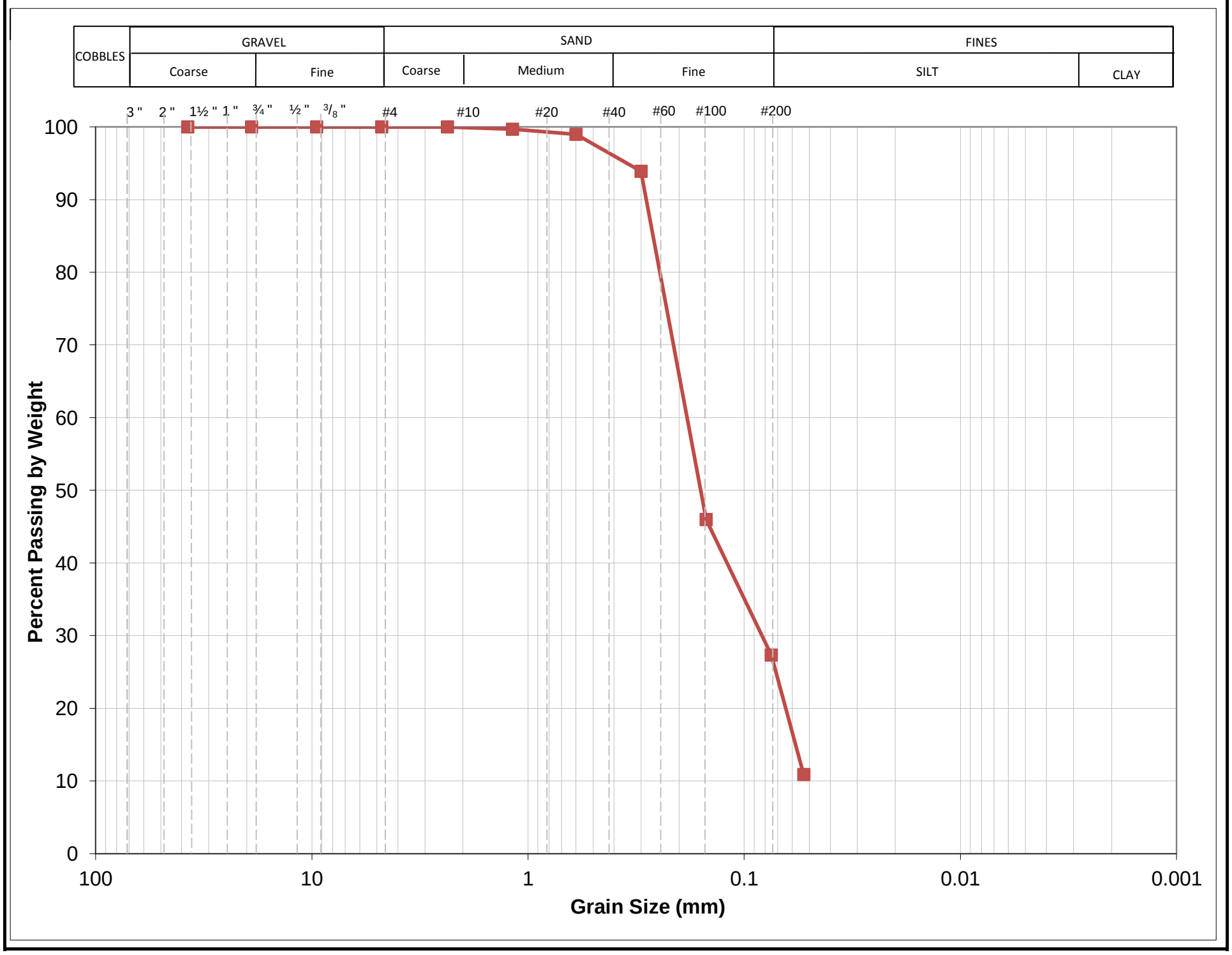
| | |
|---|---|
| Sieve Initial weight (g) | 100 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0 | 100.0 |
| #8 | 2.36 | 0 | 100.0 |
| #14 | 1.18 | 0.32 | 99.7 |
| #30 | 0.6 | 0.7 | 99.0 |
| #48 | 0.3 | 5.09 | 93.9 |
| #100 | 0.15 | 47.92 | 46.0 |
| #200 | 0.075 | 18.65 | 27.3 |
| #270 | 0.053 | 16.44 | 10.9 |
| Pan | | 10.88 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 72.7 |
| Fines (%) | 27.3 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **BH-T-13-01**

Sample No. **ARD-01**

Depth **1.1 m**

Location **TSF-Tailings**

Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| | |
|---|---|
| Sieve Initial weight (g) | 100 |

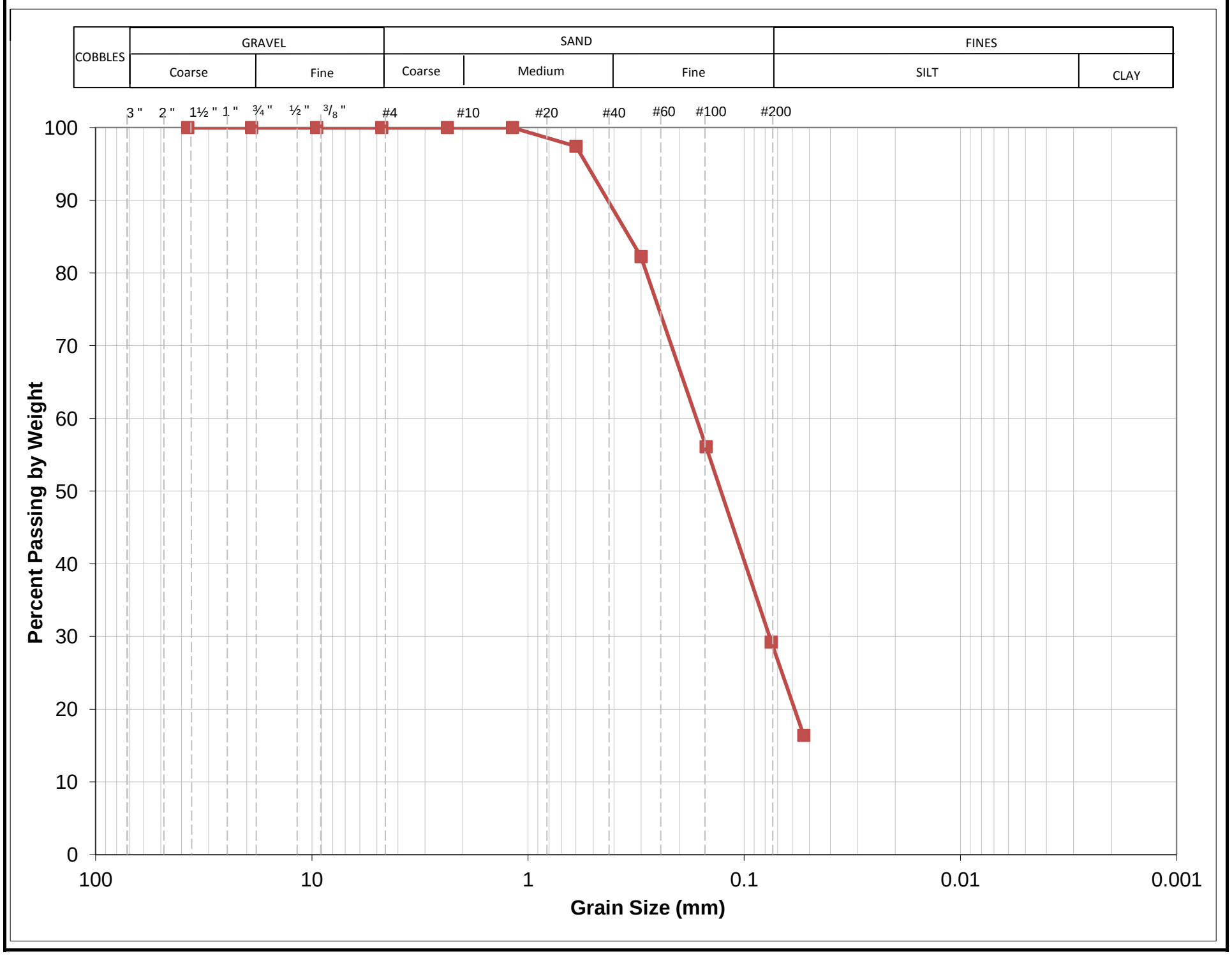
**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0 | 100.0 |
| #8 | 2.36 | 0 | 100.0 |
| #14 | 1.18 | 0 | 100.0 |
| #30 | 0.6 | 2.57 | 97.4 |
| #48 | 0.3 | 15.18 | 82.3 |
| #100 | 0.15 | 26.16 | 56.1 |
| #200 | 0.075 | 26.86 | 29.2 |
| #270 | 0.053 | 12.83 | 16.4 |
| Pan | | 16.4 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 70.8 |
| Fines (%) | 29.2 |

Notes:

1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **BH-T-13-01**
Sample No. **ARD-03**
Depth **5.1 m**
Location **TSF-Tailings**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

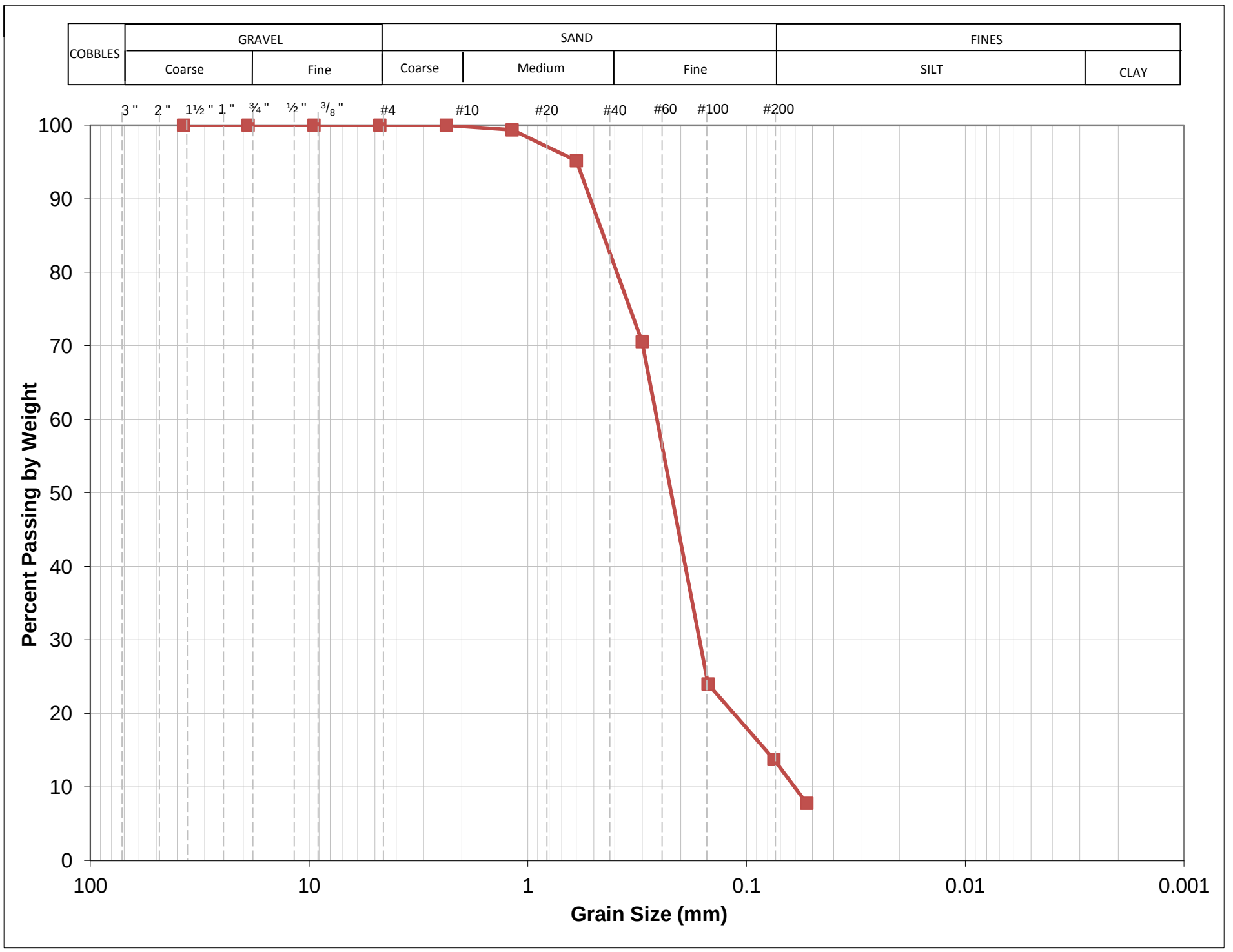
| | |
|---|---|
| Sieve Initial weight (g) | 100 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0 | 100.0 |
| #8 | 2.36 | 0 | 100.0 |
| #14 | 1.18 | 0.65 | 99.4 |
| #30 | 0.6 | 4.2 | 95.2 |
| #48 | 0.3 | 24.59 | 70.6 |
| #100 | 0.15 | 46.56 | 24.0 |
| #200 | 0.075 | 10.27 | 13.7 |
| #270 | 0.053 | 5.96 | 7.8 |
| Pan | | 7.77 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 86.3 |
| Fines (%) | 13.7 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **BH-T-13-01**
Sample No. **ARD-05**
Depth **8.1 m**
Location **TSF-Tailings**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

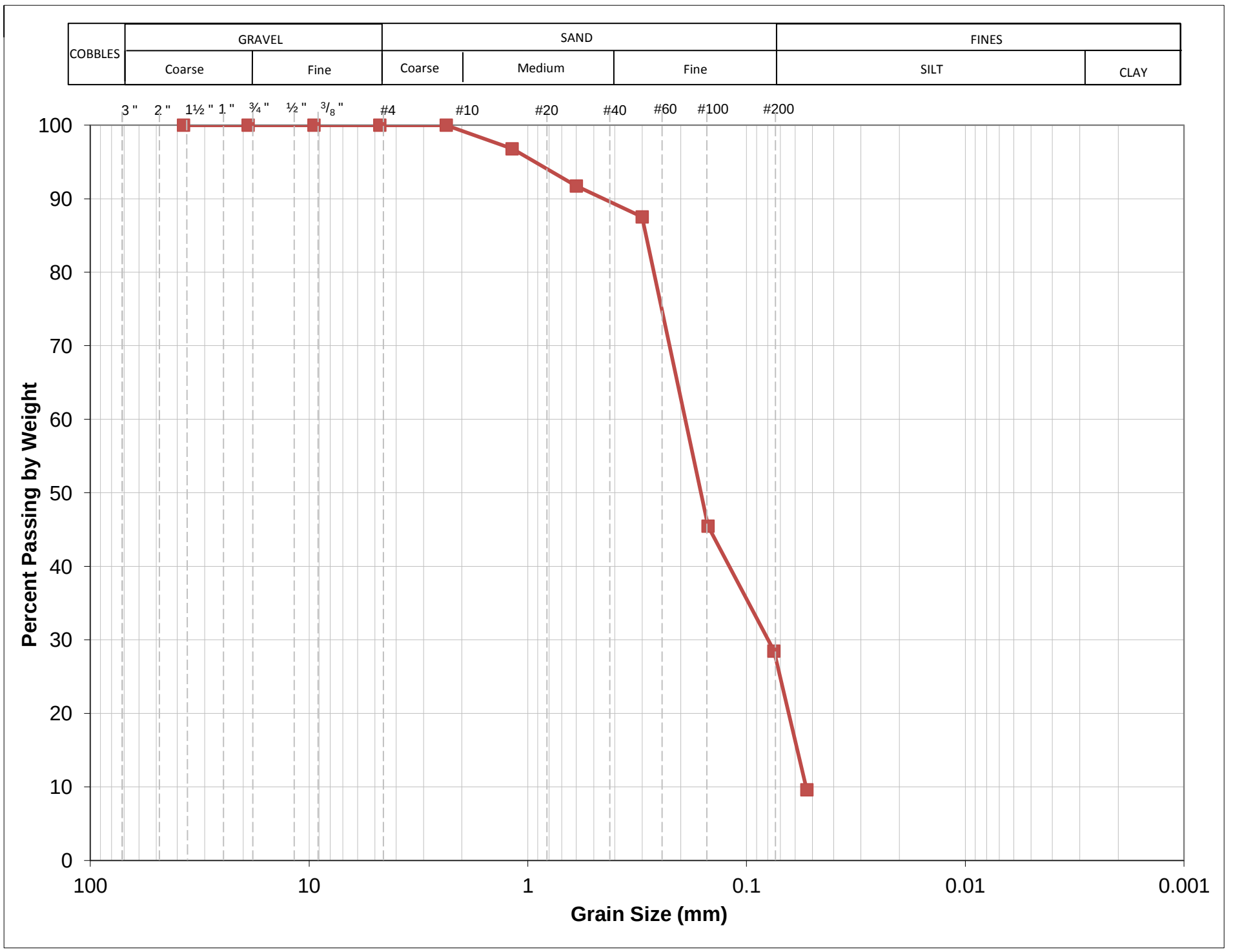
| | |
|---|---|
| Sieve Initial weight (g) | 100 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0 | 100.0 |
| #8 | 2.36 | 0 | 100.0 |
| #14 | 1.18 | 3.22 | 96.8 |
| #30 | 0.6 | 5.06 | 91.7 |
| #48 | 0.3 | 4.2 | 87.5 |
| #100 | 0.15 | 42.06 | 45.5 |
| #200 | 0.075 | 17 | 28.5 |
| #270 | 0.053 | 18.86 | 9.6 |
| Pan | | 9.6 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 71.5 |
| Fines (%) | 28.5 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **BH-T-13-02**
Sample No. **ARD-01**
Depth **2.1 m**
Location **TSF-Tailings**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

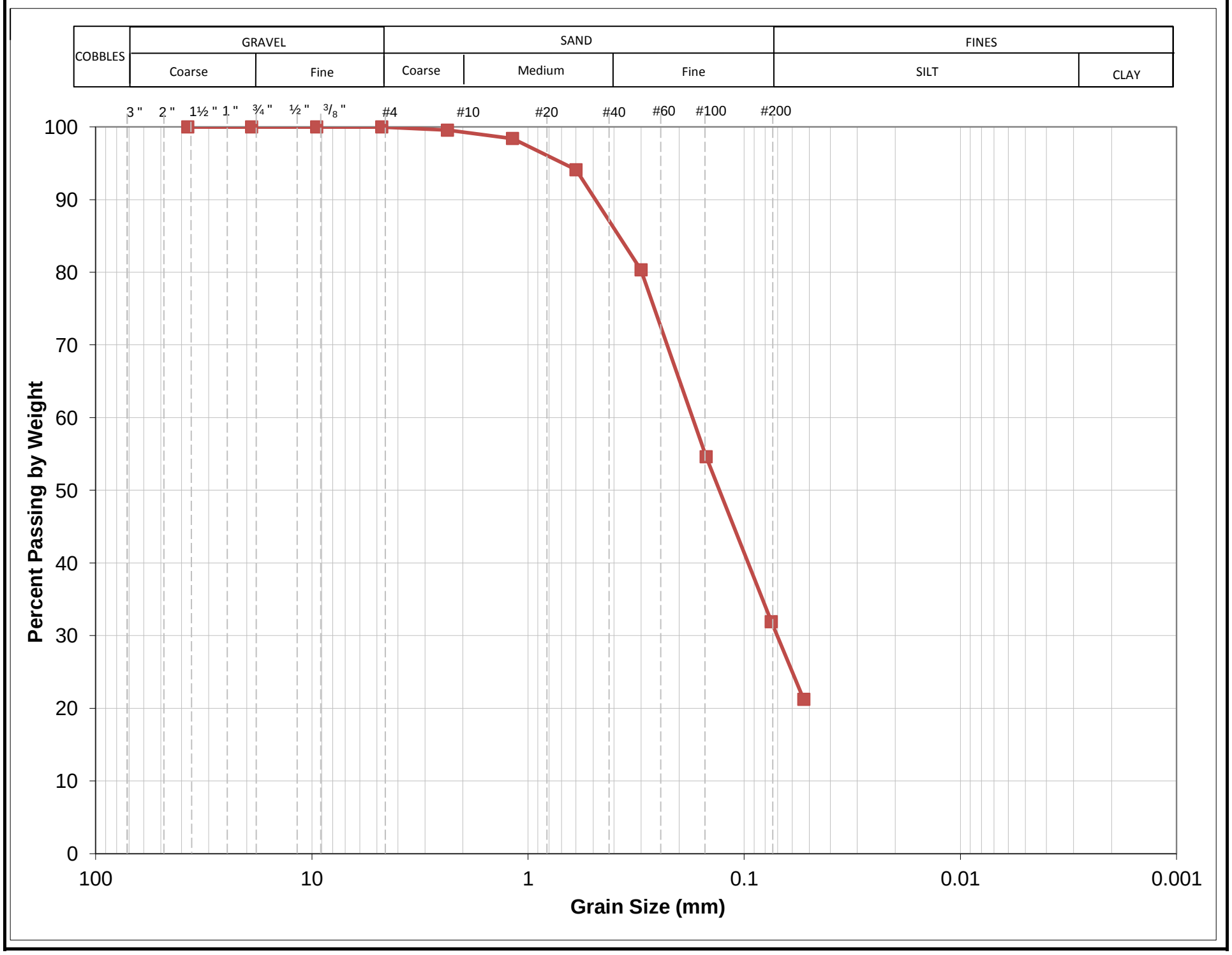
| | |
|---|---|
| Sieve Initial weight (g) | 100 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0 | 100.0 |
| #8 | 2.36 | 0.45 | 99.6 |
| #14 | 1.18 | 1.14 | 98.4 |
| #30 | 0.6 | 4.31 | 94.1 |
| #48 | 0.3 | 13.77 | 80.3 |
| #100 | 0.15 | 25.72 | 54.6 |
| #200 | 0.075 | 22.7 | 31.9 |
| #270 | 0.053 | 10.68 | 21.2 |
| Pan | | 21.23 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 68.1 |
| Fines (%) | 31.9 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **BH-T-13-02**
Sample No. **ARD-02**
Depth **3.5 m**
Location **TSF-Tailings**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

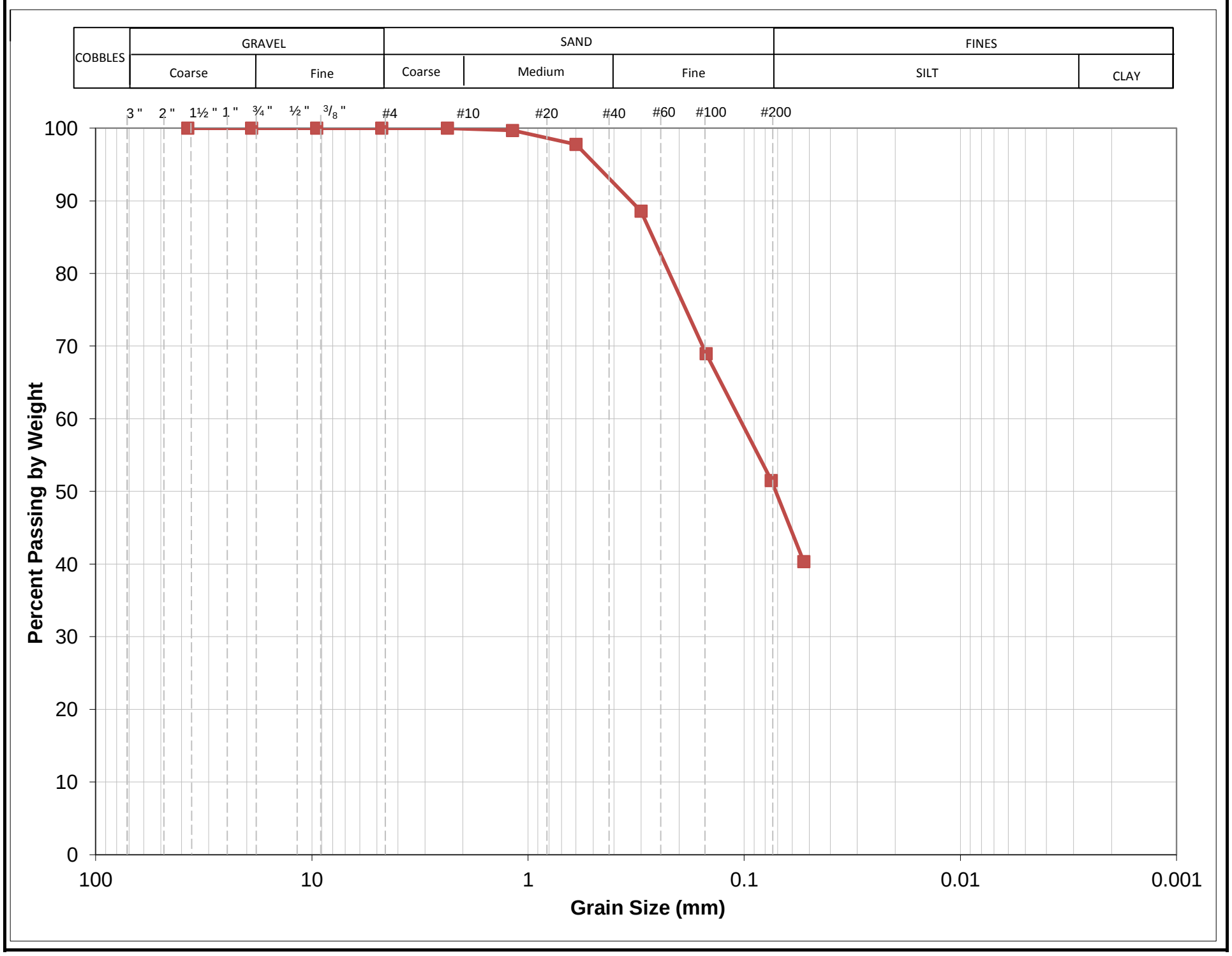
| | |
|---|---|
| Sieve Initial weight (g) | 100 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0 | 100.0 |
| #8 | 2.36 | 0 | 100.0 |
| #14 | 1.18 | 0.33 | 99.7 |
| #30 | 0.6 | 1.91 | 97.8 |
| #48 | 0.3 | 9.19 | 88.6 |
| #100 | 0.15 | 19.62 | 69.0 |
| #200 | 0.075 | 17.46 | 51.5 |
| #270 | 0.053 | 11.16 | 40.3 |
| Pan | | 40.33 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 48.5 |
| Fines (%) | 51.5 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **BH-T-13-02**
Sample No. **ARD-04**
Depth **6.5 m**
Location **TSF-Tailings**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

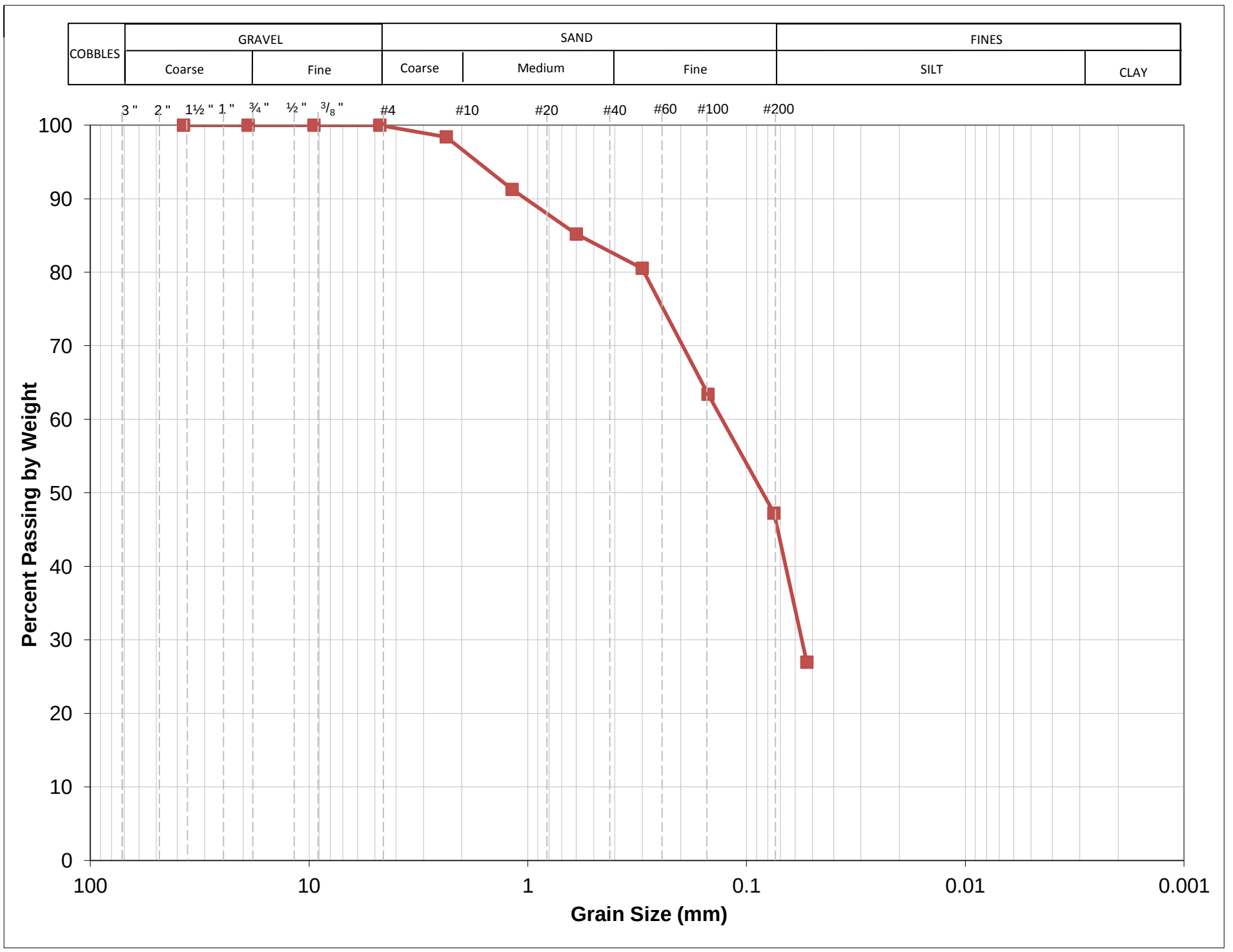
| | |
|---|---|
| Sieve Initial weight (g) | 100 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0 | 100.0 |
| #8 | 2.36 | 1.59 | 98.4 |
| #14 | 1.18 | 7.15 | 91.3 |
| #30 | 0.6 | 6.07 | 85.2 |
| #48 | 0.3 | 4.65 | 80.5 |
| #100 | 0.15 | 17.14 | 63.4 |
| #200 | 0.075 | 16.17 | 47.2 |
| #270 | 0.053 | 20.27 | 27.0 |
| Pan | | 26.96 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 52.8 |
| Fines (%) | 47.2 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **BH-T-13-02**
Sample No. **ARD-06**
Depth **9.5 m**
Location **TSF-Tailings**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

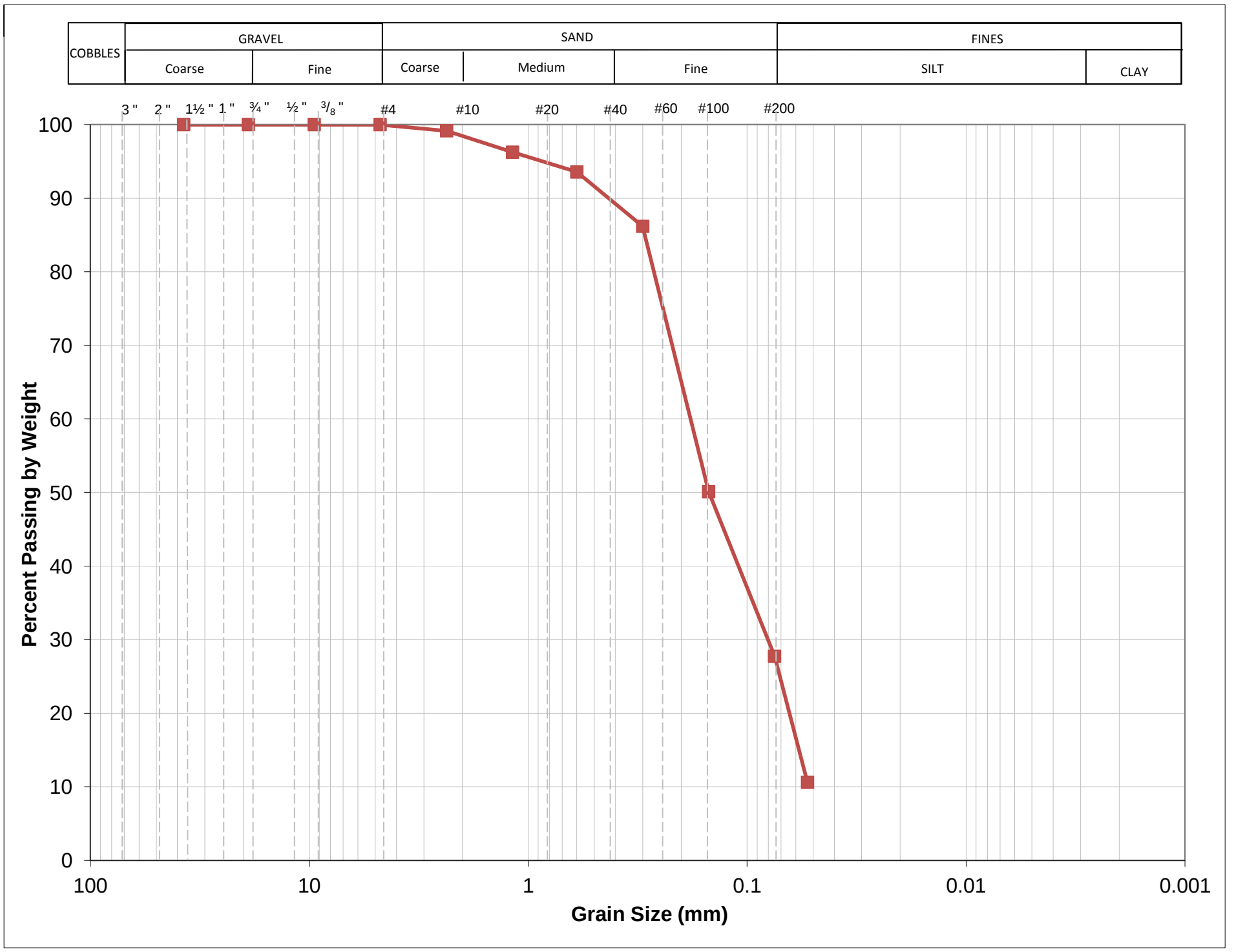
| | |
|---|---|
| Sieve Initial weight (g) | 100 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0 | 100.0 |
| #8 | 2.36 | 0.84 | 99.2 |
| #14 | 1.18 | 2.91 | 96.3 |
| #30 | 0.6 | 2.69 | 93.6 |
| #48 | 0.3 | 7.38 | 86.2 |
| #100 | 0.15 | 36.07 | 50.1 |
| #200 | 0.075 | 22.37 | 27.7 |
| #270 | 0.053 | 17.13 | 10.6 |
| Pan | | 10.61 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 72.3 |
| Fines (%) | 27.7 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **BH-T-13-02**
Sample No. **ARD-07**
Depth **11.1 m**
Location **TSF-Tailings**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

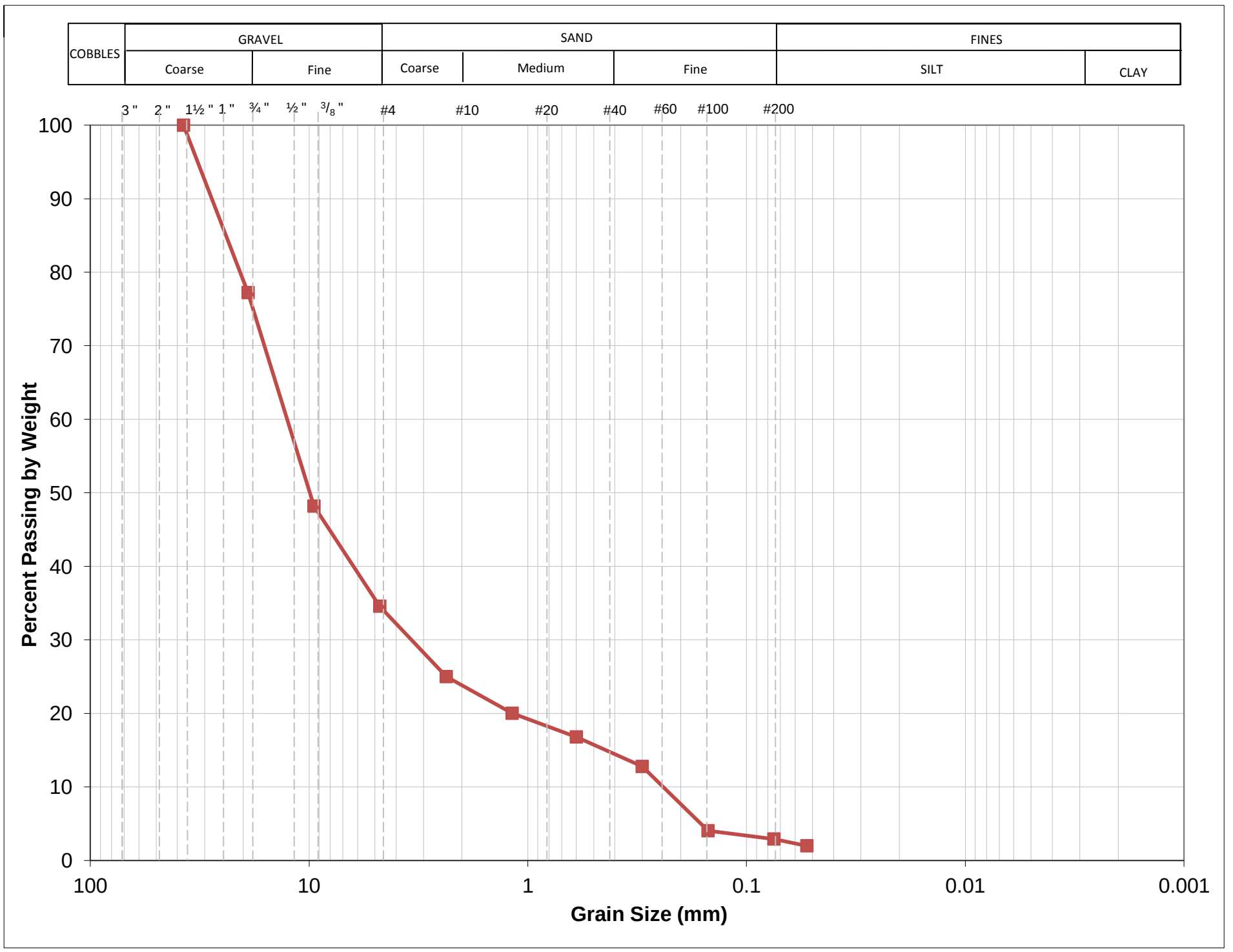
| | |
|---|---|
| Sieve Initial weight (g) | 500 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 113.85 | 77.2 |
| 3/8" | 9.5 | 145.2 | 48.2 |
| #4 | 4.75 | 68.05 | 34.6 |
| #8 | 2.36 | 47.91 | 25.0 |
| #14 | 1.18 | 24.92 | 20.0 |
| #30 | 0.6 | 16.1 | 16.8 |
| #48 | 0.3 | 20.08 | 12.8 |
| #100 | 0.15 | 43.71 | 4.0 |
| #200 | 0.075 | 5.6 | 2.9 |
| #270 | 0.053 | 4.63 | 2.0 |
| Pan | | 9.95 | 0.0 |

| | |
|---|---|
| Gravel (%) | 65.4 |
| Sand (%) | 31.7 |
| Fines (%) | 2.9 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **BH-T-13-03**
Sample No. **ARD-02**
Depth **6.5 m**
Location **TSF-Tailings**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

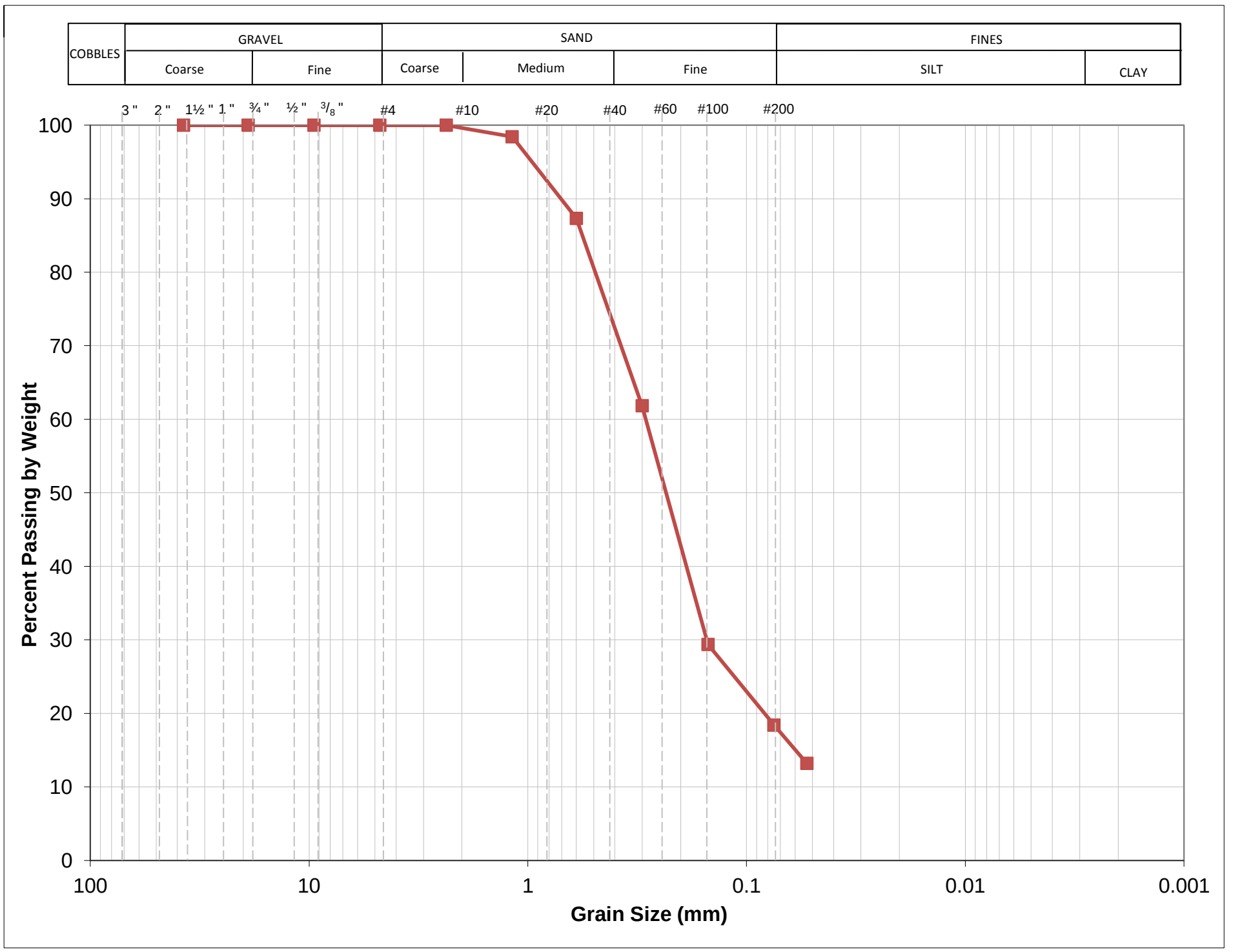
| | |
|---|---|
| Sieve Initial weight (g) | 100 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0 | 100.0 |
| #8 | 2.36 | 0 | 100.0 |
| #14 | 1.18 | 1.58 | 98.4 |
| #30 | 0.6 | 11.1 | 87.3 |
| #48 | 0.3 | 25.48 | 61.8 |
| #100 | 0.15 | 32.47 | 29.4 |
| #200 | 0.075 | 10.97 | 18.4 |
| #270 | 0.053 | 5.2 | 13.2 |
| Pan | | 13.2 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 81.6 |
| Fines (%) | 18.4 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **BH-T-13-04**

Sample No. **ARD-02**

Depth **7.0 m**

Location **TSF-Tailings**

Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| | |
|---|---|
| Sieve Initial weight (g) | 100 |

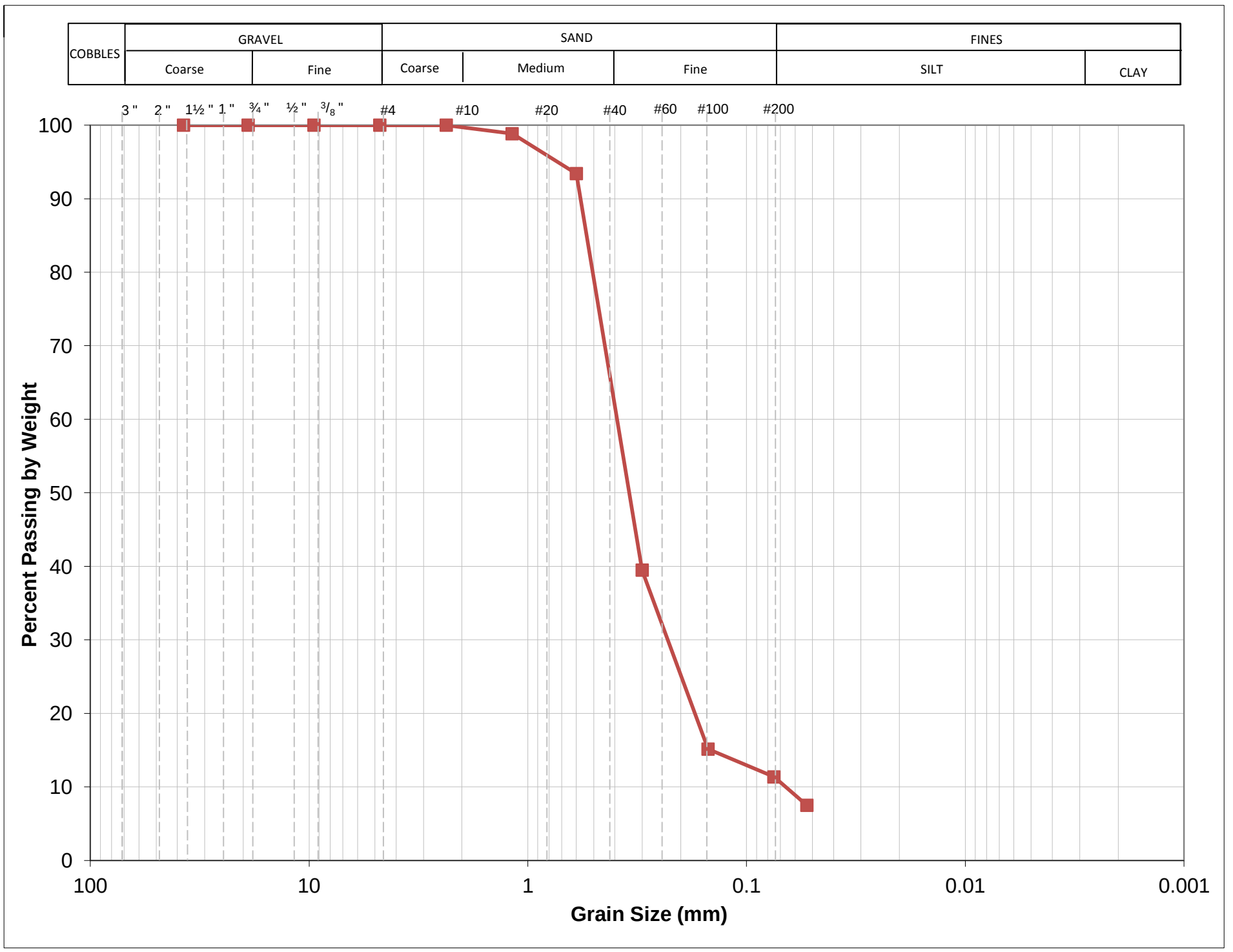
**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0 | 100.0 |
| #8 | 2.36 | 0 | 100.0 |
| #14 | 1.18 | 1.17 | 98.8 |
| #30 | 0.6 | 5.42 | 93.4 |
| #48 | 0.3 | 53.93 | 39.5 |
| #100 | 0.15 | 24.35 | 15.1 |
| #200 | 0.075 | 3.78 | 11.4 |
| #270 | 0.053 | 3.86 | 7.5 |
| Pan | | 7.49 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 88.7 |
| Fines (%) | 11.4 |

Notes:

1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **BH-T-13-04**

Sample No. **ARD-04**

Depth **10.6 m**

Location **TSF-Tailings**

Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| | |
|---|---|
| Sieve Initial weight (g) | 100 |

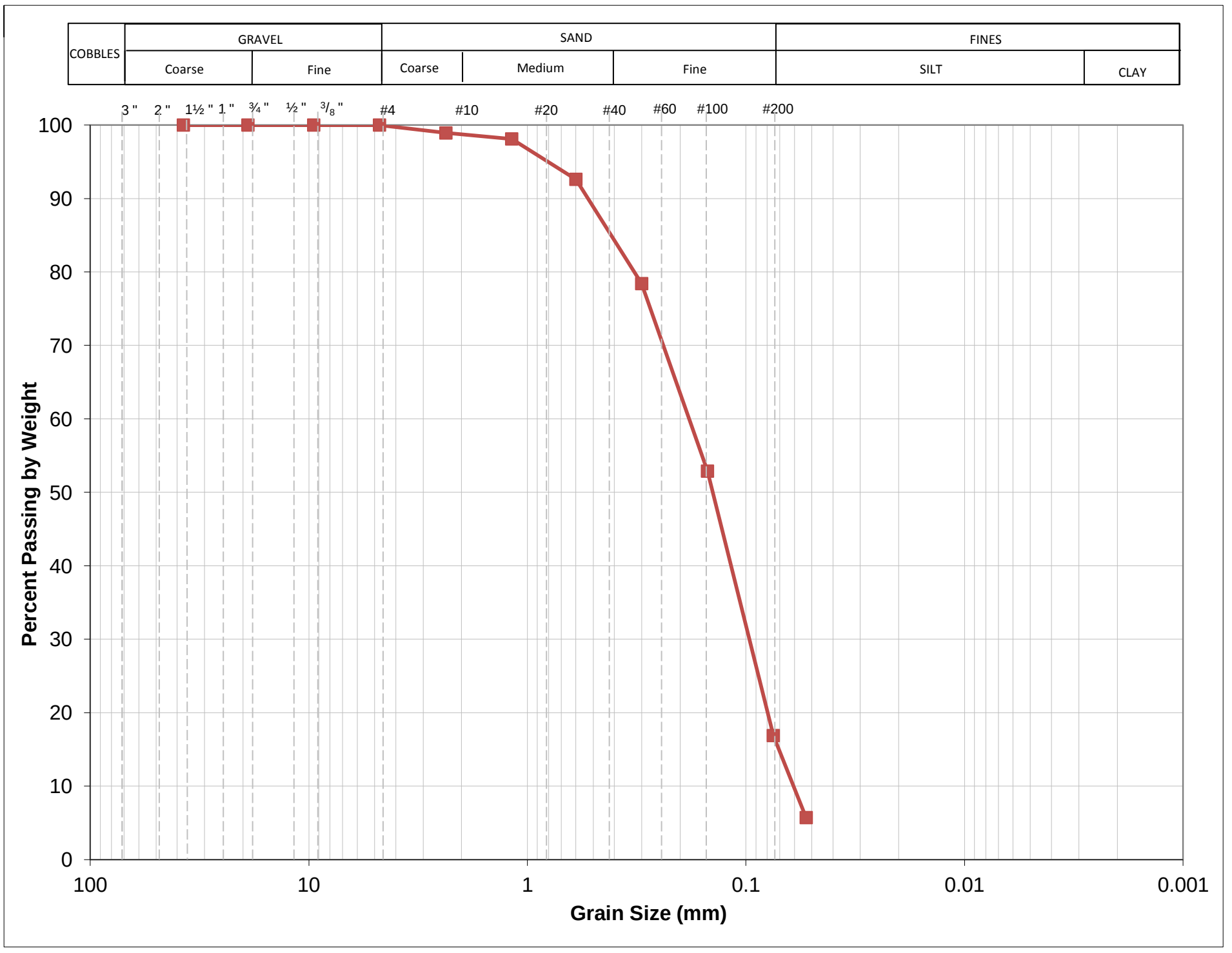
**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0 | 100.0 |
| #8 | 2.36 | 1.08 | 98.9 |
| #14 | 1.18 | 0.81 | 98.1 |
| #30 | 0.6 | 5.5 | 92.6 |
| #48 | 0.3 | 14.2 | 78.4 |
| #100 | 0.15 | 25.53 | 52.9 |
| #200 | 0.075 | 36 | 16.9 |
| #270 | 0.053 | 11.17 | 5.7 |
| Pan | | 5.71 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 83.1 |
| Fines (%) | 16.9 |

Notes:

1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **BH-T-13-04**
Sample No. **ARD-06**
Depth **13.6 m**
Location **TSF-Tailings**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

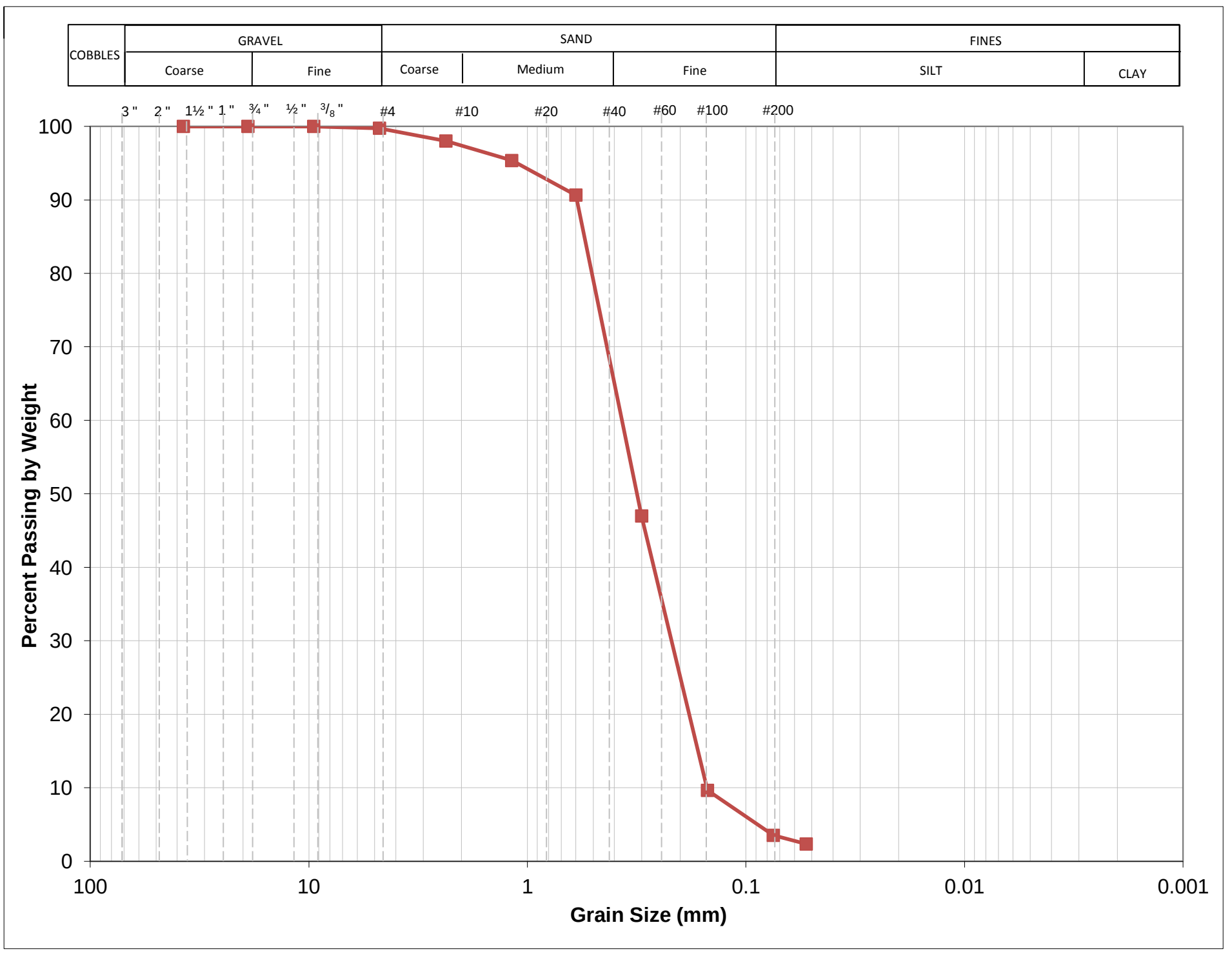
| | |
|---|---|
| Sieve Initial weight (g) | 100 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0.25 | 99.8 |
| #8 | 2.36 | 1.74 | 98.0 |
| #14 | 1.18 | 2.66 | 95.4 |
| #30 | 0.6 | 4.7 | 90.7 |
| #48 | 0.3 | 43.67 | 47.0 |
| #100 | 0.15 | 37.34 | 9.6 |
| #200 | 0.075 | 6.12 | 3.5 |
| #270 | 0.053 | 1.18 | 2.3 |
| Pan | | 2.34 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.3 |
| Sand (%) | 96.2 |
| Fines (%) | 3.5 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **BH-T-13-04**
Sample No. **ARD-08**
Depth **17.1 m**
Location **TSF-Tailings**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

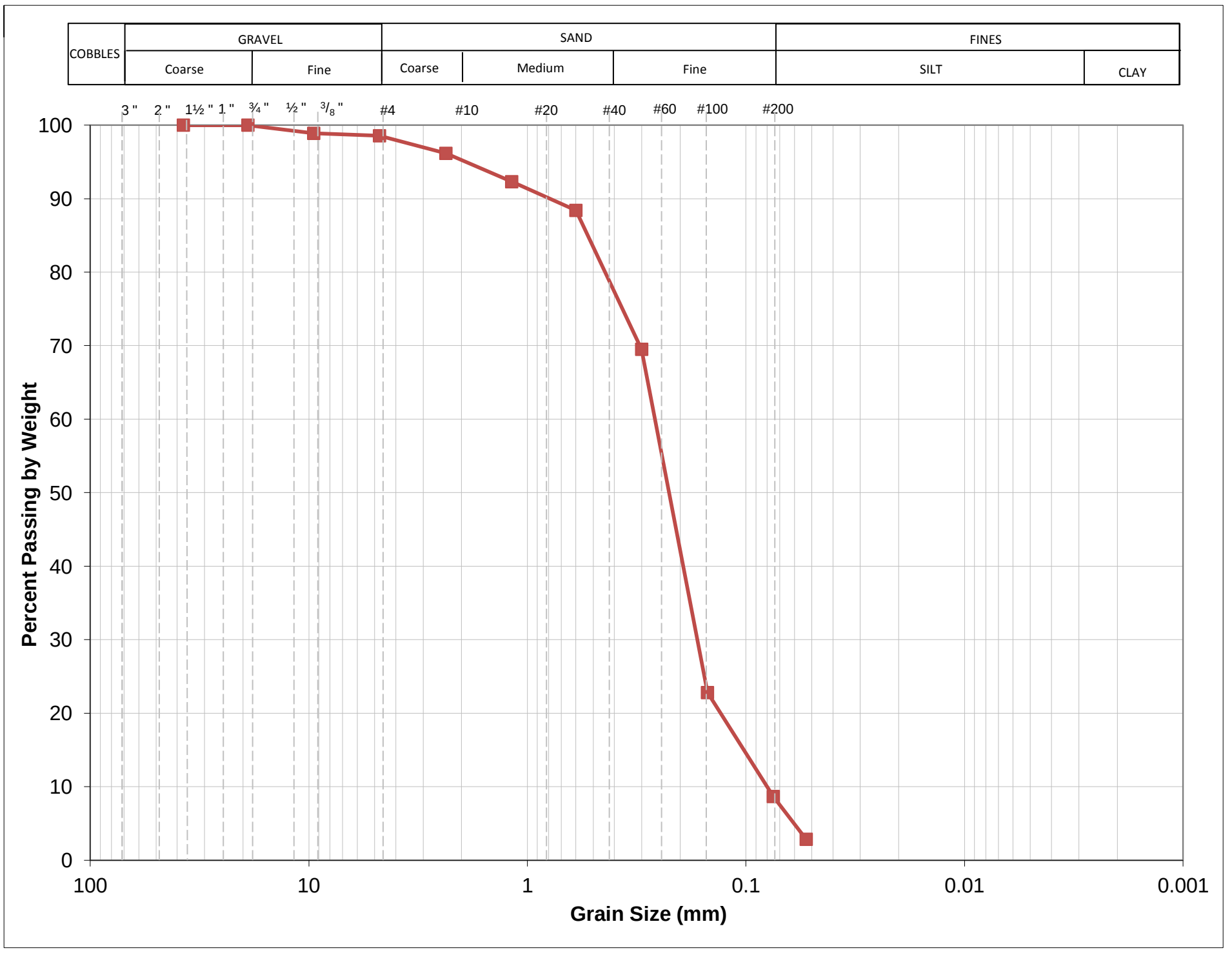
| | |
|---|---|
| Sieve Initial weight (g) | 100 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 1.12 | 98.9 |
| #4 | 4.75 | 0.33 | 98.6 |
| #8 | 2.36 | 2.39 | 96.2 |
| #14 | 1.18 | 3.86 | 92.3 |
| #30 | 0.6 | 3.9 | 88.4 |
| #48 | 0.3 | 18.9 | 69.5 |
| #100 | 0.15 | 46.7 | 22.8 |
| #200 | 0.075 | 14.14 | 8.7 |
| #270 | 0.053 | 5.82 | 2.8 |
| Pan | | 2.84 | 0.0 |

| | |
|---|---|
| Gravel (%) | 1.5 |
| Sand (%) | 89.9 |
| Fines (%) | 8.7 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **TP-WA-13-02**
Sample No. **ARD-02**
Depth **2.1 m**
Location **Waste Area**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

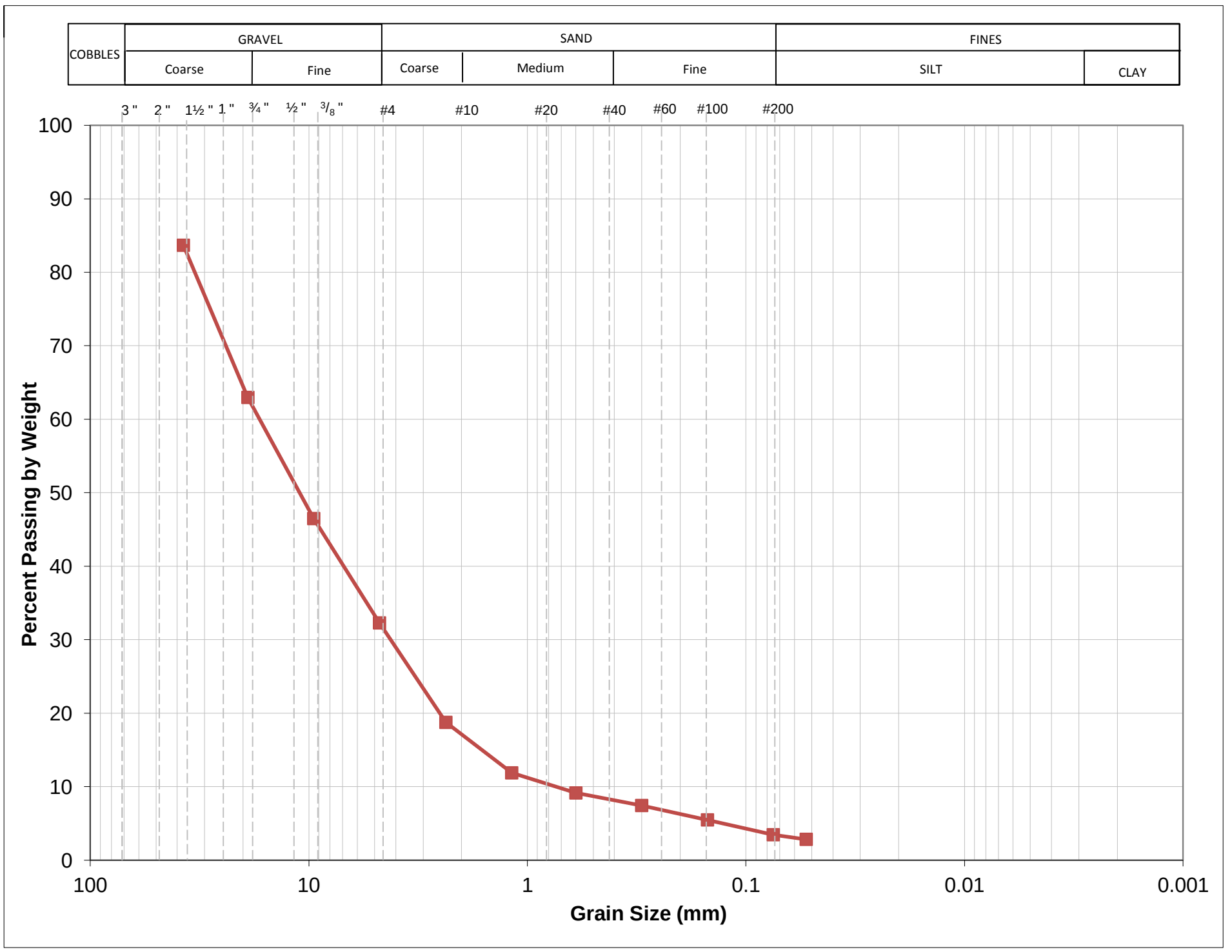
| | |
|---|---|
| Sieve Initial weight (g) | 500 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 81.58 | 83.7 |
| 3/4" | 19 | 103.57 | 63.0 |
| 3/8" | 9.5 | 82.43 | 46.5 |
| #4 | 4.75 | 71.01 | 32.3 |
| #8 | 2.36 | 67.69 | 18.7 |
| #14 | 1.18 | 34.37 | 11.9 |
| #30 | 0.6 | 13.66 | 9.1 |
| #48 | 0.3 | 8.55 | 7.4 |
| #100 | 0.15 | 9.78 | 5.5 |
| #200 | 0.075 | 10.09 | 3.5 |
| #270 | 0.053 | 3.14 | 2.8 |
| Pan | | 14.13 | 0.0 |

| | |
|---|---|
| Gravel (%) | 67.7 |
| Sand (%) | 28.8 |
| Fines (%) | 3.5 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **TP-WA-13-03**

Sample No. **ARD-02**

Depth **2.0 m**

Location **Waste Area**

Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| | |
|---|---|
| Sieve Initial weight (g) | 500 |

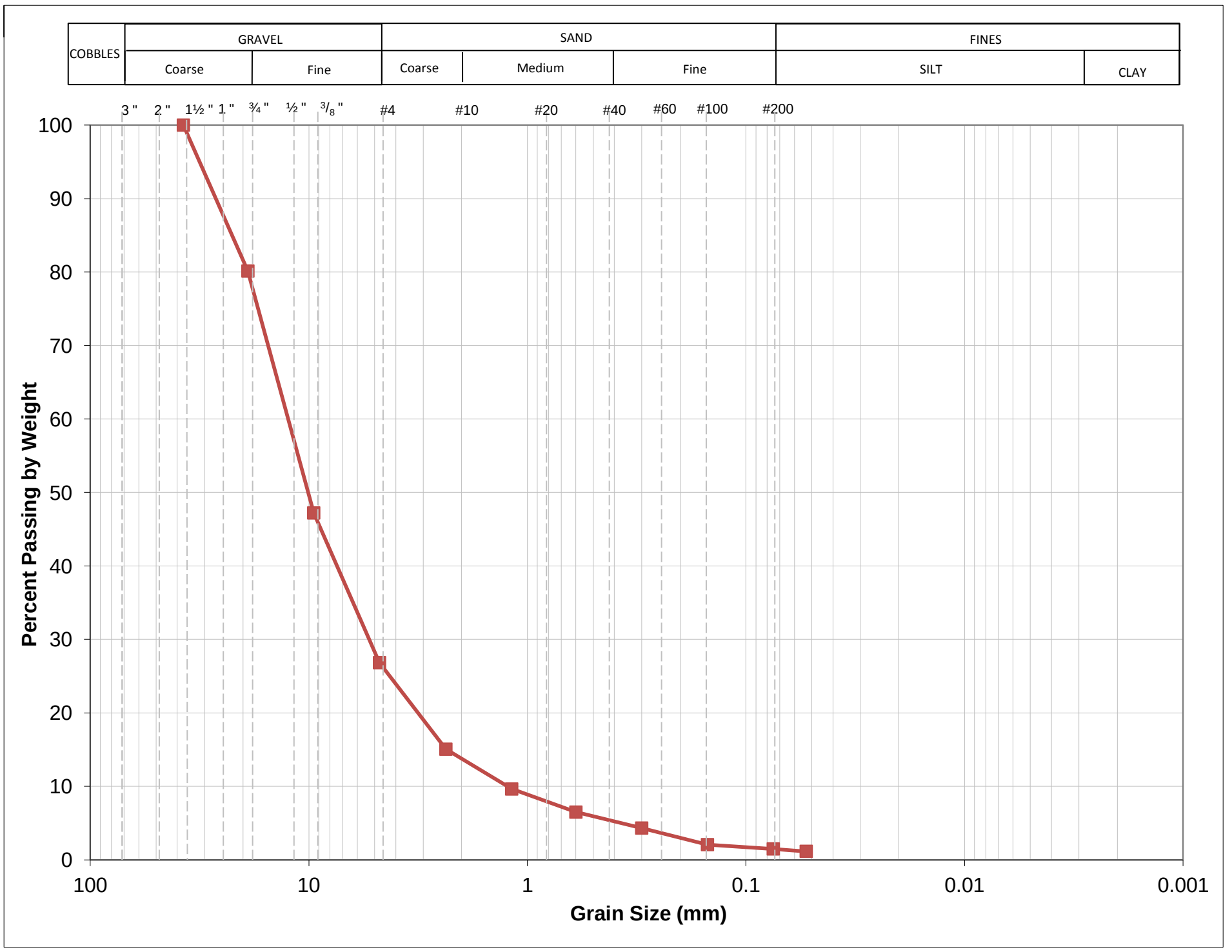
**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 99.34 | 80.1 |
| 3/8" | 9.5 | 164.6 | 47.2 |
| #4 | 4.75 | 101.89 | 26.8 |
| #8 | 2.36 | 58.9 | 15.1 |
| #14 | 1.18 | 27.1 | 9.6 |
| #30 | 0.6 | 15.7 | 6.5 |
| #48 | 0.3 | 10.87 | 4.3 |
| #100 | 0.15 | 11.27 | 2.1 |
| #200 | 0.075 | 2.92 | 1.5 |
| #270 | 0.053 | 1.63 | 1.2 |
| Pan | | 5.78 | 0.0 |

| | |
|---|---|
| Gravel (%) | 73.2 |
| Sand (%) | 25.4 |
| Fines (%) | 1.5 |

Notes:

1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **TP-WA-13-05**
Sample No. **ARD-02**
Depth **2.0 m**
Location **Waste Area**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

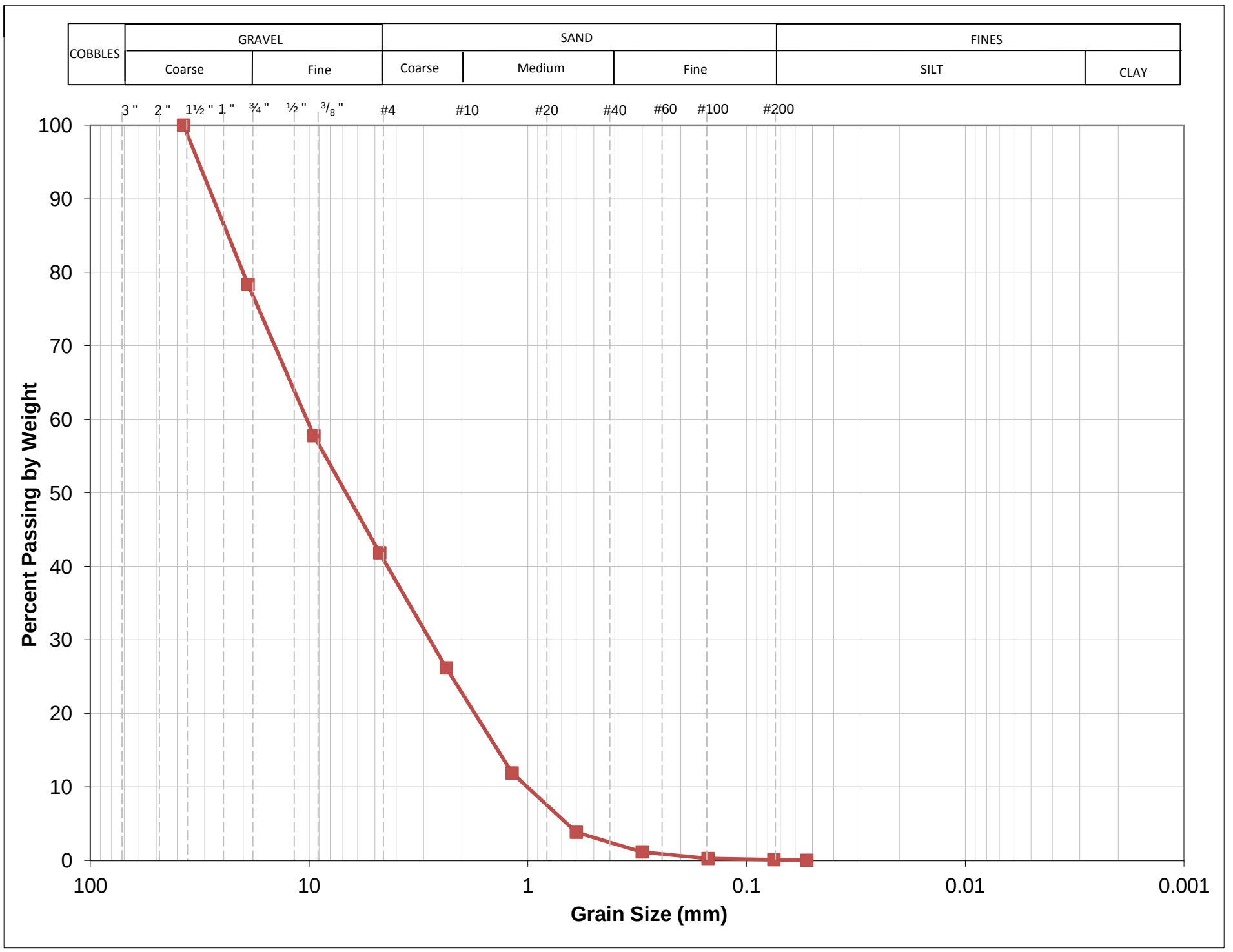
| | |
|---|---|
| Sieve Initial weight (g) | 530 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 114.8 | 78.3 |
| 3/8" | 9.5 | 109.1 | 57.8 |
| #4 | 4.75 | 84.37 | 41.8 |
| #8 | 2.36 | 82.95 | 26.2 |
| #14 | 1.18 | 75.77 | 11.9 |
| #30 | 0.6 | 42.76 | 3.8 |
| #48 | 0.3 | 14.15 | 1.2 |
| #100 | 0.15 | 4.73 | 0.3 |
| #200 | 0.075 | 0.87 | 0.1 |
| #270 | 0.053 | 0.4 | 0.0 |
| Pan | | 0.1 | 0.0 |

| | |
|---|---|
| Gravel (%) | 58.2 |
| Sand (%) | 41.7 |
| Fines (%) | 0.1 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **TP-WA-13-06**
Sample No. **ARD-01**
Depth **1.0 m**
Location **Waste Area**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

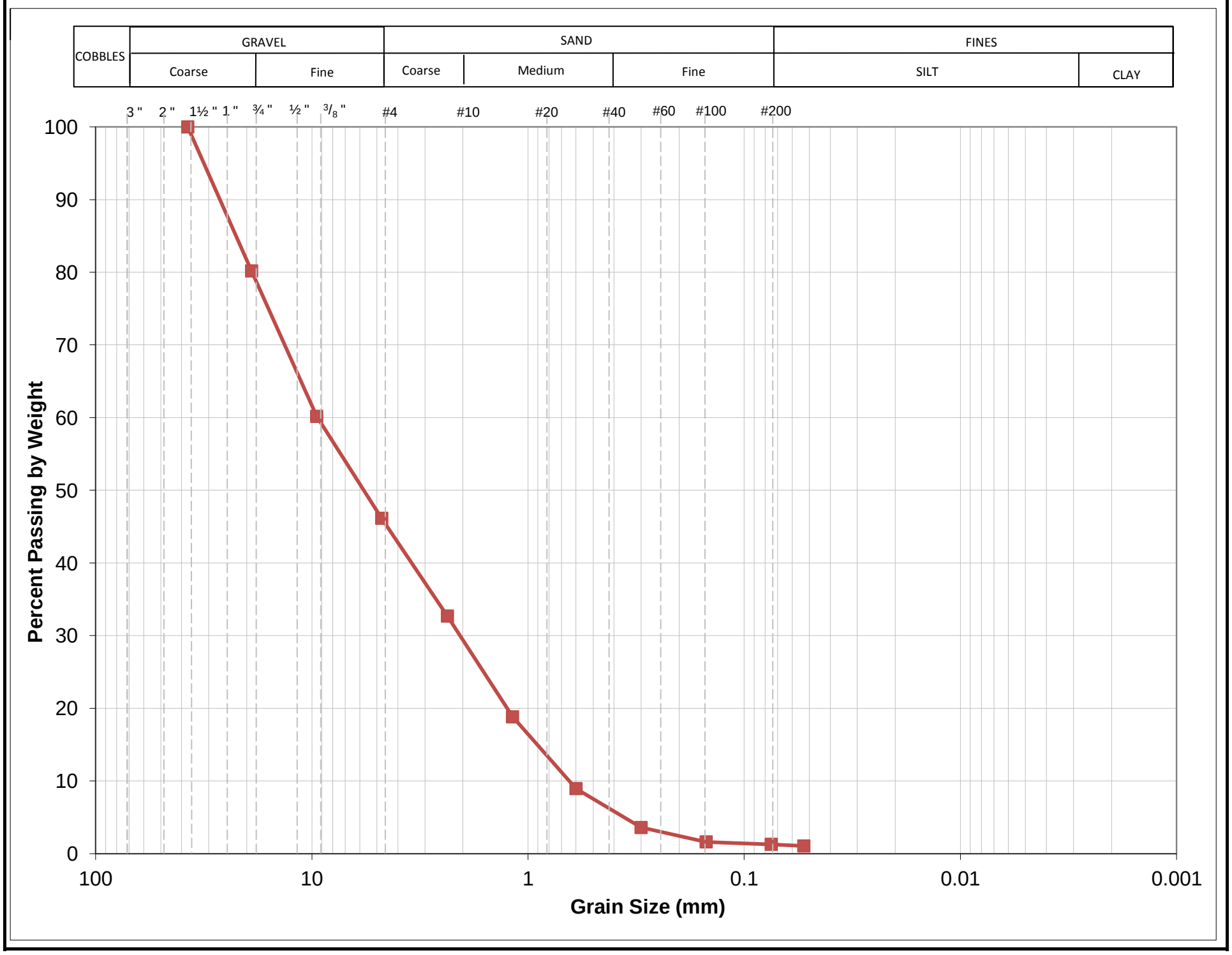
| | |
|---|---|
| Sieve Initial weight (g) | 500 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 99.09 | 80.2 |
| 3/8" | 9.5 | 100.06 | 60.2 |
| #4 | 4.75 | 70.12 | 46.1 |
| #8 | 2.36 | 67.28 | 32.7 |
| #14 | 1.18 | 69.36 | 18.8 |
| #30 | 0.6 | 49.35 | 8.9 |
| #48 | 0.3 | 26.78 | 3.6 |
| #100 | 0.15 | 9.88 | 1.6 |
| #200 | 0.075 | 1.68 | 1.3 |
| #270 | 0.053 | 1.14 | 1.1 |
| Pan | | 5.26 | 0.0 |

| | |
|---|---|
| Gravel (%) | 53.9 |
| Sand (%) | 44.9 |
| Fines (%) | 1.3 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **TP-WA-13-06**
Sample No. **ARD-04**
Depth **4.0 m**
Location **Waste Area**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

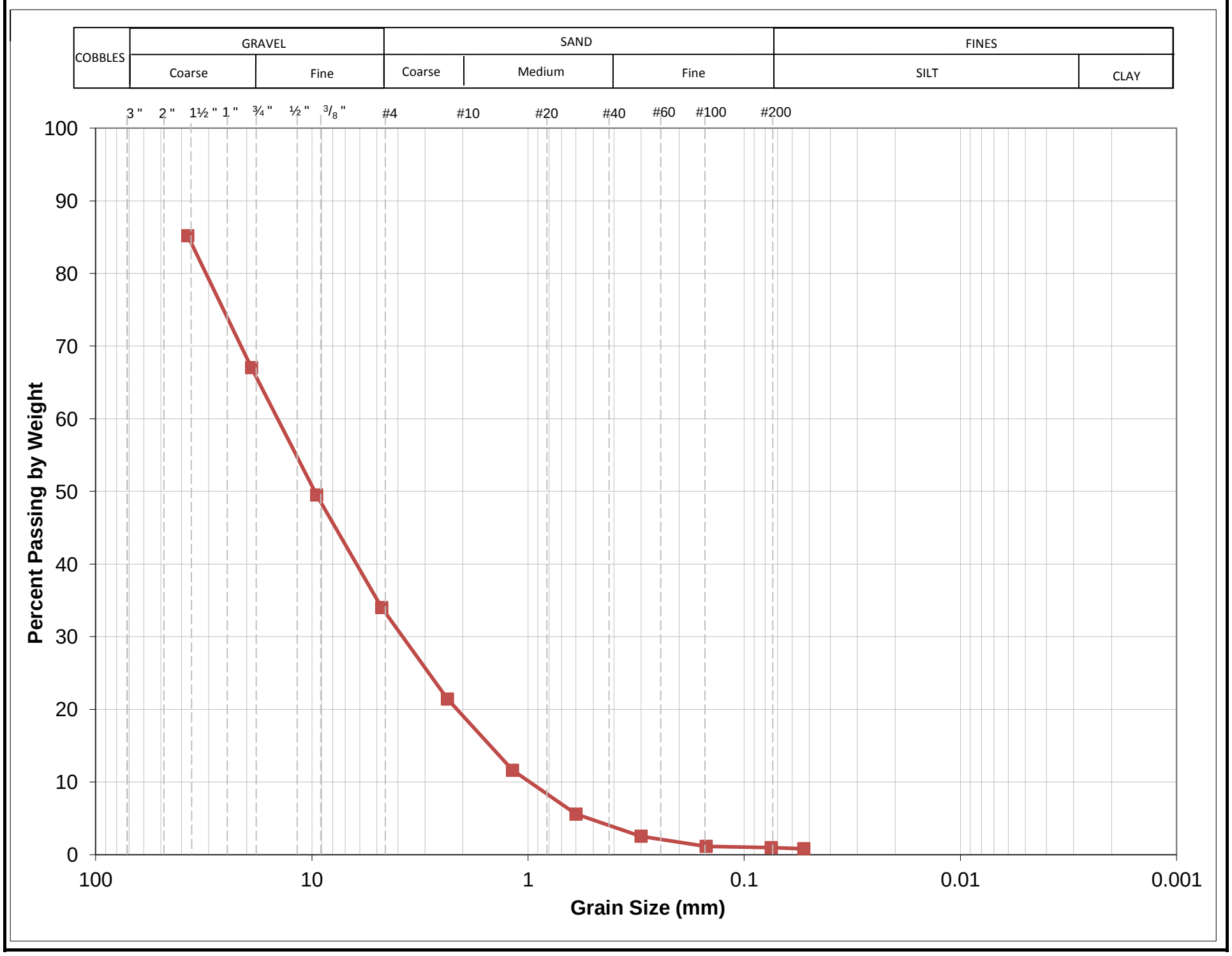
| | |
|---|---|
| Sieve Initial weight (g) | 500 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 74.07 | 85.2 |
| 3/4" | 19 | 90.77 | 67.0 |
| 3/8" | 9.5 | 87.63 | 49.5 |
| #4 | 4.75 | 77.47 | 34.0 |
| #8 | 2.36 | 62.98 | 21.4 |
| #14 | 1.18 | 49.04 | 11.6 |
| #30 | 0.6 | 30.17 | 5.6 |
| #48 | 0.3 | 15.17 | 2.5 |
| #100 | 0.15 | 6.99 | 1.1 |
| #200 | 0.075 | 0.89 | 1.0 |
| #270 | 0.053 | 0.73 | 0.8 |
| Pan | | 4.09 | 0.0 |

| | |
|---|---|
| Gravel (%) | 66.0 |
| Sand (%) | 33.0 |
| Fines (%) | 1.0 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **TP-WA-13-08**
Sample No. **ARD-02**
Depth **2.0 m**
Location **Waste Area**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

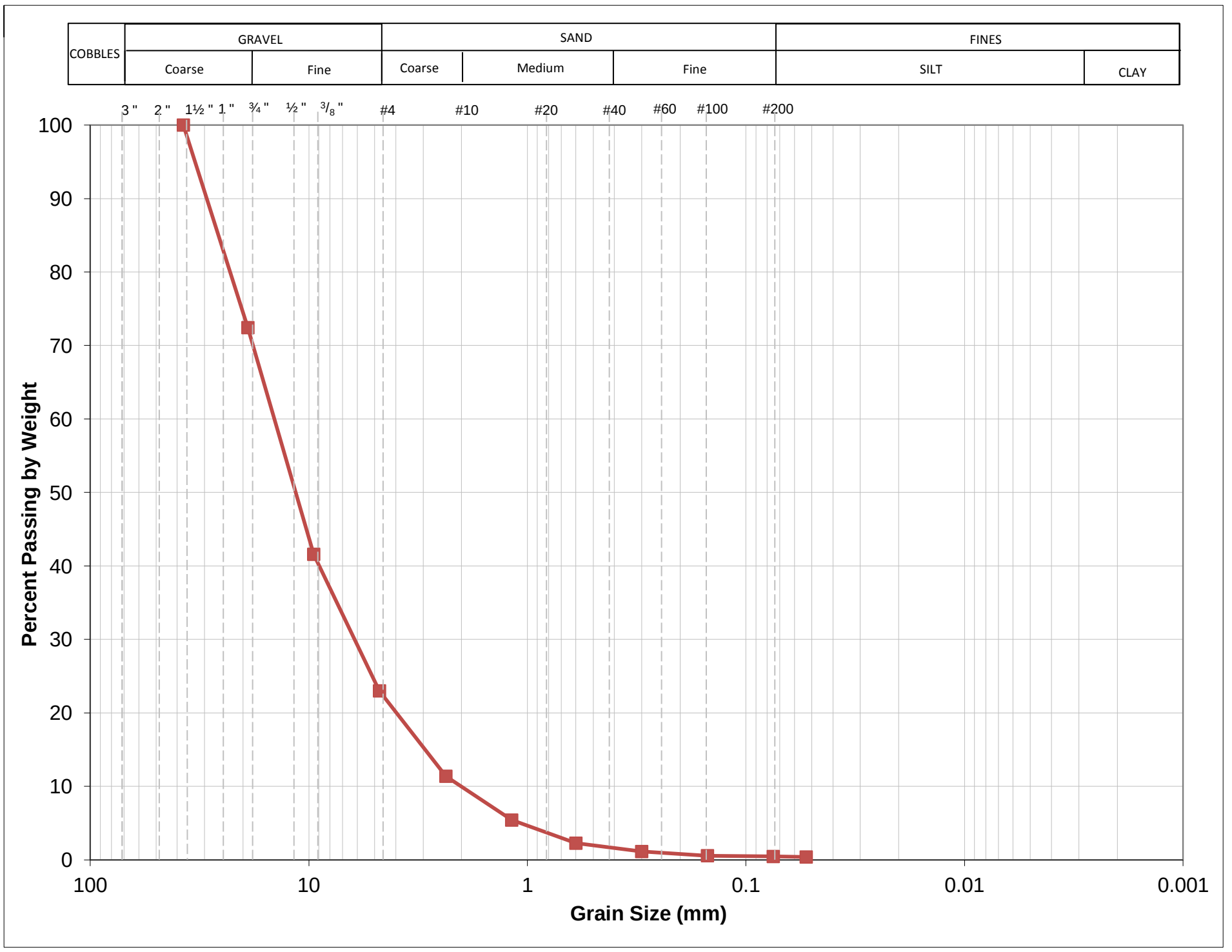
| | |
|---|---|
| Sieve Initial weight (g) | 500 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 137.85 | 72.4 |
| 3/8" | 9.5 | 154.26 | 41.6 |
| #4 | 4.75 | 92.93 | 23.0 |
| #8 | 2.36 | 58.11 | 11.4 |
| #14 | 1.18 | 29.83 | 5.4 |
| #30 | 0.6 | 15.72 | 2.3 |
| #48 | 0.3 | 5.68 | 1.1 |
| #100 | 0.15 | 2.84 | 0.6 |
| #200 | 0.075 | 0.54 | 0.4 |
| #270 | 0.053 | 0.35 | 0.4 |
| Pan | | 1.89 | 0.0 |

| | |
|---|---|
| Gravel (%) | 77.0 |
| Sand (%) | 22.5 |
| Fines (%) | 0.4 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **TP-WA-13-09**
Sample No. **ARD-04**
Depth **3.0 m**
Location **Waste Area**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

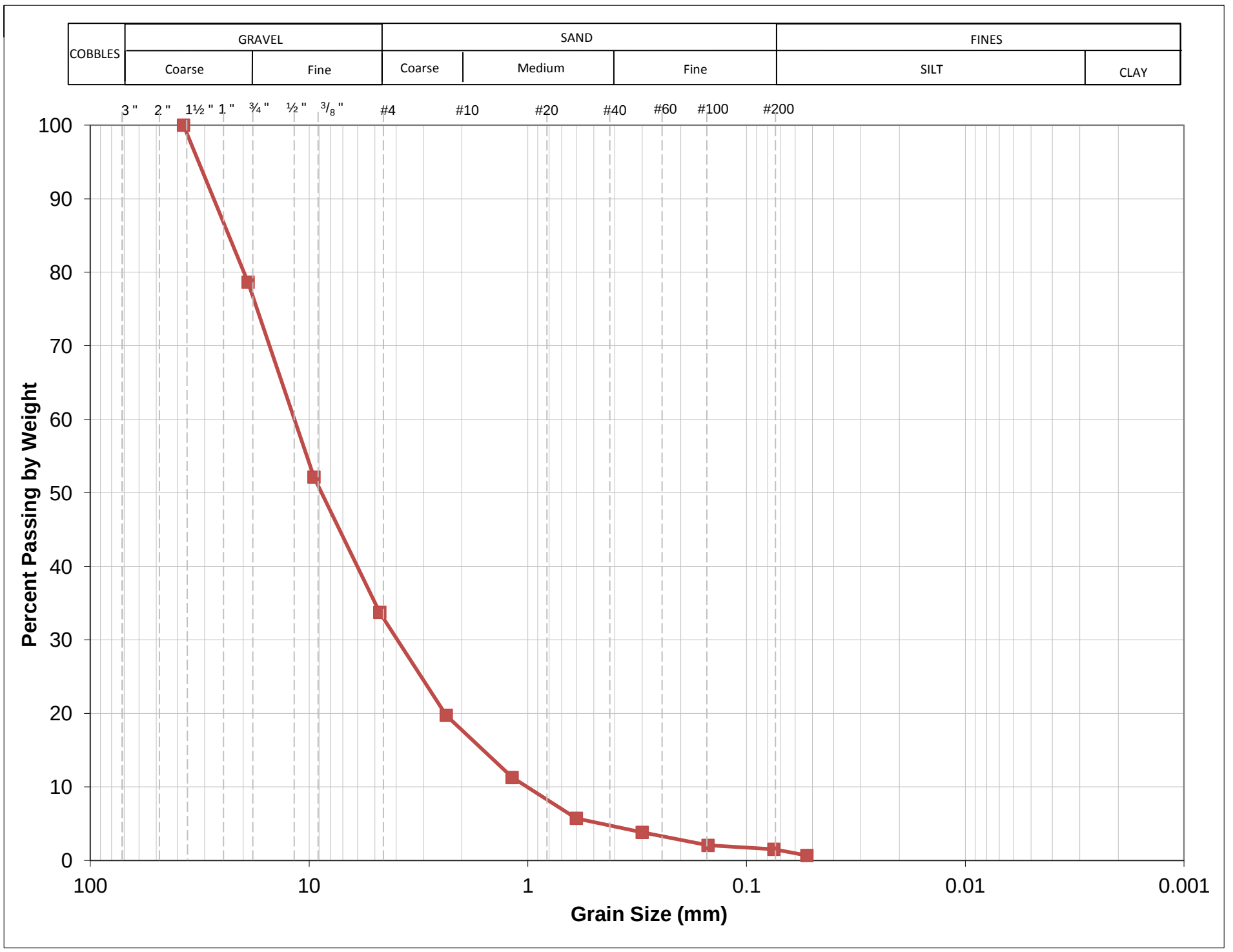
| | |
|---|---|
| Sieve Initial weight (g) | 505 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 107.87 | 78.6 |
| 3/8" | 9.5 | 133.93 | 52.1 |
| #4 | 4.75 | 92.86 | 33.7 |
| #8 | 2.36 | 70.7 | 19.7 |
| #14 | 1.18 | 42.75 | 11.3 |
| #30 | 0.6 | 27.99 | 5.7 |
| #48 | 0.3 | 9.67 | 3.8 |
| #100 | 0.15 | 8.94 | 2.0 |
| #200 | 0.075 | 2.68 | 1.5 |
| #270 | 0.053 | 4.27 | 0.7 |
| Pan | | 3.34 | 0.0 |

| | |
|---|---|
| Gravel (%) | 66.3 |
| Sand (%) | 32.2 |
| Fines (%) | 1.5 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **TP-WA-13-10**
Sample No. **ARD-02**
Depth **2.0 m**
Location **Waste Area**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

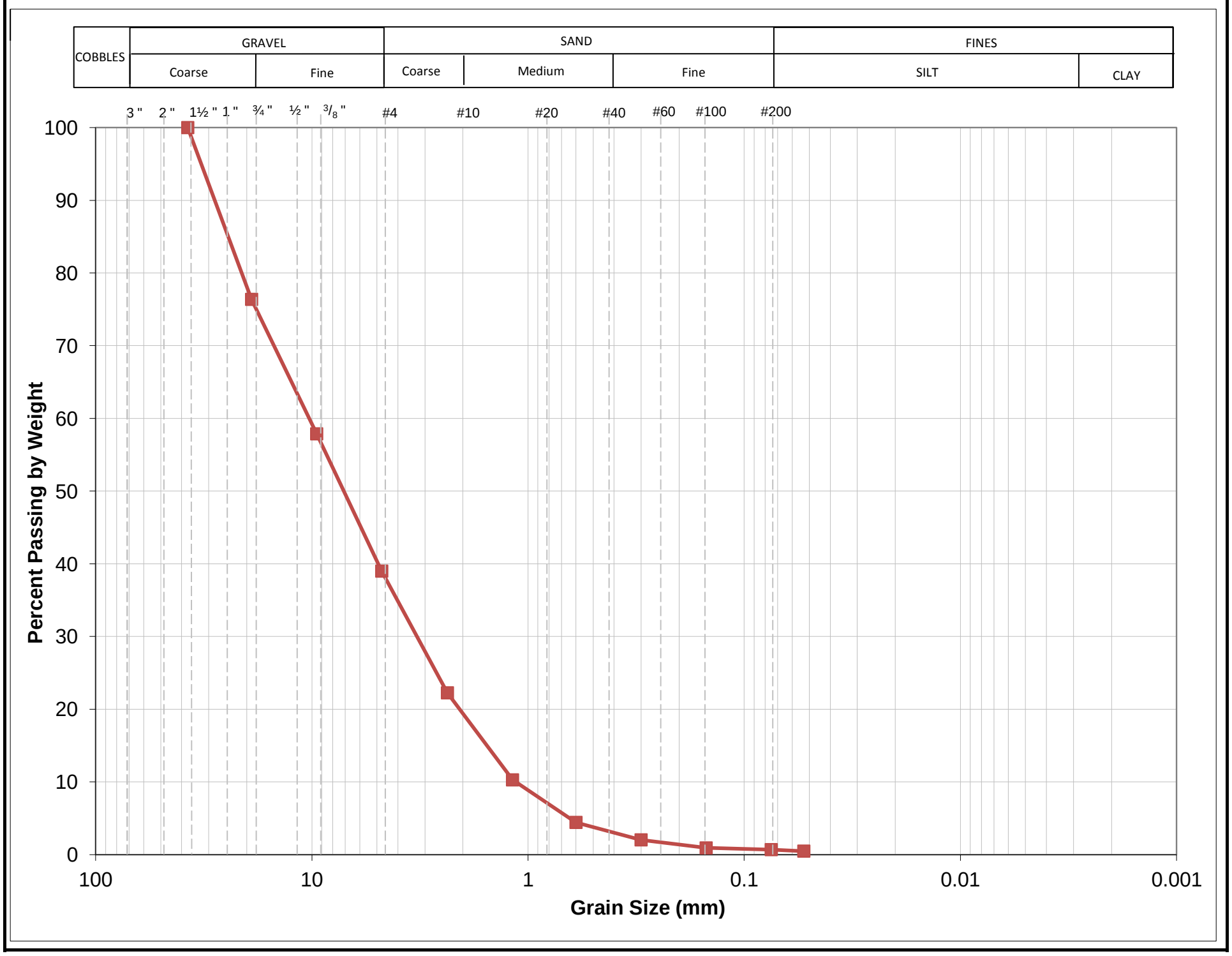
| | |
|---|---|
| Sieve Initial weight (g) | 500 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 118.14 | 76.4 |
| 3/8" | 9.5 | 92.49 | 57.9 |
| #4 | 4.75 | 94.41 | 39.0 |
| #8 | 2.36 | 83.72 | 22.2 |
| #14 | 1.18 | 59.87 | 10.3 |
| #30 | 0.6 | 29.26 | 4.4 |
| #48 | 0.3 | 11.99 | 2.0 |
| #100 | 0.15 | 5.55 | 0.9 |
| #200 | 0.075 | 1.18 | 0.7 |
| #270 | 0.053 | 1.01 | 0.5 |
| Pan | | 2.38 | 0.0 |

| | |
|---|---|
| Gravel (%) | 61.0 |
| Sand (%) | 38.3 |
| Fines (%) | 0.7 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **TP-WA-13-11**
Sample No. **ARD-02**
Depth **2.0 m**
Location **Waste Area**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

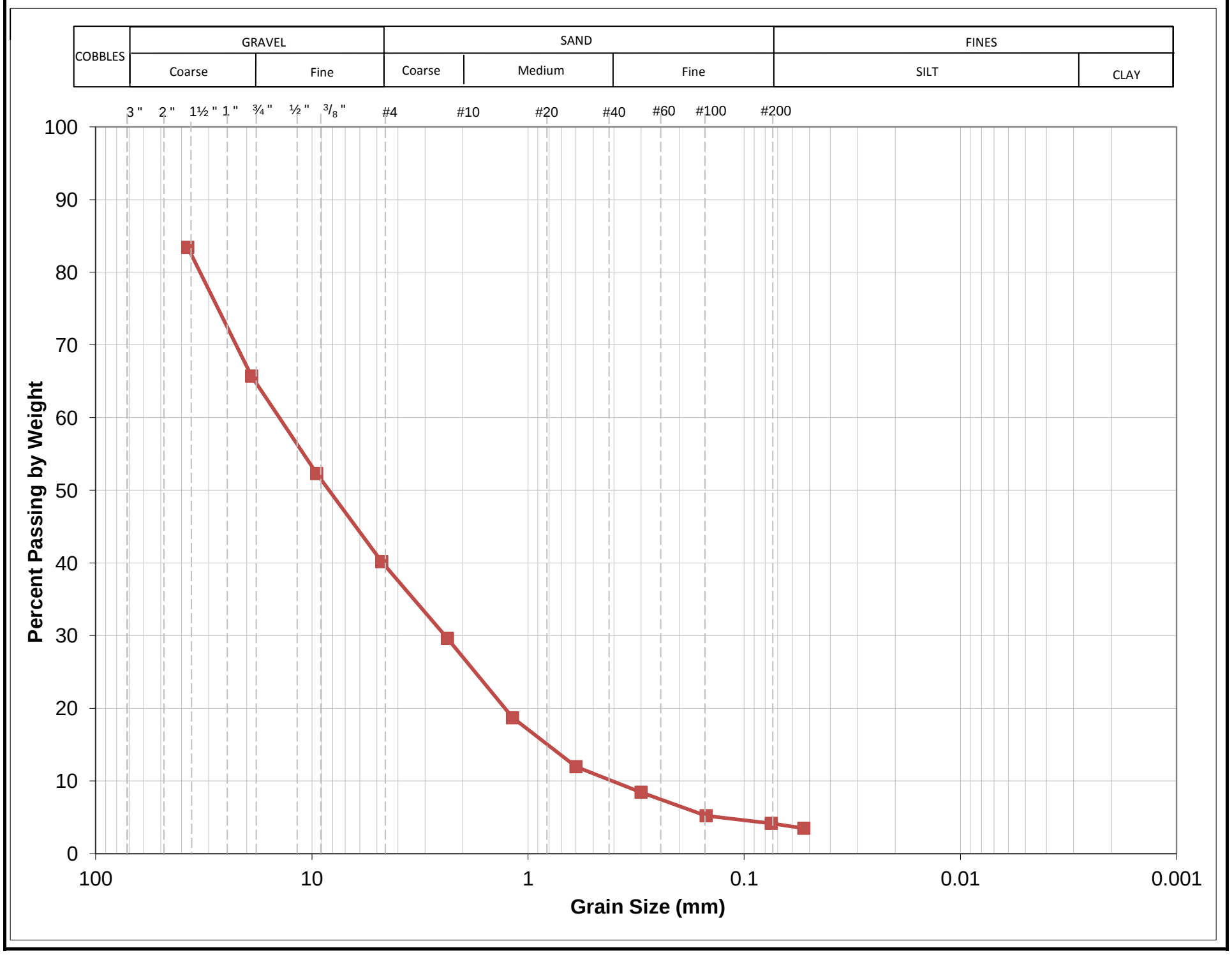
| | |
|---|---|
| Sieve Initial weight (g) | 500 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 82.89 | 83.4 |
| 3/4" | 19 | 88.55 | 65.7 |
| 3/8" | 9.5 | 67.04 | 52.3 |
| #4 | 4.75 | 60.62 | 40.2 |
| #8 | 2.36 | 52.82 | 29.6 |
| #14 | 1.18 | 54.6 | 18.7 |
| #30 | 0.6 | 33.68 | 12.0 |
| #48 | 0.3 | 17.57 | 8.4 |
| #100 | 0.15 | 16.17 | 5.2 |
| #200 | 0.075 | 5.24 | 4.2 |
| #270 | 0.053 | 3.37 | 3.5 |
| Pan | | 17.45 | 0.0 |

| | |
|---|---|
| Gravel (%) | 59.8 |
| Sand (%) | 36.0 |
| Fines (%) | 4.2 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **TP-WA-13-11**
Sample No. **ARD-05**
Depth **4.9 m**
Location **Waste Area**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

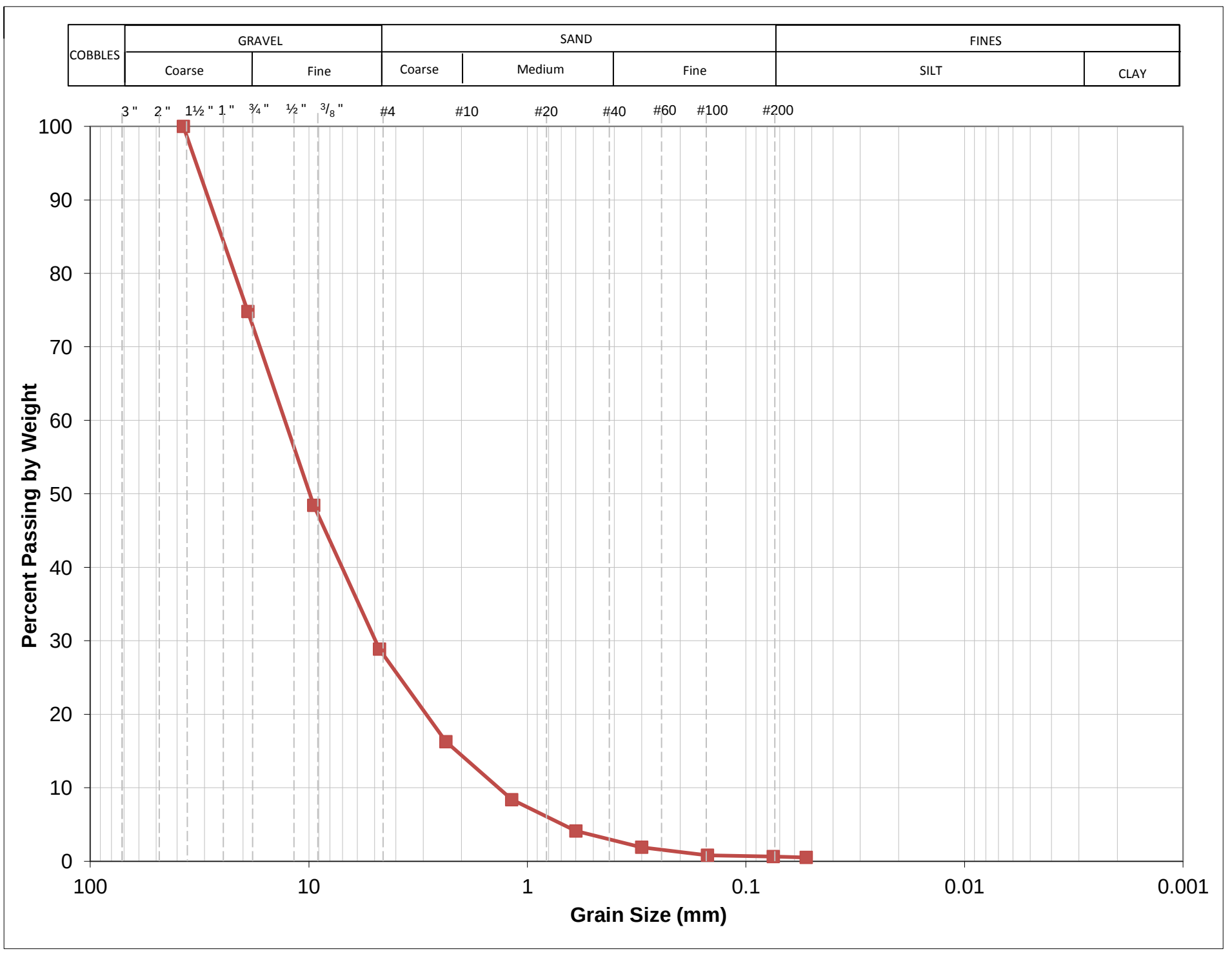
| | |
|---|---|
| Sieve Initial weight (g) | 500 |

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 125.95 | 74.8 |
| 3/8" | 9.5 | 131.88 | 48.4 |
| #4 | 4.75 | 97.84 | 28.9 |
| #8 | 2.36 | 63.01 | 16.3 |
| #14 | 1.18 | 39.47 | 8.4 |
| #30 | 0.6 | 21.29 | 4.1 |
| #48 | 0.3 | 11.03 | 1.9 |
| #100 | 0.15 | 5.45 | 0.8 |
| #200 | 0.075 | 0.91 | 0.6 |
| #270 | 0.053 | 0.57 | 0.5 |
| Pan | | 2.6 | 0.0 |

| | |
|---|---|
| Gravel (%) | 71.1 |
| Sand (%) | 28.2 |
| Fines (%) | 0.6 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**

Project No. **VM00605**

**Sample Information**

Borehole ID **HA-BA-13-01**

Sample No. **2-3 m**

Depth **2.0 m**

Location **Borrow Area**

Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

| Sieve Initial weight (g) | 100 |
|---|---|

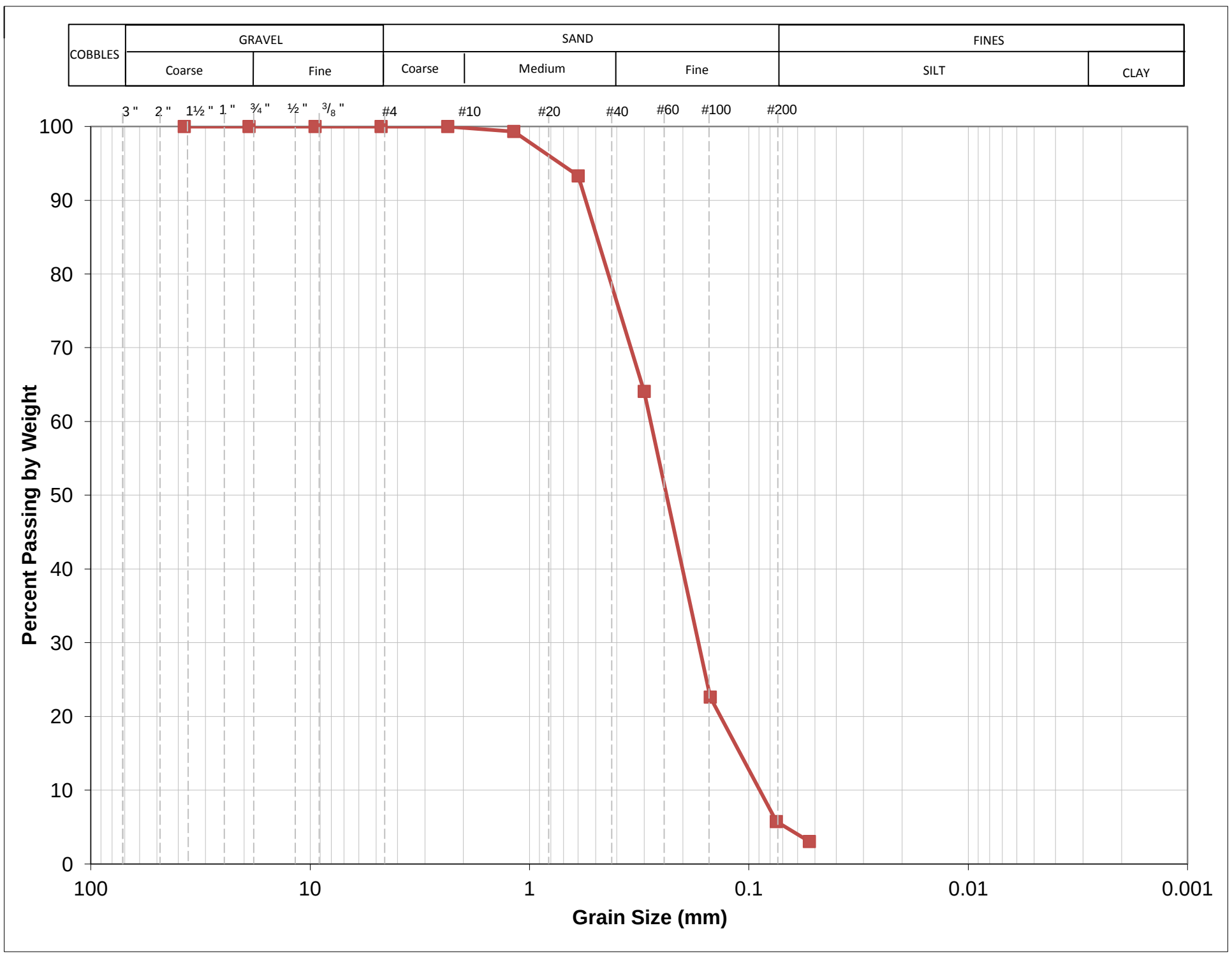
**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0 | 100.0 |
| #8 | 2.36 | 0 | 100.0 |
| #14 | 1.18 | 0.67 | 99.3 |
| #30 | 0.6 | 6.03 | 93.3 |
| #48 | 0.3 | 29.22 | 64.1 |
| #100 | 0.15 | 41.46 | 22.6 |
| #200 | 0.075 | 16.88 | 5.7 |
| #270 | 0.053 | 2.7 | 3.0 |
| Pan | | 3.04 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 94.3 |
| Fines (%) | 5.7 |

Notes:

1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



Project **Mount Nansen - 2013 Site Investigation**
Project No. **VM00605**

**Sample Information**

Borehole ID **HA-BA-13-02**
Sample No. **0-1 m**
Depth **0.0 m**
Location **Borrow Area**
Date **December 5, 2013**

## SIEVE ANALYSIS RESULTS[Note 1]

**Sample Details**

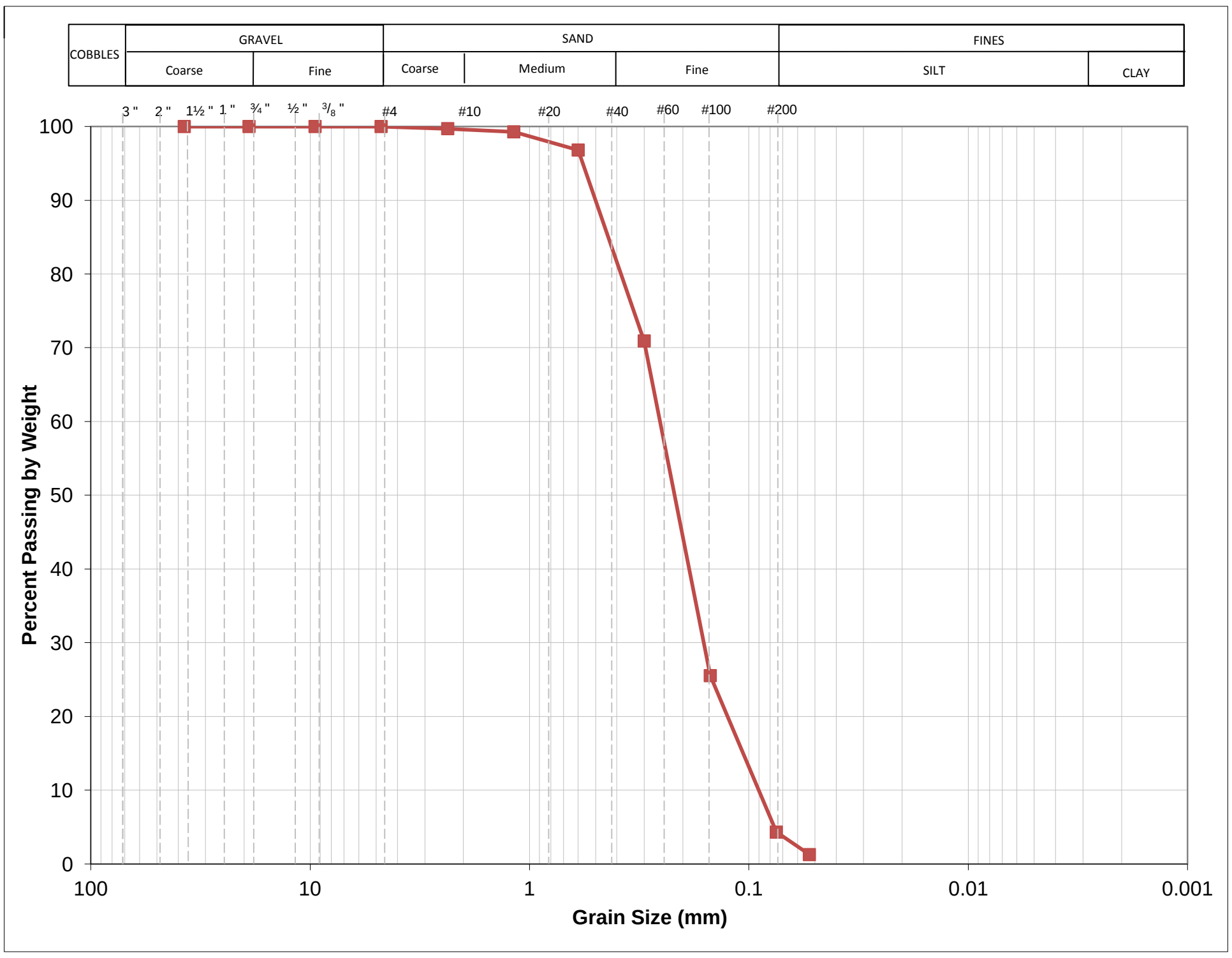
| Sieve Initial weight (g) | 100 |
|---|---|

**Sieve Results**

| Nominal Sieve Size | Sieve Size (mm) | Weight Retained (g) | % Passing |
|---|---|---|---|
| 1 1/2" | 37.5 | 0 | 100.0 |
| 3/4" | 19 | 0 | 100.0 |
| 3/8" | 9.5 | 0 | 100.0 |
| #4 | 4.75 | 0 | 100.0 |
| #8 | 2.36 | 0.29 | 99.7 |
| #14 | 1.18 | 0.43 | 99.3 |
| #30 | 0.6 | 2.47 | 96.8 |
| #48 | 0.3 | 25.89 | 70.9 |
| #100 | 0.15 | 45.39 | 25.5 |
| #200 | 0.075 | 21.22 | 4.3 |
| #270 | 0.053 | 3.05 | 1.3 |
| Pan | | 1.26 | 0.0 |

| | |
|---|---|
| Gravel (%) | 0.0 |
| Sand (%) | 95.7 |
| Fines (%) | 4.3 |

Notes:
1. Sieve test performed by SGS Canada Inc., presented by AMEC E&I.



# HYDROMETER TEST

| | | | |
|---|---|---|---|
| Project | M Nansen TA5 2013 SI Program | | |
| Project No. | VM00605E.523.20 | | |
| Lab No. | S-9985 | | |
| Hole | BH-T-13-02 | | |
| Sample | GS1 | Depth | 1.0 - 1.1m |
| Reported By | CR/MR | Date | 9-Jan-00 |

Hydrometer No. 799 Hydrometer Type 151 Graduate No. 9

Air Dried Wt. of Soil Tested 75.2 g Dry Wt. of Soil Tested 75.20

**Moisture Content**

Tare 20. g Wet + Tare 40. g Dry + Tare 40. g M.C. 0.00%

**Composite Correction Factors**

Factor -0.0084697temp^2+0.1196543temp+3.2870133 Specific Gravity $G_s$ 2.73

**Dispersant**

Type 10 % Sodium Hexametaphosphate Amount 125 Date Mixed & Jug No. 3-Dec-13

## Mechanical Sieve Results

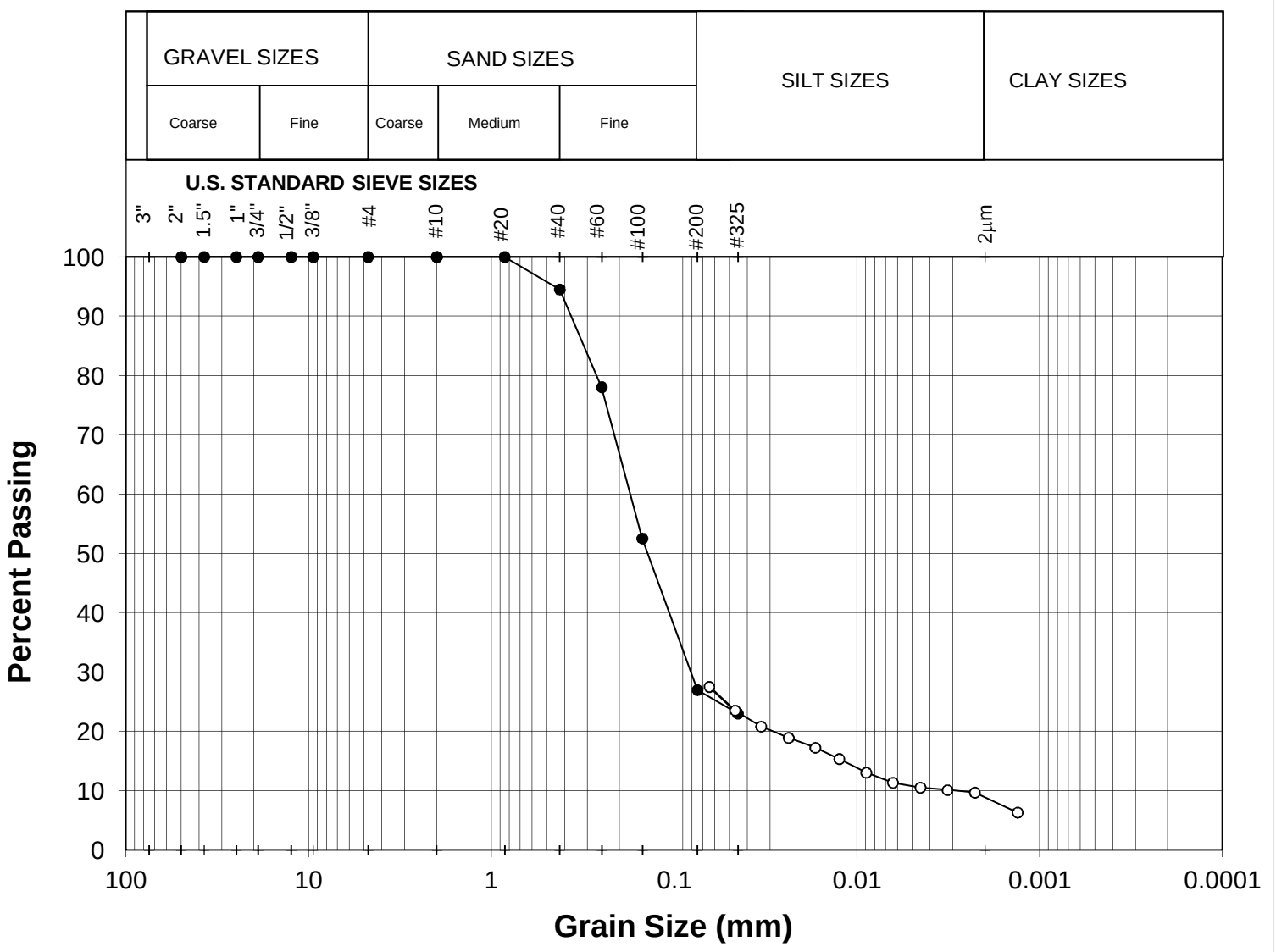
Total Wt of Sample Dry 171.6 g
+ # 10 0.0 g
- # 10 171.6 g

**Hydrometer Test**
(Adjusted for + # 10 Material)
Total Dry Wt. 75.20 g

| Sieve Size | Particle Size (mm) | Weight Retained (g) | Weight Passing (g) | Percent Finer Than | Sieve # | Particle Size (mm) | Weight Retained (g) | Weight Passing (g) | Percent Finer Than |
|---|---|---|---|---|---|---|---|---|---|
| 2 in. | 50.0 | | 171.60 | 100.0 | 10 | 2.000 | | 75.20 | 100 |
| 1 1/2 in. | 37.5 | | 171.60 | 100.0 | 20 | 0.850 | | 75.20 | 100 |
| 1 in. | 25.0 | | 171.60 | 100.0 | 40 | 0.425 | 4.1 | 71.10 | 95 |
| 3/4 in. | 19.0 | | 171.60 | 100.0 | 60 | 0.250 | 12.4 | 58.70 | 78 |
| 1/2 in. | 12.5 | | 171.60 | 100.0 | 100 | 0.150 | 19.2 | 39.50 | 53 |
| 3/8 in. | 9.5 | | 171.60 | 100.0 | 200 | 0.075 | 19.2 | 20.30 | 27 |
| 4 | 4.75 | | 171.60 | 100.0 | 325 | 0.045 | 3.0 | 17.30 | 23 |
| 10 | 2.00 | | 171.60 | 100.0 | pan | | | | |
| | | 0.0 | | | | | | | |

## Hydrometer Results

| Date | Time | Elapsed Time (min) | $R'_h$ | Temp. °C | Effective Length (cm) | Comp. Corr. | Corrected Reading | Diam. (mm) | % Soil in Susp. |
|---|---|---|---|---|---|---|---|---|---|
| 1/9/1900 | 8:42:00 | 0 | | | | | | | |
| 1/9/1900 | 8:42:30 | 0.5 | 16.1 | 22.4 | 12.1 | 2.983156 | 13.11684 | 0.0645 | 28 |
| 1/9/1900 | 8:43:00 | 1 | 14.2 | 22.4 | 12.6 | 2.983156 | 11.21684 | 0.0466 | 24 |
| 1/9/1900 | 8:44:00 | 2 | 12.9 | 22.4 | 13.1 | 2.983156 | 9.916844 | 0.0336 | 21 |
| 1/9/1900 | 8:46:00 | 4 | 12.0 | 22.4 | 13.1 | 2.983156 | 9.016844 | 0.0237 | 19 |
| 1/9/1900 | 8:50:00 | 8 | 11.2 | 22.4 | 13.4 | 2.983156 | 8.216844 | 0.0170 | 17 |
| 1/9/1900 | 8:57:00 | 15 | 10.3 | 22.4 | 13.7 | 2.983156 | 7.316844 | 0.0125 | 15 |
| 1/9/1900 | 9:12:00 | 30 | 9.2 | 22.4 | 13.9 | 2.983156 | 6.216844 | 0.0089 | 13 |
| 1/9/1900 | 9:42:00 | 60 | 8.4 | 22.4 | 14.2 | 2.983156 | 5.416844 | 0.0064 | 11 |
| 1/9/1900 | 10:42:00 | 120 | 8.0 | 22.4 | 14.2 | 2.983156 | 5.016844 | 0.0045 | 11 |
| 1/9/1900 | 12:42:00 | 240 | 7.8 | 22.4 | 14.4 | 2.983156 | 4.816844 | 0.0032 | 10 |
| 1/9/1900 | 16:42:00 | 480 | 7.6 | 22.4 | 14.4 | 2.983156 | 4.616844 | 0.0023 | 10 |
| 1/10/1900 | 8:42:00 | 1440 | 6.0 | 22.4 | 14.7 | 2.983156 | 3.016844 | 0.0013 | 6 |




| Remarks | SUMMARY | | | |
|---|---|---|---|---|
| | $D_{10}$ = | 0.003 | Gravel | 0.0 % |
| | $D_{30}$ = | 0.084 | Sand | 73.0 % |
| | $D_{50}$ = | 0.143 | Silt Sizes | 18.3 % |
| | $D_{60}$ = | 0.179 | Clay Sizes | 8.7 % |
| | $C_U$ = | | | |
| | $C_C$ = | | | |

**Results of Other Testing**

| | |
|---|---|
| WL | % |
| WP | % |
| IP | % |

amec

# Grain Size Distribution

| | | | |
|---|---|---|---|
| Project | M Nansen TA5 2013 SI Program | | |
| Project No. | VM00605E.523.20 | | |
| Lab No. | S-9985 | | |
| Sample | BH-T-13-02 | | |
| Hole | GS1 | Depth | 1.0 - 1.1m |
| Reported By | CR/MR | Date | 9-Jan-00 |

# HYDROMETER TEST

| | | | |
|---|---|---|---|
| Project | M Nansen TA5 2013 SI Program | | |
| Project No. | VM00605E.523.20 | | |
| Lab No. | S-9985 | | |
| Hole | GP-T-13-03 | | |
| Sample | GS1 | Depth | 5.0 - 6.0m |
| Reported By | CR/MR | Date | 9-Jan-00 |

Hydrometer No. 799 Hydrometer Type 151 Graduate No. 17

Air Dried Wt. of Soil Tested 50.6 g Dry Wt. of Soil Tested 50.60 10

**Moisture Content**

Tare 20. g Wet + Tare 40. g Dry + Tare 40. g M.C. 0.00%

**Composite Correction Factors**

Factor -0.0084697temp^2+0.1196543temp+3.2870133 Specific Gravity $G_s$ 2.73

**Dispersant**

Type 10 % Sodium Hexametaphosphate Amount 125 Date Mixed & Jug No. 3-Dec-13

## Mechanical Sieve Results

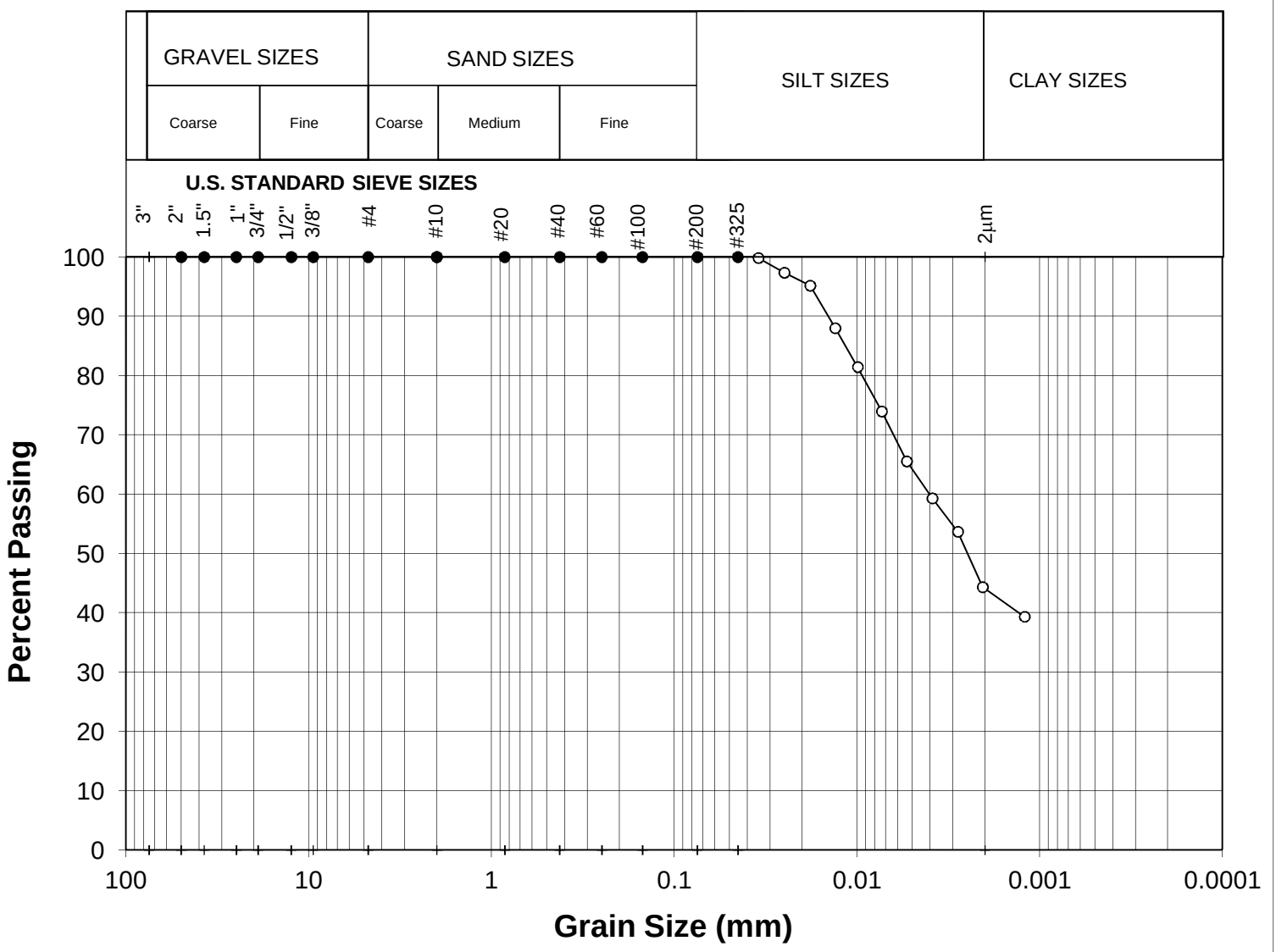
Total Wt of Sample Dry 100.7 g
+ # 10 0.0 g
- # 10 100.7 g

**Hydrometer Test**
(Adjusted for + # 10 Material)
Total Dry Wt. 50.60 g

| Sieve Size | Particle Size (mm) | Weight Retained (g) | Weight Passing (g) | Percent Finer Than | Sieve # | Particle Size (mm) | Weight Retained (g) | Weight Passing (g) | Percent Finer Than |
|---|---|---|---|---|---|---|---|---|---|
| 2 in. | 50.0 | | 100.70 | 100.0 | 10 | 2.000 | | 50.60 | 100 |
| 1 1/2 in. | 37.5 | | 100.70 | 100.0 | 20 | 0.850 | | 50.60 | 100 |
| 1 in. | 25.0 | | 100.70 | 100.0 | 40 | 0.425 | | 50.60 | 100 |
| 3/4 in. | 19.0 | | 100.70 | 100.0 | 60 | 0.250 | | 50.60 | 100 |
| 1/2 in. | 12.5 | | 100.70 | 100.0 | 100 | 0.150 | | 50.60 | 100 |
| 3/8 in. | 9.5 | | 100.70 | 100.0 | 200 | 0.075 | | 50.60 | 100 |
| 4 | 4.75 | | 100.70 | 100.0 | 325 | 0.045 | | 50.60 | 100 |
| 10 | 2.00 | | 100.70 | 100.0 | pan | | | | |
| | | 0.0 | | | | | | | |

## Hydrometer Results

| Date | Time | Elapsed Time (min) | $R'_h$ | Temp. $^oC$ | Effective Length (cm) | Comp. Corr. | Corrected Reading | Diam. (mm) | % Soil in Susp. |
|---|---|---|---|---|---|---|---|---|---|
| 1/9/1900 | 8:42:00 | 0 | | | | | | | |
| 1/9/1900 | 8:42:30 | 0.5 | 36.2 | 22.4 | 6.8 | 2.983156 | 33.21684 | 0.0484 | 104 |
| 1/9/1900 | 8:43:00 | 1 | 35.0 | 22.4 | 7 | 2.983156 | 32.01684 | 0.0347 | 100 |
| 1/9/1900 | 8:44:00 | 2 | 34.2 | 22.4 | 7.3 | 2.983156 | 31.21684 | 0.0251 | 97 |
| 1/9/1900 | 8:46:00 | 4 | 33.5 | 22.4 | 7.6 | 2.983156 | 30.51684 | 0.0181 | 95 |
| 1/9/1900 | 8:50:00 | 8 | 31.2 | 22.4 | 8.1 | 2.983156 | 28.21684 | 0.0132 | 88 |
| 1/9/1900 | 8:57:00 | 15 | 29.1 | 22.4 | 8.6 | 2.983156 | 26.11684 | 0.0099 | 81 |
| 1/9/1900 | 9:12:00 | 30 | 26.7 | 22.4 | 9.4 | 2.983156 | 23.71684 | 0.0073 | 74 |
| 1/9/1900 | 9:42:00 | 60 | 24.0 | 22.4 | 10 | 2.983156 | 21.01684 | 0.0054 | 66 |
| 1/9/1900 | 10:42:00 | 120 | 22.0 | 22.4 | 10.5 | 2.983156 | 19.01684 | 0.0039 | 59 |
| 1/9/1900 | 12:42:00 | 240 | 20.2 | 22.4 | 11 | 2.983156 | 17.21684 | 0.0028 | 54 |
| 1/9/1900 | 16:42:00 | 480 | 17.2 | 22.4 | 11.8 | 2.983156 | 14.21684 | 0.0021 | 44 |
| 1/10/1900 | 8:42:00 | 1440 | 15.6 | 22.4 | 12.3 | 2.983156 | 12.61684 | 0.0012 | 39 |




| Remarks | SUMMARY | | | |
|---|---|---|---|---|
| | $D_{10}$ = | | Gravel | 0.0 % |
| | $D_{30}$ = | | Sand | 0.0 % |
| | $D_{50}$ = | 0.003 | Silt Sizes | 56.0 % |
| | $D_{60}$ = | 0.004 | Clay Sizes | 44.0 % |
| | $C_U$ = | | | |
| | $C_C$ = | | | |

**Results of Other Testing**

| | |
|---|---|
| WL | % |
| WP | % |
| IP | % |

amec

# Grain Size Distribution

| | | | |
|---|---|---|---|
| Project | M Nansen TA5 2013 SI Program | | |
| Project No. | VM00605E.523.20 | | |
| Lab No. | S-9985 | | |
| Sample | GP-T-13-03 | | |
| Hole | GS1 | Depth | 5.0 - 6.0m |
| Reported By | CR/MR | Date | 9-Jan-00 |

# HYDROMETER TEST

| | | | |
|---|---|---|---|
| Project | M Nansen TA5 2013 SI Program | | |
| Project No. | VM00605E.523.20 | | |
| Lab No. | S-9985 | | |
| Hole | GP-T-13-10 | | |
| Sample | N/A | Depth | 8.6 - 9.4m |
| Reported By | CR/MR | Date | 26-Mar-13 |

Hydrometer No. 799 Hydrometer Type 151 Graduate No. 11

Air Dried Wt. of Soil Tested 50.2 g Dry Wt. of Soil Tested 50.20

**Moisture Content**

Tare 20. g Wet + Tare 40. g Dry + Tare 40. g M.C. 0.00%

**Composite Correction Factors**

Factor -0.0084697temp^2+0.1196543temp+3.2870133 Specific Gravity $G_s$ 2.73

**Dispersant**

Type 10 % Sodium Hexametaphosphate Amount 125 Date Mixed & Jug No. 25-Mar-13

## Mechanical Sieve Results

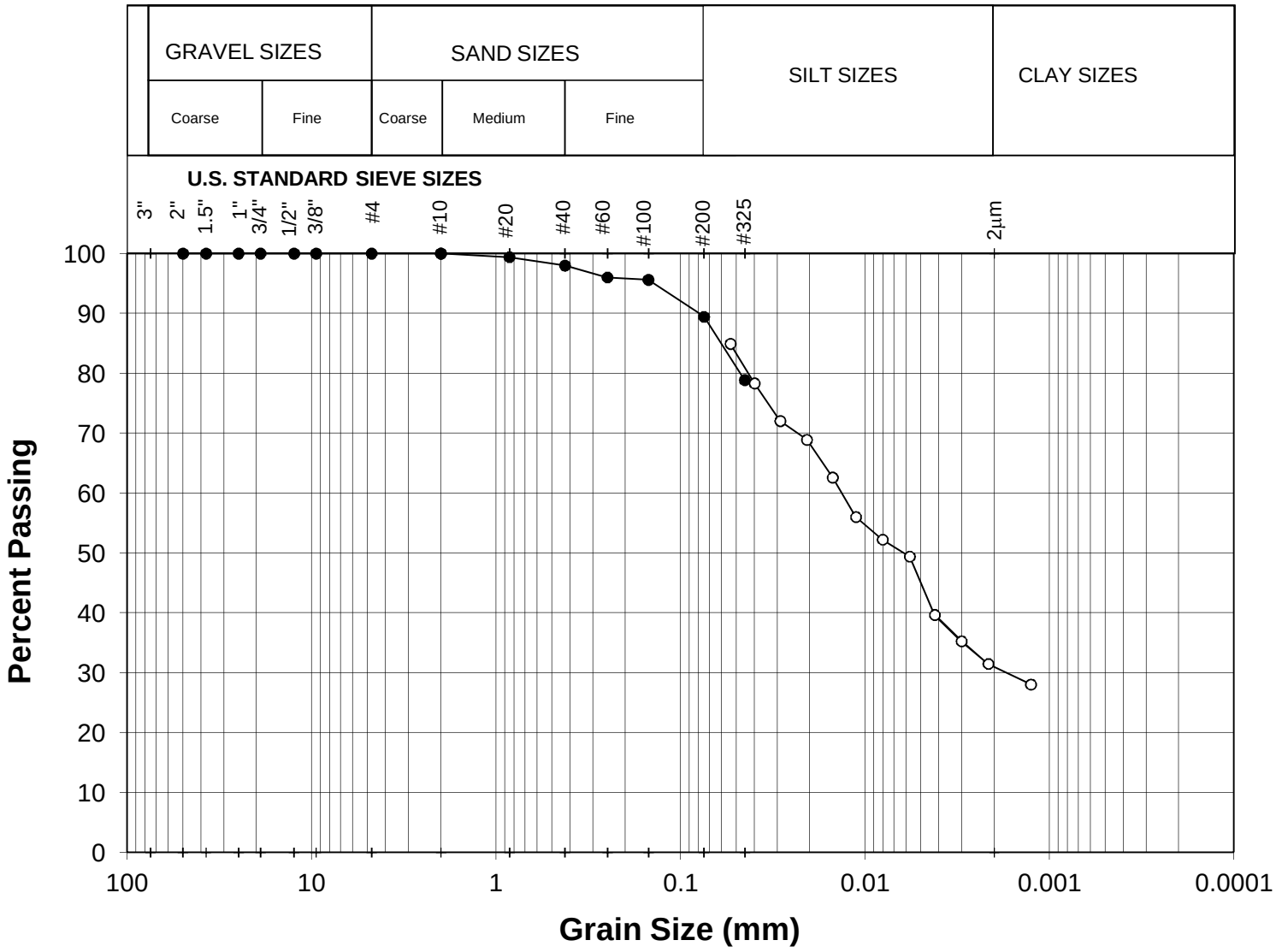
Total Wt of Sample Dry 139.4 g
+ # 10 0.0 g
- # 10 139.4 g

**Hydrometer Test**
(Adjusted for + # 10 Material)
Total Dry Wt. 50.20 g

| Sieve Size | Particle Size (mm) | Weight Retained (g) | Weight Passing (g) | Percent Finer Than | Sieve # | Particle Size (mm) | Weight Retained (g) | Weight Passing (g) | Percent Finer Than |
|---|---|---|---|---|---|---|---|---|---|
| 2 in. | 50.0 | | 139.40 | 100.0 | 10 | 2.000 | | 50.20 | 100 |
| 1 1/2 in. | 37.5 | | 139.40 | 100.0 | 20 | 0.850 | 0.3 | 49.90 | 99 |
| 1 in. | 25.0 | | 139.40 | 100.0 | 40 | 0.425 | 0.7 | 49.20 | 98 |
| 3/4 in. | 19.0 | | 139.40 | 100.0 | 60 | 0.250 | 1.0 | 48.20 | 96 |
| 1/2 in. | 12.5 | | 139.40 | 100.0 | 100 | 0.150 | 0.2 | 48.00 | 96 |
| 3/8 in. | 9.5 | | 139.40 | 100.0 | 200 | 0.075 | 3.1 | 44.90 | 89 |
| 4 | 4.75 | | 139.40 | 100.0 | 325 | 0.045 | 5.3 | 39.60 | 79 |
| 10 | 2.00 | | 139.40 | 100.0 | pan | | | | |
| | | 0.0 | | | | | | | |

## Hydrometer Results

| Date | Time | Elapsed Time (min) | $R'_h$ | Temp. $^oC$ | Effective Length (cm) | Comp. Corr. | Corrected Reading | Diam. (mm) | % Soil in Susp. |
|---|---|---|---|---|---|---|---|---|---|
| 3/26/2013 | 8:42:00 | 0 | | | | | | | |
| 3/26/2013 | 8:42:30 | 0.5 | 30.0 | 22.4 | 8.4 | 2.983156 | 27.01684 | 0.0538 | 85 |
| 3/26/2013 | 8:43:00 | 1 | 27.9 | 22.4 | 9.2 | 2.983156 | 24.91684 | 0.0398 | 78 |
| 3/26/2013 | 8:44:00 | 2 | 25.9 | 22.4 | 9.7 | 2.983156 | 22.91684 | 0.0289 | 72 |
| 3/26/2013 | 8:46:00 | 4 | 24.9 | 22.4 | 10 | 2.983156 | 21.91684 | 0.0207 | 69 |
| 3/26/2013 | 8:50:00 | 8 | 22.9 | 22.4 | 10.5 | 2.983156 | 19.91684 | 0.0150 | 63 |
| 3/26/2013 | 8:57:00 | 15 | 20.8 | 22.4 | 11 | 2.983156 | 17.81684 | 0.0112 | 56 |
| 3/26/2013 | 9:12:00 | 30 | 19.6 | 22.4 | 11.3 | 2.983156 | 16.61684 | 0.0081 | 52 |
| 3/26/2013 | 9:42:00 | 60 | 18.7 | 22.4 | 11.5 | 2.983156 | 15.71684 | 0.0057 | 49 |
| 3/26/2013 | 10:42:00 | 120 | 15.6 | 22.4 | 12.3 | 2.983156 | 12.61684 | 0.0042 | 40 |
| 3/26/2013 | 12:42:00 | 240 | 14.2 | 22.4 | 12.6 | 2.983156 | 11.21684 | 0.0030 | 35 |
| 3/26/2013 | 16:42:00 | 480 | 13.0 | 22.4 | 12.9 | 2.983156 | 10.01684 | 0.0022 | 31 |
| 3/27/2013 | 8:42:00 | 1440 | 11.9 | 22.4 | 13.4 | 2.983156 | 8.916844 | 0.0013 | 28 |




| Remarks | SUMMARY | | | |
|---|---|---|---|---|
| | $D_{10}$ = | | Gravel | 0.0 % |
| | $D_{30}$ = | 0.002 | Sand | 10.6 % |
| | $D_{50}$ = | 0.006 | Silt Sizes | 58.5 % |
| | $D_{60}$ = | 0.014 | Clay Sizes | 30.9 % |
| | $C_U$ = | | | |
| | $C_C$ = | | | |

**Results of Other Testing**

| | |
|---|---|
| WL | % |
| WP | % |
| IP | % |

# Grain Size Distribution

| | | | |
|---|---|---|---|
| Project | M Nansen TA5 2013 SI Program | | |
| Project No. | VM00605E.523.20 | | |
| Lab No. | S-9985 | | |
| Sample | GP-T-13-10 | | |
| Hole | N/A | Depth | 8.6 - 9.4m |
| Reported By | CR/MR | Date | 26-Mar-13 |

# HYDROMETER TEST

| | | | |
|---|---|---|---|
| Project | M Nansen TA5 2013 SI Program | | |
| Project No. | VM00605E.523.20 | | |
| Lab No. | S-9985 | | |
| Hole | TP-T-13-04 | | |
| Sample | GS1 | Depth | 1.0 - 1.1m |
| Reported By | CR/MR | Date | 9-Jan-00 |

Hydrometer No. 799 Hydrometer Type 151 Graduate No. 10

Air Dried Wt. of Soil Tested 115.2 g Dry Wt. of Soil Tested 115.20 10

**Moisture Content**

Tare 20. g Wet + Tare 40. g Dry + Tare 40. g M.C. 0.00%

**Composite Correction Factors**

Factor -0.0084697temp^2+0.1196543temp+3.2870133 Specific Gravity $G_s$ 2.73

**Dispersant**

Type 10 % Sodium Hexametaphosphate Amount 125 Date Mixed & Jug No. 3-Dec-13

## Mechanical Sieve Results

Total Wt of Sample Dry 279.4 g
+ # 10 0.0 g
- # 10 279.4 g

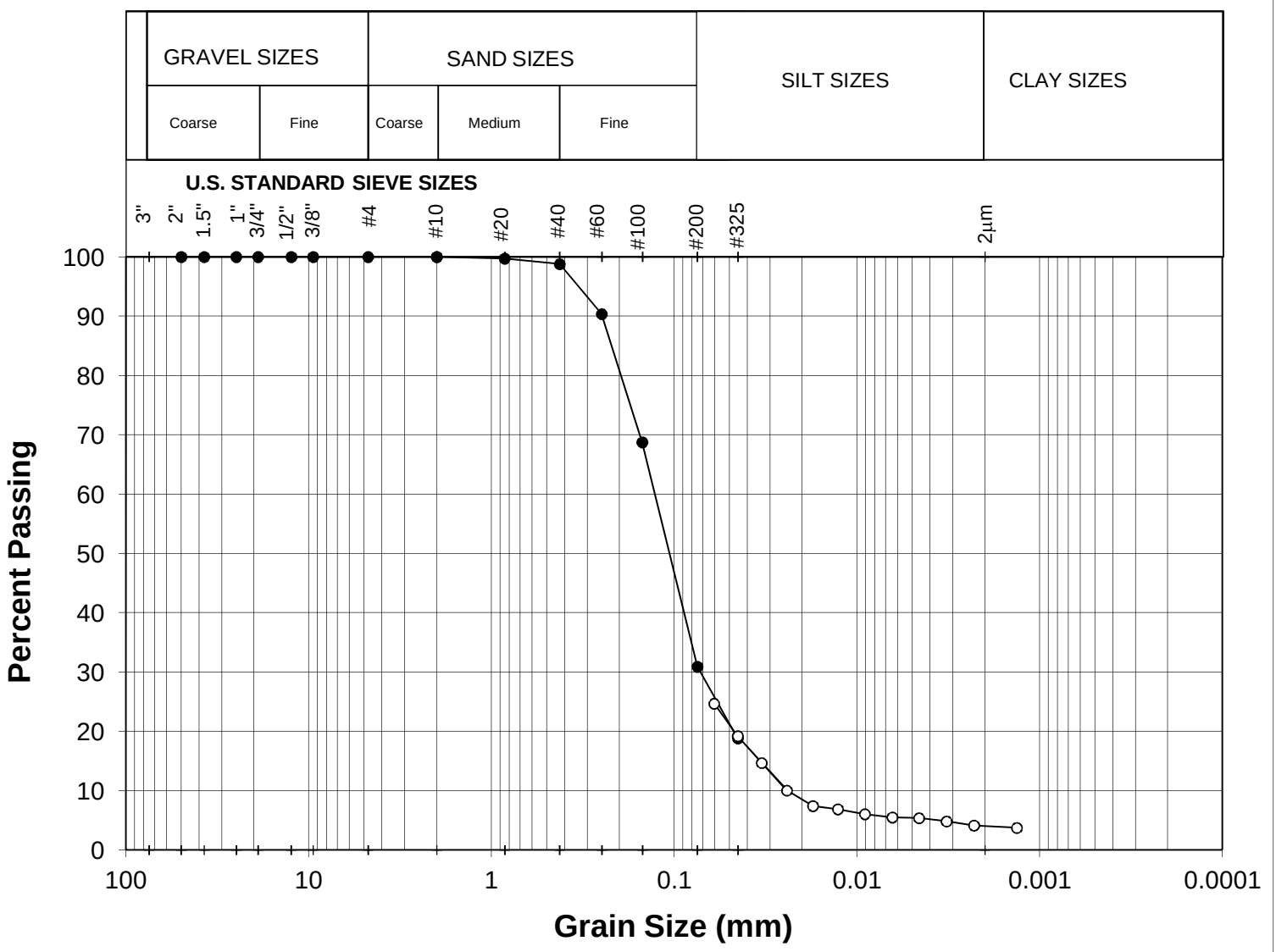
**Hydrometer Test**
(Adjusted for + # 10 Material)
Total Dry Wt. 115.20 g

| Sieve Size | Particle Size (mm) | Weight Retained (g) | Weight Passing (g) | Percent Finer Than | Sieve # | Particle Size (mm) | Weight Retained (g) | Weight Passing (g) | Percent Finer Than |
|---|---|---|---|---|---|---|---|---|---|
| 2 in. | 50.0 | | 279.40 | 100.0 | 10 | 2.000 | | 115.20 | 100 |
| 1 1/2 in. | 37.5 | | 279.40 | 100.0 | 20 | 0.850 | 0.3 | 114.90 | 100 |
| 1 in. | 25.0 | | 279.40 | 100.0 | 40 | 0.425 | 1.1 | 113.80 | 99 |
| 3/4 in. | 19.0 | | 279.40 | 100.0 | 60 | 0.250 | 9.7 | 104.10 | 90 |
| 1/2 in. | 12.5 | | 279.40 | 100.0 | 100 | 0.150 | 24.9 | 79.20 | 69 |
| 3/8 in. | 9.5 | | 279.40 | 100.0 | 200 | 0.075 | 43.6 | 35.60 | 31 |
| 4 | 4.75 | | 279.40 | 100.0 | 325 | 0.045 | 13.9 | 21.70 | 19 |
| 10 | 2.00 | | 279.40 | 100.0 | pan | | | | |

0.0

## Hydrometer Results

| Date | Time | Elapsed Time (min) | $R'_h$ | Temp. $^oC$ | Effective Length (cm) | Comp. Corr. | Corrected Reading | Diam. (mm) | % Soil in Susp. |
|---|---|---|---|---|---|---|---|---|---|
| 1/9/1900 | 8:42:00 | 0 | | | | | | | |
| 1/9/1900 | 8:42:30 | 0.5 | 21.0 | 22.4 | 10.7 | 2.983156 | 18.01684 | 0.0607 | 25 |
| 1/9/1900 | 8:43:00 | 1 | 17.0 | 22.4 | 11.8 | 2.983156 | 14.01684 | 0.0451 | 19 |
| 1/9/1900 | 8:44:00 | 2 | 13.7 | 22.4 | 12.9 | 2.983156 | 10.71684 | 0.0333 | 15 |
| 1/9/1900 | 8:46:00 | 4 | 10.3 | 22.4 | 13.7 | 2.983156 | 7.316844 | 0.0243 | 10 |
| 1/9/1900 | 8:50:00 | 8 | 8.4 | 22.4 | 14.2 | 2.983156 | 5.416844 | 0.0175 | 7 |
| 1/9/1900 | 8:57:00 | 15 | 8.0 | 22.4 | 14.2 | 2.983156 | 5.016844 | 0.0128 | 7 |
| 1/9/1900 | 9:12:00 | 30 | 7.4 | 22.4 | 14.4 | 2.983156 | 4.416844 | 0.0091 | 6 |
| 1/9/1900 | 9:42:00 | 60 | 7.0 | 22.4 | 14.4 | 2.983156 | 4.016844 | 0.0064 | 6 |
| 1/9/1900 | 10:42:00 | 120 | 6.9 | 22.4 | 14.7 | 2.983156 | 3.916844 | 0.0046 | 5 |
| 1/9/1900 | 12:42:00 | 240 | 6.5 | 22.4 | 14.7 | 2.983156 | 3.516844 | 0.0032 | 5 |
| 1/9/1900 | 16:42:00 | 480 | 6.0 | 22.4 | 14.7 | 2.983156 | 3.016844 | 0.0023 | 4 |
| 1/10/1900 | 8:42:00 | 1440 | 5.7 | 22.4 | 15 | 2.983156 | 2.716844 | 0.0013 | 4 |




| Remarks | SUMMARY | | | |
|---|---|---|---|---|
| | $D_{10}$ = | 0.024 | Gravel | 0.0 % |
| | $D_{30}$ = | 0.073 | Sand | 69.1 % |
| | $D_{50}$ = | 0.113 | Silt Sizes | 26.9 % |
| | $D_{60}$ = | 0.133 | Clay Sizes | 4.0 % |
| | $C_U$ = | | | |
| | $C_C$ = | | | |

**Results of Other Testing**

| | |
|---|---|
| WL | % |
| WP | % |
| IP | % |

amec

# Grain Size Distribution

| | | | |
|---|---|---|---|
| Project | M Nansen TA5 2013 SI Program | | |
| Project No. | VM00605E.523.20 | | |
| Lab No. | S-9985 | | |
| Sample | TP-T-13-04 | | |
| Hole | GS1 | Depth | 1.0 - 1.1m |
| Reported By | CR/MR | Date | 9-Jan-00 |

# HYDROMETER TEST

| | | | |
|---|---|---|---|
| Project | M Nansen TA5 2013 SI Program | | |
| Project No. | VM00605E.523.20 | | |
| Lab No. | S-9985 | | |
| Hole | TP-T-13-04 | | |
| Sample | GS6 | Depth | 3.0 - 3.1m |
| Reported By | CR/MR | Date | 9-Jan-00 |

Hydrometer No. 799 Hydrometer Type 151 Graduate No. 18

Air Dried Wt. of Soil Tested 50.7 g Dry Wt. of Soil Tested 50.70 10

**Moisture Content**

Tare 20. g Wet + Tare 40. g Dry + Tare 40. g M.C. 0.00%

**Composite Correction Factors**

Factor -0.0084697temp^2+0.1196543temp+3.2870133 Specific Gravity $G_s$ 2.73

**Dispersant**

Type 10 % Sodium Hexametaphosphate Amount 125 Date Mixed & Jug No. 3-Dec-13

## Mechanical Sieve Results

Total Wt of Sample Dry 468.1 g
+ # 10 0.0 g
- # 10 468.1 g

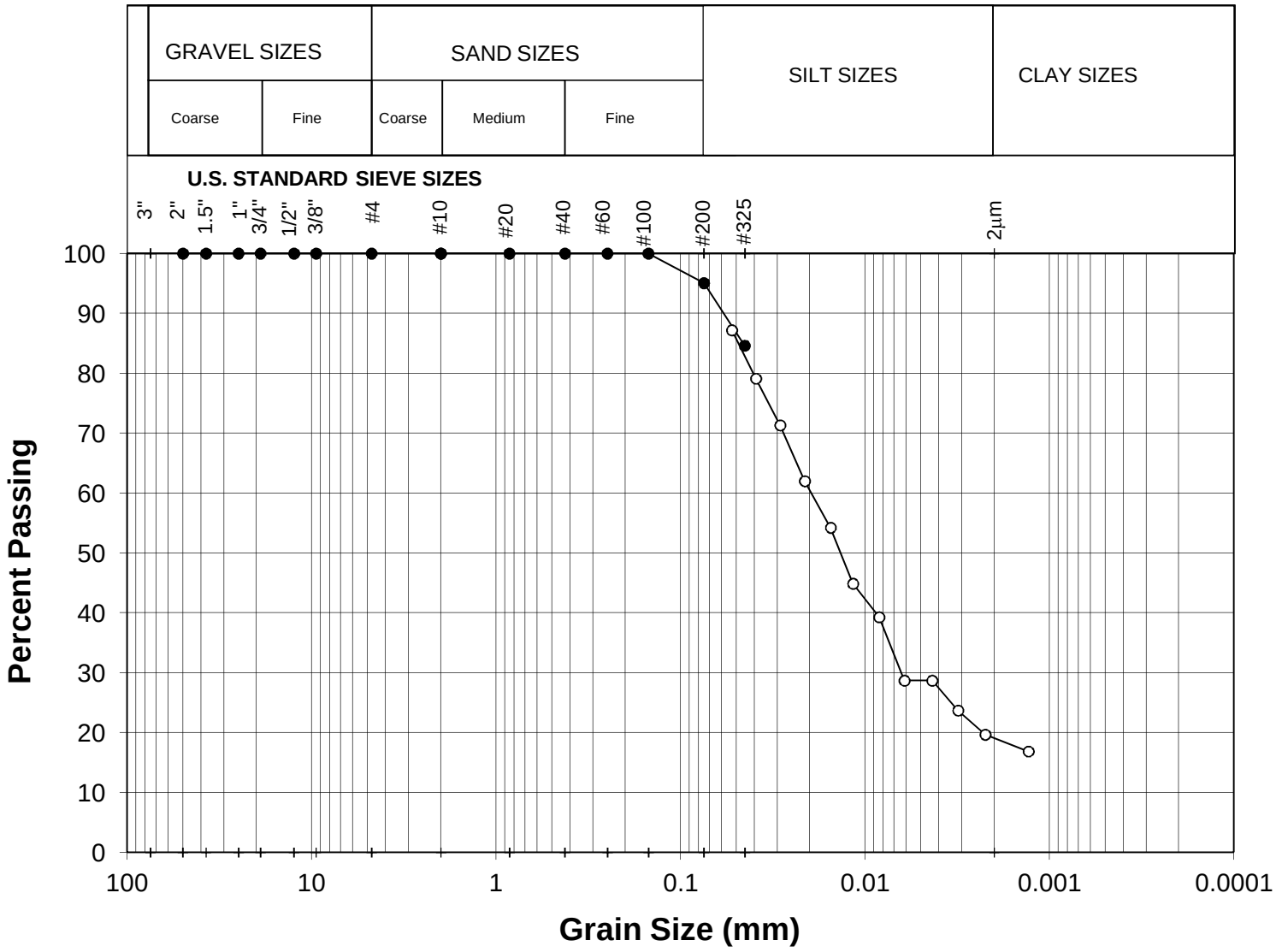
**Hydrometer Test**
(Adjusted for + # 10 Material)
Total Dry Wt. 50.70 g

| Sieve Size | Particle Size (mm) | Weight Retained (g) | Weight Passing (g) | Percent Finer Than | Sieve # | Particle Size (mm) | Weight Retained (g) | Weight Passing (g) | Percent Finer Than |
|---|---|---|---|---|---|---|---|---|---|
| 2 in. | 50.0 | | 468.10 | 100.0 | 10 | 2.000 | | 50.70 | 100 |
| 1 1/2 in. | 37.5 | | 468.10 | 100.0 | 20 | 0.850 | | 50.70 | 100 |
| 1 in. | 25.0 | | 468.10 | 100.0 | 40 | 0.425 | | 50.70 | 100 |
| 3/4 in. | 19.0 | | 468.10 | 100.0 | 60 | 0.250 | | 50.70 | 100 |
| 1/2 in. | 12.5 | | 468.10 | 100.0 | 100 | 0.150 | | 50.70 | 100 |
| 3/8 in. | 9.5 | | 468.10 | 100.0 | 200 | 0.075 | 2.5 | 48.20 | 95 |
| 4 | 4.75 | | 468.10 | 100.0 | 325 | 0.045 | 5.3 | 42.90 | 85 |
| 10 | 2.00 | | 468.10 | 100.0 | pan | | | | |

0.0

## Hydrometer Results

| Date | Time | Elapsed Time (min) | $R'_h$ | Temp. °C | Effective Length (cm) | Comp. Corr. | Corrected Reading | Diam. (mm) | % Soil in Susp. |
|---|---|---|---|---|---|---|---|---|---|
| 1/9/1900 | 8:42:00 | 0 | | | | | | | |
| 1/9/1900 | 8:42:30 | 0.5 | 31.0 | 22.4 | 8.1 | 2.983156 | 28.01684 | 0.0528 | 87 |
| 1/9/1900 | 8:43:00 | 1 | 28.4 | 22.4 | 8.9 | 2.983156 | 25.41684 | 0.0391 | 79 |
| 1/9/1900 | 8:44:00 | 2 | 25.9 | 22.4 | 9.7 | 2.983156 | 22.91684 | 0.0289 | 71 |
| 1/9/1900 | 8:46:00 | 4 | 22.9 | 22.4 | 10.5 | 2.983156 | 19.91684 | 0.0213 | 62 |
| 1/9/1900 | 8:50:00 | 8 | 20.4 | 22.4 | 11 | 2.983156 | 17.41684 | 0.0154 | 54 |
| 1/9/1900 | 8:57:00 | 15 | 17.4 | 22.4 | 11.8 | 2.983156 | 14.41684 | 0.0116 | 45 |
| 1/9/1900 | 9:12:00 | 30 | 15.6 | 22.4 | 12.3 | 2.983156 | 12.61684 | 0.0084 | 39 |
| 1/9/1900 | 9:42:00 | 60 | 12.2 | 22.4 | 13.1 | 2.983156 | 9.216844 | 0.0061 | 29 |
| 1/9/1900 | 10:42:00 | 120 | 12.2 | 22.4 | 13.1 | 2.983156 | 9.216844 | 0.0043 | 29 |
| 1/9/1900 | 12:42:00 | 240 | 10.6 | 22.4 | 13.7 | 2.983156 | 7.616844 | 0.0031 | 24 |
| 1/9/1900 | 16:42:00 | 480 | 9.3 | 22.4 | 13.9 | 2.983156 | 6.316844 | 0.0022 | 20 |
| 1/10/1900 | 8:42:00 | 1440 | 8.4 | 22.4 | 14.2 | 2.983156 | 5.416844 | 0.0013 | 17 |




| Remarks | SUMMARY | | | |
|---|---|---|---|---|
| | $D_{10}$ = | | Gravel | 0.0 % |
| | $D_{30}$ = | 0.006 | Sand | 4.9 % |
| | $D_{50}$ = | 0.014 | Silt Sizes | 76.1 % |
| | $D_{60}$ = | 0.020 | Clay Sizes | 19.0 % |
| | $C_U$ = | | | |
| | $C_C$ = | | | |

**Results of Other Testing**

| | |
|---|---|
| WL | % |
| WP | % |
| IP | % |

amec

# Grain Size Distribution

| | | | |
|---|---|---|---|
| Project | M Nansen TA5 2013 SI Program | | |
| Project No. | VM00605E.523.20 | | |
| Lab No. | S-9985 | | |
| Sample | TP-T-13-04 | | |
| Hole | GS6 | Depth | 3.0 - 3.1m |
| Reported By | CR/MR | Date | 9-Jan-00 |

# HYDROMETER TEST

| | | | |
|---|---|---|---|
| Project | M Nansen TA5 2013 SI Program | | |
| Project No. | VM00605E.523.20 | | |
| Lab No. | S-9985 | | |
| Hole | TP-T-13-06 | | |
| Sample | GS1 | Depth | 0.8 - 0.9m |
| Reported By | CR/MR | Date | 9-Jan-00 |

Hydrometer No. 799 Hydrometer Type 151 Graduate No. 18

Air Dried Wt. of Soil Tested 75.1 g Dry Wt. of Soil Tested 75.10 10

**Moisture Content**

Tare 20. g Wet + Tare 40. g Dry + Tare 40. g M.C. 0.00%

**Composite Correction Factors**

Factor -0.0084697temp^2+0.1196543temp+3.2870133 Specific Gravity $G_s$ 2.73

**Dispersant**

Type 10 % Sodium Hexametaphosphate Amount 125 Date Mixed & Jug No. 3-Dec-13

## Mechanical Sieve Results

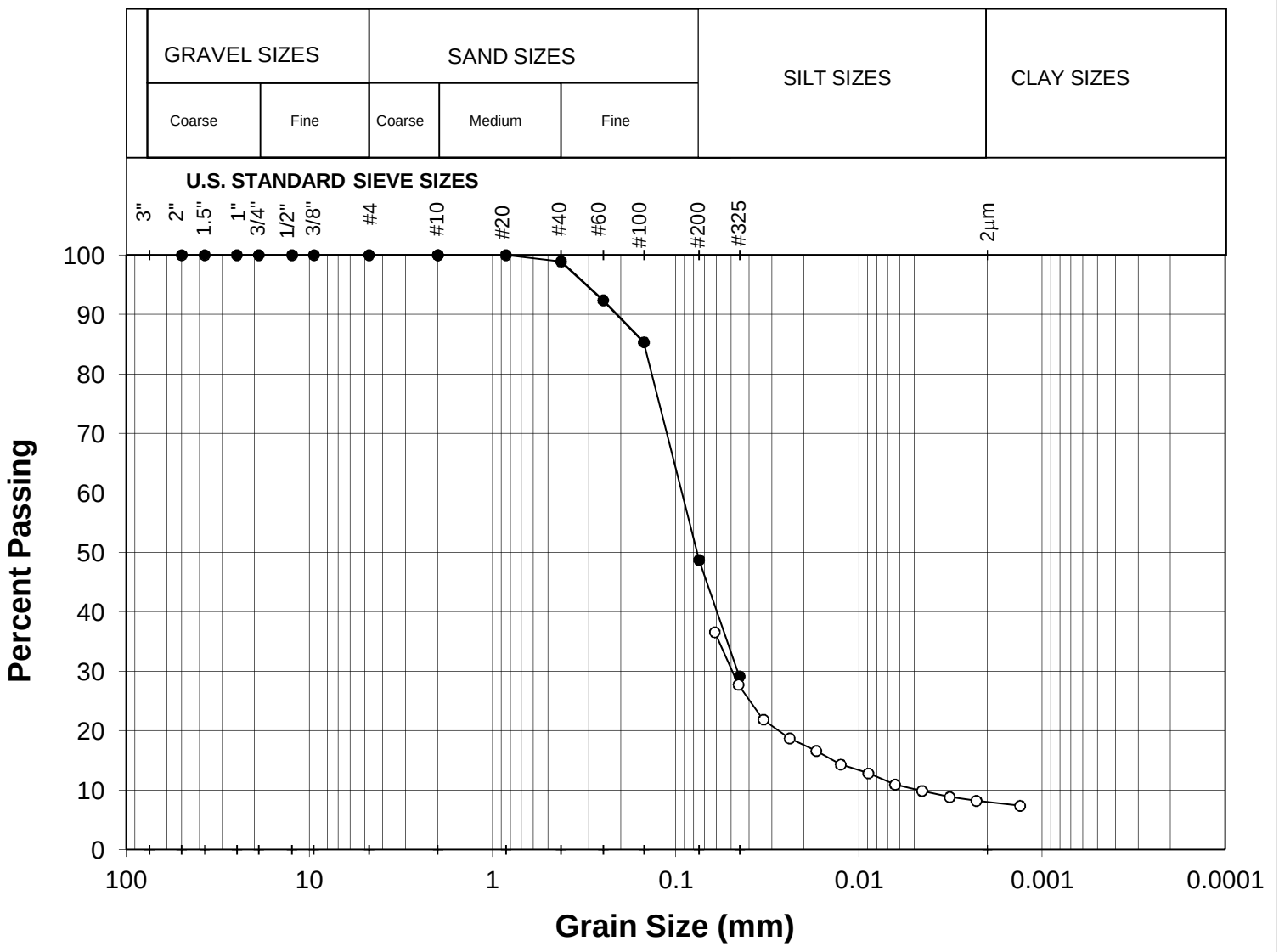
Total Wt of Sample Dry 287.3 g
+ # 10 0.0 g
- # 10 287.3 g

**Hydrometer Test**
(Adjusted for + # 10 Material)
Total Dry Wt. 75.10 g

| Sieve Size | Particle Size (mm) | Weight Retained (g) | Weight Passing (g) | Percent Finer Than | Sieve # | Particle Size (mm) | Weight Retained (g) | Weight Passing (g) | Percent Finer Than |
|---|---|---|---|---|---|---|---|---|---|
| 2 in. | 50.0 | | 287.30 | 100.0 | 10 | 2.000 | | 75.10 | 100 |
| 1 1/2 in. | 37.5 | | 287.30 | 100.0 | 20 | 0.850 | | 75.10 | 100 |
| 1 in. | 25.0 | | 287.30 | 100.0 | 40 | 0.425 | 0.8 | 74.30 | 99 |
| 3/4 in. | 19.0 | | 287.30 | 100.0 | 60 | 0.250 | 4.9 | 69.40 | 92 |
| 1/2 in. | 12.5 | | 287.30 | 100.0 | 100 | 0.150 | 5.3 | 64.10 | 85 |
| 3/8 in. | 9.5 | | 287.30 | 100.0 | 200 | 0.075 | 27.5 | 36.60 | 49 |
| 4 | 4.75 | | 287.30 | 100.0 | 325 | 0.045 | 14.7 | 21.90 | 29 |
| 10 | 2.00 | | 287.30 | 100.0 | pan | | | | |
| | | 0.0 | | | | | | | |

## Hydrometer Results

| Date | Time | Elapsed Time (min) | $R'_h$ | Temp. $^oC$ | Effective Length (cm) | Comp. Corr. | Corrected Reading | Diam. (mm) | % Soil in Susp. |
|---|---|---|---|---|---|---|---|---|---|
| 1/9/1900 | 8:42:00 | 0 | | | | | | | |
| 1/9/1900 | 8:42:30 | 0.5 | 20.4 | 22.4 | 11 | 2.983156 | 17.41684 | 0.0615 | 37 |
| 1/9/1900 | 8:43:00 | 1 | 16.2 | 22.4 | 12.1 | 2.983156 | 13.21684 | 0.0456 | 28 |
| 1/9/1900 | 8:44:00 | 2 | 13.4 | 22.4 | 12.9 | 2.983156 | 10.41684 | 0.0333 | 22 |
| 1/9/1900 | 8:46:00 | 4 | 11.9 | 22.4 | 13.4 | 2.983156 | 8.916844 | 0.0240 | 19 |
| 1/9/1900 | 8:50:00 | 8 | 10.9 | 22.4 | 13.7 | 2.983156 | 7.916844 | 0.0172 | 17 |
| 1/9/1900 | 8:57:00 | 15 | 9.8 | 22.4 | 13.9 | 2.983156 | 6.816844 | 0.0126 | 14 |
| 1/9/1900 | 9:12:00 | 30 | 9.1 | 22.4 | 13.9 | 2.983156 | 6.116844 | 0.0089 | 13 |
| 1/9/1900 | 9:42:00 | 60 | 8.2 | 22.4 | 14.2 | 2.983156 | 5.216844 | 0.0064 | 11 |
| 1/9/1900 | 10:42:00 | 120 | 7.7 | 22.4 | 14.4 | 2.983156 | 4.716844 | 0.0045 | 10 |
| 1/9/1900 | 12:42:00 | 240 | 7.2 | 22.4 | 14.4 | 2.983156 | 4.216844 | 0.0032 | 9 |
| 1/9/1900 | 16:42:00 | 480 | 6.9 | 22.4 | 14.7 | 2.983156 | 3.916844 | 0.0023 | 8 |
| 1/10/1900 | 8:42:00 | 1440 | 6.5 | 22.4 | 14.7 | 2.983156 | 3.516844 | 0.0013 | 7 |




| Remarks | SUMMARY | | | |
|---|---|---|---|---|
| | $D_{10}$ = | 0.005 | Gravel | 0.0 % |
| | $D_{30}$ = | 0.050 | Sand | 51.3 % |
| | $D_{50}$ = | 0.078 | Silt Sizes | 40.8 % |
| | $D_{60}$ = | 0.098 | Clay Sizes | 8.0 % |
| | $C_U$ = | | | |
| | $C_C$ = | | | |

**Results of Other Testing**

| | |
|---|---|
| WL | % |
| WP | % |
| IP | % |

amec

# Grain Size Distribution

| | | | |
|---|---|---|---|
| Project | M Nansen TA5 2013 SI Program | | |
| Project No. | VM00605E.523.20 | | |
| Lab No. | S-9985 | | |
| Sample | TP-T-13-06 | | |
| Hole | GS1 | Depth | 0.8 - 0.9m |
| Reported By | CR/MR | Date | 9-Jan-00 |

# HYDROMETER TEST

| | | | |
|---|---|---|---|
| Project | M Nansen TA5 2013 SI Program | | |
| Project No. | VM00605E.523.20 | | |
| Lab No. | S-9985 | | |
| Hole | TP-T-13-09 | | |
| Sample | GS2 | Depth | 2.0 - 2.1m |
| Reported By | CR/MR | Date | 9-Jan-00 |

Hydrometer No. 799 Hydrometer Type 151 Graduate No. 9

Air Dried Wt. of Soil Tested 100.2 g Dry Wt. of Soil Tested 100.20

**Moisture Content**

Tare 20. g Wet + Tare 40. g Dry + Tare 40. g M.C. 0.00%

**Composite Correction Factors**

Factor -0.0084697temp^2+0.1196543temp+3.2870133 Specific Gravity $G_s$ 2.73

**Dispersant**

Type 10 % Sodium Hexametaphosphate Amount 125 Date Mixed & Jug No. 3-Dec-13

## Mechanical Sieve Results

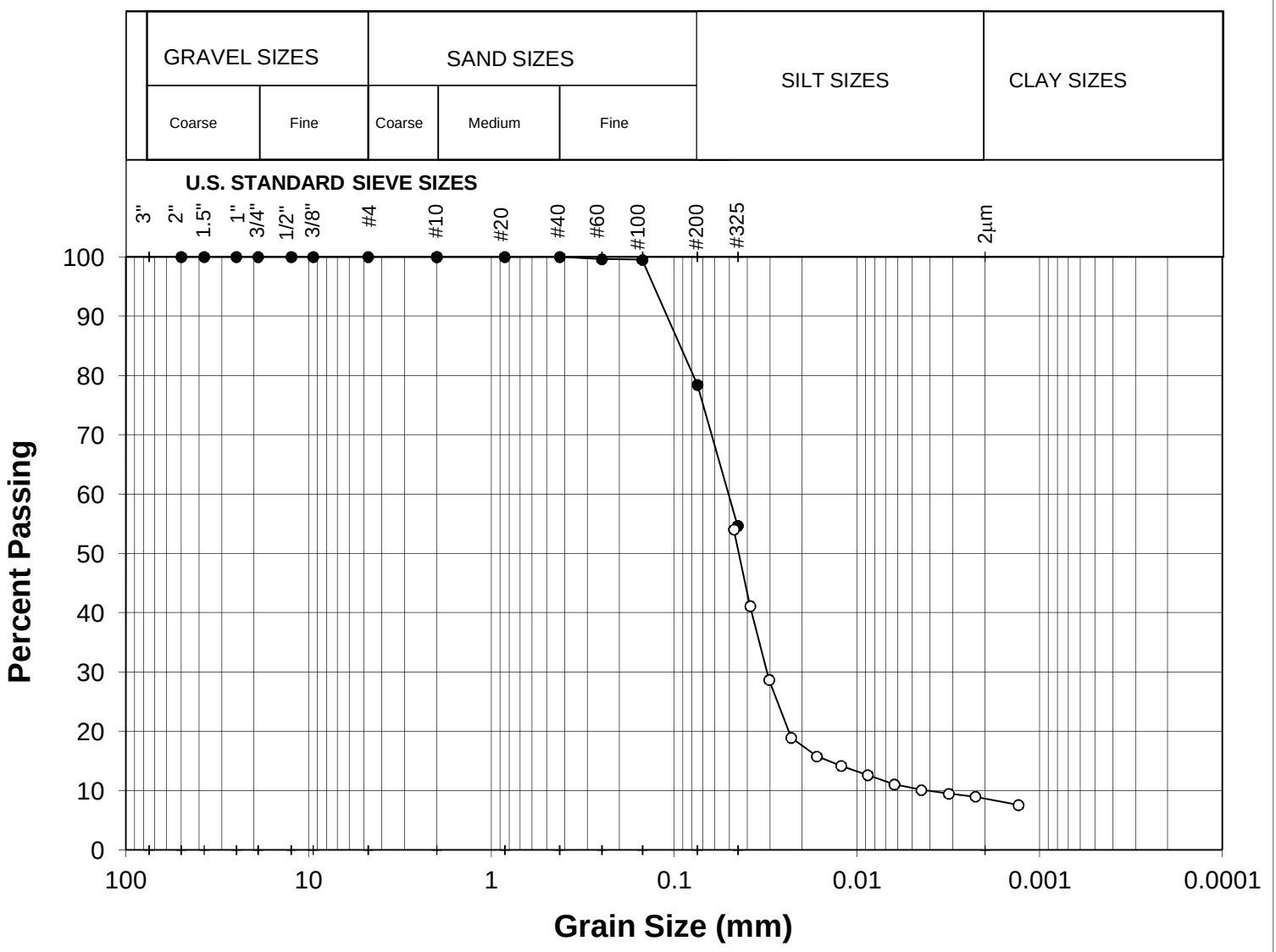
Total Wt of Sample Dry 208.4 g
+ # 10 0.0 g
- # 10 208.4 g

**Hydrometer Test**
(Adjusted for + # 10 Material)
Total Dry Wt. 100.20 g

| Sieve Size | Particle Size (mm) | Weight Retained (g) | Weight Passing (g) | Percent Finer Than | Sieve # | Particle Size (mm) | Weight Retained (g) | Weight Passing (g) | Percent Finer Than |
|---|---|---|---|---|---|---|---|---|---|
| 2 in. | 50.0 | | 208.40 | 100.0 | 10 | 2.000 | | 100.20 | 100 |
| 1 1/2 in. | 37.5 | | 208.40 | 100.0 | 20 | 0.850 | | 100.20 | 100 |
| 1 in. | 25.0 | | 208.40 | 100.0 | 40 | 0.425 | | 100.20 | 100 |
| 3/4 in. | 19.0 | | 208.40 | 100.0 | 60 | 0.250 | 0.4 | 99.80 | 100 |
| 1/2 in. | 12.5 | | 208.40 | 100.0 | 100 | 0.150 | 0.1 | 99.70 | 100 |
| 3/8 in. | 9.5 | | 208.40 | 100.0 | 200 | 0.075 | 21.1 | 78.60 | 78 |
| 4 | 4.75 | | 208.40 | 100.0 | 325 | 0.045 | 23.8 | 54.80 | 55 |
| 10 | 2.00 | | 208.40 | 100.0 | pan | | | | |
| | | 0.0 | | | | | | | |

## Hydrometer Results

| Date | Time | Elapsed Time (min) | $R'_h$ | Temp. $^oC$ | Effective Length (cm) | Comp. Corr. | Corrected Reading | Diam. (mm) | % Soil in Susp. |
|---|---|---|---|---|---|---|---|---|---|
| 1/9/1900 | 8:42:00 | 0 | | | | | | | |
| 1/9/1900 | 8:42:30 | 0.5 | 37.3 | 22.4 | 6.5 | 2.983156 | 34.31684 | 0.0473 | 54 |
| 1/9/1900 | 8:43:00 | 1 | 29.1 | 22.4 | 8.6 | 2.983156 | 26.11684 | 0.0385 | 41 |
| 1/9/1900 | 8:44:00 | 2 | 21.2 | 22.4 | 10.7 | 2.983156 | 18.21684 | 0.0303 | 29 |
| 1/9/1900 | 8:46:00 | 4 | 15.0 | 22.4 | 12.3 | 2.983156 | 12.01684 | 0.0230 | 19 |
| 1/9/1900 | 8:50:00 | 8 | 13.0 | 22.4 | 12.9 | 2.983156 | 10.01684 | 0.0167 | 16 |
| 1/9/1900 | 8:57:00 | 15 | 12.0 | 22.4 | 13.1 | 2.983156 | 9.016844 | 0.0123 | 14 |
| 1/9/1900 | 9:12:00 | 30 | 11.0 | 22.4 | 13.4 | 2.983156 | 8.016844 | 0.0088 | 13 |
| 1/9/1900 | 9:42:00 | 60 | 10.0 | 22.4 | 13.7 | 2.983156 | 7.016844 | 0.0063 | 11 |
| 1/9/1900 | 10:42:00 | 120 | 9.4 | 22.4 | 13.9 | 2.983156 | 6.416844 | 0.0045 | 10 |
| 1/9/1900 | 12:42:00 | 240 | 9.0 | 22.4 | 13.9 | 2.983156 | 6.016844 | 0.0032 | 9 |
| 1/9/1900 | 16:42:00 | 480 | 8.7 | 22.4 | 14.2 | 2.983156 | 5.716844 | 0.0023 | 9 |
| 1/10/1900 | 8:42:00 | 1440 | 7.8 | 22.4 | 14.4 | 2.983156 | 4.816844 | 0.0013 | 8 |




| Remarks | SUMMARY | | | |
|---|---|---|---|---|
| | $D_{10}$ = | 0.004 | Gravel | 0.0 % |
| | $D_{30}$ = | 0.031 | Sand | 21.6 % |
| | $D_{50}$ = | 0.045 | Silt Sizes | 69.8 % |
| | $D_{60}$ = | 0.054 | Clay Sizes | 8.6 % |
| | $C_U$ = | | | |
| | $C_C$ = | | | |

**Results of Other Testing**

| | |
|---|---|
| WL | % |
| WP | % |
| IP | % |

amec

# Grain Size Distribution

| | | | |
|---|---|---|---|
| Project | M Nansen TA5 2013 SI Program | | |
| Project No. | VM00605E.523.20 | | |
| Lab No. | S-9985 | | |
| Sample | TP-T-13-09 | | |
| Hole | GS2 | Depth | 2.0 - 2.1m |
| Reported By | CR/MR | Date | 9-Jan-00 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| amec | | | | | Project No. | VM00605E.523.20 | | |
| | | | | | Lab No. | N/A | | |
| | | | | | Reported by | CR/MR | | |
| **MOISTURE CONTENT WORKSHEET** | | | | | Date | 4-Nov-13 | | |
| Hole No. | BH-TD-13-01 | | | | GP-T-13-03 | | | |
| Depth (m) | 19.0-19.1 | | | | 4.0-5.0 | | | |
| | **Record Tare Weight (zero or actual weight)** | | | | | | | |
| Wt. Sample Wet + Tare | 87.71 | | | | 88.07 | | | |
| Wt. Sample Dry + Tare | 70.71 | | | | 57.78 | | | |
| Wt. Water | 17.00 | | | | 30.29 | | | |
| Tare Container | 0.00 | | | | 0.00 | | | |
| Wt. Dry Sample | 70.71 | | | | 57.78 | | | |
| Moisture Content % | 24.0 | | | | 52.4 | | | |
| Hole No. | TP-TD-13-03 | | BH-T-13-03 | | GP-T-13-03 | | | |
| Depth (m) | 4.5-4.6 | | 4.9-5.0 | | 6.0-7.0 | | | |
| | **Record Tare Weight (zero or actual weight)** | | | | | | | |
| Wt. Sample Wet + Tare | 93.01 | | 81.11 | | 125.52 | | | |
| Wt. Sample Dry + Tare | 90.56 | | 67.14 | | 99.04 | | | |
| Wt. Water | 2.45 | | 13.97 | | 26.48 | | | |
| Tare Container | 0.00 | | 0.00 | | 0.00 | | | |
| Wt. Dry Sample | 90.56 | | 67.14 | | 99.04 | | | |
| Moisture Content % | 2.7 | | 20.8 | | 26.7 | | | |
| Hole No. | TP-T-13-04 | | GP-T-13-04 | | | | | |
| Depth (m) | 3.4-3.5 | | 5.5-6.5 | | | | | |
| | **Record Tare Weight (zero or actual weight)** | | | | | | | |
| Wt. Sample Wet + Tare | 117.29 | | 95.56 | | | | | |
| Wt. Sample Dry + Tare | 87.21 | | 70.22 | | | | | |
| Wt. Water | 30.08 | | 25.34 | | | | | |
| Tare Container | 0.00 | | 0.00 | | | | | |
| Wt. Dry Sample | 87.21 | | 70.22 | | | | | |
| Moisture Content % | 34.5 | | 36.1 | | | | | |
| Hole No. | BH-T-13-04 | | BH-T-13-04 | | GP-T-13-10 | | | |
| Depth (m) | 8.7-8.8 | | 12.0-12.1 | | 4.5-5.5 | | | |
| | **Record Tare Weight (zero or actual weight)** | | | | | | | |
| Wt. Sample Wet + Tare | 72.69 | | 105.96 | | 93.76 | | | |
| Wt. Sample Dry + Tare | 48.75 | | 81.26 | | 65.31 | | | |
| Wt. Water | 23.94 | | 24.70 | | 28.45 | | | |
| Tare Container | 0.00 | | 0.00 | | 0.00 | | | |
| Wt. Dry Sample | 48.75 | | 81.26 | | 65.31 | | | |
| Moisture Content % | 49.1 | | 30.4 | | 43.6 | | | |
| Hole No. | | | | | | | | |
| Depth (m) | | | | | | | | |
| | **Record Tare Weight (zero or actual weight)** | | | | | | | |
| Wt. Sample Wet + Tare | | | | | | | | |
| Wt. Sample Dry + Tare | | | | | | | | |
| Wt. Water | | | | | | | | |
| Tare Container | | | | | | | | |
| Wt. Dry Sample | | | | | | | | |
| Moisture Content % | | | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| amec | | | | Project No. | VM00605E.523.2 | |
| | | | | Lab No. | | |
| | | | | Reported By | MR | |
| **MOISTURE CONTENT WORKSHEET** | | | | Date | 19-Nov-13 | |
| Hole No. | TP-T-13-02 | | TP-T-13-04 | | | |
| Depth(m) | 1.0 - 1.1m | | 2.1-2.2 | 3.0 - 3.1 | 1.0 - 1.1 | |
| | **Record Tare Weight (zero or actual weight)** | | | | | |
| Wt. Sample Wet + Tare | 250.55 | | 211.21 | 222.82 | 277.23 | |
| Wt. Sample Dry + Tare | 199.27 | | 164.04 | 150.24 | 214.48 | |
| Wt. Water | 51.28 | | 47.17 | 72.58 | 62.75 | |
| Tare Container | 0.00 | | 0.00 | 0.00 | 0.00 | |
| Wt. Dry Sample | 199.27 | | 164.04 | 150.24 | 214.48 | |
| Moisture Content % | 25.7 | | 28.8 | 48.3 | 29.3 | |
| Hole No. | | | | | | |
| Depth(m) | | | | | | |
| Tare No. | **Record Tare Weight (zero or actual weight)** | | | | | |
| Wt. Sample Wet + Tare | | | | | | |
| Wt. Sample Dry + Tare | | | | | | |
| Wt. Water | | | | | | |
| Tare Container | | | | | | |
| Wt. Dry Sample | | | | | | |
| Moisture Content % | | | | | | |
| Hole No. | | | | | | |
| Depth(m) | | | | | | |
| Tare No. | **Record Tare Weight (zero or actual weight)** | | | | | |
| Wt. Sample Wet + Tare | | | | | | |
| Wt. Sample Dry + Tare | | | | | | |
| Wt. Water | | | | | | |
| Tare Container | | | | | | |
| Wt. Dry Sample | | | | | | |
| Moisture Content % | | | | | | |
| Hole No. | | | | | | |
| Depth(m) | | | | | | |
| Tare No. | **Record Tare Weight (zero or actual weight)** | | | | | |
| Wt. Sample Wet + Tare | | | | | | |
| Wt. Sample Dry + Tare | | | | | | |
| Wt. Water | | | | | | |
| Tare Container | | | | | | |
| Wt. Dry Sample | | | | | | |
| Moisture Content % | | | | | | |
| Hole No. | | | | | | |
| Depth(m) | | | | | | |
| Tare No. | **Record Tare Weight (zero or actual weight)** | | | | | |
| Wt. Sample Wet + Tare | | | | | | |
| Wt. Sample Dry + Tare | | | | | | |
| Wt. Water | | | | | | |
| Tare Container | | | | | | |
| Wt. Dry Sample | | | | | | |
| Moisture Content % | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Project No. | **VM00605** | |
| | | | | Lab No. | N/A | |
| | | | | Reported by | Dark Side | |
| **MOISTURE CONTENT WORKSHEET** | | | | Date | 04-Dec-13 | |
| Hole No. | **BH-T-13-03** | | **BH-T-13-01** | | **BH-TD-13-01** | |
| Sample No. | **ARD-05** | | **ARD-17** | | **ARD-20** | |
| Depth (m) | 10.5 - 10.6 m | | 20.1 - 20.2 m | | 24.6 - 24.7 m | |
| | **Record Tare Weight (zero or actual weight)** | | | | | |
| Wt. Sample Wet + Tare | 777.00 | | 816.00 | | 563.00 | |
| Wt. Sample Dry + Tare | 667.00 | | 695.00 | | 522.00 | |
| Wt. Water | 110.00 | | 121.00 | | 41.00 | |
| Tare Container | 0.00 | | 0.00 | | 0.00 | |
| Wt. Dry Sample | 667.00 | | 695.00 | | 522.00 | |
| Moisture Content % | 16.5 | | 17.4 | | 7.9 | |
| Hole No. | **GP-T-13-04** | | **GP-T-13-21** | | **TP-WA-13-03** | |
| Sample No. | **10.5 - 11.5** | | **2.5 - 3.25** | | **GS4/BULK** | |
| Depth (m) | 10.5 - 11.5 m | | 10.5 - 11.5 m | | 4.5 - 4.6 m | |
| | **Record Tare Weight (zero or actual weight)** | | | | | |
| Wt. Sample Wet + Tare | 738.00 | | 1142.00 | | 887.00 | |
| Wt. Sample Dry + Tare | 622.00 | | 966.00 | | 811.00 | |
| Wt. Water | 116.00 | | 176.00 | | 76.00 | |
| Tare Container | 0.00 | | 0.00 | | 0.00 | |
| Wt. Dry Sample | 622.00 | | 966.00 | | 811.00 | |
| Moisture Content % | 18.6 | | 18.2 | | 9.4 | |
| Hole No. | **BH-T-13-03** | | **BH-TD-13-01** | | **GP-T-13-18** | |
| Sample No. | **ARD-07** | | **ARD-19** | | **5.0 - 6.25** | |
| Depth (m) | 13.5 - 13.6 m | | 23.1 - 23.2 m | | 5.0 - 6.25 m | |
| | **Record Tare Weight (zero or actual weight)** | | | | | |
| Wt. Sample Wet + Tare | 827.00 | | 935.00 | | 1054.00 | |
| Wt. Sample Dry + Tare | 737.00 | | 859.00 | | 923.00 | |
| Wt. Water | 90.00 | | 76.00 | | 131.00 | |
| Tare Container | 0.00 | | 0.00 | | 0.00 | |
| Wt. Dry Sample | 737.00 | | 859.00 | | 923.00 | |
| Moisture Content % | 12.2 | | 8.8 | | 14.2 | |
| Hole No. | | | | | | |
| Depth (m) | | | | | | |
| | **Record Tare Weight (zero or actual weight)** | | | | | |
| Wt. Sample Wet + Tare | | | | | | |
| Wt. Sample Dry + Tare | | | | | | |
| Wt. Water | | | | | | |
| Tare Container | 0.00 | | 0.00 | | 0.00 | |
| Wt. Dry Sample | | | | | | |
| Moisture Content % | | | | | | |
| Hole No. | | | | | | |
| Depth (m) | | | | | | |
| | **Record Tare Weight (zero or actual weight)** | | | | | |
| Wt. Sample Wet + Tare | | | | | | |
| Wt. Sample Dry + Tare | | | | | | |
| Wt. Water | | | | | | |
| Tare Container | | | | | | |
| Wt. Dry Sample | | | | | | |
| Moisture Content % | | | | | | |

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| PROJECT | Mt Nansen TA5 2013 SI Program | | |
|---|---|---|---|
| JOB No. | **VM00605E.523.20** | LAB No. | N/A |
| DATE | 11-14-13 | REPORTED BY | MR |

## ATTERBERG LIMITS

| | HOLE | BH-TD-13-01 | TP-T-13-02 | GP-T-13-03 | TP-TD-13-03 |
|---|---|---|---|---|---|
| | SAMPLE | GS14 | GS2 | N/A | ARD03 |
| | DEPTH(m) | 19.0-19.1 | 1.0-1.1 | 4.0-5.0 | 4.5-4.6 |
| **LIQUID LIMIT** | | | | | |
| TRIAL NO. | | | 1 | 2 | 1 | 2 | | |
| NO. OF BLOWS | | | 26 | 27 | 21 | 20 | | |
| CONTAINER NO. | | | J-2 | 144 | 100 | B-1 | | |
| WT. OF WET SAMPLE + TARE | | NON PLASTI | 32.491 | 31.372 | 26.732 | 33.162 | | NON PLASTI |
| WT. OF DRY SAMPLE + TARE | | | 28.187 | 27.442 | 22.764 | 28.638 | | |
| TARE OF CONTAINER | | | 17.134 | 17.281 | 14.975 | 19.744 | | |
| WT. OF WATER | | | 4.304 | 3.930 | 3.968 | 4.524 | | |
| WT. OF DRY SOIL | | | 11.053 | 10.161 | 7.789 | 8.894 | | |
| WATER CONTENT % | | | 38.9 | 38.7 | 50.9 | 50.9 | | |
| CORR'D WATER CONTENT % | | | 39.1 | 39.0 | 49.9 | 49.5 | | |
| **PLASTIC LIMIT** | | | | | | | | |
| TRIAL NO. | | | 1 | 2 | 1 | 2 | | |
| CONTAINER NO. | | | L-310 | L-325 | B-21 | 409 | | |
| WT. OF WET SAMPLE + TARE | | | 22.394 | 21.513 | 25.916 | 25.386 | | |
| WT. OF DRY SAMPLE + TARE | | | 20.498 | 19.676 | 24.184 | 23.748 | | |
| TARE OF CONTAINER | | | 12.325 | 11.680 | 18.031 | 17.711 | | |
| WT. OF WATER | | | 1.896 | 1.837 | 1.732 | 1.638 | | |
| WT. OF DRY SOIL | | | 8.173 | 7.996 | 6.153 | 6.037 | | |
| WATER CONTENT % | | | 23.2 | 23.0 | 28.1 | 27.1 | | |
| **SHRINKAGE LIMIT** | | | | | | | | |
| TRIAL NO. | | | 1 | 2 | 1 | 2 | | |
| CONTAINER NO. | | | | | | | | |
| WT. OF WET SAMPLE + TARE | | | | | | | | |
| WT. OF DRY SAMPLE + TARE | | | | | | | | |
| TARE OF CONTAINER | | | | | | | | |
| WT. OF WATER | | | | | | | | |
| WT. OF DRY SOIL | | | | | | | | |
| WATER CONTENT % | | | | | | | | |
| VOL. OF CONTAINER | | | | | | | | |
| VOL. OF DRY SOIL PAT | | | | | | | | |
| SHRINKAGE VOL. | | | | | | | | |

| BLOW FACTORS | | | | | |
|---|---|---|---|---|---|
| NO. | ASTM | $W_L$ | 39.1 | 49.7 | |
| 20 | 0.974 | $W_P$ | 23.1 | 27.6 | |
| 21 | 0.979 | $W_S$ | | | |
| 22 | 0.985 | $W_n$ | | | |
| 23 | 0.990 | $I_P$ | 16.0 | 22.1 | |
| 24 | 0.995 | $I_f$ | | | |
| 25 | 1.000 | $I_t$ | | | |
| 26 | 1.005 | $I_L$ | | | |
| 27 | 1.009 | A-LINE | 13.9 | 21.7 | |
| 28 | 1.014 | PLASTICITY | **CI** | **CI** | |
| 29 | 1.018 | REMARKS | | | |
| 30 | 1.022 | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| amec | | | PROJECT | | Mt Nansen TA5 2013 SI Program | | | | | |
| | | | JOB No. | VM00605E.523.20 | | LAB No. | N/A | | | |
| **ATTERBERG LIMITS** | | | DATE | 11-14-13 | | TECH | MR | | | |
| | HOLE | BH-T-13-03 | GP-T-13-04 | | TP-T-13-04 | | | | | |
| | SAMPLE | GS5 | N/A | | GS6 | | | | | |
| | DEPTH(m) | 4.9-5.0 | 5.5-6.5 | | 3.4-3.5 | | | | | |
| **LIQUID LIMIT** | | | | | | | | | | |
| TRIAL NO. | | | 1 | 2 | | | | | | |
| NO. OF BLOWS | | | 21 | 20 | | | | | | |
| CONTAINER NO. | | | L-317 | 103 | | | | | | |
| WT. OF WET SAMPLE + TARE | | NON PLASTI | 29.624 | 29.555 | | NON PLASTI | | | | |
| WT. OF DRY SAMPLE + TARE | | | 25.968 | 26.334 | | | | | | |
| TARE OF CONTAINER | | | 16.346 | 17.802 | | | | | | |
| WT. OF WATER | | | 3.656 | 3.221 | | | | | | |
| WT. OF DRY SOIL | | | 9.622 | 8.532 | | | | | | |
| WATER CONTENT % | | | 38.0 | 37.8 | | | | | | |
| CORR'D WATER CONTENT % | | | 37.2 | 36.7 | | | | | | |
| **PLASTIC LIMIT** | | | | | | | | | | |
| TRIAL NO. | | | 1 | 2 | | | | | | |
| CONTAINER NO. | | | J-36 | 441 | | | | | | |
| WT. OF WET SAMPLE + TARE | | | 27.699 | 30.750 | | | | | | |
| WT. OF DRY SAMPLE + TARE | | | 25.433 | 28.506 | | | | | | |
| TARE OF CONTAINER | | | 15.673 | 18.863 | | | | | | |
| WT. OF WATER | | | 2.266 | 2.244 | | | | | | |
| WT. OF DRY SOIL | | | 9.760 | 9.643 | | | | | | |
| WATER CONTENT % | | | 23.2 | 23.3 | | | | | | |
| **SHRINKAGE LIMIT** | | | | | | | | | | |
| TRIAL NO. | | | 1 | 2 | | | | | | |
| CONTAINER NO. | | | | | | | | | | |
| WT. OF WET SAMPLE + TARE | | | | | | | | | | |
| WT. OF DRY SAMPLE + TARE | | | | | | | | | | |
| TARE OF CONTAINER | | | | | | | | | | |
| WT. OF WATER | | | | | | | | | | |
| WT. OF DRY SOIL | | | | | | | | | | |
| WATER CONTENT % | | | | | | | | | | |
| VOL. OF CONTAINER | | | | | | | | | | |
| VOL. OF DRY SOIL PAT | | | | | | | | | | |
| SHRINKAGE VOL. | | | | | | | | | | |

| BLOW FACTORS | | | | | |
|---|---|---|---|---|---|
| NO. | ASTM | $W_L$ | 37.0 | | |
| 20 | 0.974 | $W_P$ | 23.2 | | |
| 21 | 0.979 | $W_S$ | | | |
| 22 | 0.985 | $W_n$ | | | |
| 23 | 0.990 | $I_P$ | 13.7 | | |
| 24 | 0.995 | $I_f$ | | | |
| 25 | 1.000 | $I_t$ | | | |
| 26 | 1.005 | $I_L$ | | | |
| 27 | 1.009 | A-LINE | 12.4 | | |
| 28 | 1.014 | PLASTICITY | **CI** | | |
| 29 | 1.018 | REMARKS | | | |
| 30 | 1.022 | | | | |

| amec | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PROJECT | | | Mt Nansen TA5 2013 SI Program | | | |
| | | | | JOB No. | VM00605E.523.20 | | LAB No. | | N/A | |
| **ATTERBERG LIMITS** | | | | DATE | 11/15/13 | | REPORTED BY | | MR | |
| | | HOLE | TP-T-13-04 | | TP-T-13-04 | | BH-T-13-04 | | GP-T-13-10 | |
| | | SAMPLE | GS5 | | GS3 | | GS2 | | N/A | |
| | | DEPTH(m) | 3.0-3.1 | | 2.1-2.2 | | 8.7-8.8 | | 4.5-5.5 | |
| **LIQUID LIMIT** | | | | | | | | | | |
| TRIAL NO. | | | 1 | 2 | | | 1 | 2 | 1 | 2 |
| NO. OF BLOWS | | | 23 | 24 | | | 24 | 23 | 26 | 27 |
| CONTAINER NO. | | | J-30 | 53 | | | 66 | B-3 | B-13 | B-11 |
| WT. OF WET SAMPLE + TARE | | | 28.598 | 31.308 | | | 28.754 | 30.567 | 28.018 | 30.292 |
| WT. OF DRY SAMPLE + TARE | | | 25.444 | 27.400 | | | 25.437 | 27.012 | 24.586 | 26.268 |
| TARE OF CONTAINER | | | 15.958 | 15.700 | | | 16.642 | 17.542 | 16.923 | 17.371 |
| WT. OF WATER | | | 3.154 | 3.908 | | | 3.317 | 3.555 | 3.432 | 4.024 |
| WT. OF DRY SOIL | | | 9.486 | 11.700 | | | 8.795 | 9.470 | 7.663 | 8.897 |
| WATER CONTENT % | | | 33.2 | 33.4 | | | 37.7 | 37.5 | 44.8 | 45.2 |
| CORR'D WATER CONTENT % | | | 32.9 | 33.2 | | | 37.5 | 37.2 | 45.0 | 45.7 |
| **PLASTIC LIMIT** | | | | | | | | | | |
| TRIAL NO. | | | 1 | 2 | | | 1 | 2 | 1 | 2 |
| CONTAINER NO. | | | 232 | J-62 | | | 450 | 205 | B-5 | B-6 |
| WT. OF WET SAMPLE + TARE | | | 22.860 | 19.619 | | | 29.098 | 26.230 | 27.917 | 23.572 |
| WT. OF DRY SAMPLE + TARE | | | 21.299 | 18.159 | | | 27.070 | 24.522 | 25.649 | 21.572 |
| TARE OF CONTAINER | | | 14.857 | 12.272 | | | 18.740 | 17.497 | 17.730 | 14.524 |
| WT. OF WATER | | | 1.561 | 1.460 | | | 2.028 | 1.708 | 2.268 | 2.000 |
| WT. OF DRY SOIL | | | 6.442 | 5.887 | | | 8.330 | 7.025 | 7.919 | 7.048 |
| WATER CONTENT % | | | 24.2 | 24.8 | | | 24.3 | 24.3 | 28.6 | 28.4 |
| **SHRINKAGE LIMIT** | | | | | | | | | | |
| TRIAL NO. | | | 1 | 2 | | | 1 | 2 | 1 | 2 |
| CONTAINER NO. | | | | | | | | | | |
| WT. OF WET SAMPLE + TARE | | | | | | | | | | |
| WT. OF DRY SAMPLE + TARE | | | | | | | | | | |
| TARE OF CONTAINER | | | | | | | | | | |
| WT. OF WATER | | | | | | | | | | |
| WT. OF DRY SOIL | | | | | | | | | | |
| WATER CONTENT % | | | | | | | | | | |
| VOL. OF CONTAINER | | | | | | | | | | |
| VOL. OF DRY SOIL PAT | | | | | | | | | | |
| SHRINKAGE VOL. | | | | | | | | | | |
| BLOW FACTORS | | $W_L$ | 33.1 | | | | 37.3 | | 45.3 | |
| NO. | ASTM | $W_P$ | 24.5 | | | | 24.3 | | 28.5 | |
| 20 | 0.974 | $W_S$ | | | | | | | | |
| 21 | 0.979 | $W_n$ | | | | | | | | |
| 22 | 0.985 | $I_P$ | 8.6 | | | | 13.0 | | 16.8 | |
| 23 | 0.990 | $I_f$ | | | | | | | | |
| 24 | 0.995 | $I_t$ | | | | | | | | |
| 25 | 1.000 | $I_L$ | | | | | | | | |
| 26 | 1.005 | A-LINE | 9.5 | | | | 12.7 | | 18.5 | |
| 27 | 1.009 | PLASTICITY | **ML or OL** | | | | **CI** | | **ML or OL** | |
| 28 | 1.014 | REMARKS | | | | | | | | |
| 29 | 1.018 | | | | | | | | | |
| 30 | 1.022 | | | | | | | | | |

NON PLASTIC

| amec | | | PROJECT | | Mt Nansen TA5 2013 SI Program | | | |
|---|---|---|---|---|---|---|---|---|
| | | | JOB No. | VM00605E.523.20 | LAB No. | N/A | | |
| **ATTERBERG LIMITS** | | | DATE | 12/04/13 | REPORTED BY | MR | | |
| | HOLE | BH-T-13-02 | GP-T-13-03 | | TP-T-13-04 | | TP-T-13-06 | |
| | SAMPLE | GS1 | N/A | | GS1 | | GS1 | |
| | DEPTH(m) | 1.0-1.1 | 5.0-6.0 | | 1.0-1.1 | | 0.8-0.9 | |
| **LIQUID LIMIT** | | | | | | | | |
| TRIAL NO. | | | 1 | 2 | | | | |
| NO. OF BLOWS | | | 21 | 22 | | | | |
| CONTAINER NO. | | | 144 | D-17 | | | | |
| WT. OF WET SAMPLE + TARE | | | 24.557 | 20.112 | | | | |
| WT. OF DRY SAMPLE + TARE | | NON PLASTIC | 21.057 | 16.817 | NON PLASTIC | | NON PLASTIC | |
| TARE OF CONTAINER | | | 14.558 | 10.698 | | | | |
| WT. OF WATER | | | 3.500 | 3.295 | | | | |
| WT. OF DRY SOIL | | | 6.499 | 6.119 | | | | |
| WATER CONTENT % | | | 53.9 | 53.8 | | | | |
| CORR'D WATER CONTENT % | | | 52.7 | 53.0 | | | | |
| **PLASTIC LIMIT** | | | | | | | | |
| TRIAL NO. | | | 1 | 2 | | | | |
| CONTAINER NO. | | | 453 | J-31 | | | | |
| WT. OF WET SAMPLE + TARE | | | 29.558 | 27.715 | | | | |
| WT. OF DRY SAMPLE + TARE | | | 27.284 | 25.365 | | | | |
| TARE OF CONTAINER | | | 20.320 | 17.974 | | | | |
| WT. OF WATER | | | 2.274 | 2.350 | | | | |
| WT. OF DRY SOIL | | | 6.964 | 7.391 | | | | |
| WATER CONTENT % | | | 32.7 | 31.8 | | | | |
| **SHRINKAGE LIMIT** | | | | | | | | |
| TRIAL NO. | | | 1 | 2 | | | | |
| CONTAINER NO. | | | | | | | | |
| WT. OF WET SAMPLE + TARE | | | | | | | | |
| WT. OF DRY SAMPLE + TARE | | | | | | | | |
| TARE OF CONTAINER | | | | | | | | |
| WT. OF WATER | | | | | | | | |
| WT. OF DRY SOIL | | | | | | | | |
| WATER CONTENT % | | | | | | | | |
| VOL. OF CONTAINER | | | | | | | | |
| VOL. OF DRY SOIL PAT | | | | | | | | |
| SHRINKAGE VOL. | | | | | | | | |

| BLOW FACTORS | | | | | | |
|---|---|---|---|---|---|---|
| NO. | ASTM | $W_L$ | 52.9 | | | |
| 20 | 0.974 | $W_P$ | 32.2 | | | |
| 21 | 0.979 | $W_S$ | | | | |
| 22 | 0.985 | $W_n$ | | | | |
| 23 | 0.990 | $I_P$ | 20.7 | | | |
| 24 | 0.995 | $I_f$ | | | | |
| 25 | 1.000 | $I_t$ | | | | |
| 26 | 1.005 | $I_L$ | | | | |
| 27 | 1.009 | A-LINE | 24.0 | | | |
| 28 | 1.014 | PLASTICITY | **MH or OH** | | | |
| 29 | 1.018 | REMARKS | | | | |
| 30 | 1.022 | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| amec | | | | PROJECT | | Mt Nansen TA5 2013 SI Program | | | | | |
| | | | | JOB No. | VM00605E.523.20 | | | LAB No. | | N/A | |
| **ATTERBERG LIMITS** | | | | DATE | 12/04/13 | | | TECH | | MR | |
| | HOLE | TP-T-13-09 | | GP-T-13-10 | | | | | | | |
| | SAMPLE | GS2 | | N/A | | | | | | | |
| | DEPTH(m) | 2.0-2.1 | | 8.6-9.4 | | | | | | | |
| **LIQUID LIMIT** | | | | | | | | | | | |
| TRIAL NO. | | | | 1 | 2 | | | | | | |
| NO. OF BLOWS | | | | 20 | 20 | | | | | | |
| CONTAINER NO. | | | | L-317 | B-20 | | | | | | |
| WT. OF WET SAMPLE + TARE | | | | 32.211 | 34.301 | | | | | | |
| WT. OF DRY SAMPLE + TARE | | | | 27.755 | 29.378 | | | | | | |
| TARE OF CONTAINER | | | | 16.344 | 16.859 | | | | | | |
| WT. OF WATER | | | | 4.456 | 4.923 | | | | | | |
| WT. OF DRY SOIL | | | | 11.411 | 12.519 | | | | | | |
| WATER CONTENT % | | | | 39.1 | 39.3 | | | | | | |
| CORR'D WATER CONTENT % | | | | 38.0 | 38.3 | | | | | | |
| **PLASTIC LIMIT** | | | | | | | | | | | |
| TRIAL NO. | | | | 1 | 2 | | | | | | |
| CONTAINER NO. | | | | 420 | J-46 | | | | | | |
| WT. OF WET SAMPLE + TARE | | | | 26.476 | 23.275 | | | | | | |
| WT. OF DRY SAMPLE + TARE | | | | 24.999 | 21.686 | | | | | | |
| TARE OF CONTAINER | | | | 18.378 | 14.461 | | | | | | |
| WT. OF WATER | | | | 1.477 | 1.589 | | | | | | |
| WT. OF DRY SOIL | | | | 6.621 | 7.225 | | | | | | |
| WATER CONTENT % | | | | 22.3 | 22.0 | | | | | | |
| **SHRINKAGE LIMIT** | | | | | | | | | | | |
| TRIAL NO. | | | | 1 | 2 | | | | | | |
| CONTAINER NO. | | | | | | | | | | | |
| WT. OF WET SAMPLE + TARE | | | | | | | | | | | |
| WT. OF DRY SAMPLE + TARE | | | | | | | | | | | |
| TARE OF CONTAINER | | | | | | | | | | | |
| WT. OF WATER | | | | | | | | | | | |
| WT. OF DRY SOIL | | | | | | | | | | | |
| WATER CONTENT % | | | | | | | | | | | |
| VOL. OF CONTAINER | | | | | | | | | | | |
| VOL. OF DRY SOIL PAT | | | | | | | | | | | |
| SHRINKAGE VOL. | | | | | | | | | | | |

NON PLASTIC

| BLOW FACTORS | | | | | | | |
|---|---|---|---|---|---|---|---|
| NO. | ASTM | $W_L$ | 38.1 | | | | |
| 20 | 0.974 | $W_P$ | 22.2 | | | | |
| 21 | 0.979 | $W_S$ | | | | | |
| 22 | 0.985 | $W_n$ | | | | | |
| 23 | 0.990 | $I_P$ | 16.0 | | | | |
| 24 | 0.995 | $I_f$ | | | | | |
| 25 | 1.000 | $I_t$ | | | | | |
| 26 | 1.005 | $I_L$ | | | | | |
| 27 | 1.009 | A-LINE | 13.2 | | | | |
| 28 | 1.014 | PLASTICITY | **CI** | | | | |
| 29 | 1.018 | REMARKS | | | | | |
| 30 | 1.022 | | | | | | |

**AMEC E & I**

**Project:** Mount Nansen

## SPECIFIC GRAVITY AND ABSORPTION ASTM D854, C127, C128

**Project No.:** VM00605E.523.20

**Technician:** GM

**Date:** Nov. 16, 2013

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SOIL - D854 | Hole Number | | TP-T-13-02 | TP-T-13-02 | | | Average |
| | Sample Number | | GS2 Bulk | GS2 Bulk | | | |
| | Weight of Bottle and Water and Soil | "Wb" | 775.2 | 777.8 | | | |
| | Temperature of Water | "Tx" | 20C | 20C | | | |
| | Weight of Bottle and Water | "Wa" | 709.4 | 711.1 | | | |
| | Evaporating Dish Number | | | | | | |
| | Weight Dish and Dry Soil | | | | | | |
| | Weight of Dish | | | | | | |
| | Weight of Dry Soil | "Wo" | 101.1 | 102.40 | | | |
| | Specific Gravity of Soil | | 2.864 | 2.868 | | | 2.866 |
| SAND - C128 | Trial Number | | | | | | Average |
| | Bottle Number | | | | | | |
| | Weight of Bottle | | | | | | |
| | Weight of S.S.D. Sand in Air | "D" | | | | | |
| | Weight of Bottle, Water and Sand | "C" | | | | | |
| | Temperature of Water | | | | | | |
| | Weight of Bottle and Water (chart) | "B" | | | | | |
| | Tare Number | | | | | | |
| | Weight Dry Sand and Tare | | | | | | |
| | Weight of Tare | | | | | | |
| | Weight of Dry Sand | "A" | | | | | |
| | Bulk Specific Gravity | | | | | | |
| | S.S.D. Specific Gravity | | | | | | |
| | % Absorption | | | | | | |
| GRAVEL - C127 | Trial Number | | | | | | Average |
| | Weight of S.S.D. Rock and Tare in Air | | | | | | |
| | Weight of Tare | | | | | | |
| | Weight of S.S.D. Rock (in Air) | "B" | | | | | |
| | Weight of S.S.D. Rock (in Water) | "C" | | | | | |
| | Weight of Tare and Dry Rock | | | | | | |
| | Weight of Tare | | | | | | |
| | Weight of Dry Rock | "A" | | | | | |
| | Bulk Specific Gravity | | | | | | |
| | S.S.D. Specific Gravity | | | | | | |
| | % Absorption | | | | | | |

Calculation

Soil: Gs=Wo/(Wo+Wa)-Wb

Sand: Bulk Sp. Gr. = A/ (B+D-C)

Sand: S.S.D. Sp. Gr. = D/ (B+D-C)

Gravel: Bulk Sp. Gr. = A/ (B-C)

Gravel: S.S.D. Sp. Gr. = B/ (B-C)

Absorption: Sand % Abs. = ((D-A) /A) x 100

Absorption: Gravel % Abs. = ((B-A) /A) x 100

Remarks:

**AMEC E & I**

**Project:** Mount Nansen

## SPECIFIC GRAVITY AND ABSORPTION
## ASTM D854, C127, C128

**Project No.:** VM00605E.523.20

**Technician:** GM

**Date: Nov. 16, 2013**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SOIL - D854 | Hole Number | | TP-T-13-04 | TP-T-13-04 | | | Average |
| | Sample Number | | GS1 Bulk | GS1 Bulk | | | |
| | Weight of Bottle and Water and Soil | "Wb" | 759.3 | 782.5 | | | |
| | Temperature of Water | "Tx" | 20C | 20C | | | |
| | Weight of Bottle and Water | "Wa" | 686.6 | 711.8 | | | |
| | Evaporating Dish Number | | | | | | |
| | Weight Dish and Dry Soil | | | | | | |
| | Weight of Dish | | | | | | |
| | Weight of Dry Soil | "Wo" | 112.7 | 109.60 | | | |
| | Specific Gravity of Soil | | 2.818 | 2.817 | | | 2.818 |
| SAND - C128 | Trial Number | | | | | | Average |
| | Bottle Number | | | | | | |
| | Weight of Bottle | | | | | | |
| | Weight of S.S.D. Sand in Air | "D" | | | | | |
| | Weight of Bottle, Water and Sand | "C" | | | | | |
| | Temperature of Water | | | | | | |
| | Weight of Bottle and Water (chart) | "B" | | | | | |
| | Tare Number | | | | | | |
| | Weight Dry Sand and Tare | | | | | | |
| | Weight of Tare | | | | | | |
| | Weight of Dry Sand | "A" | | | | | |
| | Bulk Specific Gravity | | | | | | |
| | S.S.D. Specific Gravity | | | | | | |
| | % Absorption | | | | | | |
| GRAVEL - C127 | Trial Number | | | | | | Average |
| | Weight of S.S.D. Rock and Tare in Air | | | | | | |
| | Weight of Tare | | | | | | |
| | Weight of S.S.D. Rock (in Air) | "B" | | | | | |
| | Weight of S.S.D. Rock (in Water) | "C" | | | | | |
| | Weight of Tare and Dry Rock | | | | | | |
| | Weight of Tare | | | | | | |
| | Weight of Dry Rock | "A" | | | | | |
| | Bulk Specific Gravity | | | | | | |
| | S.S.D. Specific Gravity | | | | | | |
| | % Absorption | | | | | | |

Calculation

Soil: Gs=Wo/(Wo+Wa)-Wb

Sand: Bulk Sp. Gr. = A/ (B+D-C)

Sand: S.S.D. Sp. Gr. = D/ (B+D-C)

Gravel: Bulk Sp. Gr. = A/ (B-C)

Gravel: S.S.D. Sp. Gr. = B/ (B-C)

Absorption: Sand % Abs. = ((D-A) /A) x 100

Absorption: Gravel % Abs. = ((B-A) /A) x 100

Remarks:

**AMEC E & I**

**Project:** Mount Nansen

## SPECIFIC GRAVITY AND ABSORPTION
## ASTM D854, C127, C128

**Project No.:** VM00605E.523.20

**Technician:** GM

**Date:** Nov. 16, 2013

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SOIL - D854 | Hole Number | | TP-T-13-04 | TP-T-13-04 | | | Average |
| | Sample Number | | GS5 Bulk | GS5 Bulk | | | |
| | Weight of Bottle and Water and Soil | "Wb" | 752.1 | 774.6 | | | |
| | Temperature of Water | "Tx" | 20C | 20C | | | |
| | Weight of Bottle and Water | "Wa" | 686.6 | 709.4 | | | |
| | Evaporating Dish Number | | | | | | |
| | Weight Dish and Dry Soil | | | | | | |
| | Weight of Dish | | | | | | |
| | Weight of Dry Soil | "Wo" | 101.7 | 101.30 | | | |
| | Specific Gravity of Soil | | 2.809 | 2.806 | | | 2.808 |
| SAND - C128 | Trial Number | | | | | | Average |
| | Bottle Number | | | | | | |
| | Weight of Bottle | | | | | | |
| | Weight of S.S.D. Sand in Air | "D" | | | | | |
| | Weight of Bottle, Water and Sand | "C" | | | | | |
| | Temperature of Water | | | | | | |
| | Weight of Bottle and Water (chart) | "B" | | | | | |
| | Tare Number | | | | | | |
| | Weight Dry Sand and Tare | | | | | | |
| | Weight of Tare | | | | | | |
| | Weight of Dry Sand | "A" | | | | | |
| | Bulk Specific Gravity | | | | | | |
| | S.S.D. Specific Gravity | | | | | | |
| | % Absorption | | | | | | |
| GRAVEL - C127 | Trial Number | | | | | | Average |
| | Weight of S.S.D. Rock and Tare in Air | | | | | | |
| | Weight of Tare | | | | | | |
| | Weight of S.S.D. Rock (in Air) | "B" | | | | | |
| | Weight of S.S.D. Rock (in Water) | "C" | | | | | |
| | Weight of Tare and Dry Rock | | | | | | |
| | Weight of Tare | | | | | | |
| | Weight of Dry Rock | "A" | | | | | |
| | Bulk Specific Gravity | | | | | | |
| | S.S.D. Specific Gravity | | | | | | |
| | % Absorption | | | | | | |

Calculation

Soil: Gs=Wo/(Wo+Wa)-Wb

Sand: Bulk Sp. Gr. = A/ (B+D-C)

Sand: S.S.D. Sp. Gr. = D/ (B+D-C)

Gravel: Bulk Sp. Gr. = A/ (B-C)

Gravel: S.S.D. Sp. Gr. = B/ (B-C)

Absorption: Sand % Abs. = ((D-A) /A) x 100

Absorption: Gravel % Abs. = ((B-A) /A) x 100

Remarks:

**AMEC E & I**

**Project:** Mount Nansen

## SPECIFIC GRAVITY AND ABSORPTION
## ASTM D854, C127, C128

**Project No.:** VM00605E.523.20

**Technician:** GM

**Date:** Nov. 16, 2013

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SOIL - D854 | Hole Number | | TP-T-13-06 | TP-T-13-06 | | | Average |
| | Sample Number | | GS1 Bulk | GS1 Bulk | | | |
| | Weight of Bottle and Water and Soil | "Wb" | 778.1 | 779.7 | | | |
| | Temperature of Water | "Tx" | 20C | 20C | | | |
| | Weight of Bottle and Water | "Wa" | 711.8 | 711.1 | | | |
| | Evaporating Dish Number | | | | | | |
| | Weight Dish and Dry Soil | | | | | | |
| | Weight of Dish | | | | | | |
| | Weight of Dry Soil | "Wo" | 103.7 | 107.30 | | | |
| | Specific Gravity of Soil | | 2.773 | 2.773 | | | 2.773 |
| SAND - C128 | Trial Number | | | | | | Average |
| | Bottle Number | | | | | | |
| | Weight of Bottle | | | | | | |
| | Weight of S.S.D. Sand in Air | "D" | | | | | |
| | Weight of Bottle, Water and Sand | "C" | | | | | |
| | Temperature of Water | | | | | | |
| | Weight of Bottle and Water (chart) | "B" | | | | | |
| | Tare Number | | | | | | |
| | Weight Dry Sand and Tare | | | | | | |
| | Weight of Tare | | | | | | |
| | Weight of Dry Sand | "A" | | | | | |
| | Bulk Specific Gravity | | | | | | |
| | S.S.D. Specific Gravity | | | | | | |
| | % Absorption | | | | | | |
| GRAVEL - C127 | Trial Number | | | | | | Average |
| | Weight of S.S.D. Rock and Tare in Air | | | | | | |
| | Weight of Tare | | | | | | |
| | Weight of S.S.D. Rock (in Air) | "B" | | | | | |
| | Weight of S.S.D. Rock (in Water) | "C" | | | | | |
| | Weight of Tare and Dry Rock | | | | | | |
| | Weight of Tare | | | | | | |
| | Weight of Dry Rock | "A" | | | | | |
| | Bulk Specific Gravity | | | | | | |
| | S.S.D. Specific Gravity | | | | | | |
| | % Absorption | | | | | | |

Calculation

Soil: Gs=Wo/(Wo+Wa)-Wb

Sand: Bulk Sp. Gr. = A/ (B+D-C)

Sand: S.S.D. Sp. Gr. = D/ (B+D-C)

Gravel: Bulk Sp. Gr. = A/ (B-C)

Gravel: S.S.D. Sp. Gr. = B/ (B-C)

Absorption: Sand % Abs. = ((D-A) /A) x 100

Absorption: Gravel % Abs. = ((B-A) /A) x 100

Remarks:

# GEOTECHNICAL LABORATORY WORK ORDER
## SUMMARY SHEET

amec

| | | | |
|---|---|---|---|
| **Project #:** | VM00605E.223.20 | **AMEC Engineer:** | Renata Wood |
| **Project Name:** | Mount Nansen | **Lab Number:** | |
| **Date:** | 08-Nov-13 | **Date Required:** | |

**A. Details of Samples Being Submitted for Testing:**

| Hole Number | TP-T-13-02 | TP-T-13-04 | TP-T-13-04 | TP-T-13-06 | |
|---|---|---|---|---|---|
| Sample ID | GS2-BULK | GS1-BULK | GS5-BULK | GS1-BULK | |
| Depth (From / To) (units) | 1-1.1 | 1-1.1 | 3-3.1 | 0.8-0.9 | |
| Storage - Dry | | | | | |
| Storage - Moist | | | | | |

**Samples will be discarded 60 DAYS after testing is complete unless other arrangements are made**

**B. Tests Required**

| | | | | | |
|---|---|---|---|---|---|
| Visual Description | | | | | |
| Moisture Content | | | | | |
| Density (specify method) | | | | | |
| Liquid Limit | | | | | |
| Plastic Limit | | | | | |
| Shrinkage Limit | | | | | |
| Hydrometer[2] | | | | | |
| Sieve Analysis[3] | | | | | |
| Specific Gravity | x | x | x | x | |
| Organic Content (specify method) | | | | | |
| Soluble Sulphates | | | | | |
| Laboratory Vane Shear | | | | | |
| Chloride Analysis | | | | | |
| Unconfined ( ) w/Stress Plot | | | | | |
| Confined- UU-ASTM D2850( ) w/Stress Plot (specify confining stresses) | | | | | |
| Minimum Index Density | | | | | |
| Maximum Index Density | | | | | |
| Compaction Test | | | | | |
| Resistivity | | | | | |

**C. Specific Requisition Forms Must Be Filled Out for the Following Tests (in addition to checking the boxes below)**

| | | | | | |
|---|---|---|---|---|---|
| Consolidation | | | | | |
| Direct Shear | | | | | |
| Triaxial | | | | | |
| Swelling Pressure / Swell | | | | | |
| Permeability Fixed Wall | | | | | |
| Permeability Flexible Wall | | | | | |
| Pinhole Test | | | | | |
| Filter Test | | | | | |
| Large Strain Consolidation | | | | | |
| Column Settling Test | | | | | |
| Tempe Cell | | | | | |

**NOTES:** 1. Types of Samples: A - Auger B - Block C - Core D - Drive O - Other P - Pitcher U - Shelby Tube W - Wash
2. Sodium hexamethaphosphate will be used as a dispersant, unless otherwise specified
3. Unless otherwise specified, the following sieve set will be used: 76, 50.8, 32.5, 25.4,19, 12.5, 10, 5mm, #10, #20, #40, #60, #100, #200

**D. Special Instructions / Other Tests**

Depth of sample is expressed in meters
Above 4 samples are from bulk samples (in 5 gallon bucket)

# MOISTURE - DENSITY RELATIONSHIP REPORT

**AMEC Environment & Infrastructure**
5671 70 Street
Edmonton, AB T6B 3P6

TO
AMEC Environment & Infrastr.
5681 - 70 Street
Edmonton, AB
T6B 3P6

ATTN: Renata Wood

PROJECT NO. VM00605
CLIENT AMEC Environment & Infrastr.
C.C.

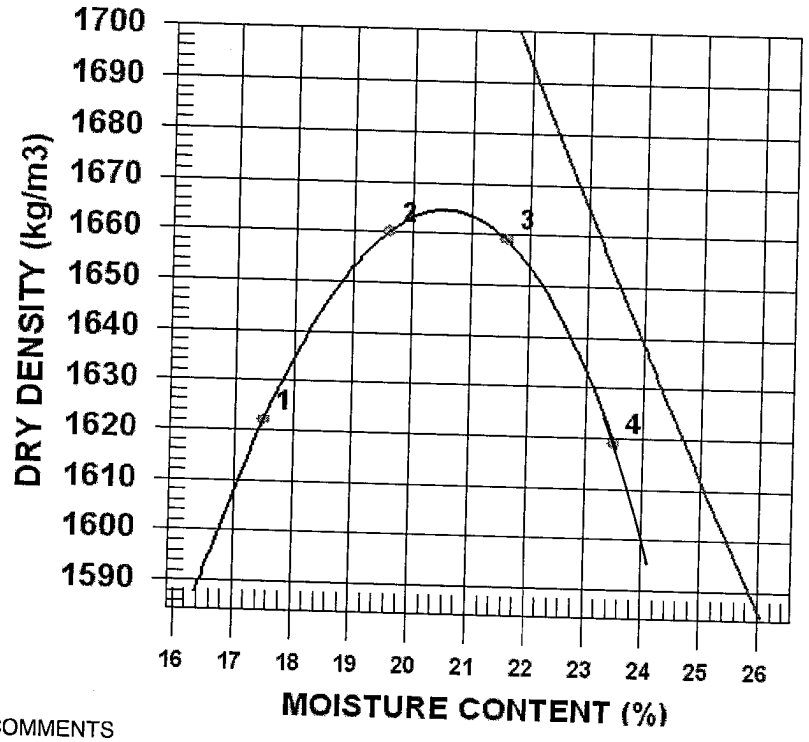
PROJECT Mount Nansen

CONTRACTOR

PROCTOR NO. 1 NO. OF TRIALS 4 DATE RECEIVED 2013.Dec.02 DATE SAMPLED 2013.Dec.02

INSITU MOISTURE N/A %
SAMPLED BY
TESTED BY
SUPPLIER
SOURCE TP-T-1-04, GS5, 3-3.1m
MATERIAL IDENTIFICATION
MAJOR COMPONENT CI - CLAY
SIZE
DESCRIPTION Very Silty
ROCK TYPE

COMPACTION STANDARD Standard Proctor, ASTM D698
COMPACTION PROCEDURE A: 101.6mm Mold, Passing 4.75mm
RAMMER TYPE Automatic
PREPARATION Moist
OVERSIZE CORRECTION METHOD None
RETAINED 4.75mm SCREEN %
OVERSIZE SPECIFIC GRAVITY




| TRIAL NUMBER | WET DENSITY (kg/m3) | DRY DENSITY (kg/m3) | MOISTURE CONTENT (%) |
|---|---|---|---|
| 1 | 1906 | 1622 | 17.5 |
| 2 | 1985 | 1660 | 19.6 |
| 3 | 2017 | 1659 | 21.6 |
| 4 | 1999 | 1619 | 23.5 |

| ZERO AIR VOIDS CURVE FOR ESTIMATED SPECIFIC GRAVITY OF 2.70 | MAXIMUM DRY DENSITY (kg/m3) | OPTIMUM MOISTURE CONTENT (%) |
|---|---|---|
| CALCULATED OVERSIZE CORRECTED | 1660 | 20.5 |

COMMENTS

Page 1 of 1 2013.Dec.11

PER. _____
AMEC Environment & Infrastructure

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

AMEC Environment & Infrastructure
5671 70 Street
Edmonton, AB T6B 3P6

# MOISTURE - DENSITY RELATIONSHIP REPORT

PROJECT NO. VM00605
CLIENT AMEC Environment & Infrastr.
C.C.

TO
AMEC Environment & Infrastr.
5681 - 70 Street
Edmonton, AB
T6B 3P6

ATTN: Renata Wood

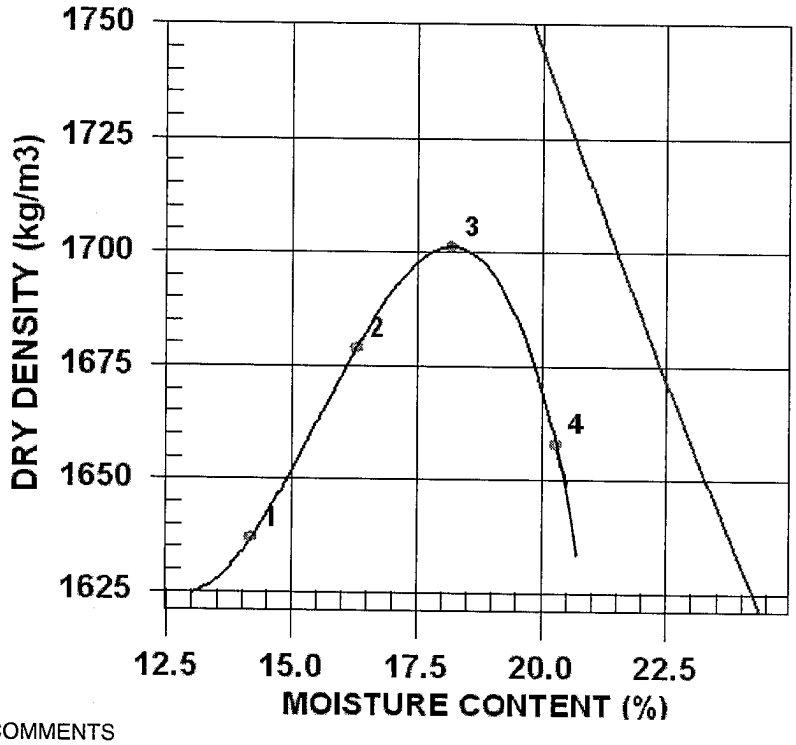
PROJECT Mount Nansen

CONTRACTOR

PROCTOR NO. 2 NO. OF TRIALS 4 DATE RECEIVED 2013.Dec.02 DATE SAMPLED 2013.Dec.02

INSITU MOISTURE N/A %
SAMPLED BY
TESTED BY
SUPPLIER
SOURCE TP-T-13-06, GS1, 0.8-0.
MATERIAL IDENTIFICATION
MAJOR COMPONENT Silty Sand
SIZE
DESCRIPTION
ROCK TYPE

COMPACTION STANDARD Standard Proctor, ASTM D698
COMPACTION PROCEDURE A: 101.6mm Mold, Passing 4.75mm
RAMMER TYPE Automatic
PREPARATION Moist
OVERSIZE CORRECTION METHOD None
RETAINED 4.75mm SCREEN %
OVERSIZE SPECIFIC GRAVITY




| TRIAL NUMBER | WET DENSITY (kg/m3) | DRY DENSITY (kg/m3) | MOISTURE CONTENT (%) |
|---|---|---|---|
| 1 | 1869 | 1637 | 14.2 |
| 2 | 1953 | 1679 | 16.3 |
| 3 | 2010 | 1701 | 18.2 |
| 4 | 1994 | 1658 | 20.3 |

| ZERO AIR VOIDS CURVE FOR ESTIMATED SPECIFIC GRAVITY OF 2.68 | MAXIMUM DRY DENSITY (kg/m3) | OPTIMUM MOISTURE CONTENT (%) |
|---|---|---|
| CALCULATED OVERSIZE CORRECTED | 1700 | 18.0 |

COMMENTS

PER. _____
AMEC Environment & Infrastructure

 2013.Dec.11

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

**ONE-DIMENSIONAL CONSOLIDATION TEST**
( ASTM D2435-90 )

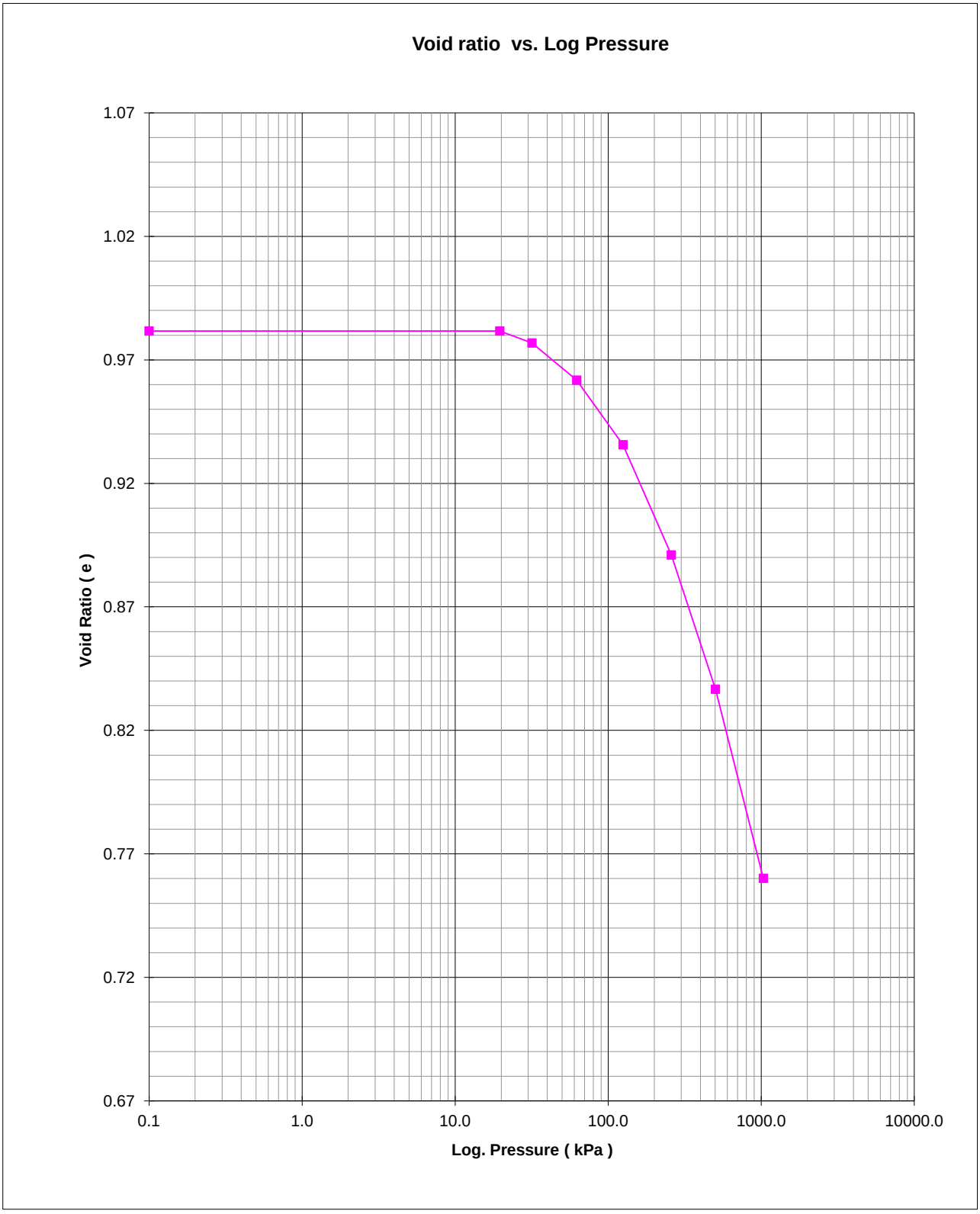
| | | | |
|---|---|---|---|
| **Project** | M. Nansen TA5 2013 | | |
| **Test** | Government of Yucon | | |
| **Location** | N/A | | |
| **Job No.** | VM00605E.B001 | **Sample No.** | GS5 |
| **Hole No.** | TP-T-13-04 | **Depth** | 3.0-3.1 m |
| **Reported by** | CR/SH | **Date Started** | 4-Feb-14 |

| **Apparatus Data** | | | **Moisture Content Data** | | |
|---|---|---|---|---|---|
| Ring No. | 2 | | Wt. of Ring + Soil + Water ( Start ) | 189.30 | g |
| Weight of ring | 85.7 | g | Wt. of Ring + Soil + Water ( End ) | 192.40 | g |
| Thickness | 18.8 | mm | Wt. of Ring | 85.66 | g |
| Diameter | 63.4 | mm | Wt. of Soil + Water ( End ) | 106.74 | g |
| Area | 31.6 | $cm^2$ | Wt. of Tare ( Tare # ) | 85.66 | g |
| Machine No. | 2 | | Wt. of Soil Dry + Tare | 169.70 | g |
| Loading Beam Ratio | 11:01 | | Wt. of Soil | 84.04 | g |
| Weight of Top + Stone | 0.345 | kg | | | |

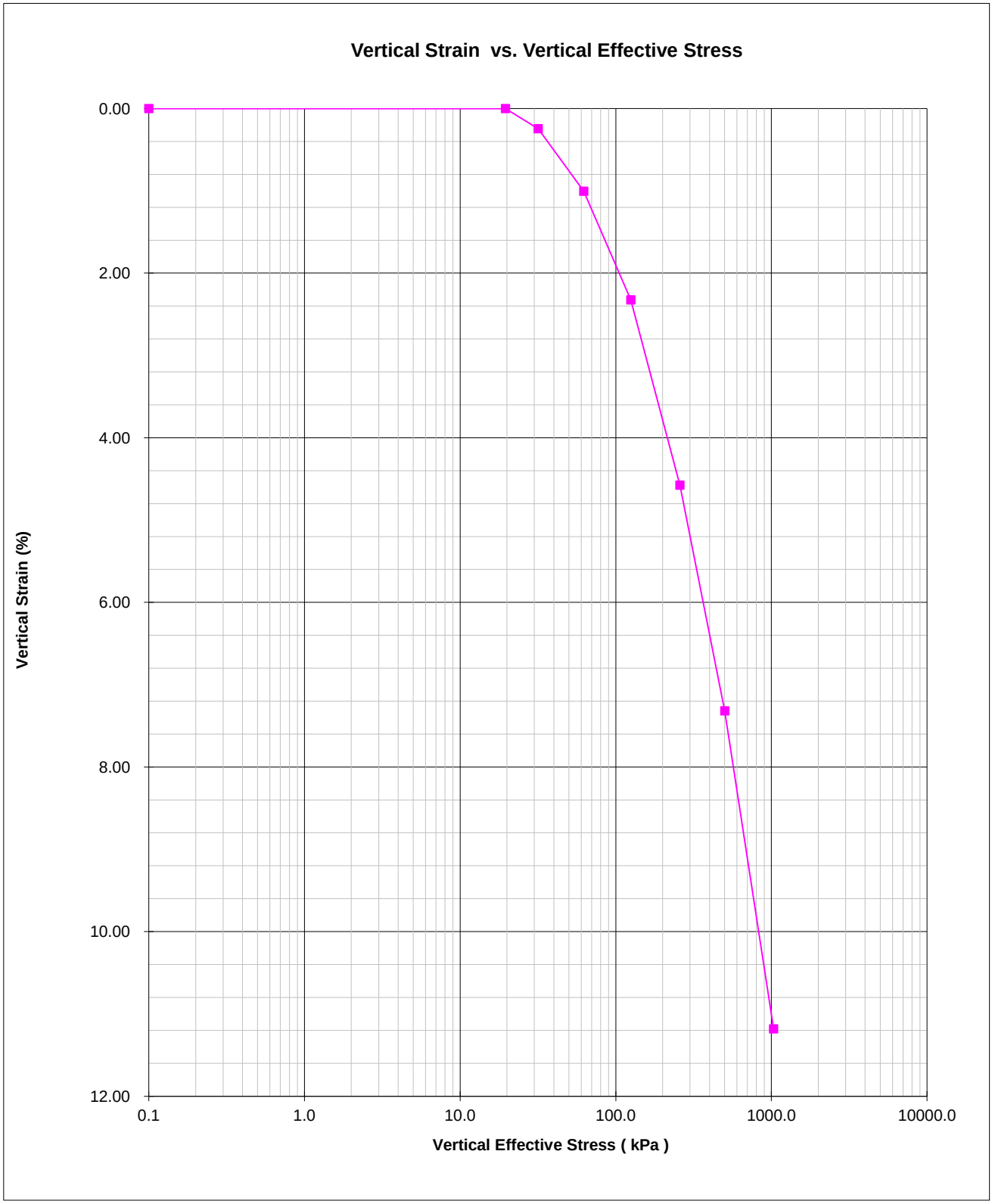
| **Specimen Data** | **Initial** | **Final** | | **Index Tests** | Calculated | Final |
|---|---|---|---|---|---|---|
| Specimen Height | 18.7500 | 16.6534 | mm | Specific Gravity ( Assumed ) | 2.81 | |
| Volume of Specimen | 59.27 | 52.64 | ml | Liquid Limit % | | |
| Volume of Solids | 29.91 | 29.91 | ml | Plastic Limit % | | |
| Volume of Voids | 29.36 | 22.73 | ml | Plastic Index % | | |
| Volume of Water | 19.60 | 22.70 | ml | Sand % | | |
| Void Ratio | 0.982 | 0.760 | | Silt % | | |
| Saturation | 66.8 | 100 | % | Clay % | | |
| Moisture Content | 23.3 | 27.0 | % | **Soil Description** | SILTY CLAY (86% SPDD) | |
| Height of Solids | 9.46 | 9.46 | mm | | | |
| Wet Density | 1749 | 2028 | $kg/m_3$ | | | |
| Dry Density | 1418 | 1596 | $kg/m^3$ | | | |
| Compressive Index $C_C$ | | **0.250** | | Swelling Pressure $P_S$ | **19.57** | kPa |
| Recompression Index $C_r$ | | | | Percent Swell | | % |
| Pre-Consolidation Pressure $P_O'$ | | **250** | kPa | Overburden Pressure $P_V$ | | kPa |

| Pressure p (kPa ) | Dial Reading (mm) | Apparatus Deformation (mm) | Corrected Height (mm) | Vertical Strain ε ( % ) | Void Ratio e | Constrained Modulus $E=\Delta p/\Delta\varepsilon$ ( MPa ) | Coeff. of Consolidation $c_v$ ( $m^2$/yr ) | Coeff.of Volume Compressibility $m_v$ ( $m^2$/MN ) | Coeff. of Permeability $k = c_v m_v \rho_w g$ ( m/s ) |
|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 18.7500 | | 18.7500 | | 0.982 | | | | |
| 19.57 | 18.7500 | | 18.7500 | | 0.982 | | | | |
| 31.74 | 18.7030 | -0.0012 | 18.7041 | 0.24 | 0.977 | 4.97 | 9.77 | 2.0E-01 | 6.1E-10 |
| 62.27 | 18.5592 | -0.0025 | 18.5617 | 1.00 | 0.962 | 4.02 | 11.91 | 2.5E-01 | 9.2E-10 |
| 125.02 | 18.3122 | -0.0019 | 18.3141 | 2.32 | 0.936 | 4.75 | 16.74 | 2.1E-01 | 1.1E-09 |
| 258.33 | 17.8885 | -0.0036 | 17.8921 | 4.58 | 0.891 | 5.92 | 15.97 | 1.7E-01 | 8.6E-10 |
| 501.87 | 17.3744 | -0.0034 | 17.3778 | 7.32 | 0.837 | 8.88 | 15.27 | 1.2E-01 | 5.6E-10 |
| 1032.38 | 16.6483 | -0.0051 | 16.6534 | 11.18 | 0.760 | 13.73 | 14.08 | 7.9E-02 | 3.4E-10 |

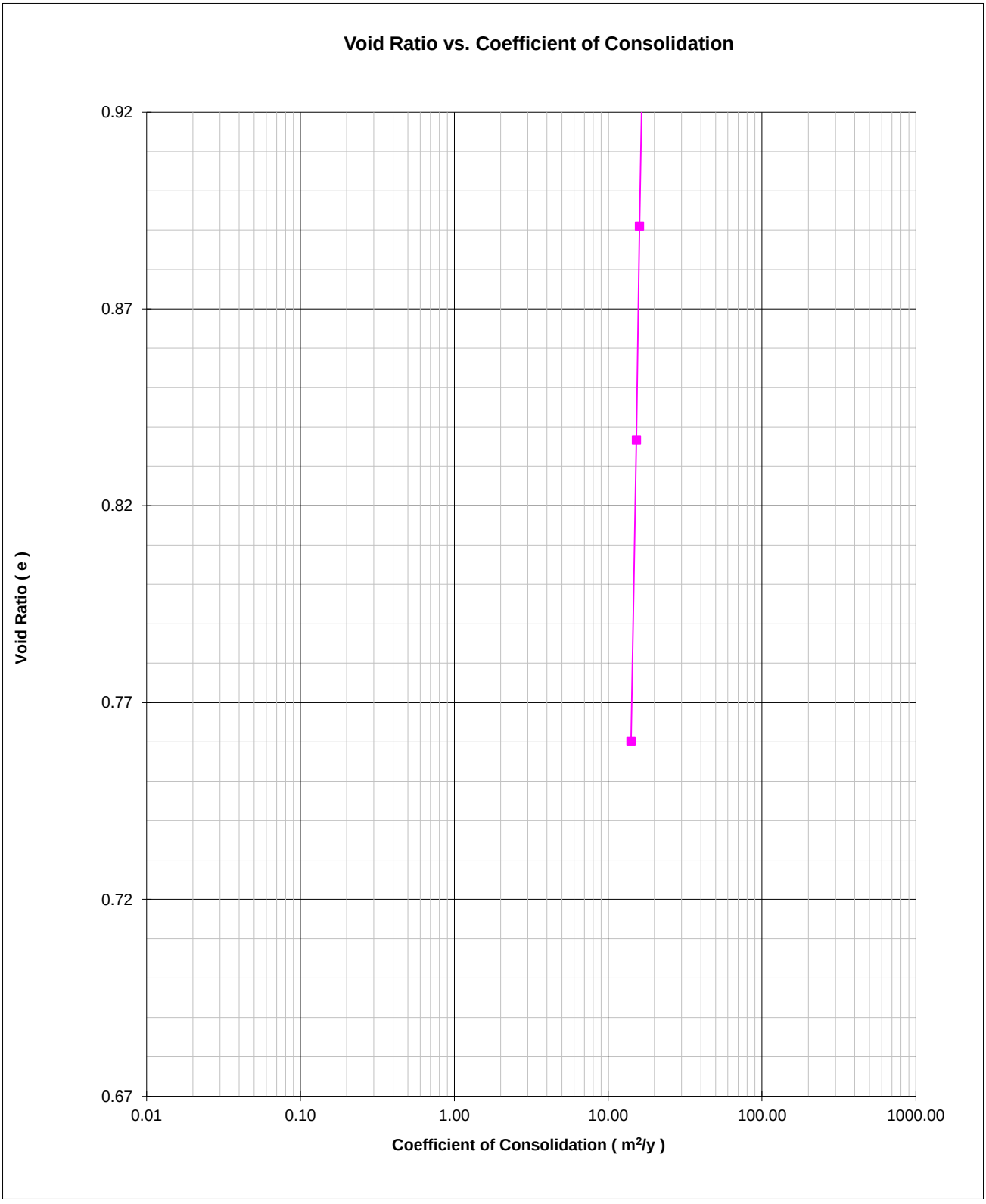
| | | | | |
|---|---|---|---|---|
| **ONE-DIMENSIONAL CONSOLIDATION TEST** ( ASTM D2435-90 ) | **Project** | M. Nansen TA5 2013 | | |
| | **Test** | Government of Yucon | | |
| | **Location** | N/A | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS5 |
| | **Hole No.** | TP-T-13-04 | **Depth** | 3.0-3.1 m |
| | **Reported by** | CR/SH | **Date Started** | 04-Feb-14 |



| | | | | |
|---|---|---|---|---|
| amec | **Project** | M. Nansen TA5 2013 | | |
| | **Test** | Government of Yucon | | |
| | **Location** | N/A | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS5 |
| **ONE-DIMENSIONAL CONSOLIDATION TEST** | **Hole No.** | TP-T-13-04 | **Depth** | 3.0-3.1 m |
| ( ASTM D2435-90 ) | **Reported by** | CR/SH | **Date Started** | 04-Feb-14 |



| | | | | |
|---|---|---|---|---|
| amec | **Project** | M. Nansen TA5 2013 | | |
| | **Test** | Government of Yucon | | |
| | **Location** | N/A | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS5 |
| **ONE-DIMENSIONAL CONSOLIDATION TEST** ( ASTM D2435-90 ) | **Hole No.** | TP-T-13-04 | **Depth** | 3.0-3.1 m |
| | **Reported by** | CR/SH | **Date Started** | 04-Feb-14 |



| | | | | |
|---|---|---|---|---|
| **Project** | M. Nansen TA5 2013 | | | |
| **Test** | Government of Yucon | | | |
| **Location** | N/A | | | |
| **Job No.** | VM00605E.B001 | **Sample No.** | GS1 | |
| **Hole No.** | TP-T-13-06 | **Depth** | 0.8-0.9 m | |
| **Reported by** | CR/SH | **Date Started** | 4-Feb-14 | |

**ONE-DIMENSIONAL CONSOLIDATION TEST**
( ASTM D2435-90 )

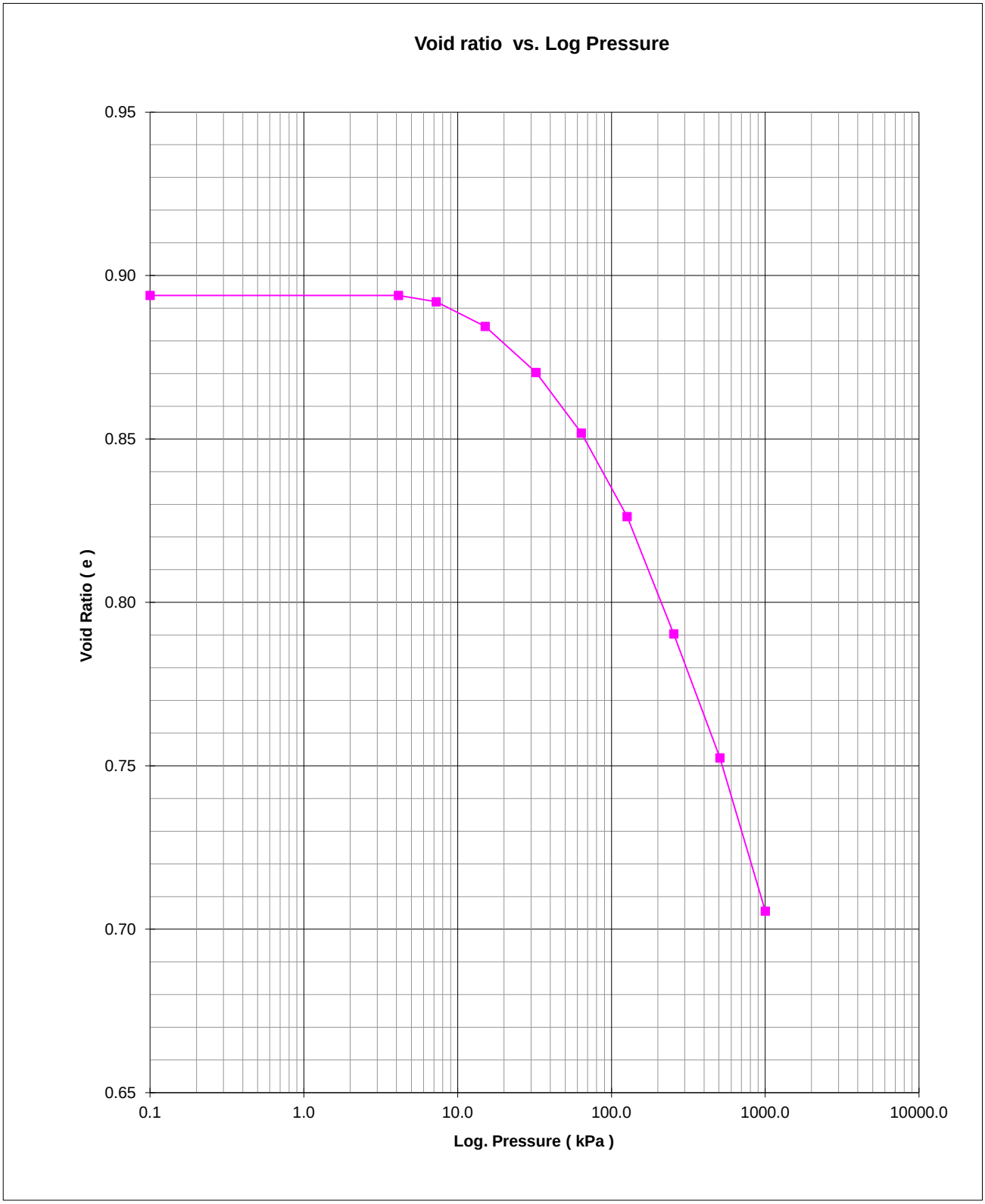
| **Apparatus Data** | | | **Moisture Content Data** | | |
|---|---|---|---|---|---|
| Ring No. | 9 | | Wt. of Ring + Soil + Water ( Start ) | 199.80 | g |
| Weight of ring | 87.5 | g | Wt. of Ring + Soil + Water ( End ) | 204.95 | g |
| Thickness | 18.7 | mm | Wt. of Ring | 87.50 | g |
| Diameter | 66.0 | mm | Wt. of Soil + Water ( End ) | 117.45 | g |
| Area | 34.2 | $cm^2$ | Wt. of Tare ( Tare # ) | 87.50 | g |
| Machine No. | 9 | | Wt. of Soil Dry + Tare | 181.20 | g |
| Loading Beam Ratio | 11:01 | | Wt. of Soil | 93.70 | g |
| Weight of Top + Stone | 0.345 | kg | | | |

| **Specimen Data** | **Initial** | **Final** | | **Index Tests** | Calculated | Final |
|---|---|---|---|---|---|---|
| Specimen Height | 18.7200 | 16.8581 | mm | Specific Gravity ( Assumed ) | 2.77 | |
| Volume of Specimen | 64.06 | 57.69 | ml | Liquid Limit % | | |
| Volume of Solids | 33.83 | 33.83 | ml | Plastic Limit % | | |
| Volume of Voids | 30.24 | 23.87 | ml | Plastic Index % | | |
| Volume of Water | 18.60 | 23.75 | ml | Sand % | | |
| Void Ratio | 0.894 | 0.706 | | Silt % | | |
| Saturation | 61.5 | 100 | % | Clay % | | |
| Moisture Content | 19.9 | 25.3 | % | **Soil Description** | SILTY SAND(86%SPDD) | |
| Height of Solids | 9.88 | 9.88 | mm | | | |
| Wet Density | 1753 | 2036 | $kg/m_3$ | | | |
| Dry Density | 1463 | 1624 | $kg/m^3$ | | | |
| Compressive Index $C_C$ | | **0.120** | | Swelling Pressure $P_S$ | **4.12** | kPa |
| Recompression Index $C_r$ | | | | Percent Swell | | % |
| Pre-Consolidation Pressure $P_O'$ | | **125** | kPa | Overburden Pressure $P_V$ | | kPa |

| Pressure p (kPa ) | Dial Reading (mm) | Apparatus Deformation (mm) | Corrected Height (mm) | Vertical Strain ε ( % ) | Void Ratio e | Constrained Modulus $E=\Delta p/\Delta\varepsilon$ ( MPa ) | Coeff. of Consolidation $c_v$ ( $m^2$/yr ) | Coeff.of Volume Compressibility $m_v$ ( $m^2$/MN ) | Coeff. of Permeability $k = c_v m_v \rho_w g$ ( m/s ) |
|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 18.7200 | | 18.7200 | | 0.894 | | | | |
| 4.12 | 18.7200 | | 18.7200 | | 0.894 | | | | |
| 7.25 | 18.7004 | -0.0002 | 18.7007 | 0.10 | 0.892 | 3.03 | 39.03 | 3.3E-01 | 4.0E-09 |
| 15.09 | 18.6258 | -0.0005 | 18.6263 | 0.50 | 0.884 | 1.97 | 4.30 | 5.1E-01 | 6.8E-10 |
| 32.32 | 18.4863 | -0.0007 | 18.4870 | 1.24 | 0.870 | 2.32 | 7.23 | 4.3E-01 | 9.8E-10 |
| 63.66 | 18.3025 | -0.0012 | 18.3037 | 2.22 | 0.852 | 3.20 | 16.70 | 3.2E-01 | 1.6E-09 |
| 126.34 | 18.0489 | -0.0023 | 18.0512 | 3.57 | 0.826 | 4.65 | 16.28 | 2.2E-01 | 1.1E-09 |
| 254.20 | 17.6929 | -0.0037 | 17.6966 | 5.47 | 0.790 | 6.75 | 15.60 | 1.5E-01 | 7.5E-10 |
| 507.41 | 17.3179 | -0.0037 | 17.3216 | 7.47 | 0.752 | 12.64 | 15.05 | 8.4E-02 | 3.9E-10 |
| 1000.68 | 16.8527 | -0.0054 | 16.8581 | 9.95 | 0.706 | 19.92 | 19.07 | 5.4E-02 | 3.2E-10 |

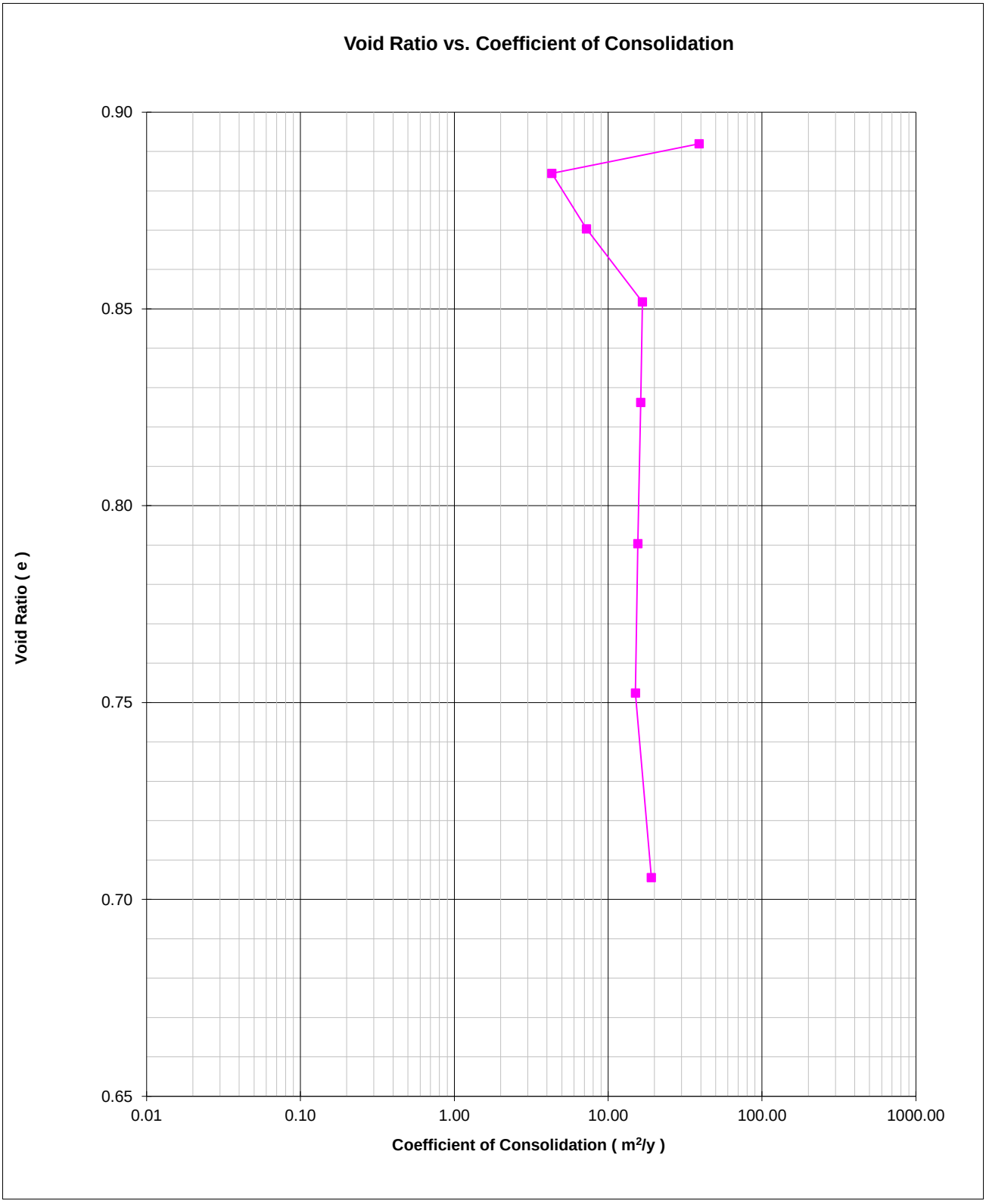
**ONE-DIMENSIONAL CONSOLIDATION TEST**
( ASTM D2435-90 )

| | | | |
|---|---|---|---|
| **Project** | M. Nansen TA5 2013 | | |
| **Test** | Government of Yucon | | |
| **Location** | N/A | | |
| **Job No.** | VM00605E.B001 | **Sample No.** | GS1 |
| **Hole No.** | TP-T-13-06 | **Depth** | 0.8-0.9 m |
| **Reported by** | CR/SH | **Date Started** | 04-Feb-14 |



| | | | | |
|---|---|---|---|---|
| amec | **Project** | M. Nansen TA5 2013 | | |
| | **Test** | Government of Yucon | | |
| | **Location** | N/A | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS1 |
| **ONE-DIMENSIONAL CONSOLIDATION TEST** | **Hole No.** | TP-T-13-06 | **Depth** | 0.8-0.9 m |
| ( ASTM D2435-90 ) | **Reported by** | CR/SH | **Date Started** | 04-Feb-14 |

| | | | | |
|---|---|---|---|---|
| amec | **Project** | M. Nansen TA5 2013 | | |
| | **Test** | Government of Yucon | | |
| | **Location** | N/A | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS1 |
| **ONE-DIMENSIONAL CONSOLIDATION TEST** ( ASTM D2435-90 ) | **Hole No.** | TP-T-13-06 | **Depth** | 0.8-0.9 m |
| | **Reported by** | CR/SH | **Date Started** | 04-Feb-14 |



**ONE-DIMENSIONAL CONSOLIDATION TEST**
( ASTM D2435-90 )

| | | | |
|---|---|---|---|
| **Project** | Mount Nansen TA5 2013 | | |
| **Test** | Government of Yukon - AAM | | |
| **Location** | N/A | | |
| **Job No.** | VM00605E.B001 | **Sample No.** | GS5 |
| **Hole No.** | TP-T-13-04 | **Depth** | 3.0-3.1 m |
| **Reported by** | CR/SH | **Date Started** | 4-Feb-14 |

| **Apparatus Data** | | | **Moisture Content Data** | | |
|---|---|---|---|---|---|
| Ring No. | 8 | | Wt. of Ring + Soil + Water ( Start ) | 180.50 | g |
| Weight of ring | 76.5 | g | Wt. of Ring + Soil + Water ( End ) | 190.20 | g |
| Thickness | 18.0 | mm | Wt. of Ring | 76.50 | g |
| Diameter | 66.2 | mm | Wt. of Soil + Water ( End ) | 113.70 | g |
| Area | 34.4 | $cm^2$ | Wt. of Tare ( Tare # ) | 76.50 | g |
| Machine No. | 8 | | Wt. of Soil Dry + Tare | 168.53 | g |
| Loading Beam Ratio | 11:01 | | Wt. of Soil | 92.03 | g |
| Weight of Top + Stone | 0.345 | kg | | | |

| **Specimen Data** | **Initial** | **Final** | | **Index Tests** | Calculated | Final |
|---|---|---|---|---|---|---|
| Specimen Height | 18.0340 | 15.8293 | mm | Specific Gravity ( Assumed ) | 2.81 | |
| Volume of Specimen | 62.01 | 54.43 | ml | Liquid Limit % | | |
| Volume of Solids | 32.75 | 32.75 | ml | Plastic Limit % | | |
| Volume of Voids | 29.26 | 21.68 | ml | Plastic Index % | | |
| Volume of Water | 11.97 | 21.67 | ml | Sand % | | |
| Void Ratio | 0.893 | 0.662 | | Silt % | | |
| Saturation | 40.9 | 100.0 | % | Clay % | | |
| Moisture Content | 13.0 | 23.5 | % | **Soil Description** | SILTY CLAY (50% INITIAL SATURATION) | |
| Height of Solids | 9.52 | 9.52 | mm | | | |
| Wet Density | 1677 | 2089 | $kg/m_3$ | | | |
| Dry Density | 1484 | 1691 | $kg/m^3$ | | | |
| Compressive Index $C_C$ | | | | Swelling Pressure $P_S$ | 16.16 | kPa |
| Recompression Index $C_r$ | | | | Percent Swell | | % |
| Pre-Consolidation Pressure $P_O'$ | | | kPa | Overburden Pressure $P_V$ | | kPa |

Results based on conventional assessment of primary consolidation

| Pressure p (kPa ) | Dial Reading (mm) | Apparatus Deformation (mm) | Corrected Height (mm) | Vertical Strain ε ( % ) | Void Ratio e | Constrained Modulus $E=\Delta p/\Delta\varepsilon$ ( MPa ) | Coeff. of Consolidation $c_v$ ( $m^2$/yr ) | Coeff.of Volume Compressibility $m_v$ ( $m^2$/MN ) | Coeff. of Permeability $k = c_v m_v \rho_w g$ ( m/s ) |
|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 18.0340 | | 18.0340 | | 0.893 | | | | |
| 16.16 | 18.0340 | | 18.0340 | | 0.893 | | | | |
| 32.32 | 17.7987 | -0.0096 | 17.8082 | 1.25 | 0.870 | 1.29 | 5.68 | 7.7E-01 | 1.4E-09 |
| 63.66 | 17.7530 | -0.0032 | 17.7561 | 1.54 | 0.864 | 10.85 | 3.91 | 9.3E-02 | 1.1E-10 |
| 126.34 | 17.6872 | -0.0042 | 17.6914 | 1.90 | 0.857 | 17.46 | 3.88 | 5.8E-02 | 7.0E-11 |
| 254.20 | 17.6107 | -0.0060 | 17.6166 | 2.31 | 0.850 | 30.84 | 34.60 | 3.3E-02 | 3.6E-10 |
| 254.20 | 17.3462 | -0.0060 | 17.3462 | 3.81 | 0.821 | | | | |
| 507.41 | 16.6307 | -0.0045 | 16.6352 | 7.76 | 0.747 | 4.65 | 3.65 | 2.2E-01 | 2.5E-10 |
| 1000.68 | 15.8231 | -0.0062 | 15.8293 | 12.23 | 0.662 | 11.04 | 5.91 | 9.8E-02 | 1.8E-10 |
| | | | | | | | | | |
| Results based on total measured change in height | | | | | | | | | |
| 0.10 | 18.034 | | 18.0340 | | 0.893 | | | | |
| 32.32 | 17.7192 | -0.0096 | 17.7288 | 1.69 | 0.861 | 1.90 | | 5.3E-01 | |
| 63.66 | 17.6437 | -0.0032 | 17.6469 | 2.15 | 0.853 | 6.90 | | 1.5E-01 | |
| 126.34 | 17.5412 | -0.0042 | 17.5453 | 2.71 | 0.842 | 11.13 | | 9.2E-02 | |
| 254.20 | 17.4117 | -0.0060 | 17.4177 | 3.42 | 0.829 | 18.07 | | 5.7E-02 | |
| 254.20 | 17.1413 | -0.0060 | 17.1473 | 4.92 | 0.800 | | | | |
| 507.41 | 16.1850 | -0.0045 | 16.1895 | 10.23 | 0.700 | 4.77 | | 2.2E-01 | |
| 1000.68 | 15.2945 | -0.0062 | 15.3007 | 15.16 | 0.606 | 10.01 | | 1.1E-01 | |
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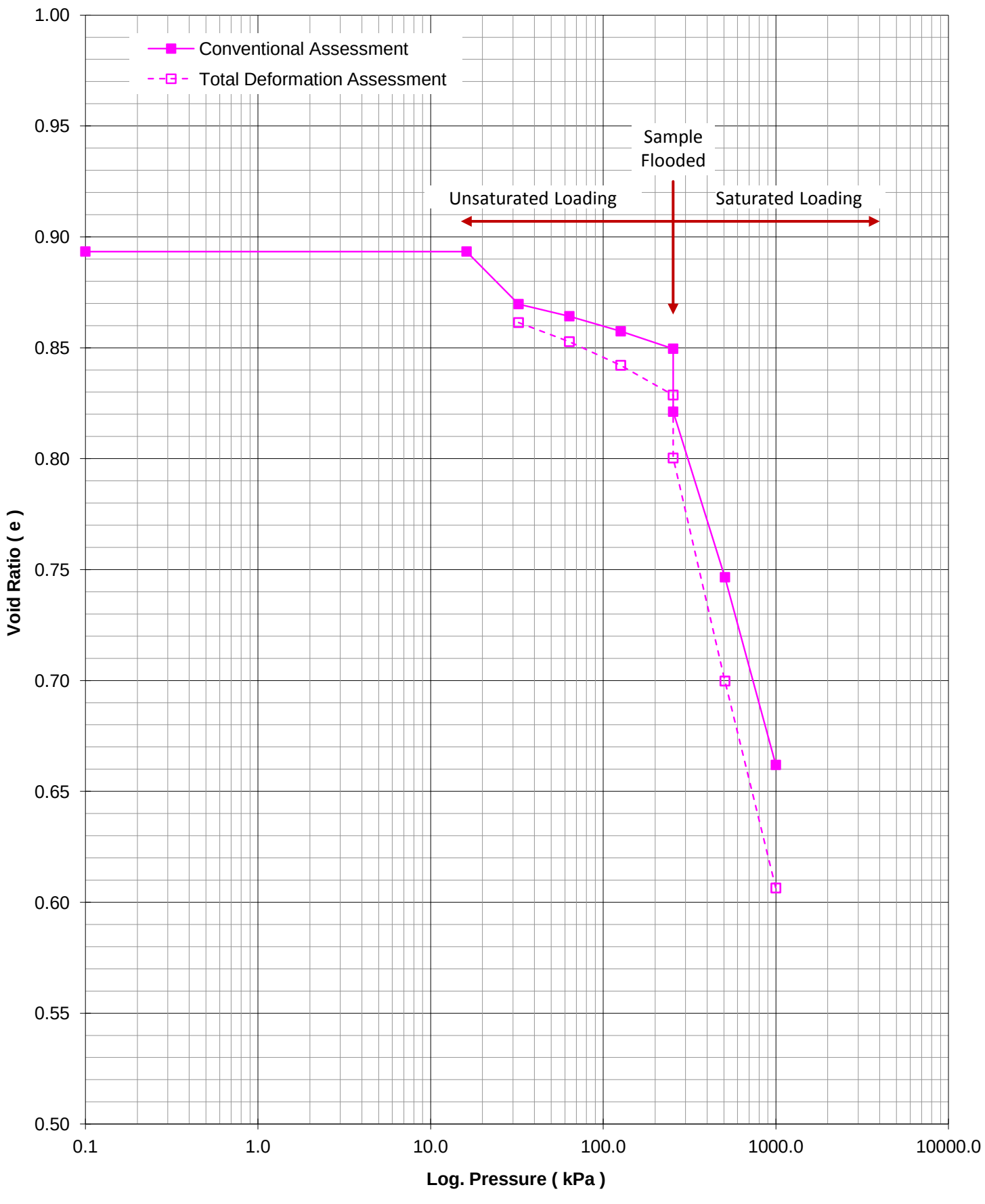
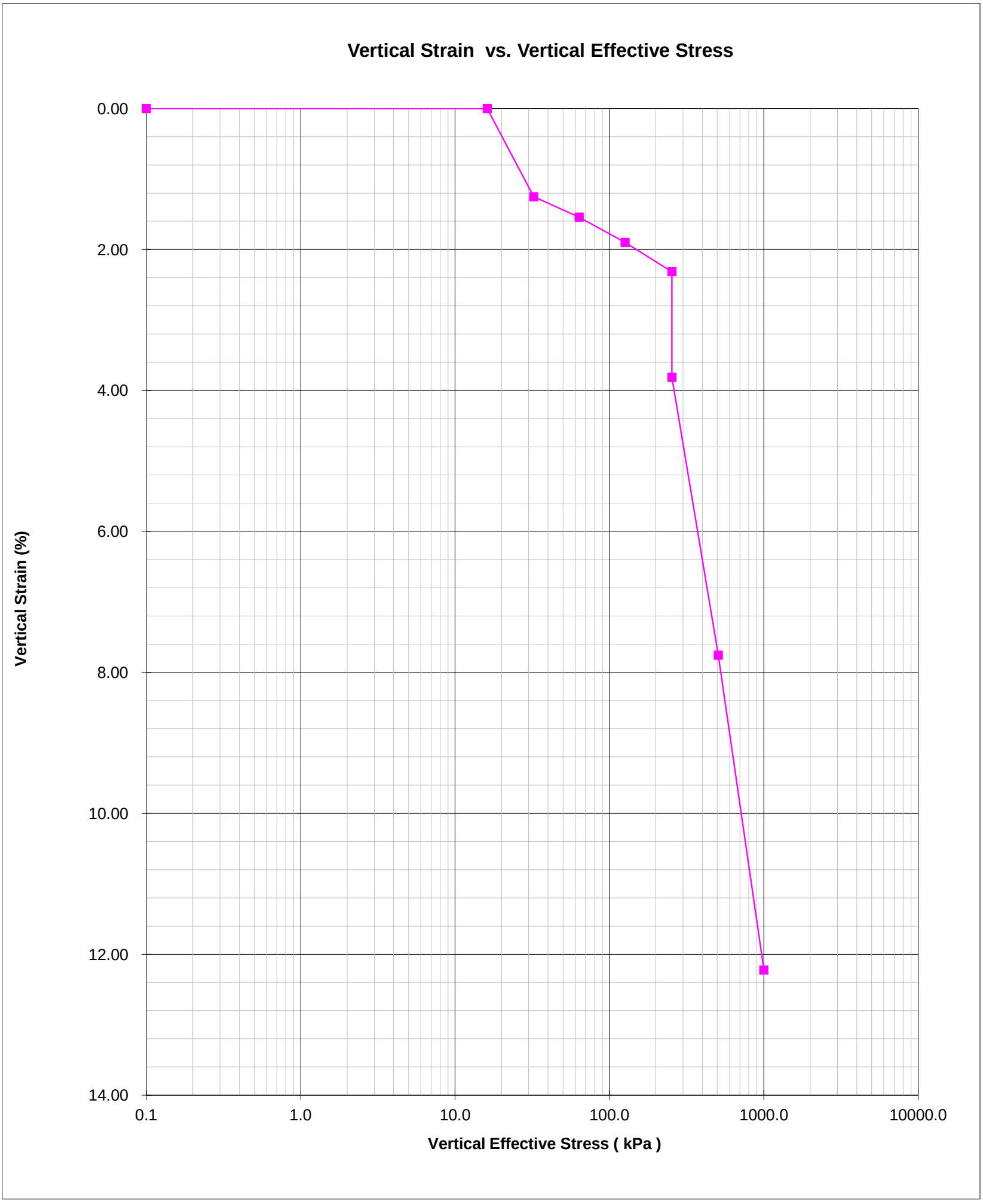
|---|---|---|---|---|
| amec | **Project** | Mount Nansen TA5 2013 | | |
| | **Test** | Government of Yukon - AAM | | |
| | **Location** | N/A | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS5 |
| **ONE-DIMENSIONAL CONSOLIDATION TEST** ( ASTM D2435-90 ) | **Hole No.** | TP-T-13-04 | **Depth** | 3.0-3.1 m |
| | **Reported by** | CR/SH | **Date Started** | 04-Feb-14 |

## Void ratio vs. Log Pressure

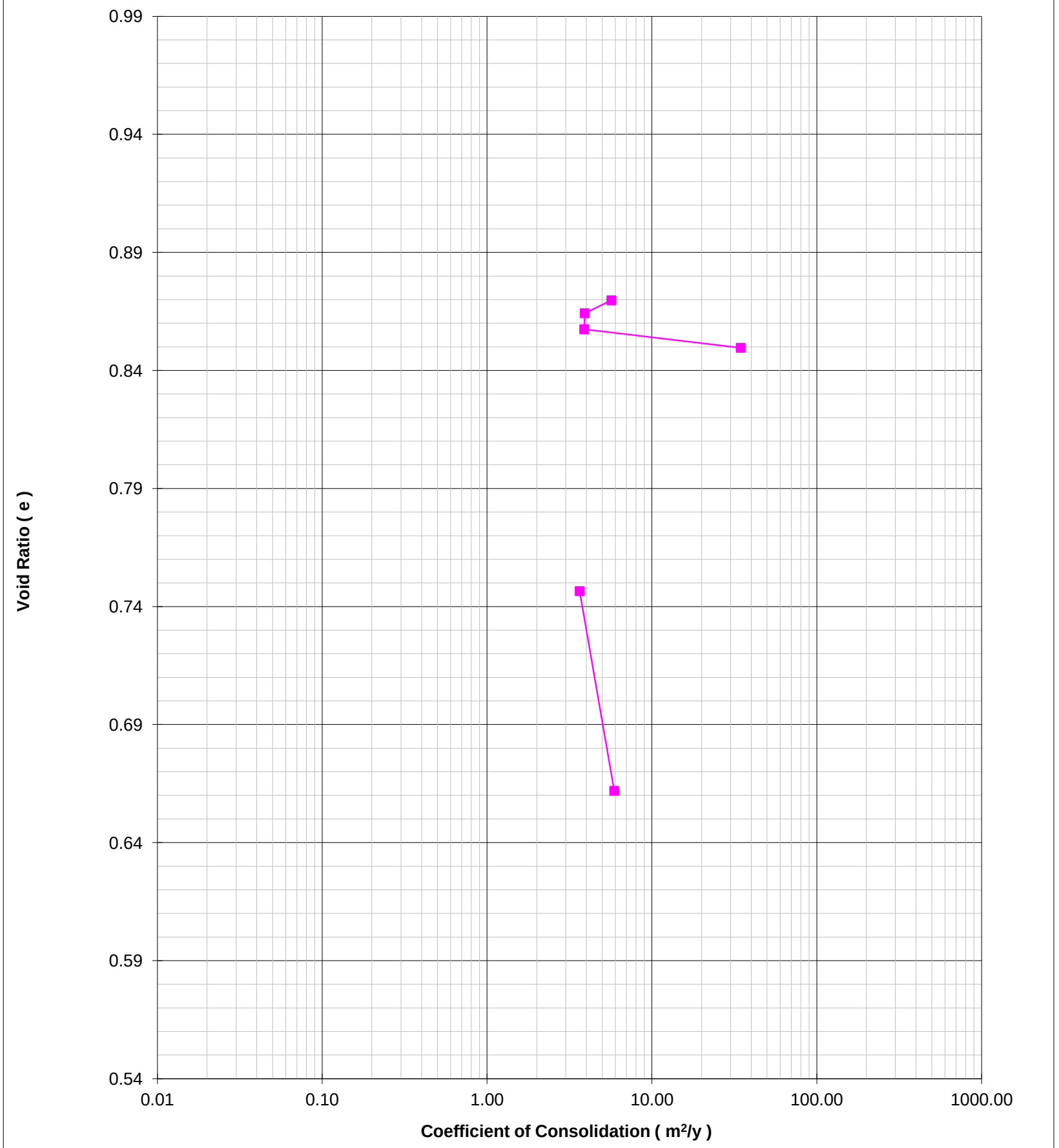


| | | | | |
|---|---|---|---|---|
| amec | **Project** | Mount Nansen TA5 2013 | | |
| | **Test** | Government of Yukon - AAM | | |
| | **Location** | N/A | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS5 |
| **ONE-DIMENSIONAL CONSOLIDATION TEST** | **Hole No.** | TP-T-13-04 | **Depth** | 3.0-3.1 m |
| ( ASTM D2435-90 ) | **Reported by** | CR/SH | **Date Started** | 04-Feb-14 |

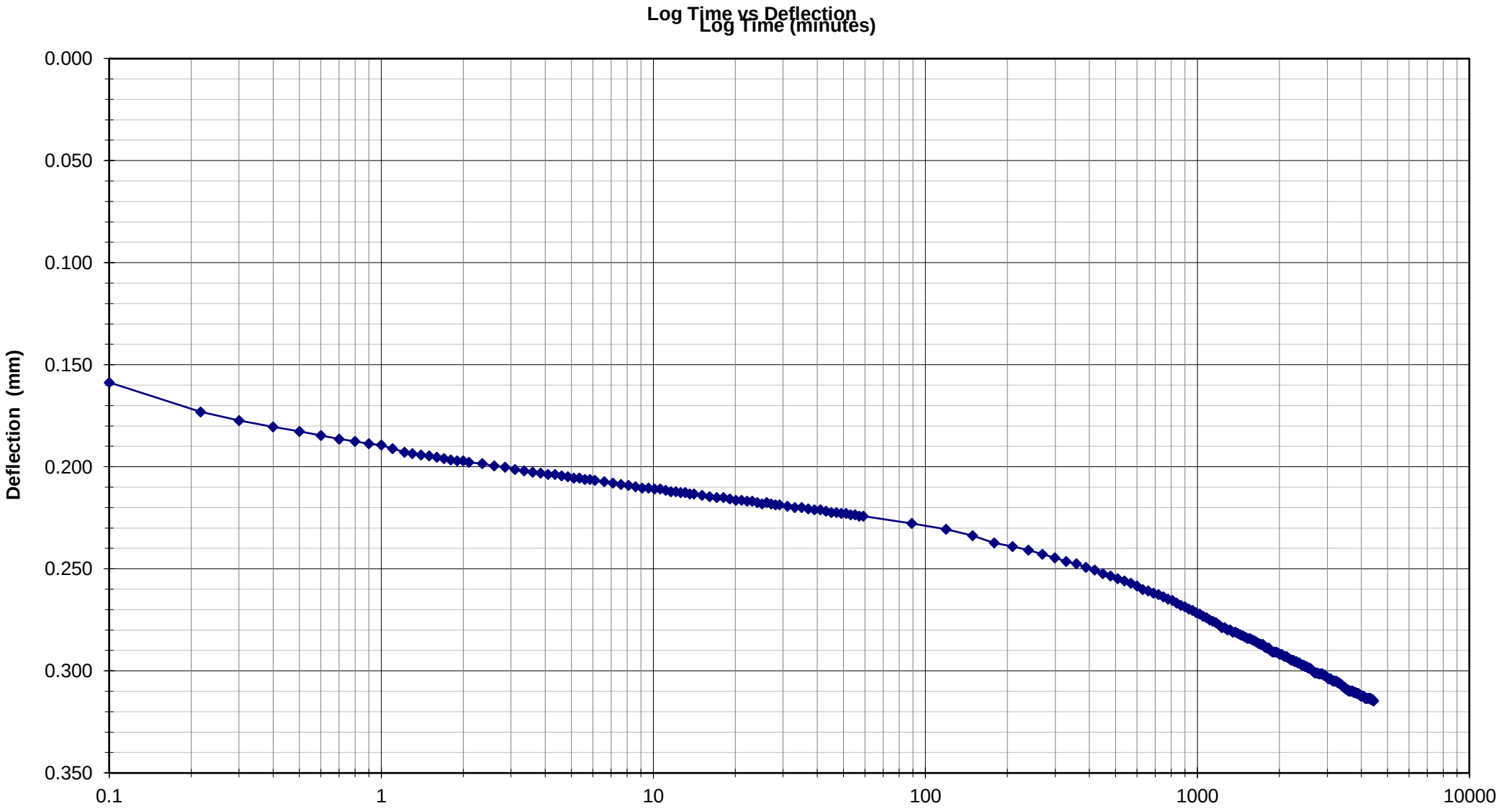


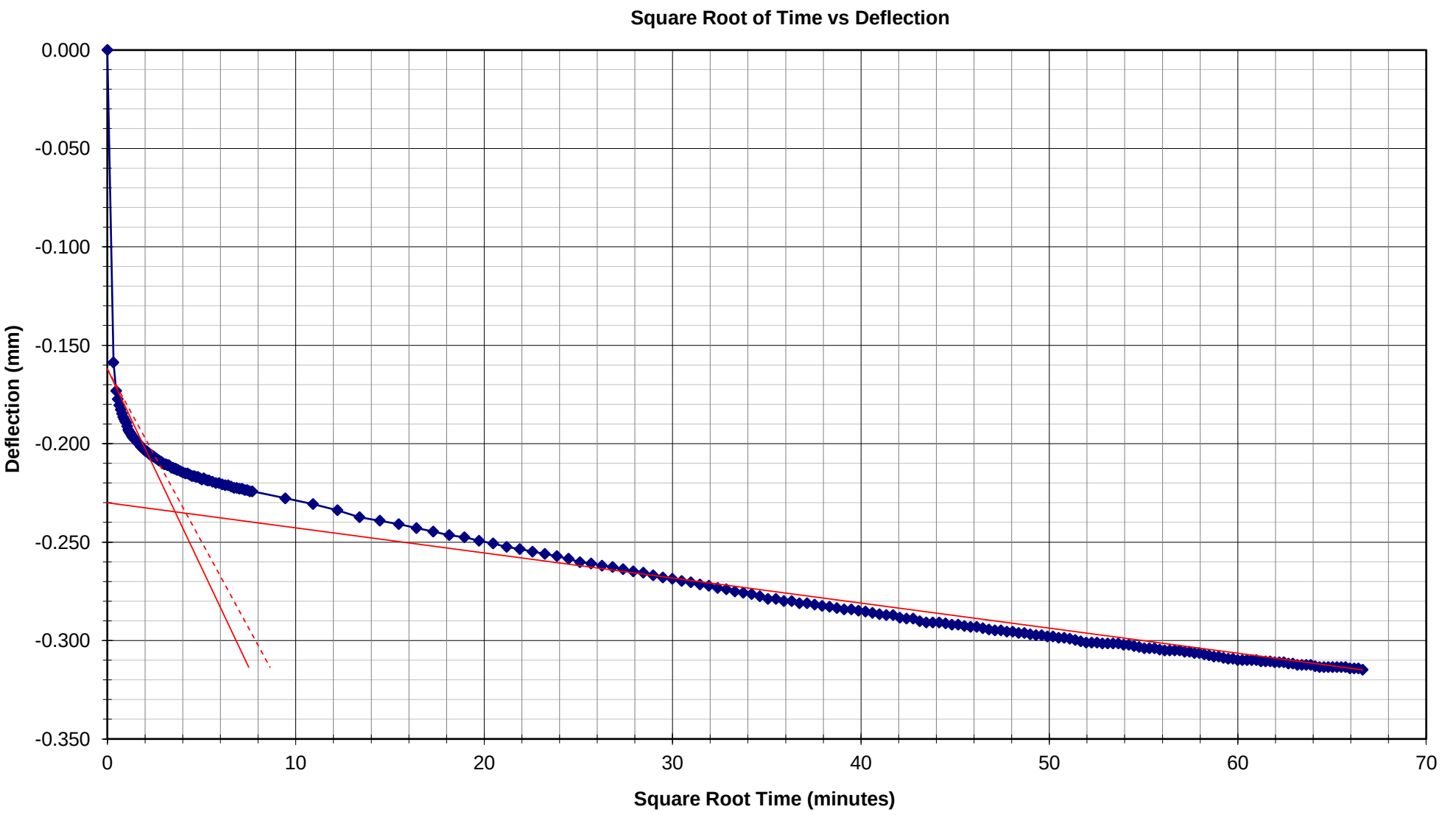
| | | | | |
|---|---|---|---|---|
| amec | **Project** | Mount Nansen TA5 2013 | | |
| | **Test** | Government of Yukon - AAM | | |
| | **Location** | N/A | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS5 |
| **ONE-DIMENSIONAL CONSOLIDATION TEST** ( ASTM D2435-90 ) | **Hole No.** | TP-T-13-04 | **Depth** | 3.0-3.1 m |
| | **Reported by** | CR/SH | **Date Started** | 04-Feb-14 |

## Void Ratio vs. Coefficient of Consolidation

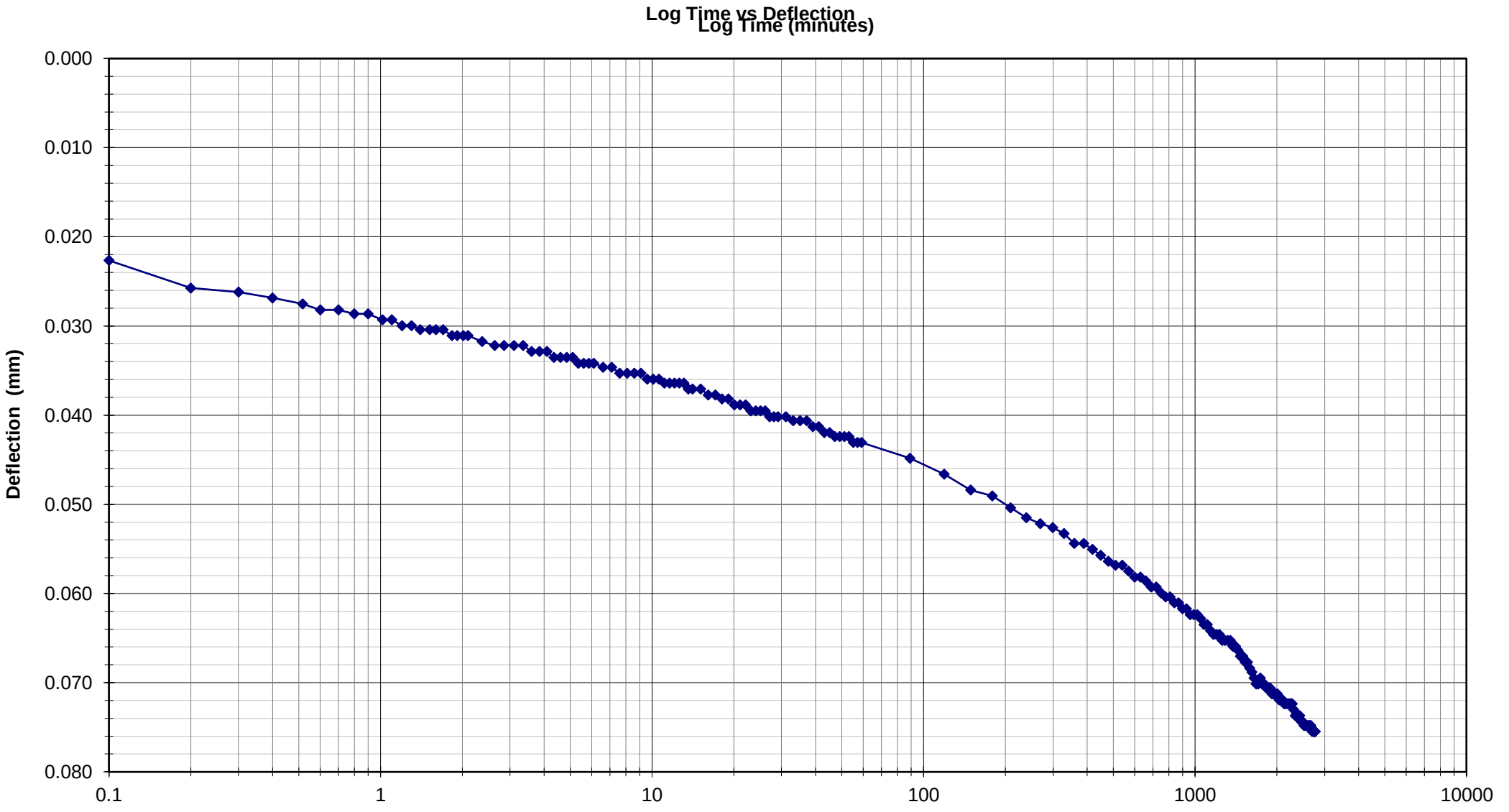


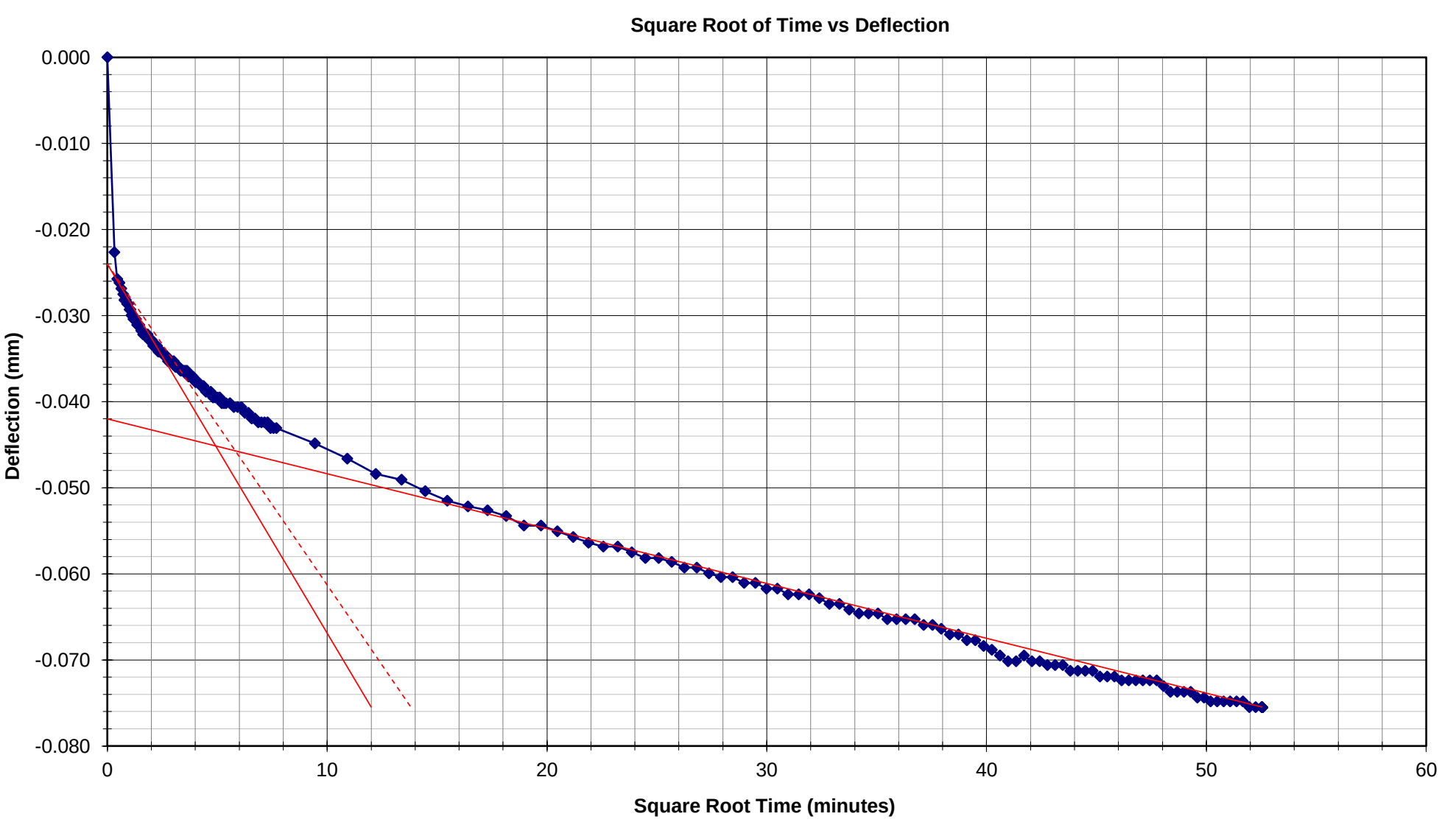
| AMEC EARTH & ENVIRONMENTAL<br>*Engineering & Environmental Services*<br><br>**ONE-DIMENSIONAL CONSOLIDATION TEST**<br>( ASTM D2435-90 ) | | | | |
|---|---|---|---|---|
| | **Project** | Mount Nansen TA5 2013 | | |
| | **Location** | | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS5 |
| | **Hole No.** | TP-T-13-04 | **Depth ( ft )** | 3.0-3.1 m |
| | **Technician** | CR/SH | **Loading Date** | |
| | **Loading Stage** | 32.32 kPa | **Start Loading Time** | 4-Feb-14 11:06 |



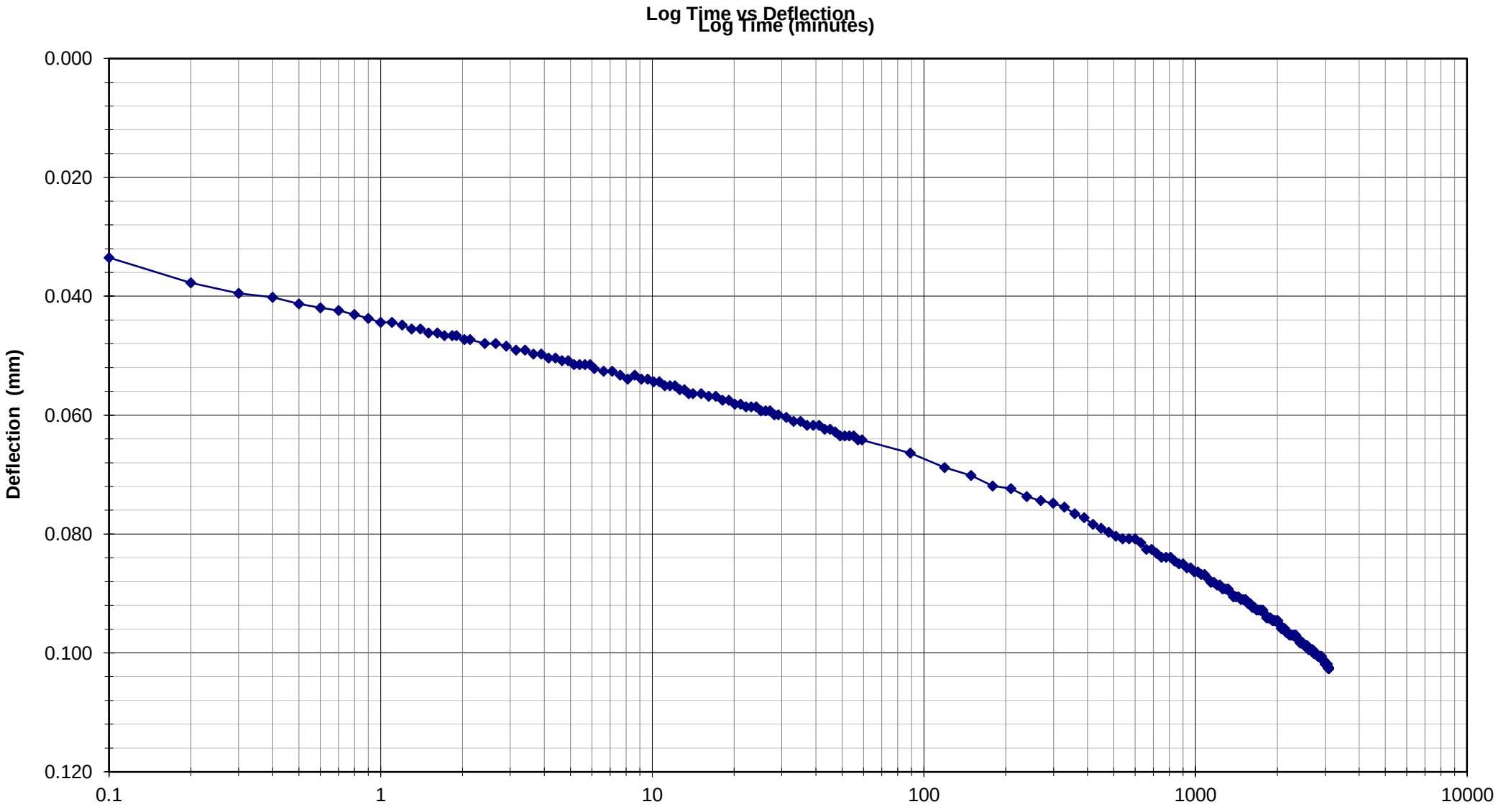



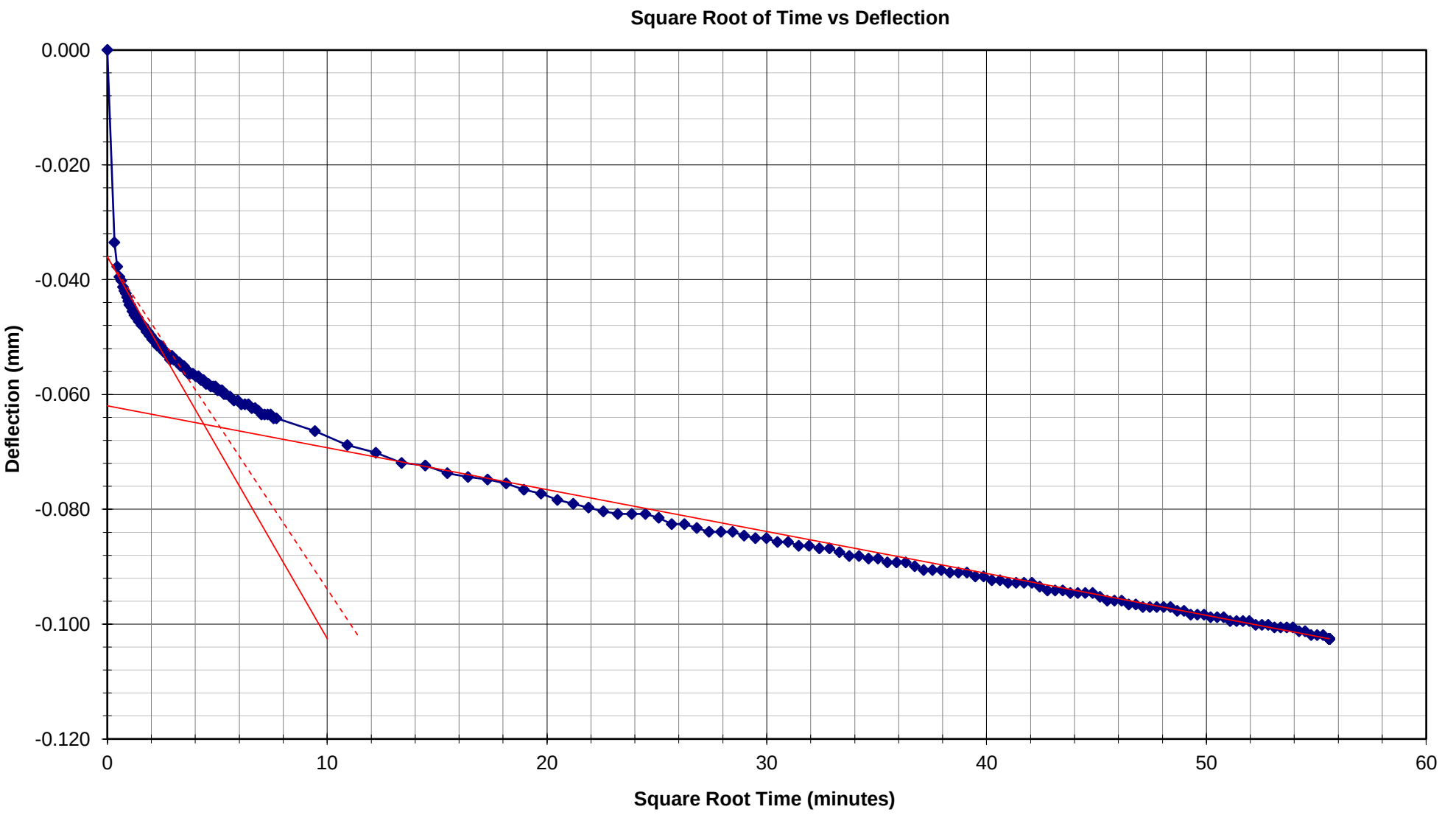
| AMEC EARTH & ENVIRONMENTAL<br>*Engineering & Environmental Services*<br><br>**ONE-DIMENSIONAL CONSOLIDATION TEST**<br>( ASTM D2435-90 ) | | | | |
|---|---|---|---|---|
| | **Project** | Mount Nansen TA5 2013 | | |
| | **Location** | | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS5 |
| | **Hole No.** | TP-T-13-04 | **Depth ( ft )** | 3.0-3.1 m |
| | **Technician** | CR/SH | **Loading Date** | |
| | **Loading Stage** | 63.66 kPa | **Start Loading Time** | 7-Feb-14 13:15 |



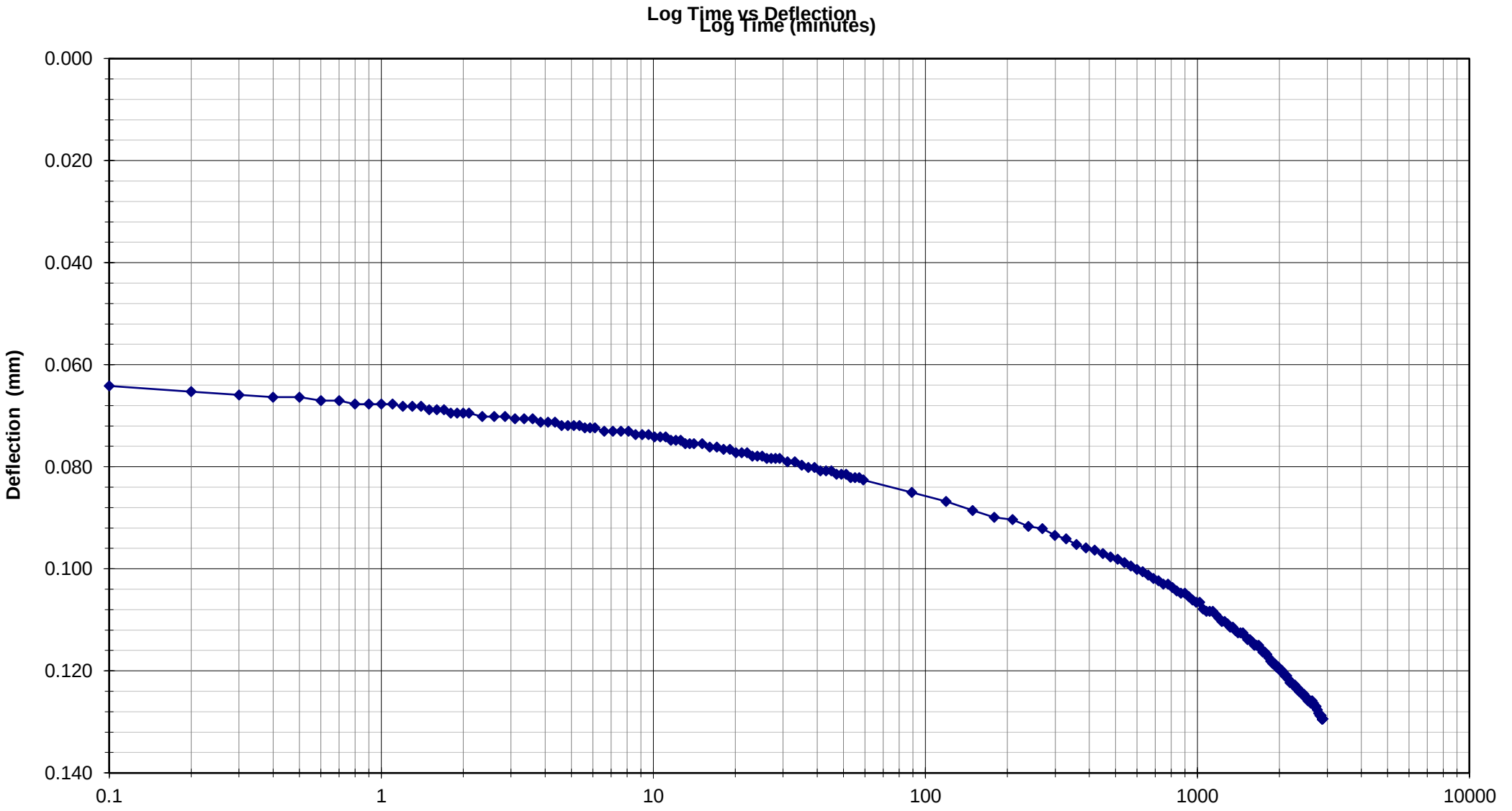



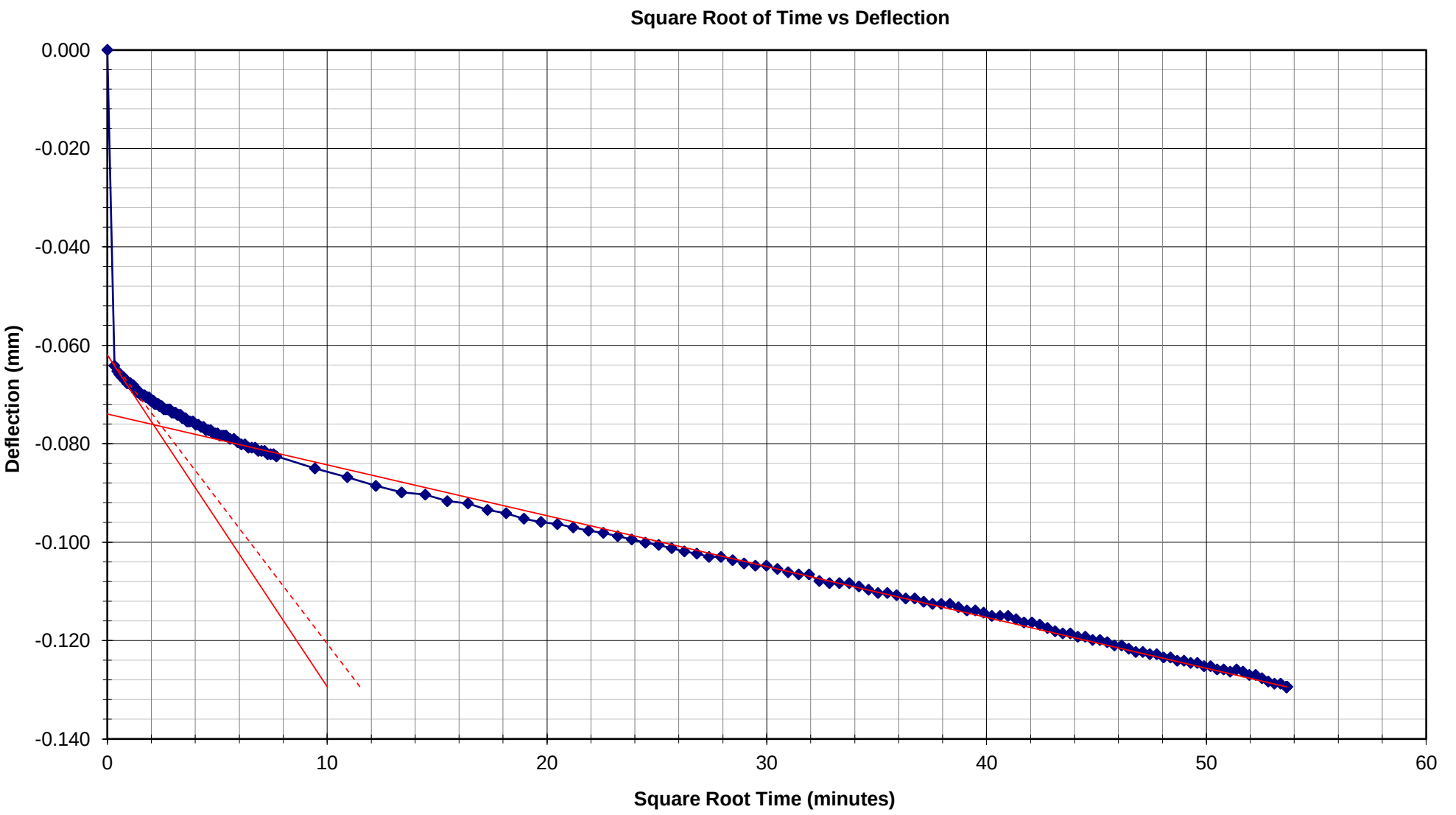
| AMEC EARTH & ENVIRONMENTAL<br>*Engineering & Environmental Services*<br><br>**ONE-DIMENSIONAL CONSOLIDATION TEST**<br>( ASTM D2435-90 ) | | | | |
|---|---|---|---|---|
| | **Project** | Mount Nansen TA5 2013 | | |
| | **Location** | | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS5 |
| | **Hole No.** | TP-T-13-04 | **Depth ( ft )** | 3.0-3.1 m |
| | **Technician** | CR/SH | **Loading Date** | |
| | **Loading Stage** | 126.34 kPa | **Start Loading Time** | 9-Feb-14 11:43 |



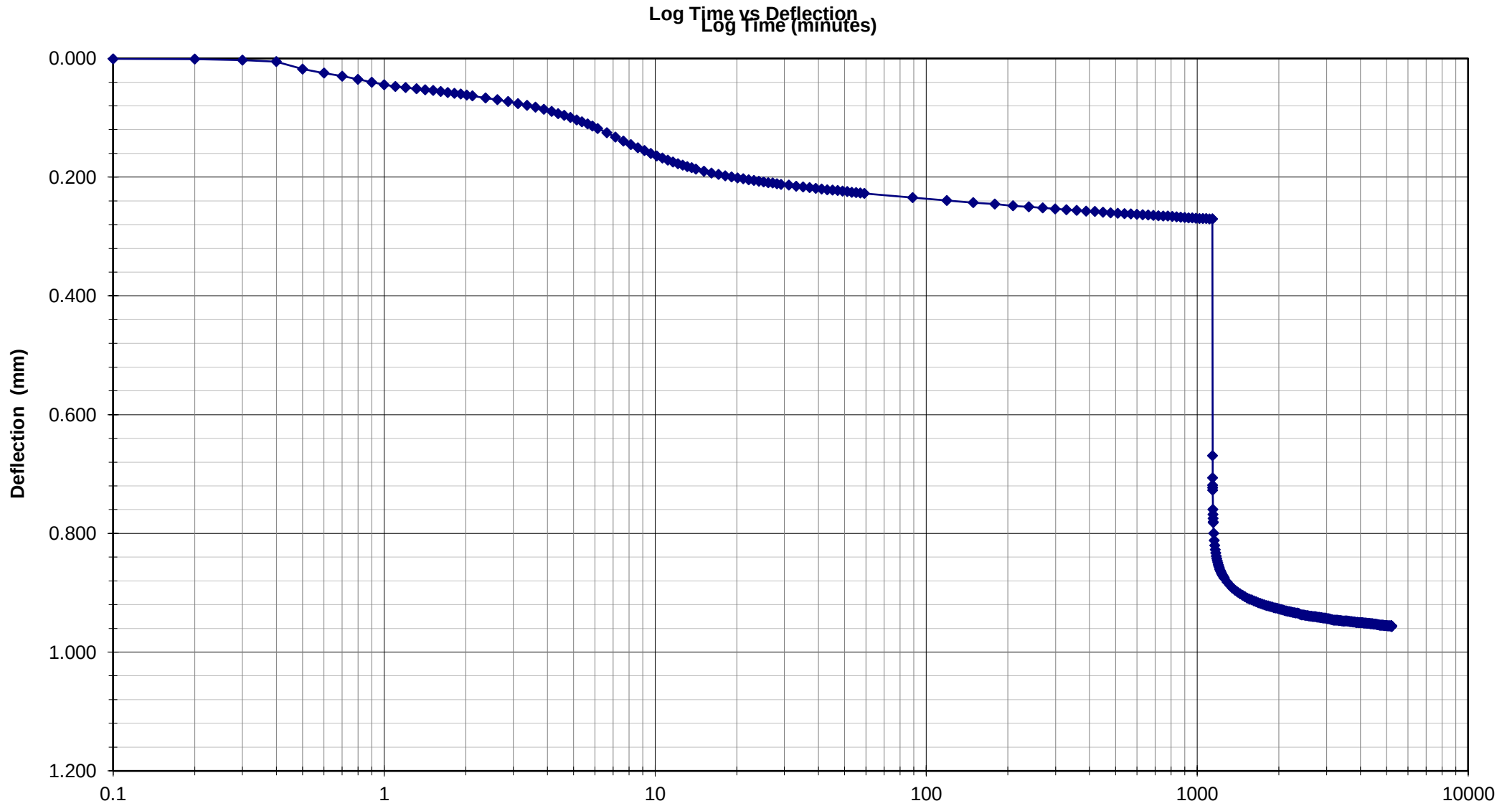



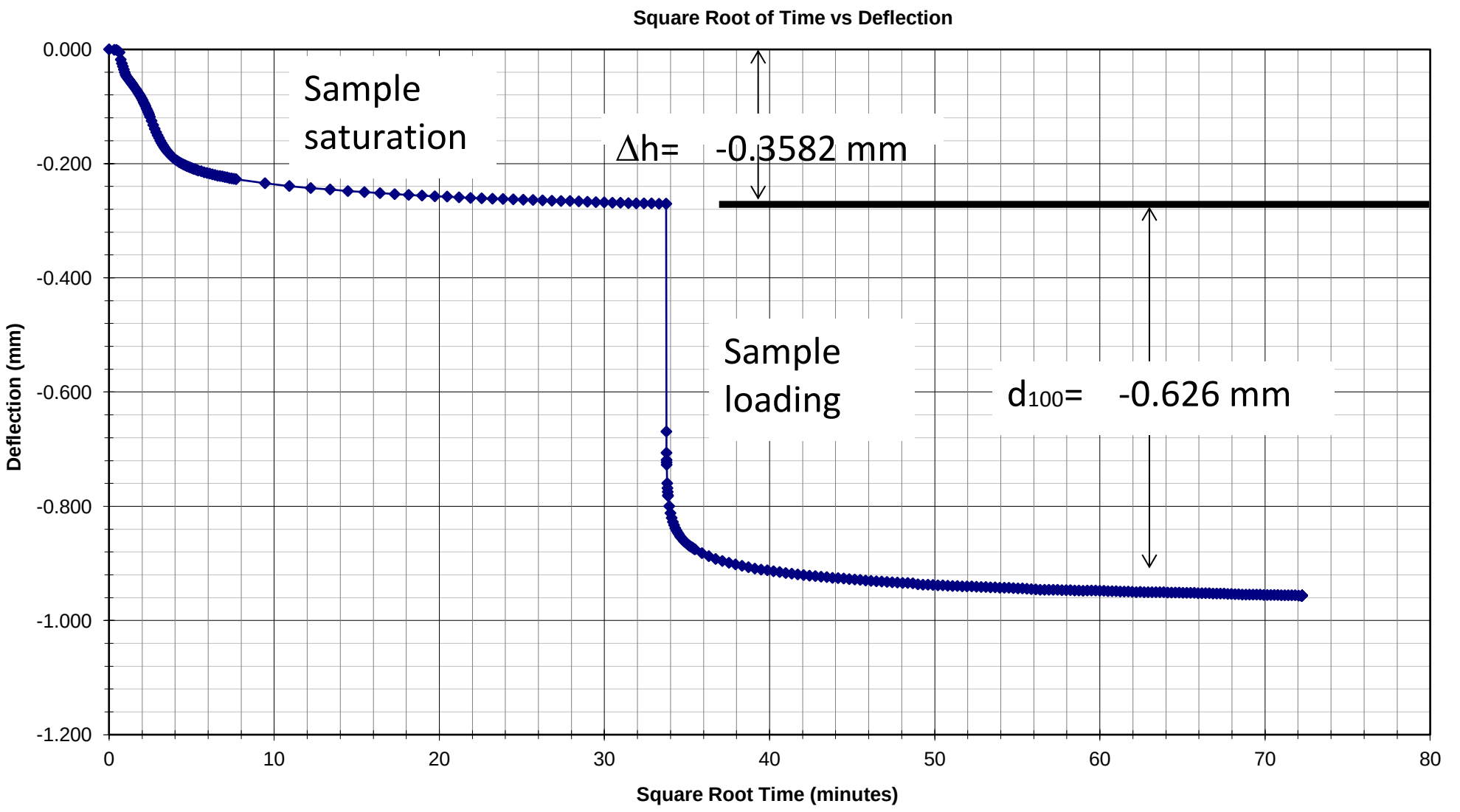
| AMEC EARTH & ENVIRONMENTAL<br>*Engineering & Environmental Services*<br><br>**ONE-DIMENSIONAL CONSOLIDATION TEST**<br>( ASTM D2435-90 ) | | | | |
|---|---|---|---|---|
| | **Project** | Mount Nansen TA5 2013 | | |
| | **Location** | | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS5 |
| | **Hole No.** | TP-T-13-04 | **Depth ( ft )** | 3.0-3.1 m |
| | **Technician** | CR/SH | **Loading Date** | |
| | **Loading Stage** | 254.20 kPa | **Start Loading Time** | 11-Feb-14 15:31 |



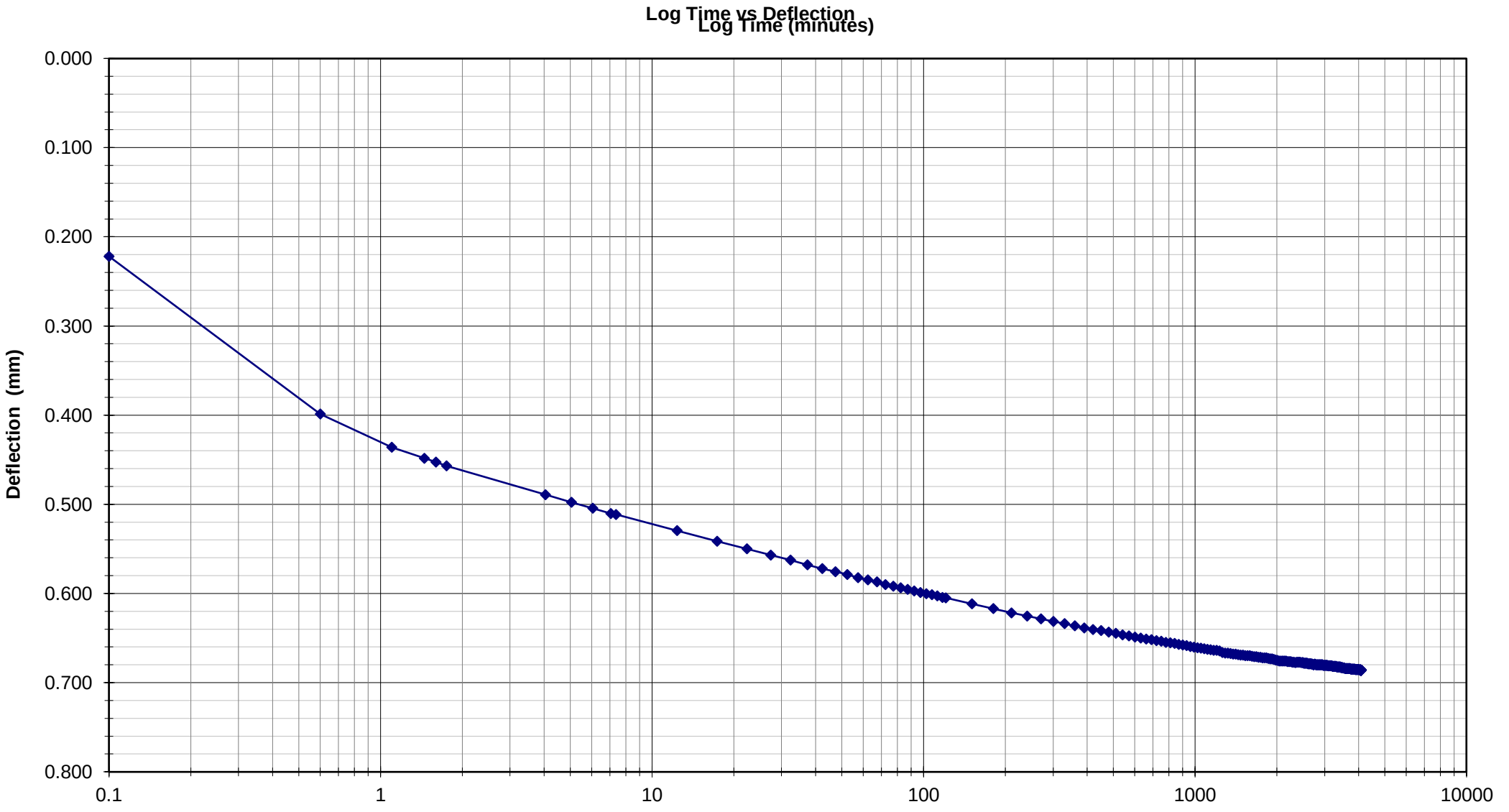



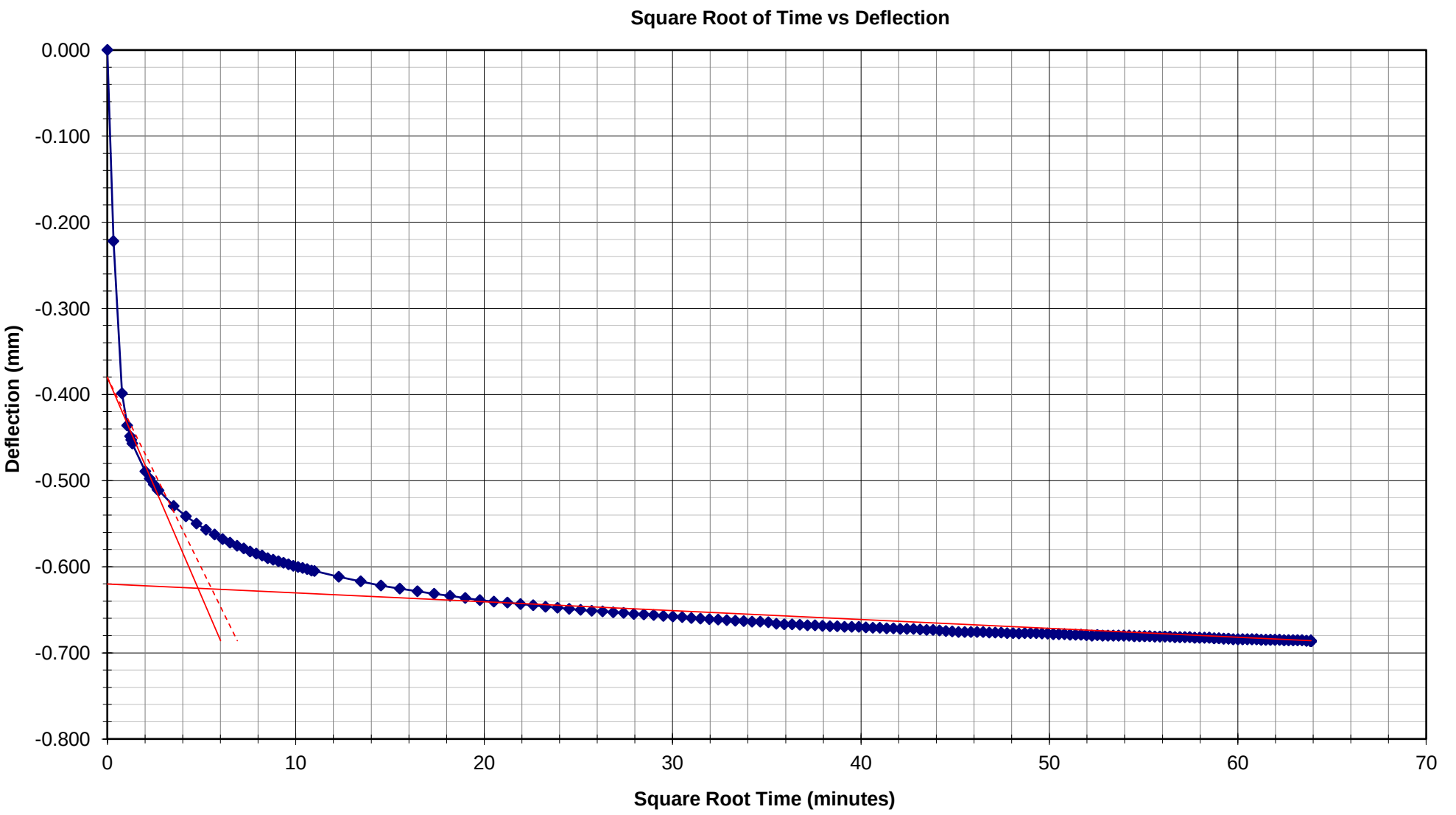
| AMEC EARTH & ENVIRONMENTAL<br>*Engineering & Environmental Services*<br><br>**ONE-DIMENSIONAL CONSOLIDATION TEST**<br>( ASTM D2435-90 ) | | | | |
|---|---|---|---|---|
| | **Project** | Mount Nansen TA5 2013 | | |
| | **Location** | | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS5 |
| | **Hole No.** | TP-T-13-04 | **Depth ( ft )** | 3.0-3.1 m |
| | **Technician** | CR/SH | **Loading Date** | |
| | **Loading Stage** | 254.2 kPa saturated + 507.41 kPa | **Start Loading Time** | 13-Feb-14 15:39 |



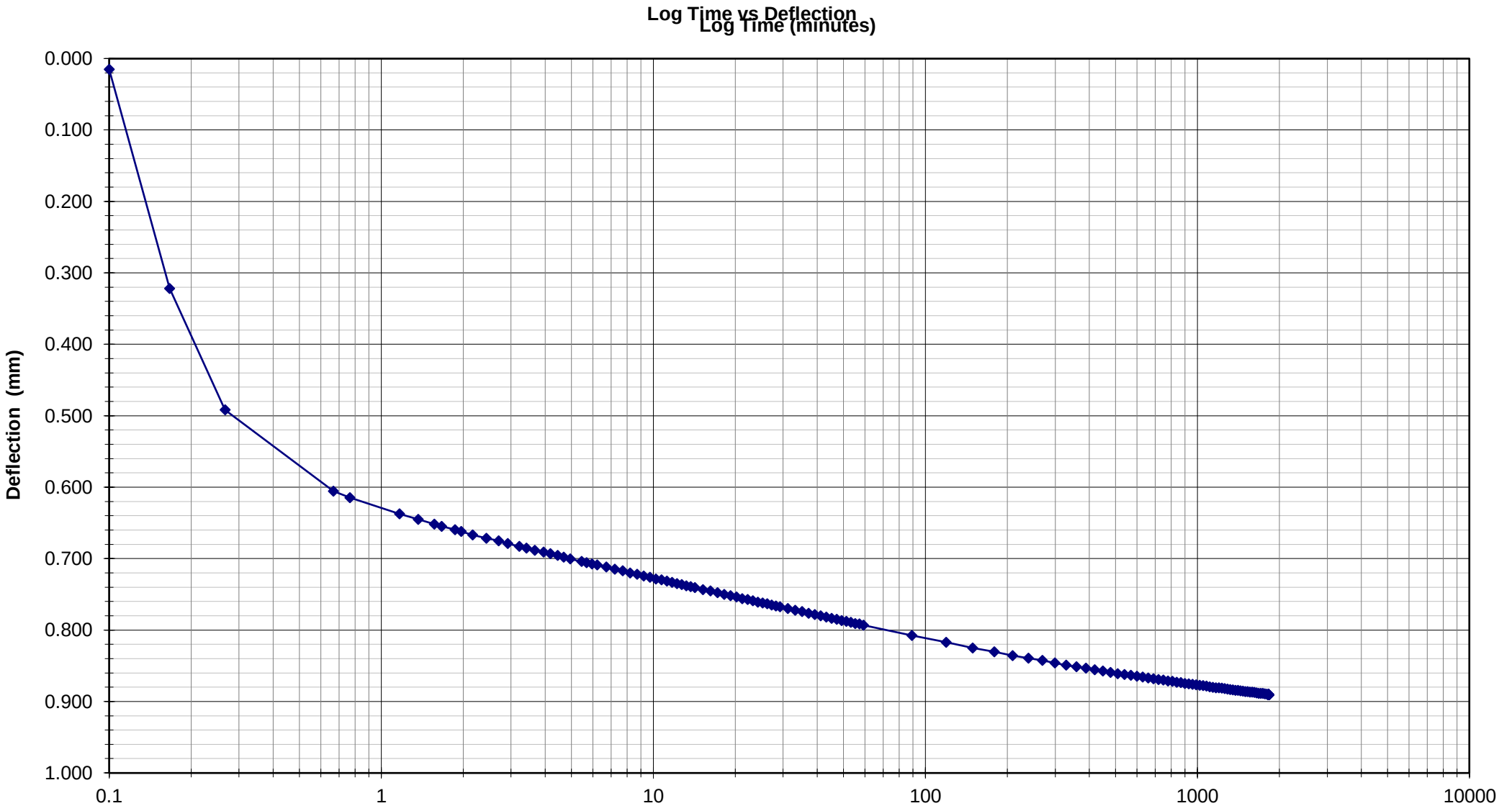



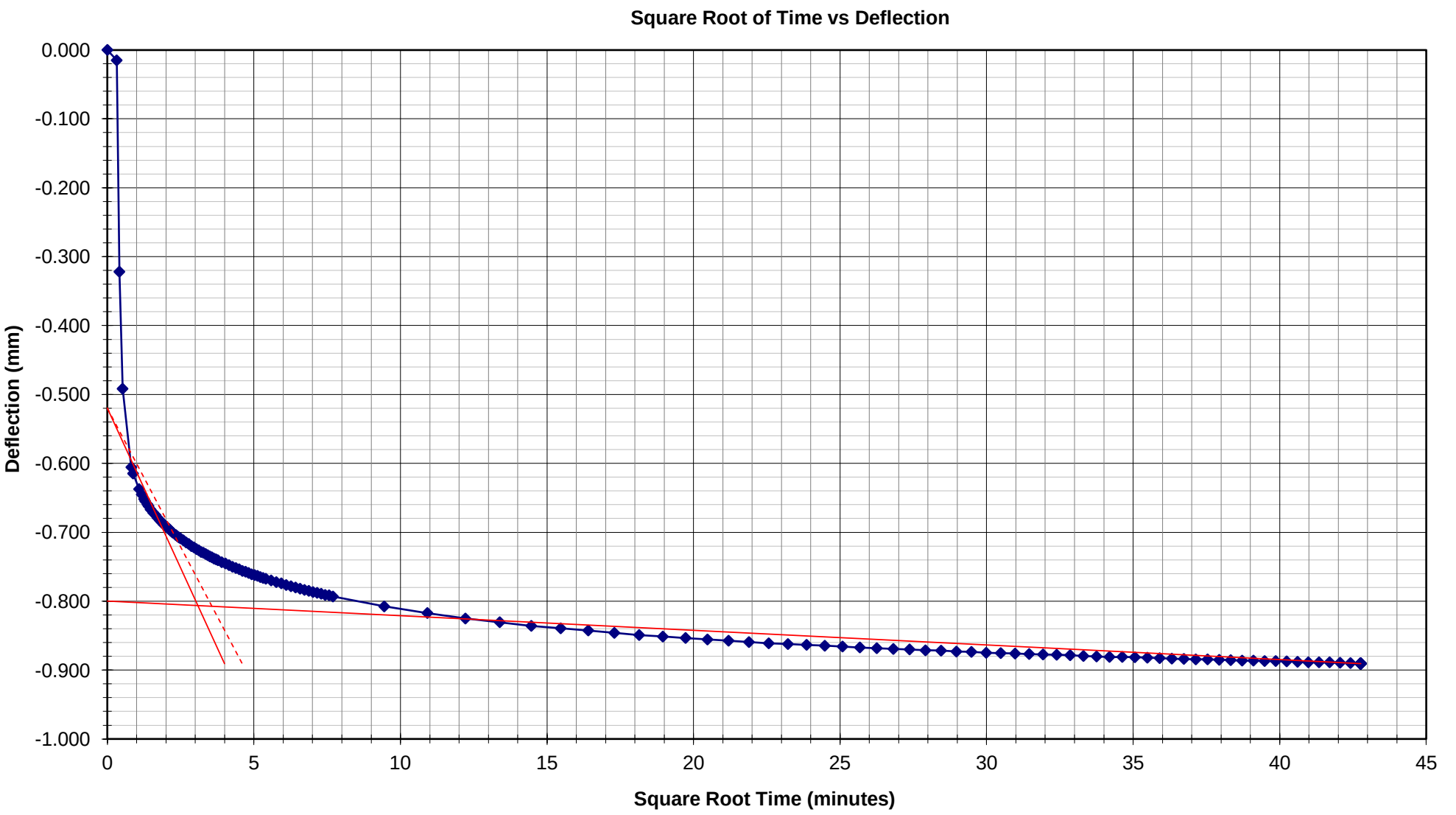
| AMEC EARTH & ENVIRONMENTAL<br>*Engineering & Environmental Services*<br><br>**ONE-DIMENSIONAL CONSOLIDATION TEST**<br>( ASTM D2435-90 ) | | | | |
|---|---|---|---|---|
| | **Project** | Mount Nansen TA5 2013 | | |
| | **Location** | | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS5 |
| | **Hole No.** | TP-T-13-04 | **Depth ( ft )** | 3.0-3.1 m |
| | **Technician** | CR/SH | **Loading Date** | |
| | **Loading Stage** | 507.41 kPa | **Start Loading Time** | 14-Feb-14 10:37 |



| AMEC EARTH & ENVIRONMENTAL<br>*Engineering & Environmental Services*<br><br>**ONE-DIMENSIONAL CONSOLIDATION TEST**<br>( ASTM D2435-90 ) | | | | |
|---|---|---|---|---|
| | **Project** | Mount Nansen TA5 2013 | | |
| | **Location** | | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS5 |
| | **Hole No.** | TP-T-13-04 | **Depth ( ft )** | 3.0-3.1 m |
| | **Technician** | CR/SH | **Loading Date** | |
| | **Loading Stage** | 1000.68 kPa | **Start Loading Time** | 17-Feb-14 7:06 |



**ONE-DIMENSIONAL CONSOLIDATION TEST**
( ASTM D2435-90 )

| | | | |
|---|---|---|---|
| **Project** | M. Nansen TA5 2013 | | |
| **Test** | Government of Yukon - AAM | | |
| **Location** | N/A | | |
| **Job No.** | VM00605E.B001 | **Sample No.** | GS1 |
| **Hole No.** | TP-T-13-6 | **Depth** | 0.8-0.9 m |
| **Reported by** | CR/SH | **Date Started** | 4-Feb-14 |

| **Apparatus Data** | | | **Moisture Content Data** | | |
|---|---|---|---|---|---|
| Ring No. | 7 | | Wt. of Ring + Soil + Water ( Start ) | 187.80 | g |
| Weight of ring | 81.0 | g | Wt. of Ring + Soil + Water ( End ) | 193.20 | g |
| Thickness | 18.5 | mm | Wt. of Ring | 81.00 | g |
| Diameter | 65.9 | mm | Wt. of Soil + Water ( End ) | 112.20 | g |
| Area | 34.1 | $cm^2$ | Wt. of Tare ( Tare # ) | 81.00 | g |
| Machine No. | 7 | | Wt. of Soil Dry + Tare | 165.93 | g |
| Loading Beam Ratio | 11:01 | | Wt. of Soil | 84.93 | g |
| Weight of Top + Stone | 0.345 | kg | | | |

| **Specimen Data** | **Initial** | **Final** | | **Index Tests** | Calculated | Final |
|---|---|---|---|---|---|---|
| Specimen Height | 18.4500 | 16.9854 | mm | Specific Gravity ( Assumed ) | 2.77 | |
| Volume of Specimen | 62.93 | 57.93 | ml | Liquid Limit % | | |
| Volume of Solids | 30.66 | 30.66 | ml | Plastic Limit % | | |
| Volume of Voids | 32.27 | 27.27 | ml | Plastic Index % | | |
| Volume of Water | 21.87 | 27.27 | ml | Sand % | | |
| Void Ratio | 1.052 | 0.890 | | Silt % | | |
| Saturation | 67.8 | 100.0 | % | Clay % | | |
| Moisture Content | 25.8 | 32.1 | % | **Soil Description** | SILTY SAND (50% INITIAL SATURATION) | |
| Height of Solids | 8.99 | 8.99 | mm | | | |
| Wet Density | 1697 | 1937 | $kg/m_3$ | | | |
| Dry Density | 1350 | 1466 | $kg/m^3$ | | | |
| Compressive Index $C_C$ | | | | Swelling Pressure $P_S$ | 16.16 | kPa |
| Recompression Index $C_r$ | | | | Percent Swell | | % |
| Pre-Consolidation Pressure $P_O'$ | | | kPa | Overburden Pressure $P_V$ | | kPa |

Results based on conventional assessment of primary consolidation

| Pressure p (kPa ) | Dial Reading (mm) | Apparatus Deformation (mm) | Corrected Height (mm) | Vertical Strain ε ( % ) | Void Ratio e | Constrained Modulus $E=\Delta p/\Delta\varepsilon$ ( MPa ) | Coeff. of Consolidation $c_v$ ( $m^2$/yr ) | Coeff.of Volume Compressibility $m_v$ ( $m^2$/MN ) | Coeff. of Permeability $k = c_v m_v \rho_w g$ ( m/s ) |
|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 18.4500 | | 18.4500 | | 1.052 | | | | |
| 16.16 | 18.4500 | | 18.4500 | | 1.052 | | | | |
| 32.32 | 18.2152 | -0.0074 | 18.2226 | 1.23 | 1.027 | 1.31 | 4.13 | 7.6E-01 | 9.8E-10 |
| 63.66 | 18.1779 | -0.0018 | 18.1798 | 1.46 | 1.022 | 13.49 | 9.22 | 7.5E-02 | 2.2E-10 |
| 126.34 | 18.1335 | -0.0032 | 18.1367 | 1.70 | 1.018 | 26.84 | 9.18 | 3.8E-02 | 1.1E-10 |
| 254.20 | 18.0976 | -0.0048 | 18.1024 | 1.88 | 1.014 | 68.81 | 36.53 | 1.5E-02 | 1.7E-10 |
| 254.20 | 17.7394 | -0.0048 | 17.7442 | 3.83 | 0.974 | | 5.64 | | |
| 507.41 | 17.4076 | -0.0042 | 17.4117 | 5.63 | 0.937 | 6.76 | 5.64 | 1.5E-01 | 2.6E-10 |
| 1000.68 | 16.9797 | -0.0057 | 16.9854 | 7.94 | 0.890 | 21.35 | 3.61 | 5.0E-02 | 5.6E-11 |
| | | | | | | | | | |
| Results based on total measured change in height | | | | | | | | | |
| 0.1 | 18.4500 | | | | | | | | |
| 16.16 | 18.4500 | | 18.4500 | | 1.052 | | | | |
| 32.32 | 18.1622 | -0.007426 | 18.1696 | 1.52 | 1.021 | 1.06 | | 9.4E-01 | |
| 63.66 | 18.0871 | -0.001834 | 18.0890 | 1.96 | 1.012 | 7.17 | | 1.4E-01 | |
| 126.34 | 17.9800 | -0.003192 | 17.9832 | 2.53 | 1.001 | 10.94 | | 9.3E-02 | |
| 254.2 | 17.9346 | -0.004822 | 17.9394 | 2.77 | 0.996 | 53.81 | | 1.9E-02 | |
| 254.2 | 17.5764 | -0.004822 | 17.5812 | 4.71 | 0.956 | | | | |
| 507.41 | 16.8220 | -0.004166 | 16.8261 | 8.80 | 0.872 | 6.19 | | 1.7E-01 | |
| 1000.68 | 16.3233 | -0.005683 | 16.3290 | 11.50 | 0.817 | 18.31 | | 6.0E-02 | |
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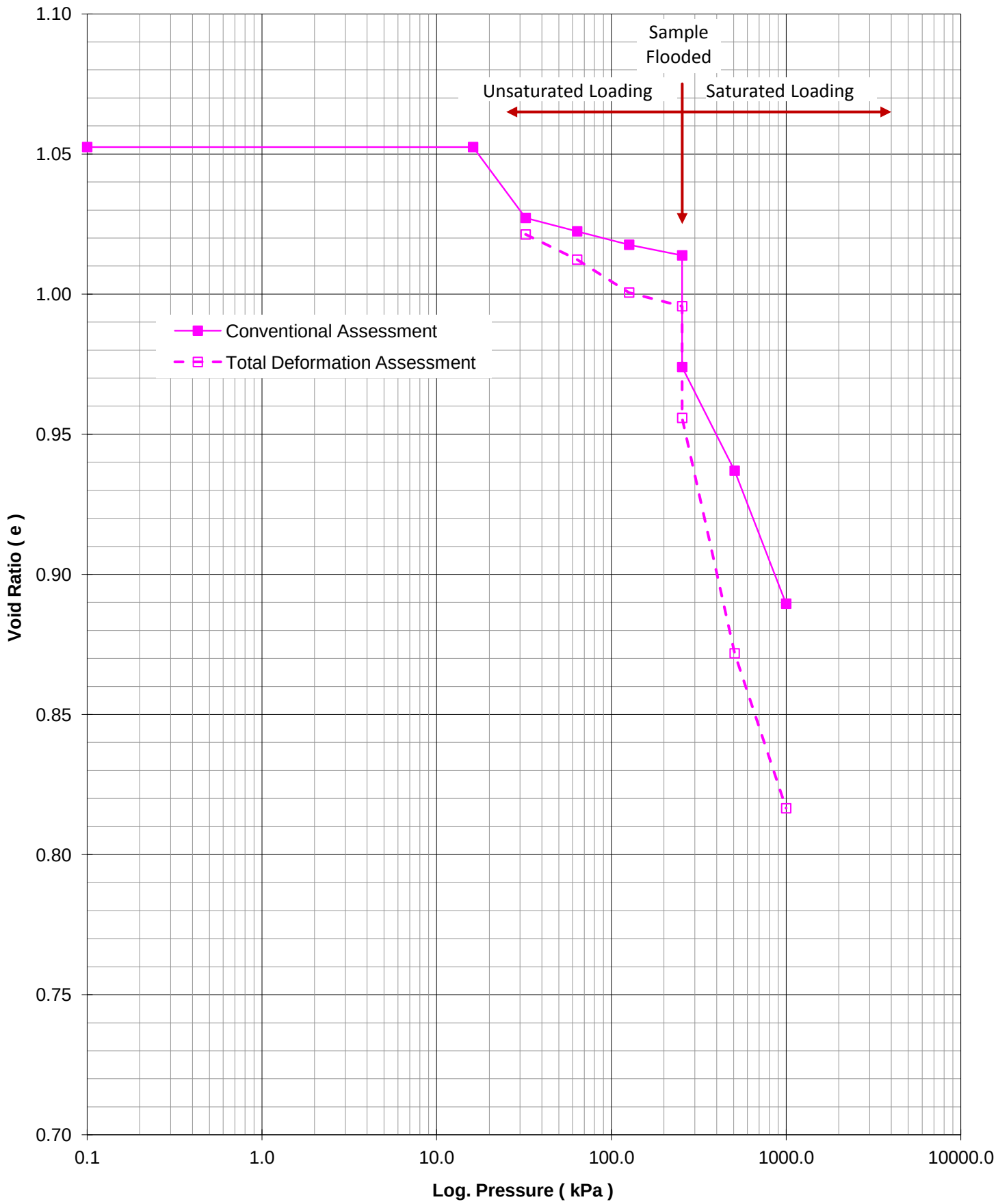
|---|---|---|---|---|
| **ONE-DIMENSIONAL CONSOLIDATION TEST** ( ASTM D2435-90 ) | **Project** | M. Nansen TA5 2013 | | |
| | **Test** | Government of Yukon - AAM | | |
| | **Location** | N/A | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS1 |
| | **Hole No.** | TP-T-13-6 | **Depth** | 0.8-0.9 m |
| | **Reported by** | CR/SH | **Date Started** | 04-Feb-14 |

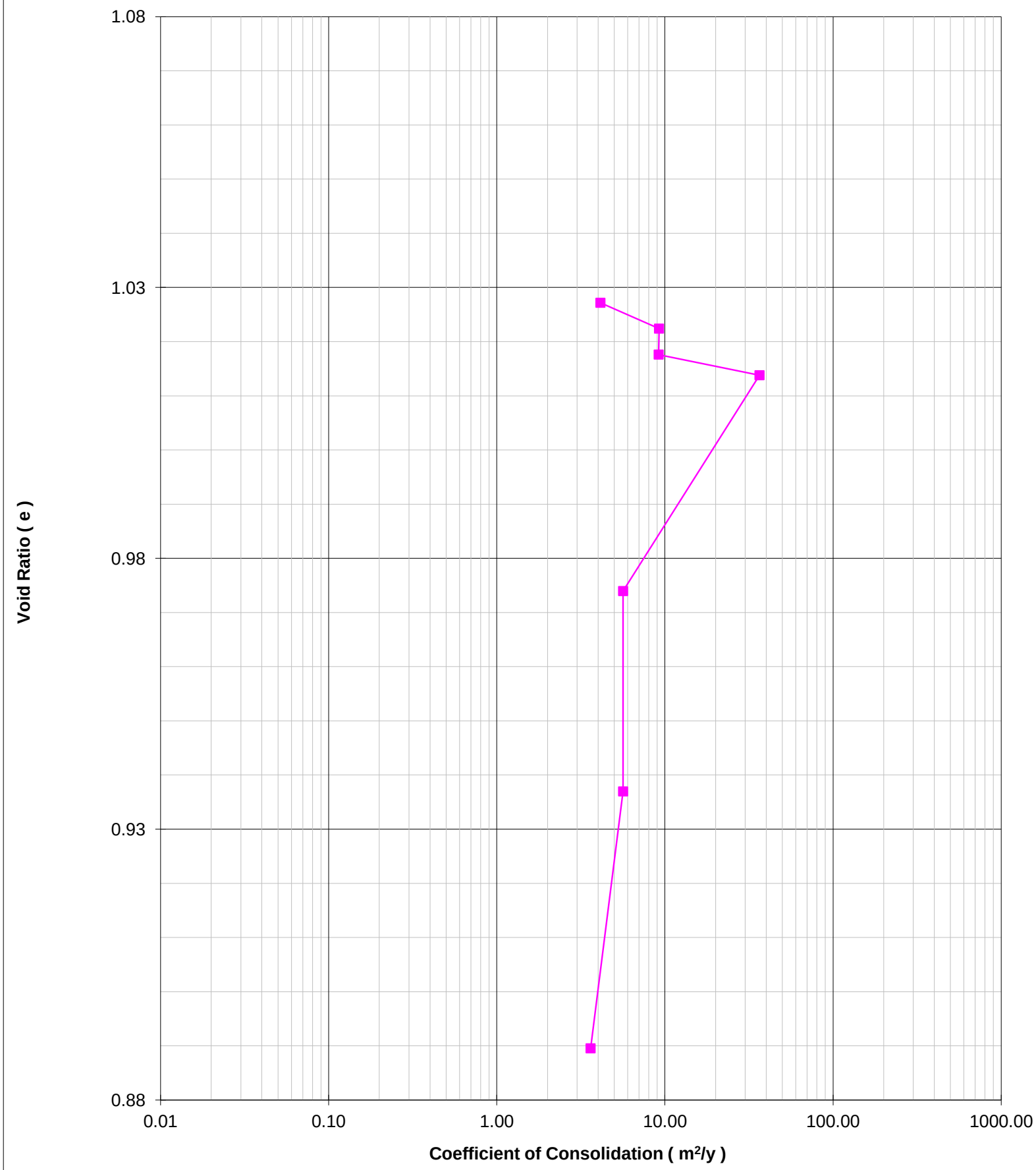
## Void ratio vs. Log Pressure



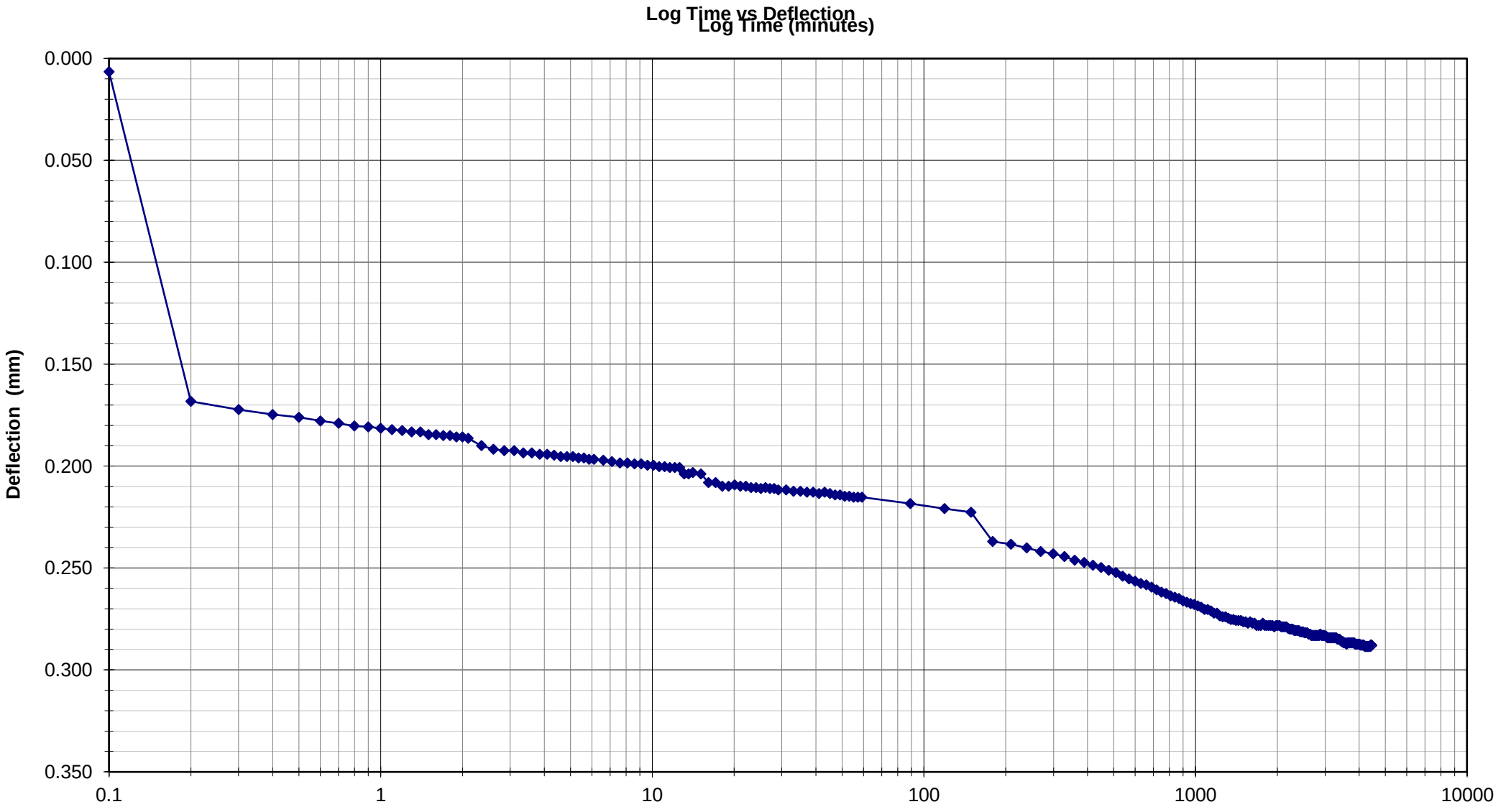
| | | | | |
|---|---|---|---|---|
| amec | **Project** | M. Nansen TA5 2013 | | |
| | **Test** | Government of Yukon - AAM | | |
| | **Location** | N/A | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS1 |
| **ONE-DIMENSIONAL CONSOLIDATION TEST** | **Hole No.** | TP-T-13-6 | **Depth** | 0.8-0.9 m |
| ( ASTM D2435-90 ) | **Reported by** | CR/SH | **Date Started** | 04-Feb-14 |

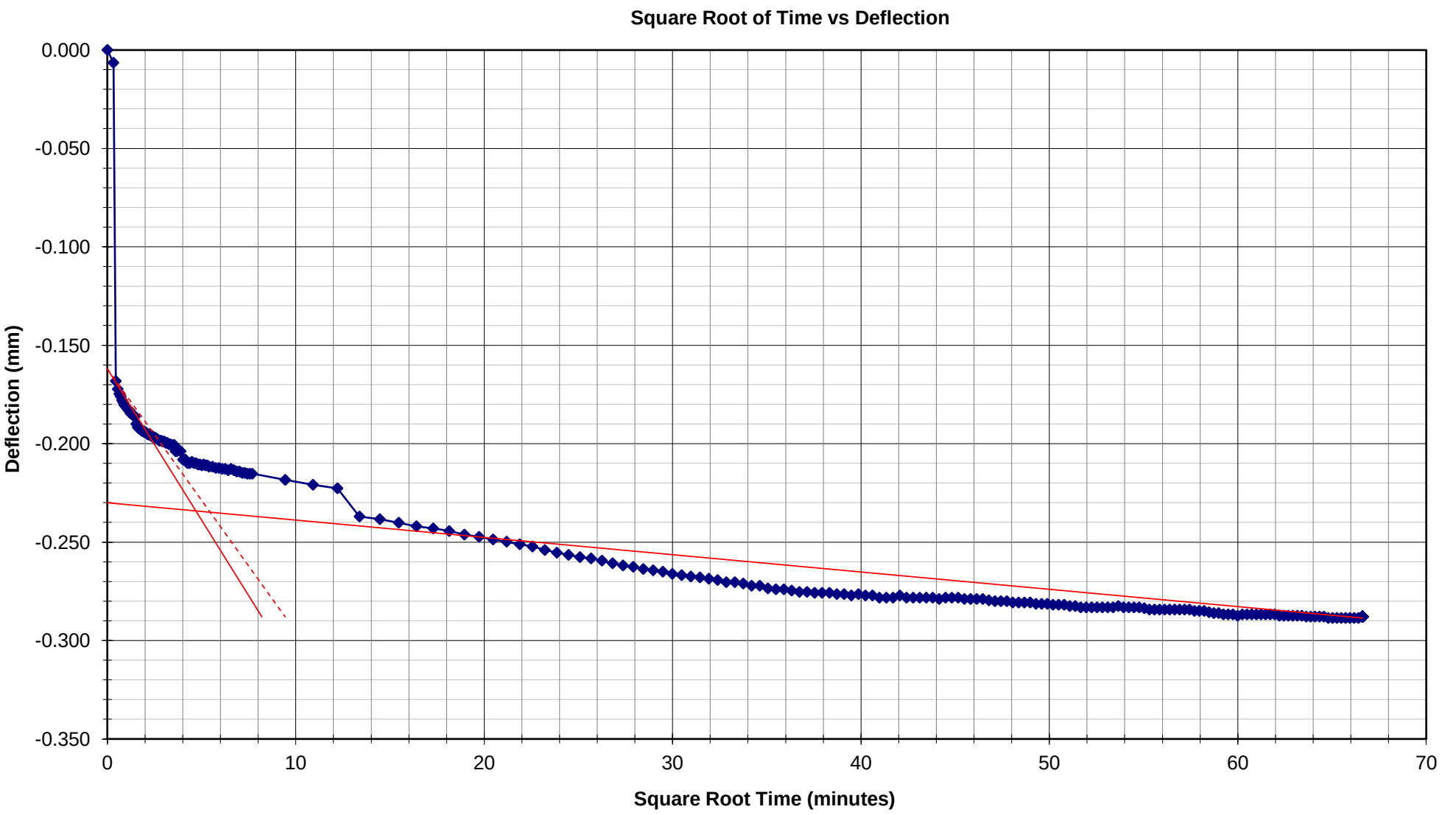
| | | | | |
|---|---|---|---|---|
| amec | **Project** | M. Nansen TA5 2013 | | |
| | **Test** | Government of Yukon - AAM | | |
| | **Location** | N/A | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS1 |
| **ONE-DIMENSIONAL CONSOLIDATION TEST** | **Hole No.** | TP-T-13-6 | **Depth** | 0.8-0.9 m |
| ( ASTM D2435-90 ) | **Reported by** | CR/SH | **Date Started** | 04-Feb-14 |

## Void Ratio vs. Coefficient of Consolidation

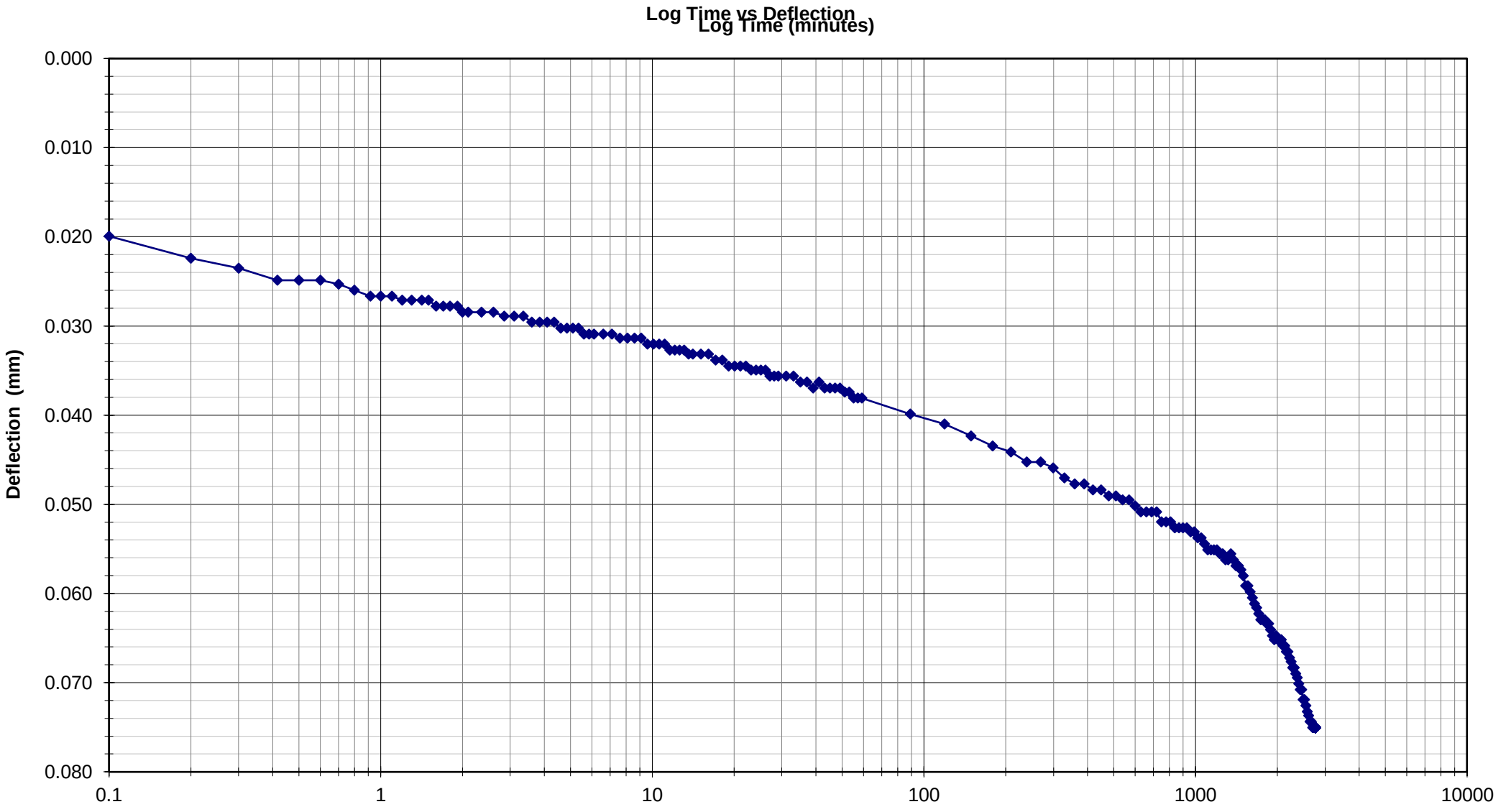


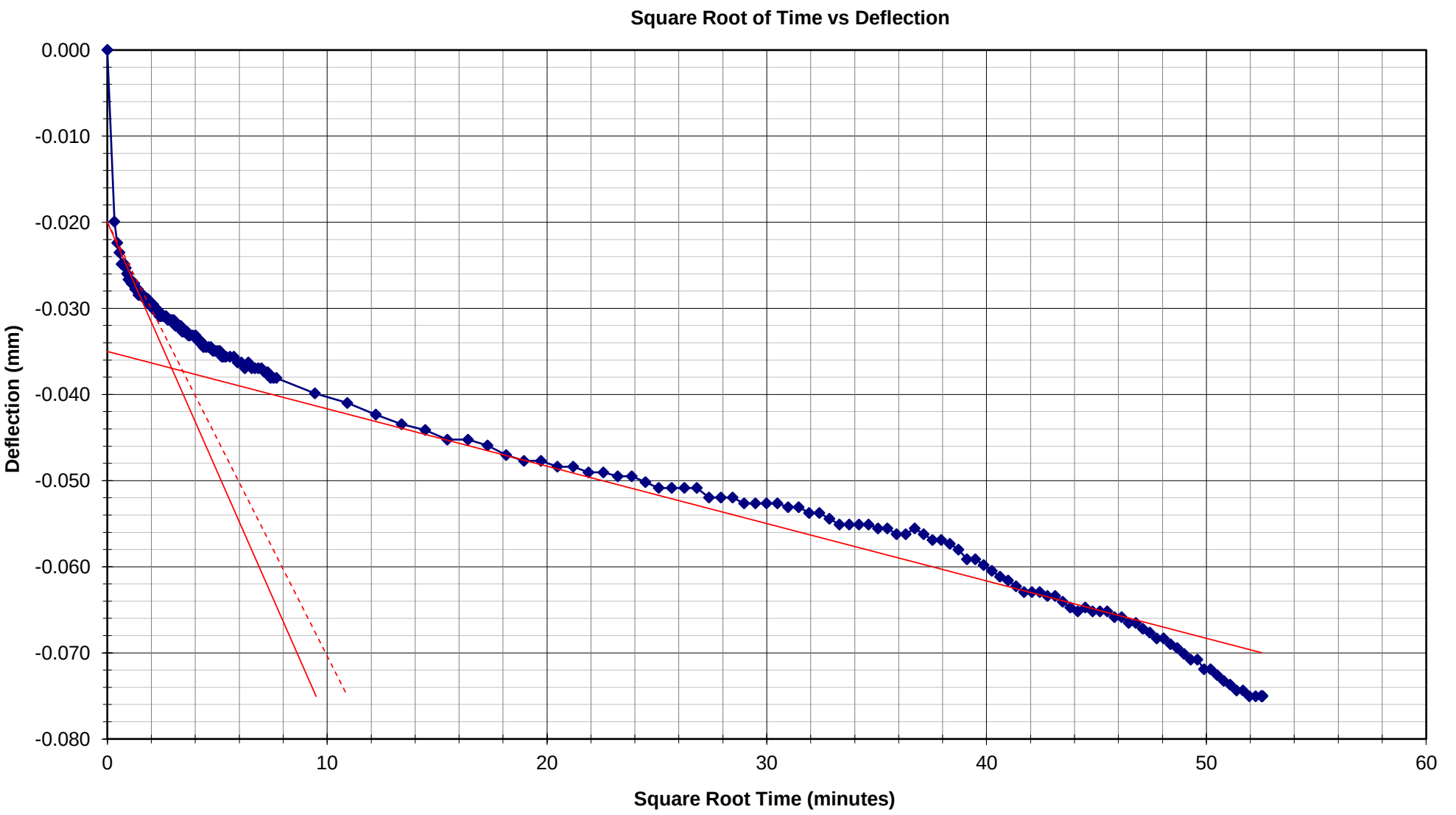
| AMEC EARTH & ENVIRONMENTAL<br>*Engineering & Environmental Services*<br><br>**ONE-DIMENSIONAL CONSOLIDATION TEST**<br>( ASTM D2435-90 ) | | | | |
|---|---|---|---|---|
| | **Project** | M. Nansen TA5 2013 | | |
| | **Location** | | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS1 |
| | **Hole No.** | TP-T-13-6 | **Depth ( ft )** | 0.8-0.9 m |
| | **Technician** | CR/SH | **Loading Date** | |
| | **Loading Stage** | 32.32 kPa | **Start Loading Time** | 4-Feb-14 10:49 |



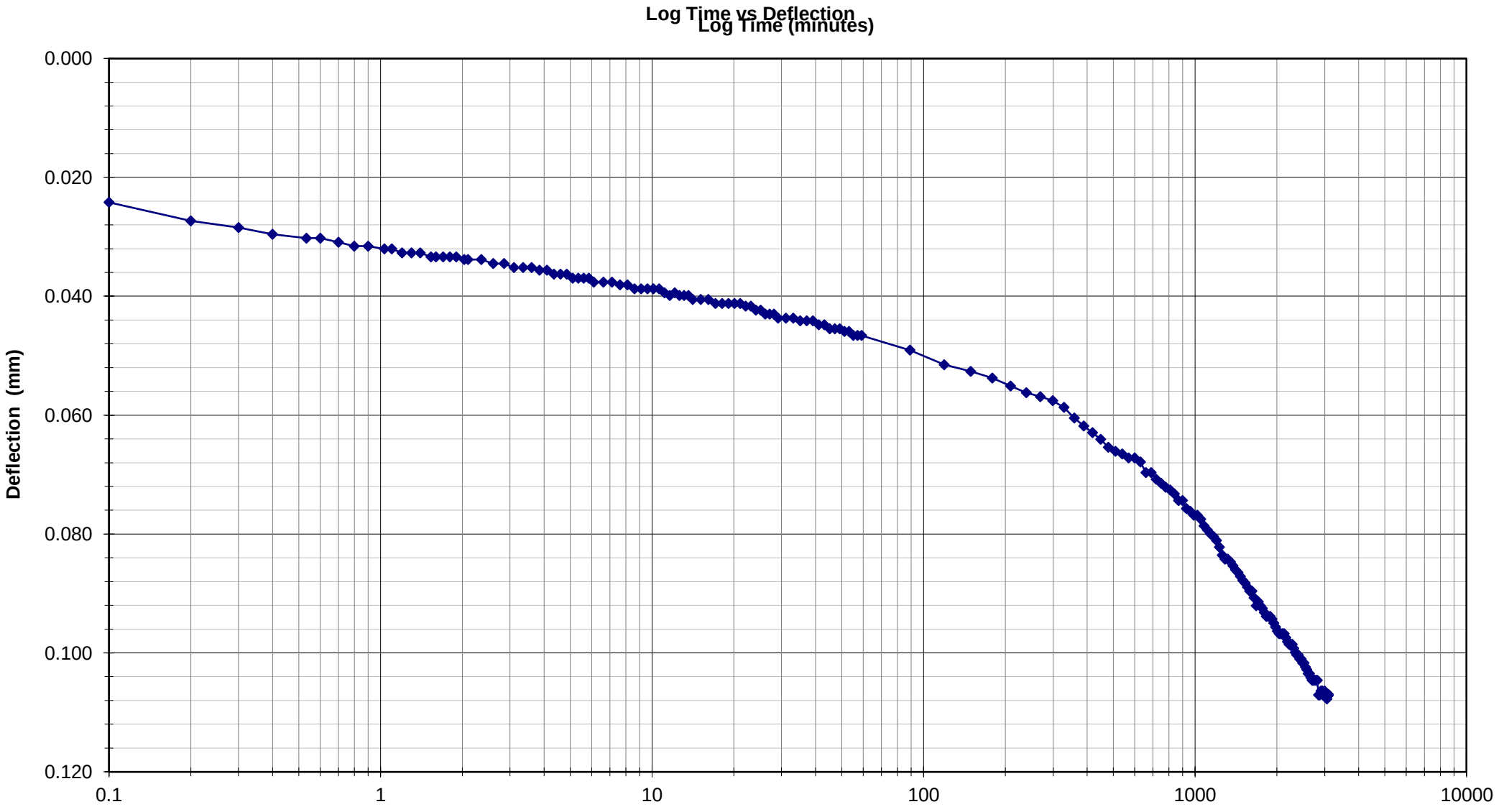



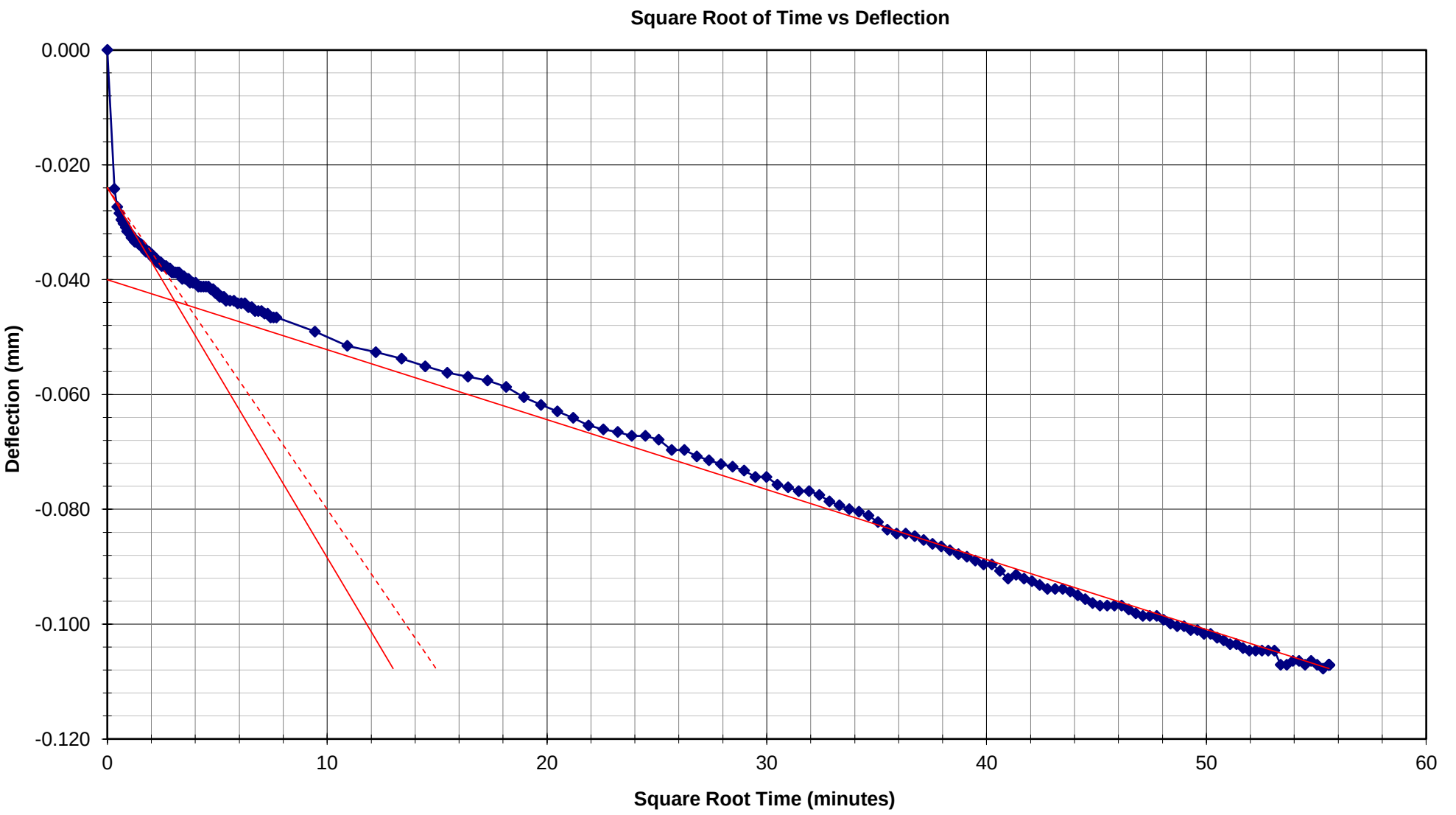
| AMEC EARTH & ENVIRONMENTAL<br>*Engineering & Environmental Services*<br><br>**ONE-DIMENSIONAL CONSOLIDATION TEST**<br>( ASTM D2435-90 ) | | | | |
|---|---|---|---|---|
| | **Project** | M. Nansen TA5 2013 | | |
| | **Location** | | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS1 |
| | **Hole No.** | TP-T-13-6 | **Depth ( ft )** | 0.8-0.9 m |
| | **Technician** | CR/SH | **Loading Date** | |
| | **Loading Stage** | 63.66 kPa | **Start Loading Time** | 7-Feb-14 13:19 |



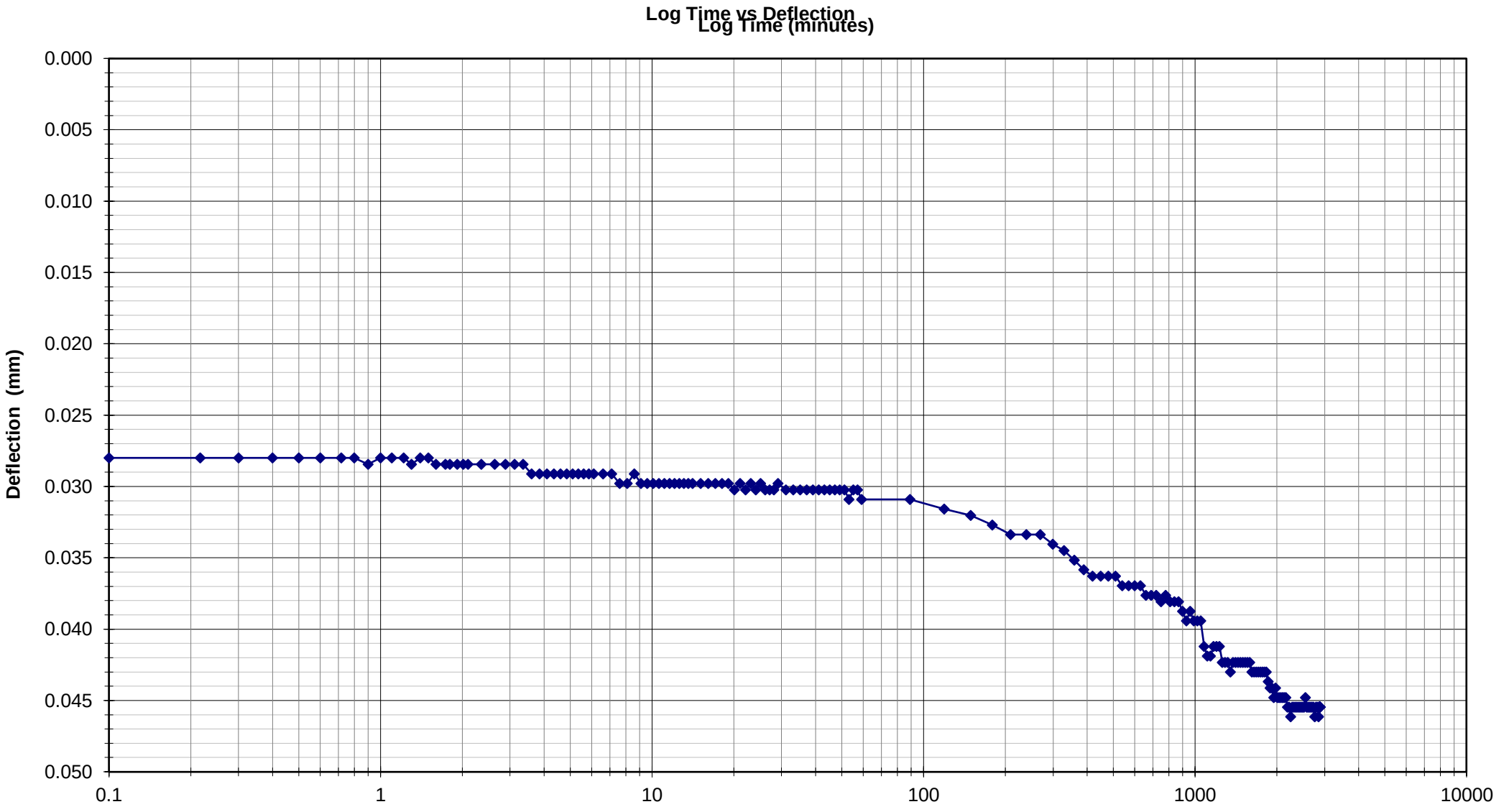



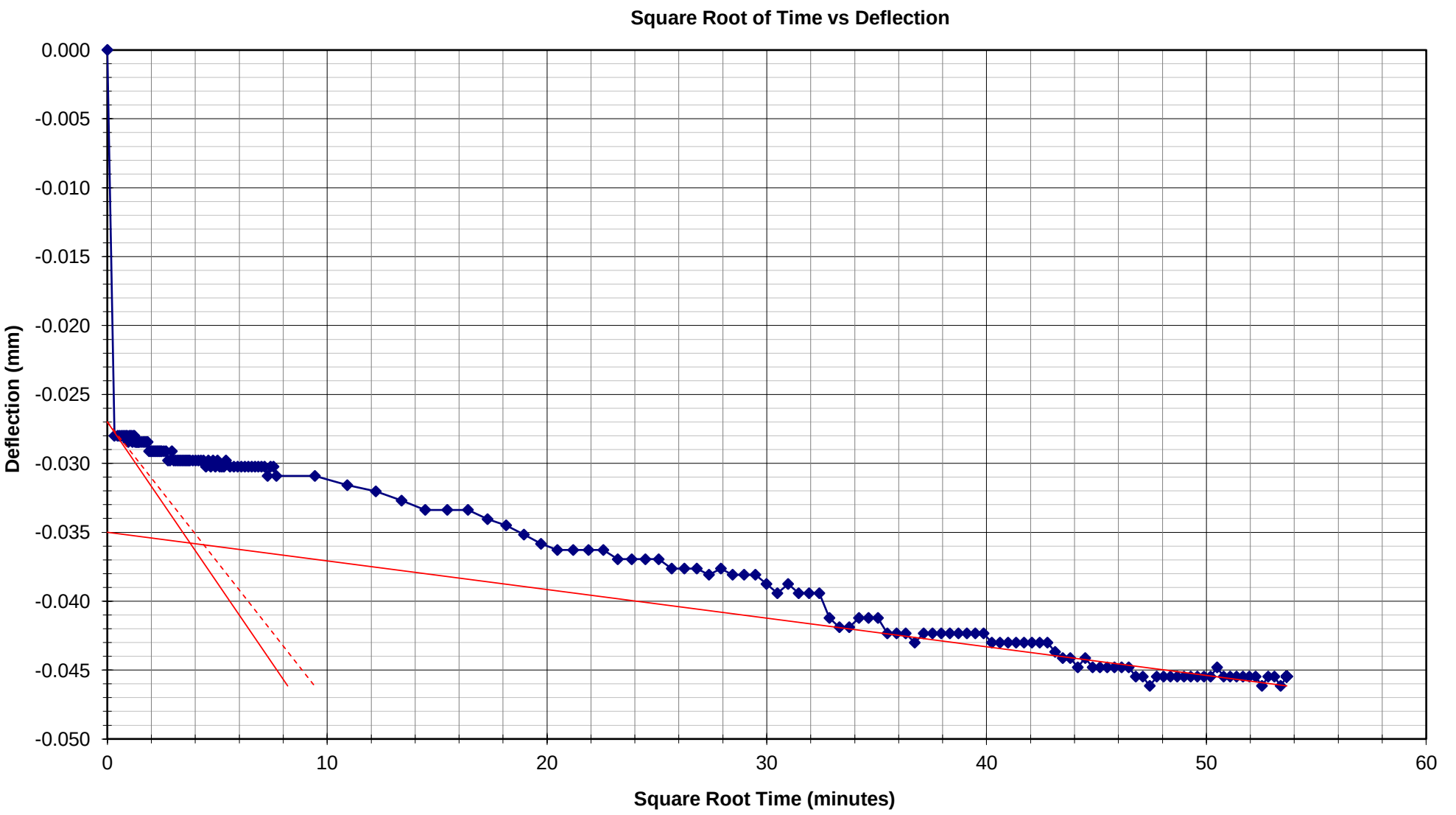
| AMEC EARTH & ENVIRONMENTAL<br>*Engineering & Environmental Services*<br><br>**ONE-DIMENSIONAL CONSOLIDATION TEST**<br>( ASTM D2435-90 ) | | | | |
|---|---|---|---|---|
| | **Project** | M. Nansen TA5 2013 | | |
| | **Location** | | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS1 |
| | **Hole No.** | TP-T-13-6 | **Depth ( ft )** | 0.8-0.9 m |
| | **Technician** | CR/SH | **Loading Date** | |
| | **Loading Stage** | 126.34 kPa | **Start Loading Time** | 9-Feb-14 11:46 |



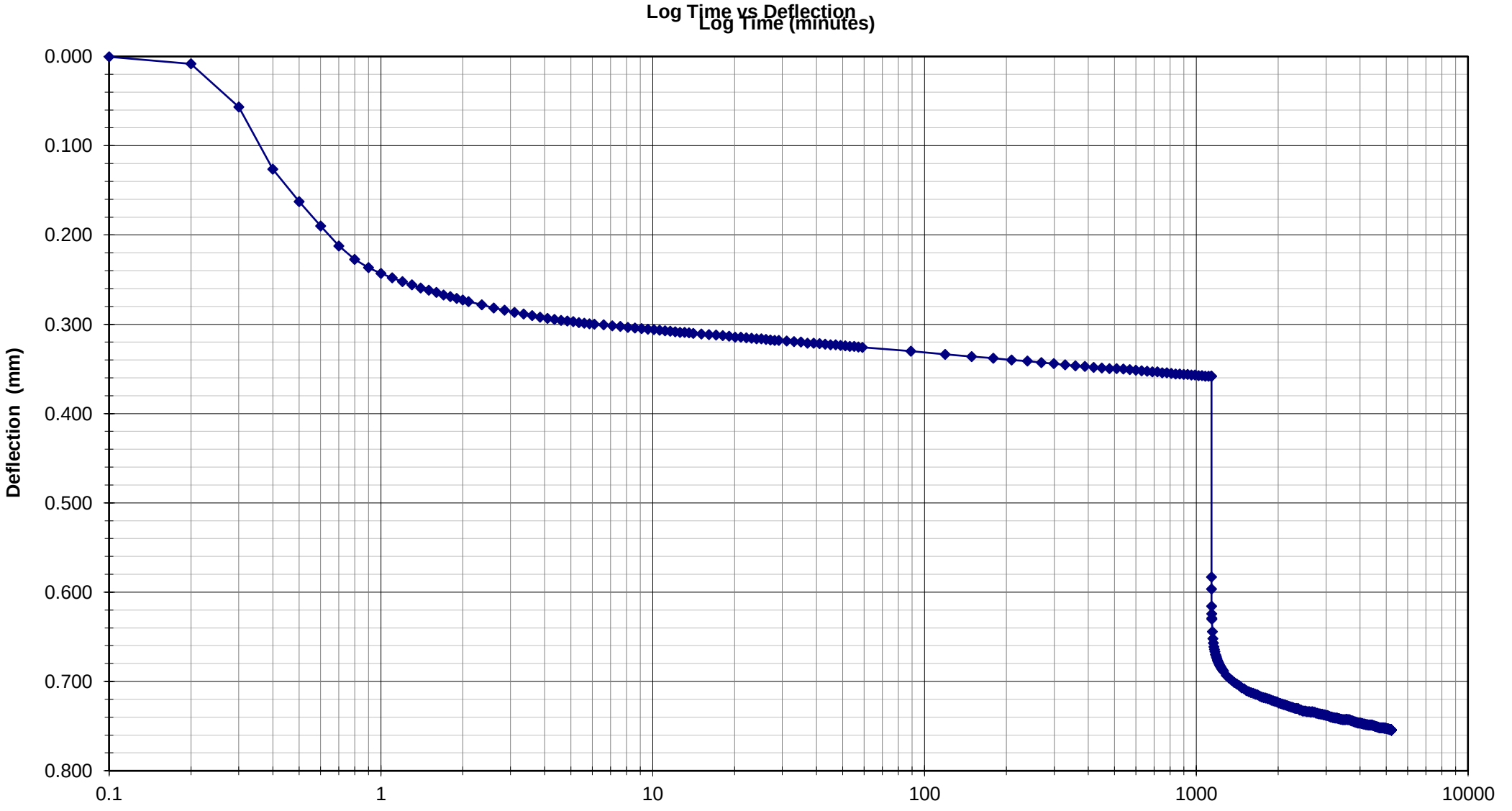



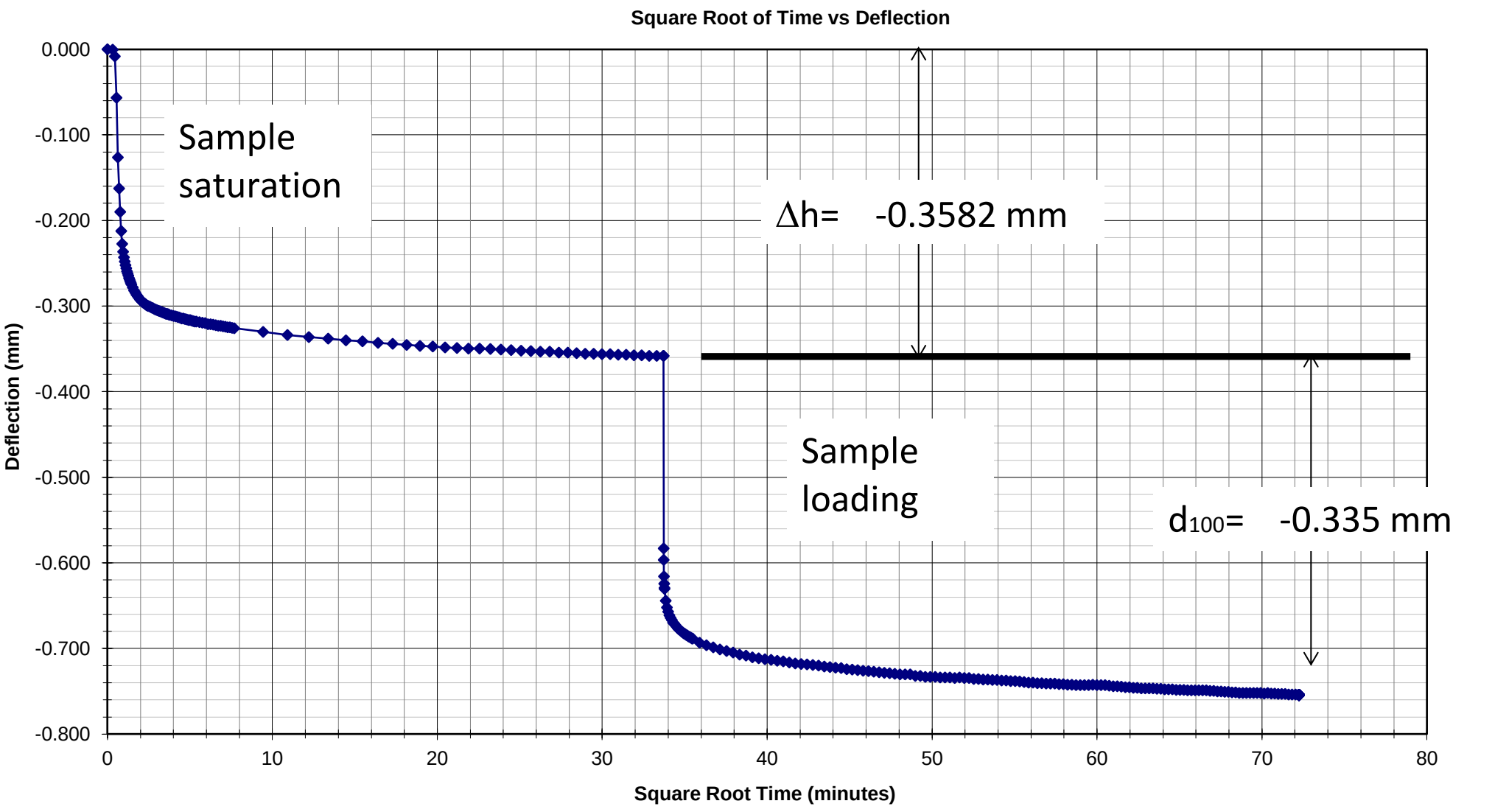
| AMEC EARTH & ENVIRONMENTAL<br>*Engineering & Environmental Services*<br><br>**ONE-DIMENSIONAL CONSOLIDATION TEST**<br>( ASTM D2435-90 ) | | | | |
|---|---|---|---|---|
| | **Project** | M. Nansen TA5 2013 | | |
| | **Location** | | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS1 |
| | **Hole No.** | TP-T-13-6 | **Depth ( ft )** | 0.8-0.9 m |
| | **Technician** | CR/SH | **Loading Date** | |
| | **Loading Stage** | 254.20 kPa | **Start Loading Time** | 11-Feb-14 15:28 |



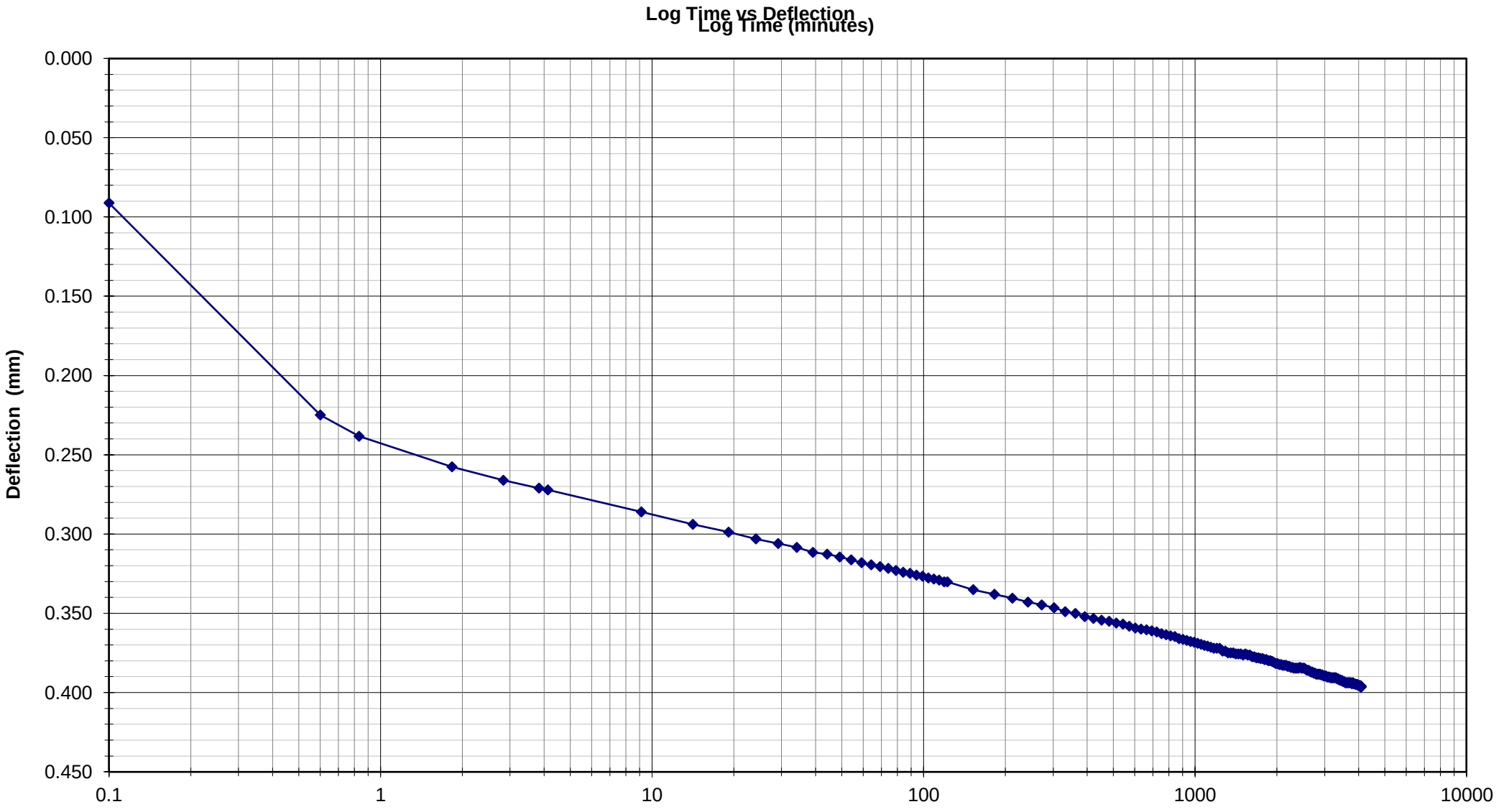



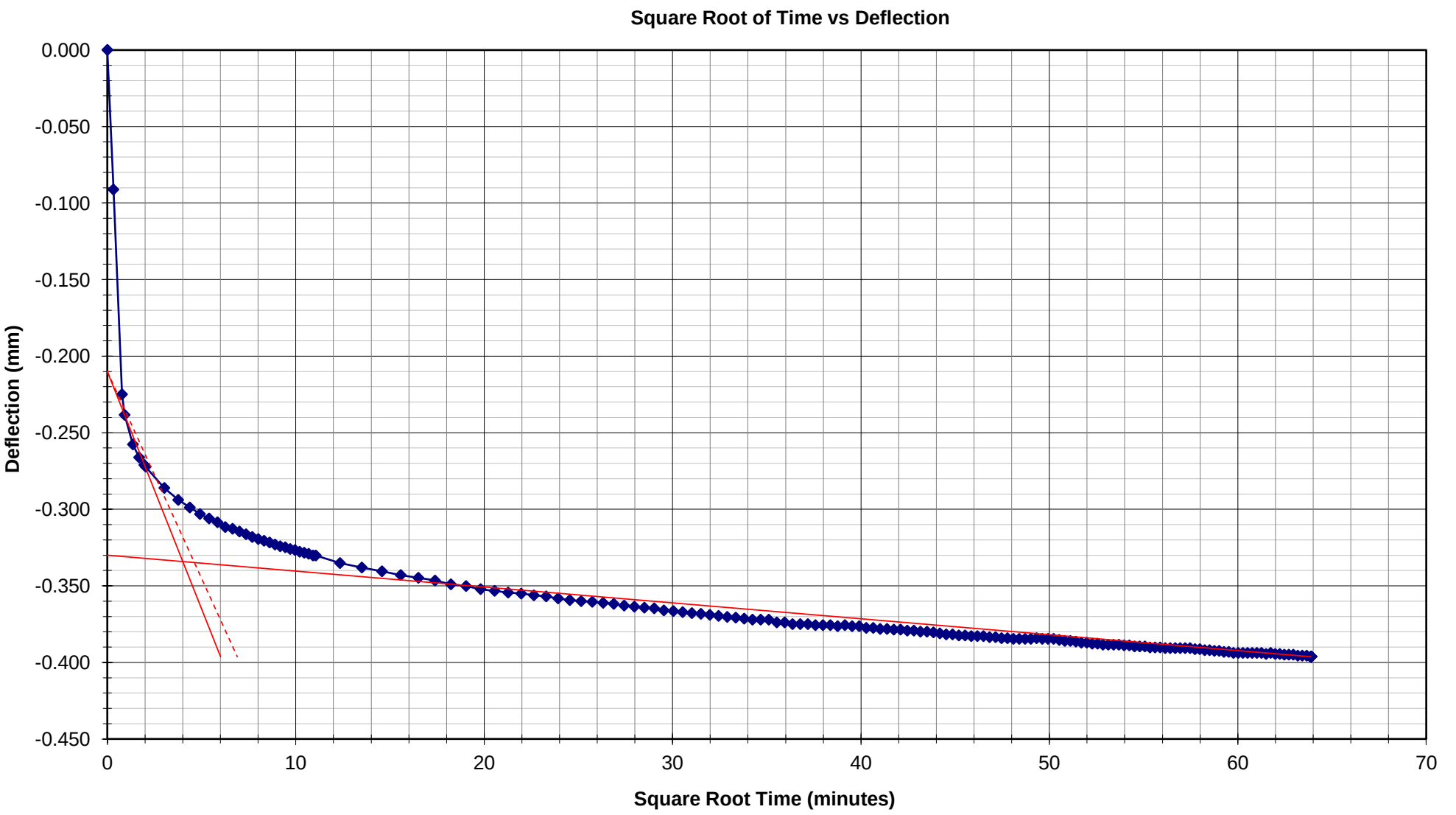
| AMEC EARTH & ENVIRONMENTAL<br>*Engineering & Environmental Services*<br><br>**ONE-DIMENSIONAL CONSOLIDATION TEST**<br>( ASTM D2435-90 ) | | | | |
|---|---|---|---|---|
| | **Project** | M. Nansen TA5 2013 | | |
| | **Location** | | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS1 |
| | **Hole No.** | TP-T-13-6 | **Depth ( ft )** | 0.8-0.9 m |
| | **Technician** | CR/SH | **Loading Date** | |
| | **Loading Stage** | 254.20 kPa saturated+507.41 kPa | **Start Loading Time** | 13-Feb-14 15:44 |



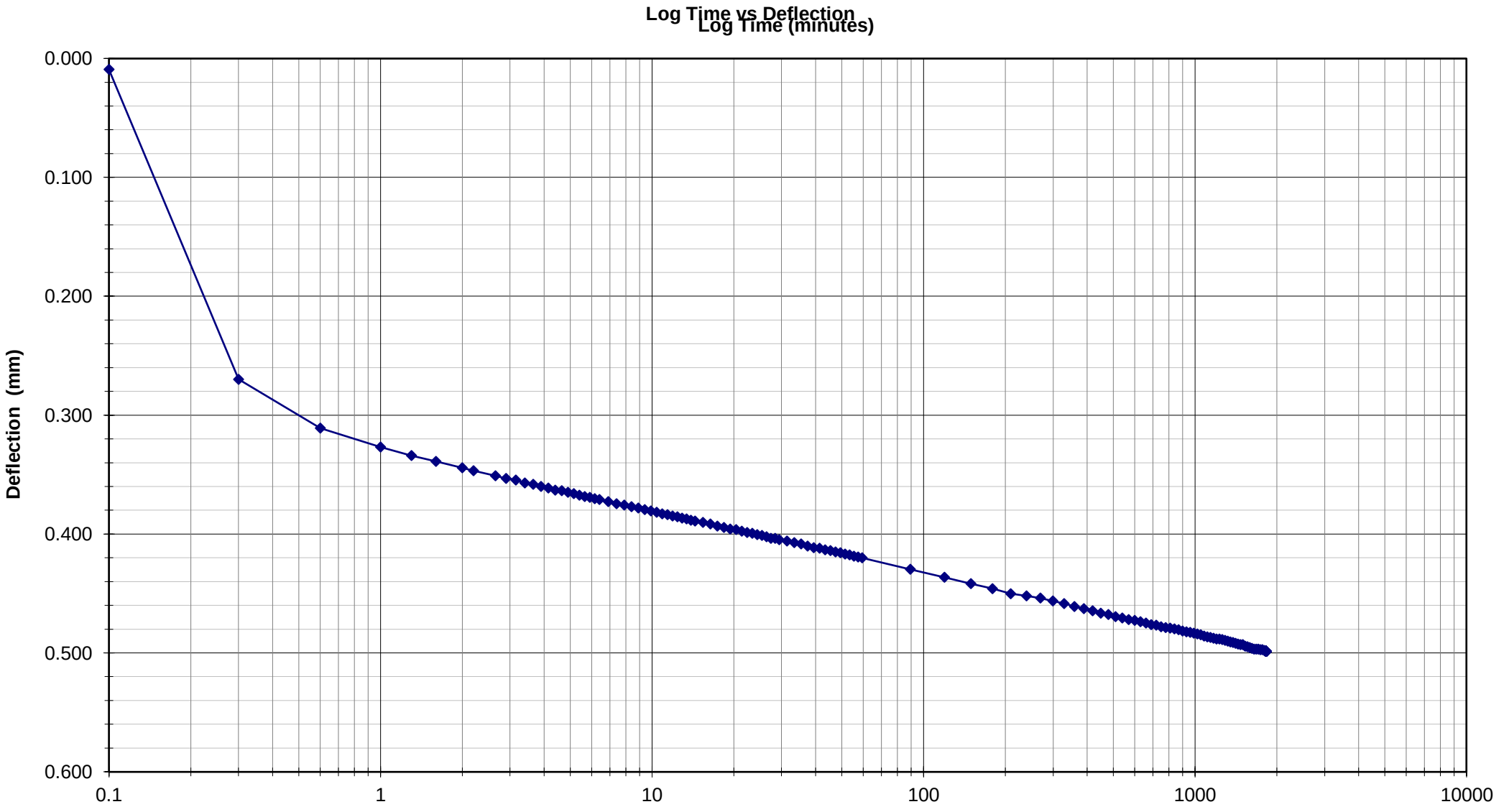



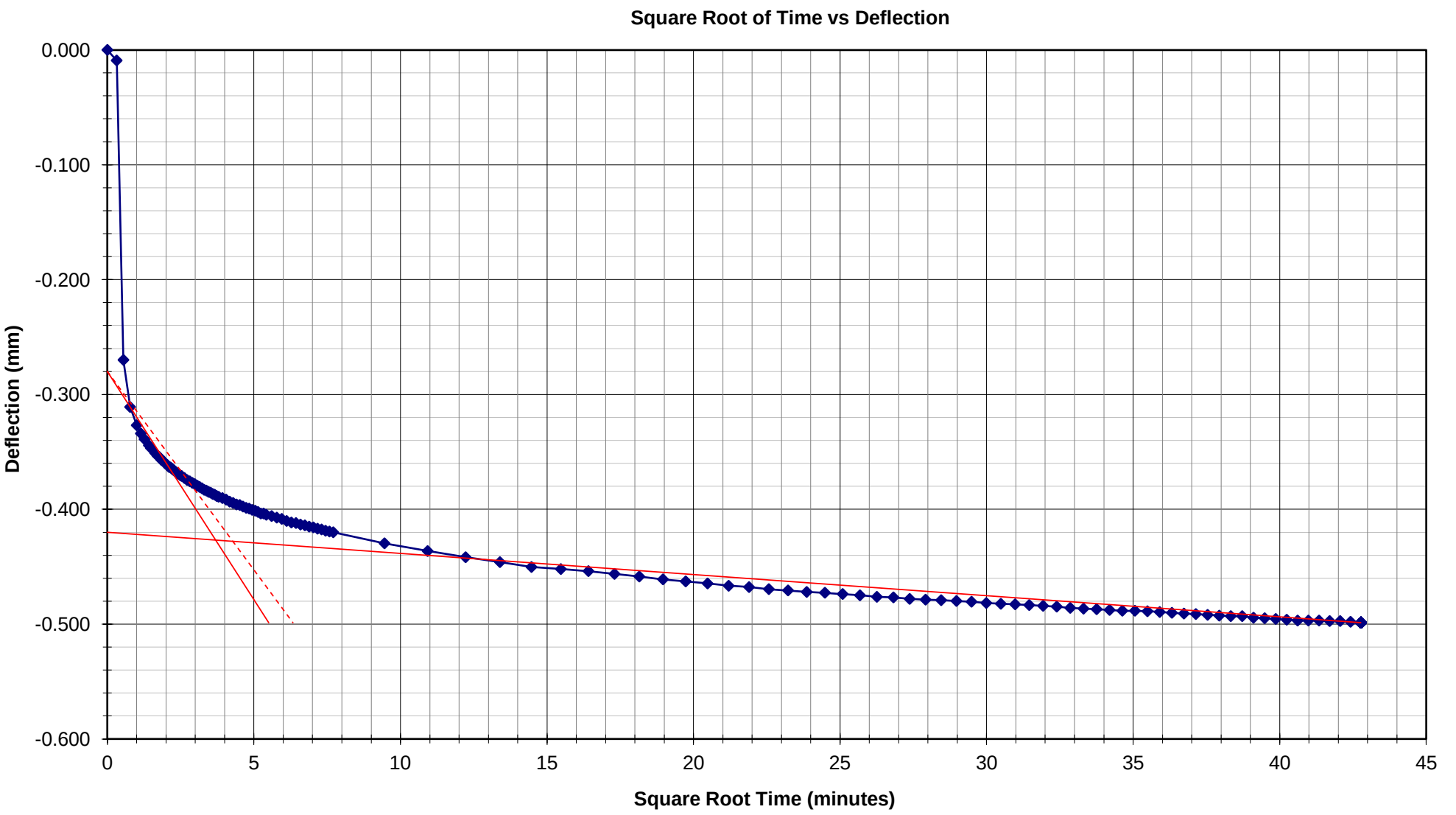
| AMEC EARTH & ENVIRONMENTAL<br>*Engineering & Environmental Services*<br><br>**ONE-DIMENSIONAL CONSOLIDATION TEST**<br>( ASTM D2435-90 ) | | | | |
|---|---|---|---|---|
| | **Project** | M. Nansen TA5 2013 | | |
| | **Location** | | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS1 |
| | **Hole No.** | TP-T-13-6 | **Depth ( ft )** | 0.8-0.9 m |
| | **Technician** | CR/SH | **Loading Date** | |
| | **Loading Stage** | 570.41 kPa | **Start Loading Time** | 14-Feb-14 10:40 |



| AMEC EARTH & ENVIRONMENTAL<br>*Engineering & Environmental Services*<br><br>**ONE-DIMENSIONAL CONSOLIDATION TEST**<br>( ASTM D2435-90 ) | | | | |
|---|---|---|---|---|
| | **Project** | M. Nansen TA5 2013 | | |
| | **Location** | | | |
| | **Job No.** | VM00605E.B001 | **Sample No.** | GS1 |
| | **Hole No.** | TP-T-13-6 | **Depth ( ft )** | 0.8-0.9 m |
| | **Technician** | CR/SH | **Loading Date** | |
| | **Loading Stage** | 1000.68 kPa | **Start Loading Time** | 17-Feb-14 7:10 |



## TEMPE CELL TEST - LABORATORY DATA SHEET
## SAMPLE AND APPARATUS DETAILS

| | | | |
|---|---|---|---|
| PROJECT | Mt Nansen TA5 2013 SI | PROJECT LOCATION | Yukon |
| CLIENT | Government of Yukon | BOREHOLE No. | TP-T-13-04 GS5 |
| PROJECT No. | VM00605E.523.20 | DEPTH (m) | 3.0-3.1 m |
| LAB No. | S-9985 | SAMPLE NUMBER | GS5 |
| PROJECT ENGINEER | Renata Wood | SAMPLE TYPE | Silt |
| | | DATE ORDERED | 07-Dec-13 |
| SOIL DESCRIPTION | Silty clay, trace sand | | |
| COMMENTS | | | |

**PRE-TEST MEASUREMENTS**

| | | | | | |
|---|---|---|---|---|---|
| Reported By | SH/CR | | START DATE | 12-Jan-14 | |
| CELL No. | 4 | | TARGET SPECIMEN DRY DENSITY | 1428 | kg/m$^3$ |
| RING HEIGHT | 59.6 | mm | PRE-TEST WEIGHT OF SPECIMEN | 242.4 | g |
| RING DIAMETER | 54.0 | mm | PRE-TEST MOISTURE CONTENT | 24.0 | % |
| RING VOLUME | 136.5 | ml | | | |
| WEIGHT OF RING | 140.0 | g | | | |
| TARE + INITIAL WT OF SOIL + RING | 382.4 | g | BULK DENSITY OF SPECIMEN | 1776 | kg/m$^3$ |
| TARE | 0.0 | g | DRY DENSITY OF SPECIMEN | 1432 | kg/m$^3$ |
| WEIGHT OF CELL (with stone saturated, etc.) | 899.80 | g | | | |
| SPECIFIC GRAVITY | 2.80 | | [ ] assumed | [x] measured | |

**TRIMMINGS/INITIAL SAMPLE**

| | | | | | |
|---|---|---|---|---|---|
| TARE | 0 | g | | | |
| TARE AND SOIL (wet) | 85 | g | MOISTURE CONTENT (trimmings) | 25.2 | % |
| TARE AND SOIL (dry) | 67.9 | g | | | |

METHOD OF SPECIMEN PREPARATION: Compacted to 86% SPDD in three layers

**POST-TEST MEASUREMENTS**

| | | | | | |
|---|---|---|---|---|---|
| TARE | 140.00 | g | | | |
| TARE AND SOIL (wet) | 382.80 | g | | | |
| TARE AND SOIL (dry) | 335.50 | g | WEIGHT OF WATER | 47.30 | g |
| FINAL MOISTURE CONTENT | 24.2 | % | WEIGHT OF DRY SOIL | 195.50 | g |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PROJECT** Mt Nansen TA5 2013 SI Program | | | | | **PROJECT LOCATION** Yukon | | | | | | | | | | |
| | **CLIENT** Government of Yukon | | | | | **BOREHOLE No.** TP-T-13-04 GS5 | | | | | | | | | | |
| | **PROJECT No.** VM00605E.523.20 | | | | | **Cell No.** 4 | | | | | | | | | | |
| | **LAB No.** S-9985 | | | | | **SAMPLE NUMBER** GS5 | | | | | | | | | | |
| | **PROJECT ENGINEER** Renata Wood | | | | | **SAMPLE TYPE** Silt | | | | | | | | | | |
| **Capillary-Moisture Relationship of Soils by Tempe Cell** | | | | | | | | | | | | | | | | |
| SOIL DESCRIPTION: | Silty clay, trace sand | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Pre-Test Wet Density | 1776 | kg / $m^3$ | | | | Porosity of compacted sample | | 0.49 | | | | **(A)** Post-Test Weight of Water | | | 47.30 | g |
| Initial Dry Density | 1432 | kg / $m^3$ | | | | Pre-Test Moisture content of sample | | 24.0 | % | | | Post-Test Moisture Content (% weight) of Sample | | | 24.2 | % |
| | Saturated | **DRYING CURVE** | | | | | | | | | | | | | | |
| **(B)** Matric Suction Applied ( kPa ) | 0 | 0.5 | 1 | 2 | 3 | 5 | 7 | 10 | 20 | 40 | 80 | 110 | | | | |
| | | | | | | | | | | | | | | | | |
| **(C)** Weight of soil + water + cell (g) | 899.80 | 899.80 | 899.60 | 899.50 | 899.20 | 899.10 | 898.20 | 895.80 | 893.50 | 891.00 | 887.00 | 882.80 | | | | |
| | | | | | | | | | | | | | | | | |
| **(D)** Weight of Cell (g) | 899.80 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| **(E)** Weight of soil + water (g) | 259.80 | 259.80 | 259.60 | 259.50 | 259.20 | 259.10 | 258.20 | 255.80 | 253.50 | 251.00 | 247.00 | 242.80 | | | | |
| E = F + G | | | | | | | | | | | | | | | | |
| **(F)** Weight of dry soil (g) | 195.50 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| **(G)** Weight of water (g) | 64.30 | 64.30 | 64.10 | 64.00 | 63.70 | 63.60 | 62.70 | 60.30 | 58.00 | 55.50 | 51.50 | 47.30 | | | | |
| $G_n = G_{(n+1)} + (C_n - C_{(n+1)})$, $G_{(final)} = A$ | | | | | | | | | | | | | | | | |
| **(H)** Moisture Content (percent weight) | 32.9 | 32.9 | 32.8 | 32.7 | 32.6 | 32.5 | 32.1 | 30.8 | 29.7 | 28.4 | 26.3 | 24.2 | | | | |
| H = G/F | | | | | | | | | | | | | | | | |
| Wet Density of sample ( $kg/m^3$ ) | 1903 | 1903 | 1902 | 1901 | 1899 | 1898 | 1892 | 1874 | 1857 | 1839 | 1810 | 1779 | | | | |
| | | | | | | | | | | | | | | | | |
| Dry Density of sample ( $kg/m^3$ ) | 1432 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Moisture Content (percent volume) | 47.1 | 47.1 | 47.0 | 46.9 | 46.7 | 46.6 | 45.9 | 44.2 | 42.5 | 40.7 | 37.7 | 34.7 | | | | |
| (Volume Water / Total Volume) | | | | | | | | | | | | | | | | |
| Porosity [note 1] | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | | | | |
| | | | | | | | | | | | | | | | | |
| Void Ratio [note 1] | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | | | | |
| | | | | | | | | | | | | | | | | |
| Specific Gravity | 2.80 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Saturation [note 1] | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.95 | 0.94 | 0.90 | 0.87 | 0.83 | 0.77 | 0.71 | | | | |

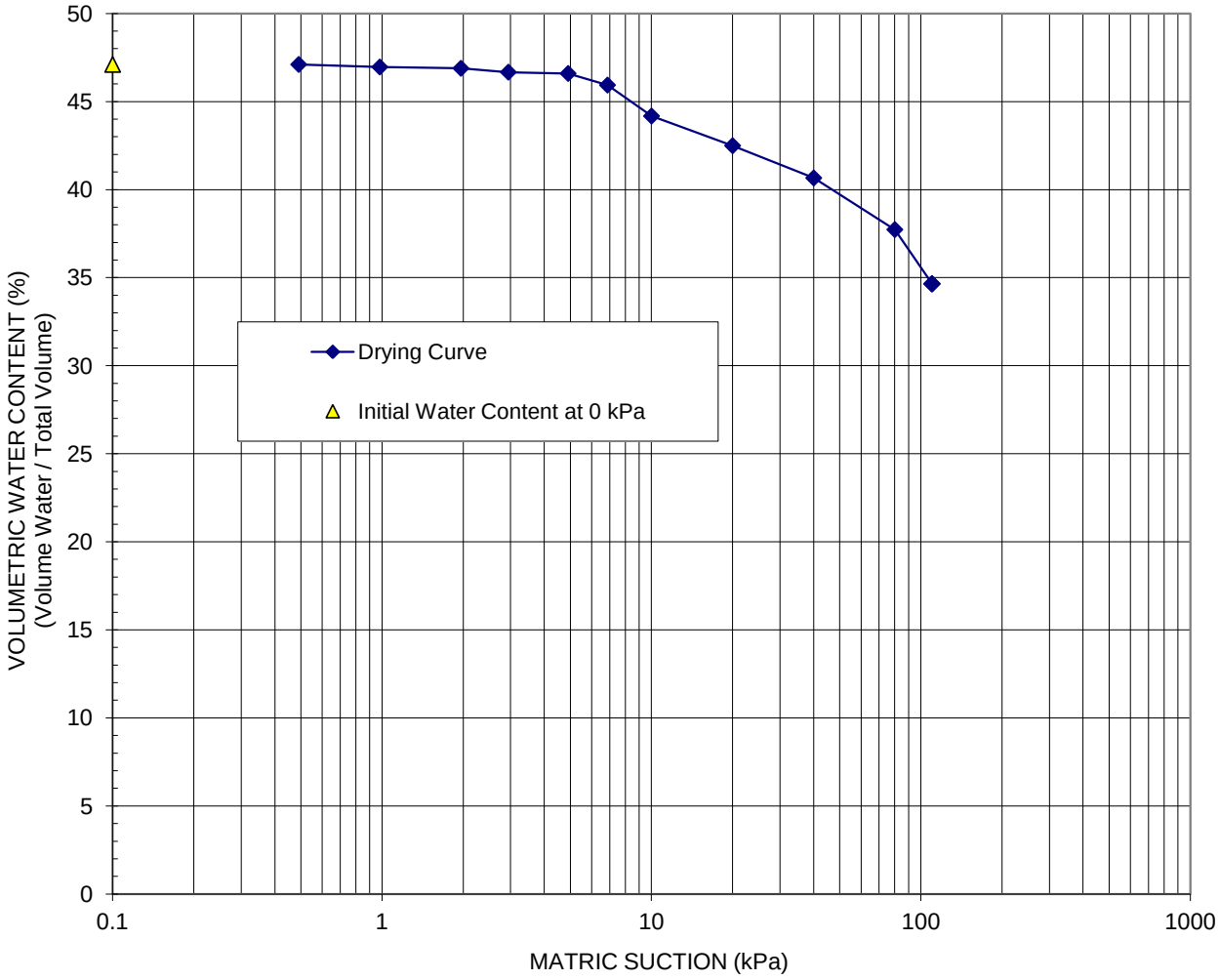
Note 1. Calculated using a specific gravity of 2.8

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request.

| | | | |
|---|---|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program | **PROJECT LOCATION** | Yukon |
| **CLIENT** | Government of Yukon | **BOREHOLE No.** | TP-T-13-04 GS5 |
| **PROJECT No.** | VM00605E.523.20 | **Cell No.** | 4 |
| **LAB No.** | S-9985 | **SAMPLE NUMBER** | GS5 |
| **PROJECT ENGINEER** | Renata Wood | **SAMPLE TYPE** | Silt |

**Capillary-Moisture Relationship of Soils by Tempe Cell**

## Capillary-Moisture Relationship




SOIL DESCRIPTION: Silty clay, trace sand

VOID RATIO, e: 0.95

POROSITY, n: 0.49

Reporting of these test results constitutes a testing service only.
Engineering interpretation or evaluation of the test results is provided only on written request.

## TEMPE CELL TEST - LABORATORY DATA SHEET
## SAMPLE AND APPARATUS DETAILS

| | | | |
|---|---|---|---|
| PROJECT | Mt Nansen TA5 2013 SI | PROJECT LOCATION | Yukon |
| CLIENT | Government of Yukon | BOREHOLE No. | TP-T-13-06 |
| PROJECT No. | VM00605E.523.20 | DEPTH (m) | 0.8-0.9 m |
| LAB No. | N/A | SAMPLE NUMBER | GS1 |
| PROJECT ENGINEER | Renata Wood | SAMPLE TYPE | Sand and Silt |
| | | DATE ORDERED | 07-Dec-13 |
| SOIL DESCRIPTION | Sand and Silt trace Clay | | |
| COMMENTS | | | |

**PRE-TEST MEASUREMENTS**

| | | | | | |
|---|---|---|---|---|---|
| Reported By | CR/SH | | START DATE | 12-Jan-13 | |
| CELL No. | 2 | | TARGET SPECIMEN DRY DENSITY | 1462 | kg/m$^3$ |
| RING HEIGHT | 59.8 | mm | PRE-TEST WEIGHT OF SPECIMEN | 239.4 | g |
| RING DIAMETER | 53.8 | mm | PRE-TEST MOISTURE CONTENT | 20.7 | % |
| RING VOLUME | 136.0 | ml | | | |
| WEIGHT OF RING | 140.0 | g | | | |
| TARE + INITIAL WT OF SOIL + RING | 379.4 | g | BULK DENSITY OF SPECIMEN | 1760 | kg/m$^3$ |
| TARE | 0.0 | g | DRY DENSITY OF SPECIMEN | 1458 | kg/m$^3$ |
| WEIGHT OF CELL (with stone saturated, etc.) | | g | | | |
| SPECIFIC GRAVITY | 2.77 | | assumed | | measured |

**TRIMMINGS/INITIAL SAMPLE**

| | | | | | |
|---|---|---|---|---|---|
| TARE | 0 | g | | | |
| TARE AND SOIL (wet) | 120.1 | g | MOISTURE CONTENT (trimmings) | 21.6 | % |
| TARE AND SOIL (dry) | 98.8 | g | | | |

METHOD OF SPECIMEN PREPARATION: Compacted to 86% SPDD by 3 layers

**POST-TEST MEASUREMENTS**

| | | | | | |
|---|---|---|---|---|---|
| TARE | 140.00 | g | | | |
| TARE AND SOIL (wet) | 356.80 | g | | | |
| TARE AND SOIL (dry) | 338.30 | g | WEIGHT OF WATER | 18.50 | g |
| FINAL MOISTURE CONTENT | 9.3 | % | WEIGHT OF DRY SOIL | 198.30 | g |

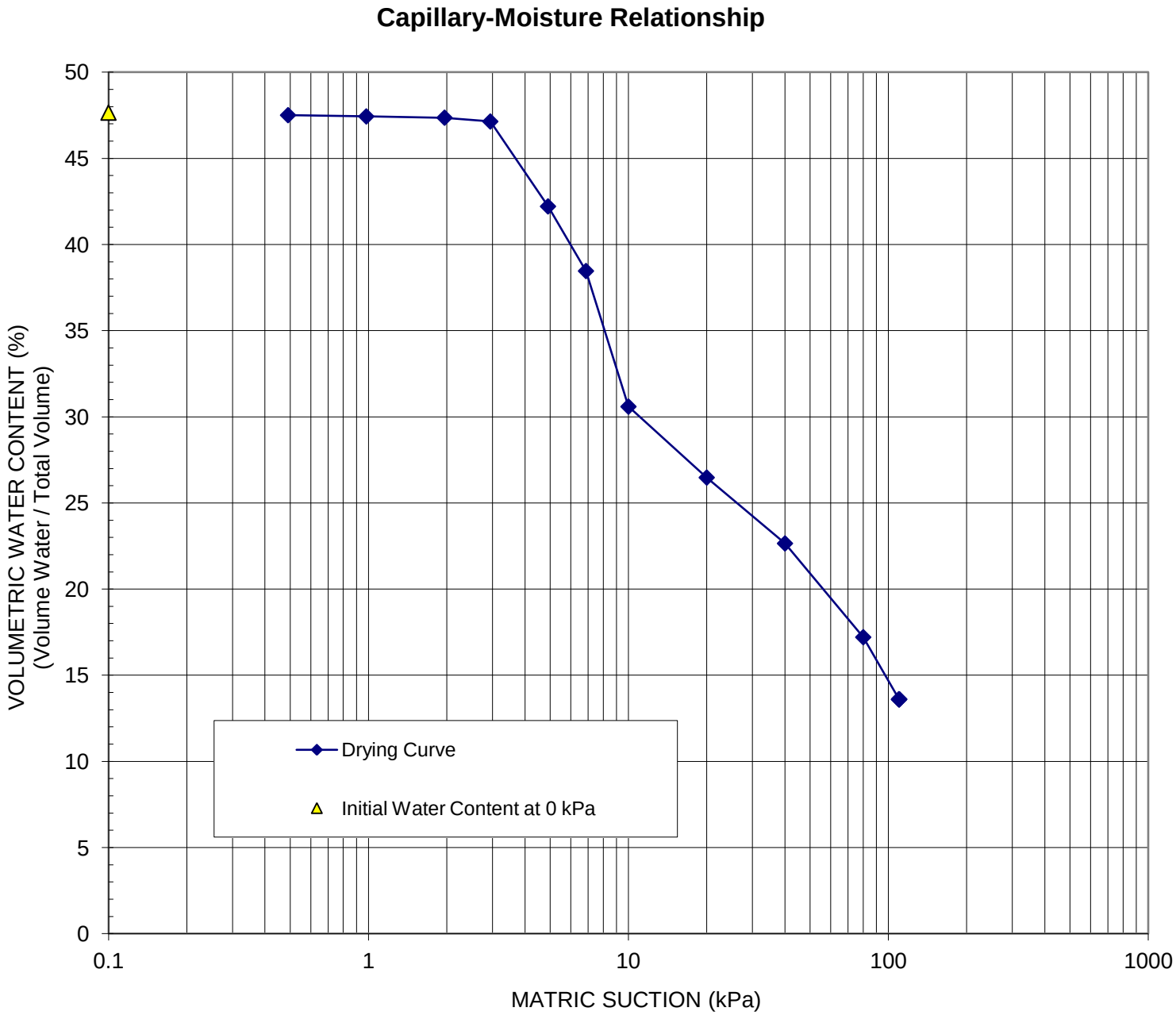
| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PROJECT** Mt Nansen TA5 2013 SI Program | | | | | | **PROJECT LOCATION** Yukon | | | | | | | | | |
| | **CLIENT** Government of Yukon | | | | | | **BOREHOLE No.** TP-T-13-06 | | | | | | | | | |
| | **PROJECT No.** VM00605E.523.20 | | | | | | **Cell No.** 2 | | | | | | | | | |
| | **LAB No.** N/A | | | | | | **SAMPLE NUMBER** GS1 | | | | | | | | | |
| | **PROJECT ENGINEER** Renata Wood | | | | | | **SAMPLE TYPE** Sand and Silt | | | | | | | | | |
| **Capillary-Moisture Relationship of Soils by Tempe Cell** | | | | | | | | | | | | | | | | |
| SOIL DESCRIPTION: | Sand and Silt trace Clay | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Pre-Test Wet Density | 1760 | kg / $m^3$ | | | | Porosity of compacted sample | | 0.47 | | | | **(A)** Post-Test Weight of Water | | | 18.50 | g |
| Initial Dry Density | 1458 | kg / $m^3$ | | | | Pre-Test Moisture content of sample | | 20.7 | % | | | Post-Test Moisture Content (% weight) of Sample | | | 9.3 | % |
| | Saturated | **DRYING CURVE** | | | | | | | | | | | | | | |
| **(B)** Matric Suction Applied ( kPa ) | 0 | 0.5 | 1 | 2 | 3 | 5 | 7 | 10 | 20 | 40 | 80 | 110 | | | | |
| | | | | | | | | | | | | | | | | |
| **(C)** Weight of soil + water + cell (g) | 883.20 | 883.00 | 882.90 | 882.80 | 882.50 | 875.80 | 870.70 | 860.00 | 854.40 | 849.20 | 841.80 | 836.90 | | | | |
| | | | | | | | | | | | | | | | | |
| **(D)** Weight of Cell (g) | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| **(E)** Weight of soil + water (g) | 263.10 | 262.90 | 262.80 | 262.70 | 262.40 | 255.70 | 250.60 | 239.90 | 234.30 | 229.10 | 221.70 | 216.80 | | | | |
| E = F + G | | | | | | | | | | | | | | | | |
| **(F)** Weight of dry soil (g) | 198.30 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| **(G)** Weight of water (g) | 64.80 | 64.60 | 64.50 | 64.40 | 64.10 | 57.40 | 52.30 | 41.60 | 36.00 | 30.80 | 23.40 | 18.50 | | | | |
| $G_n = G_{(n+1)} + (C_n - C_{(n+1)})$, $G_{(final)} = A$ | | | | | | | | | | | | | | | | |
| **(H)** Moisture Content (percent weight) | 32.7 | 32.6 | 32.5 | 32.5 | 32.3 | 28.9 | 26.4 | 21.0 | 18.2 | 15.5 | 11.8 | 9.3 | | | | |
| H = G/F | | | | | | | | | | | | | | | | |
| Wet Density of sample ( $kg/m^3$ ) | 1935 | 1933 | 1933 | 1932 | 1930 | 1880 | 1843 | 1764 | 1723 | 1685 | 1630 | 1594 | | | | |
| | | | | | | | | | | | | | | | | |
| Dry Density of sample ( $kg/m^3$ ) | 1458 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Moisture Content (percent volume) | 47.7 | 47.5 | 47.4 | 47.4 | 47.1 | 42.2 | 38.5 | 30.6 | 26.5 | 22.6 | 17.2 | 13.6 | | | | |
| (Volume Water / Total Volume) | | | | | | | | | | | | | | | | |
| Porosity [note 1] | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | | | | |
| | | | | | | | | | | | | | | | | |
| Void Ratio [note 1] | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | | | | |
| | | | | | | | | | | | | | | | | |
| Specific Gravity | 2.77 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Saturation [note 1] | 1.01 | 1.00 | 1.00 | 1.00 | 1.00 | 0.89 | 0.81 | 0.65 | 0.56 | 0.48 | 0.36 | 0.29 | | | | |

Note 1. Calculated using a specific gravity of 2.77

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request.

| | | | |
|---|---|---|---|
| **PROJECT** | Mt Nansen TA5 2013 SI Program | **PROJECT LOCATION** | Yukon |
| **CLIENT** | Government of Yukon | **BOREHOLE No.** | TP-T-13-06 |
| **PROJECT No.** | VM00605E.523.20 | **Cell No.** | 2 |
| **LAB No.** | N/A | **SAMPLE NUMBER** | GS1 |
| **PROJECT ENGINEER** | Renata Wood | **SAMPLE TYPE** | Sand and Silt |

## Capillary-Moisture Relationship of Soils by Tempe Cell




SOIL DESCRIPTION: Sand and Silt trace Clay

VOID RATIO, e: 0.90

POROSITY, n: 0.47

Reporting of these test results constitutes a testing service only.
Engineering interpretation or evaluation of the test results is provided only on written request.

TP-T-13-06 GS1 @ 0.8-0.9 m.xls

| | | | |
|---|---|---|---|
| PROJECT | Mount Nansen | | |
| LOCATION | GS5 & GS1 | | |
| CLIENT | AMEC | DEPTH | 0.8-3.1 |
| BOREHOLE | TP-T-1-04 & TP-T-13-06 | LAB NO. | - |
| JOB NO. | VM00605 | DATE | 19-Dec-13 |

## PERMEABILITY TEST

| | |
|---|---|
| Soil Description | Very Silty & Silty Sand |
| Preparation | 50% very silty + 50% Silty Sand |

**Specimen Details:**

| | | | | | |
|---|---|---|---|---|---|
| Mold No: | *1* | Diameter: | 10.14 cm | Area: | 80.75 $cm^2$ |
| Weight: | 1909.2 g | Height (L): | 11.660 cm | Volume: | 941.60 $cm^3$ |
| Wet Density: | 2028 $kg/m^3$ | | | Dry Unit Weight: | 1662 $kg/m^3$ |
| Proctor MDD: | 1680 $kg/m^3$ | | | Void Ratio, e: | 0.59 |
| Sample Moisture: | 22.0 % | | | | |

Date Start: 19-Dec-13
Time: 11:30 AM

| Date | Time (hr) | Water (g) | Collected water per Day (g) | days | | Height of head | |
|---|---|---|---|---|---|---|---|
| 19-Dec-13 | 0.0 | 0 | | 0.0 | | | |
| 20-Dec-13 | 24.0 | 0 | | 1.0 | | | |
| 23-Dec-13 | 95.8 | 36.7 | 12.2 | 4.0 | | | |
| 24-Dec-13 | 119.7 | 51.3 | 14.6 | 5.0 | | | |
| 27-Dec-13 | 189.5 | 88.6 | 12.4 | 8.0 | | | |
| 30-Dec-13 | 263.5 | 114.7 | 8.7 | 11.0 | | | |
| 31-Dec-13 | 287.5 | 120.2 | 5.5 | 12.0 | | | |
| 02-Jan-14 | 335.5 | 136.1 | 8.0 | 14.0 | | | |
| 06-Jan-14 | 432.0 | 170.3 | 8.6 | 18.0 | | | |
| 07-Jan-14 | 456.0 | 178.2 | 7.9 | 19.0 | | | |
| 08-Jan-14 | 480.0 | 187.0 | 8.8 | 20.0 | | | |
| 09-Jan-14 | 504.0 | 194.9 | 7.9 | 21.0 | | | |
| 10-Jan-14 | 528.0 | 202.3 | 7.4 | 22.0 | | | |
| 13-Jan-14 | 600.0 | 232.7 | 10.1 | 25.0 | | | |
| 14-Jan-14 | 624.0 | 239.2 | 6.5 | 26.0 | | | |
| 15-Jan-14 | 648.0 | 246.9 | 7.7 | 27.0 | | | |
| 16-Jan-14 | 672.0 | 254.5 | 7.6 | 28.0 | | | |
| 17-Jan-14 | 696.0 | 262.2 | 7.7 | 29.0 | | | |
| 20-Jan-14 | 768.0 | 290.6 | 9.5 | 32.0 | | 50mm | Start |
| 21-Jan-14 | 792.0 | 299.2 | 8.6 | 33.0 | ** | | |
| 22-Jan-14 | 816.0 | 307.3 | 8.1 | 34.0 | ** | 43mm | |
| 23-Jan-14 | 840.0 | 315.7 | 8.4 | 35.0 | ** | 42mm | |
| 24-Jan-14 | 864.0 | 324.1 | 8.4 | 36.0 | ** | 40mm | |
| 27-Jan-14 | 936.0 | 349.7 | 8.5 | 39.0 | ** | 35mm | |
| 28-Jan-14 | 960.0 | 357.8 | 8.1 | 40.0 | ** | 34mm | |
| 29-Jan-14 | 984.0 | 365.6 | 7.8 | 41.0 | ** | 33mm | |
| 30-Jan-14 | 1008.0 | 373.0 | 7.4 | 42.0 | ** | 31.5mm | *** |
| 31-Jan-14 | 1032.0 | 378.6 | 5.6 | 43.0 | | | *** |
| 03-Feb-14 | 1104.0 | 379.9 | 0.4 | 46.0 | | | *** |
| 04-Feb-14 | 1128.0 | 381.0 | 1.1 | 47.0 | | | *** |
| 05-Feb-14 | 1152.0 | 381.0 | 0.0 | 48.0 | | | *** |
| 06-Feb-14 | 1176.0 | 381.0 | 0.0 | 49.0 | | | *** |
| 07-Feb-14 | 1200.0 | 380.7 | -0.3 | 50.0 | | | *** |
| 10-Feb-14 | 1272.0 | 380.3 | -0.1 | 53.0 | | | *** |
| 11-Feb-14 | 1296.0 | 380.2 | -0.1 | 54.0 | | | *** |
| 12-Feb-14 | 1320.0 | 380.1 | -0.1 | 55.0 | | | *** |
| 13-Feb-14 | 1344.0 | 380.0 | -0.1 | 56.0 | | | *** |
| | | | | | | | |
| | | | | | | | |

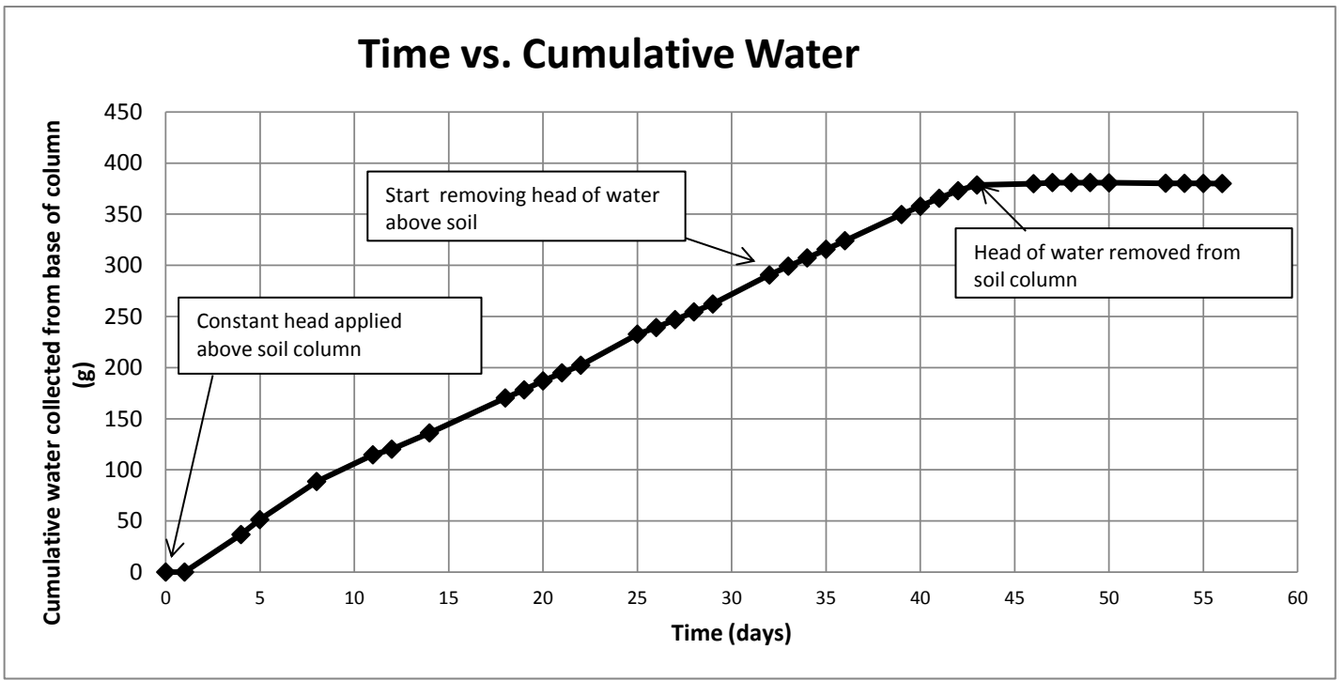
Comments: ** reading without adding water since Jan 20
*** remove water at 1:45 pm

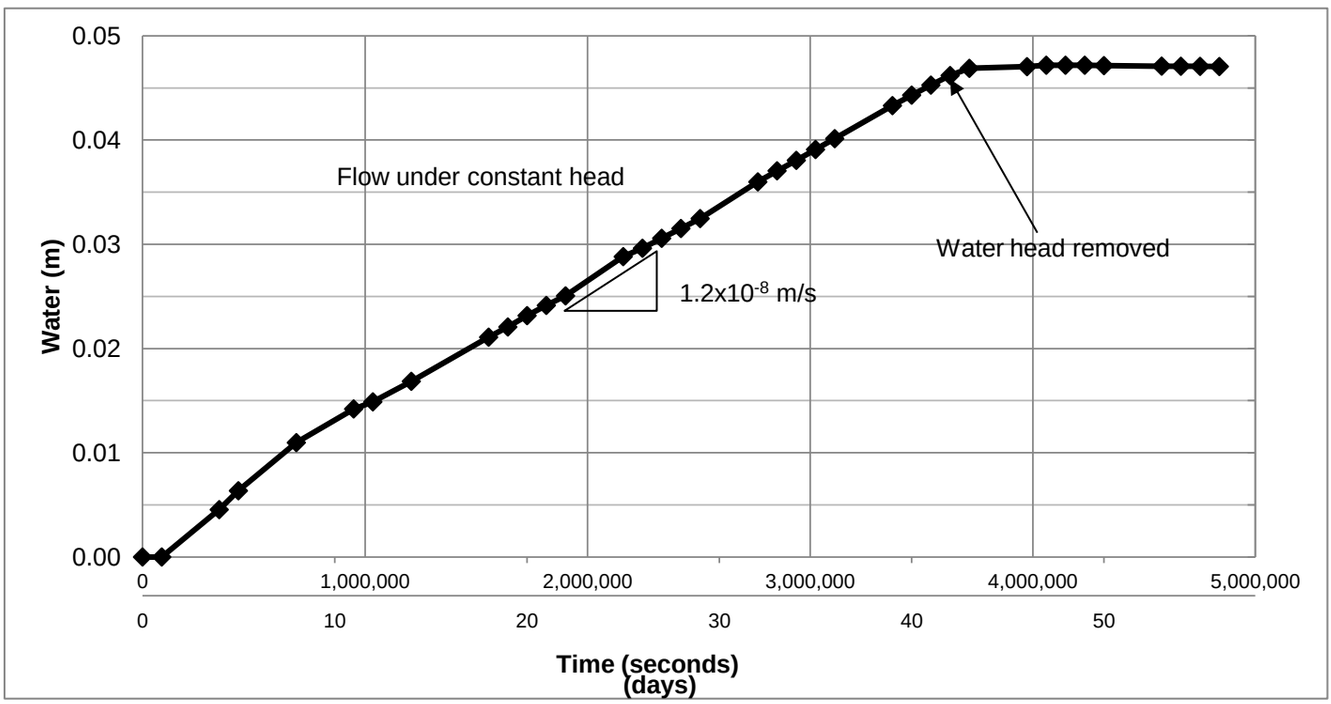
Technician: Reviewer:

| | | | | |
|---|---|---|---|---|
| | PROJECT | Mount Nansen | | |
| | LOCATION | GS5 & GS1 | | |
| | CLIENT | AMEC | DEPTH | 0.8-3.1 |
| | BOREHOLE | TP-T-1-04 & TP-T-13-06 | LAB NO. | - |
| | JOB NO. | VM00605 | DATE | 19-Dec-13 |

**PERMEABILITY TEST**

| | |
|---|---|
| Soil Description | Very Silty & Silty Sand |
| Preparation | 50% very silty + 50% Silty Sand |




Average collected water per day, with constant head: 8.5 g/day
1.22E-08 m/s

Comments:

Technician: Reviewer:

# Final Analytical Report

Attention: Renata Wood

AMEC Environment & Infrastructure
Suite 600, 4445 Lougheed Highway
Burnaby, BC V5C 0E4

Results for File: EC-66510

Project Number: VM00605E.523.20
Project Name: Mount Nansen

Date Received: 2013/11/05
Date of Report: 2013/11/15

Report reviewed by:

Jesse Dang, B.Sc.
Manager
Laboratory Services

Kristine Connor
Client Services Representative
Laboratory Services

** All samples will be disposed of after 30 days following analysis. Please contact the lab if you require additional sample storage time. (Samples deemed hazardous will be returned to the client at their own expense or disposal will be arranged.) **

AMEC Environment & Infrastructure, Edmonton Chemistry
5667 - 70 Street, Edmonton, Alberta, Canada T6B 3P6
Tel: (780) 436-2152
www.amec.com

# Soil Analysis

Project No. VM00605E.523.20

Final
File No. EC-66510

| Analyst | Date of Analysis (yyyy/m/d) | Analytical Parameter | Units | Reference Method | Lab #: / Client ID: / Sample Date: / MDL | 13-16243 BH-TD-13-01-GS14-19-19.1 N/P | 13-16244 TP-TD-13-03-ARD-03-4.5 N/P | 13-16245 BH-T-13-03-GS5-4.9-5.0m N/P | 13-16246 TP-T-13-04-GS6-3.4-3.5m N/P |
|---|---|---|---|---|---|---|---|---|---|
| TY | 2013/11/12 | Organic Matter (375°C) | % | McKeague 4.23 | 0.01 | 1.8 | 0.27 | 0.88 | 4.0 |

| Analyst | Date of Analysis (yyyy/m/d) | Analytical Parameter | Units | Reference Method | Lab #: / Client ID: / Sample Date: / MDL | 13-16247 BH-T-13-04-GS2-8.7-8.8m N/P |
|---|---|---|---|---|---|---|
| TY | 2013/11/12 | Organic Matter (375°C) | % | McKeague 4.23 | 0.01 | 1.9 |

# Quality Control Standard

Project No. VM00605E.523.20 File No. EC-66510

## Soil Analysis

| Analyst | Date of Analysis (yyyy/m/d) | Analytical Parameter | Units | Reference Method | MDL | Analyzed Value | Advisory Range | Target Value | Reference No. |
|---|---|---|---|---|---|---|---|---|---|
| TY | 2013/11/12 | Organic Matter (375°C) | % | McKeague 4.23 | 0.01 | 2.4 | 1.42-3.34 | 2.38 | SS#18(@375) |

# Analytical Comments

Project No. VM00605E.523.20 File No. EC-66510

All Analytical results pertain to samples analyzed as received.

McKeague: Manual on Soil Sampling and Methods of Analyses. Can. Soc. Soil Sci. Ottawa.

MDL - Method Detection Limit

EI-66510 SRB 11

amec

# EDMONTON CHEMISTRY LAB 29964

## Chain of Custody Record/Analysis Request

Tracking #:

ISSUING OFFICE:

Project Name: Mount Nansen
Project Manager: Ronald Wood
Project Number: VM00605 E.523.20

Sampler: MOZNUR
Phone No.: 436-2492

ANALYSIS REQUIRED (Note preferred method)

Organic Control

QUOTE NUMBER

REQUIREMENTS
AB Tier 1
AB Tier 2
CCME
BCME
Other

| Client Sample ID | AMEC E & E Lab Sample ID (FOR LAB USE ONLY) | Date Collected (dd-mm-yy) | Time Collected (hh:mm) | Matrix | # of Containers | 50% RUSH (Please Notify Lab!) | 100% RUSH (Please Notify Lab!) |
|---|---|---|---|---|---|---|---|
| BH-TD-13-01 | → GS1 | 4 → 19 | 19.1 | m | | | |
| TP-TD-13-03 | → ARD-03 | → 4.5 | 4.6 | m | | | |
| BH-T-13-04 | → GS5 | → 4.9 | 5.0 | m | | | |
| TP-T-13-04 | → GS6 | → 3.4 | 3.5 | m | | | |
| BH-T-13-04 | → GS2 | → 8.7 | 8.8 | m | | | |

13-162463

4

5

6

7

RECEIVER COMMENTS

RELINQUISHED BY:
Signature:
Printed Name: MOZNUR
Firm: Amec
Date/Time: Nov 04/13

RECEIVED BY:
Signature:
Printed Name: Eli Cai
Date/Time: Nov 5/13 11:00
Temperature °C: 18.0°

REPORT FORMAT
Digital pdf _____ Excel _____ Hardcopy _____

INVOICING
Digital pdf _____ Hardcopy _____

CLIENT COMMENTS / SPECIAL INSTRUCTIONS
Results Send to Pm.
Thx.

# Appendix D2

# Geochemical Solid Material Lab Results

## Geochemistry SI Summary Table

| Area | Laboratory Tests | | | |
|---|---|---|---|---|
| | Acid Base Accounting | Metal | Leachable Metal with Shake Flask Extraction | Cyanide Analysis |
| Waste Rock Dump | 32 | | | |
| TSF-Tailings | | 4 | | 4 |
| TSF-Tailings Dam | 21 | 21 | 9 | |
| TSF-Native Soil | 30 | 30 | 11 | 15 |
| TSF-Borrow Area | 22 | 22 | 9 | |
| Mill Area | 15 | 15 | 2 | |
| Road | 12 | 12 | 4 | |
| Dome Creek Sediment | | 20 | | 20 |

Note:
Number of samples does not include the duplicate samples for QA/QC

## Table D2-1 : Acid Base Accounting Testing Results of Waste Rock Dump Samples

| Sample ID | Borehole/Test Pit ID | Sample Interval (m) | Fizz Test | Paste pH | TIC | Total Sulphur | Sulphate Sulphur | Sulphide Sulphur* | AP | NP | Carb-NP | Net NP | NPR | Carb-NPR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | % | | | | kg $CaCO_3$/t | | | | | |
| TP-WA-13-02 ARD-01 | TP-WA-13-02 | 1.0 - 1.1 | None | 7.56 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 2.0 | <0.8 | 2.0 | 6.7 | 2.7 |
| TP-WA-13-02 ARD-02 | TP-WA-13-02 | 2.1 - 2.2 | None | 6.07 | <0.01 | 0.37 | 0.39 | <0.01 | <0.3 | 0.0 | <0.8 | <0.3 | **0.10** | 2.7 |
| TP-WA-13-02 ARD-03 | TP-WA-13-02 | 3.1 - 3.2 | None | 5.60 | <0.01 | 0.4 | 0.4 | <0.01 | <0.3 | -0.4 | <0.8 | -0.4 | **0.10** | 2.7 |
| TP-WA-13-03 ARD-01 | TP-WA-13-03 | 1.0 - 1.1 | None | 7.87 | 0.06 | 0.01 | 0.01 | <0.01 | <0.3 | 6.2 | 5.0 | 6.2 | 20.7 | 16.7 |
| TP-WA-13-03 ARD-02 | TP-WA-13-03 | 2.0 - 2.1 | None | 7.13 | 0.01 | 0.18 | 0.17 | 0.01 | 0.3 | 2.8 | 0.8 | 2.5 | 9.0 | 2.7 |
| TP-WA-13-03 ARD-03 | TP-WA-13-03 | 2.9 - 3.0 | None | 6.18 | <0.01 | 0.05 | 0.04 | 0.01 | 0.3 | 0.5 | <0.8 | 0.2 | **1.6** | 2.6 |
| TP-WA-13-05 ARD-01 | TP-WA-13-05 | 1.0 - 1.1 | None | 7.37 | 0.05 | 0.14 | 0.06 | 0.08 | 2.5 | 8.0 | 4.2 | 5.5 | 3.2 | **1.7** |
| TP-WA-13-05 ARD-02 | TP-WA-13-05 | 2.0 - 2.1 | None | 7.33 | 0.07 | 0.18 | 0.08 | 0.10 | 3.1 | 9.9 | 5.8 | 6.8 | 3.2 | **1.9** |
| TP-WA-13-05 ARD-03 | TP-WA-13-05 | 3.0 - 3.1 | None | 7.46 | 0.07 | 0.19 | 0.09 | 0.10 | 3.1 | 8.7 | 5.8 | 5.6 | 2.8 | **1.9** |
| TP-WA-13-05 ARD-04 | TP-WA-13-05 | 4.0 - 4.1 | Slight | 7.89 | 0.09 | 0.18 | 0.03 | 0.15 | 4.7 | 12.3 | 7.5 | 7.6 | 2.6 | **1.6** |
| TP-WA-13-06 ARD-01 | TP-WA-13-06 | 1.0 - 1.1 | Slight | 7.64 | 0.49 | 0.4 | 0.08 | 0.32 | 10.0 | 39.4 | 40.8 | 29.4 | 3.9 | 4.1 |
| TP-WA-13-06 ARD-02 | TP-WA-13-06 | 2.0 - 2.1 | Slight | 7.76 | 0.69 | 0.3 | 0.07 | 0.23 | 7.2 | 77.2 | 57.5 | 70.0 | 10.7 | 8.0 |
| TP-WA-13-06 ARD-03 | TP-WA-13-06 | 3.0 - 3.1 | Slight | 7.73 | 1.00 | 0.49 | 0.1 | 0.39 | 12.2 | 67.9 | 83.3 | 55.7 | 5.6 | 6.8 |
| TP-WA-13-06 ARD-04 | TP-WA-13-06 | 4.0 - 4.1 | Slight | 7.50 | 0.30 | 0.31 | 0.3 | 0.01 | 0.3 | 24.8 | 25.0 | 24.5 | 79.4 | 80.0 |
| TP-WA-13-08 ARD-01 | TP-WA-13-08 | 1.0 - 1.1 | None | 7.63 | 0.03 | <0.01 | <0.01 | <0.01 | <0.3 | 4.9 | 2.5 | 4.9 | 16.3 | 8.3 |
| TP-WA-13-08 ARD-02 | TP-WA-13-08 | 2.0 - 2.1 | None | 7.73 | 0.03 | 0.03 | 0.01 | 0.02 | 0.6 | 4.9 | 2.5 | 4.3 | 7.8 | 4.0 |
| TP-WA-13-08 ARD-03 | TP-WA-13-08 | 3.0 - 3.1 | Slight | 7.77 | 0.25 | 0.16 | 0.03 | 0.13 | 4.1 | 21.8 | 20.8 | 17.7 | 5.4 | 5.1 |
| TP-WA-13-09 ARD-01 | TP-WA-13-09 | 0.6 - 0.7 | None | 7.88 | 0.04 | 0.02 | 0.02 | <0.01 | <0.3 | 4.2 | 3.3 | 4.2 | 14.0 | 11.1 |
| TP-WA-13-09 ARD-02 | TP-WA-13-09 | 1.1 - 1.2 | Slight | 7.56 | 0.28 | 0.41 | 0.19 | 0.22 | 6.9 | 24.3 | 23.3 | 17.4 | 3.5 | 3.4 |
| TP-WA-13-09 ARD-03 | TP-WA-13-09 | 2.0 - 2.1 | Slight | 7.83 | 0.33 | 0.27 | 0.06 | 0.21 | 6.6 | 28.3 | 27.5 | 21.7 | 4.3 | 4.2 |
| TP-WA-13-09 ARD-04 | TP-WA-13-09 | 3.0 - 3.1 | Slight | 7.58 | 0.19 | 0.14 | 0.05 | 0.09 | 2.8 | 17.7 | 15.8 | 14.9 | 6.3 | 5.6 |
| TP-WA-13-09 ARD-05 | TP-WA-13-09 | 4.0 - 4.1 | Slight | 7.84 | 0.28 | 0.11 | 0.03 | 0.08 | 2.5 | 26.0 | 23.3 | 23.5 | 10.4 | 9.3 |
| TP-WA-13-09 ARD-06 | TP-WA-13-09 | 5.1 - 5.2 | Slight | 7.83 | 0.45 | 0.14 | 0.05 | 0.09 | 2.8 | 37.9 | 37.5 | 35.1 | 13.5 | 13.3 |
| TP-WA-13-10 ARD-01 | TP-WA-13-10 | 1.2 - 1.3 | Slight | 7.73 | 0.61 | 0.35 | 0.07 | 0.28 | 8.8 | 48.9 | 50.8 | 40.2 | 5.6 | 5.8 |
| TP-WA-13-10 ARD-02 | TP-WA-13-10 | 2.0 - 2.1 | Slight | 7.60 | 0.60 | 0.3 | 0.11 | 0.19 | 5.9 | 48.6 | 50.0 | 42.7 | 8.2 | 8.4 |
| TP-WA-13-10 ARD-03 | TP-WA-13-10 | 3.0 - 3.1 | Slight | 7.74 | 0.45 | 0.36 | 0.07 | 0.29 | 9.1 | 35.6 | 37.5 | 26.5 | 3.9 | 4.1 |
| TP-WA-13-10 ARD-04 | TP-WA-13-10 | 4.0 - 4.1 | Slight | 7.58 | 0.31 | 0.26 | 0.15 | 0.11 | 3.4 | 25.7 | 25.8 | 22.3 | 7.5 | 7.5 |
| TP-WA-13-11 ARD-01 | TP-WA-13-11 | 1.0 - 1.1 | Slight | 8.10 | 0.46 | 0.14 | 0.02 | 0.12 | 3.8 | 36.6 | 38.3 | 32.9 | 9.8 | 10.2 |
| TP-WA-13-11 ARD-02 | TP-WA-13-11 | 2.0 - 2.1 | Slight | 7.90 | 0.35 | 0.17 | 0.17 | <0.01 | <0.3 | 26.1 | 29.2 | 26.1 | 87.0 | 97.2 |
| TP-WA-13-11 ARD-03 | TP-WA-13-11 | 3.0 - 3.1 | Slight | 8.02 | 0.28 | 0.02 | 0.02 | <0.01 | <0.3 | 24.0 | 23.3 | 24.0 | 80.0 | 77.8 |
| TP-WA-13-11 ARD-04 | TP-WA-13-11 | 4.0 - 4.1 | Slight | 8.07 | 0.67 | 0.37 | 0.35 | 0.02 | 0.6 | 51.2 | 55.8 | 50.6 | 81.9 | 89.3 |
| TP-WA-13-11 ARD-05 | TP-WA-13-11 | 4.9 - 5.0 | Slight | 7.79 | 0.17 | 0.15 | 0.16 | <0.01 | <0.3 | 13.4 | 14.2 | 13.4 | 44.7 | 47.2 |

**Notes:**

*Sulphide sulphur is determined from calculated sulphide sulphur content: Total Sulphur- Sulphate Sulphur

AP = Acid potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material.

AP is determined from calculated sulphide sulphur content

NP = Neutralization potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material.

TIC = Total Inorganic Carbon

Carb-NP is Carbonate-NP; calculated from TIC originating from carbonates and is expressed in kg $CaCO_3$/tonne.

Net NP = Net Neutralization Potential = NP - AP; expressed in kg CaCO3/tonne.

NPR = Net Potential Ratio = NP/AP; Carb-NPR = Carb-NP/AP

Where NP value is equal to or less than zero, NPR is calculated assuming detection limit (NP = 0.2 kg $CaCO_3$/tonne)

Bold indicates NPR or Carb-NPR value less than 2

NPR<2 is Potential Acid Generation (PAG) and NPR>2 is Non Potential Acid Generating (Non-PAG) based on MEND (2009)

## Table D2-2 : Acid Base Accounting Testing Results of Native Soil Tailings Pond Samples

| Sample ID | Borehole/Test Pit ID | Sample Interval (m) | Fizz Test | Paste pH | Paste EC | TIC | Total Sulphur | Sulphate Sulphur | Sulphide Sulphur | Insoluble Sulphur* | AP | NP | Carb-NP | Net NP | NPR | Carb-NPR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | µS/cm | % | | | | | kg $CaCO_3$/t | | | | | |
| BH-T-13-01 ARD-01 | BH-T-13-01 | 1.1 - 1.2 | Slight | 8.31 | 198 | 0.26 | 0.04 | 0.02 | 0.02 | <0.01 | 0.6 | 21.4 | 21.7 | 20.8 | 34.2 | 34.7 |
| BH-T-13-01 ARD-02 | BH-T-13-01 | 3.5 - 3.6 | Slight | 8.58 | | 0.24 | 0.01 | <0.01 | <0.01 | 0.01 | <0.3 | 23.2 | 20.0 | 23.2 | 77.3 | 66.7 |
| BH-T-13-01 ARD-03 | BH-T-13-01 | 5.1 - 5.2 | Slight | 8.37 | | 0.20 | 0.02 | <0.01 | <0.01 | 0.02 | <0.3 | 15.9 | 16.7 | 15.9 | 53.0 | 55.6 |
| BH-T-13-01 ARD-05 | BH-T-13-01 | 8.1 - 8.2 | Slight | 8.21 | | 0.37 | 0.02 | <0.01 | <0.01 | 0.02 | <0.3 | 29.4 | 30.8 | 29.4 | 98.0 | 102.8 |
| BH-T-13-01 ARD-07 | BH-T-13-01 | 11.1 - 11.2 | Slight | 7.81 | | 0.10 | 0.03 | 0.01 | 0.01 | 0.01 | 0.3 | 6.9 | 8.3 | 6.6 | 22.1 | 26.7 |
| BH-T-13-01 ARD-08 | BH-T-13-01 | 13.1 - 13.2 | None | 8.14 | | 0.04 | 0.01 | <0.01 | <0.01 | 0.01 | <0.3 | 5.8 | 3.3 | 5.8 | 19.3 | 11.1 |
| BH-T-13-02 ARD-01 | BH-T-13-02 | 2.1 - 2.2 | None | 7.38 | 148.9 | <0.01 | 0.05 | 0.02 | 0.01 | 0.02 | 0.3 | 2.2 | <0.8 | 1.9 | 7.0 | 2.6 |
| BH-T-13-02 ARD-02 | BH-T-13-02 | 3.5 - 3.6 | None | 7.41 | 117.1 | <0.01 | 0.04 | 0.01 | 0.03 | <0.01 | 0.9 | 2.8 | <0.8 | 1.9 | 3.0 | **0.9** |
| BH-T-13-02 ARD-04 | BH-T-13-02 | 6.5 - 6.6 | Slight | 7.98 | | 0.44 | 0.05 | 0.02 | 0.01 | 0.02 | 0.3 | 33.4 | 36.7 | 33.1 | 106.9 | 117.3 |
| BH-T-13-02 ARD-06 | BH-T-13-02 | 9.5 - 9.6 | Slight | 8.16 | | 0.29 | 0.04 | 0.01 | 0.03 | <0.01 | 0.9 | 26.1 | 24.2 | 25.2 | 27.8 | 25.8 |
| BH-T-13-02 ARD-07 | BH-T-13-02 | 11.1 - 11.2 | Slight | 7.84 | | 0.07 | 0.07 | 0.04 | 0.01 | 0.02 | 0.3 | 4.4 | 5.8 | 4.1 | 14.1 | 18.7 |
| BH-T-13-03 ARD-01 | BH-T-13-02 | 4.8 - 4.9 | None | 6.78 | | <0.01 | 0.03 | 0.02 | <0.01 | 0.01 | <0.3 | 1.6 | <0.8 | 1.6 | 5.3 | 2.7 |
| BH-T-13-03 ARD-02 | BH-T-13-03 | 6.5 - 6.6 | None | 7.78 | 122.6 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 2.8 | <0.8 | 2.8 | 9.3 | 2.7 |
| BH-T-13-03 ARD-04 | BH-T-13-03 | 9.1 - 9.2 | None | 8.38 | 78.9 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 3.2 | <0.8 | 3.2 | 10.7 | 2.7 |
| BH-T-13-03 ARD-06 | BH-T-13-03 | 12.1 - 12.2 | None | 8.29 | | <0.01 | 0.01 | 0.01 | <0.01 | 0.01 | <0.3 | 3.3 | <0.8 | 3.3 | 11.0 | 2.7 |
| BH-T-13-03 ARD-08 | BH-T-13-03 | 15.1 - 15.2 | Slight | 7.87 | | 0.42 | 0.05 | 0.01 | 0.01 | 0.03 | 0.3 | 30.9 | 35.0 | 30.6 | 98.9 | 112.0 |
| BH-T-13-04 ARD-01 | BH-T-13-04 | 5.4 - 5.5 | Slight | 6.97 | | 0.11 | 2.71 | 1.31 | 1.17 | 0.23 | 36.6 | 7.3 | 9.2 | -29.3 | **0.2** | **0.3** |
| BH-T-13-04 ARD-02 | BH-T-13-04 | 7.0 - 7.1 | Slight | 7.66 | | 0.09 | 1.95 | 0.86 | 0.96 | 0.13 | 30.0 | 7.1 | 7.5 | -22.9 | **0.2** | **0.3** |
| BH-T-13-04 ARD-04 | BH-T-13-04 | 10.6 - 10.7 | Slight | 8.07 | 125.4 | 0.11 | <0.01 | <0.01 | 0.01 | <0.01 | 0.3 | 11.0 | 9.2 | 10.7 | 35.2 | 29.3 |
| BH-T-13-04 ARD-06 | BH-T-13-04 | 13.6 - 13.7 | None | 8.77 | | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 3.2 | 1.7 | 3.2 | 10.7 | 5.6 |
| BH-T-13-04 ARD-08 | BH-T-13-04 | 17.1 - 17.2 | None | 8.84 | | 0.06 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 8.6 | 5.0 | 8.6 | 28.7 | 16.7 |
| TP-T-13-01 ARD-01 | TP-T-13-01 | 2.1 - 2.2 | None | 7.98 | | <0.01 | 0.04 | 0.03 | <0.01 | 0.01 | <0.3 | 3.4 | <0.8 | 3.4 | 11.3 | 2.7 |
| TP-T-13-02 ARD-01 | TP-T-13-02 | 2.6 - 2.7 | None | 6.26 | | <0.01 | 0.03 | <0.01 | <0.01 | 0.03 | <0.3 | 1.6 | <0.8 | 1.6 | 5.3 | 2.7 |
| TP-T-13-02 ARD-02 | TP-T-13-02 | 4.0 - 4.1 | None | 6.06 | | 0.04 | 0.11 | 0.03 | 0.06 | 0.02 | 1.9 | 1.7 | 3.3 | -0.2 | 0.9 | **1.8** |
| TP-T-13-02 ARD-03 | TP-T-13-02 | 4.7 - 4.8 | None | 7.85 | | <0.01 | 0.04 | <0.01 | 0.02 | 0.02 | 0.6 | 3.4 | <0.8 | 2.8 | 5.4 | **1.3** |
| TP-T-13-04 ARD-01 | TP-T-13-04 | 3.4 - 3.5 | None | 6.22 | 343 | 0.01 | 0.24 | 0.2 | 0.05 | <0.01 | 1.6 | -1.1 | 0.8 | -2.7 | **0.13** | **0.5** |
| TP-T-13-04 ARD-02 | TP-T-13-04 | 5.0 - 5.1 | None | 7.40 | | <0.01 | 0.01 | 0.01 | <0.01 | <0.01 | <0.3 | 2.7 | <0.8 | 2.7 | 9.0 | 2.7 |
| TP-T-13-06 ARD-01 | TP-T-13-06 | 2.1 - 2.2 | Slight | 8.36 | | 0.29 | <0.01 | <0.01 | 0.03 | <0.01 | 0.9 | 25.7 | 24.2 | 24.8 | 27.4 | 25.8 |
| TP-T-13-06 ARD-02 | TP-T-13-06 | 3.0 - 3.1 | Slight | 8.49 | | 0.41 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 34.9 | 34.2 | 34.9 | 116.3 | 113.9 |
| TP-T-13-06 ARD-03 | TP-T-13-06 | 4.0 - 4.1 | Slight | 8.04 | | 0.12 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 10.1 | 10.0 | 10.1 | 33.7 | 33.3 |

**Notes:**

* Insoluble sulphur is determined from calculated insoluble sulphur: Total Sulphur- Sulphate Sulphur - Sulphide Sulphur

AP = Acid potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material.

AP is determined from sulphide sulphur content

NP = Neutralization potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material.

TIC = Total Inorganic Carbon

Carb-NP is Carbonate-NP; calculated from TIC originating from carbonates and is expressed in kg $CaCO_3$/tonne.

Net NP = Net Neutralization Potential = NP - AP; expressed in kg CaCO3/tonne.

NPR = Net Potential Ratio = NP/AP; Carb-NPR = Carb-NP/AP

Where NP value is equal to or less than zero, NPR is calculated assuming detection limit (NP = 0.2 kg $CaCO_3$/tonne)

Bold indicates NPR or Carb-NPR value less than 2

NPR<2 is Potential Acid Generation (PAG) and NPR>2 is Non Potential Acid Generating (Non-PAG) based on MEND (2009)

## Table D2-3 : Acid Base Accounting Testing Results of Dam Fill Samples

| Sample ID | Borehole/Test Pit ID | Sample Interval (m) | Fizz Test | Paste pH | TIC | Total Sulphur | Sulphate Sulphur | Sulphide Sulphur | Insoluble Sulphur* | AP | NP | Carb-NP | Net NP | NPR | Carb- NPR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | % | | | | | kg $CaCO_3$/t | | | | | |
| TP-TD-13-01 ARD-01 | TP-TD-13-01 | 1.0 - 1.1 | None | 8.19 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 1.9 | <0.8 | 1.9 | 6.3 | 2.7 |
| TP-TD-13-01 ARD-02 | TP-TD-13-01 | 2.0 - 2.1 | None | 7.99 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 1.7 | <0.8 | 1.7 | 5.7 | 2.7 |
| TP-TD-13-01 ARD-03 | TP-TD-13-01 | 3.5 - 3.6 | None | 8.36 | <0.01 | 0.02 | <0.01 | <0.01 | 0.02 | <0.3 | 2.3 | <0.8 | 2.3 | 7.7 | 2.7 |
| TP-TD-13-01 ARD-04 | TP-TD-13-01 | 4.4 - 4.5 | None | 8.41 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 2.3 | <0.8 | 2.3 | 7.7 | 2.7 |
| TP-TD-13-02 ARD-01 | TP-TD-13-02 | 1.0 - 1.1 | None | 8.22 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 2.0 | <0.8 | 2.0 | 6.7 | 2.7 |
| TP-TD-13-02 ARD-02 | TP-TD-13-02 | 2.0 - 2.1 | None | 7.66 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 2.1 | <0.8 | 2.1 | 7.0 | 2.7 |
| TP-TD-13-02 ARD-03 | TP-TD-13-02 | 3.5 - 3.6 | None | 7.58 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 2.8 | <0.8 | 2.8 | 9.3 | 2.7 |
| TP-TD-13-02 ARD-04 | TP-TD-13-02 | 5.0 - 5.1 | None | 8.00 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 2.1 | <0.8 | 2.1 | 7.0 | 2.7 |
| TP-TD-13-03 ARD-01 | TP-TD-13-03 | 1.0 - 1.1 | None | 7.92 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 2.2 | <0.8 | 2.2 | 7.3 | 2.7 |
| TP-TD-13-03 ARD-02 | TP-TD-13-03 | 2.0 - 2.1 | None | 8.26 | 0.05 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 6.4 | 4.2 | 6.4 | 21.3 | 13.9 |
| TP-TD-13-03 ARD-03 | TP-TD-13-03 | 3.5 - 3.6 | None | 8.09 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 2.3 | <0.8 | 2.3 | 7.7 | 2.7 |
| TP-TD-13-03 ARD-04 | TP-TD-13-03 | 4.4 - 4.5 | None | 6.54 | <0.01 | 0.03 | 0.03 | <0.01 | <0.01 | <0.3 | -0.20 | <0.8 | -0.5 | **0.10** | 2.7 |
| TP-TD-13-03 ARD-05 | TP-TD-13-03 | 4.5 - 4.6 | None | 5.53 | 0.02 | 0.15 | 0.17 | 0.03 | <0.01 | 0.9 | -11.20 | 1.7 | -12.1 | **0.03** | 1.8 |
| TP-TD-13-03 ARD-06 | TP-TD-13-03 | 5.8 - 5.9 | None | 8.60 | 0.06 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 7.3 | 5.0 | 7.3 | 24.3 | 16.7 |
| BH-TD-13-01 ARD-01 | BH-TD-13-01 | 0.1 - 0.2 | None | 8.31 | 0.07 | 0.05 | 0.01 | 0.02 | 0.02 | 0.6 | 13.2 | 5.8 | 12.6 | 21.1 | 9.3 |
| BH-TD-13-01 ARD-03 | BH-TD-13-01 | 2.0 - 2.1 | Slight | 8.59 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 3.4 | <0.8 | 3.4 | 11.3 | 2.7 |
| BH-TD-13-01 ARD-06 | BH-TD-13-01 | 5.0 - 5.1 | Slight | 8.57 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 3.0 | <0.8 | 3.0 | 10.0 | 2.7 |
| BH-TD-13-01 ARD-08 | BH-TD-13-01 | 7.5 - 7.6 | Slight | 8.35 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 2.7 | <0.8 | 2.7 | 9.0 | 2.7 |
| BH-TD-13-01 ARD-10 | BH-TD-13-01 | 10.5 - 10.6 | None | 8.63 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.3 | 3.1 | <0.8 | 3.1 | 10.3 | 2.7 |
| BH-TD-13-01 ARD-12 | BH-TD-13-01 | 13.6 - 13.7 | None | 8.08 | <0.01 | 0.01 | 0.01 | <0.01 | 0.01 | <0.3 | 3.8 | <0.8 | 3.8 | 12.7 | 2.7 |
| BH-TD-13-01 ARD-14 | BH-TD-13-01 | 17.1 - 17.2 | Slight | 7.52 | <0.01 | 0.01 | 0.01 | <0.01 | 0.01 | <0.3 | 2.2 | <0.8 | 2.2 | 7.3 | 2.7 |

**Notes:**

* Insoluble sulphur is determined from calculated insoluble sulphur: Total Sulphur- Sulphate Sulphur - Sulphide Sulphur

AP = Acid potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material.

AP is determined from measured sulphide sulphur content or calculated sulphide content if the sulphide is not measured

NP = Neutralization potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material.

TIC = Total Inorganic Carbon

Carb-NP is Carbonate-NP; calculated from TIC originating from carbonates and is expressed in kg $CaCO_3$/tonne.

Net NP = Net Neutralization Potential = NP - AP; expressed in kg CaCO3/tonne.

NPR = Net Potential Ratio = NP/AP; Carb-NPR = Carb-NP/AP

Where NP value is equal to or less than zero, NPR is calculated assuming detection limit (NP = 0.2 kg $CaCO_3$/tonne)

Bold indicates NPR or Carb-NPR value less than 2

NPR<2 is Potential Acid Generation (PAG) and NPR>2 is Non Potential Acid Generating (Non-PAG) based on MEND (2009)

## Table D2-4 : Acid Base Accounting Testing Results of Mill Area Samples

| Sample ID | Borehole/Test Pit ID | Sample Interval (m) | Fizz Test | Paste pH | TIC | Total Sulphur | Sulphate Sulphur | Sulphide Sulphur | Insoluble Sulphur* | AP | NP | Carb-NP | Net NP | NPR | Carb-NPR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | % | | | | | kg $CaCO_3$/t | | | | | |
| BH-M-13-04 ARD -01 | BH-M-13-04 | 0.0 - 0.5 | Slight | 7.71 | 0.18 | 0.91 | 0.08 | 0.65 | 0.18 | 20.3 | 13.4 | 15.0 | -6.91 | **0.7** | **0.7** |
| BH-M-13-04 ARD -02 | BH-M-13-04 | 0.6 - 1.0 | Slight | 7.86 | 0.34 | 0.73 | 0.08 | 0.56 | 0.09 | 17.5 | 26.2 | 28.3 | 8.70 | **1.5** | **1.6** |
| TP-M-13-01 ARD -02 | TP-M-13-01 | 0.6 - 1.0 | None | 7.49 | 0.01 | 0.05 | 0.01 | 0.04 | 0.01 | 1.25 | 6.20 | 0.83 | 4.95 | 5.0 | **0.7** |
| TP-M-13-01 ARD -03 | TP-M-13-01 | 1.1 - 1.5 | None | 6.20 | 0.02 | 0.07 | 0.04 | 0.02 | 0.01 | 0.63 | 2.10 | 1.67 | 1.48 | 3.4 | 2.7 |
| TP-M-13-01 ARD -04 | TP-M-13-01 | 1.6 - 2.0 | None | 6.13 | 0.04 | 0.09 | 0.02 | 0.05 | 0.02 | 1.56 | 1.20 | 3.33 | -0.36 | **0.8** | 2.1 |
| TP-M-13-02 ARD -02 | TP-M-13-02 | 0.6 - 1.0 | Slight | 7.75 | 0.39 | 0.08 | 0.02 | 0.05 | 0.01 | 1.56 | 34.4 | 32.5 | 32.8 | 22.0 | 20.8 |
| TP-M-13-02 ARD -03 | TP-M-13-02 | 1.1 - 1.5 | None | 6.43 | 0.03 | 0.09 | 0.03 | 0.05 | 0.01 | 1.56 | 2.10 | 2.50 | 0.54 | **1.3** | **1.6** |
| TP-M-13-03 ARD -01 | TP-M-13-03 | 0.0 - 0.5 | Slight | 7.41 | 0.58 | 1.42 | 0.04 | 1.15 | 0.23 | 35.9 | 34.2 | 48.3 | -1.74 | **1.0** | **1.3** |
| TP-M-13-03 ARD -02 | TP-M-13-03 | 0.6 - 1.0 | Slight | 7.59 | 0.19 | 0.65 | 0.03 | 0.48 | 0.14 | 15.0 | 15.4 | 15.8 | 0.40 | **1.0** | **1.1** |
| TP-M-13-03 ARD -03 | TP-M-13-03 | 1.1 - 1.5 | Slight | 7.46 | 0.18 | 0.31 | 0.06 | 0.22 | 0.03 | 6.88 | 14.3 | 15.0 | 7.43 | 2.1 | 2.2 |
| TP-M-13-03 ARD -04 | TP-M-13-03 | 1.6 - 2.0 | Slight | 7.53 | 0.23 | 0.28 | 0.04 | 0.23 | 0.01 | 7.19 | 17.0 | 19.2 | 9.81 | 2.4 | 2.7 |
| TP-M-13-04 ARD -01 | TP-M-13-04 | 0.0 - 0.5 | Slight | 7.66 | 0.14 | 0.27 | 0.08 | 0.16 | 0.03 | 5.00 | 14.7 | 11.7 | 9.70 | 2.9 | 2.3 |
| TP-M-13-04 ARD -02 | TP-M-13-04 | 0.6 - 1.0 | Slight | 7.74 | 0.45 | 0.40 | 0.07 | 0.32 | 0.01 | 10.0 | 31.0 | 37.5 | 21.0 | 3.1 | 3.8 |
| TP-M-13-04 ARD -03 | TP-M-13-04 | 1.1 - 1.5 | Slight | 7.48 | 0.48 | 1.60 | 0.10 | 0.97 | 0.53 | 30.3 | 33.0 | 40.0 | 2.69 | **1.1** | **1.3** |
| TP-M-13-04 ARD -04 | TP-M-13-04 | 1.6 - 2.0 | Slight | 8.30 | 0.50 | 1.83 | 0.10 | 1.26 | 0.47 | 39.4 | 56.2 | 41.7 | 16.8 | **1.4** | **1.1** |

**Notes:**

* Insoluble sulphur is determined from calculated insoluble sulphur: Total Sulphur- Sulphate Sulphur - Sulphide Sulphur

AP = Acid potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material.

AP is determined from measured sulphide sulphur content or calculated sulphide content if the sulphide is not measured

NP = Neutralization potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material.

TIC = Total Inorganic Carbon

Carb-NP is Carbonate-NP; calculated from TIC originating from carbonates and is expressed in kg $CaCO_3$/tonne.

Net NP = Net Neutralization Potential = NP - AP; expressed in kg CaCO3/tonne.

NPR = Net Potential Ratio = NP/AP; Carb-NPR = Carb-NP/AP

Where NP value is equal to or less than zero, NPR is calculated assuming detection limit (NP = 0.2 kg $CaCO_3$/tonne)

Bold indicates NPR or Carb-NPR value less than 2

NPR<2 is Potential Acid Generation (PAG) and NPR>2 is Non Potential Acid Generating (Non-PAG) based on MEND (2009)

## Table D2-5 : Acid Base Accounting Testing Results of Road Samples

| Sample ID | Borehole/Test Pit ID | Sample Interval (m) | Fizz Test | Paste pH | TIC | Total Sulphur | Sulphate Sulphur | Sulphide Sulphur* | AP | NP | Carb-NP | Net NP | NPR | Carb- NPR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | % | | | | kg $CaCO_3$/t | | | | | |
| TP-M-13-05 ARD -02 | TP-M-13-05 | 0.6 - 1.0 | None | 8.46 | 0.03 | 0.21 | <0.01 | 0.21 | 6.6 | 8.4 | 2.5 | 1.8 | **1.3** | 0.38 |
| TP-M-13-05 ARD -03 | TP-M-13-05 | 1.1 - 1.5 | None | 7.75 | 0.03 | 0.22 | 0.01 | 0.21 | 6.6 | 7.6 | 2.5 | 1.0 | **1.2** | 0.38 |
| TP-M-13-05 ARD -04 | TP-M-13-05 | 1.6 - 2.0 | Moderate | 7.80 | 0.87 | 0.15 | <0.01 | 0.15 | 4.7 | 69.0 | 72.5 | 64.3 | 14.7 | 15.47 |
| TP-R-13-01 ARD -01 | TP-R-13-01 | 0.0 - 0.5 | None | 6.54 | 0.02 | 0.21 | 0.1 | 0.11 | 3.4 | 4.4 | 1.7 | 1.0 | **1.3** | 0.48 |
| TP-R-13-01 ARD -02 | TP-R-13-01 | 0.6 - 1.0 | None | 6.93 | 0.01 | 0.09 | 0.06 | 0.03 | 0.9 | 4.8 | 0.8 | 3.9 | 5.1 | 0.89 |
| TP-R-13-01 ARD -03 | TP-R-13-01 | 1.1 - 1.5 | None | 7.64 | 0.01 | 0.15 | <0.01 | 0.15 | 4.7 | 6.4 | 0.8 | 1.7 | **1.4** | 0.18 |
| TP-R-13-01 ARD -04 | TP-R-13-01 | 1.6 - 1.9 | Slight | 8.07 | 0.09 | 0.5 | 0.01 | 0.49 | 15.3 | 13.3 | 7.5 | -2.0 | **0.9** | 0.49 |
| TP-R-13-02 ARD -01 | TP-R-13-02 | 0.0 - 0.5 | Slight | 7.54 | 0.22 | 0.18 | 0.07 | 0.11 | 3.4 | 18.6 | 18.3 | 15.2 | 5.4 | 5.33 |
| TP-R-13-02 ARD -02 | TP-R-13-02 | 0.6 - 1.0 | Slight | 7.66 | 0.27 | 0.27 | 0.04 | 0.23 | 7.2 | 25.2 | 22.5 | 18.0 | 3.5 | 3.13 |
| TP-R-13-02 ARD -03 | TP-R-13-02 | 1.1 - 1.5 | Slight | 7.63 | 0.10 | 0.4 | 0.04 | 0.36 | 11.3 | 15.6 | 8.3 | 4.4 | **1.4** | 0.74 |
| TP-R-13-03 ARD -02 | TP-R-13-03 | 0.6 - 1.0 | Slight | 7.71 | 0.21 | 0.35 | 0.05 | 0.30 | 9.4 | 20.2 | 17.5 | 10.8 | 2.2 | 1.87 |
| TP-R-13-03 ARD -04 | TP-R-13-03 | 1.6 - 2.0 | Slight | 7.53 | 0.23 | 0.52 | 0.12 | 0.40 | 12.5 | 22.3 | 19.2 | 9.8 | **1.8** | 1.53 |

**Notes:**

*Sulphide sulphur is determined from calculated sulphide sulphur content: Total Sulphur- Sulphate Sulphur

AP = Acid potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material.

AP is determined from calculated sulphide sulphur content

NP = Neutralization potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material.

TIC = Total Inorganic Carbon

Carb-NP is Carbonate-NP; calculated from TIC originating from carbonates and is expressed in kg $CaCO_3$/tonne.

Net NP = Net Neutralization Potential = NP - AP; expressed in kg CaCO3/tonne.

NPR = Net Potential Ratio = NP/AP; Carb-NPR = Carb-NP/AP

Where NP value is equal to or less than zero, NPR is calculated assuming detection limit (NP = 0.2 kg $CaCO_3$/tonne)

Bold indicates NPR or Carb-NPR value less than 2

NPR<2 is Potential Acid Generation (PAG) and NPR>2 is Non Potential Acid Generating (Non-PAG) based on MEND (2009)

## Table D2-6 : Acid Base Accounting Results for Borrow Area Samples

| Sample ID | Borehole/Test Pit/Hand Auger ID | Sample Interval (m) | Fizz Test | Paste pH | TIC | Total Sulphur | Sulphate Sulphur | Sulphide Sulphur | Sulphide Sulphur* | Insoluble Sulphur** | AP | NP | Carb-NP | Net NP | NPR | Carb- NPR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | % | | | | | | kg $CaCO_3$/t | | | | | |
| TP-BA-13-03 ARD-01 | TP-BA-13-03 | 1.0 - 1.1 | None | 9.04 | 0.02 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 4.4 | 1.7 | 4.4 | 14.7 | 5.6 |
| TP-BA-13-03 ARD-02 | TP-BA-13-03 | 2.0 - 2.1 | None | 9.07 | 0.02 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 4.4 | 1.7 | 4.4 | 14.7 | 5.6 |
| TP-BA-13-03 ARD-03 | TP-BA-13-03 | 3.5 - 3.6 | None | 8.73 | 0.03 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 5.3 | 2.5 | 5.3 | 17.7 | 8.3 |
| TP-BA-13-03 ARD-04 | TP-BA-13-03 | 5.0 - 5.1 | None | 8.56 | 0.02 | 0.01 | <0.01 | <0.01 | | 0.01 | <0.3 | 4.8 | 1.7 | 4.8 | 16.0 | 5.6 |
| TP-BA-13-04 ARD-01 | TP-BA-13-04 | 1.0 - 1.1 | Slight | 8.40 | <0.01 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 3.4 | <0.8 | 3.4 | 11.3 | 2.7 |
| TP-BA-13-04 ARD-02 | TP-BA-13-04 | 2.0 - 2.1 | None | 8.84 | <0.01 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 3.0 | <0.8 | 3.0 | 10.0 | 2.7 |
| TP-BA-13-04 ARD-03 | TP-BA-13-04 | 3.0 - 3.1 | None | 9.13 | 0.04 | 0.01 | <0.01 | <0.01 | | 0.01 | <0.3 | 5.8 | 3.3 | 5.8 | 19.3 | 11.1 |
| TP-BA-13-04 ARD-04 | TP-BA-13-04 | 4.5 - 4.6 | None | 8.76 | 0.03 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 5.4 | 2.5 | 5.4 | 18.0 | 8.3 |
| TP-BA-13-05 ARD-01 | TP-BA-13-05 | 1.0 - 1.1 | Slight | 8.74 | <0.01 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 3.1 | <0.8 | 3.1 | 10.3 | 2.7 |
| TP-BA-13-05 ARD-02 | TP-BA-13-05 | 2.0 - 2.1 | Slight | 8.66 | 0.02 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 4.3 | 1.7 | 4.3 | 14.3 | 5.6 |
| TP-BA-13-05 ARD-03 | TP-BA-13-05 | 3.5 - 3.6 | None | 8.51 | 0.03 | 0.01 | <0.01 | <0.01 | | 0.01 | <0.3 | 4.4 | 2.5 | 4.4 | 14.7 | 8.3 |
| TP-BA-13-05 ARD-04 | TP-BA-13-05 | 5.0 - 5.1 | None | 8.76 | 0.03 | 0.01 | <0.01 | <0.01 | | 0.01 | <0.3 | 4.9 | 2.5 | 4.9 | 16.3 | 8.3 |
| TP-BA-13-06 ARD-01 | TP-BA-13-06 | 1.0 - 1.1 | None | 7.98 | <0.01 | 0.02 | 0.01 | <0.01 | | 0.01 | <0.3 | 1.4 | <0.8 | 1.4 | 4.7 | 2.7 |
| TP-BA-13-07 ARD-01 | TP-BA-13-07 | 0.5 - 0.6 | None | 7.50 | <0.01 | 0.08 | 0.09 | <0.01 | | <0.01 | <0.3 | 3.9 | <0.8 | 3.9 | 13.0 | 2.7 |
| TP-BA-13-07 ARD-02 | TP-BA-13-07 | 1.1 - 1.2 | None | 8.23 | 0.05 | 0.04 | 0.03 | <0.01 | | 0.01 | <0.3 | 6.3 | 4.2 | 6.3 | 21.0 | 13.9 |
| TP-BA-13-08 ARD-01 | TP-BA-13-08 | 1.0 - 1.1 | Slight | 7.16 | 0.64 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 31.5 | 53.3 | 31.5 | 105.0 | 177.8 |
| HA-BA-13-01 0-1 m | HA-BA-13-01 | 0 - 1.0 | Slight | 9.06 | 0.07 | <0.01 | <0.01 | | <0.01 | | <0.3 | 8.4 | 5.8 | 8.4 | 28.0 | 19.4 |
| HA-BA-13-01 1-2 m | HA-BA-13-01 | 1.0 - 2.0 | None | 9.04 | 0.07 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 8.9 | 5.8 | 8.9 | 29.7 | 19.4 |
| HA-BA-13-01 2-3 m | HA-BA-13-01 | 2.0 - 3.0 | Slight | 9.08 | 0.07 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 8.7 | 5.8 | 8.7 | 29.0 | 19.4 |
| HA-BA-13-02 0-1 m | HA-BA-13-02 | 1.0 - 2.0 | None | 8.83 | 0.07 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 8.9 | 5.8 | 8.9 | 29.7 | 19.4 |
| HA-BA-13-02 1-2 m | HA-BA-13-02 | 1.0 - 2.0 | Slight | 8.88 | 0.08 | <0.01 | <0.01 | | <0.01 | | <0.3 | 9.5 | 6.7 | 9.5 | 31.7 | 22.2 |
| HA-BA-13-02 2-3 m | HA-BA-13-02 | 2.0 - 3.0 | Slight | 9.00 | 0.08 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 9.9 | 6.7 | 9.9 | 33.0 | 22.2 |

**Notes:**

* Sulphide sulphur is determined from calculated sulphide sulphur content: Total Sulphur- Sulphate Sulphur

** Insoluble sulphur is determined from calculated insoluble sulphur: Total Sulphur- Sulphate Sulphur - Sulphide Sulphur

AP = Acid potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material.

AP is determined from measured sulphide sulphur content or calculated sulphide content if the sulphide is not measured

NP = Neutralization potential in tonnes $CaCO_3$ equivalent per 1000 tonnes of material.

TIC = Total Inorganic Carbon

Carb-NP is Carbonate-NP; calculated from TIC originating from carbonates and is expressed in kg $CaCO_3$/tonne.

Net NP = Net Neutralization Potential = NP - AP; expressed in kg CaCO3/tonne.

NPR = Net Potential Ratio = NP/AP; Carb-NPR = Carb-NP/AP

Where NP value is equal to or less than zero, NPR is calculated assuming detection limit (NP = 0.2 kg $CaCO_3$/tonne)

Bold indicates NPR or Carb-NPR value less than 2

NPR<2 is Potential Acid Generation (PAG) and NPR>2 is Non Potential Acid Generating (Non-PAG) based on MEND (2009)

## Table D2-7 : Metal Testing Results of Waste Rock Dump Samples

| Parameter | Unit | Comparison Guideline | | TP-WA-13-02 | TP-WA-13-02 | TP-WA-13-02 | TP-WA-13-03 | TP-WA-13-03 | TP-WA-13-03 | TP-WA-13-03 | TP-WA-13-05 | TP-WA-13-05 | TP-WA-13-05 | TP-WA-13-05 | TP-WA-13-06 | TP-WA-13-06 | TP-WA-13-06 | TP-WA-13-06 | TP-WA-13-06 | TP-WA-13-08 | TP-WA-13-08 | TP-WA-13-08 | TP-WA-13-09 | TP-WA-13-09 | TP-WA-13-09 | TP-WA-13-09 | TP-WA-13-09 | TP-WA-13-09 | TP-WA-13-10 | TP-WA-13-10 | TP-WA-13-10 | TP-WA-13-10 | TP-WA-13-10 | TP-WA-13-11 | TP-WA-13-11 | TP-WA-13-11 | TP-WA-13-11 | TP-WA-13-11 | TP-WA-13-11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Average Concentration (Continental Crustal)** | Ten Times Average Concentration (Crustal) | ARD-01* | ARD-01 | ARD-02 | ARD-03 | ARD-01* | ARD-01 | ARD-02 | ARD-03 | ARD-01 | ARD-02* | ARD-02 | ARD-03 | ARD-04 | ARD-01 | ARD-02* | ARD-02 | ARD-03 | ARD-04 | ARD-01 | ARD-02 | ARD-03* | ARD-03 | ARD-01 | ARD-02* | ARD-02 | ARD-03 | ARD-04 | ARD-05 | ARD-06 | ARD-01 | ARD-02 | ARD-03 | ARD-04* | ARD-04 | ARD-01 | ARD-02* | ARD-02 | ARD-03 | ARD-04 | ARD-05 |
| | | | | Sample Interval (m) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1.0 - 1.1 | 1.0 - 1.1 | 2.1 - 2.2 | 3.1 - 3.2 | 1.0 - 1.1 | 1.0 - 1.1 | 2.0 - 2.1 | 2.9 - 3.0 | 1.0 - 1.1 | 2.0 - 2.1 | 2.0 - 2.1 | 3.0 - 3.1 | 4.0 - 4.1 | 1.0 - 1.1 | 2.0 - 2.1 | 2.0 - 2.1 | 3.0 - 3.1 | 4.0 - 4.1 | 1.0 - 1.1 | 2.0 - 2.1 | 3.0 - 3.1 | 3.0 - 3.1 | 0.6 - 0.7 | 1.1 - 1.2 | 1.1 - 1.2 | 2.0 - 2.1 | 3.0 - 3.1 | 4.0 - 4.1 | 5.1 - 5.2 | 1.2 - 1.3 | 2.0 - 2.1 | 3.0 - 3.1 | 4.0 - 4.1 | 4.0 - 4.1 | 1.0 - 1.1 | 2.0 - 2.1 | 2.0 - 2.1 | 3.0 - 3.1 | 4.0 - 4.1 | 4.9 - 5.0 |
| Ag | µg/g | 75 | 750 | <0.02 | 0.17 | 14.4 | 22.5 | 0.08 | 0.24 | 8.44 | 1.91 | 3.55 | 8.84 | 8.93 | 2.65 | 1.39 | 1.63 | 1.25 | 1.55 | 1.66 | 6.63 | 0.19 | 0.34 | 0.5 | 0.71 | 1.87 | 11.7 | 9.3 | 1.63 | 1.05 | 0.93 | 2.11 | 1.08 | 0.92 | 11.7 | 2.71 | 3.11 | 1.46 | 3.85 | 3.52 | 1.16 | 3.68 | 3.73 |
| Al | % | 8.23 | 82.3 | 8.51 | 0.53 | 0.78 | 0.56 | 8.23 | 0.53 | 0.89 | 1.01 | 1.15 | 7.81 | 1.08 | 0.9 | 1.2 | 0.79 | 8 | 0.65 | 0.44 | 0.68 | 0.47 | 0.46 | 7.95 | 0.49 | 0.6 | 7.18 | 0.71 | 0.39 | 0.57 | 0.48 | 0.53 | 0.46 | 0.49 | 0.61 | 7.66 | 0.64 | 0.39 | 6.14 | 0.51 | 0.36 | 0.42 | 1.15 |
| As | µg/g | 1.8 | 18 | **32** | **31** | **1110** | **1670** | **30** | **27** | **535** | **133** | **196** | **411** | **387** | **261** | **150** | **64** | **290** | **297** | **274** | **1210** | **123** | **107** | **161** | **163** | **488** | **842** | **919** | **519** | **631** | **237** | **449** | **357** | **310** | **414** | **294** | **308** | **638** | **1090** | **1160** | **294** | **565** | **889** |
| B | µg/g | 10 | 100 | | 40 | 50 | 40 | | 40 | 50 | 50 | 40 | | 50 | 40 | 50 | 50 | | 40 | 40 | 40 | 40 | 40 | | 40 | 50 | | 50 | 40 | 40 | 40 | 40 | 40 | 40 | | 40 | 40 | | 40 | 40 | 40 | 40 |
| Ba | µg/g | 425 | 4250 | 1510 | 202 | 146 | 142 | 1650 | 592 | 387 | 161 | 153 | 1800 | 264 | 227 | 120 | 173 | 1410 | 124 | 171 | 154 | 412 | 398 | 1290 | 419 | 50 | 1100 | 97 | 225 | 108 | 176 | 192 | 148 | 135 | 211 | 1370 | 137 | 451 | 960 | 503 | 48 | 375 | 176 |
| Be | µg/g | 3 | 30 | 1.3 | 0.4 | 0.2 | 0.3 | 1.2 | 0.4 | 0.4 | 0.3 | 0.4 | 1.3 | 0.4 | 0.4 | 0.4 | 0.7 | 1.3 | 0.6 | 0.4 | 0.8 | 0.6 | 0.5 | 1.4 | 0.6 | 0.4 | 1.2 | 0.4 | 0.4 | 0.6 | 0.5 | 0.5 | 0.5 | 0.4 | 0.5 | 1.2 | 0.6 | 0.5 | 1 | 0.5 | 0.4 | 0.5 | 0.8 |
| Bi | µg/g | 0.0085 | 0.085 | 0.11 | 0.11 | 12.7 | 18.4 | 0.27 | 0.27 | 7.02 | 1.68 | 3 | 9.17 | 8.64 | 2.33 | 1.02 | 1.84 | 0.91 | 0.88 | 1.27 | 4.43 | 0.06 | 0.1 | 0.44 | 0.43 | 1.08 | 2.9 | 2.69 | 0.53 | 0.41 | 0.45 | 0.52 | 0.43 | 0.37 | 0.94 | 2.09 | 2.22 | 0.82 | 1.95 | 1.95 | 0.62 | 4.21 | 3.21 |
| Ca | % | 4.15 | 41.5 | 0.26 | 0.19 | 0.19 | 0.13 | 0.41 | 0.37 | 0.26 | 0.31 | 0.51 | 1.48 | 0.58 | 0.46 | 0.74 | 1.5 | 1.9 | 1.7 | 1.99 | 1.02 | 0.34 | 0.29 | 1.05 | 1 | 0.23 | 1.55 | 1.18 | 1.31 | 0.83 | 1.21 | 1.56 | 1.79 | 1.8 | 1.41 | 1.23 | 1.2 | 1.41 | 0.82 | 0.85 | 1.06 | 1.74 | 0.63 |
| Cd | µg/g | 0.15 | 1.5 | 0.9 | 0.91 | **5.79** | **6.86** | 0.38 | 0.39 | **5.49** | **1.99** | **6.32** | **6.49** | **7** | **8.25** | **4.35** | **25.9** | **7.93** | **8.45** | **17.7** | **21.5** | 0.81 | **2.05** | **6.22** | **6.45** | **13.9** | **8.93** | **9.3** | **8.11** | **6.36** | **8.71** | **8.66** | **9.37** | **5.72** | **5.79** | **7.98** | **8.81** | **3.14** | **17.5** | **18.7** | **5.06** | **12.9** | **11** |
| Ce | µg/g | 66.5 | 665 | 26.5 | 22.6 | 17.2 | 16.8 | 26.7 | 24.6 | 23.3 | 17.5 | 19.8 | 25.7 | 17.6 | 17.5 | 14.5 | 30.4 | 30.2 | 24.3 | 21.1 | 18.5 | 28.9 | 26.8 | 33.5 | 26 | 14.3 | 28.4 | 19 | 29.2 | 30.5 | 33 | 27.6 | 29.5 | 22.3 | 21.1 | 29.8 | 24.6 | 14.6 | 16.1 | 12 | 13.4 | 10.2 | 14.8 |
| Co | µg/g | 25 | 250 | 5 | 4.8 | 3.3 | 3.5 | 10.5 | 9.8 | 7.6 | 6.8 | 9.1 | 9.9 | 9.2 | 9.1 | 8.7 | 8.3 | 9.4 | 9 | 6.2 | 5.7 | 5.6 | 6.5 | 8 | 7.6 | 5.2 | 9.3 | 9.7 | 7.8 | 10.6 | 8.5 | 7.9 | 11.8 | 9.1 | 8.9 | 8.5 | 8.7 | 10.5 | 12.3 | 12.5 | 6 | 7.7 | 11.9 |
| Cr | µg/g | 102 | 1020 | 66 | 56 | 108 | 76 | 76 | 73 | 116 | 77 | 63 | 93 | 105 | 69 | 72 | 86 | 53 | 42 | 44 | 65 | 111 | 103 | 80 | 81 | 76 | 68 | 87 | 83 | 72 | 54 | 50 | 84 | 100 | 56 | 72 | 83 | 77 | 102 | 104 | 111 | 85 | 74 |
| Cs | µg/g | ND | ND | 8 | 2.91 | 1.94 | 1.72 | 7 | 2.66 | 2.92 | 2.26 | 3.79 | 8 | 3.81 | 3.95 | 3.35 | 5.84 | 21 | 10.4 | 3.64 | 10.8 | 4.67 | 4.71 | 12 | 4.93 | 3.82 | 11 | 4.6 | 3.41 | 7.64 | 6.39 | 7.34 | 6.78 | 6.25 | 6.53 | 13 | 5.75 | 4.27 | 14 | 4.84 | 3.9 | 4.38 | 5.22 |
| Cu | µg/g | 60 | 600 | 5.8 | 5.6 | 120 | 107 | 8.7 | 7.3 | 150 | 28.1 | 129 | 68.3 | 70.1 | 192 | 178 | 234 | 61 | 61.8 | 187 | 254 | 3.9 | 11 | 14.7 | 15.5 | 79.5 | 88.7 | 87.8 | 30.4 | 29.1 | 17.6 | 30.2 | 36.4 | 33.9 | 84.8 | 124 | 130 | 29.6 | 117 | 114 | 21 | 43.9 | 247 |
| Fe | % | 5.63 | 56.3 | 1.33 | 1.3 | 3.19 | 3.19 | 1.71 | 1.68 | 2.72 | 2.25 | 3.01 | 3.4 | 3.07 | 3.04 | 3.08 | 3.07 | 3.65 | 3.56 | 3.1 | 6.26 | 2.16 | 1.99 | 2.87 | 2.78 | 2.81 | 3.65 | 3.46 | 2.57 | 3.74 | 2.94 | 2.99 | 2.91 | 2.94 | 2.88 | 3.43 | 3.47 | 3 | 4.11 | 4.05 | 1.9 | 3.04 | 4.44 |
| Ga | µg/g | 19 | 190 | 20.6 | 1.4 | 3.4 | 2.5 | 20.4 | 1.4 | 3.4 | 3.9 | 4.4 | 18.6 | 4.4 | 3.3 | 5.1 | 1.9 | 18.7 | 2.2 | 1.3 | 3.1 | 1.4 | 1.4 | 19.2 | 1.6 | 1.2 | 17.6 | 2.8 | 1.3 | 1.9 | 1.6 | 1.8 | 1.5 | 1.6 | 2.2 | 17.9 | 2.1 | 1.4 | 14 | 1.2 | 0.9 | 1.5 | 3 |
| Ge | µg/g | 1.5 | 15 | | <0.1 | <0.1 | <0.1 | | <0.1 | <0.1 | <0.1 | <0.1 | | <0.1 | <0.1 | <0.1 | <0.1 | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | | <0.1 | <0.1 | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Hf | µg/g | 3 | 30 | 0.32 | <0.05 | <0.05 | <0.05 | 0.53 | 0.15 | 0.12 | <0.05 | 0.06 | 0.38 | 0.07 | <0.05 | 0.07 | 0.14 | 0.48 | 0.05 | 0.08 | 0.06 | 0.06 | 0.08 | 0.83 | 0.07 | <0.05 | 0.61 | 0.08 | 0.11 | 0.08 | 0.11 | 0.11 | 0.15 | 0.08 | 0.13 | 0.5 | 0.06 | <0.05 | 0.51 | <0.05 | <0.05 | <0.05 | <0.05 |
| Hg | µg/g | 85 | 850 | | 0.03 | 0.21 | 0.21 | | 0.07 | 0.12 | 0.06 | 0.06 | | 0.09 | 0.06 | 0.03 | 0.06 | | 0.27 | 0.11 | 0.19 | 0.09 | 0.06 | | 0.17 | 0.07 | | 0.14 | 0.27 | 0.11 | 0.39 | 0.15 | 0.14 | 0.16 | 0.2 | | 0.29 | 0.12 | | 0.1 | 0.06 | 0.09 | 0.17 |
| In | µg/g | 0.25 | 2.5 | 0.06 | 0.04 | 0.46 | 0.45 | 0.05 | 0.03 | 0.16 | 0.04 | 0.1 | 0.2 | 0.15 | 0.1 | 0.09 | 0.19 | 0.14 | 0.11 | 0.41 | 0.48 | 0.06 | 0.04 | 0.1 | 0.08 | 0.06 | 0.28 | 0.23 | 0.1 | 0.09 | 0.11 | 0.14 | 0.07 | 0.07 | 0.08 | 0.18 | 0.15 | 0.05 | 0.09 | 0.08 | 0.03 | 0.11 | 0.3 |
| K | % | 2.085 | 20.85 | 1.76 | 0.11 | 0.25 | 0.27 | 1.7 | 0.11 | 0.18 | 0.11 | 0.16 | 2.2 | 0.2 | 0.18 | 0.14 | 0.17 | 2.3 | 0.15 | 0.19 | 0.23 | 0.13 | 0.15 | 2.04 | 0.13 | 0.14 | 2.47 | 0.18 | 0.17 | 0.19 | 0.17 | 0.19 | 0.18 | 0.15 | 0.16 | 2.31 | 0.15 | 0.13 | 2.12 | 0.2 | 0.14 | 0.29 | 0.2 |
| La | µg/g | 39 | 390 | 13.6 | 11.2 | 9.1 | 8.8 | 12.8 | 12.3 | 13.2 | 9.5 | 9.8 | 12.7 | 9.4 | 9 | 7.2 | 17.4 | 15.2 | 12.6 | 11.2 | 9.4 | 13.8 | 14.8 | 16.3 | 13.1 | 7.1 | 14.9 | 10.1 | 17.5 | 15.8 | 19.1 | 15.3 | 16.6 | 11.8 | 11 | 14.8 | 12.3 | 7.3 | 7.7 | 5.8 | 6.8 | 4.8 | 7.1 |
| Lu | µg/g | ND | ND | 0.17 | 0.13 | 0.05 | 0.05 | 0.2 | 0.17 | 0.12 | 0.1 | 0.17 | 0.26 | 0.16 | 0.17 | 0.16 | 0.17 | 0.25 | 0.22 | 0.17 | 0.17 | 0.19 | 0.15 | 0.25 | 0.2 | 0.12 | 0.23 | 0.16 | 0.13 | 0.25 | 0.18 | 0.16 | 0.17 | 0.16 | 0.15 | 0.24 | 0.21 | 0.16 | 0.17 | 0.14 | 0.11 | 0.1 | 0.18 |
| Li | µg/g | ND | ND | 32 | 2 | 4 | 3 | 23 | 2 | 6 | 6 | 7 | 18 | 6 | 7 | 9 | 3 | 28 | 3 | 2 | 2 | 2 | 3 | 39 | 3 | 3 | 23 | 5 | 2 | 3 | 3 | 3 | 2 | 3 | 4 | 30 | 4 | 2 | 28 | 2 | 2 | 2 | 8 |
| Mg | % | 2.33 | 23.3 | 0.15 | 0.07 | 0.22 | 0.11 | 0.17 | 0.09 | 0.4 | 0.35 | 0.59 | 0.75 | 0.58 | 0.39 | 0.7 | 0.27 | 0.47 | 0.38 | 0.59 | 0.17 | 0.06 | 0.08 | 0.28 | 0.13 | 0.05 | 0.51 | 0.35 | 0.11 | 0.14 | 0.08 | 0.18 | 0.28 | 0.28 | 0.34 | 0.35 | 0.25 | 0.17 | 0.39 | 0.25 | 0.05 | 0.31 | 0.25 |
| Mn | µg/g | 950 | 9500 | 442 | 447 | 464 | 714 | 381 | 394 | 1070 | 625 | 1550 | 1720 | 1570 | 1700 | 1330 | 2310 | 1970 | 2080 | 1990 | 1530 | 1840 | 1650 | 2140 | 2170 | 1130 | 2600 | 2540 | 3340 | 3070 | 1580 | 2120 | 2680 | 2010 | 1940 | 2080 | 2200 | 1810 | 6070 | 6180 | 1950 | 2530 | 2270 |
| Mo | µg/g | 1.2 | 12 | 1.59 | 1.14 | 3.59 | 1.79 | 1.85 | 1.43 | 4.04 | 1.38 | 1.08 | 4.15 | 3.38 | 1.24 | 1.24 | 3.35 | 1.11 | 0.86 | 1.3 | 2.37 | 3.32 | 4.31 | 3.57 | 2.7 | 2.5 | 3.75 | 2.89 | 3.47 | 2.41 | 1.62 | 1.61 | 3.43 | 3.56 | 1.36 | 3.42 | 2.66 | 2.59 | 4.99 | 4.22 | 3.5 | 2.98 | 2.4 |
| Na | % | 2.355 | 23.55 | 0.3 | 0.01 | 0.03 | 0.02 | 1.06 | 0.02 | 0.03 | 0.04 | 0.03 | 1.79 | 0.03 | 0.03 | 0.04 | 0.02 | 0.41 | 0.01 | <0.01 | 0.01 | 0.01 | 0.01 | 0.2 | 0.01 | <0.01 | 0.67 | 0.02 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | <0.01 | 0.02 | 0.31 | 0.01 | <0.01 | 0.03 | <0.01 | <0.01 | <0.01 | 0.01 |
| Nb | µg/g | 20 | 200 | 7 | <0.05 | 0.54 | 0.28 | 6.6 | 0.62 | 0.53 | 0.96 | 0.12 | 6.5 | 0.15 | 0.09 | 0.15 | <0.05 | 6.2 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 7.8 | <0.05 | <0.05 | 6.4 | <0.05 | 0.06 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.08 | 6.5 | <0.05 | <0.05 | 3 | <0.05 | <0.05 | <0.05 | <0.05 |
| Ni | µg/g | 84 | 840 | 4 | 3.8 | 6.4 | 5 | 5.9 | 6.1 | 9.2 | 8.3 | 5.4 | 7.8 | 7.4 | 5.5 | 4.9 | 6.6 | 4.5 | 4.2 | 3.1 | 3.4 | 7.2 | 6.7 | 6.3 | 5.9 | 6.2 | 6.4 | 6.5 | 7.5 | 9.6 | 5.9 | 4.8 | 6.2 | 5.2 | 4.5 | 4.9 | 5.1 | 9.3 | 10.5 | 9.9 | 8.1 | 8.8 | 10.9 |
| P | µg/g | 0.105 | 1.05 | 0.053 | 0.05 | 0.043 | 0.047 | 0.06 | 0.06 | 0.061 | 0.075 | 0.095 | 0.094 | 0.088 | 0.075 | 0.106 | 0.084 | 0.113 | 0.108 | 0.085 | 0.128 | 0.092 | 0.082 | 0.103 | 0.096 | 0.063 | 0.098 | 0.092 | 0.068 | 0.118 | 0.096 | 0.086 | 0.097 | 0.079 | 0.084 | 0.105 | 0.102 | 0.047 | 0.041 | 0.035 | 0.035 | 0.04 | 0.064 |
| Pb | µg/g | 14 | 140 | 17.6 | 14.5 | **495** | **561** | 17.4 | 14.6 | 266 | 67.5 | **298** | **1040** | **1030** | **157** | 53.4 | **189** | **205** | **198** | **231** | **915** | 14 | 49.2 | 92.5 | 88 | 94.9 | **461** | **448** | **297** | **155** | **157** | **330** | 132 | **173** | **274** | **155** | **160** | **226** | **512** | **490** | 88.3 | **520** | **342** |
| Rb | µg/g | 90 | 900 | 61 | 5.9 | 15.8 | 16.7 | 51.6 | 5.1 | 11.3 | 9.4 | 10.6 | 79.2 | 12.8 | 11.6 | 9 | 10.3 | 92.1 | 13.1 | 11.5 | 17.9 | 8.5 | 8.8 | 85.3 | 8.5 | 7.7 | 116 | 13 | 11 | 14.9 | 12.4 | 13.3 | 13.1 | 11.9 | 11.9 | 93.9 | 11.1 | 8.8 | 93.9 | 11.1 | 8.2 | 17.3 | 12.9 |
| S | µg/g | 0.035 | 0.35 | <0.01 | <0.01 | 0.4 | 0.44 | 0.01 | 0.01 | 0.21 | 0.06 | 0.15 | 0.18 | 0.22 | 0.22 | 0.21 | 0.47 | 0.29 | 0.33 | 0.54 | 0.39 | <0.01 | 0.05 | 0.15 | 0.18 | 0.02 | 0.39 | 0.48 | 0.26 | 0.17 | 0.1 | 0.17 | 0.42 | 0.35 | 0.42 | 0.24 | 0.3 | 0.15 | 0.17 | 0.14 | 0.02 | 0.42 | 0.17 |
| Sb | µg/g | 0.2 | 2 | **16.4** | **2.24** | **86.3** | **106** | 11.8 | 1.98 | **60.7** | **17.5** | **38.6** | **98.6** | **66.5** | **30** | **15.9** | **7.74** | **25.7** | **10.1** | **10.7** | **70.5** | **4.69** | **4.01** | **21.5** | **7.41** | **12.6** | **78.9** | **46.8** | **16.8** | **13.7** | **8.71** | **14.3** | **12.8** | **10.2** | **99.2** | **55.1** | **30.2** | **11.9** | **42.8** | **18.9** | **6.33** | **45.9** | **51** |
| Sc | µg/g | 22 | 220 | 6 | 2.9 | 2.8 | 2.4 | 6 | 3.7 | 4.2 | 3.6 | 4.8 | 9.6 | 5 | 4.1 | 5.6 | 4.2 | 10.3 | 7 | 3.6 | 5 | 7.4 | 3.8 | 10 | 6.9 | 3.6 | 11 | 5.2 | 3.4 | 7.3 | 4.9 | 4.4 | 4.7 | 4.8 | 4.6 | 10 | 6.5 | 6.7 | 10.2 | 4.4 | 2.9 | 4.4 | 9 |
| Se | µg/g | 0.05 | 0.5 | <2 | <1 | <1 | <1 | <2 | <1 | <1 | <1 | <1 | <2 | <1 | <1 | <1 | <1 | <2 | <1 | <1 | <1 | <1 | <1 | <2 | <1 | <1 | <2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <2 | <1 | <1 | <2 | <1 | <1 | <1 | <1 |
| Sn | µg/g | 2.3 | 23 | 1.1 | <0.3 | 0.8 | 1 | 1.1 | <0.3 | 0.6 | 0.3 | 0.3 | 1.3 | 0.4 | <0.3 | 0.4 | <0.3 | 1.3 | <0.3 | <0.3 | 0.4 | <0.3 | <0.3 | 1.4 | <0.3 | <0.3 | 1.8 | 0.5 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | 0.4 | 1.2 | <0.3 | <0.3 | 1.2 | <0.3 | <0.3 | <0.3 | <0.3 |
| Sr | µg/g | 370 | 3700 | 112 | 8.5 | 42.9 | 35.6 | 158 | 14.7 | 37.7 | 23.9 | 24.7 | 414 | 24.3 | 25.6 | 28.3 | 53.1 | 195 | 48.5 | 51.2 | 75.6 | 13.4 | 13.9 | 95 | 22.5 | 24.2 | 197 | 29.2 | 29.8 | 31.4 | 25.1 | 41.3 | 48.8 | 37.6 | 46.5 | 141 | 27.8 | 26.8 | 89.3 | 64.9 | 18.5 | 61.3 | 59.2 |
| Ta | µg/g | 2 | 20 | 0.52 | <0.05 | <0.05 | <0.05 | 1.35 | 0.58 | 0.14 | <0.05 | <0.05 | 0.39 | <0.05 | <0.05 | <0.05 | <0.05 | 0.34 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.48 | <0.05 | <0.05 | 0.33 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.4 | <0.05 | <0.05 | 0.16 | <0.05 | <0.05 | <0.05 | <0.05 |
| Tb | µg/g | ND | ND | 0.31 | 0.28 | 0.17 | 0.17 | 0.38 | 0.35 | 0.28 | 0.24 | 0.35 | 0.47 | 0.32 | 0.33 | 0.32 | 0.45 | 0.5 | 0.47 | 0.37 | 0.36 | 0.46 | 0.35 | 0.5 | 0.45 | 0.27 | 0.45 | 0.33 | 0.35 | 0.54 | 0.41 | 0.41 | 0.43 | 0.37 | 0.33 | 0.47 | 0.4 | 0.27 | 0.3 | 0.25 | 0.2 | 0.2 | 0.33 |
| Te | µg/g | ND | ND | <0.05 | <0.05 | 0.3 | 0.42 | 0.1 | 0.09 | 0.18 | 0.06 | 0.12 | 0.2 | 0.2 | 0.14 | 0.14 | 0.07 | <0.05 | <0.05 | 0.08 | 0.08 | <0.05 | <0.05 | 0.05 | <0.05 | 0.3 | 0.09 | 0.11 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.07 | 0.06 | <0.05 | 0.11 | 0.09 | <0.05 | 0.08 | 0.08 |
| Th | µg/g | 9.6 | 96 | 3.4 | 2.7 | 2.2 | 1.8 | 3.3 | 2.7 | 4.1 | 1.8 | 2 | 2.7 | 2 | 2 | 1.7 | 4 | 2.7 | 2.1 | 2.7 | 2 | 3.1 | 3.1 | 4.2 | 2.7 | 1.4 | 3.7 | 2.3 | 5.2 | 2.9 | 4.4 | 3.3 | 4.1 | 3.1 | 2.7 | 3.1 | 2.6 | 1.8 | 1.9 | 1.2 | 1.5 | 1.1 | 1.6 |
| Ti | % | 0.565 | 5.65 | 0.14 | <0.01 | 0.03 | 0.01 | 0.12 | <0.01 | 0.03 | 0.05 | 0.03 | 0.22 | 0.03 | 0.01 | 0.05 | <0.01 | 0.26 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.23 | <0.01 | <0.01 | 0.25 | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.24 | <0.01 | <0.01 | 0.15 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tl | µg/g | 0.85 | 8.5 | 1 | 0.16 | 0.8 | 1.13 | 0.62 | 0.09 | 0.49 | 0.18 | 0.26 | 1.3 | 0.37 | 0.37 | 0.19 | 0.26 | 1.71 | 0.48 | 0.41 | 0.78 | 0.6 | 0.47 | 2.06 | 0.55 | 0.42 | 2.69 | 0.81 | 1.19 | 1.19 | 0.52 | 0.86 | 1.01 | 0.92 | 0.86 | 2.11 | 0.85 | 0.58 | 2.34 | 0.86 | 0.36 | 1.11 | 1.25 |
| U | µg/g | 2.7 | 27 | 0.89 | 0.38 | 0.53 | 0.57 | 0.78 | 0.32 | 0.75 | 0.55 | 0.49 | 1.01 | 0.46 | 0.57 | 0.44 | 1.36 | 1.23 | 0.63 | 0.7 | 0.66 | 0.63 | 0.63 | 1.58 | 0.63 | 0.68 | 1.2 | 0.49 | 0.89 | 0.65 | 0.81 | 0.71 | 0.85 | 0.61 | 0.71 | 1.29 | 0.67 | 0.52 | 1.1 | 0.57 | 0.38 | 0.41 | 0.65 |
| V | µg/g | 120 | 1200 | 45 | 17 | 28 | 21 | 48 | 20 | 33 | 36 | 42 | 76 | 43 | 32 | 51 | 25 | 83 | 42 | 22 | 39 | 39 | 23 | 87 | 41 | 19 | 85 | 33 | 15 | 41 | 27 | 22 | 23 | 26 | 28 | 82 | 39 | 27 | 66 | 18 | 12 | 20 | 40 |
| W | µg/g | 1.25 | 12.5 | 0.9 | 0.2 | 0.1 | 0.1 | 2 | 0.5 | 0.3 | 0.1 | 0.2 | 1.6 | 0.3 | 0.2 | 0.3 | 0.2 | 5.5 | 0.3 | <0.1 | 0.5 | 0.1 | 0.1 | 5.3 | 0.2 | <0.1 | 2.6 | 0.2 | 0.2 | 0.4 | 0.2 | 0.2 | 0.4 | 0.2 | 0.2 | 5.1 | 0.4 | 0.1 | 2.6 | 0.1 | 0.1 | 0.1 | 0.1 |
| Zn | µg/g | 70 | 700 | 126 | 131 | 353 | 430 | 52 | 48 | 505 | 177 | 795 | 636 | 685 | **895** | 591 | **1800** | **1040** | **1080** | **1550** | **1650** | 177 | 296 | **878** | **879** | **1390** | **975** | **966** | 686 | **808** | **823** | **941** | **898** | 556 | 524 | **832** | **819** | 420 | **1760** | **1760** | 389 | **870** | **1320** |
| Zr | µg/g | 165 | 1650 | 8.8 | 1.1 | 1.4 | 0.6 | 6.9 | 1.1 | 3.6 | 0.7 | 1.7 | 11.9 | 1.8 | 1.8 | 1.9 | 8 | 12.2 | 2.2 | 4.3 | 3.2 | 3 | 4.7 | 25.8 | 3.4 | 1.4 | 19.8 | 3.2 | 8.7 | 4.6 | 7.1 | 6.5 | 8.1 | 4.4 | 4.9 | 14.1 | 2.6 | 2.7 | 21.2 | 2.6 | 2.3 | 2.2 | 2.3 |
| Y | µg/g | 33 | 330 | 9.2 | 7.15 | 3.63 | 3.75 | 10.5 | 8.58 | 6.64 | 6.24 | 9.94 | 15.5 | 9.5 | 9.05 | 9.26 | 11.3 | 15 | 13 | 10.4 | 10.2 | 11.6 | 9.42 | 14.8 | 12.1 | 6.37 | 13.4 | 9.09 | 9.79 | 14.8 | 11.4 | 10.1 | 10.6 | 9.98 | 10.1 | 13.6 | 12.2 | 8.55 | 9.8 | 8.32 | 6.1 | 6.38 | 9.78 |
| Yb | µg/g | 3.2 | 32 | 0.9 | 0.8 | 0.4 | 0.3 | 1.1 | 1 | 0.7 | 0.6 | 1 | 1.5 | 1 | 1 | 1 | 1.1 | 1.5 | 1.3 | 1 | 1 | 1.2 | 0.9 | 1.5 | 1.3 | 0.8 | 1.4 | 1 | 0.7 | 1.5 | 1 | 1 | 1 | 1 | 0.9 | 1.4 | 1.2 | 0.9 | 1 | 0.8 | 0.6 | 0.6 | 1 |

**Note:**

Bold exceeds 10 times average crustal abundance values

Bold and italic exceeds CSR values

Bold, italic, and underscore exceeds 10 times average crustal abundance and CSR.

ND= No data

Aqua regia digestion method was used on all samples

* Strong acid digestion method was used on this sample

**Price (1997)

## Table D2-8 : Metal Testing Results of Native Soil of Tailings Pond Samples

| Parameter | Unit | Comparison Guidelines | | | TP-T-13-01 | TP-T-13-02 | TP-T-13-02 | TP-T-13-02 | TP-T-13-04 | TP-T-13-04 | TP-T-13-06 | TP-T-13-06 | TP-T-13-06 | TP-T-13-06 | BH-T-13-01 | BH-T-13-01 | BH-T-13-01 | BH-T-13-01 | BH-T-13-01 | BH-T-13-01 | BH-T-13-02 | BH-T-13-02 | BH-T-13-02 | BH-T-13-02 | BH-T-13-02 | BH-T-13-03 | BH-T-13-03 | BH-T-13-03 | BH-T-13-03 | BH-T-13-03 | BH-T-13-04 | BH-T-13-04 | BH-T-13-04 | BH-T-13-04 | BH-T-13-04 | BH-T-13-04 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Average Concentration (Continental Crustal)** | Ten Times Average Concentration (Crustal) | Yukon Contaminated Site Regulation O.I.C. 2002/171 | ARD-01 | ARD-01 | ARD-02 | ARD-03 | ARD-01 | ARD-02 | ARD-01 | ARD-02 | ARD-02* | ARD-03 | ARD-01 | ARD-01 | ARD-02 | ARD-03 | ARD-05 | ARD-07 | ARD-08 | ARD-01 | ARD-01* | ARD-02 | ARD-04 | ARD-06 | ARD-07 | ARD-01 | ARD-02 | ARD-02* | ARD-04 | ARD-06 | ARD-08 | ARD-01 | ARD-02 | ARD-02* | ARD-04 | ARD-06 | ARD-08 |
| | | | | | Sample Interval (m) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | 2.1 - 2.2 | 2.6 - 2.7 | 4.0 - 4.1 | 4.7 - 4.8 | 3.4 - 3.5 | 5.0 - 5.1 | 2.1 - 2.2 | 3.0 - 3.1 | 3.0 - 3.1 | 4.0 - 4.1 | 1.1 - 1.2 | 3.5 - 3.6 | 5.1 - 5.2 | 8.1 - 8.2 | 11.1 - 11.2 | 13.1 - 13.2 | 2.1 - 2.2 | 2.1 - 2.2 | 3.5 - 3.6 | 6.5 - 6.6 | 9.5 - 9.6 | 11.1 - 11.2 | 4.8 - 4.9 | 6.5 - 6.6 | 6.5 - 6.6 | 9.1 - 9.2 | 12.1 - 12.2 | 15.1 - 15.2 | 5.4 - 5.5 | 7.0 - 7.1 | 7.0 - 7.1 | 10.6 - 10.7 | 13.6 - 13.7 | 17.1 - 17.2 |
| Cyanide, Weak Acid Diss. | µg/g | N/A | N/A | N/A | | < 0.001 | < 0.001 | | < 0.001 | < 0.001 | < 0.001 | < 0.001 | | | < 0.001 | < 0.001 | < 0.001 | | | | < 10 | | < 10 | | | | < 10 | < 10 | | | | 30 | 20 | | | | |
| Cyanide, Total | µg/g | N/A | N/A | 50 | | < 0.001 | < 0.001 | | < 0.001 | < 0.001 | < 0.001 | < 0.001 | | | < 0.001 | < 0.001 | < 0.001 | | | | <10 | | <10 | | | | <10 | <10 | | | | <10 | <10 | | | | |
| Ag | µg/g | 75 | 750 | 20 | 0.18 | <0.02 | <0.02 | <0.02 | 6.51 | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 | <0.02 | <0.02 | <0.02 | 1.31 | <0.02 | <0.02 | <0.02 | 0.16 | 0.36 | <0.02 | 0.28 | <0.02 | 1.67 | <0.02 | 0.07 | 0.06 | 0.68 | <0.02 | ***48.7*** | ***40.9*** | ***41.8*** | <0.02 | <0.02 | <0.02 |
| Al | % | 8.23 | 82.3 | N/A | 7.12 | 6.77 | 6.52 | 6.75 | 7.77 | 6.55 | 6.42 | 6.27 | 0.78 | 6.01 | 6.36 | 6.37 | 6.04 | 7.11 | 6.46 | 5.96 | 6.49 | 0.81 | 6.96 | 6.37 | 6.23 | 6.36 | 6.83 | 6.31 | 0.54 | 6.31 | 6.61 | 6.41 | 3.46 | 3.95 | 0.4 | 6.32 | 6.06 | 6.36 |
| As | µg/g | 1.8 | 18 | 20 | ***233*** | ***26*** | ***21*** | ***94*** | ***617*** | ***59*** | 5 | 7 | 4 | 5 | ***21*** | 6 | 11 | 11 | 8 | 6 | 16 | 14 | ***36*** | 15 | ***50*** | ***23*** | ***129*** | 9 | 7 | ***28*** | ***43*** | ***22*** | ***3150*** | ***3790*** | ***3720*** | ***21*** | 5 | 7 |
| Ba | µg/g | 425 | 4250 | 500 | ***1430*** | ***979*** | ***967*** | ***1250*** | ***625*** | ***1090*** | ***889*** | ***811*** | 91 | ***981*** | ***911*** | ***917*** | ***1030*** | ***746*** | ***917*** | ***1050*** | ***981*** | 84 | ***939*** | ***730*** | ***900*** | ***1780*** | ***1130*** | ***1120*** | 97 | ***1130*** | ***1120*** | ***781*** | ***660*** | ***666*** | 150 | ***1010*** | ***1100*** | ***973*** |
| Be | µg/g | 3 | 30 | 4 | 1.5 | 1.2 | 1.2 | 1.2 | 1.1 | 1.3 | 1.3 | 1.3 | 0.2 | 1.1 | 1.3 | 1.3 | 1.2 | 1.2 | 1.2 | 1.1 | 1.2 | 0.2 | 1.3 | 1.2 | 1.1 | 1.2 | 1.3 | 1.3 | 0.2 | 1.3 | 1.2 | 1.2 | 0.7 | 0.7 | 0.2 | 1.3 | 1.3 | 1.3 |
| Bi | µg/g | 0.0085 | 0.085 | N/A | **0.44** | **0.1** | **0.16** | **0.16** | **2.19** | **0.15** | 0.09 | 0.14 | 0.06 | 0.07 | 0.16 | 0.09 | 0.11 | 0.24 | 0.09 | 0.08 | 0.19 | 0.15 | 0.4 | 0.15 | 0.41 | 0.32 | 0.11 | 0.13 | 0.18 | 0.19 | 0.19 | 0.17 | 23.5 | 26.2 | 24.2 | 0.17 | 0.08 | 0.09 |
| Ca | % | 4.15 | 41.5 | N/A | 0.96 | 1.94 | 1.86 | 1.59 | 3.45 | 1.51 | 3.09 | 3.55 | 1.74 | 2.18 | 3.02 | 3.08 | 2.23 | 3.53 | 2.25 | 1.78 | 1.99 | 0.38 | 2.19 | 3.6 | 3.04 | 1.01 | 1.38 | 1.73 | 0.29 | 1.72 | 1.66 | 3.31 | 1.57 | 0.9 | 0.83 | 2.16 | 1.6 | 2.2 |
| Cd | µg/g | 0.15 | 1.5 | 2 | 1.43 | 0.15 | 0.23 | 0.32 | 1.2 | 0.42 | 0.12 | 0.14 | 0.11 | 0.11 | 0.18 | 0.13 | 0.15 | 0.48 | 0.19 | 0.13 | 0.25 | 0.21 | 0.43 | 0.3 | 0.52 | 0.32 | 0.35 | 0.15 | 0.11 | 0.23 | 0.23 | 0.3 | ***21.6*** | ***15.8*** | ***15.8*** | 0.17 | 0.09 | 0.13 |
| Ce | µg/g | 66.5 | 665 | N/A | 40.2 | 43.4 | 32.2 | 33.8 | 35.6 | 42 | 39.9 | 41.3 | 21.5 | 45.7 | 41.6 | 43 | 28.4 | 42.2 | 41.6 | 31.4 | 34.4 | 17.7 | 40.5 | 44.1 | 34.9 | 37.9 | 36.4 | 29.9 | 19.4 | 32.6 | 32.9 | 36.5 | 23.5 | 22.5 | 11.5 | 32.4 | 31.9 | 43.2 |
| Co | µg/g | 25 | 250 | 50 | 9.6 | 6 | 5.7 | 7.5 | 11.9 | 5.8 | 7.7 | 8.8 | 5.1 | 6 | 7.7 | 7.4 | 5.2 | 10.2 | 9.1 | 5.6 | 7.3 | 4.7 | 7.2 | 12.6 | 8.3 | 7 | 6.7 | 4.7 | 3.1 | 4.8 | 4.9 | 11.6 | 3.3 | 5.4 | 3.5 | 6 | 5.1 | 6.7 |
| Cr | µg/g | 102 | 1020 | N/A | 197 | 127 | 95 | 160 | 59 | 106 | 119 | 108 | 100 | 116 | 96 | 123 | 86 | 115 | 136 | 128 | 184 | 162 | 97 | 93 | 84 | 139 | 130 | 102 | 90 | 113 | 116 | 97 | 55 | 71 | 60 | 100 | 95 | 114 |
| Cs | µg/g | ND | ND | N/A | 5 | 2 | 2 | 3 | 2 | 3 | 1 | 1 | 0.49 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 0.53 | 1 | 2 | 1 | 4 | 3 | 1 | 0.46 | 1 | 2 | 2 | 7 | 8 | 2.49 | 1 | 1 | 1 |
| Cu | µg/g | 60 | 600 | 150 | 35.9 | 5 | 9 | 48.9 | 44.3 | 16 | 7 | 9.3 | 7.3 | 7.3 | 10.1 | 6 | 7.2 | 39 | 14.1 | 7.8 | 15.5 | 14.2 | 22.3 | 19.9 | 16.8 | 26.4 | 35.6 | 13.4 | 15.1 | 8.8 | 8.8 | 23.1 | ***366*** | ***226*** | ***232*** | 13.2 | 6.2 | 14.5 |
| Fe | % | 5.63 | 56.3 | N/A | 2.9 | 1.63 | 1.49 | 2.67 | 2.73 | 1.84 | 2.08 | 2.3 | 1.64 | 1.75 | 2.25 | 2.17 | 1.37 | 2.47 | 2.16 | 1.38 | 1.8 | 1.35 | 2.11 | 2.86 | 2.08 | 2.3 | 2.11 | 1.39 | 1.05 | 1.47 | 1.67 | 2.5 | 3.78 | 4.19 | 4.22 | 1.75 | 1.26 | 1.86 |
| Ga | µg/g | 19 | 190 | N/A | 16.6 | 14.4 | 13.7 | 16 | 19.5 | 14.7 | 14.2 | 14.6 | 2.9 | 13.3 | 14.3 | 14.1 | 12.7 | 15.3 | 14.1 | 12.7 | 14.3 | 2.8 | 14.1 | 14.6 | 13.8 | 15.2 | 15.2 | 13.1 | 2 | 13.3 | 13.4 | 14.2 | 9.3 | 10.3 | 1.6 | 13.6 | 12.9 | 13.9 |
| Hf | µg/g | 3 | 30 | N/A | 0.63 | 0.89 | 0.69 | 0.78 | 2.22 | 0.7 | 0.86 | 0.96 | 0.24 | 0.75 | 0.89 | 0.87 | 0.77 | 1.03 | 0.96 | 0.61 | 0.9 | 0.08 | 0.86 | 1.11 | 0.89 | 0.99 | 0.71 | 0.58 | 0.12 | 0.59 | 0.62 | 0.98 | 0.81 | 0.86 | 0.08 | 0.7 | 0.76 | 0.85 |
| Hg | µg/g | 85 | 850 | 15 | | | | | | | | | 0.04 | | | | | | | | | 0.01 | | | | | | | <0.01 | | | | | 0.27 | | | |
| In | µg/g | 0.25 | 2.5 | N/A | 0.06 | 0.03 | 0.03 | 0.05 | 0.07 | 0.04 | 0.03 | 0.04 | <0.02 | 0.03 | 0.03 | 0.03 | 0.02 | 0.13 | 0.03 | 0.02 | 0.03 | <0.02 | 0.04 | 0.05 | 0.04 | 0.05 | 0.03 | 0.02 | <0.02 | 0.02 | 0.03 | 0.04 | 0.73 | 0.6 | 0.53 | 0.03 | 0.02 | 0.03 |
| K | % | 2.085 | 20.85 | N/A | 1.93 | 1.55 | 1.57 | 1.83 | 1.41 | 1.72 | 1.47 | 1.36 | 0.1 | 1.52 | 1.47 | 1.47 | 1.61 | 1.32 | 1.51 | 1.65 | 1.56 | 0.1 | 1.59 | 1.25 | 1.43 | 1.84 | 1.79 | 1.63 | 0.09 | 1.55 | 1.66 | 1.29 | 1.3 | 1.53 | 0.26 | 1.56 | 1.68 | 1.54 |
| La | µg/g | 39 | 390 | N/A | 21.2 | 23.3 | 16.2 | 16.9 | 17.8 | 22.7 | 21.3 | 21.6 | 10.7 | 25.1 | 22 | 22.7 | 14.9 | 22.1 | 22 | 16.9 | 17.8 | 8.8 | 21.7 | 23.1 | 18.3 | 21.7 | 19 | 15.5 | 9.9 | 17.6 | 18 | 18.7 | 12.8 | 12 | 5.8 | 17 | 17 | 23.3 |
| Lu | µg/g | ND | ND | N/A | 0.2 | 0.21 | 0.17 | 0.27 | 0.15 | 0.2 | 0.22 | 0.25 | 0.1 | 0.21 | 0.24 | 0.23 | 0.16 | 0.25 | 0.23 | 0.17 | 0.18 | 0.06 | 0.2 | 0.27 | 0.21 | 0.19 | 0.19 | 0.18 | 0.06 | 0.16 | 0.18 | 0.24 | 0.1 | 0.11 | 0.05 | 0.17 | 0.16 | 0.22 |
| Li | µg/g | ND | ND | N/A | 19 | 12 | 11 | 14 | 14 | 11 | 11 | 11 | 6 | 10 | 10 | 10 | 10 | 13 | 13 | 10 | 11 | 4 | 11 | 15 | 12 | 20 | 14 | 9 | 4 | 9 | 9 | 14 | 27 | 29 | 2 | 10 | 9 | 10 |
| Mg | % | 2.33 | 23.3 | N/A | 0.74 | 0.61 | 0.56 | 0.68 | 1.08 | 0.45 | 0.8 | 0.92 | 0.44 | 0.53 | 0.79 | 0.78 | 0.47 | 1 | 0.74 | 0.44 | 0.61 | 0.28 | 0.72 | 1.17 | 0.82 | 0.46 | 0.55 | 0.42 | 0.23 | 0.4 | 0.4 | 1 | 0.2 | 0.19 | 0.1 | 0.57 | 0.37 | 0.61 |
| Mn | µg/g | 950 | 9500 | N/A | 637 | 388 | 311 | 445 | 439 | 400 | 457 | 506 | 219 | 392 | 488 | 471 | 296 | 568 | 446 | 308 | 353 | 159 | 422 | 644 | 479 | 400 | 323 | 298 | 138 | 306 | 334 | 613 | 1190 | 1180 | 1110 | 352 | 255 | 429 |
| Mo | µg/g | 1.2 | 12 | 10 | 7.31 | 4.43 | 1.62 | 6.01 | 2.42 | 2.16 | 4.57 | 3.48 | 2.48 | 4.58 | 1.57 | 4.51 | 1.91 | 3.32 | 3.88 | 5.03 | 3.43 | 2.47 | 1.75 | 1.6 | 1.96 | 6.33 | 4.96 | 1.9 | 1.4 | 5.14 | 4.69 | 1.57 | 3.36 | 4.73 | 4.52 | 2.01 | 4.46 | 5.6 |
| Na | % | 2.355 | 23.55 | N/A | 1.3 | 2.12 | 2 | 2.03 | 2.31 | 1.9 | 2.16 | 2.1 | 0.06 | 2.1 | 2.2 | 2.28 | 2.14 | 2.2 | 2.02 | 2.05 | 2.2 | 0.07 | 2.22 | 1.93 | 2.04 | 1.35 | 1.7 | 2.16 | 0.05 | 2.19 | 2.1 | 1.98 | 0.18 | 0.15 | 0.02 | 2.08 | 2.14 | 2.12 |
| Nb | µg/g | 20 | 200 | N/A | 7.3 | 9.2 | 6.2 | 7.2 | 4.9 | 6.4 | 8.4 | 9.6 | 1.82 | 7.9 | 8.9 | 8.7 | 5.6 | 9.7 | 8.1 | 5.5 | 6.7 | 1.42 | 7.7 | 9.8 | 7.9 | 6.9 | 6.7 | 5.9 | 0.53 | 5.3 | 5.7 | 7.6 | 4.8 | 4.8 | 0.07 | 6.7 | 5.6 | 8.3 |
| Ni | µg/g | 84 | 840 | 100 | 31.2 | 10.2 | 9.6 | 18.8 | 10.4 | 10 | 12.7 | 13.8 | 10.3 | 10 | 11.9 | 12.2 | 8.8 | 17 | 16.3 | 9.6 | 11.8 | 9.5 | 11.8 | 21.5 | 13.4 | 16 | 14.8 | 8 | 6.7 | 8.4 | 8.7 | 19.5 | 6.6 | 3.7 | 3.6 | 10.9 | 7.6 | 10.7 |
| P | µg/g | 0.105 | 1.05 | N/A | 0.066 | 0.052 | 0.045 | 0.064 | 0.064 | 0.048 | 0.05 | 0.058 | 0.056 | 0.041 | 0.051 | 0.051 | 0.036 | 0.07 | 0.071 | 0.041 | 0.04 | 0.037 | 0.049 | 0.078 | 0.05 | 0.055 | 0.045 | 0.034 | 0.028 | 0.032 | 0.033 | 0.08 | 0.043 | 0.048 | 0.041 | 0.041 | 0.031 | 0.052 |
| Pb | µg/g | 14 | 140 | 250 | 56.2 | 14.1 | 17.6 | 25.2 | 123 | 21 | 10.5 | 10.4 | 3.3 | 10.9 | 17.1 | 11.4 | 13.2 | 13.6 | 11.5 | 11.4 | 18.2 | 10.5 | 28.6 | 13.4 | 32.3 | 22.2 | 20.3 | 14.1 | 6.7 | 23.6 | 29.2 | 14.6 | ***1960*** | ***1820*** | ***1720*** | 20.3 | 11.5 | 11.8 |
| Rb | µg/g | 90 | 900 | N/A | 66.8 | 48.4 | 49 | 58.5 | 36.2 | 57.6 | 43.8 | 42.5 | 5.9 | 46.6 | 43.5 | 43.7 | 48.1 | 42.8 | 49.3 | 50.2 | 46.3 | 5.9 | 46.3 | 42.9 | 44.5 | 63.8 | 60.8 | 47.9 | 5.3 | 49.2 | 51 | 44.8 | 75.3 | 79.6 | 15.6 | 46.5 | 51.1 | 45.9 |
| S | µg/g | 0.035 | 0.35 | N/A | 0.04 | 0.03 | 0.1 | 0.03 | 0.23 | 0.01 | <0.01 | <0.01 | <0.01 | 0.01 | 0.04 | 0.01 | 0.02 | 0.02 | 0.03 | 0.01 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.07 | 0.03 | 0.01 | 0.01 | 0.01 | 0.01 | 0.03 | 2.48 | 1.79 | 2 | <0.01 | <0.01 | <0.01 |
| Sb | µg/g | 0.2 | 2 | 20 | **11** | 1.97 | 3.1 | **11.3** | ***26.9*** | **5.31** | 0.68 | 0.7 | 0.27 | 0.87 | **2.46** | 0.87 | 1.74 | 0.8 | 0.78 | 0.88 | **2.15** | 1.16 | **5.15** | 1.67 | **6.6** | **3.37** | **5.41** | 1.17 | 0.54 | **4.46** | **5.44** | **2.05** | ***677*** | ***478*** | ***306*** | **3.23** | 1.04 | 0.97 |
| Sc | µg/g | 22 | 220 | N/A | 11.7 | 8.8 | 8 | 12.3 | 10.7 | 8.5 | 10.4 | 12.2 | 3.4 | 7.8 | 10.5 | 10.3 | 6.2 | 12.7 | 10.1 | 6.3 | 8 | 2.5 | 9.6 | 14.6 | 10.4 | 8.1 | 9 | 6.2 | 2.1 | 6 | 6.7 | 12.5 | 4.9 | 5.6 | 2.2 | 7.9 | 5.5 | 8.7 |
| Se | µg/g | 0.05 | 0.5 | 3 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <1 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <1 | <2 | <2 | <2 | <2 | <2 | <2 | <1 | <2 | <2 | <2 | <2 | <2 | <1 | <2 | <2 | <2 |
| Sn | µg/g | 2.3 | 23 | 50 | 1.2 | 1.1 | 0.9 | 1.1 | 1.8 | 1 | 1.1 | 1.1 | 0.4 | 0.9 | 2.3 | 1 | 0.7 | 1.5 | 1.2 | 0.8 | 1.3 | 1.7 | 1.6 | 1.2 | 1 | 1 | 1 | 1.8 | 2.1 | 1 | 0.8 | 1.1 | 2.4 | 2.7 | 1.2 | 1.6 | 0.8 | 1 |
| Sr | µg/g | 370 | 3700 | N/A | 281 | 414 | 412 | 349 | 826 | 375 | 463 | 454 | 61.9 | 445 | 470 | 476 | 452 | 442 | 410 | 419 | 474 | 34.4 | 458 | 412 | 449 | 348 | 321 | 482 | 22.8 | 482 | 448 | 401 | 111 | 108 | 43 | 450 | 432 | 452 |
| Ta | µg/g | 2 | 20 | N/A | 0.58 | 0.73 | 0.45 | 0.59 | 0.37 | 0.46 | 0.56 | 0.66 | 0.59 | 0.55 | 0.63 | 0.62 | 0.39 | 0.66 | 0.56 | 0.39 | 0.46 | 0.07 | 0.51 | 0.63 | 0.52 | 0.47 | 0.46 | 0.43 | <0.05 | 0.39 | 0.39 | 0.47 | 0.22 | 0.29 | <0.05 | 0.46 | 0.39 | 0.57 |
| Tb | µg/g | ND | ND | N/A | 0.49 | 0.5 | 0.42 | 0.56 | 0.45 | 0.43 | 0.52 | 0.59 | 0.29 | 0.47 | 0.55 | 0.56 | 0.35 | 0.62 | 0.56 | 0.38 | 0.41 | 0.2 | 0.51 | 0.65 | 0.48 | 0.38 | 0.42 | 0.37 | 0.2 | 0.35 | 0.38 | 0.57 | 0.21 | 0.23 | 0.14 | 0.41 | 0.36 | 0.53 |
| Te | µg/g | ND | ND | N/A | 0.12 | <0.05 | <0.05 | <0.05 | 0.07 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.26 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.55 | 0.49 | 0.49 | <0.05 | <0.05 | <0.05 |
| Th | µg/g | 9.6 | 96 | N/A | 7.3 | 5.6 | 5 | 6.6 | 4.1 | 5.7 | 5.2 | 5.2 | 2.9 | 6 | 5.4 | 5.6 | 4 | 5.4 | 5.7 | 4.1 | 4.7 | 2.3 | 5 | 5.5 | 4.4 | 8.5 | 5 | 4.2 | 3 | 4.4 | 4.7 | 4.4 | 3.2 | 3.5 | 1.6 | 4.4 | 4.7 | 6.1 |
| Ti | % | 0.565 | 5.65 | N/A | 0.23 | 0.28 | 0.18 | 0.24 | 0.3 | 0.2 | 0.28 | 0.32 | 0.1 | 0.24 | 0.3 | 0.29 | 0.17 | 0.35 | 0.27 | 0.16 | 0.22 | 0.07 | 0.26 | 0.38 | 0.28 | 0.2 | 0.22 | 0.17 | 0.05 | 0.15 | 0.17 | 0.3 | 0.16 | 0.16 | <0.01 | 0.22 | 0.15 | 0.26 |
| Tl | µg/g | 0.85 | 8.5 | N/A | 0.77 | 0.46 | 0.37 | 0.67 | 0.37 | 0.6 | 0.29 | 0.28 | 0.05 | 0.32 | 0.29 | 0.29 | 0.34 | 0.31 | 0.35 | 0.35 | 0.33 | 0.06 | 0.33 | 0.32 | 0.34 | 0.61 | 0.63 | 0.31 | 0.05 | 0.35 | 0.43 | 0.37 | 2.11 | 2.23 | 0.99 | 0.32 | 0.35 | 0.32 |
| U | µg/g | 2.7 | 27 | N/A | 1.7 | 1.57 | 1.42 | 1.48 | 1.6 | 1.31 | 1.34 | 1.67 | 0.67 | 1.23 | 1.42 | 1.44 | 1.16 | 1.61 | 1.54 | 1.04 | 1.24 | 0.41 | 1.25 | 1.66 | 1.34 | 1.93 | 1.24 | 0.99 | 0.39 | 0.97 | 1.04 | 1.57 | 1.44 | 1.5 | 0.56 | 1.1 | 1.1 | 1.41 |
| V | µg/g | 120 | 1200 | 200 | 132 | 52 | 47 | 86 | 87 | 63 | 69 | 81 | 41 | 56 | 76 | 73 | 44 | 85 | 70 | 43 | 58 | 31 | 67 | 97 | 71 | 79 | 74 | 41 | 22 | 38 | 50 | 85 | 37 | 42 | 14 | 61 | 38 | 62 |
| W | µg/g | 1.25 | 12.5 | N/A | 1.3 | 0.7 | 0.6 | 1.2 | 0.5 | 1.9 | 0.5 | 0.6 | 0.4 | 0.6 | 0.7 | 0.5 | 1.1 | 1.3 | 6 | 6.9 | 0.6 | 0.3 | 0.6 | 1.1 | 1.4 | 15 | 1.6 | 1.3 | 0.8 | 2.6 | 1.1 | 1.2 | 2.8 | **26.1** | 1.5 | 0.7 | 8.1 | 3.3 |
| Zn | µg/g | 70 | 700 | 300 | 246 | 77 | 38 | 105 | 113 | 71 | 37 | 39 | 25 | 32 | 40 | 37 | 32 | 103 | 46 | 31 | 41 | 29 | 58 | 61 | 64 | 76 | 73 | 28 | 20 | 35 | 38 | 63 | ***1370*** | ***1060*** | ***1020*** | 36 | 26 | 34 |
| Zr | µg/g | 165 | 1650 | N/A | 27 | 31.1 | 25.5 | 25 | 77 | 26.9 | 30.1 | 33.3 | 3.7 | 26.4 | 31.4 | 31 | 27.2 | 40.7 | 32.7 | 21.7 | 31.9 | 1.5 | 31.6 | 42.2 | 33.4 | 35.9 | 25.3 | 19.8 | 3 | 23.3 | 24.5 | 39.1 | 36.3 | 35.6 | 4.1 | 24.8 | 23.1 | 29.2 |
| Y | µg/g | 33 | 330 | N/A | 12.5 | 13.5 | 11.2 | 16 | 11.1 | 11.6 | 14.4 | 16.4 | 6.41 | 12.8 | 15.1 | 15 | 10 | 16.5 | 15.1 | 10.2 | 10.9 | 4.18 | 13.4 | 18.1 | 13.7 | 10.7 | 11.2 | 10.5 | 4.39 | 9.8 | 10.8 | 16.1 | 5.4 | 6.3 | 3.37 | 11.4 | 10.1 | 14.1 |
| Yb | µg/g | 3.2 | 32 | N/A | 1.2 | 1.3 | 1 | 1.6 | 0.9 | 1.2 | 1.4 | 1.6 | 0.6 | 1.2 | 1.5 | 1.4 | 1 | 1.5 | 1.4 | 1 | 1.1 | 0.4 | 1.3 | 1.6 | 1.3 | 1.1 | 1.1 | 1 | 0.4 | 0.9 | 1.1 | 1.5 | 0.5 | 0.6 | 0.3 | 1.1 | 1 | 1.3 |

**Note:**
Bold exceeds 10 times average crustal abundance values
Bold and italic exceeds CSR values
Bold, italic, and underscore exceeds 10 times average crustal abundance and CSR values.
ND= No data
Strong acid digestion method was used on all samples
* Aqua regia digestion method was used on this sample
**Price (1997)

## Table D2-9 : Metal Testing Results of Dam Fill Samples

| Parameter | Unit | Comparison Guidelines | | | TP-TD-13-01 | TP-TD-13-01 | TP-TD-13-01 | TP-TD-13-01 | TP-TD-13-01 | TP-TD-13-02 | TP-TD-13-02 | TP-TD-13-02 | TP-TD-13-02 | TP-TD-13-03 | TP-TD-13-03 | TP-TD-13-03 | TP-TD-13-03 | TP-TD-13-03 | TP-TD-13-03 | BH-TD-13-01 | BH-TD-13-01 | BH-TD-13-01 | BH-TD-13-01 | BH-TD-13-01 | BH-TD-13-01 | BH-TD-13-01 | BH-TD-13-01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Average Concentration (Continental Crustal)** | Ten Times Average Concentration (Crustal) | Yukon Contaminated Site Regulation O.I.C. 2002/171 | ARD-01 | ARD-01* | ARD-02 | ARD-03 | ARD-04 | ARD-01 | ARD-02 | ARD-03 | ARD-04 | ARD-01 | ARD-02 | ARD-02* | ARD-03 | ARD-04 | ARD-05 | ARD-06 | ARD-01 | ARD-03 | ARD-03* | ARD-06 | ARD-08 | ARD-10 | ARD-12 | ARD-14 |
| | | | | | Sample Interval (m) | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | 1.0 - 1.1 | 1.0 - 1.1 | 2.0 - 2.1 | 3.5 - 3.6 | 4.4 - 4.5 | 1.0 - 1.1 | 2.0 - 2.1 | 3.5 - 3.6 | 5.0 - 5.1 | 1.0 - 1.1 | 2.0 - 2.1 | 2.0 - 2.1 | 3.5 - 3.6 | 4.4 - 4.5 | 4.5 - 4.6 | 5.8 - 5.9 | 0.1 - 0.2 | 2.0 - 2.1 | 2.0 - 2.1 | 5.0 - 5.1 | 7.5 - 7.6 | 10.5 - 10.6 | 13.6 - 13.7 | 17.1 - 17.2 |
| Ag | µg/g | 75 | 750 | 20 | <0.02 | 0.04 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.12 | <0.02 | 0.12 | 0.28 | <0.02 | 0.22 | <0.02 | 0.06 | <0.02 | <0.02 | <0.02 | 0.14 | <0.02 |
| Al | % | 8.23 | 82.3 | N/A | 6.37 | 0.52 | 6.35 | 6.3 | 6.26 | 6.31 | 6.67 | 6.49 | 6.39 | 6.44 | 6.4 | 0.68 | 6.77 | 7.24 | 5.68 | 6.25 | 7.78 | 6.53 | 0.64 | 6.26 | 6.53 | 6.32 | 6.49 | 6.26 |
| As | µg/g | 1.8 | 18 | 20 | 6 | 5 | 7 | 7 | 8 | 11 | 16 | 6 | 11 | 8 | 7 | 5 | 7 | 11 | ***58*** | 9 | ***22*** | 13 | 11 | 11 | 12 | ***28*** | ***28*** | 10 |
| Ba | µg/g | 425 | 4250 | 500 | ***1160*** | 98 | ***1140*** | ***1110*** | ***1100*** | ***1140*** | ***1170*** | 933 | ***1100*** | ***1040*** | ***988*** | 92 | ***1050*** | ***814*** | ***816*** | ***1110*** | ***1380*** | ***1050*** | 99 | ***1080*** | ***1110*** | ***1070*** | ***1340*** | ***1090*** |
| Be | µg/g | 3 | 30 | 4 | 1.3 | 0.2 | 1.4 | 1.3 | 1.3 | 1.3 | 1.4 | 1.4 | 1.4 | 1.5 | 1.4 | 0.2 | 1.5 | 1.3 | 1.4 | 1.4 | 1.6 | 1.4 | 0.2 | 1.5 | 1.4 | 1.4 | 1.2 | 1.2 |
| Bi | µg/g | 0.0085 | 0.085 | N/A | 0.06 | 0.06 | 0.08 | 0.07 | 0.07 | 0.06 | 0.08 | 0.07 | 0.07 | **0.09** | **0.13** | **0.14** | 0.08 | 0.1 | **0.14** | 0.11 | **4.31** | 0.08 | 0.08 | 0.07 | 0.07 | 0.07 | 0.07 | 0.08 |
| Ca | % | 4.15 | 41.5 | N/A | 1.62 | 0.24 | 1.66 | 1.68 | 1.67 | 1.58 | 1.7 | 2.18 | 1.73 | 1.8 | 2.16 | 0.53 | 1.79 | 2.49 | 1.78 | 1.69 | 1.9 | 1.84 | 0.34 | 1.59 | 1.63 | 1.74 | 1.78 | 1.66 |
| Cd | µg/g | 0.15 | 1.5 | 2 | 0.1 | 0.09 | 0.11 | 0.14 | 0.11 | 0.13 | 0.21 | 0.11 | 0.14 | 0.13 | 0.12 | 0.09 | 0.1 | 0.23 | 0.35 | 0.11 | 1.34 | 0.14 | 0.12 | 0.11 | 0.29 | 0.15 | 0.17 | 0.12 |
| Ce | µg/g | 66.5 | 665 | N/A | 31.5 | 18.3 | 30.2 | 32.2 | 26.8 | 29.1 | 35 | 42.1 | 38 | 36 | 36 | 19 | 30.9 | 32.5 | 38 | 28.4 | 41.8 | 34.6 | 19.6 | 32.2 | 27.6 | 30.7 | 29.1 | 35.5 |
| Co | µg/g | 25 | 250 | 50 | 4.6 | 3 | 4.5 | 4.8 | 4.7 | 4.5 | 6.4 | 7.7 | 5.2 | 6.1 | 6.1 | 3.8 | 5.7 | 15.5 | 38.5 | 4.3 | 13.9 | 5.4 | 3.7 | 4.7 | 4.7 | 5 | 5.3 | 5.4 |
| Cr | µg/g | 102 | 1020 | N/A | 120 | 135 | 103 | 80 | 90 | 119 | 92 | 112 | 75 | 120 | 88 | 92 | 112 | 90 | 97 | 83 | 118 | 85 | 90 | 124 | 73 | 79 | 127 | 139 |
| Cs | µg/g | ND | ND | N/A | 1 | 0.47 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0.55 | 1 | 2 | 3 | 1 | 8 | 1 | 0.63 | 1 | 1 | 1 | 2 | 1 |
| Cu | µg/g | 60 | 600 | 150 | 5.1 | 5.4 | 11.2 | 5.7 | 5.5 | 6.6 | 7.5 | 6.7 | 7.5 | 7 | 11.2 | 11.2 | 9.1 | 137 | 55.3 | 5.8 | 31.2 | 7.2 | 7.6 | 7 | 5.9 | 8.9 | 13.9 | 16 |
| Fe | % | 5.63 | 56.3 | N/A | 1.42 | 1.11 | 1.35 | 1.36 | 1.26 | 1.28 | 1.68 | 2.08 | 1.52 | 1.59 | 1.76 | 1.3 | 1.61 | 2.17 | 3.62 | 1.28 | 3.71 | 1.65 | 1.25 | 1.46 | 1.41 | 1.53 | 1.65 | 1.45 |
| Ga | µg/g | 19 | 190 | N/A | 13.5 | 1.8 | 13.6 | 13.9 | 13.4 | 13.2 | 15.2 | 14.5 | 13.8 | 14 | 13.7 | 2.5 | 14 | 17.9 | 13 | 13 | 18.6 | 13.5 | 2.2 | 13.2 | 13.1 | 13 | 13.9 | 13.4 |
| Hf | µg/g | 3 | 30 | N/A | 0.64 | 0.05 | 0.56 | 0.6 | 0.6 | 0.62 | 0.67 | 0.85 | 0.75 | 0.72 | 0.7 | <0.05 | 0.7 | 2.14 | 1.57 | 0.55 | 0.48 | 0.62 | 0.11 | 0.57 | 0.6 | 0.62 | 0.9 | 0.69 |
| Hg | µg/g | 85 | 850 | 15 | ND | <0.01 | ND | ND | ND | ND | ND | ND | ND | ND | ND | <0.01 | ND | ND | ND | ND | ND | ND | <0.01 | ND | ND | ND | ND | ND |
| In | µg/g | 0.25 | 2.5 | N/A | 0.02 | <0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.04 | 0.02 | 0.03 | 0.03 | <0.02 | 0.02 | 0.03 | 0.03 | 0.02 | 0.09 | 0.03 | <0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.02 |
| K | % | 2.085 | 20.85 | N/A | 1.7 | 0.08 | 1.72 | 1.64 | 1.64 | 1.73 | 1.72 | 1.49 | 1.67 | 1.69 | 1.57 | 0.09 | 1.69 | 1.63 | 1.18 | 1.78 | 2.34 | 1.66 | 0.1 | 1.71 | 1.67 | 1.75 | 1.81 | 1.69 |
| La | µg/g | 39 | 390 | N/A | 16.3 | 8.7 | 16.4 | 17.1 | 14 | 16.3 | 18.8 | 22.5 | 20.6 | 19.4 | 19.7 | 9.5 | 16.2 | 16.7 | 18.4 | 15.7 | 22.4 | 18.8 | 10 | 17.4 | 14.1 | 16.5 | 15.3 | 19.1 |
| Lu | µg/g | ND | ND | N/A | 0.15 | 0.06 | 0.14 | 0.15 | 0.14 | 0.14 | 0.16 | 0.21 | 0.18 | 0.17 | 0.18 | 0.07 | 0.17 | 0.15 | 0.18 | 0.13 | 0.23 | 0.17 | 0.08 | 0.15 | 0.15 | 0.16 | 0.19 | 0.16 |
| Li | µg/g | ND | ND | N/A | 9 | 3 | 9 | 9 | 9 | 9 | 10 | 11 | 10 | 11 | 10 | 5 | 11 | 16 | 13 | 11 | 16 | 10 | 4 | 10 | 9 | 10 | 10 | 10 |
| Mg | % | 2.33 | 23.3 | N/A | 0.37 | 0.18 | 0.37 | 0.41 | 0.42 | 0.37 | 0.54 | 0.7 | 0.44 | 0.52 | 0.59 | 0.28 | 0.52 | 0.79 | 0.5 | 0.4 | 1.05 | 0.49 | 0.25 | 0.43 | 0.4 | 0.45 | 0.46 | 0.45 |
| Mn | µg/g | 950 | 9500 | N/A | 292 | 143 | 289 | 293 | 269 | 282 | 370 | 433 | 326 | 361 | 385 | 181 | 335 | 498 | 1450 | 261 | 1080 | 367 | 180 | 315 | 309 | 333 | 368 | 287 |
| Mo | µg/g | 1.2 | 12 | 10 | 5.2 | 3.68 | 4.84 | 1.84 | 1.78 | 5.5 | 2.03 | 4.52 | 1.78 | 5.54 | 1.88 | 1.36 | 4.83 | 3.55 | 4.46 | 1.85 | 5.59 | 1.73 | 1.31 | 4.64 | 4.54 | 4.86 | 5.96 | 4.54 |
| Na | % | 2.355 | 23.55 | N/A | 2.21 | 0.05 | 2.26 | 2.18 | 2.13 | 2.2 | 2.19 | 2.12 | 2.21 | 2.1 | 2.22 | 0.05 | 2.1 | 2.33 | 1.37 | 2.18 | 1.81 | 2.21 | 0.05 | 2.06 | 2.18 | 2.05 | 2.13 | 2.15 |
| Nb | µg/g | 20 | 200 | N/A | 5.6 | 0.49 | 5.5 | 6 | 5.6 | 5.2 | 6.2 | 8.7 | 7.9 | 6.4 | 6.9 | 0.97 | 6.7 | 5.8 | 5.4 | 4.9 | 6.9 | 5.8 | 0.48 | 5.8 | 5.5 | 5.8 | 7.8 | 6.1 |
| Ni | µg/g | 84 | 840 | 100 | 8.1 | 7 | 7.9 | 7.4 | 7.7 | 8.4 | 9.7 | 12.2 | 8.9 | 11.2 | 10.2 | 8.1 | 10.3 | 13.2 | 19.7 | 8.1 | 24.2 | 9.1 | 7.8 | 8.8 | 8.7 | 9.3 | 9.2 | 9.8 |
| P | µg/g | 0.105 | 1.05 | N/A | 0.028 | 0.026 | 0.028 | 0.031 | 0.034 | 0.03 | 0.04 | 0.05 | 0.034 | 0.041 | 0.043 | 0.04 | 0.041 | 0.071 | 0.176 | 0.034 | 0.089 | 0.039 | 0.036 | 0.035 | 0.032 | 0.039 | 0.041 | 0.037 |
| Pb | µg/g | 14 | 140 | 250 | 11.5 | 3 | 11.5 | 12.6 | 12.2 | 15.3 | 15 | 10.8 | 13.6 | 12.8 | 10.9 | 3.2 | 11.4 | 9 | 10.4 | 11.4 | 40.2 | 11.7 | 3.9 | 12.4 | 26.3 | 10.9 | 20.1 | 12.4 |
| Rb | µg/g | 90 | 900 | N/A | 50.5 | 4.7 | 50.7 | 51.1 | 49.4 | 51.3 | 51.2 | 45.9 | 50.9 | 52.2 | 47.1 | 5.9 | 50.8 | 42 | 36.4 | 52.7 | 71.9 | 48.5 | 6.1 | 52.1 | 49.3 | 52.3 | 52.7 | 50.8 |
| S | µg/g | 0.035 | 0.35 | N/A | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.04 | 0.19 | <0.01 | 0.04 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | 0.01 |
| Sb | µg/g | 0.2 | 2 | 20 | 0.97 | 0.34 | 0.94 | 0.94 | 0.99 | 1.9 | 1.56 | 0.78 | 1.09 | 1.16 | 0.79 | 0.32 | 0.9 | 0.8 | 1.94 | 0.94 | **3.26** | 1.45 | 0.73 | 1.17 | 1.42 | 1.27 | **2.37** | 1.2 |
| Sc | µg/g | 22 | 220 | N/A | 5.8 | 1.8 | 5.8 | 6.4 | 6.4 | 5.8 | 7.7 | 10.4 | 7 | 7.5 | 8.6 | 2.6 | 7.6 | 8.4 | 11.2 | 5.5 | 14.8 | 7.3 | 2.6 | 6.7 | 6.1 | 7.1 | 7.3 | 6.5 |
| Se | µg/g | 0.05 | 0.5 | 3 | <2 | <1 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <1 | <2 | <2 | <2 | <2 | <2 | <2 | <1 | <2 | <2 | <2 | <2 | <2 |
| Sn | µg/g | 2.3 | 23 | 50 | 0.7 | <0.3 | 0.7 | 0.8 | 0.7 | 0.8 | 0.8 | 1 | 0.8 | 0.9 | 0.9 | 0.4 | 0.9 | 0.7 | 0.7 | 0.7 | 1.2 | 0.8 | 0.3 | 0.7 | 0.7 | 0.8 | 0.9 | 0.8 |
| Sr | µg/g | 370 | 3700 | N/A | 485 | 19.2 | 494 | 459 | 436 | 463 | 491 | 449 | 459 | 423 | 448 | 28.8 | 434 | 658 | 353 | 436 | 454 | 453 | 25.3 | 421 | 446 | 420 | 462 | 417 |
| Ta | µg/g | 2 | 20 | N/A | 0.36 | <0.05 | 0.35 | 0.38 | 0.38 | 0.34 | 0.39 | 0.54 | 0.59 | 0.41 | 0.43 | <0.05 | 0.43 | 0.35 | 0.31 | 0.31 | 0.34 | 0.36 | <0.05 | 0.4 | 0.38 | 0.37 | 0.76 | 0.61 |
| Tb | µg/g | ND | ND | N/A | 0.33 | 0.18 | 0.32 | 0.34 | 0.34 | 0.32 | 0.39 | 0.5 | 0.4 | 0.4 | 0.41 | 0.22 | 0.4 | 0.35 | 0.45 | 0.32 | 0.54 | 0.38 | 0.23 | 0.33 | 0.32 | 0.36 | 0.38 | 0.38 |
| Te | µg/g | ND | ND | N/A | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | <0.05 | 0.09 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Th | µg/g | 9.6 | 96 | N/A | 4.1 | 2.8 | 4 | 4.2 | 3.7 | 3.8 | 4.9 | 5 | 5 | 4.8 | 4.6 | 2.7 | 3.9 | 4.3 | 6.4 | 4.1 | 6.3 | 4.2 | 2.9 | 4.3 | 3.7 | 3.9 | 4.7 | 5 |
| Ti | % | 0.565 | 5.65 | N/A | 0.14 | 0.04 | 0.15 | 0.16 | 0.15 | 0.14 | 0.19 | 0.28 | 0.18 | 0.19 | 0.22 | 0.07 | 0.18 | 0.24 | 0.18 | 0.14 | 0.29 | 0.18 | 0.05 | 0.16 | 0.15 | 0.18 | 0.18 | 0.17 |
| Tl | µg/g | 0.85 | 8.5 | N/A | 0.34 | 0.05 | 0.35 | 0.34 | 0.33 | 0.36 | 0.4 | 0.31 | 0.37 | 0.37 | 0.33 | 0.06 | 0.34 | 0.33 | 0.52 | 0.39 | 0.75 | 0.34 | 0.07 | 0.38 | 0.34 | 0.38 | 0.44 | 0.37 |
| U | µg/g | 2.7 | 27 | N/A | 0.93 | 0.37 | 0.86 | 0.89 | 0.9 | 0.93 | 1.05 | 1.26 | 1.74 | 1.08 | 1.05 | 0.44 | 1.03 | 1.78 | 3.12 | 0.93 | 1.41 | 0.98 | 0.42 | 0.92 | 0.9 | 0.96 | 1.11 | 1.01 |
| V | µg/g | 120 | 1200 | 200 | 42 | 24 | 39 | 40 | 39 | 38 | 54 | 68 | 48 | 49 | 57 | 30 | 48 | 64 | 62 | 39 | 128 | 51 | 27 | 47 | 44 | 48 | 52 | 46 |
| W | µg/g | 1.25 | 12.5 | N/A | 0.4 | <0.1 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.4 | 0.4 | 0.7 | 0.2 | 0.5 | 0.4 | 0.7 | 0.6 | 0.5 | 0.8 | 0.1 | 0.5 | 0.4 | 0.4 | 4.7 | 1.5 |
| Zn | µg/g | 70 | 700 | 300 | 25 | 18 | 25 | 26 | 26 | 28 | 45 | 36 | 33 | 34 | 34 | 21 | 31 | 51 | 45 | 29 | 232 | 35 | 25 | 31 | 38 | 36 | 41 | 30 |
| Zr | µg/g | 165 | 1650 | N/A | 21.8 | 3 | 24.9 | 19.1 | 22.2 | 21.9 | 26.9 | 32.1 | 24.5 | 26.9 | 25.3 | 2.6 | 26.1 | 80.4 | 64.1 | 22.3 | 17.7 | 24.3 | 3.5 | 22.5 | 23.8 | 26.2 | 20.3 | 25.1 |
| Y | µg/g | 33 | 330 | N/A | 9.5 | 3.6 | 9.1 | 9.9 | 9.7 | 9.2 | 11.1 | 14.3 | 11.6 | 11.7 | 12.2 | 5.08 | 11.7 | 10 | 12.4 | 9.1 | 15.6 | 11.3 | 5.26 | 9.6 | 9.4 | 10.9 | 11.2 | 9.8 |
| Yb | µg/g | 3.2 | 32 | N/A | 0.9 | 0.4 | 0.9 | 0.9 | 0.9 | 0.9 | 1 | 1.3 | 1.1 | 1.1 | 1.1 | 0.5 | 1 | 0.9 | 1.1 | 0.8 | 1.4 | 1 | 0.5 | 0.9 | 0.9 | 1 | 1.1 | 0.9 |

**Note:**

Bold exceeds 10 times average crustal abundance values

Bold and italic exceeds CSR values

Bold, italic, and underscore exceeds 10 times average crustal abundance and CSR values.

ND= No data

Strong acid digestion method was used on all samples

* Aqua regia digestion method was used on this sample

**Price (1997)

## Table D2-10 : Metal Testing Results of Mill Area Samples

| Parameter | Unit | Comparison Guidelines | | | BH-M-13-04 | BH-M-13-04 | TP-M-13-01 | TP-M-13-01 | TP-M-13-01 | TP-M-13-01 | TP-M-13-02 | TP-M-13-02 | TP-M-13-03 | TP-M-13-03 | TP-M-13-03 | TP-M-13-03 | TP-M-13-03 | TP-M-13-04 | TP-M-13-04 | TP-M-13-04 | TP-M-13-04 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | ARD-01 | ARD-02 | ARD-02 | ARD-03 | ARD-03* | ARD-04 | ARD-02 | ARD-03 | ARD-01 | ARD-02 | ARD-03 | ARD-04 | ARD-04* | ARD-01 | ARD-02 | ARD-03 | ARD-04 |
| | | | | | Sample Interval (m) | | | | | | | | | | | | | | | | |
| | | Average Concentration (Continental Crustal)** | Ten Times Average Concentration (Crustal) | Yukon Contaminated Site Regulation O.I.C. 2002/171 | 0.0 - 0.5 | 0.6 - 1.0 | 0.6 - 1.0 | 1.1 - 1.5 | 1.1 - 1.5 | 1.6 - 2.0 | 0.6 - 1.0 | 1.1 - 1.5 | 0.0 - 0.5 | 0.6 - 1.0 | 1.1 - 1.5 | 1.6 - 2.0 | 1.6 - 2.0 | 0.0 - 0.5 | 0.6 - 1.0 | 1.1 - 1.5 | 1.6 - 2.0 |
| Ag | µg/g | 75 | 750 | 20 | ***32.2*** | 19.7 | <0.02 | <0.02 | 0.27 | <0.02 | 0.26 | 0.07 | ***46.3*** | 5.41 | 6.71 | 0.97 | 1.23 | 7.35 | 5.61 | 73.1 | 35 |
| Al | % | 8.23 | 82.3 | N/A | 6.65 | 7.27 | 7.64 | 7.5 | 1.05 | 7.24 | 7.89 | 7.8 | 7.16 | 7.62 | 7.48 | 7.79 | 0.75 | 7.66 | 8.34 | 7.39 | 6.69 |
| As | µg/g | 1.8 | 18 | 20 | ***4830*** | ***2430*** | ***150*** | ***92*** | ***97*** | ***39*** | ***276*** | ***86*** | ***1950*** | ***444*** | ***538*** | ***327*** | ***326*** | ***1220*** | ***772*** | ***6510*** | ***6470*** |
| Ba | µg/g | 425 | 4250 | 500 | ***1230*** | ***1010*** | ***909*** | ***820*** | ***188*** | ***908*** | ***1460*** | ***1140*** | ***918*** | ***1220*** | ***1050*** | ***1280*** | 232 | ***1360*** | ***1160*** | ***968*** | ***897*** |
| Be | µg/g | 3 | 30 | 4 | 1.1 | 1.1 | 1.1 | 1.1 | 0.3 | 1.1 | 1.3 | 1.2 | 1.2 | 1.7 | 1.5 | 1.5 | 0.5 | 1.5 | 1.4 | 1.3 | 1.3 |
| Bi | µg/g | 0.0085 | 0.085 | N/A | 2.12 | 0.41 | 0.11 | 0.09 | 0.07 | 0.08 | 0.25 | 0.13 | 0.54 | 0.14 | 0.14 | 0.16 | 0.16 | 0.88 | 3.6 | 0.65 | 1.27 |
| Ca | % | 4.15 | 41.5 | N/A | 1.25 | 2.83 | 1.98 | 2.36 | 0.57 | 2.49 | 2.76 | 2.39 | 1.87 | 2.75 | 1.93 | 2.5 | 0.87 | 1.51 | 2.97 | 1.52 | 1.65 |
| Cd | µg/g | 0.15 | 1.5 | 2 | ***22.1*** | ***16.2*** | 0.37 | 0.37 | 0.37 | 0.37 | 8.73 | 0.7 | ***44*** | ***6.6*** | ***3.89*** | ***2.16*** | ***2.03*** | ***18.9*** | ***17*** | ***69.1*** | ***42.4*** |
| Ce | µg/g | 66.5 | 665 | N/A | 33.5 | 31.4 | 35.8 | 33.1 | 19.9 | 36.5 | 33.3 | 25.6 | 38 | 39.9 | 30.1 | 32.9 | 22.3 | 31.1 | 25.8 | 31 | 33.2 |
| Co | µg/g | 25 | 250 | 50 | 9.7 | 11.4 | 15.9 | 15.1 | 11.7 | 12.1 | 15.9 | 8.9 | 11.3 | 13.8 | 11.7 | 12.7 | 11.5 | 11.8 | 10.8 | 9.5 | 10.4 |
| Cr | µg/g | 102 | 1020 | N/A | 93 | 111 | 89 | 94 | 75 | 108 | 136 | 121 | 118 | 113 | 102 | 136 | 109 | 121 | 89 | 115 | 130 |
| Cs | µg/g | ND | ND | N/A | 11 | 9 | 16 | 13 | 5.85 | 9 | 22 | 5 | 11 | 10 | 12 | 12 | 5.87 | 16 | 13 | 13 | 12 |
| Cu | µg/g | 60 | 600 | 150 | 140 | 128 | 29.2 | 28.2 | 28.6 | 22.7 | 23.4 | 19.5 | 162 | 58.2 | 58.1 | 33.4 | 33.2 | 67.2 | 49.2 | 425 | 113 |
| Fe | % | 5.63 | 56.3 | N/A | 3.68 | 3.71 | 4.36 | 3.06 | 2.36 | 3.27 | 3.95 | 2.77 | 3.74 | 4.78 | 3.85 | 4.14 | 3.28 | 3.93 | 3.89 | 4.46 | 4.05 |
| Ga | µg/g | 19 | 190 | N/A | 15 | 16.2 | 17.2 | 16.6 | 4.1 | 15.4 | 18.5 | 16.4 | 14.9 | 17.8 | 17.1 | 18.2 | 3.2 | 18.4 | 17.7 | 16.3 | 15 |
| Hf | µg/g | 3 | 30 | N/A | 0.63 | 0.74 | 0.66 | 1.16 | 0.07 | 0.68 | 0.49 | 0.77 | 0.72 | 1.18 | 0.79 | 0.77 | 0.23 | 0.54 | 0.61 | 0.51 | 0.72 |
| Hg | µg/g | 85 | 850 | 15 | ND | ND | ND | ND | 0.07 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| In | µg/g | 0.25 | 2.5 | N/A | 0.14 | 0.11 | 0.07 | 0.04 | 0.02 | 0.05 | 0.07 | 0.05 | 0.21 | 0.11 | 0.08 | 0.08 | 0.05 | 0.22 | 0.23 | 0.31 | 0.26 |
| K | % | 2.085 | 20.85 | N/A | 2.2 | 1.79 | 1.57 | 1.48 | 0.14 | 1.52 | 1.93 | 1.61 | 1.81 | 1.81 | 1.91 | 1.68 | 0.17 | 2.52 | 2.09 | 2.05 | 2.04 |
| La | µg/g | 39 | 390 | N/A | 18 | 16 | 17.2 | 16.7 | 9.6 | 19 | 17.2 | 13 | 20.8 | 18.6 | 14.4 | 15.7 | 11.9 | 15.4 | 13.3 | 15.6 | 16.9 |
| Lu | µg/g | ND | ND | N/A | 0.22 | 0.27 | 0.36 | 0.24 | 0.13 | 0.27 | 0.31 | 0.29 | 0.26 | 0.35 | 0.29 | 0.36 | 0.21 | 0.28 | 0.27 | 0.24 | 0.26 |
| Li | µg/g | ND | ND | N/A | 16 | 18 | 23 | 19 | 9 | 23 | 24 | 12 | 20 | 15 | 15 | 16 | 5 | 21 | 21 | 22 | 22 |
| Mg | % | 2.33 | 23.3 | N/A | 0.58 | 0.87 | 1.14 | 1.07 | 0.5 | 1.37 | 0.76 | 0.89 | 0.8 | 1.21 | 0.86 | 0.83 | 0.47 | 0.64 | 0.67 | 0.65 | 0.66 |
| Mn | µg/g | 950 | 9500 | N/A | 1020 | 1290 | 940 | 861 | 684 | 666 | 2400 | 614 | 1530 | 1250 | 1010 | 1190 | 868 | 1840 | 2570 | 1710 | 1620 |
| Mo | µg/g | 1.2 | 12 | 10 | 2.46 | 2.6 | 1.39 | 2.6 | 2.08 | 3.29 | 3.94 | 4.18 | 4.76 | 4.53 | 2.11 | 5.72 | 4.39 | 4.17 | 2.13 | 4.22 | 3.37 |
| Na | % | 2.355 | 23.55 | N/A | 1.4 | 1.78 | 1.48 | 1.76 | 0.05 | 1.82 | 1.42 | 2.42 | 0.86 | 1.9 | 2.11 | 1.73 | 0.03 | 1.15 | 0.85 | 0.68 | 0.89 |
| Nb | µg/g | 20 | 200 | N/A | 5 | 5.8 | 4.7 | 5.4 | 0.82 | 5.7 | 7.9 | 5.2 | 4.9 | 8.5 | 5.9 | 6.6 | 0.37 | 6.2 | 5.3 | 4.9 | 5 |
| Ni | µg/g | 84 | 840 | 100 | 9.2 | 15 | 11.6 | 12.8 | 10.1 | 11.4 | 15.7 | 9.2 | 9.9 | 13.7 | 11.2 | 11.9 | 11 | 14.3 | 9 | 9.7 | 14.1 |
| P | µg/g | 0.105 | 1.05 | N/A | 0.063 | 0.091 | 0.129 | 0.077 | 0.074 | 0.091 | 0.117 | 0.075 | 0.082 | 0.148 | 0.091 | 0.105 | 0.093 | 0.093 | 0.089 | 0.092 | 0.08 |
| Pb | µg/g | 14 | 140 | 250 | ***1680*** | ***885*** | 21.2 | 17.3 | 11.9 | 22.1 | 63.2 | 35.8 | ***1950*** | ***213*** | ***173*** | 127 | 114 | ***710*** | ***602*** | ***4320*** | ***2290*** |
| Rb | µg/g | 90 | 900 | N/A | 86.1 | 73.5 | 66.6 | 59.9 | 14.7 | 57.9 | 72.7 | 50.5 | 79.5 | 67 | 71.6 | 62.5 | 10.9 | 106 | 103 | 101 | 102 |
| S | µg/g | 0.035 | 0.35 | N/A | 0.81 | 0.65 | 0.05 | 0.06 | 0.08 | 0.08 | 0.08 | 0.07 | 1.15 | 0.64 | 0.3 | 0.29 | 0.31 | 0.29 | 0.41 | 1.57 | 1.71 |
| Sb | µg/g | 0.2 | 2 | 20 | ***313*** | ***145*** | **18.2** | **11.4** | **7.4** | **7.58** | **23** | **7.7** | ***557*** | ***60.4*** | ***55.6*** | ***38.7*** | **19.4** | ***93.8*** | ***76.3*** | ***1530*** | ***338*** |
| Sc | µg/g | 22 | 220 | N/A | 12.2 | 16 | 21.6 | 16.3 | 7.3 | 17.8 | 16.2 | 12.8 | 15.3 | 21.1 | 17.2 | 19.1 | 9.8 | 16.2 | 14.8 | 14.2 | 13.8 |
| Se | µg/g | 0.05 | 0.5 | 3 | <2 | <2 | <2 | <2 | <1 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <1 | <2 | <2 | <2 | <2 |
| Sn | µg/g | 2.3 | 23 | 50 | 3.4 | 2.4 | 1.2 | 1 | 0.3 | 1.1 | 1.3 | 1 | 6.2 | 2.1 | 1.7 | 1.7 | 0.5 | 2.4 | 2 | 8.3 | 4.7 |
| Sr | µg/g | 370 | 3700 | N/A | 261 | 302 | 313 | 472 | 26.3 | 401 | 412 | 544 | 197 | 410 | 279 | 345 | 27.5 | 206 | 199 | 162 | 181 |
| Ta | µg/g | 2 | 20 | N/A | 0.3 | 0.35 | 0.27 | 0.31 | <0.05 | 0.33 | 0.41 | 0.31 | 0.28 | 1.36 | 0.82 | 0.73 | <0.05 | 0.55 | 0.47 | 0.41 | 0.43 |
| Tb | µg/g | ND | ND | N/A | 0.45 | 0.54 | 0.73 | 0.55 | 0.31 | 0.64 | 0.59 | 0.54 | 0.54 | 0.77 | 0.59 | 0.7 | 0.4 | 0.54 | 0.5 | 0.48 | 0.52 |
| Te | µg/g | ND | ND | N/A | 0.1 | 0.1 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.12 | 0.09 | <0.05 | 0.06 | 0.08 | 0.09 | 1.51 | 0.14 | 0.14 |
| Th | µg/g | 9.6 | 96 | N/A | 6.8 | 5.3 | 4.2 | 4.3 | 1.7 | 4.8 | 4.4 | 3.8 | 7.5 | 6.1 | 4.7 | 4.9 | 3.4 | 3.8 | 3.3 | 4.4 | 5.6 |
| Ti | % | 0.565 | 5.65 | N/A | 0.23 | 0.29 | 0.37 | 0.33 | 0.07 | 0.33 | 0.33 | 0.27 | 0.27 | 0.36 | 0.3 | 0.33 | 0.05 | 0.3 | 0.28 | 0.25 | 0.23 |
| Tl | µg/g | 0.85 | 8.5 | N/A | 1.73 | 1.43 | 1.14 | 0.91 | 0.4 | 0.84 | 1.09 | 0.49 | 1.79 | 1.16 | 2.09 | 1.14 | 0.54 | 2.02 | 2.02 | 2.34 | 2.19 |
| U | µg/g | 2.7 | 27 | N/A | 1.71 | 2.02 | 1.28 | 1.48 | 0.57 | 1.32 | 1.12 | 1.32 | 1.67 | 1.9 | 1.43 | 1.8 | 0.7 | 1.31 | 1.51 | 1.48 | 2.08 |
| V | µg/g | 120 | 1200 | 200 | 86 | 105 | 147 | 111 | 63 | 117 | 118 | 82 | 98 | 147 | 110 | 125 | 60 | 109 | 97 | 96 | 84 |
| W | µg/g | 1.25 | 12.5 | N/A | 1.9 | 2.9 | 1.9 | 1 | 0.2 | 0.7 | 5.3 | 0.4 | 3.4 | 3 | 3.2 | 2.8 | 0.4 | 4.2 | 4.4 | 3.6 | 4.5 |
| Zn | µg/g | 70 | 700 | 300 | **1370** | **891** | 108 | 88 | 72 | 91 | **1820** | 101 | **2080** | 641 | 313 | 219 | 176 | **1450** | **1680** | **4560** | **2920** |
| Zr | µg/g | 165 | 1650 | N/A | 23.9 | 25 | 21 | 41.9 | 1.2 | 21.6 | 15.4 | 22.9 | 23.2 | 19.7 | 18.9 | 21.4 | 2.4 | 14.2 | 18.8 | 13.2 | 22 |
| Y | µg/g | 33 | 330 | N/A | 12.8 | 16.2 | 20.6 | 15.9 | 9.05 | 18.3 | 18.9 | 17.5 | 16.1 | 21.8 | 17.5 | 20.7 | 11.8 | 16.4 | 16 | 13.7 | 15.5 |
| Yb | µg/g | 3.2 | 32 | N/A | 1.3 | 1.6 | 2.2 | 1.5 | 0.8 | 1.7 | 1.8 | 1.7 | 1.6 | 2.2 | 1.9 | 2.2 | 1.2 | 1.7 | 1.6 | 1.5 | 1.6 |

**Note:**

Bold exceeds 10 times average crustal abundance values

Bold and italic exceeds CSR values

Bold, italic, and underscore exceeds 10 times average crustal abundance and CSR values.

ND= No data

Strong acid digestion method was used on all samples

* Aqua regia digestion method was used on this sample

**Price (1997)

## Table D2-11 : Metal Testing Results of Road Samples

| Parameter | Unit | Comparison Guidelines | | | TP-M-13-05 | TP-M-13-05 | TP-M-13-05 | TP-M-13-05 | TP-R-13-01 | TP-R-13-01 | TP-R-13-01 | TP-R-13-01 | TP-R-13-01 | TP-R-13-02 | TP-R-13-02 | TP-R-13-02 | TP-R-13-03 | TP-R-13-03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Average Concentration (Continental Crustal)** | Ten Times Average Concentration (Crustal) | Yukon Contaminated Site Regulation O.I.C. 2002/171 | ARD-02 | ARD-02* | ARD-03 | ARD-04 | ARD-01 | ARD-01* | ARD-02 | ARD-03 | ARD-04 | ARD-01 | ARD-02 | ARD-03 | ARD-02 | ARD-04 |
| | | | | | Sample Interval (m) | | | | | | | | | | | | | |
| | | | | | 0.6 - 1.0 | 0.6 - 1.0 | 1.1 - 1.5 | 1.6 - 2.0 | 0.0 - 0.5 | 0.0 - 0.5 | 0.6 - 1.0 | 1.1 - 1.5 | 1.6 - 1.9 | 0.0 - 0.5 | 0.6 - 1.0 | 1.1 - 1.5 | 0.6 - 1.0 | 1.6 - 2.0 |
| Ag | µg/g | 75 | 750 | 20 | <0.02 | 0.12 | <0.02 | <0.02 | 4.59 | 4.63 | 5.52 | <0.02 | <0.02 | 10.6 | 1.06 | 3.42 | 1.71 | 2.38 |
| Al | % | 8.23 | 82.3 | N/A | 8.51 | 1.17 | 8.44 | 8.32 | 7.4 | 1.08 | 7.41 | 8.11 | 8.03 | 7.83 | 7.5 | 7.98 | 9.3 | 8.31 |
| As | µg/g | 1.8 | 18 | 20 | ***26*** | **19** | ***28*** | ***44*** | ***822*** | ***892*** | ***249*** | ***25*** | ***42*** | ***567*** | ***320*** | ***288*** | ***118*** | ***197*** |
| Ba | µg/g | 425 | 4250 | 500 | ***1690*** | 281 | ***1010*** | ***1480*** | ***977*** | 164 | ***1550*** | ***1340*** | ***1360*** | ***1360*** | ***939*** | ***910*** | ***1840*** | ***1810*** |
| Be | µg/g | 3 | 30 | 4 | 1.3 | 0.3 | 1.7 | 1.4 | 1.3 | 0.3 | 1.4 | 1.3 | 1.5 | 1.4 | 1.1 | 1.1 | 1.5 | 1.5 |
| Bi | µg/g | 0.0085 | 0.085 | N/A | 0.08 | 0.09 | 0.13 | 0.16 | 3.7 | 3.91 | 2.53 | 0.08 | 0.25 | 1.37 | 0.51 | 0.76 | 1.79 | 1.49 |
| Ca | % | 4.15 | 41.5 | N/A | 3.41 | 0.89 | 3.46 | 3.5 | 2.28 | 0.56 | 1.97 | 2.29 | 2.96 | 1.12 | 1.63 | 1.84 | 1.66 | 1.66 |
| Cd | µg/g | 0.15 | 1.5 | 2 | 0.24 | 0.14 | 0.38 | 0.51 | 1.26 | 1.16 | 1.07 | 0.25 | 0.25 | ***7.99*** | ***2.92*** | ***15.3*** | ***7.81*** | ***12.3*** |
| Ce | µg/g | 66.5 | 665 | N/A | 39.4 | 19.2 | 37.1 | 26.3 | 30.3 | 20.5 | 32.5 | 34.5 | 40.9 | 29.2 | 34.6 | 29.8 | 38 | 22.8 |
| Co | µg/g | 25 | 250 | 50 | 13.4 | 9.8 | 17.5 | 12 | 11.8 | 8.9 | 14.9 | 15.2 | 14.6 | 10.8 | 9.8 | 14.8 | 9.9 | 10.8 |
| Cr | µg/g | 102 | 1020 | N/A | 91 | 69 | 112 | 90 | 110 | 77 | 104 | 84 | 137 | 84 | 86 | 107 | 83 | 85 |
| Cs | µg/g | ND | ND | N/A | 10 | 5.79 | 11 | 15 | 12 | 6.08 | 21 | 22 | 17 | 13 | 8 | 9 | 10 | 9 |
| Cu | µg/g | 60 | 600 | 150 | 18.2 | 19.8 | 30.4 | 32.3 | 29.8 | 31.9 | 30.5 | 26.6 | 34.4 | 44.4 | 33.6 | 52.6 | 107 | 97.9 |
| Fe | % | 5.63 | 56.3 | N/A | 4.07 | 2.6 | 4.66 | 3.8 | 3.74 | 2.82 | 4.19 | 4.42 | 4.58 | 3.84 | 3.19 | 4.96 | 3.2 | 2.93 |
| Ga | µg/g | 19 | 190 | N/A | 18.9 | 4.7 | 19.6 | 19.3 | 17 | 4.7 | 17.3 | 19.3 | 19.1 | 19.1 | 17.3 | 18.8 | 20.9 | 19.6 |
| Hf | µg/g | 3 | 30 | N/A | 0.63 | 0.15 | 0.82 | 0.64 | 0.65 | <0.05 | 0.72 | 0.65 | 0.9 | 0.66 | 0.71 | 0.54 | 0.66 | 0.46 |
| Hg | µg/g | 85 | 850 | 15 | ND | 0.03 | ND | ND | ND | 0.1 | ND | ND | ND | ND | ND | ND | ND | ND |
| In | µg/g | 0.25 | 2.5 | N/A | 0.07 | 0.03 | 0.08 | 0.07 | 0.13 | 0.08 | 0.11 | 0.08 | 0.09 | 0.18 | 0.13 | 0.2 | 0.18 | 0.26 |
| K | % | 2.085 | 20.85 | N/A | 1.76 | 0.21 | 1.5 | 1.9 | 1.58 | 0.2 | 1.8 | 1.85 | 2.02 | 2.71 | 1.74 | 1.86 | 2.2 | 2.25 |
| La | µg/g | 39 | 390 | N/A | 18.8 | 10.7 | 17.3 | 12.6 | 15 | 11.3 | 15.8 | 16.5 | 18.3 | 14.9 | 16.9 | 14.8 | 18.2 | 11.1 |
| Lu | µg/g | ND | ND | N/A | 0.36 | 0.15 | 0.4 | 0.34 | 0.31 | 0.15 | 0.32 | 0.38 | 0.39 | 0.27 | 0.31 | 0.35 | 0.28 | 0.22 |
| Li | µg/g | ND | ND | N/A | 15 | 10 | 13 | 22 | 17 | 9 | 15 | 13 | 11 | 30 | 24 | 28 | 26 | 22 |
| Mg | % | 2.33 | 23.3 | N/A | 1.54 | 0.72 | 1.53 | 0.61 | 1.14 | 0.63 | 1.05 | 1.18 | 1.54 | 0.48 | 0.68 | 1.36 | 0.71 | 0.58 |
| Mn | µg/g | 950 | 9500 | N/A | 981 | 537 | 1100 | 1150 | 776 | 504 | 982 | 938 | 913 | 3380 | 1410 | 2310 | 1500 | 1880 |
| Mo | µg/g | 1.2 | 12 | 10 | 1.49 | 1.04 | 3.58 | 3.3 | 1.7 | 1.33 | 1.67 | 1.5 | 4.81 | 1.65 | 2.37 | 1.84 | 3.61 | 3.3 |
| Na | % | 2.355 | 23.55 | N/A | 2.5 | 0.07 | 2.4 | 0.79 | 2.04 | 0.04 | 1.9 | 2.37 | 2.52 | 0.66 | 1.78 | 1.8 | 1.96 | 2.03 |
| Nb | µg/g | 20 | 200 | N/A | 6.3 | 0.34 | 7.2 | 6.1 | 5.8 | 1.01 | 5.3 | 6.1 | 8.5 | 5.6 | 6.2 | 5.2 | 5.7 | 5.4 |
| Ni | µg/g | 84 | 840 | 100 | 12.5 | 9.6 | 20.2 | 11.1 | 10.9 | 8.9 | 13.4 | 11.4 | 23.9 | 6.3 | 8.5 | 9.2 | 5.8 | 6.4 |
| P | µg/g | 0.105 | 1.05 | N/A | 0.098 | 0.086 | 0.121 | 0.086 | 0.079 | 0.073 | 0.081 | 0.119 | 0.179 | 0.106 | 0.09 | 0.12 | 0.08 | 0.091 |
| Pb | µg/g | 14 | 140 | 250 | 15 | 5.8 | 16.2 | 23.6 | 281 | 275 | 190 | 16.6 | 21.6 | ***313*** | 115 | ***466*** | 120 | ***396*** |
| Rb | µg/g | 90 | 900 | N/A | 57.9 | 11.2 | 50.1 | 58.7 | 62.5 | 14.3 | 68.1 | 65 | 65.7 | 148 | 85.7 | 78.8 | 104 | 91.8 |
| S | µg/g | 0.035 | 0.35 | N/A | 0.21 | 0.25 | 0.22 | 0.13 | 0.19 | 0.24 | 0.08 | 0.14 | 0.5 | 0.17 | 0.26 | 0.34 | 0.33 | 0.5 |
| Sb | µg/g | 0.2 | 2 | 20 | **4.8** | 1.54 | **10.2** | ***25.5*** | ***64.2*** | ***41.2*** | ***50*** | **12.7** | **10.4** | ***60.9*** | ***34.8*** | ***119*** | ***38.3*** | ***26.2*** |
| Sc | µg/g | 22 | 220 | N/A | 22.3 | 8 | 25.1 | 20.5 | 18 | 7.5 | 21.1 | 24.5 | 25 | 13.8 | 15.7 | 22.1 | 10.8 | 10.4 |
| Se | µg/g | 0.05 | 0.5 | 3 | <2 | <1 | <2 | <2 | <2 | <1 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| Sn | µg/g | 2.3 | 23 | 50 | 1.6 | 0.5 | 1.7 | 1.4 | 1.5 | 0.5 | 1.4 | 1.4 | 1.8 | 1.6 | 4.8 | 1.6 | 1.3 | 1.3 |
| Sr | µg/g | 370 | 3700 | N/A | 498 | 29.8 | 489 | 245 | 398 | 19.8 | 371 | 404 | 501 | 161 | 176 | 225 | 480 | 465 |
| Ta | µg/g | 2 | 20 | N/A | 0.64 | 0.06 | 0.59 | 0.51 | 0.56 | <0.05 | 0.49 | 0.52 | 0.61 | 0.43 | 0.65 | 0.39 | 0.43 | 0.57 |
| Tb | µg/g | ND | ND | N/A | 0.72 | 0.3 | 0.82 | 0.63 | 0.6 | 0.3 | 0.63 | 0.77 | 0.85 | 0.52 | 0.6 | 0.66 | 0.54 | 0.41 |
| Te | µg/g | ND | ND | N/A | <0.05 | <0.05 | <0.05 | <0.05 | 0.06 | 0.08 | 0.06 | <0.05 | <0.05 | <0.05 | 0.07 | 0.06 | 0.12 | 0.11 |
| Th | µg/g | 9.6 | 96 | N/A | 4.8 | 2.7 | 4.7 | 3.7 | 4.5 | 2.7 | 4.2 | 4.7 | 5 | 3.7 | 4.6 | 4 | 6.9 | 2.6 |
| Ti | % | 0.565 | 5.65 | N/A | 0.36 | 0.13 | 0.42 | 0.34 | 0.29 | 0.1 | 0.32 | 0.38 | 0.39 | 0.26 | 0.29 | 0.38 | 0.21 | 0.21 |
| Tl | µg/g | 0.85 | 8.5 | N/A | 0.55 | 0.18 | 0.78 | 1.16 | 0.78 | 0.33 | 0.8 | 0.56 | 0.55 | 3.33 | 1.79 | 1.56 | 1.48 | 1.45 |
| U | µg/g | 2.7 | 27 | N/A | 1.36 | 0.42 | 1.67 | 1.55 | 1.32 | 0.54 | 1.23 | 1.32 | 1.68 | 1.31 | 1.32 | 1.21 | 2.04 | 1 |
| V | µg/g | 120 | 1200 | 200 | 130 | 60 | 159 | 126 | 97 | 54 | 133 | 150 | 166 | 98 | 88 | 150 | 66 | 70 |
| W | µg/g | 1.25 | 12.5 | N/A | 0.6 | 0.1 | 1.3 | 3.7 | 1 | 0.2 | 1.6 | 1.6 | 0.7 | 2.5 | 5.3 | 2.3 | 1.7 | 2.1 |
| Zn | µg/g | 70 | 700 | 300 | 79 | 49 | 105 | 103 | 146 | 130 | 141 | 95 | 100 | **825** | 301 | **953** | **810** | **1230** |
| Zr | µg/g | 165 | 1650 | N/A | 14.8 | 2.9 | 16.8 | 12.5 | 19.2 | 1.2 | 22.4 | 14.7 | 18 | 24.3 | 23.8 | 15.8 | 16.8 | 11.4 |
| Y | µg/g | 33 | 330 | N/A | 21.4 | 8.9 | 24.3 | 19.9 | 18.5 | 9.1 | 19.1 | 22.7 | 23.9 | 15.4 | 17.9 | 20.1 | 16.4 | 12.8 |
| Yb | µg/g | 3.2 | 32 | N/A | 2.2 | 0.9 | 2.5 | 2.1 | 1.9 | 0.8 | 2 | 2.4 | 2.5 | 1.7 | 2 | 2.2 | 1.6 | 1.3 |

**Note:**

Bold exceeds 10 times average crustal abundance values

Bold and italic exceeds CSR values

Bold, italic, and underscore exceeds 10 times average crustal abundance and CSR values.

ND= No data

Strong acid digestion method was used on all samples

* Aqua regia digestion method was used on this sample

**Price (1997)

**Table D2-12 : Metal Testing Results of Borrow Area Samples**

| Parameter | Unit | Comparison Guidelines | | | TP-BA-13-03 | TP-BA-13-03 | TP-BA-13-03 | TP-BA-13-03 | TP-BA-13-04 | TP-BA-13-04 | TP-BA-13-04 | TP-BA-13-04 | TP-BA-13-05 | TP-BA-13-05 | TP-BA-13-05 | TP-BA-13-05 | TP-BA-13-06 | TP-BA-13-07 | TP-BA-13-07 | TP-BA-13-08 | HA-BA-13-01 | HA-BA-13-01 | HA-BA-13-02 | HA-BA-13-02 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | ARD-01 | ARD-02 | ARD-03 | ARD-04 | ARD-01 | ARD-02 | ARD-03 | ARD-04 | ARD-01 | ARD-02 | ARD-03 | ARD-04 | ARD-01 | ARD-01 | ARD-02 | ARD-01 | ARD-02 | ARD-03 | ARD-01 | ARD-02 |
| | | | | | Sample Interval (m) | | | | | | | | | | | | | | | | | | | |
| | | Average Concentration (Continental Crustal)** | Ten Times Average Concentration (Crustal) | Yukon Contaminated Site Regulation O.I.C. 2002/171 | 1.0 - 1.1 | 2.0 - 2.1 | 3.5 - 3.6 | 5.0 - 5.1 | 1.0 - 1.1 | 2.0 - 2.1 | 3.0 - 3.1 | 4.5 - 4.6 | 1.0 - 1.1 | 2.0 - 2.1 | 3.5 - 3.6 | 5.0 - 5.1 | 1.0 - 1.1 | 0.5 - 0.6 | 1.1 - 1.2 | 1.0 - 1.1 | 1.0 - 2.0 | 2.0 - 3.0 | 0 - 1.0 | 2.0 - 3.0 |
| Ag | µg/g | 75 | 750 | 20 | <0.02 | <0.02 | 0.05 | <0.02 | 0.24 | 0.22 | <0.02 | 0.14 | 0.12 | 0.89 | 0.05 | <0.02 | 0.76 | 0.26 | 0.39 | 0.4 | <0.02 | <0.02 | 0.32 | 0.89 |
| Al | % | 8.23 | 82.3 | N/A | 6.1 | 6.25 | 6.75 | 6.67 | 6.78 | 6.31 | 6.25 | 6.49 | 6.26 | 6.28 | 6.45 | 6.2 | 7.44 | 7.46 | 8.36 | 6.93 | 6.56 | 6.87 | 6.61 | 6.76 |
| As | µg/g | 1.8 | 18 | 20 | 12 | 8 | ***91*** | ***43*** | ***95*** | 13 | 13 | ***52*** | 16 | ***94*** | ***70*** | ***27*** | ***310*** | 16 | ***165*** | ***168*** | 4 | 5 | 6 | 5 |
| Ba | µg/g | 425 | 4250 | 500 | ***1060*** | ***1130*** | ***1140*** | ***1140*** | ***1140*** | ***1090*** | ***1190*** | ***1180*** | ***1160*** | ***1170*** | ***1230*** | ***1150*** | ***1250*** | ***2270*** | ***1590*** | ***1100*** | ***1060*** | ***1070*** | ***1070*** | ***1040*** |
| Be | µg/g | 3 | 30 | 4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.3 | 1.4 | 1.2 | 1.3 | 1.3 | 1.4 | 1.2 | 1.2 | 2.2 | 1.9 | 2 | 1.8 | 1.3 | 1.3 | 1.3 | 1.3 |
| Bi | µg/g | 0.0085 | 0.085 | N/A | 0.07 | 0.07 | **0.09** | 0.15 | 0.11 | 0.07 | 0.06 | 0.08 | 0.07 | 0.08 | 0.09 | 0.09 | **0.43** | **0.16** | **0.28** | **0.17** | **0.11** | 0.07 | 0.08 | **0.4** |
| Ca | % | 4.15 | 41.5 | N/A | 1.77 | 1.72 | 1.63 | 1.59 | 1.55 | 1.66 | 1.7 | 1.54 | 1.59 | 1.41 | 1.49 | 1.71 | 0.14 | 0.3 | 0.3 | 2.25 | 2.15 | 2.24 | 2.16 | 2.22 |
| Cd | µg/g | 0.15 | 1.5 | 2 | 0.11 | 0.09 | 0.36 | 0.25 | 0.35 | 0.11 | 0.12 | 0.31 | 0.13 | 0.52 | 0.32 | 0.19 | ***4.56*** | ***2.84*** | ***2.74*** | 0.47 | 0.12 | 0.12 | 0.14 | 0.13 |
| Ce | µg/g | 66.5 | 665 | N/A | 35.1 | 28.8 | 38.5 | 35.8 | 32.1 | 30.9 | 28.1 | 28.9 | 33.7 | 28.4 | 32.8 | 33 | 58.7 | 31 | 66.2 | 45 | 31.9 | 30.9 | 34.9 | 33.3 |
| Co | µg/g | 25 | 250 | 50 | 5 | 4.6 | 6.1 | 5.6 | 6.8 | 4.9 | 4.1 | 4.4 | 5 | 4.8 | 4.7 | 5.1 | 9.9 | 7.5 | 22.5 | 13.9 | 5.7 | 5.8 | 5.7 | 5.9 |
| Cr | µg/g | 102 | 1020 | N/A | 116 | 96 | 113 | 106 | 117 | 101 | 113 | 115 | 117 | 107 | 108 | 119 | 187 | 73 | 213 | 166 | 99 | 112 | 119 | 109 |
| Cs | µg/g | ND | ND | N/A | 1 | 1 | 3 | 2 | 3 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 12 | 7 | 13 | 15 | 1 | 1 | 1 | 1 |
| Cu | µg/g | 60 | 600 | 150 | 7.6 | 6 | 11.6 | 10.2 | 21.9 | 9.2 | 6.5 | 9.1 | 6.4 | 9.8 | 11.5 | 8.7 | 53.5 | 18.1 | 69.5 | 39.3 | 6.4 | 5.7 | 5.3 | 6 |
| Fe | % | 5.63 | 56.3 | N/A | 1.56 | 1.28 | 2.12 | 1.75 | 2.11 | 1.47 | 1.32 | 1.42 | 1.55 | 1.49 | 1.57 | 1.62 | 3.34 | 2.23 | 4.76 | 3.48 | 1.57 | 1.7 | 1.57 | 1.65 |
| Ga | µg/g | 19 | 190 | N/A | 13.4 | 13.8 | 14.6 | 14.2 | 14.3 | 13.8 | 13.4 | 13.1 | 13.8 | 14.8 | 13.9 | 13.7 | 20.5 | 17.9 | 22.6 | 18.2 | 13.6 | 13.9 | 14 | 14 |
| Hf | µg/g | 3 | 30 | N/A | 0.93 | 0.66 | 0.71 | 0.8 | 0.59 | 0.66 | 0.56 | 0.55 | 0.59 | 0.58 | 0.55 | 0.6 | 0.88 | 0.88 | 0.72 | 0.43 | 0.65 | 0.84 | 0.63 | 0.71 |
| Hg | µg/g | 85 | 850 | 15 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| In | µg/g | 0.25 | 2.5 | N/A | 0.03 | 0.02 | 0.04 | 0.03 | 0.03 | 0.03 | <0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.19 | 0.06 | 0.1 | 0.07 | 0.03 | 0.03 | 0.03 | 0.03 |
| K | % | 2.085 | 20.85 | N/A | 1.58 | 1.67 | 1.74 | 1.84 | 1.71 | 1.64 | 1.71 | 1.76 | 1.66 | 1.71 | 1.76 | 1.67 | 2.69 | 2.54 | 2.68 | 2.25 | 1.64 | 1.67 | 1.65 | 1.63 |
| La | µg/g | 39 | 390 | N/A | 19.1 | 15.2 | 20.6 | 19.7 | 16.6 | 16.5 | 15.3 | 16 | 18.3 | 15.7 | 18.4 | 18.2 | 31.4 | 16.8 | 34.2 | 23.6 | 16.2 | 15.8 | 17.4 | 16.9 |
| Lu | µg/g | ND | ND | N/A | 0.18 | 0.16 | 0.21 | 0.21 | 0.2 | 0.18 | 0.15 | 0.15 | 0.17 | 0.16 | 0.16 | 0.17 | 0.35 | 0.16 | 0.18 | 0.2 | 0.17 | 0.18 | 0.16 | 0.2 |
| Li | µg/g | ND | ND | N/A | 10 | 10 | 12 | 12 | 11 | 10 | 9 | 10 | 9 | 13 | 11 | 10 | 12 | 21 | 13 | 26 | 10 | 10 | 10 | 10 |
| Mg | % | 2.33 | 23.3 | N/A | 0.43 | 0.38 | 0.45 | 0.45 | 0.45 | 0.42 | 0.33 | 0.33 | 0.37 | 0.34 | 0.35 | 0.4 | 0.29 | 0.44 | 0.31 | 0.37 | 0.57 | 0.59 | 0.58 | 0.61 |
| Mn | µg/g | 950 | 9500 | N/A | 308 | 263 | 360 | 324 | 623 | 304 | 274 | 301 | 325 | 281 | 327 | 330 | 331 | 467 | 957 | 946 | 344 | 352 | 336 | 345 |
| Mo | µg/g | 1.2 | 12 | 10 | 5.22 | 4.8 | 5.2 | 5.09 | 5.39 | 6.27 | 5.7 | 5.55 | 5.85 | 5.64 | 5.31 | 5.51 | ***15.6*** | 5.61 | 7.38 | 6.9 | 3.88 | 4.15 | 4.2 | 4.19 |
| Na | % | 2.355 | 23.55 | N/A | 2.06 | 2.15 | 1.89 | 1.9 | 1.99 | 2.1 | 2.17 | 2.02 | 2.14 | 1.86 | 1.96 | 2.16 | 0.1 | 0.17 | 0.1 | 0.38 | 2.32 | 2.31 | 2.34 | 2.18 |
| Nb | µg/g | 20 | 200 | N/A | 6.9 | 5.9 | 6.9 | 6.8 | 5.8 | 5.8 | 5.2 | 5.4 | 6.2 | 5.8 | 5.1 | 6.4 | 10.3 | 9.7 | 9.5 | 9.8 | 6.2 | 6.4 | 6.3 | 6.4 |
| Ni | µg/g | 84 | 840 | 100 | 8.6 | 7.6 | 9.8 | 8.7 | 10.3 | 8.6 | 7.3 | 8 | 8.5 | 8.5 | 8.6 | 8.3 | 66.5 | 29.8 | 78.7 | 52.4 | 9.8 | 9.9 | 10 | 10.3 |
| P | µg/g | 0.105 | 1.05 | N/A | 0.036 | 0.029 | 0.043 | 0.037 | 0.042 | 0.031 | 0.027 | 0.029 | 0.029 | 0.037 | 0.033 | 0.035 | 0.064 | 0.064 | 0.09 | 0.074 | 0.042 | 0.043 | 0.042 | 0.043 |
| Pb | µg/g | 14 | 140 | 250 | 12.2 | 11.9 | 34.2 | 21.8 | 25.1 | 12.1 | 12.8 | 21.5 | 12.8 | 53.5 | 19.5 | 13.4 | 26.9 | 27.3 | 19.3 | 20.4 | 11.7 | 11.2 | 11.7 | 11.7 |
| Rb | µg/g | 90 | 900 | N/A | 48.8 | 51.6 | 58 | 61.6 | 54.8 | 50.9 | 52.4 | 53.4 | 53.1 | 54.8 | 55.7 | 51.1 | 131 | 80.7 | 116 | 93.5 | 50.3 | 48.4 | 50.5 | 50.2 |
| S | µg/g | 0.035 | 0.35 | N/A | <0.01 | <0.01 | 0.01 | 0.01 | 0.01 | 0.03 | 0.01 | 0.01 | <0.01 | 0.01 | 0.01 | <0.01 | 0.06 | 0.08 | 0.03 | 0.04 | <0.01 | <0.01 | <0.01 | 0.01 |
| Sb | µg/g | 0.2 | 2 | 20 | 1.21 | 0.95 | **6.28** | **5.29** | 8 | 1.25 | 1.79 | **3.86** | 1.59 | **18.1** | **4.3** | **2.84** | **18.4** | **2.77** | **11.1** | **10.1** | 0.8 | 0.78 | 0.83 | 0.76 |
| Sc | µg/g | 22 | 220 | N/A | 7 | 6 | 8.9 | 8.3 | 9.6 | 6.8 | 5.5 | 5.9 | 6.4 | 6.3 | 6.8 | 7 | 16 | 9.6 | 23.3 | 14.4 | 7.9 | 8.1 | 8 | 8.7 |
| Se | µg/g | 0.05 | 0.5 | 3 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | ***5*** | <2 | 3 | <2 | <2 | <2 | <2 | <2 |
| Sn | µg/g | 2.3 | 23 | 50 | 0.8 | 0.9 | 1 | 0.9 | 0.9 | 0.8 | 0.7 | 0.7 | 0.8 | 0.8 | 0.7 | 0.9 | 1.8 | 1.3 | 2.1 | 1.6 | 1.1 | 0.9 | 0.9 | 0.9 |
| Sr | µg/g | 370 | 3700 | N/A | 470 | 482 | 418 | 385 | 406 | 471 | 508 | 464 | 460 | 429 | 435 | 455 | 50.6 | 268 | 164 | 84.5 | 467 | 482 | 463 | 483 |
| Ta | µg/g | 2 | 20 | N/A | 0.56 | 0.44 | 0.49 | 0.49 | 0.39 | 0.39 | 0.33 | 0.34 | 0.4 | 0.4 | 0.34 | 0.41 | 0.66 | 0.66 | 0.52 | 0.59 | 0.51 | 0.54 | 0.49 | 0.52 |
| Tb | µg/g | ND | ND | N/A | 0.39 | 0.35 | 0.45 | 0.41 | 0.41 | 0.37 | 0.3 | 0.3 | 0.37 | 0.33 | 0.33 | 0.38 | 0.86 | 0.32 | 0.74 | 0.6 | 0.4 | 0.4 | 0.43 | 0.42 |
| Te | µg/g | ND | ND | N/A | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.18 | 0.22 | 0.22 | 0.06 | <0.05 | <0.05 | <0.05 | <0.05 |
| Th | µg/g | 9.6 | 96 | N/A | 4.6 | 4.1 | 5.4 | 5.7 | 3.7 | 4.2 | 3.8 | 4.1 | 4.5 | 3.9 | 4.7 | 4.4 | 10.4 | 5.7 | 10.9 | 7.1 | 4.3 | 4.6 | 5.1 | 5.1 |
| Ti | % | 0.565 | 5.65 | N/A | 0.18 | 0.14 | 0.2 | 0.18 | 0.19 | 0.16 | 0.13 | 0.14 | 0.16 | 0.15 | 0.15 | 0.18 | 0.28 | 0.15 | 0.38 | 0.3 | 0.18 | 0.19 | 0.19 | 0.19 |
| Tl | µg/g | 0.85 | 8.5 | N/A | 0.34 | 0.34 | 0.61 | 0.55 | 0.59 | 0.35 | 0.38 | 0.45 | 0.36 | 0.51 | 0.53 | 0.39 | 1.61 | 1.03 | 1.41 | 1.07 | 0.31 | 0.31 | 0.31 | 0.33 |
| U | µg/g | 2.7 | 27 | N/A | 1 | 0.93 | 1.25 | 1.25 | 1.03 | 0.92 | 0.9 | 0.91 | 0.94 | 0.97 | 0.97 | 1.01 | 3.39 | 1.77 | 3.38 | 2.06 | 1.08 | 1.17 | 1.09 | 1.13 |
| V | µg/g | 120 | 1200 | 200 | 47 | 37 | 63 | 59 | 62 | 42 | 36 | 43 | 45 | 49 | 52 | 50 | ***357*** | 79 | ***267*** | 136 | 47 | 48 | 48 | 50 |
| W | µg/g | 1.25 | 12.5 | N/A | 0.5 | 0.5 | 0.8 | 0.5 | 0.7 | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 | 0.6 | 0.5 | 1.4 | 0.5 | 1.8 | 1.3 | 0.7 | 0.7 | 0.9 | 0.7 |
| Zn | µg/g | 70 | 700 | 300 | 30 | 25 | 66 | 46 | 67 | 31 | 25 | 44 | 28 | 45 | 56 | 39 | **427** | 254 | **452** | 131 | 31 | 31 | 30 | 32 |
| Zr | µg/g | 165 | 1650 | N/A | 23.1 | 19.6 | 24.6 | 23.8 | 19.2 | 20.2 | 17.8 | 18.6 | 20.6 | 19.7 | 21.4 | 23.9 | 59.9 | 30.2 | 29.1 | 44.4 | 21.2 | 25.8 | 24.4 | 23.7 |
| Y | µg/g | 33 | 330 | N/A | 11.3 | 10.2 | 13 | 11.7 | 12.3 | 11.4 | 9.5 | 9 | 10.9 | 10 | 9.8 | 11.4 | 20.6 | 9.7 | 14.6 | 14.6 | 11 | 11.5 | 11.5 | 11.8 |
| Yb | µg/g | 3.2 | 32 | N/A | 1.1 | 0.9 | 1.2 | 1.2 | 1.2 | 1 | 0.9 | 0.8 | 1 | 1 | 0.9 | 1 | 2.1 | 0.8 | 1.1 | 1.3 | 1.1 | 1.1 | 1.1 | 1.1 |

**Note:**

Bold exceeds 10 times average crustal abundance values

Bold and italic exceeds CSR values

Bold, italic, and underscore exceeds 10 times average crustal abundance and CSR values.

ND= No data

Strong acid digestion method was used on all samples

* Aqua regia digestion method was used on this sample

**Price (1997)

## Table D2-13 : Metal and Cyanide Testing Results of Tailings Samples

| Parameter | Unit | Comparison Guidelines | | | TP-T-13-02 | TP-T-13-04 | TP-T-13-04 | TP-T-13-04 | TP-T-13-06 |
|---|---|---|---|---|---|---|---|---|---|
| | | Average Concentration (Continental Crustal)** | Ten Times Average Concentration (Crustal) | Yukon Contaminated Site Regulation O.I.C. 2002/171 | GS2 1.0 m | GS1 1.0 m | GS1 1.0 m Duplicate | GS5 3.0 - 3.1 m | GS1 0.8 m |
| Moisture | | NA | NA | NA | 34.9 | 19.7 | 19.1 | 34.5 | 24.1 |
| pH (1:2 soil:water) | | NA | NA | NA | 7.81 | 2.86 | 2.40 | 8.83 | 7.78 |
| Cyanide, Weak Acid Diss. | mg/kg | NA | NA | NA | 0.156 | 0.192 | <0.50 | <0.050 | 0.083 |
| Cyanide, Total | mg/kg | NA | NA | NA | 54.1 | 36.8 | 58.9 | 0.233 | 6.92 |
| Antimony (Sb) | mg/kg | 0.2 | 2 | 20 | ***436*** | ***415*** | ***412*** | ***529*** | ***164*** |
| Arsenic (As) | mg/kg | 1.8 | 18 | 20 | ***3450*** | ***5620*** | ***4890*** | ***4990*** | ***1650*** |
| Barium (Ba) | mg/kg | 425 | 4250 | 500 | 137 | 62.3 | 73.8 | 201 | 75.6 |
| Beryllium (Be) | mg/kg | 3 | 30 | 4 | 0.51 | <0.20 | <0.20 | 0.31 | 0.25 |
| Cadmium (Cd) | mg/kg | 0.15 | 1.5 | 2 | ***42.2*** | ***21.0*** | ***10.8*** | ***12.3*** | ***20.0*** |
| Chromium (Cr) | mg/kg | 102 | 1020 | NA | 11.1 | 5.60 | 5.08 | 11.0 | 9.49 |
| Cobalt (Co) | mg/kg | 25 | 250 | 50 | 5.85 | 2.49 | 2.21 | 3.55 | 5.71 |
| Copper (Cu) | mg/kg | 60 | 600 | 150 | ***485*** | ***386*** | ***344*** | ***157*** | ***192*** |
| Lead (Pb) | mg/kg | 14 | 140 | 250 | ***2550*** | ***2300*** | ***1770*** | ***2620*** | ***974*** |
| Mercury (Hg) | mg/kg | 85 | 850 | 15 | 0.397 | 0.230 | 0.222 | 0.641 | 0.179 |
| Molybdenum (Mo) | mg/kg | 1.2 | 12 | 10 | 1.77 | 1.00 | 1.06 | 1.60 | 0.97 |
| Nickel (Ni) | mg/kg | 84 | 840 | 100 | 5.52 | 1.76 | 1.76 | 4.53 | 5.14 |
| Selenium (Se) | mg/kg | 0.05 | 0.5 | 3 | 0.36 | 0.96 | 0.60 | 0.54 | <0.20 |
| Silver (Ag) | mg/kg | 75 | 750 | 20 | ***32.8*** | ***39.7*** | ***44.4*** | ***37.0*** | ***20.4*** |
| Thallium (Tl) | mg/kg | 9.6 | 96 | | 1.28 | 0.857 | 0.769 | 2.01 | 0.565 |
| Tin (Sn) | mg/kg | 2.3 | 23 | 50 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| Uranium (U) | mg/kg | 2.7 | 27 | | 0.968 | 0.548 | 0.430 | 0.629 | 0.551 |
| Vanadium (V) | mg/kg | 120 | 1200 | 200 | 21.3 | 12.7 | 12.2 | 23.0 | 19.6 |
| Zinc (Zn) | mg/kg | 70 | 700 | 300 | ***2890*** | ***685*** | ***547*** | ***1060*** | ***1470*** |

**Note:**

Bold exceeds 10 times average crustal abundance values

Bold and italic exceeds CSR values

Bold, italic, and underscore exceeds 10 times average crustal abundance and CSR values.

ND= No data

Strong acid digestion method was used on all samples

*Price (1997)

**Table D2-14 : Metal and Cyanide Testing Results of Sediment Samples**

| Parameter | Unit | Yukon Contaminated Site Regulation O.I.C. 2002/171 | SED-DC-1 | SED-DC-2 | SED-DC-3 | SED-DC-4 | SED-DC-5 | SED-DC-6 | SED-DC-7 | SED-DC-8 | SED-DC-9 | SED-DC-10 | SED-DC-11 | SED-DC-12 | SED-DC-13 | SED-DC-14 | SED-DC-15 | SED-DC-16 | SED-DC-17 | SED-DC-18 | SED-DC-19 | SED-DC-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Moisture | % | NA | 19.8 | 22.3 | 20.5 | 20.7 | 20.0 | 23.5 | 17.6 | 19.0 | 19.3 | 21.6 | 56.9 | 56.5 | 12.4 | 13.5 | 15.7 | 19.6 | 25.9 | 19.1 | 11.5 | 26.4 |
| pH (1:2 soil:water) | | NA | 7.66 | 7.14 | 7.75 | 7.70 | 7.40 | 6.59 | 8.41 | 7.44 | 7.88 | 7.90 | 7.87 | 7.69 | 7.96 | 7.26 | 8.00 | 7.95 | 7.58 | 7.06 | 7.20 | 7.38 |
| MUST PSA % > 75 µm | % | NA | 79.9 | 67.8 | 88.9 | 78.2 | 87.5 | 82.0 | 91.8 | 95.4 | 95.2 | 85.1 | 41.4 | 52.5 | 97.9 | 93.0 | 87.5 | 79.7 | 81.3 | 91.0 | 92.6 | 30.6 |
| Total Kjeldahl Nitrogen | % | NA | 0.029 | 0.107 | <0.020 | 0.034 | 0.021 | 0.028 | <0.020 | <0.020 | <0.020 | <0.020 | 0.198 | 0.220 | <0.020 | <0.020 | 0.020 | 0.059 | 0.050 | 0.025 | <0.020 | 0.339 |
| Sulphate (SO4) | mg/L | NA | 46.0 | 56.6 | 44.4 | 43.4 | 46.1 | 57.1 | <0.50 | 47.0 | 29.2 | 37.1 | 148 | 130 | 18.3 | 19.3 | 28.5 | 37.0 | 52.7 | 21.3 | 27.3 | 80.1 |
| Total Carbon by Combustion | % | NA | 0.5 | 2.2 | 0.4 | 0.6 | 0.4 | 0.5 | 0.2 | 0.2 | 0.2 | 0.4 | 5.2 | 4.5 | 0.2 | 0.4 | 0.4 | 1.4 | 1.0 | 0.6 | 0.5 | 6.7 |
| Total Organic Carbon | % | NA | 0.49 | 2.11 | 0.33 | 0.59 | 0.36 | 0.47 | 0.14 | 0.14 | 0.16 | 0.27 | 4.88 | 4.36 | 0.15 | 0.43 | 0.38 | 1.33 | 0.95 | 0.55 | 0.45 | 6.59 |
| Nitrogen | % | NA | 0.054 | 0.126 | 0.021 | 0.043 | 0.027 | 0.036 | <0.020 | <0.020 | 0.033 | 0.021 | 0.216 | 0.232 | <0.020 | 0.025 | 0.027 | 0.072 | 0.058 | 0.032 | 0.028 | 0.321 |
| Cyanide, Weak Acid Diss. | mg/kg | NA | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| Cyanide, Total | mg/kg | 50 | <0.050 | 0.107 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 9.12 | 0.434 | <0.050 | 0.224 | 0.071 | 0.122 | 0.059 | <0.050 | 0.053 | 0.146 |
| Antimony (Sb) | mg/kg | 20 | 0.67 | 0.78 | 0.68 | 0.89 | 0.97 | 0.59 | 0.25 | 0.42 | 0.43 | 0.50 | 2.91 | 2.16 | 0.58 | 0.98 | 3.24 | 3.58 | 1.31 | 1.02 | 1.26 | 2.76 |
| Arsenic (As) | mg/kg | 20 | 14.9 | 15.2 | 12.0 | **34.8** | 15.0 | 18.3 | 3.98 | 14.3 | 10.0 | 14.0 | **926** | **110** | 19.2 | **73.6** | **37.3** | **156** | **32.4** | **29.5** | **27.8** | **210** |
| Barium (Ba) | mg/kg | 500 | 74.8 | 55.2 | 47.5 | 48.4 | 50.6 | 57.2 | 60.1 | 40.6 | 41.7 | 48.1 | 228 | 120 | 51.4 | 41.4 | 46.1 | 71.5 | 59.5 | 53.0 | 40.3 | 88.8 |
| Beryllium (Be) | mg/kg | 4 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.29 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.21 |
| Cadmium (Cd) | mg/kg | 2 | 0.151 | 0.142 | 0.107 | 0.179 | 0.112 | 0.115 | 0.061 | 0.059 | 0.057 | 0.094 | **3.96** | 0.759 | 0.147 | 0.185 | 0.324 | 0.292 | 0.275 | 0.145 | 0.211 | 0.650 |
| Chromium (Cr) | mg/kg | NA | 8.77 | 8.40 | 7.16 | 8.15 | 14.2 | 10.2 | 17.9 | 8.54 | 7.25 | 9.79 | 8.35 | 18.2 | 12.5 | 8.79 | 9.46 | 10.2 | 11.3 | 11.0 | 17.3 | 17.6 |
| Cobalt (Co) | mg/kg | 50 | 3.36 | 2.87 | 2.74 | 2.90 | 3.57 | 3.14 | 4.09 | 2.76 | 2.39 | 3.19 | 5.58 | 5.96 | 3.21 | 2.88 | 3.34 | 3.54 | 3.58 | 2.88 | 3.47 | 4.94 |
| Copper (Cu) | mg/kg | 150 | 4.11 | 4.58 | 2.81 | 3.51 | 4.81 | 4.72 | 5.00 | 4.41 | 4.02 | 5.09 | 41.5 | 22.0 | 6.03 | 8.93 | 9.05 | 8.04 | 8.02 | 7.04 | 7.77 | 13.4 |
| Lead (Pb) | mg/kg | 250 | 3.07 | 3.32 | 3.01 | 3.58 | 3.73 | 3.26 | 2.36 | 2.80 | 2.64 | 5.75 | 8.20 | 9.05 | 8.74 | 15.4 | 13.8 | 246 | 6.70 | 7.04 | 4.43 | 12.2 |
| Mercury (Hg) | mg/kg | 15 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| Molybdenum (Mo) | mg/kg | 10 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 1.31 | 0.52 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 |
| Nickel (Ni) | mg/kg | 100 | 5.85 | 5.39 | 4.60 | 4.96 | 6.05 | 6.14 | 6.74 | 4.87 | 4.50 | 6.25 | 6.95 | 12.4 | 5.47 | 4.77 | 5.80 | 6.61 | 6.85 | 5.35 | 6.14 | 9.02 |
| Selenium (Se) | mg/kg | 3 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | 0.41 | 0.44 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| Silver (Ag) | mg/kg | 20 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.93 | 0.22 | <0.10 | 0.10 | <0.10 | 0.30 | <0.10 | <0.10 | <0.10 | 0.20 |
| Sulphur (S)-Total | mg/kg | NA | 1800 | 1300 | 1800 | 1200 | 700 | 700 | 600 | 600 | <500 | <500 | 1400 | 1400 | <500 | 600 | <500 | 600 | 500 | <500 | <500 | 1900 |
| Thallium (Tl) | mg/kg | NA | 0.059 | 0.066 | <0.050 | <0.050 | <0.050 | 0.053 | <0.050 | <0.050 | <0.050 | <0.050 | 0.055 | 0.113 | <0.050 | <0.050 | <0.050 | 0.059 | 0.098 | <0.050 | <0.050 | 0.070 |
| Tin (Sn) | mg/kg | 50 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| Uranium (U) | mg/kg | NA | 0.393 | 0.397 | 0.318 | 0.336 | 0.429 | 0.342 | 0.438 | 0.325 | 0.269 | 0.365 | 0.889 | 0.727 | 0.387 | 0.291 | 0.345 | 0.332 | 0.383 | 0.294 | 0.407 | 0.503 |
| Vanadium (V) | mg/kg | 200 | 20.5 | 19.7 | 19.6 | 20.0 | 48.8 | 23.0 | 66.8 | 25.7 | 18.0 | 23.6 | 28.0 | 40.4 | 48.9 | 35.2 | 30.6 | 37.5 | 36.7 | 40.8 | 69.0 | 49.6 |
| Zinc (Zn) | mg/kg | 300 | 43.0 | 41.7 | 30.8 | 42.0 | 29.3 | 37.3 | 21.2 | 23.2 | 21.9 | 29.1 | 91.7 | 91.1 | 27.7 | 40.5 | 49.7 | 58.9 | 46.8 | 35.9 | 34.8 | 83.8 |

**Note:**

Bold exceeds CSR values

NA= Not Applicable

Strong acid digestion method was used on all samples

## Table D2-15 : Leachable Metal Testing Results of Native Soil Tailings Pond Samples

| Sample ID | Method | Units | Comparison Guideline | TP-T-13-02 | TP-T-13-04 | TP-T-13-06 | BH-T-13-01 | BH-T-13-01 | BH-T-13-02 | BH-T-13-02 | BH-T-13-03 | BH-T-13-03 | BH-T-13-04 | BH-T-13-04 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CCME | ARD-02 | ARD-02 | ARD-02 | ARD-01 | ARD-05 | ARD-01 | ARD-04 | ARD-02 | ARD-06 | ARD-02 | ARD-04 |
| | | | Water Quality Guideline For Protection Aquatic Life | Sample Interval (m) | | | | | | | | | | |
| | | | | 4.0 - 4.1 | 5.0 - 5.1 | 3.0 - 3.1 | 1.1 - 1.2 | 8.1 - 8.2 | 2.1 - 2.2 | 6.5 - 6.6 | 6.5 - 6.6 | 12.1 - 12.2 | 7.0 - 7.1 | 10.6 - 10.7 |
| **Parameter** | | | | | | | | | | | | | | |
| Volume Nanopure Water | | mL | | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 |
| Sample Weight | | g | | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| pH | meter | | 6.5-9.0 | **6.33** | 7.19 | 8.07 | 8.00 | 7.98 | 7.52 | 8.30 | 7.62 | 7.48 | 7.49 | 8.00 |
| Redox | meter | mV | | 259 | 330 | 317 | 347 | 344 | 350 | 311 | 349 | 304 | 335 | 320 |
| Conductivity | meter | uS/cm | | 418 | 213 | 159 | 420 | 272 | 347 | 417 | 192 | 128 | 2089 | 227 |
| Acidity (to pH 4.5) | titration | mg $CaCO_3$/L | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Total Acidity (to pH 8.3) | titration | mg $CaCO_3$/L | | 8.6 | 2.9 | 1.9 | 5.9 | 5.3 | 5.7 | 7.0 | 4.6 | 2.9 | 8.8 | 5.2 |
| Alkalinity | titration | mg $CaCO_3$/L | | 1.6 | 3.9 | 58.8 | 38.9 | 103.0 | 13.2 | 119.9 | 6.1 | 16.6 | 34.0 | 36.1 |
| Sulphate | Turbidity | mg/L | 100 | 145 | 58 | 10 | 156 | 26 | 133 | 84 | 63 | 32 | 1072 | 20 |
| **Ion Balance** | | | | | | | | | | | | | | |
| Major Anions | Calc | meq/L | | 3.05 | 1.29 | 1.38 | 4.03 | 2.60 | 3.04 | 4.15 | 1.44 | 1.00 | 23.01 | 1.14 |
| Major Cations | Calc | meq/L | | 3.31 | 1.77 | 1.55 | 4.14 | 3.07 | 3.33 | 4.59 | 1.70 | 1.16 | 26.74 | 2.01 |
| Difference | Calc | meq/L | | -0.26 | -0.48 | -0.16 | -0.11 | -0.46 | -0.29 | -0.45 | -0.26 | -0.16 | -3.72 | -0.87 |
| Balance (%) | Calc | % | | -4.1% | -15.8% | -5.6% | -1.3% | -8.2% | -4.6% | -5.1% | -8.3% | -7.6% | -7.5% | -27.7% |
| **Dissolved Metals** | | | | | | | | | | | | | | |
| Hardness CaCO3 | | mg/L | | 156 | 65.6 | 74.2 | 195 | 123 | 160 | 195 | 71.7 | 48.8 | 1280 | 95.2 |
| Aluminum | ICP-MS | mg/L | 0.005 and 0.1 * | **0.0566** | 0.0997 | 0.0219 | 0.0294 | **0.172** | **0.112** | **0.101** | **0.155** | 0.0744 | 0.0111 | 0.0299 |
| Antimony | ICP-MS | mg/L | | 0.0033 | 0.0007 | 0.0013 | 0.0065 | 0.0035 | 0.0046 | 0.0073 | 0.0013 | 0.0063 | 0.465 | 0.0075 |
| Arsenic | ICP-MS | mg/L | 0.005 | **0.0133** | 0.0046 | 0.0022 | **0.0166** | **0.0183** | **0.0087** | **0.0475** | 0.0023 | **0.0160** | **1.24** | **0.0072** |
| Barium | ICP-MS | mg/L | | 0.087 | 0.0648 | 0.0437 | 0.0519 | 0.0626 | 0.0904 | 0.112 | 0.069 | 0.0542 | 0.015 | 0.077 |
| Beryllium | ICP-MS | mg/L | | 0.00003 | < 0.00002 | < 0.00002 | 0.00002 | 0.00008 | < 0.00002 | 0.00014 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 |
| Bismuth | ICP-MS | mg/L | | < 0.00001 | < 0.00001 | < 0.00001 | 0.00002 | 0.00044 | 0.00001 | 0.00030 | 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 |
| Boron | ICP-MS | mg/L | 1.5 | 0.0531 | 0.0273 | 0.0224 | 0.0162 | 0.0280 | 0.0843 | 0.0934 | 0.0183 | 0.0160 | 0.126 | 0.0245 |
| Cadmium | ICP-MS | mg/L | 0.00004-0.00037** | 0.00012 | 0.00030 | 0.00001 | 0.00003 | 0.00009 | 0.00006 | 0.00022 | 0.00022 | 0.00005 | 0.00343 | 0.00006 |
| Calcium | ICP-MS | mg/L | 0.37 | 45.7 | 23.6 | 22.5 | 36.3 | 34.1 | 36.3 | 51.9 | 21.2 | 15.5 | 479 | 32.5 |
| Chromium | ICP-MS | mg/L | | 0.0014 | < 0.0005 | < 0.0005 | < 0.0005 | 0.0038 | 0.0006 | 0.0042 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 |
| Cobalt | ICP-MS | mg/L | | 0.00431 | 0.000902 | 0.000245 | 0.000501 | 0.00391 | 0.00203 | 0.00452 | 0.000892 | 0.000261 | 0.00951 | 0.00120 |
| Copper | ICP-MS | mg/L | 0.002 - 0.004** | **0.0035** | **0.0035** | **0.0042** | **0.0077** | **0.0325** | **0.0100** | **0.0325** | **0.0126** | **0.0029** | **0.0117** | **0.0080** |
| Iron | ICP-MS | mg/L | 0.3 | **0.415** | 0.108 | 0.046 | 0.016 | **1.25** | 0.103 | **1.38** | 0.132 | 0.068 | 0.025 | 0.046 |
| Lead* | ICP-MS | mg/L | 0.001 - 0.007** | 0.00015 | 0.00023 | 0.00004 | 0.00007 | 0.00067 | 0.00057 | 0.00102 | 0.00037 | 0.00039 | 0.00048 | 0.00045 |
| Lithium | ICP-MS | mg/L | | 0.008 | < 0.001 | 0.001 | 0.002 | 0.002 | < 0.001 | 0.004 | < 0.001 | < 0.001 | 0.008 | < 0.001 |
| Magnesium | ICP-MS | mg/L | | 10.1 | 1.59 | 4.34 | 25.4 | 9.09 | 16.8 | 15.9 | 4.52 | 2.44 | 20.6 | 3.43 |
| Manganese | ICP-MS | mg/L | | 0.435 | 0.146 | 0.0548 | 0.0265 | 0.126 | 0.365 | 0.134 | 0.578 | 0.0181 | 2.76 | 0.0729 |
| Mercury | ICP-MS | ug/L | 0.026 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | 0.01 | **0.14** | < 0.01 |
| Molybdenum | ICP-MS | mg/L | 0.073 | 0.00038 | 0.00039 | 0.0108 | 0.00170 | 0.0362 | 0.00656 | 0.0403 | 0.00163 | 0.00512 | 0.00816 | 0.00332 |
| Nickel | ICP-MS | mg/L | 0.025 - 0.15** | 0.0049 | 0.0009 | 0.0014 | 0.0014 | 0.0104 | 0.0015 | 0.0099 | 0.0004 | 0.0004 | 0.0008 | < 0.0001 |
| Phosphorus | ICP-MS | mg/L | | 0.016 | < 0.009 | 0.016 | 0.032 | 0.106 | 0.021 | 0.240 | < 0.009 | 0.014 | 0.054 | 0.020 |
| Potassium | ICP-MS | mg/L | | 1.89 | 4.96 | 1.32 | 2.69 | 3.83 | 1.59 | 2.74 | 2.74 | 2.04 | 16.4 | 1.82 |
| Selenium | ICP-MS | mg/L | 0.001 | 0.00073 | 0.00013 | 0.00098 | 0.00050 | 0.00099 | 0.00026 | 0.00125 | 0.00008 | 0.00031 | 0.00079 | 0.00066 |
| Silicon | ICP-MS | mg/L | | 2.54 | 1.44 | 0.85 | 1.62 | 2.23 | 2.51 | 2.68 | 2.78 | 2.57 | 4.45 | 1.26 |
| Silver | ICP-MS | mg/L | 0.0001 | < 0.00001 | 0.00004 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | 0.00006 | < 0.00001 | < 0.00001 | 0.00005 | < 0.00001 |
| Sodium | ICP-MS | mg/L | | 2.57 | 7.16 | 0.79 | 3.71 | 10.3 | 1.22 | 12.1 | 3.45 | 3.07 | 12.3 | 1.31 |
| Strontium | ICP-MS | mg/L | | 0.200 | 0.0606 | 0.0841 | 0.170 | 0.136 | 0.287 | 0.216 | 0.0810 | 0.0682 | 0.653 | 0.129 |
| Sulphur | ICP-MS | mg/L | | 64.1 | 23.8 | 4.35 | 57.3 | 11.7 | 50.0 | 30.3 | 22.3 | 12.8 | 421 | 10.4 |
| Thallium | ICP-MS | mg/L | 0.0008 | < 0.00002 | 0.00005 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | 0.00009 | < 0.00002 | < 0.00002 | 0.00037 | < 0.00002 |
| Tin | ICP-MS | mg/L | | < 0.00001 | < 0.00001 | < 0.00001 | 0.00001 | < 0.00001 | 0.00007 | 0.00006 | 0.00003 | 0.00018 | < 0.00001 | 0.00002 |
| Titanium | ICP-MS | mg/L | | 0.0023 | 0.0019 | 0.0006 | 0.0006 | 0.0144 | 0.0040 | 0.0128 | 0.0056 | 0.0015 | 0.0003 | 0.0010 |
| Uranium | ICP-MS | mg/L | | 0.000061 | 0.000037 | 0.00132 | 0.000275 | 0.00327 | 0.000043 | 0.00142 | 0.000027 | 0.000032 | 0.000598 | 0.000217 |
| Vanadium | ICP-MS | mg/L | | 0.00244 | 0.00034 | 0.00068 | 0.00390 | 0.00740 | 0.00688 | 0.00789 | 0.00063 | 0.00081 | 0.00021 | 0.00098 |
| Zinc | ICP-MS | mg/L | 0.03 | 0.018 | 0.002 | < 0.001 | 0.003 | 0.004 | 0.004 | 0.004 | 0.005 | 0.001 | 0.019 | 0.002 |
| Zirconium | ICP-MS | mg/L | | 0.00012 | 0.00033 | 0.00005 | 0.00004 | 0.00207 | 0.00047 | 0.00209 | 0.00022 | 0.00004 | 0.00003 | 0.00006 |

Note:
Used Shake Flask Extraction Leachate Test at a 3:1 water to solid ratio
Bold indicates exceedance of CCME value
*pH dependence; 0.005 mg/L for pH<6.5 and 0.1 for pH>6.5
**Hardness dependence

## Table D2-16 : Leachable Metal Testing Results of Dam Fill Samples

| Sample ID | Method | Units | Comparison Guideline | TP-TD-13-01 | TP-TD-13-01 | TP-TD-13-02 | TP-TD-13-02 | TP-T-13-03 | TP-TD-13-03 | BH-TD-13-01 | BH-TD-13-01 | BH-TD-13-01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CCME | ARD-02 | ARD-04 | ARD-01 | ARD-03 | ARD-02 | ARD-05 | ARD-03 | ARD-06 | ARD-10 |
| | | | Water Quality Guideline For Protection Aquatic Life | Sample Interval (m) | | | | | | | | |
| | | | | 2.0 - 2.1 | 4.4 - 4.5 | 1.0 - 1.1 | 3.5 - 3.6 | 2.0 - 2.1 | 4.5 - 4.6 | 2.0 - 2.1 | 5.0 - 5.1 | 10.5 - 10.6 |
| **Parameter** | | | | | | | | | | | | |
| Volume Nanopure Water | | mL | | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 |
| Sample Weight | | g | | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| pH | meter | | 6.5-9.0 | 7.70 | 7.72 | 7.35 | 7.49 | 8.04 | **5.67** | 7.94 | 7.41 | 7.67 |
| Redox | meter | mV | | 337 | 321 | 352 | 287 | 303 | 278 | 337 | 319 | 357 |
| Conductivity | meter | uS/cm | | 6 | 32 | 20 | 33 | 77 | 1008 | 40 | 28 | 49 |
| Acidity (to pH 4.5) | titration | mg $CaCO_3$/L | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Total Acidity (to pH 8.3) | titration | mg $CaCO_3$/L | | 3.7 | 2.4 | 3.5 | 2.8 | 2.1 | 7.6 | 3.7 | 2.4 | 3.9 |
| Alkalinity | titration | mg $CaCO_3$/L | | 2.9 | 10.0 | 8.4 | 12.5 | 39.5 | 1.3 | 20.3 | 10.7 | 10.9 |
| Sulphate | Turbidity | mg/L | 100 | 4 | 8 | 3 | 2 | 3 | 445 | 4 | 4 | 7 |
| **Ion Balance** | | | | | | | | | | | | |
| Major Anions | Calc | meq/L | | 0.14 | 0.37 | 0.23 | 0.29 | 0.85 | 9.30 | 0.49 | 0.30 | 0.36 |
| Major Cations | Calc | meq/L | | 0.13 | 0.35 | 0.34 | 0.53 | 0.89 | 10.77 | 0.44 | 0.29 | 0.52 |
| Difference | Calc | meq/L | | 0.01 | 0.02 | -0.11 | -0.23 | -0.04 | -1.48 | 0.05 | 0.00 | -0.15 |
| Balance (%) | Calc | % | | 5.3% | 2.2% | -19.4% | -28.7% | -2.4% | -7.4% | 5.3% | 0.4% | -17.5% |
| **Dissolved Metals** | | | | | | | | | | | | |
| Hardness CaCO3 | | mg/L | | 3.4 | 12.3 | 13.1 | 20.1 | 40.3 | 489 | 15.8 | 11.1 | 9.13 |
| Aluminum | ICP-MS | mg/L | 0.005 and 0.1 * | **0.148** | **0.201** | **0.280** | **0.259** | **0.228** | **0.189** | **0.237** | 0.0827 | **0.381** |
| Antimony | ICP-MS | mg/L | | < 0.0002 | 0.0004 | < 0.0002 | 0.0017 | 0.0007 | 0.0009 | 0.0013 | 0.0020 | 0.0005 |
| Arsenic | ICP-MS | mg/L | 0.005 | 0.0008 | 0.0033 | 0.0014 | 0.0007 | 0.0013 | 0.0038 | 0.0044 | 0.0031 | 0.0027 |
| Barium | ICP-MS | mg/L | | 0.00732 | 0.0208 | 0.0145 | 0.0250 | 0.0219 | 0.0839 | 0.017 | 0.0115 | 0.023 |
| Beryllium | ICP-MS | mg/L | | 0.00002 | < 0.00002 | < 0.00002 | 0.00006 | 0.00004 | 0.00002 | < 0.00002 | < 0.00002 | 0.00002 |
| Bismuth | ICP-MS | mg/L | | < 0.00001 | < 0.00001 | 0.00010 | 0.00018 | 0.00009 | 0.00013 | < 0.00001 | < 0.00001 | < 0.00001 |
| Boron | ICP-MS | mg/L | 1.5 | 0.0053 | 0.0148 | 0.0057 | 0.0100 | 0.0094 | 0.138 | 0.0149 | 0.0065 | 0.0145 |
| Cadmium | ICP-MS | mg/L | 0.00004-0.00037** | 0.00004 | 0.00002 | < 0.000003 | 0.00029 | 0.00004 | 0.00052 | 0.00002 | 0.00003 | 0.00002 |
| Calcium | ICP-MS | mg/L | 0.37 | 1.20 | 3.91 | 4.40 | 7.06 | 13.9 | 172 | 4.93 | 3.56 | 3.23 |
| Chromium | ICP-MS | mg/L | | 0.0007 | < 0.0005 | 0.0008 | 0.0025 | 0.0009 | 0.0010 | < 0.0005 | < 0.0005 | 0.0008 |
| Cobalt | ICP-MS | mg/L | | 0.000237 | 0.000150 | 0.000345 | 0.00330 | 0.000646 | 0.115 | 0.000183 | 0.000098 | 0.00104 |
| Copper | ICP-MS | mg/L | 0.002 - 0.004** | **0.0166** | **0.0047** | **0.0069** | **0.0062** | **0.0134** | **0.0106** | **0.0035** | **0.0042** | **0.0078** |
| Iron | ICP-MS | mg/L | 0.3 | 0.069 | 0.211 | 0.196 | 0.242 | 0.188 | 0.166 | 0.212 | 0.060 | **0.305** |
| Lead* | ICP-MS | mg/L | 0.001 - 0.007** | 0.00008 | 0.00020 | 0.00043 | 0.00025 | 0.00026 | 0.00046 | 0.00023 | 0.00009 | 0.00031 |
| Lithium | ICP-MS | mg/L | | < 0.001 | < 0.001 | < 0.001 | 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| Magnesium | ICP-MS | mg/L | | 0.092 | 0.629 | 0.511 | 0.594 | 1.37 | 14.6 | 0.840 | 0.530 | 0.257 |
| Manganese | ICP-MS | mg/L | | 0.0130 | 0.0161 | 0.0100 | 0.0078 | 0.0112 | 17.3 | 0.0097 | 0.0053 | 0.0129 |
| Mercury | ICP-MS | ug/L | 0.026 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | 0.02 | < 0.01 |
| Molybdenum | ICP-MS | mg/L | 0.073 | 0.00029 | 0.00097 | 0.00174 | 0.00059 | 0.00091 | 0.00745 | 0.00138 | 0.00100 | 0.00155 |
| Nickel | ICP-MS | mg/L | 0.025 - 0.15** | 0.0004 | 0.0007 | 0.0006 | 0.0029 | 0.0010 | 0.0207 | < 0.0001 | 0.0004 | 0.0003 |
| Phosphorus | ICP-MS | mg/L | | 0.018 | 0.019 | 0.021 | 0.038 | 0.025 | 0.086 | 0.013 | 0.018 | 0.022 |
| Potassium | ICP-MS | mg/L | | 0.329 | 0.751 | 0.509 | 0.521 | 0.668 | 3.39 | 0.777 | 0.643 | 0.685 |
| Selenium | ICP-MS | mg/L | 0.001 | 0.00009 | 0.00030 | 0.00021 | 0.00039 | 0.00029 | 0.00023 | 0.00020 | 0.00021 | 0.00017 |
| Silicon | ICP-MS | mg/L | | 2.21 | 2.76 | 1.83 | 1.73 | 1.56 | 10.5 | 2.36 | 2.27 | 2.24 |
| Silver | ICP-MS | mg/L | 0.0001 | 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | 0.00009 | < 0.00001 | < 0.00001 | < 0.00001 | 0.00009 |
| Sodium | ICP-MS | mg/L | | 0.72 | 1.17 | 0.54 | 1.59 | 0.80 | 5.16 | 1.54 | 1.30 | 5.94 |
| Strontium | ICP-MS | mg/L | | 0.0064 | 0.0163 | 0.0203 | 0.0278 | 0.0490 | 0.553 | 0.0260 | 0.0142 | 0.0172 |
| Sulphur | ICP-MS | mg/L | | 0.17 | 1.44 | 0.36 | 0.90 | 0.68 | 174 | 0.82 | 0.59 | 3.04 |
| Thallium | ICP-MS | mg/L | 0.0008 | < 0.00002 | < 0.00002 | < 0.00002 | 0.00006 | < 0.00002 | 0.00033 | < 0.00002 | < 0.00002 | < 0.00002 |
| Tin | ICP-MS | mg/L | | < 0.00001 | < 0.00001 | < 0.00001 | 0.00091 | < 0.00001 | 0.00012 | 0.00002 | 0.00008 | 0.00003 |
| Titanium | ICP-MS | mg/L | | 0.0020 | 0.0062 | 0.0066 | 0.0069 | 0.0065 | 0.0019 | 0.0068 | 0.0018 | 0.0113 |
| Uranium | ICP-MS | mg/L | | 0.000066 | 0.000067 | 0.000127 | 0.00454 | 0.000232 | 0.000730 | 0.000058 | 0.000035 | 0.000063 |
| Vanadium | ICP-MS | mg/L | | 0.00065 | 0.00381 | 0.00145 | 0.00202 | 0.00189 | 0.00042 | 0.00166 | 0.00117 | 0.00169 |
| Zinc | ICP-MS | mg/L | 0.03 | 0.001 | 0.001 | 0.003 | 0.004 | 0.003 | 0.016 | 0.002 | 0.002 | 0.002 |
| Zirconium | ICP-MS | mg/L | | 0.00098 | 0.00040 | 0.00100 | 0.00078 | 0.00035 | 0.00080 | 0.00026 | 0.00022 | 0.00063 |

Note:
Used Shake Flask Extraction Leachate Test at a 3:1 water to solid ratio
Bold indicates exceedance of CCME value
*pH dependence; 0.005 mg/L for pH<6.5 and 0.1 for pH>6.5
**Hardness dependence

## Table D2-17 : Leachable Metal Testing Results of Mill and Road Area Samples

| Sample ID | Method | Units | Comparison Guideline | BH-M-13-04 | TP-M-13-04 | TP-M-13-05 | TP-R-13-01 | TP-R-13-02 | TP-R-13-03 |
|---|---|---|---|---|---|---|---|---|---|
| | | | CCME | ARD-01 | ARD-01 | ARD-02 | ARD-02 | ARD-01 | ARD-02 |
| | | | Water Quality Guideline For Protection Aquatic Life | Sample Interval (m) | | | | | |
| | | | | 0.0 - 0.5 | 0.0 - 0.5 | 0.6 - 1.0 | 0.6 - 1.0 | 0.0 - 0.5 | 0.6 - 1.0 |
| **Parameter** | | | | | | | | | |
| Volume Nanopure Water | | mL | | 750 | 750 | 750 | 750 | 750 | 750 |
| Sample Weight | | g | | 250 | 250 | 250 | 250 | 250 | 250 |
| pH | meter | | 6.5-9.0 | 7.67 | 7.82 | 7.86 | 7.43 | 7.83 | 7.82 |
| Redox | meter | mV | | 317 | 351 | 345 | 366 | 361 | 357 |
| Conductivity | meter | uS/cm | | 389 | 209 | 61 | 203 | 260 | 287 |
| Acidity (to pH 4.5) | titration | mg $CaCO_3$/L | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Total Acidity (to pH 8.3) | titration | mg $CaCO_3$/L | | 3.7 | 3.6 | 3.0 | 3.8 | 3.4 | 3.8 |
| Alkalinity | titration | mg $CaCO_3$/L | | 50.1 | 38.8 | 24.3 | 4.0 | 42.1 | 36.6 |
| Sulphate | Turbidity | mg/L | 100 | 109 | 58 | 10 | 82 | 77 | 96 |
| **Ion Balance** | | | | | | | | | |
| Major Anions | Calc | meq/L | | 3.27 | 1.98 | 0.69 | 1.79 | 2.45 | 2.73 |
| Major Cations | Calc | meq/L | | 3.98 | 2.09 | 0.65 | 1.90 | 2.62 | 2.81 |
| Difference | Calc | meq/L | | -0.71 | -0.11 | 0.04 | -0.11 | -0.18 | -0.08 |
| Balance (%) | Calc | % | | -9.8% | -2.6% | 3.1% | -3.1% | -3.5% | -1.4% |
| **Dissolved Metals** | | | | | | | | | |
| Hardness CaCO3 | | mg/L | | 191 | 98.6 | 28.7 | 85.5 | 124 | 132 |
| Aluminum | ICP-MS | mg/L | 0.005 and 0.1 * | 0.0181 | 0.0343 | **0.105** | 0.0440 | 0.0340 | 0.0362 |
| Antimony | ICP-MS | mg/L | | 0.905 | 0.110 | 0.0013 | 0.0065 | 0.0107 | 0.0026 |
| Arsenic | ICP-MS | mg/L | 0.005 | **0.375** | **0.131** | 0.0021 | **0.0092** | **0.0215** | 0.0031 |
| Barium | ICP-MS | mg/L | | 0.0328 | 0.0150 | 0.0401 | 0.0586 | 0.0188 | 0.0152 |
| Beryllium | ICP-MS | mg/L | | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 |
| Bismuth | ICP-MS | mg/L | | < 0.00001 | < 0.00001 | < 0.00001 | 0.00002 | < 0.00001 | < 0.00001 |
| Boron | ICP-MS | mg/L | 1.5 | 0.0168 | 0.0172 | 0.0073 | 0.0048 | 0.0154 | 0.0063 |
| Cadmium | ICP-MS | mg/L | 0.00004-0.00037** | 0.00144 | 0.00029 | 0.00000 | 0.00015 | 0.00010 | 0.00029 |
| Calcium | ICP-MS | mg/L | 0.37 | 52.2 | 29.8 | 8.73 | 25.6 | 39.4 | 42.7 |
| Chromium | ICP-MS | mg/L | | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 |
| Cobalt | ICP-MS | mg/L | | 0.000113 | 0.000070 | 0.000078 | 0.000084 | 0.000135 | 0.000087 |
| Copper | ICP-MS | mg/L | 0.002 - 0.004** | **0.0065** | 0.0016 | 0.0014 | **0.0033** | 0.0010 | 0.0008 |
| Iron | ICP-MS | mg/L | 0.3 | 0.021 | 0.020 | 0.095 | **0.101** | 0.022 | 0.016 |
| Lead* | ICP-MS | mg/L | 0.001 - 0.007** | 0.00516 | 0.00105 | 0.00013 | 0.00202 | 0.00045 | 0.00032 |
| Lithium | ICP-MS | mg/L | | 0.004 | < 0.001 | < 0.001 | 0.001 | < 0.001 | 0.002 |
| Magnesium | ICP-MS | mg/L | | 14.7 | 5.90 | 1.68 | 5.25 | 6.25 | 6.10 |
| Manganese | ICP-MS | mg/L | | 0.0189 | 0.0024 | 0.0105 | 0.0262 | 0.0030 | 0.0054 |
| Mercury | ICP-MS | ug/L | 0.026 | 0.02 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Molybdenum | ICP-MS | mg/L | 0.073 | 0.00266 | 0.00120 | 0.00035 | 0.00008 | 0.00023 | 0.00044 |
| Nickel | ICP-MS | mg/L | 0.025 - 0.15** | 0.0004 | 0.0003 | 0.0004 | 0.0007 | 0.0002 | 0.0002 |
| Phosphorus | ICP-MS | mg/L | | 0.014 | 0.014 | < 0.009 | 0.011 | 0.026 | < 0.009 |
| Potassium | ICP-MS | mg/L | | 4.21 | 3.29 | 1.09 | 4.32 | 3.67 | 3.14 |
| Selenium | ICP-MS | mg/L | 0.001 | 0.00041 | 0.00041 | 0.00020 | 0.00014 | 0.00009 | 0.00009 |
| Silicon | ICP-MS | mg/L | | 2.56 | 2.16 | 2.01 | 3.58 | 2.46 | 2.38 |
| Silver | ICP-MS | mg/L | 0.0001 | 0.00036 | < 0.00001 | < 0.00001 | 0.00001 | < 0.00001 | < 0.00001 |
| Sodium | ICP-MS | mg/L | | 1.32 | 0.64 | 0.80 | 1.77 | 1.09 | 2.21 |
| Strontium | ICP-MS | mg/L | | 0.150 | 0.0669 | 0.0308 | 0.0721 | 0.0865 | 0.150 |
| Sulphur | ICP-MS | mg/L | | 47.8 | 21.1 | 3.57 | 28.6 | 28.8 | 32.5 |
| Thallium | ICP-MS | mg/L | 0.0008 | 0.00021 | 0.00004 | < 0.00002 | 0.00004 | < 0.00002 | < 0.00002 |
| Tin | ICP-MS | mg/L | | 0.00087 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 |
| Titanium | ICP-MS | mg/L | | 0.0003 | 0.0004 | 0.0025 | 0.0013 | 0.0004 | 0.0002 |
| Uranium | ICP-MS | mg/L | | 0.000411 | 0.000156 | 0.000022 | 0.000008 | 0.000142 | 0.000159 |
| Vanadium | ICP-MS | mg/L | | 0.00029 | 0.00032 | 0.00062 | 0.00027 | 0.00017 | 0.00012 |
| Zinc | ICP-MS | mg/L | 0.03 | **0.038** | 0.006 | 0.001 | 0.006 | 0.003 | 0.004 |
| Zirconium | ICP-MS | mg/L | | 0.00014 | 0.00005 | 0.00003 | 0.00007 | 0.00003 | 0.00002 |

Note:
*Hardness dependence
**pH dependence; 0.005 mg/L for pH<6.5 and 0.1 for pH>6.5
Bold indicates exceedance of CCME value

## Table D2-18 : Leachable Metal Testing Results of Borrow Area Samples

| Sample ID | Method | Units | Comparison Guideline | TP-BA-13-03 | TP-BA-13-03 | TP-BA-13-04 | TP-BA-13-04 | TP-BA-13-05 | TP-BA-13-05 | TP-BA-13-07 | HA-BA-13-01 | HA-BA-13-02 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CCME | ARD-01 | ARD-03 | ARD-01 | ARD-03 | ARD-02 | ARD-04 | ARD-02 | 2-3 m | 0-1 m |
| | | | Water Quality Guideline For Protection Aquatic Life | Sample Interval (m) | | | | | | | | |
| | | | | 1.0 - 1.1 | 3.5 - 3.6 | 1.0 - 1.1 | 3.0 - 3.1 | 2.0 - 2.1 | 5.0 - 5.1 | 1.1 - 1.2 | 2.0 - 3.0 | 1.0 - 2.0 |
| **Parameter** | | | | | | | | | | | | |
| Volume Nanopure Water | | mL | | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 |
| Sample Weight | | g | | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| pH | meter | | 6.5-9.0 | 7.53 | 7.56 | 7.15 | 7.60 | 7.35 | 7.64 | 7.83 | 7.76 | 7.81 |
| Redox | meter | mV | | 333 | 335 | 338 | 351 | 345 | 350 | 353 | 331 | 329 |
| Conductivity | meter | uS/cm | | 39 | 48 | 12 | 55 | 23 | 74 | 72 | 78 | 72 |
| Acidity (to pH 4.5) | titration | mg $CaCO_3$/L | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Total Acidity (to pH 8.3) | titration | mg $CaCO_3$/L | | 2.3 | 2.4 | 2.5 | 2.2 | 2.6 | 2.6 | 2.9 | 2.2 | 2.1 |
| Alkalinity | titration | mg $CaCO_3$/L | | 20.3 | 24.3 | 5.1 | 26.7 | 9.8 | 31.3 | 38.9 | 38.3 | 34.3 |
| Sulphate | Turbidity | mg/L | 100 | <2 | <2 | 3 | <2 | <2 | 5 | 4 | 3 | 3 |
| **Ion Balance** | | | | | | | | | | | | |
| Major Anions | Calc | meq/L | | 0.41 | 0.49 | 0.16 | 0.53 | 0.20 | 0.73 | 0.86 | 0.83 | 0.75 |
| Major Cations | Calc | meq/L | | 0.40 | 0.51 | 0.13 | 0.57 | 0.23 | 0.74 | 0.77 | 0.83 | 0.76 |
| Difference | Calc | meq/L | | 0.00 | -0.03 | 0.04 | -0.04 | -0.04 | -0.01 | 0.09 | 0.00 | -0.01 |
| Balance (%) | Calc | % | | 0.3% | -2.8% | 12.1% | -3.4% | -8.5% | -0.8% | 5.3% | 0.0% | -0.9% |
| **Dissolved Metals** | | | | | | | | | | | | |
| Hardness CaCO3 | | mg/L | | 18.4 | 23.1 | 5.0 | 26.2 | 9.8 | 33.5 | 35.4 | 38.5 | 35.3 |
| Aluminum | ICP-MS | mg/L | 0.005 and 0.1 * | 0.0677 | 0.0750 | 0.0357 | 0.0873 | 0.0145 | 0.0933 | 0.0419 | 0.0622 | **0.105** |
| Antimony | ICP-MS | mg/L | | 0.0007 | 0.0010 | 0.0005 | 0.0004 | 0.0044 | 0.0014 | 0.0002 | 0.0012 | 0.0012 |
| Arsenic | ICP-MS | mg/L | 0.005 | **0.0114** | **0.0141** | 0.0041 | **0.0086** | 0.0034 | **0.0086** | 0.0010 | 0.0039 | 0.0039 |
| Barium | ICP-MS | mg/L | | 0.0160 | 0.0161 | 0.00375 | 0.00941 | 0.00791 | 0.0279 | 0.00167 | 0.0182 | 0.0249 |
| Beryllium | ICP-MS | mg/L | | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 |
| Bismuth | ICP-MS | mg/L | | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 |
| Boron | ICP-MS | mg/L | 1.5 | 0.0071 | 0.0160 | 0.0075 | 0.0113 | 0.0066 | 0.0074 | 0.0049 | 0.0174 | 0.0132 |
| Cadmium | ICP-MS | mg/L | 0.00004-0.00037** | < 0.000003 | 0.00003 | 0.00001 | 0.00001 | 0.00001 | 0.00002 | 0.00001 | 0.00001 | 0.00001 |
| Calcium | ICP-MS | mg/L | 0.37 | 6.66 | 7.13 | 1.45 | 8.73 | 3.40 | 10.9 | 11.7 | 12.2 | 11.8 |
| Chromium | ICP-MS | mg/L | | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 |
| Cobalt | ICP-MS | mg/L | | 0.000060 | 0.000075 | 0.000047 | 0.000098 | 0.000034 | 0.000121 | 0.000042 | 0.000061 | 0.000084 |
| Copper | ICP-MS | mg/L | 0.002 - 0.004** | 0.0016 | **0.0029** | **0.0027** | 0.0020 | **0.0027** | **0.0038** | < 0.0005 | **0.0024** | **0.0036** |
| Iron | ICP-MS | mg/L | 0.3 | 0.058 | 0.083 | 0.033 | 0.055 | 0.020 | 0.074 | 0.014 | 0.037 | 0.070 |
| Lead* | ICP-MS | mg/L | 0.001 - 0.007** | 0.00010 | 0.00035 | 0.00010 | 0.00010 | 0.00007 | 0.00018 | < 0.00002 | 0.00004 | 0.00011 |
| Lithium | ICP-MS | mg/L | | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| Magnesium | ICP-MS | mg/L | | 0.417 | 1.29 | 0.327 | 1.06 | 0.322 | 1.54 | 1.49 | 1.94 | 1.44 |
| Manganese | ICP-MS | mg/L | | 0.0025 | 0.0083 | 0.0043 | 0.0192 | 0.0025 | 0.0098 | 0.0005 | 0.0058 | 0.0066 |
| Mercury | ICP-MS | ug/L | 0.026 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | < 0.01 | < 0.01 | < 0.01 | 0.02 |
| Molybdenum | ICP-MS | mg/L | 0.073 | 0.00037 | 0.00075 | 0.00043 | 0.00047 | 0.00121 | 0.00157 | 0.00572 | 0.00089 | 0.00160 |
| Nickel | ICP-MS | mg/L | 0.025 - 0.15** | 0.0003 | 0.0004 | 0.0008 | 0.0002 | 0.0003 | 0.0006 | 0.0001 | 0.0003 | 0.0004 |
| Phosphorus | ICP-MS | mg/L | | 0.057 | 0.036 | 0.019 | 0.052 | 0.010 | 0.026 | 0.011 | 0.052 | 0.032 |
| Potassium | ICP-MS | mg/L | | 0.565 | 0.940 | 0.385 | 0.824 | 0.729 | 1.12 | 2.23 | 1.32 | 1.32 |
| Selenium | ICP-MS | mg/L | 0.001 | 0.00020 | 0.00069 | 0.00011 | 0.00073 | 0.00056 | 0.00095 | 0.00026 | 0.00040 | 0.00046 |
| Silicon | ICP-MS | mg/L | | 2.40 | 2.19 | 1.74 | 2.50 | 1.73 | 1.69 | 2.28 | 2.49 | 1.74 |
| Silver | ICP-MS | mg/L | 0.0001 | < 0.00001 | 0.00002 | 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 |
| Sodium | ICP-MS | mg/L | | 0.53 | 0.62 | 0.46 | 0.62 | 0.40 | 0.96 | 0.23 | 0.58 | 0.48 |
| Strontium | ICP-MS | mg/L | | 0.0206 | 0.0285 | 0.0073 | 0.0241 | 0.0110 | 0.0446 | 0.0548 | 0.0593 | 0.0508 |
| Sulphur | ICP-MS | mg/L | | 0.25 | 0.34 | 0.22 | 0.39 | 0.31 | 1.25 | 0.51 | 0.52 | 0.58 |
| Thallium | ICP-MS | mg/L | 0.0008 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 |
| Tin | ICP-MS | mg/L | | 0.00004 | 0.00001 | 0.00007 | 0.00001 | 0.00002 | < 0.00001 | < 0.00001 | 0.00004 | 0.00002 |
| Titanium | ICP-MS | mg/L | | 0.0018 | 0.0015 | 0.0009 | 0.0023 | 0.0003 | 0.0022 | 0.0002 | 0.0014 | 0.0027 |
| Uranium | ICP-MS | mg/L | | 0.000018 | 0.000037 | 0.000022 | 0.000100 | 0.000006 | 0.000158 | 0.000087 | 0.000338 | 0.000281 |
| Vanadium | ICP-MS | mg/L | | 0.00186 | 0.00255 | 0.00067 | 0.00622 | 0.00071 | 0.00222 | 0.00013 | 0.00512 | 0.00335 |
| Zinc | ICP-MS | mg/L | 0.03 | 0.002 | 0.002 | < 0.001 | < 0.001 | < 0.001 | 0.001 | < 0.001 | < 0.001 | 0.001 |
| Zirconium | ICP-MS | mg/L | | 0.00004 | 0.00006 | 0.00010 | 0.00003 | 0.00002 | 0.00005 | < 0.00001 | 0.00003 | 0.00005 |

Note:
Used Shake Flask Extraction Leachate Test at a 3:1 water to solid ratio
Bold indicates exceedance of CCME value
*pH dependence; 0.005 mg/L for pH<6.5 and 0.1 for pH>6.5
**Hardness dependence

# GEOCHEMISTRY LABORATORY CERTIFICATE RESULTS

**CLIENT** : **AMEC**
**PROJECT** : **Mt. Nansen**
**SGS Project #** : **1346**
**Test** : **Determination of Moisture Content**
**Date** : **November 5, 2013**

| Sample ID | Wet Wt. (g) | Dry Wt. (g) | % Moisture |
|---|---|---|---|
| BH-T-13-03 ARD-02 | 100 | 87.69 | 12.31 |
| BH-T-13-04 ARD-06 | 100 | 83.11 | 16.89 |
| BH-T-13-04 ARD-08 | 100 | 82.32 | 17.68 |

**CLIENT** : AMEC
**PROJECT** : Mt. Nansen
**SGS Project #** : 1346
**Test** : Modified Acid-Base Accounting
**Date** : December 2-5, 2012

| Sample ID | Paste pH | Paste EC µS/cm | TIC % | CaCO3 NP | S(T) % | S(SO4) % | S(S-2) % | S(S-2) % | Insoluble S % | AP | NP | Net NP | Fizz Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Method Code | Sobek | Sobek | CSB02V | Calc. | CSA06V | CSA07V | CSA08D | Calc. | Calc. | Calc. | Modified | Calc. | Sobek |
| LOD | 0.2 | 0.1 | 0.01 | #N/A | 0.01 | 0.01 | 0.01 | #N/A | #N/A | #N/A | 0.5 | #N/A | #N/A |
| BH-M-13-04 ARD -01 | 7.71 | | 0.18 | 15.0 | 0.91 | 0.08 | 0.65 | | 0.18 | 20.3 | 13.4 | -6.9 | Slight |
| BH-M-13-04 ARD -02 | 7.86 | | 0.34 | 28.3 | 0.73 | 0.08 | 0.56 | | 0.09 | 17.5 | 26.2 | 8.7 | Slight |
| BH-T-13-01 ARD-01 | 8.31 | 198 | 0.26 | 21.7 | 0.04 | 0.02 | 0.02 | | <0.01 | 0.6 | 21.4 | 20.8 | Slight |
| BH-T-13-01 ARD-02 | 8.58 | | 0.24 | 20.0 | 0.01 | <0.01 | <0.01 | | 0.01 | <0.3 | 23.2 | 23.2 | Slight |
| BH-T-13-01 ARD-03 | 8.37 | | 0.20 | 16.7 | 0.02 | <0.01 | <0.01 | | 0.02 | <0.3 | 15.9 | 15.9 | Slight |
| BH-T-13-01 ARD-05 | 8.21 | | 0.37 | 30.8 | 0.02 | <0.01 | <0.01 | | 0.02 | <0.3 | 29.4 | 29.4 | Slight |
| BH-T-13-01 ARD-07 | 7.81 | | 0.10 | 8.3 | 0.03 | 0.01 | 0.01 | | 0.01 | 0.3 | 6.9 | 6.6 | Slight |
| BH-T-13-01 ARD-08 | 8.14 | | 0.04 | 3.3 | 0.01 | <0.01 | <0.01 | | 0.01 | <0.3 | 5.8 | 5.8 | None |
| BH-T-13-02 ARD-01 | 7.38 | 148.9 | <0.01 | <0.8 | 0.05 | 0.02 | 0.01 | | 0.02 | 0.3 | 2.2 | 1.9 | None |
| BH-T-13-02 ARD-02 | 7.41 | 117.1 | <0.01 | <0.8 | 0.04 | 0.01 | 0.03 | | <0.01 | 0.9 | 2.8 | 1.9 | None |
| BH-T-13-02 ARD-04 | 7.98 | | 0.44 | 36.7 | 0.05 | 0.02 | 0.01 | | 0.02 | 0.3 | 33.4 | 33.1 | Slight |
| BH-T-13-02 ARD-06 | 8.16 | | 0.29 | 24.2 | 0.04 | 0.01 | 0.03 | | <0.01 | 0.9 | 26.1 | 25.2 | Slight |
| BH-T-13-02 ARD-07 | 7.84 | | 0.07 | 5.8 | 0.07 | 0.04 | 0.01 | | 0.02 | 0.3 | 4.4 | 4.1 | Slight |
| BH-T-13-03 ARD-01 | 6.78 | | <0.01 | <0.8 | 0.03 | 0.02 | <0.01 | | 0.01 | <0.3 | 1.6 | 1.6 | None |
| BH-T-13-03 ARD-02 | 7.78 | 122.6 | <0.01 | <0.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 2.8 | 2.8 | None |
| BH-T-13-03 ARD-04 | 8.38 | 78.9 | <0.01 | <0.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 3.2 | 3.2 | None |
| BH-T-13-03 ARD-06 | 8.29 | | <0.01 | <0.8 | 0.01 | 0.01 | <0.01 | | 0.01 | <0.3 | 3.3 | 3.3 | None |
| BH-T-13-03 ARD-08 | 7.87 | | 0.42 | 35.0 | 0.05 | 0.01 | 0.01 | | 0.03 | 0.3 | 30.9 | 30.6 | Slight |
| BH-T-13-04 ARD-01 | 6.97 | | 0.11 | 9.2 | 2.71 | 1.31 | 1.17 | | 0.23 | 36.6 | 7.3 | -29.3 | Slight |
| BH-T-13-04 ARD-02 | 7.66 | | 0.09 | 7.5 | 1.95 | 0.86 | 0.96 | | 0.13 | 30.0 | 7.1 | -22.9 | Slight |
| BH-T-13-04 ARD-04 | 8.07 | 125.4 | 0.11 | 9.2 | <0.01 | <0.01 | 0.01 | | <0.01 | 0.3 | 11.0 | 10.7 | Slight |
| BH-T-13-04 ARD-06 | 8.77 | | 0.02 | 1.7 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 3.2 | 3.2 | None |
| BH-T-13-04 ARD-08 | 8.84 | | 0.06 | 5.0 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 8.6 | 8.6 | None |
| BH-TD-13-01 ARD-01 | 8.31 | | 0.07 | 5.8 | 0.05 | 0.01 | 0.02 | | 0.02 | 0.6 | 13.2 | 12.6 | None |
| BH-TD-13-01 ARD-03 | 8.59 | | <0.01 | <0.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 3.4 | 3.4 | Slight |
| BH-TD-13-01 ARD-06 | 8.57 | | <0.01 | <0.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 3.0 | 3.0 | Slight |
| BH-TD-13-01 ARD-08 | 8.35 | | <0.01 | <0.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 2.7 | 2.7 | Slight |
| BH-TD-13-01 ARD-10 | 8.63 | | <0.01 | <0.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 3.1 | 3.1 | None |
| BH-TD-13-01 ARD-12 | 8.08 | | <0.01 | <0.8 | 0.01 | 0.01 | <0.01 | | 0.01 | <0.3 | 3.8 | 3.8 | None |
| BH-TD-13-01 ARD-14 | 7.52 | | <0.01 | <0.8 | 0.01 | 0.01 | <0.01 | | 0.01 | <0.3 | 2.2 | 2.2 | Slight |
| TP-BA-13-03 ARD-01 | 9.04 | | 0.02 | 1.7 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 4.4 | 4.4 | None |
| TP-BA-13-03 ARD-02 | 9.07 | | 0.02 | 1.7 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 4.4 | 4.4 | None |
| TP-BA-13-03 ARD-03 | 8.73 | | 0.03 | 2.5 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 5.3 | 5.3 | None |
| TP-BA-13-03 ARD-04 | 8.56 | | 0.02 | 1.7 | 0.01 | <0.01 | <0.01 | | 0.01 | <0.3 | 4.8 | 4.8 | None |
| TP-BA-13-04 ARD-01 | 8.40 | | <0.01 | <0.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 3.4 | 3.4 | Slight |
| TP-BA-13-04 ARD-02 | 8.84 | | <0.01 | <0.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 3.0 | 3.0 | None |
| TP-BA-13-04 ARD-03 | 9.13 | | 0.04 | 3.3 | 0.01 | <0.01 | <0.01 | | 0.01 | <0.3 | 5.8 | 5.8 | None |
| TP-BA-13-04 ARD-04 | 8.76 | | 0.03 | 2.5 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 5.4 | 5.4 | None |
| TP-BA-13-05 ARD-01 | 8.74 | | <0.01 | <0.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 3.1 | 3.1 | Slight |
| TP-BA-13-05 ARD-02 | 8.66 | | 0.02 | 1.7 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 4.3 | 4.3 | Slight |
| TP-BA-13-05 ARD-03 | 8.51 | | 0.03 | 2.5 | 0.01 | <0.01 | <0.01 | | 0.01 | <0.3 | 4.4 | 4.4 | None |
| TP-BA-13-05 ARD-04 | 8.76 | | 0.03 | 2.5 | 0.01 | <0.01 | <0.01 | | 0.01 | <0.3 | 4.9 | 4.9 | None |
| TP-BA-13-06 ARD-01 | 7.98 | | <0.01 | <0.8 | 0.02 | 0.01 | <0.01 | | 0.01 | <0.3 | 1.4 | 1.4 | None |
| TP-BA-13-07 ARD-01 | 7.50 | | <0.01 | <0.8 | 0.08 | 0.09 | <0.01 | | <0.01 | <0.3 | 3.9 | 3.9 | None |
| TP-BA-13-07 ARD-02 | 8.23 | | 0.05 | 4.2 | 0.04 | 0.03 | <0.01 | | 0.01 | <0.3 | 6.3 | 6.3 | None |
| TP-BA-13-08 ARD-01 | 7.16 | | 0.64 | 53.3 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 31.5 | 31.5 | Slight |
| TP-M-13-01 ARD -02 | 7.49 | | 0.01 | 0.8 | 0.05 | 0.01 | 0.04 | | <0.01 | 1.3 | 6.2 | 5.0 | None |
| TP-M-13-01 ARD -03 | 6.20 | | 0.02 | 1.7 | 0.07 | 0.04 | 0.02 | | 0.01 | 0.6 | 2.1 | 1.5 | None |
| TP-M-13-01 ARD -04 | 6.13 | | 0.04 | 3.3 | 0.09 | 0.02 | 0.05 | | 0.02 | 1.6 | 1.2 | -0.4 | None |
| TP-M-13-02 ARD -02 | 7.75 | | 0.39 | 32.5 | 0.08 | 0.02 | 0.05 | | 0.01 | 1.6 | 34.4 | 32.8 | Slight |
| TP-M-13-02 ARD -03 | 6.43 | | 0.03 | 2.5 | 0.09 | 0.03 | 0.05 | | 0.01 | 1.6 | 2.1 | 0.5 | None |
| TP-M-13-03 ARD -01 | 7.41 | | 0.58 | 48.3 | 1.42 | 0.04 | 1.15 | | 0.23 | 35.9 | 34.2 | -1.7 | Slight |
| TP-M-13-03 ARD -02 | 7.59 | | 0.19 | 15.8 | 0.65 | 0.03 | 0.48 | | 0.14 | 15.0 | 15.4 | 0.4 | Slight |
| TP-M-13-03 ARD -03 | 7.46 | | 0.18 | 15.0 | 0.31 | 0.06 | 0.22 | | 0.03 | 6.9 | 14.3 | 7.4 | Slight |
| TP-M-13-03 ARD -04 | 7.53 | | 0.23 | 19.2 | 0.28 | 0.04 | 0.23 | | 0.01 | 7.2 | 17.0 | 9.8 | Slight |
| TP-M-13-04 ARD -01 | 7.66 | | 0.14 | 11.7 | 0.27 | 0.08 | 0.16 | | 0.03 | 5.0 | 14.7 | 9.7 | Slight |
| TP-M-13-04 ARD -02 | 7.74 | | 0.45 | 37.5 | 0.4 | 0.07 | 0.32 | | 0.01 | 10.0 | 31.0 | 21.0 | Slight |
| TP-M-13-04 ARD -03 | 7.48 | | 0.48 | 40.0 | 1.6 | 0.1 | 0.97 | | 0.53 | 30.3 | 33.0 | 2.7 | Slight |
| TP-M-13-04 ARD -04 | 8.30 | | 0.50 | 41.7 | 1.83 | 0.1 | 1.26 | | 0.47 | 39.4 | 56.2 | 16.8 | Slight |
| TP-M-13-05 ARD -02 | 8.46 | | 0.03 | 2.5 | 0.21 | <0.01 | | 0.21 | | 6.6 | 8.4 | 1.8 | None |
| TP-M-13-05 ARD -03 | 7.75 | | 0.03 | 2.5 | 0.22 | 0.01 | | 0.21 | | 6.6 | 7.6 | 1.0 | None |
| TP-M-13-05 ARD -04 | 7.80 | | 0.87 | 72.5 | 0.15 | <0.01 | | 0.15 | | 4.7 | 69.0 | 64.3 | Moderate |
| TP-R-13-01 ARD -01 | 6.54 | | 0.02 | 1.7 | 0.21 | 0.1 | | 0.11 | | 3.4 | 4.4 | 1.0 | None |
| TP-R-13-01 ARD -02 | 6.93 | | 0.01 | 0.8 | 0.09 | 0.06 | | 0.03 | | 0.9 | 4.8 | 3.9 | None |
| TP-R-13-01 ARD -03 | 7.64 | | 0.01 | 0.8 | 0.15 | <0.01 | | 0.15 | | 4.7 | 6.4 | 1.7 | None |
| TP-R-13-01 ARD -04 | 8.07 | | 0.09 | 7.5 | 0.5 | 0.01 | | 0.49 | | 15.3 | 13.3 | -2.0 | Slight |
| TP-R-13-02 ARD -01 | 7.54 | | 0.22 | 18.3 | 0.18 | 0.07 | | 0.11 | | 3.4 | 18.6 | 15.2 | Slight |
| TP-R-13-02 ARD -02 | 7.66 | | 0.27 | 22.5 | 0.27 | 0.04 | | 0.23 | | 7.2 | 25.2 | 18.0 | Slight |
| TP-R-13-02 ARD -03 | 7.63 | | 0.10 | 8.3 | 0.4 | 0.04 | | 0.36 | | 11.3 | 15.6 | 4.4 | Slight |
| TP-R-13-03 ARD -02 | 7.71 | | 0.21 | 17.5 | 0.35 | 0.05 | | 0.30 | | 9.4 | 20.2 | 10.8 | Slight |
| TP-R-13-03 ARD -04 | 7.53 | | 0.23 | 19.2 | 0.52 | 0.12 | | 0.40 | | 12.5 | 22.3 | 9.8 | Slight |
| TP-T-13-01 ARD-01 | 7.98 | | <0.01 | <0.8 | 0.04 | 0.03 | <0.01 | | 0.01 | <0.3 | 3.4 | 3.4 | None |
| TP-T-13-02 ARD-01 | 6.26 | | <0.01 | <0.8 | 0.03 | <0.01 | <0.01 | | 0.03 | <0.3 | 1.6 | 1.6 | None |
| TP-T-13-02 ARD-02 | 6.06 | | 0.04 | 3.3 | 0.11 | 0.03 | 0.06 | | 0.02 | 1.9 | 1.7 | -0.2 | None |
| TP-T-13-02 ARD-03 | 7.85 | | <0.01 | <0.8 | 0.04 | <0.01 | 0.02 | | 0.02 | 0.6 | 3.4 | 2.8 | None |

**CLIENT** : AMEC
**PROJECT** : Mt. Nansen
**SGS Project #** : 1346
**Test** : Modified Acid-Base Accounting
**Date** : December 2-5, 2012

| Sample ID | Paste pH | Paste EC µS/cm | TIC % | CaCO3 NP | S(T) % | S(SO4) % | S(S-2) % | S(S-2) % | Insoluble S % | AP | NP | Net NP | Fizz Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Method Code | Sobek | Sobek | CSB02V | Calc. | CSA06V | CSA07V | CSA08D | Calc. | Calc. | Calc. | Modified | Calc. | Sobek |
| LOD | 0.2 | 0.1 | 0.01 | #N/A | 0.01 | 0.01 | 0.01 | #N/A | #N/A | #N/A | 0.5 | #N/A | #N/A |
| TP-T-13-04 ARD-01 | 6.22 | 343 | 0.01 | 0.8 | 0.24 | 0.2 | 0.05 | | <0.01 | 1.6 | -1.1 | -2.7 | None |
| TP-T-13-04 ARD-02 | 7.40 | | <0.01 | <0.8 | 0.01 | 0.01 | <0.01 | | <0.01 | <0.3 | 2.7 | 2.7 | None |
| TP-T-13-06 ARD-01 | 8.36 | | 0.29 | 24.2 | <0.01 | <0.01 | 0.03 | | <0.01 | 0.9 | 25.7 | 24.8 | Slight |
| TP-T-13-06 ARD-02 | 8.49 | | 0.41 | 34.2 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 34.9 | 34.9 | Slight |
| TP-T-13-06 ARD-03 | 8.04 | | 0.12 | 10.0 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 10.1 | 10.1 | Slight |
| TP-TD-13-01 ARD-01 | 8.19 | | <0.01 | <0.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 1.9 | 1.9 | None |
| TP-TD-13-01 ARD-02 | 7.99 | | <0.01 | <0.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 1.7 | 1.7 | None |
| TP-TD-13-01 ARD-03 | 8.36 | | <0.01 | <0.8 | 0.02 | <0.01 | <0.01 | | 0.02 | <0.3 | 2.3 | 2.3 | None |
| TP-TD-13-01 ARD-04 | 8.41 | | <0.01 | <0.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 2.3 | 2.3 | None |
| TP-TD-13-02 ARD-01 | 8.22 | | <0.01 | <0.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 2.0 | 2.0 | None |
| TP-TD-13-02 ARD-02 | 7.66 | | <0.01 | <0.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 2.1 | 2.1 | None |
| TP-TD-13-02 ARD-03 | 7.58 | | <0.01 | <0.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 2.8 | 2.8 | None |
| TP-TD-13-02 ARD-04 | 8.00 | | <0.01 | <0.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 2.1 | 2.1 | None |
| TP-TD-13-03 ARD-01 | 7.92 | | <0.01 | <0.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 2.2 | 2.2 | None |
| TP-TD-13-03 ARD-02 | 8.26 | | 0.05 | 4.2 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 6.4 | 6.4 | None |
| TP-TD-13-03 ARD-03 | 8.09 | | <0.01 | <0.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 2.3 | 2.3 | None |
| TP-TD-13-03 ARD-04 | 6.54 | | <0.01 | <0.8 | 0.03 | 0.03 | <0.01 | | <0.01 | <0.3 | -0.2 | -0.2 | None |
| TP-TD-13-03 ARD-05 | 5.53 | | 0.02 | 1.7 | 0.15 | 0.17 | 0.03 | | <0.01 | 0.9 | -11.2 | -12.1 | None |
| TP-TD-13-03 ARD-06 | 8.60 | | 0.06 | 5.0 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 7.3 | 7.3 | None |
| TP-WA-13-02 ARD-01 | 7.56 | | <0.01 | <0.8 | <0.01 | <0.01 | | <0.01 | | <0.3 | 2.0 | 2.0 | None |
| TP-WA-13-02 ARD-02 | 6.07 | | <0.01 | <0.8 | 0.37 | 0.39 | | <0.01 | | <0.3 | 0.0 | <0.3 | None |
| TP-WA-13-02 ARD-03 | 5.60 | | <0.01 | <0.8 | 0.4 | 0.4 | | <0.01 | | <0.3 | -0.4 | -0.4 | None |
| TP-WA-13-03 ARD-01 | 7.87 | | 0.06 | 5.0 | 0.01 | 0.01 | | <0.01 | | <0.3 | 6.2 | 6.2 | None |
| TP-WA-13-03 ARD-02 | 7.13 | | 0.01 | 0.8 | 0.18 | 0.17 | | 0.01 | | 0.3 | 2.8 | 2.5 | None |
| TP-WA-13-03 ARD-03 | 6.18 | | <0.01 | <0.8 | 0.05 | 0.04 | | 0.01 | | 0.3 | 0.5 | 0.2 | None |
| TP-WA-13-05 ARD-01 | 7.37 | | 0.05 | 4.2 | 0.14 | 0.06 | | 0.08 | | 2.5 | 8.0 | 5.5 | None |
| TP-WA-13-05 ARD-02 | 7.33 | | 0.07 | 5.8 | 0.18 | 0.08 | | 0.10 | | 3.1 | 9.9 | 6.8 | None |
| TP-WA-13-05 ARD-03 | 7.46 | | 0.07 | 5.8 | 0.19 | 0.09 | | 0.10 | | 3.1 | 8.7 | 5.6 | None |
| TP-WA-13-05 ARD-04 | 7.89 | | 0.09 | 7.5 | 0.18 | 0.03 | | 0.15 | | 4.7 | 12.3 | 7.6 | Slight |
| TP-WA-13-06 ARD-01 | 7.64 | | 0.49 | 40.8 | 0.4 | 0.08 | | 0.32 | | 10.0 | 39.4 | 29.4 | Slight |
| TP-WA-13-06 ARD-02 | 7.76 | | 0.69 | 57.5 | 0.3 | 0.07 | | 0.23 | | 7.2 | 77.2 | 70.0 | Slight |
| TP-WA-13-06 ARD-03 | 7.73 | | 1.00 | 83.3 | 0.49 | 0.1 | | 0.39 | | 12.2 | 67.9 | 55.7 | Slight |
| TP-WA-13-06 ARD-04 | 7.50 | | 0.30 | 25.0 | 0.31 | 0.3 | | 0.01 | | 0.3 | 24.8 | 24.5 | Slight |
| TP-WA-13-08 ARD-01 | 7.63 | | 0.03 | 2.5 | <0.01 | <0.01 | | <0.01 | | <0.3 | 4.9 | 4.9 | None |
| TP-WA-13-08 ARD-02 | 7.73 | | 0.03 | 2.5 | 0.03 | 0.01 | | 0.02 | | 0.6 | 4.9 | 4.3 | None |
| TP-WA-13-08 ARD-03 | 7.77 | | 0.25 | 20.8 | 0.16 | 0.03 | | 0.13 | | 4.1 | 21.8 | 17.7 | Slight |
| TP-WA-13-09 ARD-01 | 7.88 | | 0.04 | 3.3 | 0.02 | 0.02 | | <0.01 | | <0.3 | 4.2 | 4.2 | None |
| TP-WA-13-09 ARD-02 | 7.56 | | 0.28 | 23.3 | 0.41 | 0.19 | | 0.22 | | 6.9 | 24.3 | 17.4 | Slight |
| TP-WA-13-09 ARD-03 | 7.83 | | 0.33 | 27.5 | 0.27 | 0.06 | | 0.21 | | 6.6 | 28.3 | 21.7 | Slight |
| TP-WA-13-09 ARD-04 | 7.58 | | 0.19 | 15.8 | 0.14 | 0.05 | | 0.09 | | 2.8 | 17.7 | 14.9 | Slight |
| TP-WA-13-09 ARD-05 | 7.84 | | 0.28 | 23.3 | 0.11 | 0.03 | | 0.08 | | 2.5 | 26.0 | 23.5 | Slight |
| TP-WA-13-09 ARD-06 | 7.83 | | 0.45 | 37.5 | 0.14 | 0.05 | | 0.09 | | 2.8 | 37.9 | 35.1 | Slight |
| TP-WA-13-10 ARD-01 | 7.73 | | 0.61 | 50.8 | 0.35 | 0.07 | | 0.28 | | 8.8 | 48.9 | 40.2 | Slight |
| TP-WA-13-10 ARD-02 | 7.60 | | 0.60 | 50.0 | 0.3 | 0.11 | | 0.19 | | 5.9 | 48.6 | 42.7 | Slight |
| TP-WA-13-10 ARD-03 | 7.74 | | 0.45 | 37.5 | 0.36 | 0.07 | | 0.29 | | 9.1 | 35.6 | 26.5 | Slight |
| TP-WA-13-10 ARD-04 | 7.58 | | 0.31 | 25.8 | 0.26 | 0.15 | | 0.11 | | 3.4 | 25.7 | 22.3 | Slight |
| TP-WA-13-11 ARD-01 | 8.10 | | 0.46 | 38.3 | 0.14 | 0.02 | | 0.12 | | 3.8 | 36.6 | 32.9 | Slight |
| TP-WA-13-11 ARD-02 | 7.90 | | 0.35 | 29.2 | 0.17 | 0.17 | | <0.01 | | <0.3 | 26.1 | 26.1 | Slight |
| TP-WA-13-11 ARD-03 | 8.02 | | 0.28 | 23.3 | 0.02 | 0.02 | | <0.01 | | <0.3 | 24.0 | 24.0 | Slight |
| TP-WA-13-11 ARD-04 | 8.07 | | 0.67 | 55.8 | 0.37 | 0.35 | | 0.02 | | 0.6 | 51.2 | 50.6 | Slight |
| TP-WA-13-11 ARD-05 | 7.79 | | 0.17 | 14.2 | 0.15 | 0.16 | | <0.01 | | <0.3 | 13.4 | 13.4 | Slight |
| HA-BA-13-01 0-1M | 9.06 | | 0.07 | 5.8 | <0.01 | <0.01 | | <0.01 | | <0.3 | 8.4 | 8.4 | Slight |
| HA-BA-13-01 1-2M | 9.04 | | 0.07 | 5.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 8.9 | 8.9 | None |
| HA-BA-13-01 2-3M | 9.08 | | 0.07 | 5.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 8.7 | 8.7 | Slight |
| HA-BA-13-02 0-1M | 8.83 | | 0.07 | 5.8 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 8.9 | 8.9 | None |
| HA-BA-13-02 1-2M | 8.88 | | 0.08 | 6.7 | <0.01 | <0.01 | | <0.01 | | <0.3 | 9.5 | 9.5 | Slight |
| HA-BA-13-02 2-3M | 9.00 | | 0.08 | 6.7 | <0.01 | <0.01 | <0.01 | | <0.01 | <0.3 | 9.9 | 9.9 | Slight |
| **Duplicates** | | | | | | | | | | | | | |
| TP-BA-13-05 ARD-04 | | | | | | | <0.01 | | | | | | |
| TP-TD-13-03 ARD-06 | | | | | | | <0.01 | | | | | | |
| BH-T-13-01 ARD-02 | | | | | | | <0.01 | | | | | | |
| BH-T-13-02 ARD-04 | | | | | | | 0.01 | | | | | | |
| BH-M-13-04 ARD -02 | | | | | | | 0.57 | | | | | | |
| TP-M-13-03 ARD -04 | | | | | | | 0.23 | | | | | | |
| HA-BA-13-02 0-1M | | | | | | | <0.01 | | | | | | |
| BH-M-13-04 ARD -01 | 7.75 | | | | | | | | | | 12.8 | | Slight |
| BH-T-13-01 ARD-01 | | | 0.25 | | | | | | | | | | |
| BH-T-13-01 ARD-05 | | | | | | <0.01 | | | | | | | |
| BH-T-13-04 ARD-02 | 7.70 | | 0.09 | | 1.91 | | | | | | 7.5 | | Slight |
| BH-T-13-04 ARD-04 | 8.19 | 119.3 | | | | | | | | | 11.0 | | Slight |
| BH-TD-13-01 ARD-06 | | | | | | <0.01 | | | | | | | |
| TP-BA-13-03 ARD-04 | | | 0.02 | | | | | | | | | | |
| TP-BA-13-05 ARD-02 | 8.69 | | | | | | | | | | 3.9 | | Slight |
| TP-BA-13-05 ARD-03 | 8.66 | | | | | <0.01 | | | | | 4.3 | | None |
| TP-BA-13-08 ARD-01 | | | 0.63 | | | | | | | | | | |

**CLIENT** : **AMEC**
**PROJECT** : **Mt. Nansen**
**SGS Project #** : **1346**
**Test** : **Modified Acid-Base Accounting**
**Date** : **December 2-5, 2012**

| Sample ID | Paste pH | Paste EC µS/cm | TIC % | CaCO3 NP | S(T) % | S(SO4) % | S(S-2) % | S(S-2) % | Insoluble S % | AP | NP | Net NP | Fizz Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Method Code | Sobek | Sobek | CSB02V | Calc. | CSA06V | CSA07V | CSA08D | Calc. | Calc. | Calc. | Modified | Calc. | Sobek |
| LOD | 0.2 | 0.1 | 0.01 | #N/A | 0.01 | 0.01 | 0.01 | #N/A | #N/A | #N/A | 0.5 | #N/A | #N/A |
| TP-M-13-01 ARD -03 | | | | | | 0.04 | | | | | | | |
| TP-M-13-02 ARD -02 | | | 0.41 | | | | | | | | | | |
| TP-M-13-05 ARD -02 | 8.40 | | | | | | | | | | 7.3 | | None |
| TP-M-13-05 ARD -03 | 7.87 | | | | 0.23 | | | | | | 7.5 | | None |
| TP-R-13-01 ARD -04 | | | 0.09 | | | <0.01 | | | | | | | |
| TP-R-13-03 ARD -02 | | | 0.21 | | | | | | | | | | |
| TP-T-13-04 ARD-01 | | | 0.01 | | | | | | | | | | |
| TP-T-13-06 ARD-03 | 7.96 | | | | | | | | | | 10.0 | | Slight |
| TP-TD-13-01 ARD-01 | 8.32 | | | | | | | | | | 2.1 | | None |
| TP-TD-13-03 ARD-04 | | | | | 0.04 | | | | | | | | |
| TP-WA-13-03 ARD-03 | 6.20 | | | | | | | | | | 0.6 | | None |
| TP-WA-13-05 ARD-01 | 7.55 | | | | | | | | | | 7.5 | | None |
| TP-WA-13-06 ARD-04 | | | | | | 0.31 | | | | | | | |
| TP-WA-13-10 ARD-02 | | | 0.59 | | | | | | | | | | |
| TP-WA-13-10 ARD-03 | 7.73 | | | | 0.33 | | | | | | 35.5 | | Slight |
| TP-WA-13-10 ARD-04 | 7.62 | | | | | | | | | | 25.1 | | Slight |
| HA-BA-13-02 2-3M | | | | | | <0.01 | | | | | | | |
| **QC** | | | | | | | | | | | | | |
| RTS-3A | | | | | | | 2.39 | | | | | | |
| RTS-3A | | | | | | | 2.31 | | | | | | |
| RTS-3A | | | | | | | 2.36 | | | | | | |
| RTS-3A | | | | | | | 2.35 | | | | | | |
| RTS-3A | | | | | | | 2.45 | | | | | | |
| RTS-3A | | | | | | | 2.29 | | | | | | |
| GTS-2A | | | | | 0.33 | | | | | | | | |
| GTS-2A | | | | | 0.33 | | | | | | | | |
| GTS-2A | | | | | 0.32 | | | | | | | | |
| GTS-2A | | | | | 0.33 | | | | | | | | |
| GTS-2A | | | | | | | | | | | | | |
| GTS-2A | | | | | | | | | | | | | |
| PD-1 | | | | | | 4.34 | | | | | | | |
| PD-1 | | | | | | 4.39 | | | | | | | |
| PD-1 | | | | | | 4.46 | | | | | | | |
| PD-1 | | | | | | 4.37 | | | | | | | |
| PD-1 | | | | | | 4.36 | | | | | | | |
| PD-1 | | | | | | 4.47 | | | | | | | |
| PD-1 | | | | | | 4.23 | | | | | | | |
| SY4 | | | 0.91 | | | | | | | | | | |
| SY4 | | | 0.91 | | | | | | | | | | |
| SY4 | | | 0.92 | | | | | | | | | | |
| SY4 | | | 0.92 | | | | | | | | | | |
| SY4 | | | 0.91 | | | | | | | | | | |
| NBM-1 | | | | | | | | | | | 40.6 | | Slight |
| NBM-1 | | | | | | | | | | | 41.3 | | Slight |
| NBM-1 | | | | | | | | | | | 41.2 | | Slight |
| NBM-1 | | | | | | | | | | | 41.0 | | Slight |
| Expect Value | | | 0.95 | | 0.35 | 4.27 | 2.34 | | | | 42.0 | | Slight |
| Tolerance (+/-) | | | 0.06 | | 0.03 | 0.3 | 0.23 | | | | 3.0 | | |

**Note:**

AP = Acid potential in tonnes CaCO3 equivalent per 1000 tonnes of material. AP is determined from the sulphide sulphur content when analyzed. Otherwise it is determined from the calculated sulphide sulphur.

NP = Neutralization potential in tonnes CaCO3 equivalent per 1000 tonnes of material.

NET NP = NP - AP

Carbonate NP is calculated from TIC originating from carbonate minerals and is expressed in kg CaCO3/tonne.

Sulphate Sulphur determined by 25% HCl with S by ICP Finish

Sulphide Sulphur determined by Sobek 1:7 Nitric Acid with S by ICP Finish

Insoluble S is acid insoluble S (Total S - (Sulphate S + Sulphide S)).

**CLIENT** : AMEC
**PROJECT** : Mt. Nansen
**SGS Project #** : 1346
**Test** : Metals by Aqua Regia Digestion with ICP-MS Finish
**Date** : December 13, 2013

| Sample ID | Ag ppm | Al % | B ppm | Ba ppm | Ca % | Cr ppm | Cu ppm | Fe % | K % | Li ppm | Mg % | Mn ppm | Na % | Ni ppm | P ppm | S % | Sr ppm | Ti % | V ppm | Zn ppm | Zr ppm | As ppm | Be ppm | Bi ppm | Cd ppm | Ce ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Method Code | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B |
| LOD | 0.01 | 0.01 | 10 | 5 | 0.01 | 1 | 0.5 | 0.01 | 0.01 | 1 | 0.01 | 2 | 0.01 | 0.5 | 50 | 0.01 | 0.5 | 0.01 | 1 | 1 | 0.5 | 1 | 0.1 | 0.02 | 0.01 | 0.05 |
| BH-T-13-02 ARD-01 | 0.16 | 0.81 | 40 | 84 | 0.38 | 162 | 14.2 | 1.35 | 0.1 | 4 | 0.28 | 159 | 0.07 | 9.5 | 0.037 | 0.05 | 34.4 | 0.07 | 31 | 29 | 1.5 | 14 | 0.2 | 0.15 | 0.21 | 17.7 |
| BH-T-13-03 ARD-02 | 0.07 | 0.54 | 40 | 97 | 0.29 | 90 | 15.1 | 1.05 | 0.09 | 4 | 0.23 | 138 | 0.05 | 6.7 | 0.028 | 0.01 | 22.8 | 0.05 | 22 | 20 | 3 | 7 | 0.2 | 0.18 | 0.11 | 19.4 |
| BH-T-13-04 ARD-02 | 41.8 | 0.4 | 50 | 150 | 0.83 | 60 | 232 | 4.22 | 0.26 | 2 | 0.1 | 1110 | 0.02 | 3.6 | 0.041 | 2 | 43 | <0.01 | 14 | 1020 | 4.1 | 3720 | 0.2 | 24.2 | 15.8 | 11.5 |
| BH-TD-13-01 ARD-03 | 0.06 | 0.64 | 40 | 99 | 0.34 | 90 | 7.6 | 1.25 | 0.1 | 4 | 0.25 | 180 | 0.05 | 7.8 | 0.036 | <0.01 | 25.3 | 0.05 | 27 | 25 | 3.5 | 11 | 0.2 | 0.08 | 0.12 | 19.6 |
| TP-M-13-01 ARD -03 | 0.27 | 1.05 | 150 | 188 | 0.57 | 75 | 28.6 | 2.36 | 0.14 | 9 | 0.5 | 684 | 0.05 | 10.1 | 0.074 | 0.08 | 26.3 | 0.07 | 63 | 72 | 1.2 | 97 | 0.3 | 0.07 | 0.37 | 19.9 |
| TP-M-13-03 ARD -04 | 1.23 | 0.75 | 40 | 232 | 0.87 | 109 | 33.2 | 3.28 | 0.17 | 5 | 0.47 | 868 | 0.03 | 11 | 0.093 | 0.31 | 27.5 | 0.05 | 60 | 176 | 2.4 | 326 | 0.5 | 0.16 | 2.03 | 22.3 |
| TP-M-13-05 ARD -02 | 0.12 | 1.17 | 40 | 281 | 0.89 | 69 | 19.8 | 2.6 | 0.21 | 10 | 0.72 | 537 | 0.07 | 9.6 | 0.086 | 0.25 | 29.8 | 0.13 | 60 | 49 | 2.9 | 19 | 0.3 | 0.09 | 0.14 | 19.2 |
| TP-R-13-01 ARD -01 | 4.63 | 1.08 | 50 | 164 | 0.56 | 77 | 31.9 | 2.82 | 0.2 | 9 | 0.63 | 504 | 0.04 | 8.9 | 0.073 | 0.24 | 19.8 | 0.1 | 54 | 130 | 1.2 | 892 | 0.3 | 3.91 | 1.16 | 20.5 |
| TP-T-13-06 ARD-02 | 0.03 | 0.78 | 40 | 91 | 1.74 | 100 | 7.3 | 1.64 | 0.1 | 6 | 0.44 | 219 | 0.06 | 10.3 | 0.056 | <0.01 | 61.9 | 0.1 | 41 | 25 | 3.7 | 4 | 0.2 | 0.06 | 0.11 | 21.5 |
| TP-TD-13-01 ARD-01 | 0.04 | 0.52 | 40 | 98 | 0.24 | 135 | 5.4 | 1.11 | 0.08 | 3 | 0.18 | 143 | 0.05 | 7 | 0.026 | <0.01 | 19.2 | 0.04 | 24 | 18 | 3 | 5 | 0.2 | 0.06 | 0.09 | 18.3 |
| TP-TD-13-03 ARD-02 | 0.12 | 0.68 | 40 | 92 | 0.53 | 92 | 11.2 | 1.3 | 0.09 | 5 | 0.28 | 181 | 0.05 | 8.1 | 0.04 | <0.01 | 28.8 | 0.07 | 30 | 21 | 2.6 | 5 | 0.2 | 0.14 | 0.09 | 19 |
| TP-WA-13-02 ARD-01 | 0.17 | 0.53 | 40 | 202 | 0.19 | 56 | 5.6 | 1.3 | 0.11 | 2 | 0.07 | 447 | 0.01 | 3.8 | 0.05 | <0.01 | 8.5 | <0.01 | 17 | 131 | 1.1 | 31 | 0.4 | 0.11 | 0.91 | 22.6 |
| TP-WA-13-02 ARD-02 | 14.4 | 0.78 | 50 | 146 | 0.19 | 108 | 120 | 3.19 | 0.25 | 4 | 0.22 | 464 | 0.03 | 6.4 | 0.043 | 0.4 | 42.9 | 0.03 | 28 | 353 | 1.4 | 1110 | 0.2 | 12.7 | 5.79 | 17.2 |
| TP-WA-13-02 ARD-03 | 22.5 | 0.56 | 40 | 142 | 0.13 | 76 | 107 | 3.19 | 0.27 | 3 | 0.11 | 714 | 0.02 | 5 | 0.047 | 0.44 | 35.6 | 0.01 | 21 | 430 | 0.6 | 1670 | 0.3 | 18.4 | 6.86 | 16.8 |
| TP-WA-13-03 ARD-01 | 0.24 | 0.53 | 40 | 592 | 0.37 | 73 | 7.3 | 1.68 | 0.11 | 2 | 0.09 | 394 | 0.02 | 6.1 | 0.06 | 0.01 | 14.7 | <0.01 | 20 | 48 | 1.1 | 27 | 0.4 | 0.27 | 0.39 | 24.6 |
| TP-WA-13-03 ARD-02 | 8.44 | 0.89 | 50 | 387 | 0.26 | 116 | 150 | 2.72 | 0.18 | 6 | 0.4 | 1070 | 0.03 | 9.2 | 0.061 | 0.21 | 37.7 | 0.03 | 33 | 505 | 3.6 | 535 | 0.4 | 7.02 | 5.49 | 23.3 |
| TP-WA-13-03 ARD-03 | 1.91 | 1.01 | 50 | 161 | 0.31 | 77 | 28.1 | 2.25 | 0.11 | 6 | 0.35 | 625 | 0.04 | 8.3 | 0.075 | 0.06 | 23.9 | 0.05 | 36 | 177 | 0.7 | 133 | 0.3 | 1.68 | 1.99 | 17.5 |
| TP-WA-13-05 ARD-01 | 3.55 | 1.15 | 40 | 153 | 0.51 | 63 | 129 | 3.01 | 0.16 | 7 | 0.59 | 1550 | 0.03 | 5.4 | 0.095 | 0.15 | 24.7 | 0.03 | 42 | 795 | 1.7 | 196 | 0.4 | 3 | 6.32 | 19.8 |
| TP-WA-13-05 ARD-02 | 8.93 | 1.08 | 50 | 264 | 0.58 | 105 | 70.1 | 3.07 | 0.2 | 6 | 0.58 | 1570 | 0.03 | 7.4 | 0.088 | 0.22 | 24.3 | 0.03 | 43 | 685 | 1.8 | 387 | 0.4 | 8.64 | 7 | 17.6 |
| TP-WA-13-05 ARD-03 | 2.65 | 0.9 | 40 | 227 | 0.46 | 69 | 192 | 3.04 | 0.18 | 7 | 0.39 | 1700 | 0.03 | 5.5 | 0.075 | 0.22 | 25.6 | 0.01 | 32 | 895 | 1.8 | 261 | 0.4 | 2.33 | 8.25 | 17.5 |
| TP-WA-13-05 ARD-04 | 1.39 | 1.2 | 50 | 120 | 0.74 | 72 | 178 | 3.08 | 0.14 | 9 | 0.7 | 1330 | 0.04 | 4.9 | 0.106 | 0.21 | 28.3 | 0.05 | 51 | 591 | 1.9 | 150 | 0.4 | 1.02 | 4.35 | 14.5 |
| TP-WA-13-06 ARD-01 | 1.63 | 0.79 | 50 | 173 | 1.5 | 86 | 234 | 3.07 | 0.17 | 3 | 0.27 | 2310 | 0.02 | 6.6 | 0.084 | 0.47 | 53.1 | <0.01 | 25 | 1800 | 8 | 64 | 0.7 | 1.84 | 25.9 | 30.4 |
| TP-WA-13-06 ARD-02 | 1.55 | 0.65 | 40 | 124 | 1.7 | 42 | 61.8 | 3.56 | 0.15 | 3 | 0.38 | 2080 | 0.01 | 4.2 | 0.108 | 0.33 | 48.5 | <0.01 | 42 | 1080 | 2.2 | 297 | 0.6 | 0.88 | 8.45 | 24.3 |
| TP-WA-13-06 ARD-03 | 1.66 | 0.44 | 40 | 171 | 1.99 | 44 | 187 | 3.1 | 0.19 | 2 | 0.59 | 1990 | <0.01 | 3.1 | 0.085 | 0.54 | 51.2 | <0.01 | 22 | 1550 | 4.3 | 274 | 0.4 | 1.27 | 17.7 | 21.1 |
| TP-WA-13-06 ARD-04 | 6.63 | 0.68 | 40 | 154 | 1.02 | 65 | 254 | 6.26 | 0.23 | 2 | 0.17 | 1530 | 0.01 | 3.4 | 0.128 | 0.39 | 75.6 | <0.01 | 39 | 1650 | 3.2 | 1210 | 0.8 | 4.43 | 21.5 | 18.5 |
| TP-WA-13-08 ARD-01 | 0.19 | 0.47 | 40 | 412 | 0.34 | 111 | 3.9 | 2.16 | 0.13 | 2 | 0.06 | 1840 | 0.01 | 7.2 | 0.092 | <0.01 | 13.4 | <0.01 | 39 | 177 | 3 | 123 | 0.6 | 0.06 | 0.81 | 28.9 |
| TP-WA-13-08 ARD-02 | 0.34 | 0.46 | 40 | 398 | 0.29 | 103 | 11 | 1.99 | 0.15 | 3 | 0.08 | 1650 | 0.01 | 6.7 | 0.082 | 0.05 | 13.9 | <0.01 | 23 | 296 | 4.7 | 107 | 0.5 | 0.1 | 2.05 | 26.8 |
| TP-WA-13-08 ARD-03 | 0.71 | 0.49 | 40 | 419 | 1 | 81 | 15.5 | 2.78 | 0.13 | 3 | 0.13 | 2170 | 0.01 | 5.9 | 0.096 | 0.18 | 22.5 | <0.01 | 41 | 879 | 3.4 | 163 | 0.6 | 0.43 | 6.45 | 26 |
| TP-WA-13-09 ARD-01 | 1.87 | 0.6 | 50 | 50 | 0.23 | 76 | 79.5 | 2.81 | 0.14 | 3 | 0.05 | 1130 | <0.01 | 6.2 | 0.063 | 0.02 | 24.2 | <0.01 | 19 | 1390 | 1.4 | 488 | 0.4 | 1.08 | 13.9 | 14.3 |
| TP-WA-13-09 ARD-02 | 9.3 | 0.71 | 50 | 97 | 1.18 | 87 | 87.8 | 3.46 | 0.18 | 5 | 0.35 | 2540 | 0.02 | 6.5 | 0.092 | 0.48 | 29.2 | 0.01 | 33 | 966 | 3.2 | 919 | 0.4 | 2.69 | 9.3 | 19 |
| TP-WA-13-09 ARD-03 | 1.63 | 0.39 | 40 | 225 | 1.31 | 83 | 30.4 | 2.57 | 0.17 | 2 | 0.11 | 3340 | <0.01 | 7.5 | 0.068 | 0.26 | 29.8 | <0.01 | 15 | 686 | 8.7 | 519 | 0.4 | 0.53 | 8.11 | 29.2 |
| TP-WA-13-09 ARD-04 | 1.05 | 0.57 | 40 | 108 | 0.83 | 72 | 29.1 | 3.74 | 0.19 | 3 | 0.14 | 3070 | 0.01 | 9.6 | 0.118 | 0.17 | 31.4 | <0.01 | 41 | 808 | 4.6 | 631 | 0.6 | 0.41 | 6.36 | 30.5 |
| TP-WA-13-09 ARD-05 | 0.93 | 0.48 | 40 | 176 | 1.21 | 54 | 17.6 | 2.94 | 0.17 | 3 | 0.08 | 1580 | <0.01 | 5.9 | 0.096 | 0.1 | 25.1 | <0.01 | 27 | 823 | 7.1 | 237 | 0.5 | 0.45 | 8.71 | 33 |
| TP-WA-13-09 ARD-06 | 2.11 | 0.53 | 40 | 192 | 1.56 | 50 | 30.2 | 2.99 | 0.19 | 3 | 0.18 | 2120 | 0.01 | 4.8 | 0.086 | 0.17 | 41.3 | <0.01 | 22 | 941 | 6.5 | 449 | 0.5 | 0.52 | 8.66 | 27.6 |
| TP-WA-13-10 ARD-01 | 1.08 | 0.46 | 40 | 148 | 1.79 | 84 | 36.4 | 2.91 | 0.18 | 2 | 0.28 | 2680 | <0.01 | 6.2 | 0.097 | 0.42 | 48.8 | <0.01 | 23 | 898 | 8.1 | 357 | 0.5 | 0.43 | 9.37 | 29.5 |
| TP-WA-13-10 ARD-02 | 0.92 | 0.49 | 40 | 135 | 1.8 | 100 | 33.9 | 2.94 | 0.15 | 3 | 0.28 | 2010 | <0.01 | 5.2 | 0.079 | 0.35 | 37.6 | <0.01 | 26 | 556 | 4.4 | 310 | 0.4 | 0.37 | 5.72 | 22.3 |
| TP-WA-13-10 ARD-03 | 11.7 | 0.61 | 40 | 211 | 1.41 | 56 | 84.8 | 2.88 | 0.16 | 4 | 0.34 | 1940 | 0.02 | 4.5 | 0.084 | 0.42 | 46.5 | <0.01 | 28 | 524 | 4.9 | 414 | 0.5 | 0.94 | 5.79 | 21.1 |
| TP-WA-13-10 ARD-04 | 3.11 | 0.64 | 40 | 137 | 1.2 | 83 | 130 | 3.47 | 0.15 | 4 | 0.25 | 2200 | 0.01 | 5.1 | 0.102 | 0.3 | 27.8 | <0.01 | 39 | 819 | 2.6 | 308 | 0.6 | 2.22 | 8.81 | 24.6 |
| TP-WA-13-11 ARD-01 | 1.46 | 0.39 | 40 | 451 | 1.41 | 77 | 29.6 | 3 | 0.13 | 2 | 0.17 | 1810 | <0.01 | 9.3 | 0.047 | 0.15 | 26.8 | <0.01 | 27 | 420 | 2.7 | 638 | 0.5 | 0.82 | 3.14 | 14.6 |
| TP-WA-13-11 ARD-02 | 3.52 | 0.51 | 40 | 503 | 0.85 | 104 | 114 | 4.05 | 0.2 | 2 | 0.25 | 6180 | <0.01 | 9.9 | 0.035 | 0.14 | 64.9 | <0.01 | 18 | 1760 | 2.6 | 1160 | 0.5 | 1.95 | 18.7 | 12 |
| TP-WA-13-11 ARD-03 | 1.16 | 0.36 | 40 | 48 | 1.06 | 111 | 21 | 1.9 | 0.14 | 2 | 0.05 | 1950 | <0.01 | 8.1 | 0.035 | 0.02 | 18.5 | <0.01 | 12 | 389 | 2.3 | 294 | 0.4 | 0.62 | 5.06 | 13.4 |
| TP-WA-13-11 ARD-04 | 3.68 | 0.42 | 40 | 375 | 1.74 | 85 | 43.9 | 3.04 | 0.29 | 2 | 0.31 | 2530 | <0.01 | 8.8 | 0.04 | 0.42 | 61.3 | <0.01 | 20 | 870 | 2.2 | 565 | 0.5 | 4.21 | 12.9 | 10.2 |
| TP-WA-13-11 ARD-05 | 3.73 | 1.15 | 40 | 176 | 0.63 | 74 | 247 | 4.44 | 0.2 | 8 | 0.25 | 2270 | 0.01 | 10.9 | 0.064 | 0.17 | 59.2 | <0.01 | 40 | 1320 | 2.3 | 889 | 0.8 | 3.21 | 11 | 14.8 |
| **Duplicates** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BH-TD-13-01 ARD-03 | 0.06 | 0.63 | 40 | 96 | 0.34 | 88 | 8.2 | 1.25 | 0.1 | 5 | 0.25 | 177 | 0.05 | 7.6 | 0.036 | <0.01 | 25.1 | 0.05 | 27 | 25 | 3.3 | 11 | 0.2 | 0.08 | 0.11 | 18.6 |
| TP-M-13-03 ARD -04 | 1.41 | 0.74 | 40 | 226 | 0.87 | 107 | 32.8 | 3.21 | 0.17 | 5 | 0.47 | 887 | 0.03 | 10.8 | 0.094 | 0.31 | 26.9 | 0.05 | 61 | 184 | 2.4 | 333 | 0.4 | 0.16 | 2.05 | 23 |
| TP-WA-13-02 ARD-02 | 15.4 | 0.78 | 50 | 149 | 0.19 | 113 | 120 | 3.21 | 0.25 | 4 | 0.22 | 462 | 0.03 | 6.1 | 0.045 | 0.41 | 43.3 | 0.03 | 28 | 358 | 1.4 | 1110 | 0.3 | 12.8 | 5.65 | 16.6 |
| TP-WA-13-05 ARD-03 | 2.71 | 0.94 | 50 | 235 | 0.47 | 71 | 197 | 3.13 | 0.18 | 7 | 0.4 | 1760 | 0.03 | 5.6 | 0.075 | 0.21 | 25.5 | 0.01 | 33 | 870 | 1.9 | 266 | 0.4 | 2.33 | 8.52 | 16.7 |
| **QC** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CH4 | 2.15 | 1.82 | 60 | 304 | 0.59 | 114 | 1910 | 4.51 | 1.4 | 12 | 1.18 | 294 | 0.06 | 49.4 | 0.065 | 0.7 | 9.7 | 0.21 | 76 | 187 | 14.6 | 9 | 0.1 | 0.53 | 1.16 | 28.5 |
| CH4 | 2.12 | 1.81 | 50 | 307 | 0.58 | 115 | 1940 | 4.51 | 1.4 | 12 | 1.17 | 289 | 0.05 | 50.1 | 0.066 | 0.69 | 9.3 | 0.2 | 76 | 180 | 11.7 | 9 | 0.1 | 0.48 | 1.17 | 27.5 |
| CH4 | 2.22 | 1.81 | 60 | 295 | 0.57 | 102 | 1950 | 4.5 | 1.43 | 12 | 1.18 | 298 | 0.06 | 48.7 | 0.066 | 0.71 | 9.4 | 0.19 | 78 | 197 | 14 | 8 | <0.1 | 0.48 | 1.13 | 27 |
| CH4 | 2.05 | 1.82 | 60 | 298 | 0.57 | 108 | 1980 | 4.55 | 1.46 | 13 | 1.2 | 303 | 0.06 | 50 | 0.068 | 0.73 | 9.1 | 0.19 | 80 | 209 | 13.2 | 10 | <0.1 | 0.52 | 1.15 | 27.1 |
| CH4 | 2.11 | 1.85 | 50 | 303 | 0.64 | 111 | 1940 | 4.49 | 1.37 | 12 | 1.18 | 295 | 0.06 | 48.9 | 0.062 | 0.64 | 10.1 | 0.23 | 73 | 179 | 13.7 | 7 | <0.1 | 0.48 | 1.14 | 27.2 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Certified Values | 2.13 | 1.85 | #N/A | 293 | 0.61 | 103.8 | 2000 | 4.79 | 1.43 | 12.6 | 1.18 | 324 | 0.06 | 49.57 | 719 | 0.73 | 9.38 | 0.21 | 79.27 | 189.4 | 9 | 8.14 | 0.11 | 0.51 | 1.17 | 28.18 |
| Tolerance +/- (%) | 10.9 | 11.35 | #N/A | 14.3 | 14.1 | 12.4 | 10.1 | 10.52 | 11.74 | 29.84 | 12.3 | 11.5 | 50.3 | 12.52 | 27.4 | 13.4 | 23.3 | 23.3 | 13.2 | 11.3 | 17.7 | 13.1 | 241.3 | 19.7 | 12.1 | 10.4 |

**CLIENT**
**PROJECT**
**SGS Project #**
**Test**
**Date**

| Sample ID | Co ppm | Cs ppm | Ga ppm | Ge ppm | Hf ppm | Hg ppm | In ppm | La ppm | Lu ppm | Mo ppm | Nb ppm | Pb ppm | Rb ppm | Sb ppm | Sc ppm | Se ppm | Sn ppm | Ta ppm | Tb ppm | Te ppm | Th ppm | Tl ppm | U ppm | W ppm | Y ppm | Yb ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Method Code | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B | ICM14B |
| LOD | 0.1 | 0.05 | 0.1 | 0.1 | 0.05 | 0.01 | 0.02 | 0.1 | 0.01 | 0.05 | 0.05 | 0.2 | 0.2 | 0.05 | 0.1 | 1 | 0.3 | 0.05 | 0.02 | 0.05 | 0.1 | 0.02 | 0.05 | 0.1 | 0.05 | 0.1 |
| BH-T-13-02 ARD-01 | 4.7 | 0.53 | 2.8 | <0.1 | 0.08 | 0.01 | <0.02 | 8.8 | 0.06 | 2.47 | 1.42 | 10.5 | 5.9 | 1.16 | 2.5 | <1 | 1.7 | 0.07 | 0.2 | <0.05 | 2.3 | 0.06 | 0.41 | 0.3 | 4.18 | 0.4 |
| BH-T-13-03 ARD-02 | 3.1 | 0.46 | 2 | <0.1 | 0.12 | <0.01 | <0.02 | 9.9 | 0.06 | 1.4 | 0.53 | 6.7 | 5.3 | 0.54 | 2.1 | <1 | 2.1 | <0.05 | 0.2 | <0.05 | 3 | 0.05 | 0.39 | 0.8 | 4.39 | 0.4 |
| BH-T-13-04 ARD-02 | 3.5 | 2.49 | 1.6 | <0.1 | 0.08 | 0.27 | 0.53 | 5.8 | 0.05 | 4.52 | 0.07 | 1720 | 15.6 | 306 | 2.2 | <1 | 1.2 | <0.05 | 0.14 | 0.49 | 1.6 | 0.99 | 0.56 | 1.5 | 3.37 | 0.3 |
| BH-TD-13-01 ARD-03 | 3.7 | 0.63 | 2.2 | <0.1 | 0.11 | <0.01 | <0.02 | 10 | 0.08 | 1.31 | 0.48 | 3.9 | 6.1 | 0.73 | 2.6 | <1 | 0.3 | <0.05 | 0.23 | <0.05 | 2.9 | 0.07 | 0.42 | 0.1 | 5.26 | 0.5 |
| TP-M-13-01 ARD -03 | 11.7 | 5.85 | 4.1 | <0.1 | 0.07 | 0.07 | 0.02 | 9.6 | 0.13 | 2.08 | 0.82 | 11.9 | 14.7 | 7.4 | 7.3 | <1 | 0.3 | <0.05 | 0.31 | <0.05 | 1.7 | 0.4 | 0.57 | 0.2 | 9.05 | 0.8 |
| TP-M-13-03 ARD -04 | 11.5 | 5.87 | 3.2 | <0.1 | 0.23 | 0.2 | 0.05 | 11.9 | 0.21 | 4.39 | 0.37 | 114 | 10.9 | 19.4 | 9.8 | <1 | 0.5 | <0.05 | 0.4 | 0.08 | 3.4 | 0.54 | 0.7 | 0.4 | 11.8 | 1.2 |
| TP-M-13-05 ARD -02 | 9.8 | 5.79 | 4.7 | 0.1 | 0.15 | 0.03 | 0.03 | 10.7 | 0.15 | 1.04 | 0.34 | 5.8 | 11.2 | 1.54 | 8 | <1 | 0.5 | 0.06 | 0.3 | <0.05 | 2.7 | 0.18 | 0.42 | 0.1 | 8.9 | 0.9 |
| TP-R-13-01 ARD -01 | 8.9 | 6.08 | 4.7 | <0.1 | <0.05 | 0.1 | 0.08 | 11.3 | 0.15 | 1.33 | 1.01 | 275 | 14.3 | 41.2 | 7.5 | <1 | 0.5 | <0.05 | 0.3 | 0.08 | 2.7 | 0.33 | 0.54 | 0.2 | 9.1 | 0.8 |
| TP-T-13-06 ARD-02 | 5.1 | 0.49 | 2.9 | <0.1 | 0.24 | 0.04 | <0.02 | 10.7 | 0.1 | 2.48 | 1.82 | 3.3 | 5.9 | 0.27 | 3.4 | <1 | 0.4 | 0.59 | 0.29 | <0.05 | 2.9 | 0.05 | 0.67 | 0.4 | 6.41 | 0.6 |
| TP-TD-13-01 ARD-01 | 3 | 0.47 | 1.8 | <0.1 | 0.05 | <0.01 | <0.02 | 8.7 | 0.06 | 3.68 | 0.49 | 3 | 4.7 | 0.34 | 1.8 | <1 | <0.3 | <0.05 | 0.18 | <0.05 | 2.8 | 0.05 | 0.37 | <0.1 | 3.6 | 0.4 |
| TP-TD-13-03 ARD-02 | 3.8 | 0.55 | 2.5 | <0.1 | <0.05 | <0.01 | <0.02 | 9.5 | 0.07 | 1.36 | 0.97 | 3.2 | 5.9 | 0.32 | 2.6 | <1 | 0.4 | <0.05 | 0.22 | <0.05 | 2.7 | 0.06 | 0.44 | 0.2 | 5.08 | 0.5 |
| TP-WA-13-02 ARD-01 | 4.8 | 2.91 | 1.4 | <0.1 | <0.05 | 0.03 | 0.04 | 11.2 | 0.13 | 1.14 | <0.05 | 14.5 | 5.9 | 2.24 | 2.9 | <1 | <0.3 | <0.05 | 0.28 | <0.05 | 2.7 | 0.16 | 0.38 | 0.2 | 7.15 | 0.8 |
| TP-WA-13-02 ARD-02 | 3.3 | 1.94 | 3.4 | <0.1 | <0.05 | 0.21 | 0.46 | 9.1 | 0.05 | 3.59 | 0.54 | 495 | 15.8 | 86.3 | 2.8 | <1 | 0.8 | <0.05 | 0.17 | 0.3 | 2.2 | 0.8 | 0.53 | 0.1 | 3.63 | 0.4 |
| TP-WA-13-02 ARD-03 | 3.5 | 1.72 | 2.5 | <0.1 | <0.05 | 0.21 | 0.45 | 8.8 | 0.05 | 1.79 | 0.28 | 561 | 16.7 | 106 | 2.4 | <1 | 1 | <0.05 | 0.17 | 0.42 | 1.8 | 1.13 | 0.57 | 0.1 | 3.75 | 0.3 |
| TP-WA-13-03 ARD-01 | 9.8 | 2.66 | 1.4 | <0.1 | 0.15 | 0.07 | 0.03 | 12.3 | 0.17 | 1.43 | 0.62 | 14.6 | 5.1 | 1.98 | 3.7 | <1 | <0.3 | 0.58 | 0.35 | 0.09 | 2.7 | 0.09 | 0.32 | 0.5 | 8.58 | 1 |
| TP-WA-13-03 ARD-02 | 7.6 | 2.92 | 3.4 | <0.1 | 0.12 | 0.12 | 0.16 | 13.2 | 0.12 | 4.04 | 0.53 | 266 | 11.3 | 60.7 | 4.2 | <1 | 0.6 | 0.14 | 0.28 | 0.18 | 4.1 | 0.49 | 0.75 | 0.3 | 6.64 | 0.7 |
| TP-WA-13-03 ARD-03 | 6.8 | 2.26 | 3.9 | <0.1 | <0.05 | 0.06 | 0.04 | 9.5 | 0.1 | 1.38 | 0.96 | 67.5 | 9.4 | 17.5 | 3.6 | <1 | 0.3 | <0.05 | 0.24 | 0.06 | 1.8 | 0.18 | 0.55 | 0.1 | 6.24 | 0.6 |
| TP-WA-13-05 ARD-01 | 9.1 | 3.79 | 4.4 | <0.1 | 0.06 | 0.06 | 0.1 | 9.8 | 0.17 | 1.08 | 0.12 | 298 | 10.6 | 38.6 | 4.8 | <1 | 0.3 | <0.05 | 0.35 | 0.12 | 2 | 0.26 | 0.49 | 0.2 | 9.94 | 1 |
| TP-WA-13-05 ARD-02 | 9.2 | 3.81 | 4.4 | <0.1 | 0.07 | 0.09 | 0.15 | 9.4 | 0.16 | 3.38 | 0.15 | 1030 | 12.8 | 66.5 | 5 | <1 | 0.4 | <0.05 | 0.32 | 0.2 | 2 | 0.37 | 0.46 | 0.3 | 9.5 | 1 |
| TP-WA-13-05 ARD-03 | 9.1 | 3.95 | 3.3 | <0.1 | <0.05 | 0.06 | 0.1 | 9 | 0.17 | 1.24 | 0.09 | 157 | 11.6 | 30 | 4.1 | <1 | <0.3 | <0.05 | 0.33 | 0.14 | 2 | 0.37 | 0.57 | 0.2 | 9.05 | 1 |
| TP-WA-13-05 ARD-04 | 8.7 | 3.35 | 5.1 | <0.1 | 0.07 | 0.03 | 0.09 | 7.2 | 0.16 | 1.24 | 0.15 | 53.4 | 9 | 15.9 | 5.6 | <1 | 0.4 | <0.05 | 0.32 | 0.14 | 1.7 | 0.19 | 0.44 | 0.3 | 9.26 | 1 |
| TP-WA-13-06 ARD-01 | 8.3 | 5.84 | 1.9 | <0.1 | 0.14 | 0.06 | 0.19 | 17.4 | 0.17 | 3.35 | <0.05 | 189 | 10.3 | 7.74 | 4.2 | <1 | <0.3 | <0.05 | 0.45 | 0.07 | 4 | 0.26 | 1.36 | 0.2 | 11.3 | 1.1 |
| TP-WA-13-06 ARD-02 | 9 | 10.4 | 2.2 | <0.1 | 0.05 | 0.27 | 0.11 | 12.6 | 0.22 | 0.86 | <0.05 | 198 | 13.1 | 10.1 | 7 | <1 | <0.3 | <0.05 | 0.47 | <0.05 | 2.1 | 0.48 | 0.63 | 0.3 | 13 | 1.3 |
| TP-WA-13-06 ARD-03 | 6.2 | 3.64 | 1.3 | <0.1 | 0.08 | 0.11 | 0.41 | 11.2 | 0.17 | 1.3 | <0.05 | 231 | 11.5 | 10.7 | 3.6 | <1 | <0.3 | <0.05 | 0.37 | 0.08 | 2.7 | 0.41 | 0.7 | <0.1 | 10.4 | 1 |
| TP-WA-13-06 ARD-04 | 5.7 | 10.8 | 3.1 | <0.1 | 0.06 | 0.19 | 0.48 | 9.4 | 0.17 | 2.37 | <0.05 | 915 | 17.9 | 70.5 | 5 | <1 | 0.4 | <0.05 | 0.36 | 0.08 | 2 | 0.78 | 0.66 | 0.5 | 10.2 | 1 |
| TP-WA-13-08 ARD-01 | 5.6 | 4.67 | 1.4 | <0.1 | 0.06 | 0.09 | 0.06 | 13.8 | 0.19 | 3.32 | <0.05 | 14 | 8.5 | 4.69 | 7.4 | <1 | <0.3 | <0.05 | 0.46 | <0.05 | 3.1 | 0.6 | 0.63 | 0.1 | 11.6 | 1.2 |
| TP-WA-13-08 ARD-02 | 6.5 | 4.71 | 1.4 | <0.1 | 0.08 | 0.06 | 0.04 | 14.8 | 0.15 | 4.31 | <0.05 | 49.2 | 8.8 | 4.01 | 3.8 | <1 | <0.3 | <0.05 | 0.35 | <0.05 | 3.1 | 0.47 | 0.63 | 0.1 | 9.42 | 0.9 |
| TP-WA-13-08 ARD-03 | 7.6 | 4.93 | 1.6 | <0.1 | 0.07 | 0.17 | 0.08 | 13.1 | 0.2 | 2.7 | <0.05 | 88 | 8.5 | 7.41 | 6.9 | <1 | <0.3 | <0.05 | 0.45 | <0.05 | 2.7 | 0.55 | 0.63 | 0.2 | 12.1 | 1.3 |
| TP-WA-13-09 ARD-01 | 5.2 | 3.82 | 1.2 | <0.1 | <0.05 | 0.07 | 0.06 | 7.1 | 0.12 | 2.5 | <0.05 | 94.9 | 7.7 | 12.6 | 3.6 | <1 | <0.3 | <0.05 | 0.27 | 0.3 | 1.4 | 0.42 | 0.68 | <0.1 | 6.37 | 0.8 |
| TP-WA-13-09 ARD-02 | 9.7 | 4.6 | 2.8 | <0.1 | 0.08 | 0.14 | 0.23 | 10.1 | 0.16 | 2.89 | <0.05 | 448 | 13 | 46.8 | 5.2 | <1 | 0.5 | <0.05 | 0.33 | 0.11 | 2.3 | 0.81 | 0.49 | 0.2 | 9.09 | 1 |
| TP-WA-13-09 ARD-03 | 7.8 | 3.41 | 1.3 | <0.1 | 0.11 | 0.27 | 0.1 | 17.5 | 0.13 | 3.47 | 0.06 | 297 | 11 | 16.8 | 3.4 | <1 | <0.3 | <0.05 | 0.35 | <0.05 | 5.2 | 1.19 | 0.89 | 0.2 | 9.79 | 0.7 |
| TP-WA-13-09 ARD-04 | 10.6 | 7.64 | 1.9 | <0.1 | 0.08 | 0.11 | 0.09 | 15.8 | 0.25 | 2.41 | <0.05 | 155 | 14.9 | 13.7 | 7.3 | <1 | <0.3 | <0.05 | 0.54 | <0.05 | 2.9 | 1.19 | 0.65 | 0.4 | 14.8 | 1.5 |
| TP-WA-13-09 ARD-05 | 8.5 | 6.39 | 1.6 | <0.1 | 0.11 | 0.39 | 0.11 | 19.1 | 0.18 | 1.62 | <0.05 | 157 | 12.4 | 8.71 | 4.9 | <1 | <0.3 | <0.05 | 0.41 | <0.05 | 4.4 | 0.52 | 0.81 | 0.2 | 11.4 | 1 |
| TP-WA-13-09 ARD-06 | 7.9 | 7.34 | 1.8 | <0.1 | 0.11 | 0.15 | 0.14 | 15.3 | 0.16 | 1.61 | <0.05 | 330 | 13.3 | 14.3 | 4.4 | <1 | <0.3 | <0.05 | 0.41 | <0.05 | 3.3 | 0.86 | 0.71 | 0.2 | 10.1 | 1 |
| TP-WA-13-10 ARD-01 | 11.8 | 6.78 | 1.5 | <0.1 | 0.15 | 0.14 | 0.07 | 16.6 | 0.17 | 3.43 | <0.05 | 132 | 13.1 | 12.8 | 4.7 | <1 | <0.3 | <0.05 | 0.43 | <0.05 | 4.1 | 1.01 | 0.85 | 0.4 | 10.6 | 1 |
| TP-WA-13-10 ARD-02 | 9.1 | 6.25 | 1.6 | <0.1 | 0.08 | 0.16 | 0.07 | 11.8 | 0.16 | 3.56 | <0.05 | 173 | 11.9 | 10.2 | 4.8 | <1 | <0.3 | <0.05 | 0.37 | <0.05 | 3.1 | 0.92 | 0.61 | 0.2 | 9.98 | 1 |
| TP-WA-13-10 ARD-03 | 8.9 | 6.53 | 2.2 | <0.1 | 0.13 | 0.2 | 0.08 | 11 | 0.15 | 1.36 | 0.08 | 274 | 11.9 | 99.2 | 4.6 | <1 | 0.4 | <0.05 | 0.33 | <0.05 | 2.7 | 0.86 | 0.71 | 0.2 | 10.1 | 0.9 |
| TP-WA-13-10 ARD-04 | 8.7 | 5.75 | 2.1 | <0.1 | 0.06 | 0.29 | 0.15 | 12.3 | 0.21 | 2.66 | <0.05 | 160 | 11.1 | 30.2 | 6.5 | <1 | <0.3 | <0.05 | 0.4 | 0.06 | 2.6 | 0.85 | 0.67 | 0.4 | 12.2 | 1.2 |
| TP-WA-13-11 ARD-01 | 10.5 | 4.27 | 1.4 | <0.1 | <0.05 | 0.12 | 0.05 | 7.3 | 0.16 | 2.59 | <0.05 | 226 | 8.8 | 11.9 | 6.7 | <1 | <0.3 | <0.05 | 0.27 | <0.05 | 1.8 | 0.58 | 0.52 | 0.1 | 8.55 | 0.9 |
| TP-WA-13-11 ARD-02 | 12.5 | 4.84 | 1.2 | <0.1 | <0.05 | 0.1 | 0.08 | 5.8 | 0.14 | 4.22 | <0.05 | 490 | 11.1 | 18.9 | 4.4 | <1 | <0.3 | <0.05 | 0.25 | 0.09 | 1.2 | 0.86 | 0.57 | 0.1 | 8.32 | 0.8 |
| TP-WA-13-11 ARD-03 | 6 | 3.9 | 0.9 | <0.1 | <0.05 | 0.06 | 0.03 | 6.8 | 0.11 | 3.5 | <0.05 | 88.3 | 8.2 | 6.33 | 2.9 | <1 | <0.3 | <0.05 | 0.2 | <0.05 | 1.5 | 0.36 | 0.38 | 0.1 | 6.1 | 0.6 |
| TP-WA-13-11 ARD-04 | 7.7 | 4.38 | 1.5 | <0.1 | <0.05 | 0.09 | 0.11 | 4.8 | 0.1 | 2.98 | <0.05 | 520 | 17.3 | 45.9 | 4.4 | <1 | <0.3 | <0.05 | 0.2 | 0.08 | 1.1 | 1.11 | 0.41 | 0.1 | 6.38 | 0.6 |
| TP-WA-13-11 ARD-05 | 11.9 | 5.22 | 3 | <0.1 | <0.05 | 0.17 | 0.3 | 7.1 | 0.18 | 2.4 | <0.05 | 342 | 12.9 | 51 | 9 | <1 | <0.3 | <0.05 | 0.33 | 0.08 | 1.6 | 1.25 | 0.65 | 0.1 | 9.78 | 1 |
| **Duplicates** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BH-TD-13-01 ARD-03 | 3.7 | 0.63 | 2.3 | <0.1 | 0.1 | <0.01 | <0.02 | 9.5 | 0.08 | 1.32 | 0.47 | 3.9 | 6.1 | 0.71 | 2.6 | <1 | 0.3 | <0.05 | 0.23 | <0.05 | 2.7 | 0.07 | 0.43 | 0.1 | 5.34 | 0.5 |
| TP-M-13-03 ARD -04 | 11.5 | 5.63 | 3.2 | <0.1 | 0.11 | 0.17 | 0.04 | 12.5 | 0.21 | 4.15 | 0.37 | 126 | 10.4 | 19.9 | 9.9 | <1 | 0.5 | <0.05 | 0.41 | 0.06 | 3.4 | 0.51 | 0.65 | 0.3 | 11.8 | 1.2 |
| TP-WA-13-02 ARD-02 | 3.4 | 1.9 | 3.4 | <0.1 | <0.05 | 0.22 | 0.45 | 8.7 | 0.05 | 3.62 | 0.56 | 496 | 15.9 | 86 | 2.9 | <1 | 0.7 | <0.05 | 0.17 | 0.29 | 2.1 | 0.8 | 0.52 | 0.1 | 3.64 | 0.4 |
| TP-WA-13-05 ARD-03 | 9.5 | 3.97 | 3.5 | <0.1 | <0.05 | 0.06 | 0.11 | 8.6 | 0.16 | 1.29 | 0.09 | 160 | 11.7 | 30.4 | 4.2 | <1 | <0.3 | <0.05 | 0.33 | 0.14 | 2 | 0.39 | 0.58 | 0.2 | 9.38 | 1 |
| **QC** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CH4 | 23.6 | 2.68 | 9.3 | 0.2 | 0.33 | <0.01 | 0.11 | 14.4 | 0.08 | 3.24 | 0.33 | 7.8 | 67.3 | 0.36 | 8.4 | 2 | 0.7 | <0.05 | 0.32 | 0.5 | 2.1 | 0.43 | 0.29 | 1.4 | 6.07 | 0.5 |
| CH4 | 24.8 | 2.69 | 9.6 | 0.2 | 0.35 | <0.01 | 0.1 | 13.9 | 0.07 | 2.71 | 0.47 | 8.8 | 67.6 | 0.48 | 8.6 | 2 | 0.6 | 0.15 | 0.32 | 0.4 | 2.1 | 0.44 | 0.27 | 2 | 5.76 | 0.4 |
| CH4 | 23.3 | 2.63 | 9.4 | 0.2 | 0.39 | <0.01 | 0.1 | 14.6 | 0.07 | 2.76 | 0.36 | 7.8 | 67.3 | 0.39 | 8.5 | 2 | 0.6 | 0.06 | 0.32 | 0.41 | 2.1 | 0.43 | 0.29 | 1.9 | 5.88 | 0.5 |
| CH4 | 24.7 | 2.61 | 9.7 | 0.2 | 0.34 | <0.01 | 0.1 | 14.6 | 0.07 | 3.25 | 0.27 | 8.5 | 69.4 | 0.42 | 8.7 | 2 | 0.6 | <0.05 | 0.3 | 0.43 | 2.1 | 0.43 | 0.29 | 3 | 6.07 | 0.5 |
| CH4 | 23.7 | 2.6 | 9.4 | 0.2 | 0.32 | <0.01 | 0.1 | 15.1 | 0.07 | 2.69 | 0.24 | 7.6 | 67.6 | 0.3 | 8.9 | 2 | 0.6 | <0.05 | 0.29 | 0.4 | 2.2 | 0.42 | 0.29 | 2.5 | 6.25 | 0.4 |
| Certified Values | 22.8 | 2.6 | 8.72 | 0.21 | 0.29 | #N/A | 0.1 | 14 | #N/A | 3.05 | 0.19 | 8.24 | 67 | 0.34 | 7.99 | 1.57 | 0.6 | 0.3 | 0.27 | 0.42 | 2.2 | 0.4 | 0.29 | 2.15 | 5.66 | #N/A |
| Tolerance +/- (%) | 11.1 | 14.8 | 12.9 | 127.4 | 52.8 | #N/A | 62.1 | 11.8 | #N/A | 14.1 | 75 | 16.1 | 10.7 | 47.3 | 13.1 | 169.6 | 134.5 | 51.7 | 28.4 | 39.6 | 21.2 | 22.6 | 52.9 | 21.6 | 12.2 | #N/A |

**CLIENT** : AMEC
**PROJECT** : Mt. Nansen
**SGS Project #** : 1346
**Test** : Metals by Multi-Acid Digestion with ICP-MS Finish
**Date** : December 17, 2013

| Sample ID | Ag | Al | Ba | Ca | Cr | Cu | Fe | K | Li | Mg | Mn | Na | Ni | P | S | Sr | Ti | V | Zn | Zr | As | Be | Bi | Cd | Ce | Co | Cs | Ga | Hf | In | La | Lu |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ppm | % | ppm | % | ppm | ppm | % | % | ppm | % | ppm | % | ppm | % | % | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm |
| Method Code | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B |
| LOD | 0.02 | 0.01 | 1 | 0.01 | 1 | 0.5 | 0.01 | 0.01 | 1 | 0.01 | 2 | 0.01 | 0.5 | 0.005 | 0.01 | 0.5 | 0.01 | 2 | 1 | 0.5 | 1 | 0.1 | 0.04 | 0.02 | 0.05 | 0.1 | 1 | 0.1 | 0.02 | 0.02 | 0.1 | 0.01 |
| BH-M-13-04 ARD -01 | 32.2 | 6.65 | 1230 | 1.25 | 93 | 140 | 3.68 | 2.2 | 16 | 0.58 | 1020 | 1.4 | 9.2 | 0.063 | 0.81 | 261 | 0.23 | 86 | 1370 | 23.9 | 4830 | 1.1 | 2.12 | 22.1 | 33.5 | 9.7 | 11 | 15 | 0.63 | 0.14 | 18 | 0.22 |
| BH-M-13-04 ARD -02 | 19.7 | 7.27 | 1010 | 2.83 | 111 | 128 | 3.71 | 1.79 | 18 | 0.87 | 1290 | 1.78 | 15 | 0.091 | 0.65 | 302 | 0.29 | 105 | 891 | 25 | 2430 | 1.1 | 0.41 | 16.2 | 31.4 | 11.4 | 9 | 16.2 | 0.74 | 0.11 | 16 | 0.27 |
| BH-T-13-01 ARD-01 | <0.02 | 6.36 | 911 | 3.02 | 96 | 10.1 | 2.25 | 1.47 | 10 | 0.79 | 488 | 2.2 | 11.9 | 0.051 | 0.04 | 470 | 0.3 | 76 | 40 | 31.4 | 21 | 1.3 | 0.16 | 0.18 | 41.6 | 7.7 | 1 | 14.3 | 0.89 | 0.03 | 22 | 0.24 |
| BH-T-13-01 ARD-02 | <0.02 | 6.37 | 917 | 3.08 | 123 | 6 | 2.17 | 1.47 | 10 | 0.78 | 471 | 2.28 | 12.2 | 0.051 | 0.01 | 476 | 0.29 | 73 | 37 | 31 | 6 | 1.3 | 0.09 | 0.13 | 43 | 7.4 | 1 | 14.1 | 0.87 | 0.03 | 22.7 | 0.23 |
| BH-T-13-01 ARD-03 | <0.02 | 6.04 | 1030 | 2.23 | 86 | 7.2 | 1.37 | 1.61 | 10 | 0.47 | 296 | 2.14 | 8.8 | 0.036 | 0.02 | 452 | 0.17 | 44 | 32 | 27.2 | 11 | 1.2 | 0.11 | 0.15 | 28.4 | 5.2 | 1 | 12.7 | 0.77 | 0.02 | 14.9 | 0.16 |
| BH-T-13-01 ARD-05 | 1.31 | 7.11 | 746 | 3.53 | 115 | 39 | 2.47 | 1.32 | 13 | 1 | 568 | 2.2 | 17 | 0.07 | 0.02 | 442 | 0.35 | 85 | 103 | 40.7 | 11 | 1.2 | 0.24 | 0.48 | 42.2 | 10.2 | 2 | 15.3 | 1.03 | 0.13 | 22.1 | 0.25 |
| BH-T-13-01 ARD-07 | <0.02 | 6.46 | 917 | 2.25 | 136 | 14.1 | 2.16 | 1.51 | 13 | 0.74 | 446 | 2.02 | 16.3 | 0.071 | 0.03 | 410 | 0.27 | 70 | 46 | 32.7 | 8 | 1.2 | 0.09 | 0.19 | 41.6 | 9.1 | 2 | 14.1 | 0.96 | 0.03 | 22 | 0.23 |
| BH-T-13-01 ARD-08 | <0.02 | 5.96 | 1050 | 1.78 | 128 | 7.8 | 1.38 | 1.65 | 10 | 0.44 | 308 | 2.05 | 9.6 | 0.041 | 0.01 | 419 | 0.16 | 43 | 31 | 21.7 | 6 | 1.1 | 0.08 | 0.13 | 31.4 | 5.6 | 1 | 12.7 | 0.61 | 0.02 | 16.9 | 0.17 |
| BH-T-13-02 ARD-01 | <0.02 | 6.49 | 981 | 1.99 | 184 | 15.5 | 1.8 | 1.56 | 11 | 0.61 | 353 | 2.2 | 11.8 | 0.04 | 0.05 | 474 | 0.22 | 58 | 41 | 31.9 | 16 | 1.2 | 0.19 | 0.25 | 34.4 | 7.3 | 1 | 14.3 | 0.9 | 0.03 | 17.8 | 0.18 |
| BH-T-13-02 ARD-02 | 0.36 | 6.96 | 939 | 2.19 | 97 | 22.3 | 2.11 | 1.59 | 11 | 0.72 | 422 | 2.22 | 11.8 | 0.049 | 0.05 | 458 | 0.26 | 67 | 58 | 31.6 | 36 | 1.3 | 0.4 | 0.43 | 40.5 | 7.2 | 1 | 14.1 | 0.86 | 0.04 | 21.7 | 0.2 |
| BH-T-13-02 ARD-04 | <0.02 | 6.37 | 730 | 3.6 | 93 | 19.9 | 2.86 | 1.25 | 15 | 1.17 | 644 | 1.93 | 21.5 | 0.078 | 0.05 | 412 | 0.38 | 97 | 61 | 42.2 | 15 | 1.2 | 0.15 | 0.3 | 44.1 | 12.6 | 2 | 14.6 | 1.11 | 0.05 | 23.1 | 0.27 |
| BH-T-13-02 ARD-06 | 0.28 | 6.23 | 900 | 3.04 | 84 | 16.8 | 2.08 | 1.43 | 12 | 0.82 | 479 | 2.04 | 13.4 | 0.05 | 0.05 | 449 | 0.28 | 71 | 64 | 33.4 | 50 | 1.1 | 0.41 | 0.52 | 34.9 | 8.3 | 1 | 13.8 | 0.89 | 0.04 | 18.3 | 0.21 |
| BH-T-13-02 ARD-07 | <0.02 | 6.36 | 1780 | 1.01 | 139 | 26.4 | 2.3 | 1.84 | 20 | 0.46 | 400 | 1.35 | 16 | 0.055 | 0.07 | 348 | 0.2 | 79 | 76 | 35.9 | 23 | 1.2 | 0.32 | 0.32 | 37.9 | 7 | 4 | 15.2 | 0.99 | 0.05 | 21.7 | 0.19 |
| BH-T-13-03 ARD-01 | 1.67 | 6.83 | 1130 | 1.38 | 130 | 35.6 | 2.11 | 1.79 | 14 | 0.55 | 323 | 1.7 | 14.8 | 0.045 | 0.03 | 321 | 0.22 | 74 | 73 | 25.3 | 129 | 1.3 | 0.11 | 0.35 | 36.4 | 6.7 | 3 | 15.2 | 0.71 | 0.03 | 19 | 0.19 |
| BH-T-13-03 ARD-02 | <0.02 | 6.31 | 1120 | 1.73 | 102 | 13.4 | 1.39 | 1.63 | 9 | 0.42 | 298 | 2.16 | 8 | 0.034 | 0.01 | 482 | 0.17 | 41 | 28 | 19.8 | 9 | 1.3 | 0.13 | 0.15 | 29.9 | 4.7 | 1 | 13.1 | 0.58 | 0.02 | 15.5 | 0.18 |
| BH-T-13-03 ARD-04 | 0.06 | 6.31 | 1130 | 1.72 | 113 | 8.8 | 1.47 | 1.55 | 9 | 0.4 | 306 | 2.19 | 8.4 | 0.032 | 0.01 | 482 | 0.15 | 38 | 35 | 23.3 | 28 | 1.3 | 0.19 | 0.23 | 32.6 | 4.8 | 1 | 13.3 | 0.59 | 0.02 | 17.6 | 0.16 |
| BH-T-13-03 ARD-06 | 0.68 | 6.61 | 1120 | 1.66 | 116 | 8.8 | 1.67 | 1.66 | 9 | 0.4 | 334 | 2.1 | 8.7 | 0.033 | 0.01 | 448 | 0.17 | 50 | 38 | 24.5 | 43 | 1.2 | 0.19 | 0.23 | 32.9 | 4.9 | 2 | 13.4 | 0.62 | 0.03 | 18 | 0.18 |
| BH-T-13-03 ARD-08 | <0.02 | 6.41 | 781 | 3.31 | 97 | 23.1 | 2.5 | 1.29 | 14 | 1 | 613 | 1.98 | 19.5 | 0.08 | 0.03 | 401 | 0.3 | 85 | 63 | 39.1 | 22 | 1.2 | 0.17 | 0.3 | 36.5 | 11.6 | 2 | 14.2 | 0.98 | 0.04 | 18.7 | 0.24 |
| BH-T-13-04 ARD-01 | 48.7 | 3.46 | 660 | 1.57 | 55 | 366 | 3.78 | 1.3 | 27 | 0.2 | 1190 | 0.18 | 6.6 | 0.043 | 2.48 | 111 | 0.16 | 37 | 1370 | 36.3 | 3150 | 0.7 | 23.5 | 21.6 | 23.5 | 3.3 | 7 | 9.3 | 0.81 | 0.73 | 12.8 | 0.1 |
| BH-T-13-04 ARD-02 | 40.9 | 3.95 | 666 | 0.9 | 71 | 226 | 4.19 | 1.53 | 29 | 0.19 | 1180 | 0.15 | 3.7 | 0.048 | 1.79 | 108 | 0.16 | 42 | 1060 | 35.6 | 3790 | 0.7 | 26.2 | 15.8 | 22.5 | 5.4 | 8 | 10.3 | 0.86 | 0.6 | 12 | 0.11 |
| BH-T-13-04 ARD-04 | <0.02 | 6.32 | 1010 | 2.16 | 100 | 13.2 | 1.75 | 1.56 | 10 | 0.57 | 352 | 2.08 | 10.9 | 0.041 | <0.01 | 450 | 0.22 | 61 | 36 | 24.8 | 21 | 1.3 | 0.17 | 0.17 | 32.4 | 6 | 1 | 13.6 | 0.7 | 0.03 | 17 | 0.17 |
| BH-T-13-04 ARD-06 | <0.02 | 6.06 | 1100 | 1.6 | 95 | 6.2 | 1.26 | 1.68 | 9 | 0.37 | 255 | 2.14 | 7.6 | 0.031 | <0.01 | 432 | 0.15 | 38 | 26 | 23.1 | 5 | 1.3 | 0.08 | 0.09 | 31.9 | 5.1 | 1 | 12.9 | 0.76 | 0.02 | 17 | 0.16 |
| BH-T-13-04 ARD-08 | <0.02 | 6.36 | 973 | 2.2 | 114 | 14.5 | 1.86 | 1.54 | 10 | 0.61 | 429 | 2.12 | 10.7 | 0.052 | <0.01 | 452 | 0.26 | 62 | 34 | 29.2 | 7 | 1.3 | 0.09 | 0.13 | 43.2 | 6.7 | 1 | 13.9 | 0.85 | 0.03 | 23.3 | 0.22 |
| BH-TD-13-01 ARD-01 | 0.22 | 7.78 | 1380 | 1.9 | 118 | 31.2 | 3.71 | 2.34 | 16 | 1.05 | 1080 | 1.81 | 24.2 | 0.089 | 0.04 | 454 | 0.29 | 128 | 232 | 17.7 | 22 | 1.6 | 4.31 | 1.34 | 41.8 | 13.9 | 8 | 18.6 | 0.48 | 0.09 | 22.4 | 0.23 |
| BH-TD-13-01 ARD-03 | <0.02 | 6.53 | 1050 | 1.84 | 85 | 7.2 | 1.65 | 1.66 | 10 | 0.49 | 367 | 2.21 | 9.1 | 0.039 | <0.01 | 453 | 0.18 | 51 | 35 | 24.3 | 13 | 1.4 | 0.08 | 0.14 | 34.6 | 5.4 | 1 | 13.5 | 0.62 | 0.03 | 18.8 | 0.17 |
| BH-TD-13-01 ARD-06 | <0.02 | 6.26 | 1080 | 1.59 | 124 | 7 | 1.46 | 1.71 | 10 | 0.43 | 315 | 2.06 | 8.8 | 0.035 | <0.01 | 421 | 0.16 | 47 | 31 | 22.5 | 11 | 1.5 | 0.07 | 0.11 | 32.2 | 4.7 | 1 | 13.2 | 0.57 | 0.02 | 17.4 | 0.15 |
| BH-TD-13-01 ARD-08 | <0.02 | 6.53 | 1110 | 1.63 | 73 | 5.9 | 1.41 | 1.67 | 9 | 0.4 | 309 | 2.18 | 8.7 | 0.032 | <0.01 | 446 | 0.15 | 44 | 38 | 23.8 | 12 | 1.4 | 0.07 | 0.29 | 27.6 | 4.7 | 1 | 13.1 | 0.6 | 0.02 | 14.1 | 0.15 |
| BH-TD-13-01 ARD-10 | <0.02 | 6.32 | 1070 | 1.74 | 79 | 8.9 | 1.53 | 1.75 | 10 | 0.45 | 333 | 2.05 | 9.3 | 0.039 | <0.01 | 420 | 0.18 | 48 | 36 | 26.2 | 28 | 1.4 | 0.07 | 0.15 | 30.7 | 5 | 1 | 13 | 0.62 | 0.03 | 16.5 | 0.16 |
| BH-TD-13-01 ARD-12 | 0.14 | 6.49 | 1340 | 1.78 | 127 | 13.9 | 1.65 | 1.81 | 10 | 0.46 | 368 | 2.13 | 9.2 | 0.041 | 0.02 | 462 | 0.18 | 52 | 41 | 20.3 | 28 | 1.2 | 0.07 | 0.17 | 29.1 | 5.3 | 2 | 13.9 | 0.9 | 0.03 | 15.3 | 0.19 |
| BH-TD-13-01 ARD-14 | <0.02 | 6.26 | 1090 | 1.66 | 139 | 16 | 1.45 | 1.69 | 10 | 0.45 | 287 | 2.15 | 9.8 | 0.037 | 0.01 | 417 | 0.17 | 46 | 30 | 25.1 | 10 | 1.2 | 0.08 | 0.12 | 35.5 | 5.4 | 1 | 13.4 | 0.69 | 0.02 | 19.1 | 0.16 |
| TP-BA-13-03 ARD-01 | <0.02 | 6.1 | 1060 | 1.77 | 116 | 7.6 | 1.56 | 1.58 | 10 | 0.43 | 308 | 2.06 | 8.6 | 0.036 | <0.01 | 470 | 0.18 | 47 | 30 | 23.1 | 12 | 1.4 | 0.07 | 0.11 | 35.1 | 5 | 1 | 13.4 | 0.93 | 0.03 | 19.1 | 0.18 |
| TP-BA-13-03 ARD-02 | <0.02 | 6.25 | 1130 | 1.72 | 96 | 6 | 1.28 | 1.67 | 10 | 0.38 | 263 | 2.15 | 7.6 | 0.029 | <0.01 | 482 | 0.14 | 37 | 25 | 19.6 | 8 | 1.4 | 0.07 | 0.09 | 28.8 | 4.6 | 1 | 13.8 | 0.66 | 0.02 | 15.2 | 0.16 |
| TP-BA-13-03 ARD-03 | 0.05 | 6.75 | 1140 | 1.63 | 113 | 11.6 | 2.12 | 1.74 | 12 | 0.45 | 360 | 1.89 | 9.8 | 0.043 | 0.01 | 418 | 0.2 | 63 | 66 | 24.6 | 91 | 1.4 | 0.09 | 0.36 | 38.5 | 6.1 | 3 | 14.6 | 0.71 | 0.04 | 20.6 | 0.21 |
| TP-BA-13-03 ARD-04 | <0.02 | 6.67 | 1140 | 1.59 | 106 | 10.2 | 1.75 | 1.84 | 12 | 0.45 | 324 | 1.9 | 8.7 | 0.037 | 0.01 | 385 | 0.18 | 59 | 46 | 23.8 | 43 | 1.4 | 0.15 | 0.25 | 35.8 | 5.6 | 2 | 14.2 | 0.8 | 0.03 | 19.7 | 0.21 |
| TP-BA-13-04 ARD-01 | 0.24 | 6.78 | 1140 | 1.55 | 117 | 21.9 | 2.11 | 1.71 | 11 | 0.45 | 623 | 1.99 | 10.3 | 0.042 | 0.01 | 406 | 0.19 | 62 | 67 | 19.2 | 95 | 1.3 | 0.11 | 0.35 | 32.1 | 6.8 | 3 | 14.3 | 0.59 | 0.03 | 16.6 | 0.2 |
| TP-BA-13-04 ARD-02 | 0.22 | 6.31 | 1090 | 1.66 | 101 | 9.2 | 1.47 | 1.64 | 10 | 0.42 | 304 | 2.1 | 8.6 | 0.031 | 0.03 | 471 | 0.16 | 42 | 31 | 20.2 | 13 | 1.4 | 0.07 | 0.11 | 30.9 | 4.9 | 1 | 13.8 | 0.66 | 0.03 | 16.5 | 0.18 |
| TP-BA-13-04 ARD-03 | <0.02 | 6.25 | 1190 | 1.7 | 113 | 6.5 | 1.32 | 1.71 | 9 | 0.33 | 274 | 2.17 | 7.3 | 0.027 | 0.01 | 508 | 0.13 | 36 | 25 | 17.8 | 13 | 1.2 | 0.06 | 0.12 | 28.1 | 4.1 | 1 | 13.4 | 0.56 | <0.02 | 15.3 | 0.15 |
| TP-BA-13-04 ARD-04 | 0.14 | 6.49 | 1180 | 1.54 | 115 | 9.1 | 1.42 | 1.76 | 10 | 0.33 | 301 | 2.02 | 8 | 0.029 | 0.01 | 464 | 0.14 | 43 | 44 | 18.6 | 52 | 1.3 | 0.08 | 0.31 | 28.9 | 4.4 | 2 | 13.1 | 0.55 | 0.02 | 16 | 0.15 |
| TP-BA-13-05 ARD-01 | 0.12 | 6.26 | 1160 | 1.59 | 117 | 6.4 | 1.55 | 1.66 | 9 | 0.37 | 325 | 2.14 | 8.5 | 0.029 | <0.01 | 460 | 0.16 | 45 | 28 | 20.6 | 16 | 1.3 | 0.07 | 0.13 | 33.7 | 5 | 1 | 13.8 | 0.59 | 0.02 | 18.3 | 0.17 |
| TP-BA-13-05 ARD-02 | 0.89 | 6.28 | 1170 | 1.41 | 107 | 9.8 | 1.49 | 1.71 | 13 | 0.34 | 281 | 1.86 | 8.5 | 0.037 | 0.01 | 429 | 0.15 | 49 | 45 | 19.7 | 94 | 1.4 | 0.08 | 0.52 | 28.4 | 4.8 | 2 | 14.8 | 0.58 | 0.02 | 15.7 | 0.16 |
| TP-BA-13-05 ARD-03 | 0.05 | 6.45 | 1230 | 1.49 | 108 | 11.5 | 1.57 | 1.76 | 11 | 0.35 | 327 | 1.96 | 8.6 | 0.033 | 0.01 | 435 | 0.15 | 52 | 56 | 21.4 | 70 | 1.2 | 0.09 | 0.32 | 32.8 | 4.7 | 2 | 13.9 | 0.55 | 0.03 | 18.4 | 0.16 |
| TP-BA-13-05 ARD-04 | <0.02 | 6.2 | 1150 | 1.71 | 119 | 8.7 | 1.62 | 1.67 | 10 | 0.4 | 330 | 2.16 | 8.3 | 0.035 | <0.01 | 455 | 0.18 | 50 | 39 | 23.9 | 27 | 1.2 | 0.09 | 0.19 | 33 | 5.1 | 2 | 13.7 | 0.6 | 0.03 | 18.2 | 0.17 |
| TP-BA-13-06 ARD-01 | 0.76 | 7.44 | 1250 | 0.14 | 187 | 53.5 | 3.34 | 2.69 | 12 | 0.29 | 331 | 0.1 | 66.5 | 0.064 | 0.06 | 50.6 | 0.28 | 357 | 427 | 59.9 | 310 | 2.2 | 0.43 | 4.56 | 58.7 | 9.9 | 12 | 20.5 | 0.88 | 0.19 | 31.4 | 0.35 |
| TP-BA-13-07 ARD-01 | 0.26 | 7.46 | 2270 | 0.3 | 73 | 18.1 | 2.23 | 2.54 | 21 | 0.44 | 467 | 0.17 | 29.8 | 0.064 | 0.08 | 268 | 0.15 | 79 | 254 | 30.2 | 16 | 1.9 | 0.16 | 2.84 | 31 | 7.5 | 7 | 17.9 | 0.88 | 0.06 | 16.8 | 0.16 |
| TP-BA-13-07 ARD-02 | 0.39 | 8.36 | 1590 | 0.3 | 213 | 69.5 | 4.76 | 2.68 | 13 | 0.31 | 957 | 0.1 | 78.7 | 0.09 | 0.03 | 164 | 0.38 | 267 | 452 | 29.1 | 165 | 2 | 0.28 | 2.74 | 66.2 | 22.5 | 13 | 22.6 | 0.72 | 0.1 | 34.2 | 0.18 |
| TP-BA-13-08 ARD-01 | 0.4 | 6.93 | 1100 | 2.25 | 166 | 39.3 | 3.48 | 2.25 | 26 | 0.37 | 946 | 0.38 | 52.4 | 0.074 | 0.04 | 84.5 | 0.3 | 136 | 131 | 44.4 | 168 | 1.8 | 0.17 | 0.47 | 45 | 13.9 | 15 | 18.2 | 0.43 | 0.07 | 23.6 | 0.2 |
| TP-M-13-01 ARD -02 | <0.02 | 7.64 | 909 | 1.98 | 89 | 29.2 | 4.36 | 1.57 | 23 | 1.14 | 940 | 1.48 | 11.6 | 0.129 | 0.05 | 313 | 0.37 | 147 | 108 | 21 | 150 | 1.1 | 0.11 | 0.37 | 35.8 | 15.9 | 16 | 17.2 | 0.66 | 0.07 | 17.2 | 0.36 |
| TP-M-13-01 ARD -03 | <0.02 | 7.5 | 820 | 2.36 | 94 | 28.2 | 3.06 | 1.48 | 19 | 1.07 | 861 | 1.76 | 12.8 | 0.077 | 0.06 | 472 | 0.33 | 111 | 88 | 41.9 | 92 | 1.1 | 0.09 | 0.37 | 33.1 | 15.1 | 13 | 16.6 | 1.16 | 0.04 | 16.7 | 0.24 |
| TP-M-13-01 ARD -04 | <0.02 | 7.24 | 908 | 2.49 | 108 | 22.7 | 3.27 | 1.52 | 23 | 1.37 | 666 | 1.82 | 11.4 | 0.091 | 0.08 | 401 | 0.33 | 117 | 91 | 21.6 | 39 | 1.1 | 0.08 | 0.37 | 36.5 | 12.1 | 9 | 15.4 | 0.68 | 0.05 | 19 | 0.27 |
| TP-M-13-02 ARD -02 | 0.26 | 7.89 | 1460 | 2.76 | 136 | 23.4 | 3.95 | 1.93 | 24 | 0.76 | 2400 | 1.42 | 15.7 | 0.117 | 0.08 | 412 | 0.33 | 118 | 1820 | 15.4 | 276 | 1.3 | 0.25 | 8.73 | 33.3 | 15.9 | 22 | 18.5 | 0.49 | 0.07 | 17.2 | 0.31 |
| TP-M-13-02 ARD -03 | 0.07 | 7.8 | 1140 | 2.39 | 121 | 19.5 | 2.77 | 1.61 | 12 | 0.89 | 614 | 2.42 | 9.2 | 0.075 | 0.07 | 544 | 0.27 | 82 | 101 | 22.9 | 86 | 1.2 | 0.13 | 0.7 | 25.6 | 8.9 | 5 | 16.4 | 0.77 | 0.05 | 13 | 0.29 |
| TP-M-13-03 ARD -01 | 46.3 | 7.16 | 918 | 1.87 | 118 | 162 | 3.74 | 1.81 | 20 | 0.8 | 1530 | 0.86 | 9.9 | 0.082 | 1.15 | 197 | 0.27 | 98 | 2080 | 23.2 | 1950 | 1.2 | 0.54 | 44 | 38 | 11.3 | 11 | 14.9 | 0.72 | 0.21 | 20.8 | 0.26 |
| TP-M-13-03 ARD -02 | 5.41 | 7.62 | 1220 | 2.75 | 113 | 58.2 | 4.78 | 1.81 | 15 | 1.21 | 1250 | 1.9 | 13.7 | 0.148 | 0.64 | 410 | 0.36 | 147 | 641 | 19.7 | 444 | 1.7 | 0.14 | 6.6 | 39.9 | 13.8 | 10 | 17.8 | 1.18 | 0.11 | 18.6 | 0.35 |
| TP-M-13-03 ARD -03 | 6.71 | 7.48 | 1050 | 1.93 | 102 | 58.1 | 3.85 | 1.91 | 15 | 0.86 | 1010 | 2.11 | 11.2 | 0.091 | 0.3 | 279 | 0.3 | 110 | 313 | 18.9 | 538 | 1.5 | 0.14 | 3.89 | 30.1 | 11.7 | 12 | 17.1 | 0.79 | 0.08 | 14.4 | 0.29 |
| TP-M-13-03 ARD -04 | 0.97 | 7.79 | 1280 | 2.5 | 136 | 33.4 | 4.14 | 1.68 | 16 | 0.83 | 1190 | 1.73 | 11.9 | 0.105 | 0.29 | 345 | 0.33 | 125 | 219 | 21.4 | 327 | 1.5 | 0.16 | 2.16 | 32.9 | 12.7 | 12 | 18.2 | 0.77 | 0.08 | 15.7 | 0.36 |
| TP-M-13-04 ARD -01 | 7.35 | 7.66 | 1360 | 1.51 | 121 | 67.2 | 3.93 | 2.52 | 21 | 0.64 | 1840 | 1.15 | 14.3 | 0.093 | 0.29 | 206 | 0.3 | 109 | 1450 | 14.2 | 1220 | 1.5 | 0.88 | 18.9 | 31.1 | 11.8 | 16 | 18.4 | 0.54 | 0.22 | 15.4 | 0.28 |
| TP-M-13-04 ARD -02 | 5.61 | 8.34 | 1160 | 2.97 | 89 | 49.2 | 3.89 | 2.09 | 21 | 0.67 | 2570 | 0.85 | 9 | 0.089 | 0.41 | 199 | 0.28 | 97 | 1680 | 18.8 | 772 | 1.4 | 3.6 | 17 | 25.8 | 10.8 | 13 | 17.7 | 0.61 | 0.23 | 13.3 | 0.27 |
| TP-M-13-04 ARD -03 | 73.1 | 7.39 | 968 | 1.52 | 115 | 425 | 4.46 | 2.05 | 22 | 0.65 | 1710 | 0.68 | 9.7 | 0.092 | 1.57 | 162 | 0.25 | 96 | 4560 | 13.2 | 6510 | 1.3 | 0.65 | 69.1 | 31 | 9.5 | 13 | 16.3 | 0.51 | 0.31 | 15.6 | 0.24 |
| TP-M-13-04 ARD -04 | 35 | 6.69 | 897 | 1.65 | 130 | 113 | 4.05 | 2.04 | 22 | 0.66 | 1620 | 0.89 | 14.1 | 0.08 | 1.71 | 181 | 0.23 | 84 | 2920 | 22 | 6470 | 1.3 | 1.27 | 42.4 | 33.2 | 10.4 | 12 | 15 | 0.72 | 0.26 | 16.9 | 0.26 |
| TP-M-13-05 ARD -02 | <0.02 | 8.51 | 1690 | 3.41 | 91 | 18.2 | 4.07 | 1.76 | 15 | 1.54 | 981 | 2.5 | 12.5 | 0.098 | 0.21 | 498 | 0.36 | 130 | 79 | 14.8 | 26 | 1.3 | 0.08 | 0.24 | 39.4 | 13.4 | 10 | 18.9 | 0.63 | 0.07 | 18.8 | 0.36 |
| TP-M-13-05 ARD -03 | <0.02 | 8.44 | 1010 | 3.46 | 112 | 30.4 | 4.66 | 1.5 | 13 | 1.53 | 1100 | 2.4 | 20.2 | 0.121 | 0.22 | 489 | 0.42 | 159 | 105 | 16.8 | 28 | 1.7 | 0.13 | 0.38 | 37.1 | 17.5 | 11 | 19.6 | 0.82 | 0.08 | 17.3 | 0.4 |
| TP-M-13-05 ARD -04 | <0.02 | 8.32 | 1480 | 3.5 | 90 | 32.3 | 3.8 | 1.9 | 22 | 0.61 | 1150 | 0.79 | 11.1 | 0.086 | 0.13 | 245 | 0.34 | 126 | 103 | 12.5 | 44 | 1.4 | 0.16 | 0.51 | 26.3 | 12 | 15 | 19.3 | 0.64 | 0.07 | 12.6 | 0.34 |
| TP-R-13-01 ARD -01 | 4.59 | 7.4 | 977 | 2.28 | 110 | 29.8 | 3.74 | 1.58 | 17 | 1.14 | 776 | 2.04 | 10.9 | 0.079 | 0.19 | 398 | 0.29 | 97 | 146 | 19.2 | 822 | 1.3 | 3.7 | 1.26 | 30.3 | 11.8 | 12 | 17 | 0.65 | 0.13 | 15 | 0.31 |
| TP-R-13-01 ARD -02 | 5.52 | 7.41 | 1550 | 1.97 | 104 | 30.5 | 4.19 | 1.8 | 15 | 1.05 | 982 | 1.9 | 13.4 | 0.081 | 0.08 | 371 | 0.32 | 133 | 141 | 22.4 | 249 | 1.4 | 2.53 | 1.07 | 32.5 | 14.9 | 21 | 17.3 | 0.72 | 0.11 | 15.8 | 0.32 |
| TP-R-13-01 ARD -03 | <0.02 | 8.11 | 1340 | 2.29 | 84 | 26.6 | 4.42 | 1.85 | 13 | 1.18 | 938 | 2.37 | 11.4 | 0.119 | 0.14 | 404 | 0.38 | 150 | 95 | 14.7 | 25 | 1.3 | 0.08 | 0.25 | 34.5 | 15.2 | 22 | 19.3 | 0.65 | 0.08 | 16.5 | 0.38 |
| TP-R-13-01 ARD -04 | <0.02 | 8.03 | 1360 | 2.96 | 137 | 34.4 | 4.58 | 2.02 | 11 | 1.54 | 913 | 2.52 | 23.9 | 0.179 | 0.5 | 501 | 0.39 | 166 | 100 | 18 | 42 | 1.5 | 0.25 | 0.25 | 40.9 | 14.6 | 17 | 19.1 | 0.9 | 0.09 | 18.3 | 0.39 |
| TP-R-13-02 ARD -01 | 10.6 | 7.83 | 1360 | 1.12 | 84 | 44.4 | 3.84 | 2.71 | 30 | 0.48 | 3380 | 0.66 | 6.3 | 0.106 | 0.17 | 161 | 0.26 | 98 | 825 | 24.3 | 567 | 1.4 | 1.37 | 7.99 | 29.2 | 10.8 | 13 | 19.1 | 0.66 | 0.18 | 14.9 | 0.27 |
| TP-R-13-02 ARD -02 | 1.06 | 7.5 | 939 | 1.63 | 86 | 33.6 | 3.19 | 1.74 | 24 | 0.68 | 1410 | 1.78 | 8.5 | 0.09 | 0.26 | 176 | 0.29 | 88 | 301 | 23.8 | 320 | 1.1 | 0.51 | 2.92 | 34.6 | 9.8 | 8 | 17.3 | 0.71 | 0.13 | 16.9 | 0.31 |
| TP-R-13-02 ARD -03 | 3.42 | 7.98 | 910 | 1.84 | 107 | 52.6 | 4.96 | 1.86 | 28 | 1.36 | 2310 | 1.8 | 9.2 | 0.12 | 0.34 | 225 | 0.38 | 150 | 953 | 15.8 | 288 | 1.1 | 0.76 | 15.3 | 29.8 | 14.8 | 9 | 18.8 | 0.54 | 0.2 | 14.8 | 0.35 |
| TP-R-13-03 ARD -02 | 1.71 | 9.3 | 1840 | 1.66 | 83 | 107 | 3.2 | 2.2 | 26 | 0.71 | 1500 | 1.96 | 5.8 | 0.08 | 0.33 | 480 | 0.21 | 66 | 810 | 16.8 | 118 | 1.5 | 1.79 | 7.81 | 38 | 9.9 | 10 | 20.9 | 0.66 | 0.18 | 18.2 | 0.28 |
| TP-R-13-03 ARD -04 | 2.38 | 8.31 | 1810 | 1.66 | 85 | 97.9 | 2.93 | 2.25 | 22 | 0.58 | 1880 | 2.03 | 6.4 | 0.091 | 0.5 | 465 | 0.21 | 70 | 1230 | 11.4 | 197 | 1.5 | 1.49 | 12.3 | 22.8 | 10.8 | 9 | 19.6 | 0.46 | 0.26 | 11.1 | 0.22 |

| Sample ID | Ag ppm | Al % | Ba ppm | Ca % | Cr ppm | Cu ppm | Fe % | K % | Li ppm | Mg % | Mn ppm | Na % | Ni ppm | P % | S % | Sr ppm | Ti % | V ppm | Zn ppm | Zr ppm | As ppm | Be ppm | Bi ppm | Cd ppm | Ce ppm | Co ppm | Cs ppm | Ga ppm | Hf ppm | In ppm | La ppm | Lu ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Method Code | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B |
| LOD | 0.02 | 0.01 | 1 | 0.01 | 1 | 0.5 | 0.01 | 0.01 | 1 | 0.01 | 2 | 0.01 | 0.5 | 0.005 | 0.01 | 0.5 | 0.01 | 2 | 1 | 0.5 | 1 | 0.1 | 0.04 | 0.02 | 0.05 | 0.1 | 1 | 0.1 | 0.02 | 0.02 | 0.1 | 0.01 |
| TP-T-13-01 ARD-01 | 0.18 | 7.12 | 1430 | 0.96 | 197 | 35.9 | 2.9 | 1.93 | 19 | 0.74 | 637 | 1.3 | 31.2 | 0.066 | 0.04 | 281 | 0.23 | 132 | 246 | 27 | 233 | 1.5 | 0.44 | 1.43 | 40.2 | 9.6 | 5 | 16.6 | 0.63 | 0.06 | 21.2 | 0.2 |
| TP-T-13-02 ARD-01 | <0.02 | 6.77 | 979 | 1.94 | 127 | 5 | 1.63 | 1.55 | 12 | 0.61 | 388 | 2.12 | 10.2 | 0.052 | 0.03 | 414 | 0.28 | 52 | 77 | 31.1 | 26 | 1.2 | 0.1 | 0.15 | 43.4 | 6 | 2 | 14.4 | 0.89 | 0.03 | 23.3 | 0.21 |
| TP-T-13-02 ARD-02 | <0.02 | 6.52 | 967 | 1.86 | 95 | 9 | 1.49 | 1.57 | 11 | 0.56 | 311 | 2 | 9.6 | 0.045 | 0.1 | 412 | 0.18 | 47 | 38 | 25.5 | 21 | 1.2 | 0.16 | 0.23 | 32.2 | 5.7 | 2 | 13.7 | 0.69 | 0.03 | 16.2 | 0.17 |
| TP-T-13-02 ARD-03 | <0.02 | 6.75 | 1250 | 1.59 | 160 | 48.9 | 2.67 | 1.83 | 14 | 0.68 | 445 | 2.03 | 18.8 | 0.064 | 0.03 | 349 | 0.24 | 86 | 105 | 25 | 94 | 1.2 | 0.16 | 0.32 | 33.8 | 7.5 | 3 | 16 | 0.78 | 0.05 | 16.9 | 0.27 |
| TP-T-13-04 ARD-01 | 6.51 | 7.77 | 625 | 3.45 | 59 | 44.3 | 2.73 | 1.41 | 14 | 1.08 | 439 | 2.31 | 10.4 | 0.064 | 0.23 | 826 | 0.3 | 87 | 113 | 77 | 617 | 1.1 | 2.19 | 1.2 | 35.6 | 11.9 | 2 | 19.5 | 2.22 | 0.07 | 17.8 | 0.15 |
| TP-T-13-04 ARD-02 | <0.02 | 6.55 | 1090 | 1.51 | 106 | 16 | 1.84 | 1.72 | 11 | 0.45 | 400 | 1.9 | 10 | 0.048 | 0.01 | 375 | 0.2 | 63 | 71 | 26.9 | 59 | 1.3 | 0.15 | 0.42 | 42 | 5.8 | 3 | 14.7 | 0.7 | 0.04 | 22.7 | 0.2 |
| TP-T-13-06 ARD-01 | <0.02 | 6.42 | 889 | 3.09 | 119 | 7 | 2.08 | 1.47 | 11 | 0.8 | 457 | 2.16 | 12.7 | 0.05 | <0.01 | 463 | 0.28 | 69 | 37 | 30.1 | 5 | 1.3 | 0.09 | 0.12 | 39.9 | 7.7 | 1 | 14.2 | 0.86 | 0.03 | 21.3 | 0.22 |
| TP-T-13-06 ARD-02 | <0.02 | 6.27 | 811 | 3.55 | 108 | 9.3 | 2.3 | 1.36 | 11 | 0.92 | 506 | 2.1 | 13.8 | 0.058 | <0.01 | 454 | 0.32 | 81 | 39 | 33.3 | 7 | 1.3 | 0.14 | 0.14 | 41.3 | 8.8 | 1 | 14.6 | 0.96 | 0.04 | 21.6 | 0.25 |
| TP-T-13-06 ARD-03 | <0.02 | 6.01 | 981 | 2.18 | 116 | 7.3 | 1.75 | 1.52 | 10 | 0.53 | 392 | 2.1 | 10 | 0.041 | 0.01 | 445 | 0.24 | 56 | 32 | 26.4 | 5 | 1.1 | 0.07 | 0.11 | 45.7 | 6 | 1 | 13.3 | 0.75 | 0.03 | 25.1 | 0.21 |
| TP-TD-13-01 ARD-01 | <0.02 | 6.37 | 1160 | 1.62 | 120 | 5.1 | 1.42 | 1.7 | 9 | 0.37 | 292 | 2.21 | 8.1 | 0.028 | <0.01 | 485 | 0.14 | 42 | 25 | 21.8 | 6 | 1.3 | 0.06 | 0.1 | 31.5 | 4.6 | 1 | 13.5 | 0.64 | 0.02 | 16.3 | 0.15 |
| TP-TD-13-01 ARD-02 | <0.02 | 6.35 | 1140 | 1.66 | 103 | 11.2 | 1.35 | 1.72 | 9 | 0.37 | 289 | 2.26 | 7.9 | 0.028 | <0.01 | 494 | 0.15 | 39 | 25 | 24.9 | 7 | 1.4 | 0.08 | 0.11 | 30.2 | 4.5 | 1 | 13.6 | 0.56 | 0.02 | 16.4 | 0.14 |
| TP-TD-13-01 ARD-03 | <0.02 | 6.3 | 1110 | 1.68 | 80 | 5.7 | 1.36 | 1.64 | 9 | 0.41 | 293 | 2.18 | 7.4 | 0.031 | <0.01 | 459 | 0.16 | 40 | 26 | 19.1 | 7 | 1.3 | 0.07 | 0.14 | 32.2 | 4.8 | 1 | 13.9 | 0.6 | 0.02 | 17.1 | 0.15 |
| TP-TD-13-01 ARD-04 | <0.02 | 6.26 | 1100 | 1.67 | 90 | 5.5 | 1.26 | 1.64 | 9 | 0.42 | 269 | 2.13 | 7.7 | 0.034 | <0.01 | 436 | 0.15 | 39 | 26 | 22.2 | 8 | 1.3 | 0.07 | 0.11 | 26.8 | 4.7 | 1 | 13.4 | 0.6 | 0.02 | 14 | 0.14 |
| TP-TD-13-02 ARD-01 | <0.02 | 6.31 | 1140 | 1.58 | 119 | 6.6 | 1.28 | 1.73 | 9 | 0.37 | 282 | 2.2 | 8.4 | 0.03 | <0.01 | 463 | 0.14 | 38 | 28 | 21.9 | 11 | 1.3 | 0.06 | 0.13 | 29.1 | 4.5 | 1 | 13.2 | 0.62 | 0.02 | 16.3 | 0.14 |
| TP-TD-13-02 ARD-02 | <0.02 | 6.67 | 1170 | 1.7 | 92 | 7.5 | 1.68 | 1.72 | 10 | 0.54 | 370 | 2.19 | 9.7 | 0.04 | <0.01 | 491 | 0.19 | 54 | 45 | 26.9 | 16 | 1.4 | 0.08 | 0.21 | 35 | 6.4 | 2 | 15.2 | 0.67 | 0.03 | 18.8 | 0.16 |
| TP-TD-13-02 ARD-03 | <0.02 | 6.49 | 933 | 2.18 | 112 | 6.7 | 2.08 | 1.49 | 11 | 0.7 | 433 | 2.12 | 12.2 | 0.05 | <0.01 | 449 | 0.28 | 68 | 36 | 32.1 | 6 | 1.4 | 0.07 | 0.11 | 42.1 | 7.7 | 1 | 14.5 | 0.85 | 0.04 | 22.5 | 0.21 |
| TP-TD-13-02 ARD-04 | <0.02 | 6.39 | 1100 | 1.73 | 75 | 7.5 | 1.52 | 1.67 | 10 | 0.44 | 326 | 2.21 | 8.9 | 0.034 | <0.01 | 459 | 0.18 | 48 | 33 | 24.5 | 11 | 1.4 | 0.07 | 0.14 | 38 | 5.2 | 1 | 13.8 | 0.75 | 0.02 | 20.6 | 0.18 |
| TP-TD-13-03 ARD-01 | <0.02 | 6.44 | 1040 | 1.8 | 120 | 7 | 1.59 | 1.69 | 11 | 0.52 | 361 | 2.1 | 11.2 | 0.041 | <0.01 | 423 | 0.19 | 49 | 34 | 26.9 | 8 | 1.5 | 0.09 | 0.13 | 36 | 6.1 | 1 | 14 | 0.72 | 0.03 | 19.4 | 0.17 |
| TP-TD-13-03 ARD-02 | <0.02 | 6.4 | 988 | 2.16 | 88 | 11.2 | 1.76 | 1.57 | 10 | 0.59 | 385 | 2.22 | 10.2 | 0.043 | <0.01 | 448 | 0.22 | 57 | 34 | 25.3 | 7 | 1.4 | 0.13 | 0.12 | 36 | 6.1 | 1 | 13.7 | 0.7 | 0.03 | 19.7 | 0.18 |
| TP-TD-13-03 ARD-03 | <0.02 | 6.77 | 1050 | 1.79 | 112 | 9.1 | 1.61 | 1.69 | 11 | 0.52 | 335 | 2.1 | 10.3 | 0.041 | <0.01 | 434 | 0.18 | 48 | 31 | 26.1 | 7 | 1.5 | 0.08 | 0.1 | 30.9 | 5.7 | 1 | 14 | 0.7 | 0.02 | 16.2 | 0.17 |
| TP-TD-13-03 ARD-04 | 0.12 | 7.24 | 814 | 2.49 | 90 | 137 | 2.17 | 1.63 | 16 | 0.79 | 498 | 2.33 | 13.2 | 0.071 | 0.04 | 658 | 0.24 | 64 | 51 | 80.4 | 11 | 1.3 | 0.1 | 0.23 | 32.5 | 15.5 | 2 | 17.9 | 2.14 | 0.03 | 16.7 | 0.15 |
| TP-TD-13-03 ARD-05 | 0.28 | 5.68 | 816 | 1.78 | 97 | 55.3 | 3.62 | 1.18 | 13 | 0.5 | 1450 | 1.37 | 19.7 | 0.176 | 0.19 | 353 | 0.18 | 62 | 45 | 64.1 | 58 | 1.4 | 0.14 | 0.35 | 38 | 38.5 | 3 | 13 | 1.57 | 0.03 | 18.4 | 0.18 |
| TP-TD-13-03 ARD-06 | <0.02 | 6.25 | 1110 | 1.69 | 83 | 5.8 | 1.28 | 1.78 | 11 | 0.4 | 261 | 2.18 | 8.1 | 0.034 | <0.01 | 436 | 0.14 | 39 | 29 | 22.3 | 9 | 1.4 | 0.11 | 0.11 | 28.4 | 4.3 | 1 | 13 | 0.55 | 0.02 | 15.7 | 0.13 |
| TP-WA-13-02 ARD-01 | <0.02 | 8.51 | 1510 | 0.26 | 66 | 5.8 | 1.33 | 1.76 | 32 | 0.15 | 442 | 0.3 | 4 | 0.053 | <0.01 | 112 | 0.14 | 45 | 126 | 8.8 | 32 | 1.3 | 0.11 | 0.9 | 26.5 | 5 | 8 | 20.6 | 0.32 | 0.06 | 13.6 | 0.17 |
| TP-WA-13-02 ARD-02 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-02 ARD-03 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-03 ARD-01 | 0.08 | 8.23 | 1650 | 0.41 | 76 | 8.7 | 1.71 | 1.7 | 23 | 0.17 | 381 | 1.06 | 5.9 | 0.06 | 0.01 | 158 | 0.12 | 48 | 52 | 6.9 | 30 | 1.2 | 0.27 | 0.38 | 26.7 | 10.5 | 7 | 20.4 | 0.53 | 0.05 | 12.8 | 0.2 |
| TP-WA-13-03 ARD-02 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-03 ARD-03 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-05 ARD-01 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-05 ARD-02 | 8.84 | 7.81 | 1800 | 1.48 | 93 | 68.3 | 3.4 | 2.2 | 18 | 0.75 | 1720 | 1.79 | 7.8 | 0.094 | 0.18 | 414 | 0.22 | 76 | 636 | 11.9 | 411 | 1.3 | 9.17 | 6.49 | 25.7 | 9.9 | 8 | 18.6 | 0.38 | 0.2 | 12.7 | 0.26 |
| TP-WA-13-05 ARD-03 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-05 ARD-04 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-06 ARD-01 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-06 ARD-02 | 1.25 | 8 | 1410 | 1.9 | 53 | 61 | 3.65 | 2.3 | 28 | 0.47 | 1970 | 0.41 | 4.5 | 0.113 | 0.29 | 195 | 0.26 | 83 | 1040 | 12.2 | 290 | 1.3 | 0.91 | 7.93 | 30.2 | 9.4 | 21 | 18.7 | 0.48 | 0.14 | 15.2 | 0.25 |
| TP-WA-13-06 ARD-03 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-06 ARD-04 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-08 ARD-01 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-08 ARD-02 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-08 ARD-03 | 0.5 | 7.95 | 1290 | 1.05 | 80 | 14.7 | 2.87 | 2.04 | 39 | 0.28 | 2140 | 0.2 | 6.3 | 0.103 | 0.15 | 95 | 0.23 | 87 | 878 | 25.8 | 161 | 1.4 | 0.44 | 6.22 | 33.5 | 8 | 12 | 19.2 | 0.83 | 0.1 | 16.3 | 0.25 |
| TP-WA-13-09 ARD-01 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-09 ARD-02 | 11.7 | 7.18 | 1100 | 1.55 | 68 | 88.7 | 3.65 | 2.47 | 23 | 0.51 | 2600 | 0.67 | 6.4 | 0.098 | 0.39 | 197 | 0.25 | 85 | 975 | 19.8 | 842 | 1.2 | 2.9 | 8.93 | 28.4 | 9.3 | 11 | 17.6 | 0.61 | 0.28 | 14.9 | 0.23 |
| TP-WA-13-09 ARD-03 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-09 ARD-04 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-09 ARD-05 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-09 ARD-06 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-10 ARD-01 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-10 ARD-02 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-10 ARD-03 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-10 ARD-04 | 2.71 | 7.66 | 1370 | 1.23 | 72 | 124 | 3.43 | 2.31 | 30 | 0.35 | 2080 | 0.31 | 4.9 | 0.105 | 0.24 | 141 | 0.24 | 82 | 832 | 14.1 | 294 | 1.2 | 2.09 | 7.98 | 29.8 | 8.5 | 13 | 17.9 | 0.5 | 0.18 | 14.8 | 0.24 |
| TP-WA-13-11 ARD-01 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-11 ARD-02 | 3.85 | 6.14 | 960 | 0.82 | 102 | 117 | 4.11 | 2.12 | 28 | 0.39 | 6070 | 0.03 | 10.5 | 0.041 | 0.17 | 89.3 | 0.15 | 66 | 1760 | 21.2 | 1090 | 1 | 1.95 | 17.5 | 16.1 | 12.3 | 14 | 14 | 0.51 | 0.09 | 7.7 | 0.17 |
| TP-WA-13-11 ARD-03 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-11 ARD-04 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-11 ARD-05 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| HA-BA-13-01 0-1M | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| HA-BA-13-01 1-2M | <0.02 | 6.56 | 1060 | 2.15 | 99 | 6.4 | 1.57 | 1.64 | 10 | 0.57 | 344 | 2.32 | 9.8 | 0.042 | <0.01 | 467 | 0.18 | 47 | 31 | 21.2 | 4 | 1.3 | 0.11 | 0.12 | 31.9 | 5.7 | 1 | 13.6 | 0.65 | 0.03 | 16.2 | 0.17 |
| HA-BA-13-01 2-3M | <0.02 | 6.87 | 1070 | 2.24 | 112 | 5.7 | 1.7 | 1.67 | 10 | 0.59 | 352 | 2.31 | 9.9 | 0.043 | <0.01 | 482 | 0.19 | 48 | 31 | 25.8 | 5 | 1.3 | 0.07 | 0.12 | 30.9 | 5.8 | 1 | 13.9 | 0.84 | 0.03 | 15.8 | 0.18 |
| HA-BA-13-02 0-1M | 0.32 | 6.61 | 1070 | 2.16 | 119 | 5.3 | 1.57 | 1.65 | 10 | 0.58 | 336 | 2.34 | 10 | 0.042 | <0.01 | 463 | 0.19 | 48 | 30 | 24.4 | 6 | 1.3 | 0.08 | 0.14 | 34.9 | 5.7 | 1 | 14 | 0.63 | 0.03 | 17.4 | 0.16 |
| HA-BA-13-02 1-2M | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| HA-BA-13-02 2-3M | 0.89 | 6.76 | 1040 | 2.22 | 109 | 6 | 1.65 | 1.63 | 10 | 0.61 | 345 | 2.18 | 10.3 | 0.043 | 0.01 | 483 | 0.19 | 50 | 32 | 23.7 | 5 | 1.3 | 0.4 | 0.13 | 33.3 | 5.9 | 1 | 14 | 0.71 | 0.03 | 16.9 | 0.2 |
| **Duplicates** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TP-TD-13-03 ARD-06 | <0.02 | 6.3 | 1110 | 1.69 | 87 | 6.3 | 1.31 | 1.79 | 11 | 0.4 | 268 | 2.15 | 8.3 | 0.034 | <0.01 | 439 | 0.14 | 41 | 29 | 26.3 | 9 | 1.3 | 0.09 | 0.1 | 27.5 | 4.3 | 1 | 13 | 0.57 | 0.02 | 14.7 | 0.14 |
| TP-T-13-02 ARD-03 | <0.02 | 7.19 | 1280 | 1.62 | 166 | 48.5 | 2.59 | 1.82 | 14 | 0.66 | 424 | 1.98 | 18.9 | 0.065 | 0.04 | 369 | 0.25 | 92 | 105 | 28.1 | 95 | 1.2 | 0.16 | 0.32 | 34.9 | 7.5 | 3 | 16.1 | 0.79 | 0.05 | 18.3 | 0.27 |
| BH-T-13-04 ARD-04 | <0.02 | 6.33 | 1020 | 2.15 | 100 | 14.5 | 1.76 | 1.57 | 10 | 0.58 | 350 | 2.11 | 10.8 | 0.041 | 0.01 | 442 | 0.21 | 59 | 35 | 24.4 | 23 | 1.3 | 0.24 | 0.17 | 34.8 | 6 | 1 | 13.7 | 0.73 | 0.03 | 18.7 | 0.18 |
| BH-M-13-04 ARD -02 | 18 | 7.17 | 1030 | 2.89 | 118 | 138 | 3.95 | 1.9 | 18 | 0.9 | 1370 | 1.75 | 15.6 | 0.09 | 0.66 | 315 | 0.29 | 106 | 907 | 28.2 | 2350 | 1.2 | 0.37 | 16.3 | 32.9 | 11.6 | 9 | 16.3 | 0.78 | 0.12 | 16.8 | 0.27 |
| TP-M-13-04 ARD -03 | 72 | 7.44 | 970 | 1.55 | 109 | 423 | 4.48 | 2.06 | 22 | 0.65 | 1710 | 0.72 | 9.9 | 0.092 | 1.53 | 157 | 0.25 | 96 | 4520 | 14.8 | 6900 | 1.2 | 0.68 | 70.2 | 28.1 | 9.7 | 13 | 16.9 | 0.52 | 0.33 | 14.5 | 0.25 |
| **QC** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CH-4 | 2.01 | 7.3 | 434 | 1.84 | 87 | 1870 | 4.6 | 1.69 | 14 | 1.26 | 402 | 2.96 | 46.7 | 0.066 | 0.59 | 207 | 0.28 | 78 | 200 | 112 | 9 | 0.8 | 0.66 | 1.12 | 32.2 | 26.4 | 3 | 19.8 | 3.05 | 0.13 | 17 | 0.19 |
| CH-4 | 2 | 7.36 | 451 | 1.84 | 90 | 1910 | 4.66 | 1.76 | 14 | 1.28 | 412 | 3.1 | 48.7 | 0.068 | 0.62 | 202 | 0.28 | 83 | 199 | 117 | 8 | 0.7 | 0.48 | 1.11 | 33 | 25.4 | 3 | 19.4 | 3.09 | 0.13 | 17.1 | 0.2 |
| CH-4 | 2.08 | 7.36 | 457 | 1.85 | 93 | 1900 | 4.65 | 1.69 | 14 | 1.29 | 411 | 3.12 | 48.4 | 0.069 | 0.58 | 201 | 0.28 | 83 | 195 | 116 | 9 | 0.8 | 0.47 | 1.08 | 32.3 | 25.5 | 3 | 19.1 | 3.01 | 0.13 | 17.3 | 0.19 |
| CH-4 | 1.95 | 7.4 | 460 | 1.84 | 93 | 1910 | 4.65 | 1.76 | 14 | 1.29 | 416 | 3.16 | 47.6 | 0.069 | 0.58 | 198 | 0.28 | 86 | 196 | 121 | 9 | 0.8 | 0.45 | 1.09 | 31.7 | 25.5 | 3 | 19.2 | 3.01 | 0.13 | 16.5 | 0.19 |
| Expected Values | 2.1 | 7.73 | 425 | 1.96 | 76.55 | 2000 | 5 | 1.8 | 12 | 1.34 | 420 | 3.18 | 51 | 610 | 0.63 | 209 | 0.31 | 87 | 200 | 117 | 8.8 | 0.7 | 0.6 | 1.14 | 30.08 | 26 | 2 | 18 | 3 | 0.1 | 16 | 0.2 |
| Tolerance Level % | 12.38 | 10.32 | 10.59 | 11.28 | 13.27 | 10.06 | 10.50 | 11.39 | 30.83 | 11.87 | 11.19 | 10.79 | 12.45 | 30.49 | 13.97 | 10.60 | 18.06 | 15.75 | 11.25 | 11.07 | 38.41 | 45.71 | 26.67 | 14.39 | 10.42 | 10.96 | 635.00 | 11.39 | 11.67 | 60.00 | 11.56 | 22.50 |

**CLIENT**
**PROJECT**
**SGS Project #**
**Test**
**Date**

| Sample ID | Mo ppm | Nb ppm | Pb ppm | Rb ppm | Sb ppm | Sc ppm | Se ppm | Sn ppm | Ta ppm | Tb ppm | Te ppm | Th ppm | Tl ppm | U ppm | W ppm | Y ppm | Yb ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Method Code | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B |
| LOD | 0.05 | 0.1 | 0.5 | 0.2 | 0.05 | 0.5 | 2 | 0.3 | 0.05 | 0.05 | 0.05 | 0.2 | 0.02 | 0.05 | 0.1 | 0.1 | 0.1 |
| BH-M-13-04 ARD -01 | 2.46 | 5 | 1680 | 86.1 | 313 | 12.2 | <2 | 3.4 | 0.3 | 0.45 | 0.1 | 6.8 | 1.73 | 1.71 | 1.9 | 12.8 | 1.3 |
| BH-M-13-04 ARD -02 | 2.6 | 5.8 | 885 | 73.5 | 145 | 16 | <2 | 2.4 | 0.35 | 0.54 | 0.1 | 5.3 | 1.43 | 2.02 | 2.9 | 16.2 | 1.6 |
| BH-T-13-01 ARD-01 | 1.57 | 8.9 | 17.1 | 43.5 | 2.46 | 10.5 | <2 | 2.3 | 0.63 | 0.55 | <0.05 | 5.4 | 0.29 | 1.42 | 0.7 | 15.1 | 1.5 |
| BH-T-13-01 ARD-02 | 4.51 | 8.7 | 11.4 | 43.7 | 0.87 | 10.3 | <2 | 1 | 0.62 | 0.56 | <0.05 | 5.6 | 0.29 | 1.44 | 0.5 | 15 | 1.4 |
| BH-T-13-01 ARD-03 | 1.91 | 5.6 | 13.2 | 48.1 | 1.74 | 6.2 | <2 | 0.7 | 0.39 | 0.35 | <0.05 | 4 | 0.34 | 1.16 | 1.1 | 10 | 1 |
| BH-T-13-01 ARD-05 | 3.32 | 9.7 | 13.6 | 42.8 | 0.8 | 12.7 | <2 | 1.5 | 0.66 | 0.62 | <0.05 | 5.4 | 0.31 | 1.61 | 1.3 | 16.5 | 1.5 |
| BH-T-13-01 ARD-07 | 3.88 | 8.1 | 11.5 | 49.3 | 0.78 | 10.1 | <2 | 1.2 | 0.56 | 0.56 | <0.05 | 5.7 | 0.35 | 1.54 | 6 | 15.1 | 1.4 |
| BH-T-13-01 ARD-08 | 5.03 | 5.5 | 11.4 | 50.2 | 0.88 | 6.3 | <2 | 0.8 | 0.39 | 0.38 | <0.05 | 4.1 | 0.35 | 1.04 | 6.9 | 10.2 | 1 |
| BH-T-13-02 ARD-01 | 3.43 | 6.7 | 18.2 | 46.3 | 2.15 | 8 | <2 | 1.3 | 0.46 | 0.41 | <0.05 | 4.7 | 0.33 | 1.24 | 0.6 | 10.9 | 1.1 |
| BH-T-13-02 ARD-02 | 1.75 | 7.7 | 28.6 | 46.3 | 5.15 | 9.6 | <2 | 1.6 | 0.51 | 0.51 | <0.05 | 5 | 0.33 | 1.25 | 0.6 | 13.4 | 1.3 |
| BH-T-13-02 ARD-04 | 1.6 | 9.8 | 13.4 | 42.9 | 1.67 | 14.6 | <2 | 1.2 | 0.63 | 0.65 | <0.05 | 5.5 | 0.32 | 1.66 | 1.1 | 18.1 | 1.6 |
| BH-T-13-02 ARD-06 | 1.96 | 7.9 | 32.3 | 44.5 | 6.6 | 10.4 | <2 | 1 | 0.52 | 0.48 | <0.05 | 4.4 | 0.34 | 1.34 | 1.4 | 13.7 | 1.3 |
| BH-T-13-02 ARD-07 | 6.33 | 6.9 | 22.2 | 63.8 | 3.37 | 8.1 | <2 | 1 | 0.47 | 0.38 | 0.26 | 8.5 | 0.61 | 1.93 | 15 | 10.7 | 1.1 |
| BH-T-13-03 ARD-01 | 4.96 | 6.7 | 20.3 | 60.8 | 5.41 | 9 | <2 | 1 | 0.46 | 0.42 | <0.05 | 5 | 0.63 | 1.24 | 1.6 | 11.2 | 1.1 |
| BH-T-13-03 ARD-02 | 1.9 | 5.9 | 14.1 | 47.9 | 1.17 | 6.2 | <2 | 1.8 | 0.43 | 0.37 | <0.05 | 4.2 | 0.31 | 0.99 | 1.3 | 10.5 | 1 |
| BH-T-13-03 ARD-04 | 5.14 | 5.3 | 23.6 | 49.2 | 4.46 | 6 | <2 | 1 | 0.39 | 0.35 | <0.05 | 4.4 | 0.35 | 0.97 | 2.6 | 9.8 | 0.9 |
| BH-T-13-03 ARD-06 | 4.69 | 5.7 | 29.2 | 51 | 5.44 | 6.7 | <2 | 0.8 | 0.39 | 0.38 | <0.05 | 4.7 | 0.43 | 1.04 | 1.1 | 10.8 | 1.1 |
| BH-T-13-03 ARD-08 | 1.57 | 7.6 | 14.6 | 44.8 | 2.05 | 12.5 | <2 | 1.1 | 0.47 | 0.57 | <0.05 | 4.4 | 0.37 | 1.57 | 1.2 | 16.1 | 1.5 |
| BH-T-13-04 ARD-01 | 3.36 | 4.8 | 1960 | 75.3 | 677 | 4.9 | <2 | 2.4 | 0.22 | 0.21 | 0.55 | 3.2 | 2.11 | 1.44 | 2.8 | 5.4 | 0.5 |
| BH-T-13-04 ARD-02 | 4.73 | 4.8 | 1820 | 79.6 | 478 | 5.6 | <2 | 2.7 | 0.29 | 0.23 | 0.49 | 3.5 | 2.23 | 1.5 | 26.1 | 6.3 | 0.6 |
| BH-T-13-04 ARD-04 | 2.01 | 6.7 | 20.3 | 46.5 | 3.23 | 7.9 | <2 | 1.6 | 0.46 | 0.41 | <0.05 | 4.4 | 0.32 | 1.1 | 0.7 | 11.4 | 1.1 |
| BH-T-13-04 ARD-06 | 4.46 | 5.6 | 11.5 | 51.1 | 1.04 | 5.5 | <2 | 0.8 | 0.39 | 0.36 | <0.05 | 4.7 | 0.35 | 1.1 | 8.1 | 10.1 | 1 |
| BH-T-13-04 ARD-08 | 5.6 | 8.3 | 11.8 | 45.9 | 0.97 | 8.7 | <2 | 1 | 0.57 | 0.53 | <0.05 | 6.1 | 0.32 | 1.41 | 3.3 | 14.1 | 1.3 |
| BH-TD-13-01 ARD-01 | 5.59 | 6.9 | 40.2 | 71.9 | 3.26 | 14.8 | <2 | 1.2 | 0.34 | 0.54 | 0.09 | 6.3 | 0.75 | 1.41 | 0.5 | 15.6 | 1.4 |
| BH-TD-13-01 ARD-03 | 1.73 | 5.8 | 11.7 | 48.5 | 1.45 | 7.3 | <2 | 0.8 | 0.36 | 0.38 | <0.05 | 4.2 | 0.34 | 0.98 | 0.8 | 11.3 | 1 |
| BH-TD-13-01 ARD-06 | 4.64 | 5.8 | 12.4 | 52.1 | 1.17 | 6.7 | <2 | 0.7 | 0.4 | 0.33 | <0.05 | 4.3 | 0.38 | 0.92 | 0.5 | 9.6 | 0.9 |
| BH-TD-13-01 ARD-08 | 4.54 | 5.5 | 26.3 | 49.3 | 1.42 | 6.1 | <2 | 0.7 | 0.38 | 0.32 | <0.05 | 3.7 | 0.34 | 0.9 | 0.4 | 9.4 | 0.9 |
| BH-TD-13-01 ARD-10 | 4.86 | 5.8 | 10.9 | 52.3 | 1.27 | 7.1 | <2 | 0.8 | 0.37 | 0.36 | <0.05 | 3.9 | 0.38 | 0.96 | 0.4 | 10.9 | 1 |
| BH-TD-13-01 ARD-12 | 5.96 | 7.8 | 20.1 | 52.7 | 2.37 | 7.3 | <2 | 0.9 | 0.76 | 0.38 | <0.05 | 4.7 | 0.44 | 1.11 | 4.7 | 11.2 | 1.1 |
| BH-TD-13-01 ARD-14 | 4.54 | 6.1 | 12.4 | 50.8 | 1.2 | 6.5 | <2 | 0.8 | 0.61 | 0.38 | <0.05 | 5 | 0.37 | 1.01 | 1.5 | 9.8 | 0.9 |
| TP-BA-13-03 ARD-01 | 5.22 | 6.9 | 12.2 | 48.8 | 1.21 | 7 | <2 | 0.8 | 0.56 | 0.39 | <0.05 | 4.6 | 0.34 | 1 | 0.5 | 11.3 | 1.1 |
| TP-BA-13-03 ARD-02 | 4.8 | 5.9 | 11.9 | 51.6 | 0.95 | 6 | <2 | 0.9 | 0.44 | 0.35 | <0.05 | 4.1 | 0.34 | 0.93 | 0.5 | 10.2 | 0.9 |
| TP-BA-13-03 ARD-03 | 5.2 | 6.9 | 34.2 | 58 | 6.28 | 8.9 | <2 | 1 | 0.49 | 0.45 | <0.05 | 5.4 | 0.61 | 1.25 | 0.8 | 13 | 1.2 |
| TP-BA-13-03 ARD-04 | 5.09 | 6.8 | 21.8 | 61.6 | 5.29 | 8.3 | <2 | 0.9 | 0.49 | 0.41 | <0.05 | 5.7 | 0.55 | 1.25 | 0.5 | 11.7 | 1.2 |
| TP-BA-13-04 ARD-01 | 5.39 | 5.8 | 25.1 | 54.8 | 8 | 9.6 | <2 | 0.9 | 0.39 | 0.41 | <0.05 | 3.7 | 0.59 | 1.03 | 0.7 | 12.3 | 1.2 |
| TP-BA-13-04 ARD-02 | 6.27 | 5.8 | 12.1 | 50.9 | 1.25 | 6.8 | <2 | 0.8 | 0.39 | 0.37 | <0.05 | 4.2 | 0.35 | 0.92 | 0.4 | 11.4 | 1 |
| TP-BA-13-04 ARD-03 | 5.7 | 5.2 | 12.8 | 52.4 | 1.79 | 5.5 | <2 | 0.7 | 0.33 | 0.3 | <0.05 | 3.8 | 0.38 | 0.9 | 0.4 | 9.5 | 0.9 |
| TP-BA-13-04 ARD-04 | 5.55 | 5.4 | 21.5 | 53.4 | 3.86 | 5.9 | <2 | 0.7 | 0.34 | 0.3 | <0.05 | 4.1 | 0.45 | 0.91 | 0.5 | 9 | 0.8 |
| TP-BA-13-05 ARD-01 | 5.85 | 6.2 | 12.8 | 53.1 | 1.59 | 6.4 | <2 | 0.8 | 0.4 | 0.37 | <0.05 | 4.5 | 0.36 | 0.94 | 0.5 | 10.9 | 1 |
| TP-BA-13-05 ARD-02 | 5.64 | 5.8 | 53.5 | 54.8 | 18.1 | 6.3 | <2 | 0.8 | 0.4 | 0.33 | <0.05 | 3.9 | 0.51 | 0.97 | 0.5 | 10 | 1 |
| TP-BA-13-05 ARD-03 | 5.31 | 5.1 | 19.5 | 55.7 | 4.3 | 6.8 | <2 | 0.7 | 0.34 | 0.33 | <0.05 | 4.7 | 0.53 | 0.97 | 0.6 | 9.8 | 0.9 |
| TP-BA-13-05 ARD-04 | 5.51 | 6.4 | 13.4 | 51.1 | 2.84 | 7 | <2 | 0.9 | 0.41 | 0.38 | <0.05 | 4.4 | 0.39 | 1.01 | 0.5 | 11.4 | 1 |
| TP-BA-13-06 ARD-01 | 15.6 | 10.3 | 26.9 | 131 | 18.4 | 16 | 5 | 1.8 | 0.66 | 0.86 | 0.18 | 10.4 | 1.61 | 3.39 | 1.4 | 20.6 | 2.1 |
| TP-BA-13-07 ARD-01 | 5.61 | 9.7 | 27.3 | 80.7 | 2.77 | 9.6 | <2 | 1.3 | 0.66 | 0.32 | 0.22 | 5.7 | 1.03 | 1.77 | 0.5 | 9.7 | 0.8 |
| TP-BA-13-07 ARD-02 | 7.38 | 9.5 | 19.3 | 116 | 11.1 | 23.3 | 3 | 2.1 | 0.52 | 0.74 | 0.22 | 10.9 | 1.41 | 3.38 | 1.8 | 14.6 | 1.1 |
| TP-BA-13-08 ARD-01 | 6.9 | 9.8 | 20.4 | 93.5 | 10.1 | 14.4 | <2 | 1.6 | 0.59 | 0.6 | 0.06 | 7.1 | 1.07 | 2.06 | 1.3 | 14.6 | 1.3 |
| TP-M-13-01 ARD -02 | 1.39 | 4.7 | 21.2 | 66.6 | 18.2 | 21.6 | <2 | 1.2 | 0.27 | 0.73 | <0.05 | 4.2 | 1.14 | 1.28 | 1.9 | 20.6 | 2.2 |
| TP-M-13-01 ARD -03 | 2.6 | 5.4 | 17.3 | 59.9 | 11.4 | 16.3 | <2 | 1 | 0.31 | 0.55 | <0.05 | 4.3 | 0.91 | 1.48 | 1 | 15.9 | 1.5 |
| TP-M-13-01 ARD -04 | 3.29 | 5.7 | 22.1 | 57.9 | 7.58 | 17.8 | <2 | 1.1 | 0.33 | 0.64 | <0.05 | 4.8 | 0.84 | 1.32 | 0.7 | 18.3 | 1.7 |
| TP-M-13-02 ARD -02 | 3.94 | 7.9 | 63.2 | 72.7 | 23 | 16.2 | <2 | 1.3 | 0.41 | 0.59 | <0.05 | 4.4 | 1.09 | 1.12 | 5.3 | 18.9 | 1.8 |
| TP-M-13-02 ARD -03 | 4.18 | 5.2 | 35.8 | 50.5 | 7.7 | 12.8 | <2 | 1 | 0.31 | 0.54 | <0.05 | 3.8 | 0.49 | 1.32 | 0.4 | 17.5 | 1.7 |
| TP-M-13-03 ARD -01 | 4.76 | 4.9 | 1950 | 79.5 | 557 | 15.3 | <2 | 6.2 | 0.28 | 0.54 | 0.12 | 7.5 | 1.79 | 1.67 | 3.4 | 16.1 | 1.6 |
| TP-M-13-03 ARD -02 | 4.53 | 8.5 | 213 | 67 | 60.4 | 21.1 | <2 | 2.1 | 1.36 | 0.77 | 0.09 | 6.1 | 1.16 | 1.9 | 3 | 21.8 | 2.2 |
| TP-M-13-03 ARD -03 | 2.11 | 5.9 | 173 | 71.6 | 55.6 | 17.2 | <2 | 1.7 | 0.82 | 0.59 | <0.05 | 4.7 | 2.09 | 1.43 | 3.2 | 17.5 | 1.9 |
| TP-M-13-03 ARD -04 | 5.72 | 6.6 | 127 | 62.5 | 38.7 | 19.1 | <2 | 1.7 | 0.73 | 0.7 | 0.06 | 4.9 | 1.14 | 1.8 | 2.8 | 20.7 | 2.2 |
| TP-M-13-04 ARD -01 | 4.17 | 6.2 | 710 | 106 | 93.8 | 16.2 | <2 | 2.4 | 0.55 | 0.54 | 0.09 | 3.8 | 2.02 | 1.31 | 4.2 | 16.4 | 1.7 |
| TP-M-13-04 ARD -02 | 2.13 | 5.3 | 602 | 103 | 76.3 | 14.8 | <2 | 2 | 0.47 | 0.5 | 1.51 | 3.3 | 2.02 | 1.51 | 4.4 | 16 | 1.6 |
| TP-M-13-04 ARD -03 | 4.22 | 4.9 | 4320 | 101 | 1530 | 14.2 | <2 | 8.3 | 0.41 | 0.48 | 0.14 | 4.4 | 2.34 | 1.48 | 3.6 | 13.7 | 1.5 |
| TP-M-13-04 ARD -04 | 3.37 | 5 | 2290 | 102 | 338 | 13.8 | <2 | 4.7 | 0.43 | 0.52 | 0.14 | 5.6 | 2.19 | 2.08 | 4.5 | 15.5 | 1.6 |
| TP-M-13-05 ARD -02 | 1.49 | 6.3 | 15 | 57.9 | 4.8 | 22.3 | <2 | 1.6 | 0.64 | 0.72 | <0.05 | 4.8 | 0.55 | 1.36 | 0.6 | 21.4 | 2.2 |
| TP-M-13-05 ARD -03 | 3.58 | 7.2 | 16.2 | 50.1 | 10.2 | 25.1 | <2 | 1.7 | 0.59 | 0.82 | <0.05 | 4.7 | 0.78 | 1.67 | 1.3 | 24.3 | 2.5 |
| TP-M-13-05 ARD -04 | 3.3 | 6.1 | 23.6 | 58.7 | 25.5 | 20.5 | <2 | 1.4 | 0.51 | 0.63 | <0.05 | 3.7 | 1.16 | 1.55 | 3.7 | 19.9 | 2.1 |
| TP-R-13-01 ARD -01 | 1.7 | 5.8 | 281 | 62.5 | 64.2 | 18 | <2 | 1.5 | 0.56 | 0.6 | 0.06 | 4.5 | 0.78 | 1.32 | 1 | 18.5 | 1.9 |
| TP-R-13-01 ARD -02 | 1.67 | 5.3 | 190 | 68.1 | 50 | 21.1 | <2 | 1.4 | 0.49 | 0.63 | 0.06 | 4.2 | 0.8 | 1.23 | 1.6 | 19.1 | 2 |
| TP-R-13-01 ARD -03 | 1.5 | 6.1 | 16.6 | 65 | 12.7 | 24.5 | <2 | 1.4 | 0.52 | 0.77 | <0.05 | 4.7 | 0.56 | 1.32 | 1.6 | 22.7 | 2.4 |
| TP-R-13-01 ARD -04 | 4.81 | 8.5 | 21.6 | 65.7 | 10.4 | 25 | <2 | 1.8 | 0.61 | 0.85 | <0.05 | 5 | 0.55 | 1.68 | 0.7 | 23.9 | 2.5 |
| TP-R-13-02 ARD -01 | 1.65 | 5.6 | 313 | 148 | 60.9 | 13.8 | <2 | 1.6 | 0.43 | 0.52 | <0.05 | 3.7 | 3.33 | 1.31 | 2.5 | 15.4 | 1.7 |
| TP-R-13-02 ARD -02 | 2.37 | 6.2 | 115 | 85.7 | 34.8 | 15.7 | <2 | 4.8 | 0.65 | 0.6 | 0.07 | 4.6 | 1.79 | 1.32 | 5.3 | 17.9 | 2 |
| TP-R-13-02 ARD -03 | 1.84 | 5.2 | 466 | 78.8 | 119 | 22.1 | <2 | 1.6 | 0.39 | 0.66 | 0.06 | 4 | 1.56 | 1.21 | 2.3 | 20.1 | 2.2 |
| TP-R-13-03 ARD -02 | 3.61 | 5.7 | 120 | 104 | 38.3 | 10.8 | <2 | 1.3 | 0.43 | 0.54 | 0.12 | 6.9 | 1.48 | 2.04 | 1.7 | 16.4 | 1.6 |
| TP-R-13-03 ARD -04 | 3.3 | 5.4 | 396 | 91.8 | 26.2 | 10.4 | <2 | 1.3 | 0.57 | 0.41 | 0.11 | 2.6 | 1.45 | 1 | 2.1 | 12.8 | 1.3 |

| Sample ID | Mo ppm | Nb ppm | Pb ppm | Rb ppm | Sb ppm | Sc ppm | Se ppm | Sn ppm | Ta ppm | Tb ppm | Te ppm | Th ppm | Tl ppm | U ppm | W ppm | Y ppm | Yb ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Method Code | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B | ICM40B |
| LOD | 0.05 | 0.1 | 0.5 | 0.2 | 0.05 | 0.5 | 2 | 0.3 | 0.05 | 0.05 | 0.05 | 0.2 | 0.02 | 0.05 | 0.1 | 0.1 | 0.1 |
| TP-T-13-01 ARD-01 | 7.31 | 7.3 | 56.2 | 66.8 | 11 | 11.7 | <2 | 1.2 | 0.58 | 0.49 | 0.12 | 7.3 | 0.77 | 1.7 | 1.3 | 12.5 | 1.2 |
| TP-T-13-02 ARD-01 | 4.43 | 9.2 | 14.1 | 48.4 | 1.97 | 8.8 | <2 | 1.1 | 0.73 | 0.5 | <0.05 | 5.6 | 0.46 | 1.57 | 0.7 | 13.5 | 1.3 |
| TP-T-13-02 ARD-02 | 1.62 | 6.2 | 17.6 | 49 | 3.1 | 8 | <2 | 0.9 | 0.45 | 0.42 | <0.05 | 5 | 0.37 | 1.42 | 0.6 | 11.2 | 1 |
| TP-T-13-02 ARD-03 | 6.01 | 7.2 | 25.2 | 58.5 | 11.3 | 12.3 | <2 | 1.1 | 0.59 | 0.56 | <0.05 | 6.6 | 0.67 | 1.48 | 1.2 | 16 | 1.6 |
| TP-T-13-04 ARD-01 | 2.42 | 4.9 | 123 | 36.2 | 26.9 | 10.7 | <2 | 1.8 | 0.37 | 0.45 | 0.07 | 4.1 | 0.37 | 1.6 | 0.5 | 11.1 | 0.9 |
| TP-T-13-04 ARD-02 | 2.16 | 6.4 | 21 | 57.6 | 5.31 | 8.5 | <2 | 1 | 0.46 | 0.43 | <0.05 | 5.7 | 0.6 | 1.31 | 1.9 | 11.6 | 1.2 |
| TP-T-13-06 ARD-01 | 4.57 | 8.4 | 10.5 | 43.8 | 0.68 | 10.4 | <2 | 1.1 | 0.56 | 0.52 | <0.05 | 5.2 | 0.29 | 1.34 | 0.5 | 14.4 | 1.4 |
| TP-T-13-06 ARD-02 | 3.48 | 9.6 | 10.4 | 42.5 | 0.7 | 12.2 | <2 | 1.1 | 0.66 | 0.59 | <0.05 | 5.2 | 0.28 | 1.67 | 0.6 | 16.4 | 1.6 |
| TP-T-13-06 ARD-03 | 4.58 | 7.9 | 10.9 | 46.6 | 0.87 | 7.8 | <2 | 0.9 | 0.55 | 0.47 | <0.05 | 6 | 0.32 | 1.23 | 0.6 | 12.8 | 1.2 |
| TP-TD-13-01 ARD-01 | 5.2 | 5.6 | 11.5 | 50.5 | 0.97 | 5.8 | <2 | 0.7 | 0.36 | 0.33 | <0.05 | 4.1 | 0.34 | 0.93 | 0.4 | 9.5 | 0.9 |
| TP-TD-13-01 ARD-02 | 4.84 | 5.5 | 11.5 | 50.7 | 0.94 | 5.8 | <2 | 0.7 | 0.35 | 0.32 | <0.05 | 4 | 0.35 | 0.86 | 0.4 | 9.1 | 0.9 |
| TP-TD-13-01 ARD-03 | 1.84 | 6 | 12.6 | 51.1 | 0.94 | 6.4 | <2 | 0.8 | 0.38 | 0.34 | <0.05 | 4.2 | 0.34 | 0.89 | 0.4 | 9.9 | 0.9 |
| TP-TD-13-01 ARD-04 | 1.78 | 5.6 | 12.2 | 49.4 | 0.99 | 6.4 | <2 | 0.7 | 0.38 | 0.34 | <0.05 | 3.7 | 0.33 | 0.9 | 0.4 | 9.7 | 0.9 |
| TP-TD-13-02 ARD-01 | 5.5 | 5.2 | 15.3 | 51.3 | 1.9 | 5.8 | <2 | 0.8 | 0.34 | 0.32 | <0.05 | 3.8 | 0.36 | 0.93 | 0.4 | 9.2 | 0.9 |
| TP-TD-13-02 ARD-02 | 2.03 | 6.2 | 15 | 51.2 | 1.56 | 7.7 | <2 | 0.8 | 0.39 | 0.39 | <0.05 | 4.9 | 0.4 | 1.05 | 0.4 | 11.1 | 1 |
| TP-TD-13-02 ARD-03 | 4.52 | 8.7 | 10.8 | 45.9 | 0.78 | 10.4 | <2 | 1 | 0.54 | 0.5 | <0.05 | 5 | 0.31 | 1.26 | 0.5 | 14.3 | 1.3 |
| TP-TD-13-02 ARD-04 | 1.78 | 7.9 | 13.6 | 50.9 | 1.09 | 7 | <2 | 0.8 | 0.59 | 0.4 | <0.05 | 5 | 0.37 | 1.74 | 0.4 | 11.6 | 1.1 |
| TP-TD-13-03 ARD-01 | 5.54 | 6.4 | 12.8 | 52.2 | 1.16 | 7.5 | <2 | 0.9 | 0.41 | 0.4 | <0.05 | 4.8 | 0.37 | 1.08 | 0.4 | 11.7 | 1.1 |
| TP-TD-13-03 ARD-02 | 1.88 | 6.9 | 10.9 | 47.1 | 0.79 | 8.6 | <2 | 0.9 | 0.43 | 0.41 | <0.05 | 4.6 | 0.33 | 1.05 | 0.7 | 12.2 | 1.1 |
| TP-TD-13-03 ARD-03 | 4.83 | 6.7 | 11.4 | 50.8 | 0.9 | 7.6 | <2 | 0.9 | 0.43 | 0.4 | <0.05 | 3.9 | 0.34 | 1.03 | 0.5 | 11.7 | 1 |
| TP-TD-13-03 ARD-04 | 3.55 | 5.8 | 9 | 42 | 0.8 | 8.4 | <2 | 0.7 | 0.35 | 0.35 | <0.05 | 4.3 | 0.33 | 1.78 | 0.4 | 10 | 0.9 |
| TP-TD-13-03 ARD-05 | 4.46 | 5.4 | 10.4 | 36.4 | 1.94 | 11.2 | <2 | 0.7 | 0.31 | 0.45 | 0.05 | 6.4 | 0.52 | 3.12 | 0.7 | 12.4 | 1.1 |
| TP-TD-13-03 ARD-06 | 1.85 | 4.9 | 11.4 | 52.7 | 0.94 | 5.5 | <2 | 0.7 | 0.31 | 0.32 | <0.05 | 4.1 | 0.39 | 0.93 | 0.6 | 9.1 | 0.8 |
| TP-WA-13-02 ARD-01 | 1.59 | 7 | 17.6 | 61 | 16.4 | 6 | <2 | 1.1 | 0.52 | 0.31 | <0.05 | 3.4 | 1 | 0.89 | 0.9 | 9.2 | 0.9 |
| TP-WA-13-02 ARD-02 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-02 ARD-03 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-03 ARD-01 | 1.85 | 6.6 | 17.4 | 51.6 | 11.8 | 6 | <2 | 1.1 | 1.35 | 0.38 | 0.1 | 3.3 | 0.62 | 0.78 | 2 | 10.5 | 1.1 |
| TP-WA-13-03 ARD-02 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-03 ARD-03 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-05 ARD-01 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-05 ARD-02 | 4.15 | 6.5 | 1040 | 79.2 | 98.6 | 9.6 | <2 | 1.3 | 0.39 | 0.47 | 0.2 | 2.7 | 1.3 | 1.01 | 1.6 | 15.5 | 1.5 |
| TP-WA-13-05 ARD-03 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-05 ARD-04 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-06 ARD-01 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-06 ARD-02 | 1.11 | 6.2 | 205 | 92.1 | 25.7 | 10.3 | <2 | 1.3 | 0.34 | 0.5 | <0.05 | 2.7 | 1.71 | 1.23 | 5.5 | 15 | 1.5 |
| TP-WA-13-06 ARD-03 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-06 ARD-04 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-08 ARD-01 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-08 ARD-02 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-08 ARD-03 | 3.57 | 7.8 | 92.5 | 85.3 | 21.5 | 10 | <2 | 1.4 | 0.48 | 0.5 | 0.05 | 4.2 | 2.06 | 1.58 | 5.3 | 14.8 | 1.5 |
| TP-WA-13-09 ARD-01 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-09 ARD-02 | 3.75 | 6.4 | 461 | 116 | 78.9 | 11 | <2 | 1.8 | 0.33 | 0.45 | 0.09 | 3.7 | 2.69 | 1.2 | 2.6 | 13.4 | 1.4 |
| TP-WA-13-09 ARD-03 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-09 ARD-04 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-09 ARD-05 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-09 ARD-06 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-10 ARD-01 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-10 ARD-02 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-10 ARD-03 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-10 ARD-04 | 3.42 | 6.5 | 155 | 93.9 | 55.1 | 10 | <2 | 1.2 | 0.4 | 0.47 | 0.07 | 3.1 | 2.11 | 1.29 | 5.1 | 13.6 | 1.4 |
| TP-WA-13-11 ARD-01 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-11 ARD-02 | 4.99 | 3 | 512 | 93.9 | 42.8 | 10.2 | <2 | 1.2 | 0.16 | 0.3 | 0.11 | 1.9 | 2.34 | 1.1 | 2.6 | 9.8 | 1 |
| TP-WA-13-11 ARD-03 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-11 ARD-04 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| TP-WA-13-11 ARD-05 | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| HA-BA-13-01 0-1M | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| HA-BA-13-01 1-2M | 3.88 | 6.2 | 11.7 | 50.3 | 0.8 | 7.9 | <2 | 1.1 | 0.51 | 0.4 | <0.05 | 4.3 | 0.31 | 1.08 | 0.7 | 11 | 1.1 |
| HA-BA-13-01 2-3M | 4.15 | 6.4 | 11.2 | 48.4 | 0.78 | 8.1 | <2 | 0.9 | 0.54 | 0.4 | <0.05 | 4.6 | 0.31 | 1.17 | 0.7 | 11.5 | 1.1 |
| HA-BA-13-02 0-1M | 4.2 | 6.3 | 11.7 | 50.5 | 0.83 | 8 | <2 | 0.9 | 0.49 | 0.43 | <0.05 | 5.1 | 0.31 | 1.09 | 0.9 | 11.5 | 1.1 |
| HA-BA-13-02 1-2M | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| HA-BA-13-02 2-3M | 4.19 | 6.4 | 11.7 | 50.2 | 0.76 | 8.7 | <2 | 0.9 | 0.52 | 0.42 | <0.05 | 5.1 | 0.33 | 1.13 | 0.7 | 11.8 | 1.1 |
| **Duplicates** | | | | | | | | | | | | | | | | | |
| TP-TD-13-03 ARD-06 | 1.82 | 5.1 | 11.1 | 53.2 | 0.95 | 5.5 | <2 | 0.7 | 0.34 | 0.31 | <0.05 | 3.8 | 0.39 | 0.88 | 0.5 | 9.2 | 0.8 |
| TP-T-13-02 ARD-03 | 6.08 | 7.6 | 23.2 | 59.3 | 11.2 | 12.2 | <2 | 1.1 | 0.6 | 0.54 | 0.05 | 5.8 | 0.67 | 1.43 | 1.2 | 16.1 | 1.6 |
| BH-T-13-04 ARD-04 | 2.07 | 6.4 | 20.4 | 47.3 | 3.2 | 7.9 | <2 | 1.5 | 0.43 | 0.42 | <0.05 | 4.7 | 0.33 | 1.15 | 0.7 | 11.4 | 1 |
| BH-M-13-04 ARD -02 | 2.79 | 6 | 883 | 75 | 148 | 16 | <2 | 2.5 | 0.36 | 0.55 | 0.07 | 5.4 | 1.44 | 2.08 | 2.9 | 16.6 | 1.7 |
| TP-M-13-04 ARD -03 | 4.16 | 4.9 | 4390 | 104 | 1610 | 14.8 | <2 | 8.1 | 0.41 | 0.48 | 0.11 | 4.1 | 2.32 | 1.5 | 3.8 | 14.2 | 1.5 |
| **QC** | | | | | | | | | | | | | | | | | |
| CH-4 | 2.91 | 4.3 | 15.9 | 74.2 | 0.71 | 15 | 2 | 1.1 | 0.37 | 0.41 | 0.51 | 2.4 | 0.43 | 0.78 | 3.5 | 11.7 | 1.1 |
| CH-4 | 3.07 | 4.2 | 17.8 | 73 | 0.72 | 14.1 | 2 | 1.1 | 0.32 | 0.43 | 0.4 | 2.6 | 0.42 | 0.82 | 2.9 | 11.2 | 1.1 |
| CH-4 | 2.66 | 4.1 | 15.6 | 73 | 0.79 | 14 | 2 | 1.1 | 0.37 | 0.43 | 0.38 | 2.7 | 0.42 | 0.81 | 3.3 | 11.1 | 1.1 |
| CH-4 | 3.34 | 4.2 | 16.4 | 72.1 | 0.81 | 14.3 | 2 | 1.1 | 0.4 | 0.41 | 0.35 | 2.7 | 0.42 | 0.85 | 3 | 11 | 1.1 |
| Expected Values | 3 | 4 | 17.6 | 79 | 0.77 | 13 | 2.1 | 1.1 | 0.3 | 0.4 | 0.42 | 2 | 0.4 | 0.7 | 3 | 11 | 1 |
| Tolerance Level % | 14.17 | 16.25 | 17.10 | 10.63 | 26.23 | 19.62 | 248.10 | 78.18 | 51.67 | 41.25 | 39.76 | 35.00 | 22.50 | 27.86 | 18.33 | 12.27 | 35.00 |

**CLIENT** : **AMEC**
**PROJECT** : **Mt. Nansen**
**SGS Project #** : **1346**
**Test** : **Total CN, WAD CN in Solids**
**Date** : **December 9, 2013**

| **Sample ID** | **Total CN %** | **WAD CN %** |
|---|---|---|
| Method Code | - | - |
| LOD | 0.001 | 0.001 |
| BH-T-13-01 ARD-01 | < 0.001 | < 0.001 |
| BH-T-13-01 ARD-02 | < 0.001 | < 0.001 |
| BH-T-13-01 ARD-03 | < 0.001 | < 0.001 |
| BH-T-13-02 ARD-01 | < 0.001 | < 0.001 |
| BH-T-13-02 ARD-02 | < 0.001 | < 0.001 |
| BH-T-13-03 ARD-01 | < 0.001 | < 0.001 |
| BH-T-13-03 ARD-02 | < 0.001 | < 0.001 |
| BH-T-13-04 ARD-01 | 0.003 | < 0.001 |
| BH-T-13-04 ARD-02 | 0.002 | < 0.001 |
| TP-T-13-04 ARD-01 | < 0.001 | < 0.001 |
| TP-T-13-04 ARD-02 | < 0.001 | < 0.001 |
| TP-T-13-06 ARD-01 | < 0.001 | < 0.001 |
| TP-T-13-06 ARD-02 | < 0.001 | < 0.001 |
| TP-T-13-02 ARD-01 | < 0.001 | < 0.001 |
| TP-T-13-02 ARD-02 | < 0.001 | < 0.001 |

**CLIENT** : AMEC
**PROJECT** : Mt. Nansen
**SGS Project #** : 1346
**Test** : 24 Hour Nanopure Water Leach Extraction Test at 3:1 Liquid to Solid Ratio
**Date** : November 19 - December 6, 2013

**Leachate Analysis**

| Sample ID | | | BH-M-13-04 ARD-01 | BH-T-13-03 ARD-06 | BH-TD-13-01 ARD-06 | HA-BA-13-01 2-3 m | HA-BA-13-02 0-1 m | TP-BA-13-03 ARD-01 | TP-BA-13-03 ARD-03 | TP-BA-13-04 ARD-01 | TP-BA-13-04 ARD-03 | TP-BA-13-05 ARD-02 | TP-BA-13-05 ARD-04 | TP-BA-13-07 ARD-02 | TP-M-13-04 ARD-01 | TP-M-13-05 ARD-02 | TP-R-13-01 ARD-02 | TP-R-13-02 ARD-01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Method** | **Units** | | | | | | | | | | | | | | | | |
| Volume Nanopure Water | | mL | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 |
| Sample Weight | | g | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| pH | meter | | 7.67 | 7.48 | 7.41 | 7.76 | 7.81 | 7.53 | 7.56 | 7.15 | 7.60 | 7.35 | 7.64 | 7.83 | 7.82 | 7.86 | 7.43 | 7.83 |
| Redox | meter | mV | 317 | 304 | 319 | 331 | 329 | 333 | 335 | 338 | 351 | 345 | 350 | 353 | 351 | 345 | 366 | 361 |
| Conductivity | meter | uS/cm | 389 | 128 | 28 | 78 | 72 | 39 | 48 | 12 | 55 | 23 | 74 | 72 | 209 | 61 | 203 | 260 |
| Acidity (to pH 4.5) | titration | mg CaCO3/L | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Total Acidity (to pH 8.3) | titration | mg CaCO3/L | 3.7 | 2.9 | 2.4 | 2.2 | 2.1 | 2.3 | 2.4 | 2.5 | 2.2 | 2.6 | 2.6 | 2.9 | 3.6 | 3.0 | 3.8 | 3.4 |
| Alkalinity | titration | mg CaCO3/L | 50.1 | 16.6 | 10.7 | 38.3 | 34.3 | 20.3 | 24.3 | 5.1 | 26.7 | 9.8 | 31.3 | 38.9 | 38.8 | 24.3 | 4.0 | 42.1 |
| Sulphate | Turbidity | mg/L | 109 | 32 | 4 | 3 | 3 | <2 | <2 | 3 | <2 | <2 | 5 | 4 | 58 | 10 | 82 | 77 |
| **Ion Balance** | | | | | | | | | | | | | | | | | | |
| Major Anions | Calc | meq/L | 3.27 | 1.00 | 0.30 | 0.83 | 0.75 | 0.41 | 0.49 | 0.16 | 0.53 | 0.20 | 0.73 | 0.86 | 1.98 | 0.69 | 1.79 | 2.45 |
| Major Cations | Calc | meq/L | 3.98 | 1.16 | 0.29 | 0.83 | 0.76 | 0.40 | 0.51 | 0.13 | 0.57 | 0.23 | 0.74 | 0.77 | 2.09 | 0.65 | 1.90 | 2.62 |
| Difference | Calc | meq/L | -0.71 | -0.16 | 0.00 | 0.00 | -0.01 | 0.00 | -0.03 | 0.04 | -0.04 | -0.04 | -0.01 | 0.09 | -0.11 | 0.04 | -0.11 | -0.18 |
| Balance (%) | Calc | % | -9.8% | -7.6% | 0.4% | 0.0% | -0.9% | 0.3% | -2.8% | 12.1% | -3.4% | -8.5% | -0.8% | 5.3% | -2.6% | 3.1% | -3.1% | -3.5% |
| **Dissolved Metals** | | | | | | | | | | | | | | | | | | |
| Hardness CaCO3 | | mg/L | 191 | 48.8 | 11.1 | 38.5 | 35.3 | 18.4 | 23.1 | 5.0 | 26.2 | 9.8 | 33.5 | 35.4 | 98.6 | 28.7 | 85.5 | 124 |
| Aluminum Al | ICP-MS | mg/L | 0.0181 | 0.0744 | 0.0827 | 0.0622 | 0.105 | 0.0677 | 0.0750 | 0.0357 | 0.0873 | 0.0145 | 0.0933 | 0.0419 | 0.0343 | 0.105 | 0.0440 | 0.0340 |
| Antimony Sb | ICP-MS | mg/L | 0.905 | 0.0063 | 0.0020 | 0.0012 | 0.0012 | 0.0007 | 0.0010 | 0.0005 | 0.0004 | 0.0044 | 0.0014 | 0.0002 | 0.110 | 0.0013 | 0.0065 | 0.0107 |
| Arsenic As | ICP-MS | mg/L | 0.375 | 0.0160 | 0.0031 | 0.0039 | 0.0039 | 0.0114 | 0.0141 | 0.0041 | 0.0086 | 0.0034 | 0.0086 | 0.0010 | 0.131 | 0.0021 | 0.0092 | 0.0215 |
| Barium Ba | ICP-MS | mg/L | 0.0328 | 0.0542 | 0.0115 | 0.0182 | 0.0249 | 0.0160 | 0.0161 | 0.00375 | 0.00941 | 0.00791 | 0.0279 | 0.00167 | 0.0150 | 0.0401 | 0.0586 | 0.0188 |
| Beryllium Be | ICP-MS | mg/L | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 |
| Bismuth Bi | ICP-MS | mg/L | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | 0.00002 | < 0.00001 |
| Boron B | ICP-MS | mg/L | 0.0168 | 0.0160 | 0.0065 | 0.0174 | 0.0132 | 0.0071 | 0.0160 | 0.0075 | 0.0113 | 0.0066 | 0.0074 | 0.0049 | 0.0172 | 0.0073 | 0.0048 | 0.0154 |
| Cadmium Cd | ICP-MS | mg/L | 0.00144 | 0.000045 | 0.000026 | 0.000006 | 0.000009 | < 0.000003 | 0.000033 | 0.000008 | 0.000014 | 0.000005 | 0.000022 | 0.000007 | 0.000294 | 0.000003 | 0.000147 | 0.000098 |
| Calcium Ca | ICP-MS | mg/L | 52.2 | 15.5 | 3.56 | 12.2 | 11.8 | 6.66 | 7.13 | 1.45 | 8.73 | 3.40 | 10.9 | 11.7 | 29.8 | 8.73 | 25.6 | 39.4 |
| Chromium Cr | ICP-MS | mg/L | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 |
| Cobalt Co | ICP-MS | mg/L | 0.000113 | 0.000261 | 0.000098 | 0.000061 | 0.000084 | 0.000060 | 0.000075 | 0.000047 | 0.000098 | 0.000034 | 0.000121 | 0.000042 | 0.000070 | 0.000078 | 0.000084 | 0.000135 |
| Copper Cu | ICP-MS | mg/L | 0.0065 | 0.0029 | 0.0042 | 0.0024 | 0.0036 | 0.0016 | 0.0029 | 0.0027 | 0.0020 | 0.0027 | 0.0038 | < 0.0005 | 0.0016 | 0.0014 | 0.0033 | 0.0010 |
| Iron Fe | ICP-MS | mg/L | 0.021 | 0.068 | 0.060 | 0.037 | 0.070 | 0.058 | 0.083 | 0.033 | 0.055 | 0.020 | 0.074 | 0.014 | 0.020 | 0.095 | 0.101 | 0.022 |
| Lead Pb | ICP-MS | mg/L | 0.00516 | 0.00039 | 0.00009 | 0.00004 | 0.00011 | 0.00010 | 0.00035 | 0.00010 | 0.00010 | 0.00007 | 0.00018 | < 0.00002 | 0.00105 | 0.00013 | 0.00202 | 0.00045 |
| Lithium Li | ICP-MS | mg/L | 0.004 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | 0.001 | < 0.001 |
| Magnesium Mg | ICP-MS | mg/L | 14.7 | 2.44 | 0.530 | 1.94 | 1.44 | 0.417 | 1.29 | 0.327 | 1.06 | 0.322 | 1.54 | 1.49 | 5.90 | 1.68 | 5.25 | 6.25 |
| Manganese Mn | ICP-MS | mg/L | 0.0189 | 0.0181 | 0.0053 | 0.0058 | 0.0066 | 0.0025 | 0.0083 | 0.0043 | 0.0192 | 0.0025 | 0.0098 | 0.0005 | 0.0024 | 0.0105 | 0.0262 | 0.0030 |
| Mercury Hg | ICP-MS | ug/L | 0.02 | 0.01 | 0.02 | < 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Molybdenum Mo | ICP-MS | mg/L | 0.00266 | 0.00512 | 0.00100 | 0.00089 | 0.00160 | 0.00037 | 0.00075 | 0.00043 | 0.00047 | 0.00121 | 0.00157 | 0.00572 | 0.00120 | 0.00035 | 0.00008 | 0.00023 |
| Nickel Ni | ICP-MS | mg/L | 0.0004 | 0.0004 | 0.0004 | 0.0003 | 0.0004 | 0.0003 | 0.0004 | 0.0008 | 0.0002 | 0.0003 | 0.0006 | 0.0001 | 0.0003 | 0.0004 | 0.0007 | 0.0002 |
| Phosphorus P | ICP-MS | mg/L | 0.014 | 0.014 | 0.018 | 0.052 | 0.032 | 0.057 | 0.036 | 0.019 | 0.052 | 0.010 | 0.026 | 0.011 | 0.014 | < 0.009 | 0.011 | 0.026 |
| Potassium K | ICP-MS | mg/L | 4.21 | 2.04 | 0.643 | 1.32 | 1.32 | 0.565 | 0.940 | 0.385 | 0.824 | 0.729 | 1.12 | 2.23 | 3.29 | 1.09 | 4.32 | 3.67 |
| Selenium Se | ICP-MS | mg/L | 0.00041 | 0.00031 | 0.00021 | 0.00040 | 0.00046 | 0.00020 | 0.00069 | 0.00011 | 0.00073 | 0.00056 | 0.00095 | 0.00026 | 0.00041 | 0.00020 | 0.00014 | 0.00009 |
| Silicon Si | ICP-MS | mg/L | 2.56 | 2.57 | 2.27 | 2.49 | 1.74 | 2.40 | 2.19 | 1.74 | 2.50 | 1.73 | 1.69 | 2.28 | 2.16 | 2.01 | 3.58 | 2.46 |
| Silver Ag | ICP-MS | mg/L | 0.00036 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | 0.00002 | 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | 0.00001 | < 0.00001 |
| Sodium Na | ICP-MS | mg/L | 1.32 | 3.07 | 1.30 | 0.58 | 0.48 | 0.53 | 0.62 | 0.46 | 0.62 | 0.40 | 0.96 | 0.23 | 0.64 | 0.80 | 1.77 | 1.09 |
| Strontium Sr | ICP-MS | mg/L | 0.150 | 0.0682 | 0.0142 | 0.0593 | 0.0508 | 0.0206 | 0.0285 | 0.0073 | 0.0241 | 0.0110 | 0.0446 | 0.0548 | 0.0669 | 0.0308 | 0.0721 | 0.0865 |
| Sulphur (S) | ICP-MS | mg/L | 47.8 | 12.8 | 0.59 | 0.52 | 0.58 | 0.25 | 0.34 | 0.22 | 0.39 | 0.31 | 1.25 | 0.51 | 21.1 | 3.57 | 28.6 | 28.8 |
| Thallium Tl | ICP-MS | mg/L | 0.00021 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | 0.00004 | < 0.00002 | 0.00004 | < 0.00002 |
| Tin Sn | ICP-MS | mg/L | 0.00087 | 0.00018 | 0.00008 | 0.00004 | 0.00002 | 0.00004 | 0.00001 | 0.00007 | 0.00001 | 0.00002 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 |
| Titanium Ti | ICP-MS | mg/L | 0.0003 | 0.0015 | 0.0018 | 0.0014 | 0.0027 | 0.0018 | 0.0015 | 0.0009 | 0.0023 | 0.0003 | 0.0022 | 0.0002 | 0.0004 | 0.0025 | 0.0013 | 0.0004 |
| Uranium U | ICP-MS | mg/L | 0.000411 | 0.000032 | 0.000035 | 0.000338 | 0.000281 | 0.000018 | 0.000037 | 0.000022 | 0.000100 | 0.000006 | 0.000158 | 0.000087 | 0.000156 | 0.000022 | 0.000008 | 0.000142 |
| Vanadium V | ICP-MS | mg/L | 0.00029 | 0.00081 | 0.00117 | 0.00512 | 0.00335 | 0.00186 | 0.00255 | 0.00067 | 0.00622 | 0.00071 | 0.00222 | 0.00013 | 0.00032 | 0.00062 | 0.00027 | 0.00017 |
| Zinc Zn | ICP-MS | mg/L | 0.038 | 0.001 | 0.002 | < 0.001 | 0.001 | 0.002 | 0.002 | < 0.001 | < 0.001 | < 0.001 | 0.001 | < 0.001 | 0.006 | 0.001 | 0.006 | 0.003 |
| Zirconium Zr | ICP-MS | mg/L | 0.00014 | 0.00004 | 0.00022 | 0.00003 | 0.00005 | 0.00004 | 0.00006 | 0.00010 | 0.00003 | 0.00002 | 0.00005 | < 0.00001 | 0.00005 | 0.00003 | 0.00007 | 0.00003 |

**CLIENT** : AMEC
**PROJECT** : Mt. Nansen
**SGS Project #** : 1346
**Test** : 24 Hour Nanopure Water
**Date** : November 19 - Decembe

**Leachate Analysis**

| Sample ID | | | TP-R-13-03 ARD-02 | TP-TD-13-01 ARD-02 | TP-TD-13-02 ARD-01 | TP-TD-13-02 ARD-03 | TP-TD-13-03 ARD-05 | BH-T-13-01 ARD-01 | BH-T-13-01 ARD-05 | BH-T-13-02 ARD-01 | BH-T-13-02 ARD-04 | BH-T-13-03 ARD-02 | BH-T-13-04 ARD-02 | BH-T-13-04 ARD-04 | BH-TD-13-01 ARD-03 | BH-TD-13-01 ARD-10 | TP-T-13-02 ARD-02 | TP-T-13-03 ARD-02 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Method** | **Units** | | | | | | | | | | | | | | | | |
| Volume Nanopure Water | | mL | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 |
| Sample Weight | | g | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| pH | meter | | 7.82 | 7.70 | 7.35 | 7.49 | 5.67 | 8.00 | 7.98 | 7.52 | 8.30 | 7.62 | 7.49 | 8.00 | 7.94 | 7.67 | 6.33 | 8.04 |
| Redox | meter | mV | 357 | 337 | 352 | 287 | 278 | 347 | 344 | 350 | 311 | 349 | 335 | 320 | 337 | 357 | 259 | 303 |
| Conductivity | meter | uS/cm | 287 | 6 | 20 | 33 | 1008 | 420 | 272 | 347 | 417 | 192 | 2089 | 227 | 40 | 49 | 418 | 77 |
| Acidity (to pH 4.5) | titration | mg CaCO3/L | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A |
| Total Acidity (to pH 8.3) | titration | mg CaCO3/L | 3.8 | 3.7 | 3.5 | 2.8 | 7.6 | 5.9 | 5.3 | 5.7 | 7.0 | 4.6 | 8.8 | 5.2 | 3.7 | 3.9 | 8.6 | 2.1 |
| Alkalinity | titration | mg CaCO3/L | 36.6 | 2.9 | 8.4 | 12.5 | 1.3 | 38.9 | 103.0 | 13.2 | 119.9 | 6.1 | 34.0 | 36.1 | 20.3 | 10.9 | 1.6 | 39.5 |
| Sulphate | Turbidity | mg/L | 96 | 4 | 3 | 2 | 445 | 156 | 26 | 133 | 84 | 63 | 1072 | 20 | 4 | 7 | 145 | 3 |
| **Ion Balance** | | | | | | | | | | | | | | | | | | |
| Major Anions | Calc | meq/L | 2.73 | 0.14 | 0.23 | 0.29 | 9.30 | 4.03 | 2.60 | 3.04 | 4.15 | 1.44 | 23.01 | 1.14 | 0.49 | 0.36 | 3.05 | 0.85 |
| Major Cations | Calc | meq/L | 2.81 | 0.13 | 0.34 | 0.53 | 10.77 | 4.14 | 3.07 | 3.33 | 4.59 | 1.70 | 26.74 | 2.01 | 0.44 | 0.52 | 3.31 | 0.89 |
| Difference | Calc | meq/L | -0.08 | 0.01 | -0.11 | -0.23 | -1.48 | -0.11 | -0.46 | -0.29 | -0.45 | -0.26 | -3.72 | -0.87 | 0.05 | -0.15 | -0.26 | -0.04 |
| Balance (%) | Calc | % | -1.4% | 5.3% | -19.4% | -28.7% | -7.4% | -1.3% | -8.2% | -4.6% | -5.1% | -8.3% | -7.5% | -27.7% | 5.3% | -17.5% | -4.1% | -2.4% |
| **Dissolved Metals** | | | | | | | | | | | | | | | | | | |
| Hardness CaCO3 | | mg/L | 132 | 3.4 | 13.1 | 20.1 | 489 | 195 | 123 | 160 | 195 | 71.7 | 1280 | 95.2 | 15.8 | 9.13 | 156 | 40.3 |
| Aluminum Al | ICP-MS | mg/L | 0.0362 | 0.148 | 0.280 | 0.259 | 0.189 | 0.0294 | 0.172 | 0.112 | 0.101 | 0.155 | 0.0111 | 0.0299 | 0.237 | 0.381 | 0.0566 | 0.228 |
| Antimony Sb | ICP-MS | mg/L | 0.0026 | < 0.0002 | < 0.0002 | 0.0017 | 0.0009 | 0.0065 | 0.0035 | 0.0046 | 0.0073 | 0.0013 | 0.465 | 0.0075 | 0.0013 | 0.0005 | 0.0033 | 0.0007 |
| Arsenic As | ICP-MS | mg/L | 0.0031 | 0.0008 | 0.0014 | 0.0007 | 0.0038 | 0.0166 | 0.0183 | 0.0087 | 0.0475 | 0.0023 | 1.24 | 0.0072 | 0.0044 | 0.0027 | 0.0133 | 0.0013 |
| Barium Ba | ICP-MS | mg/L | 0.0152 | 0.00732 | 0.0145 | 0.0250 | 0.0839 | 0.0519 | 0.0626 | 0.0904 | 0.112 | 0.069 | 0.015 | 0.077 | 0.017 | 0.023 | 0.087 | 0.0219 |
| Beryllium Be | ICP-MS | mg/L | < 0.00002 | 0.00002 | < 0.00002 | 0.00006 | 0.00002 | 0.00002 | 0.00008 | < 0.00002 | 0.00014 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | 0.00002 | 0.00003 | 0.00004 |
| Bismuth Bi | ICP-MS | mg/L | < 0.00001 | < 0.00001 | 0.00010 | 0.00018 | 0.00013 | 0.00002 | 0.00044 | 0.00001 | 0.00030 | 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | 0.00009 |
| Boron B | ICP-MS | mg/L | 0.0063 | 0.0053 | 0.0057 | 0.0100 | 0.138 | 0.0162 | 0.0280 | 0.0843 | 0.0934 | 0.0183 | 0.126 | 0.0245 | 0.0149 | 0.0145 | 0.0531 | 0.0094 |
| Cadmium Cd | ICP-MS | mg/L | 0.000286 | 0.000035 | < 0.000003 | 0.000294 | 0.000520 | 0.000030 | 0.000087 | 0.000055 | 0.000219 | 0.000215 | 0.00343 | 0.000058 | 0.000016 | 0.000018 | 0.000119 | 0.000038 |
| Calcium Ca | ICP-MS | mg/L | 42.7 | 1.20 | 4.40 | 7.06 | 172 | 36.3 | 34.1 | 36.3 | 51.9 | 21.2 | 479 | 32.5 | 4.93 | 3.23 | 45.7 | 13.9 |
| Chromium Cr | ICP-MS | mg/L | < 0.0005 | 0.0007 | 0.0008 | 0.0025 | 0.0010 | < 0.0005 | 0.0038 | 0.0006 | 0.0042 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | 0.0008 | 0.0014 | 0.0009 |
| Cobalt Co | ICP-MS | mg/L | 0.000087 | 0.000237 | 0.000345 | 0.00330 | 0.115 | 0.000501 | 0.00391 | 0.00203 | 0.00452 | 0.000892 | 0.00951 | 0.00120 | 0.000183 | 0.00104 | 0.00431 | 0.000646 |
| Copper Cu | ICP-MS | mg/L | 0.0008 | 0.0166 | 0.0069 | 0.0062 | 0.0106 | 0.0077 | 0.0325 | 0.0100 | 0.0325 | 0.0126 | 0.0117 | 0.0080 | 0.0035 | 0.0078 | 0.0035 | 0.0134 |
| Iron Fe | ICP-MS | mg/L | 0.016 | 0.069 | 0.196 | 0.242 | 0.166 | 0.016 | 1.25 | 0.103 | 1.38 | 0.132 | 0.025 | 0.046 | 0.212 | 0.305 | 0.415 | 0.188 |
| Lead Pb | ICP-MS | mg/L | 0.00032 | 0.00008 | 0.00043 | 0.00025 | 0.00046 | 0.00007 | 0.00067 | 0.00057 | 0.00102 | 0.00037 | 0.00048 | 0.00045 | 0.00023 | 0.00031 | 0.00015 | 0.00026 |
| Lithium Li | ICP-MS | mg/L | 0.002 | < 0.001 | < 0.001 | 0.001 | < 0.001 | 0.002 | 0.002 | < 0.001 | 0.004 | < 0.001 | 0.008 | < 0.001 | < 0.001 | < 0.001 | 0.008 | < 0.001 |
| Magnesium Mg | ICP-MS | mg/L | 6.10 | 0.092 | 0.511 | 0.594 | 14.6 | 25.4 | 9.09 | 16.8 | 15.9 | 4.52 | 20.6 | 3.43 | 0.840 | 0.257 | 10.1 | 1.37 |
| Manganese Mn | ICP-MS | mg/L | 0.0054 | 0.0130 | 0.0100 | 0.0078 | 17.3 | 0.0265 | 0.126 | 0.365 | 0.134 | 0.578 | 2.76 | 0.0729 | 0.0097 | 0.0129 | 0.435 | 0.0112 |
| Mercury Hg | ICP-MS | ug/L | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | 0.14 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Molybdenum Mo | ICP-MS | mg/L | 0.00044 | 0.00029 | 0.00174 | 0.00059 | 0.00745 | 0.00170 | 0.0362 | 0.00656 | 0.0403 | 0.00163 | 0.00816 | 0.00332 | 0.00138 | 0.00155 | 0.00038 | 0.00091 |
| Nickel Ni | ICP-MS | mg/L | 0.0002 | 0.0004 | 0.0006 | 0.0029 | 0.0207 | 0.0014 | 0.0104 | 0.0015 | 0.0099 | 0.0004 | 0.0008 | < 0.0001 | < 0.0001 | 0.0003 | 0.0049 | 0.0010 |
| Phosphorus P | ICP-MS | mg/L | < 0.009 | 0.018 | 0.021 | 0.038 | 0.086 | 0.032 | 0.106 | 0.021 | 0.240 | < 0.009 | 0.054 | 0.020 | 0.013 | 0.022 | 0.016 | 0.025 |
| Potassium K | ICP-MS | mg/L | 3.14 | 0.329 | 0.509 | 0.521 | 3.39 | 2.69 | 3.83 | 1.59 | 2.74 | 2.74 | 16.4 | 1.82 | 0.777 | 0.685 | 1.89 | 0.668 |
| Selenium Se | ICP-MS | mg/L | 0.00009 | 0.00009 | 0.00021 | 0.00039 | 0.00023 | 0.00050 | 0.00099 | 0.00026 | 0.00125 | 0.00008 | 0.00079 | 0.00066 | 0.00020 | 0.00017 | 0.00073 | 0.00029 |
| Silicon Si | ICP-MS | mg/L | 2.38 | 2.21 | 1.83 | 1.73 | 10.5 | 1.62 | 2.23 | 2.51 | 2.68 | 2.78 | 4.45 | 1.26 | 2.36 | 2.24 | 2.54 | 1.56 |
| Silver Ag | ICP-MS | mg/L | < 0.00001 | 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | < 0.00001 | 0.00006 | < 0.00001 | 0.00005 | < 0.00001 | < 0.00001 | 0.00009 | < 0.00001 | 0.00009 |
| Sodium Na | ICP-MS | mg/L | 2.21 | 0.72 | 0.54 | 1.59 | 5.16 | 3.71 | 10.3 | 1.22 | 12.1 | 3.45 | 12.3 | 1.31 | 1.54 | 5.94 | 2.57 | 0.80 |
| Strontium Sr | ICP-MS | mg/L | 0.150 | 0.0064 | 0.0203 | 0.0278 | 0.553 | 0.170 | 0.136 | 0.287 | 0.216 | 0.0810 | 0.653 | 0.129 | 0.0260 | 0.0172 | 0.200 | 0.0490 |
| Sulphur (S) | ICP-MS | mg/L | 32.5 | 0.17 | 0.36 | 0.90 | 174 | 57.3 | 11.7 | 50.0 | 30.3 | 22.3 | 421 | 10.4 | 0.82 | 3.04 | 64.1 | 0.68 |
| Thallium Tl | ICP-MS | mg/L | < 0.00002 | < 0.00002 | < 0.00002 | 0.00006 | 0.00033 | < 0.00002 | < 0.00002 | < 0.00002 | 0.00009 | < 0.00002 | 0.00037 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 | < 0.00002 |
| Tin Sn | ICP-MS | mg/L | < 0.00001 | < 0.00001 | < 0.00001 | 0.00091 | 0.00012 | 0.00001 | < 0.00001 | 0.00007 | 0.00006 | 0.00003 | < 0.00001 | 0.00002 | 0.00002 | 0.00003 | < 0.00001 | < 0.00001 |
| Titanium Ti | ICP-MS | mg/L | 0.0002 | 0.0020 | 0.0066 | 0.0069 | 0.0019 | 0.0006 | 0.0144 | 0.0040 | 0.0128 | 0.0056 | 0.0003 | 0.0010 | 0.0068 | 0.0113 | 0.0023 | 0.0065 |
| Uranium U | ICP-MS | mg/L | 0.000159 | 0.000066 | 0.000127 | 0.00454 | 0.000730 | 0.000275 | 0.00327 | 0.000043 | 0.00142 | 0.000027 | 0.000598 | 0.000217 | 0.000058 | 0.000063 | 0.000061 | 0.000232 |
| Vanadium V | ICP-MS | mg/L | 0.00012 | 0.00065 | 0.00145 | 0.00202 | 0.00042 | 0.00390 | 0.00740 | 0.00688 | 0.00789 | 0.00063 | 0.00021 | 0.00098 | 0.00166 | 0.00169 | 0.00244 | 0.00189 |
| Zinc Zn | ICP-MS | mg/L | 0.004 | 0.001 | 0.003 | 0.004 | 0.016 | 0.003 | 0.004 | 0.004 | 0.004 | 0.005 | 0.019 | 0.002 | 0.002 | 0.002 | 0.018 | 0.003 |
| Zirconium Zr | ICP-MS | mg/L | 0.00002 | 0.00098 | 0.00100 | 0.00078 | 0.00080 | 0.00004 | 0.00207 | 0.00047 | 0.00209 | 0.00022 | 0.00003 | 0.00006 | 0.00026 | 0.00063 | 0.00012 | 0.00035 |

**CLIENT** : AMEC
**PROJECT** : Mt. Nansen
**SGS Project #** : 1346
**Test** : 24 Hour Nanopure Water
**Date** : November 19 - Decembe

**Leachate Analysis**

| Sample ID | | | TP-T-13-04 ARD-02 | TP-T-13-06 ARD-02 | TP-TD-13-01 ARD-04 | Blank | Blank |
|---|---|---|---|---|---|---|---|
| **Parameter** | **Method** | **Units** | | | | | |
| Volume Nanopure Water | | mL | 750 | 750 | 750 | 750 | 750 |
| Sample Weight | | g | 250 | 250 | 250 | - | - |
| pH | meter | | 7.19 | 8.07 | 7.72 | 7.01 | 7.51 |
| Redox | meter | mV | 330 | 317 | 321 | - | - |
| Conductivity | meter | uS/cm | 213 | 159 | 32 | 1 | 2 |
| Acidity (to pH 4.5) | titration | mg CaCO3/L | #N/A | #N/A | #N/A | - | - |
| Total Acidity (to pH 8.3) | titration | mg CaCO3/L | 2.9 | 1.9 | 2.4 | - | - |
| Alkalinity | titration | mg CaCO3/L | 3.9 | 58.8 | 10.0 | - | - |
| Sulphate | Turbidity | mg/L | 58 | 10 | 8 | - | - |
| **Ion Balance** | | | | | | | |
| Major Anions | Calc | meq/L | 1.29 | 1.38 | 0.37 | #N/A | #N/A |
| Major Cations | Calc | meq/L | 1.77 | 1.55 | 0.35 | #N/A | #N/A |
| Difference | Calc | meq/L | -0.48 | -0.16 | 0.02 | #N/A | #N/A |
| Balance (%) | Calc | % | -15.8% | -5.6% | 2.2% | #N/A | #N/A |
| **Dissolved Metals** | | | | | | - | - |
| Hardness CaCO3 | | mg/L | 65.6 | 74.2 | 12.3 | - | - |
| Aluminum Al | ICP-MS | mg/L | 0.0997 | 0.0219 | 0.201 | - | - |
| Antimony Sb | ICP-MS | mg/L | 0.0007 | 0.0013 | 0.0004 | - | - |
| Arsenic As | ICP-MS | mg/L | 0.0046 | 0.0022 | 0.0033 | - | - |
| Barium Ba | ICP-MS | mg/L | 0.0648 | 0.0437 | 0.0208 | - | - |
| Beryllium Be | ICP-MS | mg/L | < 0.00002 | < 0.00002 | < 0.00002 | - | - |
| Bismuth Bi | ICP-MS | mg/L | < 0.00001 | < 0.00001 | < 0.00001 | - | - |
| Boron B | ICP-MS | mg/L | 0.0273 | 0.0224 | 0.0148 | - | - |
| Cadmium Cd | ICP-MS | mg/L | 0.000303 | 0.000012 | 0.000018 | - | - |
| Calcium Ca | ICP-MS | mg/L | 23.6 | 22.5 | 3.91 | - | - |
| Chromium Cr | ICP-MS | mg/L | < 0.0005 | < 0.0005 | < 0.0005 | - | - |
| Cobalt Co | ICP-MS | mg/L | 0.000902 | 0.000245 | 0.000150 | - | - |
| Copper Cu | ICP-MS | mg/L | 0.0035 | 0.0042 | 0.0047 | - | - |
| Iron Fe | ICP-MS | mg/L | 0.108 | 0.046 | 0.211 | - | - |
| Lead Pb | ICP-MS | mg/L | 0.00023 | 0.00004 | 0.00020 | - | - |
| Lithium Li | ICP-MS | mg/L | < 0.001 | 0.001 | < 0.001 | - | - |
| Magnesium Mg | ICP-MS | mg/L | 1.59 | 4.34 | 0.629 | - | - |
| Manganese Mn | ICP-MS | mg/L | 0.146 | 0.0548 | 0.0161 | - | - |
| Mercury Hg | ICP-MS | ug/L | < 0.01 | < 0.01 | < 0.01 | - | - |
| Molybdenum Mo | ICP-MS | mg/L | 0.00039 | 0.0108 | 0.00097 | - | - |
| Nickel Ni | ICP-MS | mg/L | 0.0009 | 0.0014 | 0.0007 | - | - |
| Phosphorus P | ICP-MS | mg/L | < 0.009 | 0.016 | 0.019 | - | - |
| Potassium K | ICP-MS | mg/L | 4.96 | 1.32 | 0.751 | - | - |
| Selenium Se | ICP-MS | mg/L | 0.00013 | 0.00098 | 0.00030 | - | - |
| Silicon Si | ICP-MS | mg/L | 1.44 | 0.85 | 2.76 | - | - |
| Silver Ag | ICP-MS | mg/L | 0.00004 | < 0.00001 | < 0.00001 | - | - |
| Sodium Na | ICP-MS | mg/L | 7.16 | 0.79 | 1.17 | - | - |
| Strontium Sr | ICP-MS | mg/L | 0.0606 | 0.0841 | 0.0163 | - | - |
| Sulphur (S) | ICP-MS | mg/L | 23.8 | 4.35 | 1.44 | - | - |
| Thallium Tl | ICP-MS | mg/L | 0.00005 | < 0.00002 | < 0.00002 | - | - |
| Tin Sn | ICP-MS | mg/L | < 0.00001 | < 0.00001 | < 0.00001 | - | - |
| Titanium Ti | ICP-MS | mg/L | 0.0019 | 0.0006 | 0.0062 | - | - |
| Uranium U | ICP-MS | mg/L | 0.000037 | 0.00132 | 0.000067 | - | - |
| Vanadium V | ICP-MS | mg/L | 0.00034 | 0.00068 | 0.00381 | - | - |
| Zinc Zn | ICP-MS | mg/L | 0.002 | < 0.001 | 0.001 | - | - |
| Zirconium Zr | ICP-MS | mg/L | 0.00033 | 0.00005 | 0.00040 | - | - |

# Appendix D3

# Water Sampling Lab Results

## Summary of Water Quality Sampling 2013

| Samples | Area | Number of Samples | Parameters | | | |
|---|---|---|---|---|---|---|
| | | | General | Cyanides | Organic / Inorganic Chemistry | Metals |
| Groundwater | Pit | 4 | 3 | 4 | 3 | 4 |
| | Mill | 9 | 9 | 9 | 9 | 9 |
| | Tailings | 10 | 10 | 10 | 10 | 10 |
| | Seepage Pond | 8 | 8 | 8 | 8 | 8 |
| | Pony Creek | 4 | 4 | 3 | 3 | 3 |
| | Dome Creek | 8 | 8 | 7 | 7 | 7 |
| Surface water | Pit | 3 | 3 | 3 | 3 | 3 |
| | Seepage Pond | 1 | 1 | 1 | 1 | 1 |

**Table D3-1: Groundwater Analytical Results 2013**

| Sample ID | UNITS | Comparison Guidelines | | GLL07-03 ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | GLL07-03 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | GLL07-03 ALTERNATE PRESERVATION #3 (UNPRESERVED) | CH-13-03 | CH-13-03 (UNPRESERVED) | CH-13-04 | CH-13-04 (UNPRESERVED) | CH-13-05 | CH-13-05 (UNPRESERVED) | MW09-16 STANDARD PRESERVATION | MW09-16 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-16 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-17 STANDARD PRESERVATION | MW09-17 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-17 ALTERNATE PRESERVATION #3 (UNPRESERVED) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Water Quality Guideline For Protection Aquatic Life | Yukon Contaminated Site Regulation O.I.C. 2002/171 | | | | | | | | | | | | | | | | |
| **Location** | | | | | PIT AREA | | | PIT AREA | | PIT AREA | | PIT AREA | | MILL AREA | | | MILL AREA | | |
| **Date Sampled** | | | | 19-Sep-13 | 19-Sep-13 | 19-Sep-13 | 30-Sep-13 | 30-Sep-13 | 30-Sep-13 | 30-Sep-13 | 30-Sep-13 | 30-Sep-13 | 19-Sep-13 | 19-Sep-13 | 19-Sep-13 | 19-Sep-13 | 19-Sep-13 | 19-Sep-13 |
| **ALS Sample ID** | | | | L1367036-54 | L1367036-55 | L1367036-56 | L1371904-17 | L1371904-36 | L1371904-18 | L1371904-37 | L1371904-19 | L1371904-38 | L1367036-27 | L1367036-28 | L1367036-29 | L1367036-33 | L1367036-34 | L1367036-35 |
| **Physical Tests** | | | | | | | | | | | | | | | | | | |
| Conductivity | uS/cm | | | - | - | - | 948 | - | 505 | - | 1820 | - | 1420 | - | - | 2390 | - | - |
| Hardness (as CaCO3) | mg/L | | | - | - | 731 | 690 | 725 | 310 | 314 | 1460 | 1530 | 1050 | - | 1090 | 2010 | - | 2080 |
| pH | pH | **6.5 to 9.0** | | - | - | - | 7.45 | - | 7.53 | - | **6.06** | - | 6.89 | - | - | 6.94 | - | - |
| **Anions and Nutrients** | | | | | | | | | | | | | | | | | | |
| Alkalinity, Bicarbonate (as CaCO3) | mg/L | | | - | - | - | 192 | - | 134 | - | 44.1 | - | 319 | - | - | 503 | - | - |
| Alkalinity, Carbonate (as CaCO3) | mg/L | | | - | - | - | <1.0 | - | <1.0 | - | <1.0 | - | <1.0 | - | - | <1.0 | - | - |
| Alkalinity, Hydroxide (as CaCO3) | mg/L | | | - | - | - | <1.0 | - | <1.0 | - | <1.0 | - | <1.0 | - | - | <1.0 | - | - |
| Alkalinity, Total (as CaCO3) | mg/L | | | - | - | - | 192 | - | 134 | - | 44.1 | - | 319 | - | - | 503 | - | - |
| Ammonia, Total (as N) | mg/L | | *18.4 if pH<7.0; 18.5 if pH 7.0-7.5; 11.3 if pH 7.5-* | - | - | - | 0.113 | - | 0.0240 | - | 0.0730 | - | <0.0050 | - | - | <0.0050 | - | - |
| Chloride (Cl) | mg/L | **120** | | - | - | - | <5.0 | - | 2.66 | - | <10 | - | <5.0 | - | - | <10 | - | - |
| Fluoride (F) | mg/L | **0.12** | *2 if H<50; 3 if H>50* | - | - | - | **<0.20** | - | 0.079 | - | **<0.40** | - | **0.20** | - | - | **<0.40** | - | - |
| Nitrate (as N) | mg/L | **2.94** | *0.004* | - | - | - | *0.311* | - | *0.163* | - | *2.72* | - | *0.200* | - | - | *0.11* | - | - |
| Nitrite (as N) | mg/L | **0.06** | *0.2 if Cl<2 mg/L; 0.4 if Cl 2-4 mg/L; 0.6 if Cl 4-6* | - | - | - | <0.010 | - | 0.0072 | - | 0.029 | - | <0.010 | - | - | <0.020 | - | - |
| Total Kjeldahl Nitrogen | mg/L | | | - | - | - | 1.52 | - | 0.856 | - | 0.548 | - | 0.333 | - | - | 0.283 | - | - |
| Sulphate (SO4) | mg/L | | *1000* | - | - | - | 491 | - | 169 | - | *1430* | - | 747 | - | - | *1580* | - | - |
| Sulphide as S | mg/L | | *0.019* | - | - | - | *14.1* | - | *6.29* | - | *30.9* | - | - | - | - | - | - | - |
| Anion Sum | meq/L | | | - | - | - | 14.5 | - | 6.60 | - | 30.1 | - | 21.9 | - | - | 43.0 | - | - |
| Cation Sum | meq/L | | | - | - | - | 1.6 | - | 2.4 | - | -1.2 | - | 21.6 | - | - | 40.8 | - | - |
| Cation - Anion Balance | % | | | - | - | - | | | | | | | -0.8 | - | - | -2.5 | - | - |
| **Cyanides** | | | | | | | | | | | | | | | | | | |
| Cyanide, Weak Acid Diss | mg/L | | *0.05* | - | <0.0050 | - | <0.0050 | - | <0.0050 | - | <0.0050 | - | <0.0050 | - | - | <0.0050 | - | - |
| Cyanide, Total | mg/L | | | - | <0.0050 | - | <0.0050 | - | <0.0050 | - | <0.0050 | - | <0.0050 | - | - | <0.0050 | - | - |
| Thiocyanate (SCN) | mg/L | | | <0.50 | <0.50 | - | <0.50 | - | <0.50 | - | <0.50 | - | <0.50 | <0.50 | - | <0.50 | <0.50 | - |
| Cyanide, Free | mg/L | **0.005** | | - | <0.0050 | - | <0.0050 | - | <0.0050 | - | <0.0050 | - | <0.0050 | - | - | <0.0050 | - | - |
| **Organic / Inorganic Carbon** | | | | | | | | | | | | | | | | | | |
| Total Inorganic Carbon | mg/L | | | - | - | - | 44.1 | - | 31.6 | - | 8.59 | - | 78.7 | - | - | 59.7 | - | - |
| Total Organic Carbon | mg/L | | | - | - | - | 26.3 | - | 14.1 | - | 7.53 | - | 6.08 | - | - | 5.7 | - | - |
| **Dissolved Metals** | | | | | | | | | | | | | | | | | | |
| Dissolved Mercury Filtration Location | - | | | - | - | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | - | FIELD | FIELD | - | FIELD |
| Dissolved Metals Filtration Location | - | | | - | - | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | - | FIELD | FIELD | - | FIELD |
| Aluminum (Al)-Dissolved | mg/L | **0.005 if pH<6.5; 0.1 if pH≥6.5** | | - | - | <0.0010 | 0.0085 | 0.0054 | 0.0079 | 0.0037 | **0.462** | **0.350** | 0.0013 | - | <0.0010 | 0.0022 | - | <0.0020 |
| Antimony (Sb)-Dissolved | mg/L | | *0.2* | - | - | <0.00010 | 0.00242 | 0.00224 | 0.00090 | 0.00094 | 0.00040 | 0.00043 | 0.0610 | - | 0.0591 | 0.00037 | - | 0.00040 |
| Arsenic (As)-Dissolved | mg/L | **0.005** | *0.05* | - | - | <0.00010 | 0.00272 | 0.00277 | 0.00109 | 0.00123 | 0.00073 | 0.00066 | **0.0106** | - | **0.0106** | **0.0225** | - | **0.0243** |
| Barium (Ba)-Dissolved | mg/L | | *10* | - | - | 0.00939 | 0.0476 | 0.0481 | 0.0341 | 0.0364 | 0.0175 | 0.0183 | 0.0127 | - | 0.0123 | 0.00781 | - | 0.00860 |
| Beryllium (Be)-Dissolved | mg/L | | *0.053* | - | - | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | 0.00022 | 0.00021 | <0.00010 | - | <0.00010 | <0.00020 | - | <0.00020 |
| Bismuth (Bi)-Dissolved | mg/L | | | - | - | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.0010 | <0.0010 | <0.00050 | - | <0.00050 | <0.0010 | - | <0.0010 |
| Boron (B)-Dissolved | mg/L | **1.5** | | - | - | <0.010 | 0.021 | 0.020 | <0.010 | 0.011 | <0.020 | <0.020 | 0.085 | - | 0.082 | 0.043 | - | 0.044 |
| Cadmium (Cd)-Dissolved | mg/L | **0.00004 to 0.00037 [H]** | *0.0001 if H<30; 0.0003 if H 30-90; 0.0005 If H 90-150; 0.0006 if H 150-210* | - | - | **0.00448** | **0.00108** | 0.000967 | 0.000580 | 0.000579 | **0.145** | **0.150** | **0.0194** | - | **0.0192** | <0.000020 | - | <0.000020 |
| Calcium (Ca)-Dissolved | mg/L | | | - | - | 220 | 164 | 167 | 71 | 66 | 428 | 444 | 249 | - | 249 | 365 | - | 378 |
| Chromium (Cr)-Dissolved | mg/L | | | - | - | <0.00010 | 0.00057 | 0.00054 | 0.00028 | 0.00025 | 0.00026 | 0.00025 | <0.00010 | - | <0.00010 | <0.00020 | - | <0.00020 |
| Cobalt (Co)-Dissolved | mg/L | | *0.009* | - | - | 0.00695 | 0.00348 | 0.00337 | 0.00133 | 0.00122 | 0.00719 | 0.00748 | 0.00013 | - | <0.00010 | <0.00020 | - | <0.00020 |
| Copper (Cu)-Dissolved | mg/L | **0.002 to 0.004 [H]** | *0.02 if H<50; 0.03 if H 50-75; 0.04 If H 75-100; 0.05 if H 100-125; 0.06 if H 125-150; 0.7 If H 150-175; 0.8 if H 175-200;0.9 if H>200* | - | - | <0.00020 | **0.0100** | **0.00800** | **0.0126** | **0.0111** | **0.420** | **0.434** | **0.00571** | - | **0.00413** | 0.00070 | - | 0.00095 |
| Iron (Fe)-Dissolved | mg/L | **0.3** | | - | - | **3.8** | 0.017 | <0.010 | <0.010 | <0.010 | **1.5** | **0.44** | <0.010 | - | <0.010 | <0.010 | - | <0.010 |
| Lead (Pb)-Dissolved | mg/L | **0.001 to 0.007 [H]** | *0.04 if H<50; 0.05 if H 50-100; 0.06 If H 100-200; 0.11 if H 200-300; 0.160 if H>300* | - | - | <0.000050 | 0.000281 | 0.000092 | 0.000086 | 0.000052 | **0.0110** | **0.00912** | 0.00623 | - | 0.00302 | <0.00010 | - | <0.00010 |
| Lithium (Li)-Dissolved | mg/L | | | - | - | 0.0158 | 0.00815 | 0.00859 | 0.00609 | 0.00661 | 0.0157 | 0.0164 | 0.00840 | - | 0.00808 | 0.0169 | - | 0.0171 |
| Magnesium (Mg)-Dissolved | mg/L | | | - | - | 44.2 | 68.2 | 74.6 | 32.1 | 36.3 | 94.8 | 103.0 | 105.0 | - | 113.0 | 267.0 | - | 276.0 |
| Manganese (Mn)-Dissolved | mg/L | | | - | - | 4.12 | 0.80 | 0.80 | 0.21 | 0.20 | 5.56 | 5.84 | 0.01 | - | 0.01 | 0.00 | - | 0.00 |
| Mercury (Hg)-Dissolved | mg/L | **0.000026** | *0.001* | - | - | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | - | <0.000010 | <0.000010 | - | <0.000010 |
| Molybdenum (Mo)-Dissolved | mg/L | **0.073** | *10* | - | - | <0.000050 | 0.00575 | 0.00528 | 0.0264 | 0.0258 | 0.00125 | 0.00144 | 0.000108 | - | 0.000163 | <0.00010 | - | <0.00010 |
| Nickel (Ni)-Dissolved | mg/L | **0.025 to 0.15 [H]** | *0.25 if H<60; 0.65 if H 60-120; 1.1 If H 120-180; 1.5 if H>180* | - | - | 0.0161 | 0.00848 | 0.00818 | 0.00337 | 0.00345 | 0.0080 | 0.0087 | 0.00279 | - | 0.00272 | <0.0010 | - | <0.0010 |
| Phosphorus (P)-Dissolved | mg/L | | | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | - | <0.050 | <0.050 | - | <0.050 |
| Potassium (K)-Dissolved | mg/L | | | - | - | 1.80 | 5.81 | 5.87 | 3.05 | 2.91 | 2.41 | 2.61 | 6.01 | - | 5.96 | 6.95 | - | 7.27 |
| Selenium (Se)-Dissolved | mg/L | **0.001** | *0.01* | - | - | <0.00010 | 0.00020 | 0.00022 | <0.00010 | <0.00010 | 0.00032 | 0.00028 | <0.00010 | - | 0.00011 | <0.00020 | - | <0.00020 |
| Silicon (Si)-Dissolved | mg/L | | | - | - | 2.85 | 5.58 | 5.77 | 5.53 | 5.67 | 4.74 | 4.87 | 5.21 | - | 5.29 | 4.75 | - | 4.97 |
| Silver (Ag)-Dissolved | mg/L | **0.0001** | *0.0005 if H<100; 0.015 if H>100* | - | - | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000020 | <0.000020 | 0.000026 | - | 0.000016 | <0.000020 | - | <0.000020 |
| Sodium (Na)-Dissolved | mg/L | | | - | - | 6.45 | 13.1 | 12.6 | 7.06 | 7.33 | 7.98 | 8.92 | 6.88 | - | 7.56 | 11.2 | - | 11.7 |
| Strontium (Sr)-Dissolved | mg/L | | | - | - | 0.223 | 0.524 | 0.473 | 0.391 | 0.399 | 0.438 | 0.450 | 0.509 | - | 0.466 | 1.12 | - | 1.14 |
| Sulphur (S)-Dissolved | mg/L | | | - | - | 224 | 169 | 164 | 60 | 53 | 472 | 468 | 241 | - | 227 | 493 | - | 484 |
| Thallium (Tl)-Dissolved | mg/L | **0.0008** | *0.003* | - | - | 0.000029 | 0.000022 | 0.00002 | 0.000015 | 0.000017 | 0.000225 | 0.000216 | 0.00025 | - | 0.000267 | 0.000157 | - | 0.000165 |
| Tin (Sn)-Dissolved | mg/L | | | - | - | <0.00010 | 0.0157 | 0.00720 | 0.00263 | 0.00204 | 0.00375 | 0.00323 | <0.00010 | - | <0.00010 | <0.00020 | - | <0.00020 |
| Titanium (Ti)-Dissolved | mg/L | | *1* | - | - | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.020 | <0.020 | <0.010 | - | <0.010 | <0.020 | - | <0.020 |
| Uranium (U)-Dissolved | mg/L | | *3* | - | - | 0.000013 | 0.00204 | 0.00185 | 0.000909 | 0.000751 | 0.000199 | 0.000202 | 0.00291 | - | 0.00284 | 0.00902 | - | 0.00910 |
| Vanadium (V)-Dissolved | mg/L | | | - | - | <0.0010 | <0.0010 | <0.0010 | <0.0010 | <0.0010 | <0.0020 | <0.0020 | <0.0010 | - | <0.0010 | <0.0020 | - | <0.0020 |
| Zinc (Zn)-Dissolved | mg/L | **0.03** | *0.075 if H<90; 0.15 if H 90-100; 0.9 If H 100-200; 1.65 if H 200-300; 2.4 if H 300 - 400* | - | - | ***6.19*** | **0.280** | **0.240** | **0.136** | **0.136** | ***6.62*** | ***6.84*** | ***2.49*** | - | ***2.69*** | 0.0021 | - | 0.0033 |

Note:
Bold font indicates CCME exceedances; italicized font indicates Yukon CSR exceedances
[H], Cd: The CWQG for cadmium is related to water hardness (as CaCO3)
When the water hardness is > 0 to < 17 mg/L, the CWQG is 0.04 µg/L; At hardness > 280 mg/L, the CWQG is 0.37 µg/L□
At hardness ≥ 17 to ≤ 280 mg/L, the CWQG is calculated using this equation: CWQG (µg/L) = 10{0.83(log[hardness]) – 2.46 }□
[H], Cu: The CWQG for copper is related to water hardness (as CaCO3):
When the water hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L; At hardness >180 mg/L, the CWQG is 4 µg/L
At hardness ≥82 to ≤180 mg/L the CWQG is calculated using this equation: CWQG (µg/L) = 0.2 * e{0.8545[ln(hardness)]-1.465}□
[H], Pb:The CWQG for lead is related to water hardness (as CaCO3):
When the hardness is 0 to ≤ 60 mg/L, the CWQG is 1 µg/L; At hardness >180 mg/L, the CWQG is 7 µg/L□
At hardness >60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L)= e{1.273[ln(hardness)]-4.705}□
[H], Ni:The CWQG for nickel is related to water hardness (as CaCO3):
When the water hardness is 0 to ≤ 60 mg/L, the CWQG is 25 µg/L; At hardness >180 mg/L, the CWQG is 150 µg/L□
At hardness > 60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L) = e{0.76[ln(hardness)]+1.06}□

**Table D3-1: Groundwater Analytical Results 2013**

| Sample ID | UNITS | Comparison Guidelines | | MW09-18 STANDARD PRESERVATION | MW09-18 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-18 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-19 STANDARD PRESERVATION | FIELP DUP D STANDARD PRESERVATION | MW09-19 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | FIELP DUP D ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-19 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | FIELP DUP D ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MW09-19 ALTERNATE PRESERVATION #3 (UNPRESERVED) | FIELP DUP D ALTERNATE PRESERVATION #3 (UNPRESERVED) | HA-01 | HA-01 (UNPRESERVED) | HA-02 | HA-02 (UNPRESERVED) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Water Quality Guideline For Protection Aquatic Life | Yukon Contaminated Site Regulation O.I.C. 2002/171 | | | | | | | | | | | | | | | |
| **Location** | | | | MILL AREA | | | MILL AREA | | | | | | | | MILL AREA | | MILL AREA | |
| **Date Sampled** | | | | 19-Sep-13 | 19-Sep-13 | 19-Sep-13 | 19-Sep-13 | 19-Sep-13 | 19-Sep-13 | 19-Sep-13 | 19-Sep-13 | 19-Sep-13 | 19-Sep-13 | 19-Sep-13 | 29-Sep-13 | 29-Sep-13 | 29-Sep-13 | 29-Sep-13 |
| **ALS Sample ID** | | | | L1367036-30 | L1367036-31 | L1367036-32 | L1367036-49 | L1367036-60 | L1367036-50 | L1367036-61 | L1367036-51 | L1367036-62 | L1367036-52 | L1367036-63 | L1371904-12 | L1371904-31 | L1371904-13 | L1371904-32 |
| **Physical Tests** | | | | | | | | | | | | | | | | | | |
| Conductivity | uS/cm | | | 1970 | - | - | 1650 | 1560 | - | - | - | - | - | - | 865 | - | 774 | - |
| Hardness (as CaCO3) | mg/L | | | 1890 | - | 1980 | 1410 | 1430 | - | - | - | - | 1460 | 1460 | 631 | 667 | 529 | 530 |
| pH | pH | **6.5 to 9.0** | | 7.01 | - | - | 6.84 | 6.83 | - | - | - | - | - | - | 7.22 | - | **6.41** | - |
| **Anions and Nutrients** | | | | | | | | | | | | | | | | | | |
| Alkalinity, Bicarbonate (as CaCO3) | mg/L | | | 402 | - | - | 493 | 491 | - | - | - | - | - | - | 223 | - | 128 | - |
| Alkalinity, Carbonate (as CaCO3) | mg/L | | | <1.0 | - | - | <1.0 | <1.0 | - | - | - | - | - | - | <1.0 | - | <1.0 | - |
| Alkalinity, Hydroxide (as CaCO3) | mg/L | | | <1.0 | - | - | <1.0 | <1.0 | - | - | - | - | - | - | <1.0 | - | <1.0 | - |
| Alkalinity, Total (as CaCO3) | mg/L | | | 402 | - | - | 493 | 491 | - | - | - | - | - | - | 223 | - | 128 | - |
| Ammonia, Total (as N) | mg/L | | *18.4 if pH<7.0; 18.5 if pH 7.0-7.5; 11.3 if pH 7.5-* | 0.02 | - | - | 2.76 | 3.03 | - | - | - | - | - | - | 0.468 | - | 1.25 | - |
| Chloride (Cl) | mg/L | **120** | | <10 | - | - | <5.0 | <5.0 | - | - | - | - | - | - | <5.0 | - | <5.0 | - |
| Fluoride (F) | mg/L | **0.12** | *2 if H<50; 3 if H>50* | **<0.40** | - | - | **<0.20** | **0.21** | - | - | - | - | - | - | **0.29** | - | **<0.20** | - |
| Nitrate (as N) | mg/L | **2.94** | *0.004* | *0.23* | - | - | *0.146* | *0.14* | - | - | - | - | - | - | *0.175* | - | *<0.050* | - |
| Nitrite (as N) | mg/L | **0.06** | *0.2 if Cl<2 mg/L; 0.4 if Cl 2-4 mg/L; 0.6 if Cl 4-6* | <0.020 | - | - | <0.010 | <0.010 | - | - | - | - | - | - | 0.021 | - | <0.010 | - |
| Total Kjeldahl Nitrogen | mg/L | | | 0.244 | - | - | 4.9 | 4.85 | - | - | - | - | - | - | 8.28 | - | 10.3 | - |
| Sulphate (SO4) | mg/L | | *1000* | *1180* | - | - | 794 | 797 | - | - | - | - | - | - | 383 | - | 365 | - |
| Sulphide as S | mg/L | | *0.019* | - | - | - | *0.18* | - | - | - | - | - | - | - | *12.5* | - | *10.1* | - |
| Anion Sum | meq/L | | | 32.7 | - | - | 26.400 | 26.4 | - | - | - | - | - | - | 13.2 | - | 13.9 | - |
| Cation Sum | meq/L | | | 38.4 | - | - | 30.0 | 30.5 | - | - | - | - | - | - | 2.8 | - | 15.8 | - |
| Cation - Anion Balance | % | | | 08.0 | - | - | 06.4 | 07.1 | - | - | - | - | - | - | | | | |
| **Cyanides** | | | | | | | | | | | | | | | | | | |
| Cyanide, Weak Acid Diss | mg/L | | *0.05* | <0.0050 | - | - | <0.0050 | <0.0050 | - | - | <0.0050 | <0.0050 | - | - | <0.0050 | - | <0.0050 | - |
| Cyanide, Total | mg/L | | | <0.0050 | - | - | <0.0050 | <0.0050 | - | - | <0.0050 | <0.0050 | - | - | <0.0050 | - | <0.0050 | - |
| Thiocyanate (SCN) | mg/L | | | <0.50 | <0.50 | - | 0.51 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | - | - | <0.50 | - | <0.50 | - |
| Cyanide, Free | mg/L | **0.005** | | <0.0050 | - | - | <0.0050 | <0.0050 | - | - | <0.0050 | <0.0050 | - | - | <0.0050 | - | <0.0050 | - |
| **Organic / Inorganic Carbon** | | | | | | | | | | | | | | | | | | |
| Total Inorganic Carbon | mg/L | | | 80.6 | - | - | 115 | 116 | - | - | - | - | - | - | 56.0 | - | 32.5 | - |
| Total Organic Carbon | mg/L | | | 05.8 | - | - | 035 | 038 | - | - | - | - | - | - | 145 | - | 93.9 | - |
| **Dissolved Metals** | | | | | | | | | | | | | | | | | | |
| Dissolved Mercury Filtration Location | - | | | FIELD | - | FIELD | FIELD | FIELD | - | - | - | - | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD |
| Dissolved Metals Filtration Location | - | | | FIELD | - | FIELD | FIELD | FIELD | - | - | - | - | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD |
| Aluminum (Al)-Dissolved | mg/L | **0.005 if pH<6.5; 0.1 if pH≥6.5** | | <0.0020 | - | <0.0020 | 0.0097 | 0.0105 | - | - | - | - | 0.0100 | 0.0074 | 0.0049 | 0.0047 | **0.0355** | <0.0010 |
| Antimony (Sb)-Dissolved | mg/L | | *0.2* | 0.00022 | - | 0.00021 | 0.0002 | 0.0002 | - | - | - | - | 0.00023 | 0.00022 | 0.00097 | 0.00134 | 0.00055 | 0.00011 |
| Arsenic (As)-Dissolved | mg/L | **0.005** | *0.05* | ***0.0613*** | - | ***0.0649*** | ***0.0994*** | ***0.0867*** | - | - | - | - | ***0.0955*** | ***0.0687*** | **0.0246** | **0.0214** | **0.0258** | 0.00125 |
| Barium (Ba)-Dissolved | mg/L | | *10* | 0.0089 | - | 0.00919 | 0.0518 | 0.0541 | - | - | - | - | 0.0530 | 0.0516 | 0.198 | 0.185 | 0.0651 | 0.0714 |
| Beryllium (Be)-Dissolved | mg/L | | *0.053* | <0.00020 | - | <0.00020 | <0.00010 | <0.00010 | - | - | - | - | <0.00020 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 |
| Bismuth (Bi)-Dissolved | mg/L | | | <0.0010 | - | <0.0010 | <0.00050 | <0.00050 | - | - | - | - | <0.0010 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 |
| Boron (B)-Dissolved | mg/L | **1.5** | | <0.020 | - | <0.020 | 0.324 | 0.344 | - | - | - | - | 0.364 | 0.346 | 0.155 | 0.180 | 0.284 | 0.113 |
| Cadmium (Cd)-Dissolved | mg/L | **0.00004 to 0.00037 [H]** | *0.0001 if H<30; 0.0003 if H 30-90; 0.0005 If H 90-150; 0.0006 if H 150-210* | 0.000055 | - | 0.000053 | <0.000010 | <0.000010 | - | - | - | - | <0.000020 | <0.000010 | <0.000010 | <0.000010 | 0.000022 | <0.000010 |
| Calcium (Ca)-Dissolved | mg/L | | | 366 | - | 374 | 306 | 309 | - | - | - | - | 325 | 308 | 163 | 166 | 129 | 119 |
| Chromium (Cr)-Dissolved | mg/L | | | <0.00020 | - | <0.00020 | 000 | 000 | - | - | - | - | 0.00032 | 0.00032 | 0.00019 | 0.00015 | 0.00014 | <0.00010 |
| Cobalt (Co)-Dissolved | mg/L | | *0.009* | <0.00020 | - | <0.00020 | 0.00206 | 0.00183 | - | - | - | - | 0.00204 | 0.00188 | 0.00060 | 0.00081 | 0.00753 | 0.00435 |
| Copper (Cu)-Dissolved | mg/L | **0.002 to 0.004 [H]** | *0.02 if H<50; 0.03 if H 50-75; 0.04 If H 75-100; 0.05 if H 100-125; 0.06 if H 125-150; 0.7 If H 150-175; 0.8 if H 175-200;0.9 if H>200* | 0.00041 | - | 0.00041 | <0.00020 | <0.00020 | - | - | - | - | <0.00040 | <0.00020 | 0.00105 | 0.00145 | 0.00261 | 0.00025 |
| Iron (Fe)-Dissolved | mg/L | **0.3** | | 0.038 | - | 0.025 | **14.1** | **14.7** | - | - | - | - | **14.4** | **11.3** | **3.8** | **2.9** | **47.2** | **5.3** |
| Lead (Pb)-Dissolved | mg/L | **0.001 to 0.007 [H]** | *0.04 if H<50; 0.05 if H 50-100; 0.06 If H 100-200; 0.11 if H 200-300; 0.160 if H>300* | <0.00010 | - | <0.00010 | <0.000050 | 0.000052 | - | - | - | - | <0.00010 | <0.000050 | 0.000098 | 0.000141 | 0.000219 | <0.000050 |
| Lithium (Li)-Dissolved | mg/L | | | 0.016 | - | 0.0164 | 0.00944 | 0.010100 | - | - | - | - | 0.0094 | 0.0104 | 0.00652 | 0.00644 | <0.00050 | <0.00050 |
| Magnesium (Mg)-Dissolved | mg/L | | | 237.0 | - | 254.0 | 157.0 | 161.0 | - | - | - | - | 159.0 | 167.0 | 54.1 | 61.3 | 50.1 | 56.2 |
| Manganese (Mn)-Dissolved | mg/L | | | 0.48 | - | 0.52 | 2.97 | 2.87 | - | - | - | - | 2.99 | 3.01 | 0.46 | 0.49 | 9.87 | 9.46 |
| Mercury (Hg)-Dissolved | mg/L | **0.000026** | *0.001* | <0.000010 | - | <0.000010 | <0.000010 | <0.000010 | - | - | - | - | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| Molybdenum (Mo)-Dissolved | mg/L | **0.073** | *10* | <0.00010 | - | <0.00010 | 0.000127 | 0.000123 | - | - | - | - | 0.00014 | 0.000141 | 0.00235 | 0.00311 | 0.00251 | 0.000429 |
| Nickel (Ni)-Dissolved | mg/L | **0.025 to 0.15 [H]** | *0.25 if H<60; 0.65 if H 60-120; 1.1 If H 120-180; 1.5 if H>180* | <0.0010 | - | 0.0011 | 0.001450 | 0.001410 | - | - | - | - | 0.0021 | 0.00140 | 0.00460 | 0.00498 | 0.0278 | 0.0174 |
| Phosphorus (P)-Dissolved | mg/L | | | <0.050 | - | <0.050 | 0.22800 | 0.25300 | - | - | - | - | 0.26 | 0.183 | <0.050 | <0.050 | <0.050 | <0.050 |
| Potassium (K)-Dissolved | mg/L | | | 6.86 | - | 6.94 | 6.690 | 6.840 | - | - | - | - | 6.41 | 7.09 | 4.03 | 4.26 | 3.92 | 3.65 |
| Selenium (Se)-Dissolved | mg/L | **0.001** | *0.01* | 0.00033 | - | 0.00026 | 0.00034 | 0.00031 | - | - | - | - | <0.00020 | 0.00022 | <0.00010 | <0.00010 | <0.00010 | <0.00010 |
| Silicon (Si)-Dissolved | mg/L | | | 4.76000 | - | 4.84 | 8.60000 | 8.51000 | - | - | - | - | 8.56 | 8.53 | 6.06 | 6.35 | 7.24 | 5.97 |
| Silver (Ag)-Dissolved | mg/L | **0.0001** | *0.0005 if H<100; 0.015 if H>100* | <0.000020 | - | <0.000020 | <0.000010 | <0.000010 | - | - | - | - | <0.000020 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| Sodium (Na)-Dissolved | mg/L | | | 10.4 | - | 10.8 | 12.8 | 12.4 | - | - | - | - | 12.9 | 13.0 | 5.38 | 5.83 | 6.47 | 5.99 |
| Strontium (Sr)-Dissolved | mg/L | | | 01.1 | - | 1.08 | 00.9 | 00.9 | - | - | - | - | 0.935 | 0.914 | 0.387 | 0.409 | 0.404 | 0.420 |
| Sulphur (S)-Dissolved | mg/L | | | 458 | - | 455 | 294 | 310 | - | - | - | - | 312 | 300 | 131 | 126 | 126 | 119 |
| Thallium (Tl)-Dissolved | mg/L | **0.0008** | *0.003* | 0.000265 | - | 0.000262 | <0.000010 | <0.000010 | - | - | - | - | <0.000020 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| Tin (Sn)-Dissolved | mg/L | | | <0.00020 | - | <0.00020 | <0.00010 | <0.00010 | - | - | - | - | <0.00020 | <0.00010 | <0.00010 | <0.00010 | 0.00011 | <0.00010 |
| Titanium (Ti)-Dissolved | mg/L | | *1* | <0.020 | - | <0.020 | <0.010 | <0.010 | - | - | - | - | <0.020 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 |
| Uranium (U)-Dissolved | mg/L | | *3* | 0.00853 | - | 0.00882 | 0.000976 | 0.00087 | - | - | - | - | 0.000999 | 0.000872 | 0.000575 | 0.000910 | 0.000498 | 0.000094 |
| Vanadium (V)-Dissolved | mg/L | | | <0.0020 | - | <0.0020 | 0.001000 | <0.0010 | - | - | - | - | <0.0020 | <0.0010 | 0.0016 | 0.0012 | 0.0010 | <0.0010 |
| Zinc (Zn)-Dissolved | mg/L | **0.03** | *0.075 if H<90; 0.15 if H 90-100; 0.9 If H 100-200; 1.65 if H 200-300; 2.4 if H 300 - 400* | 0.0057 | - | 0.0041 | 0.0023 | 0.0027 | - | - | - | - | <0.0020 | 0.0015 | 0.0064 | 0.0082 | **0.0491** | 0.0134 |

Note:

Bold font indicates CCME exceedances; italicized font indicates Yukon CSR exceedances

[H], Cd: The CWQG for cadmium is related to water hardness (as CaCO3)

When the water hardness is > 0 to < 17 mg/L, the CWQG is 0.04 µg/L; At hardness > 280 mg/L, the CWQG is 0.37 µg/L

At hardness ≥ 17 to ≤ 280 mg/L, the CWQG is calculated using this equation: CWQG (µg/L) = 10{0.83(log[hardness]) – 2.46 }

[H], Cu: The CWQG for copper is related to water hardness (as CaCO3):

When the water hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L; At hardness >180 mg/L, the CWQG is 4 µg/L

At hardness ≥82 to ≤180 mg/L the CWQG is calculated using this equation: CWQG (µg/L) = 0.2 * e{0.8545[ln(hardness)]-1.465}

[H], Pb:The CWQG for lead is related to water hardness (as CaCO3):

When the hardness is 0 to ≤ 60 mg/L, the CWQG is 1 µg/L; At hardness >180 mg/L, the CWQG is 7 µg/L

At hardness >60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L)= e{1.273[ln(hardness)]-4.705}

[H], Ni:The CWQG for nickel is related to water hardness (as CaCO3):

When the water hardness is 0 to ≤ 60 mg/L, the CWQG is 25 µg/L; At hardness >180 mg/L, the CWQG is 150 µg/L

At hardness > 60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L) = e{0.76[ln(hardness)]+1.06}

## Table D3-1: Groundwater Analytical Results 2013

| Sample ID | UNITS | Comparison Guidelines | | HA-03 | HA-03 (UNPRESERVED) | HA-04 | HA-04 (UNPRESERVED) | HA-05 | DUP_02 | HA-05 (UNPRESERVED) | DUP_02 (UNPRESERVED) | MP09-04 Standard Preservation | MP09-04 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MP09-04 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MP09-05 ALTERNATE PRESERVATION #3 (UNPRESERVED) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Water Quality Guideline For Protection Aquatic Life | Yukon Contaminated Site Regulation O.I.C. 2002/171 | | | | | | | | | | | | |
| **Location** | | | | MILL AREA | | MILL AREA | | MILL AREA | | | | SEEPAGE POND AREA | | | SEEPAGE POND |
| **Date Sampled** | | | | 29-Sep-13 | 29-Sep-13 | 29-Sep-13 | 29-Sep-13 | 29-Sep-13 | 29-Sep-13 | 29-Sep-13 | 29-Sep-13 | 18-Sep-13 | 18-Sep-13 | 18-Sep-13 | 18-Sep-13 |
| **ALS Sample ID** | | | | L1371904-14 | L1371904-33 | L1371904-15 | L1371904-34 | L1371904-16 | L1371904-21 | L1371904-35 | L1371904-40 | L1367036-20 | L1367036-21 | L1367036-23 | L1367036-19 |
| **Physical Tests** | | | | | | | | | | | | | | | |
| Conductivity | uS/cm | | | 761 | - | 238 | - | 803 | 795 | - | - | 1500 | - | - | - |
| Hardness (as CaCO3) | mg/L | | | 530 | 536 | 122 | 104 | 558 | 561 | 570 | 573 | 1160 | - | 1140 | 1340 |
| pH | pH | **6.5 to 9.0** | | 6.59 | - | **6.05** | - | 6.87 | 6.82 | - | - | 7.19 | - | - | - |
| **Anions and Nutrients** | | | | | | | | | | | | | | | |
| Alkalinity, Bicarbonate (as CaCO3) | mg/L | | | 135 | - | 25.6 | - | 192 | 197 | - | - | 341 | - | - | - |
| Alkalinity, Carbonate (as CaCO3) | mg/L | | | <1.0 | - | <1.0 | - | <1.0 | <1.0 | - | - | <1.0 | - | - | - |
| Alkalinity, Hydroxide (as CaCO3) | mg/L | | | <1.0 | - | <1.0 | - | <1.0 | <1.0 | - | - | <1.0 | - | - | - |
| Alkalinity, Total (as CaCO3) | mg/L | | | 135 | - | 25.6 | - | 192 | 197 | - | - | 341 | - | - | - |
| Ammonia, Total (as N) | mg/L | | *18.4 if pH<7.0; 18.5 if pH 7.0-7.5; 11.3 if pH 7.5-* | 0.92 | - | 3.31 | - | 0.81 | 0.78 | - | - | 0.01 | - | - | - |
| Chloride (Cl) | mg/L | **120** | | <5.0 | - | <0.50 | - | <5.0 | <5.0 | - | - | <5.0 | - | - | - |
| Fluoride (F) | mg/L | **0.12** | *2 if H<50; 3 if H>50* | **<0.20** | - | 0.042 | - | **<0.20** | **<0.20** | - | - | **<0.20** | - | - | - |
| Nitrate (as N) | mg/L | **2.94** | *0.004* | *<0.050* | - | *0.0276* | - | *<0.050* | *<0.050* | - | - | *0.166* | - | - | - |
| Nitrite (as N) | mg/L | **0.06** | *0.2 if Cl<2 mg/L; 0.4 if Cl 2-4 mg/L; 0.6 if Cl 4-6* | <0.010 | - | 0.0014 | - | <0.010 | <0.010 | - | - | <0.010 | - | - | - |
| Total Kjeldahl Nitrogen | mg/L | | | 13.1 | - | 16.7 | - | 1.73 | 1.99 | - | - | 0.373 | - | - | - |
| Sulphate (SO4) | mg/L | | *1000* | 384 | - | 86 | - | 365 | 359 | - | - | 783 | - | - | - |
| Sulphide as S | mg/L | | *0.019* | *10.7* | - | *2.30* | - | *11.4* | *11.4* | - | - | - | - | - | - |
| Anion Sum | meq/L | | | 12.9 | - | 3.98 | - | 13.1 | 13.0 | - | - | 23.1 | - | - | - |
| Cation Sum | meq/L | | | 9.4 | - | 26.9 | - | 6.6 | 6.5 | - | - | 23.6 | - | - | - |
| Cation - Anion Balance | % | | | | | | | | | | | 01.1 | - | - | - |
| **Cyanides** | | | | | | | | | | | | <0.0050 | | | |
| Cyanide, Weak Acid Diss | mg/L | | *0.05* | <0.0050 | - | <0.0050 | - | <0.0050 | <0.0050 | - | - | 0.0109 | - | - | - |
| Cyanide, Total | mg/L | | | <0.0050 | - | <0.0050 | - | <0.0050 | <0.0050 | - | - | <0.50 | - | - | - |
| Thiocyanate (SCN) | mg/L | | | <0.50 | - | 0.61 | - | <0.50 | <0.50 | - | - | <0.0050 | <0.50 | - | - |
| Cyanide, Free | mg/L | **0.005** | | <0.0050 | - | <0.0050 | - | <0.0050 | <0.0050 | - | - | | - | - | - |
| **Organic / Inorganic Carbon** | | | | | | | | | | | | | | | |
| Total Inorganic Carbon | mg/L | | | 29.4 | - | 5.41 | - | 44.4 | 45.3 | - | - | 78.2 | - | - | - |
| Total Organic Carbon | mg/L | | | 396 | - | 124 | - | 71.5 | 16.2 | - | - | 02.2 | - | - | - |
| **Dissolved Metals** | | | | | | | | | | | | | | | |
| Dissolved Mercury Filtration Location | - | | | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | - | FIELD | FIELD |
| Dissolved Metals Filtration Location | - | | | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | - | FIELD | FIELD |
| Aluminum (Al)-Dissolved | mg/L | **0.005 if pH<6.5; 0.1 if pH≥6.5** | | 0.0132 | <0.0010 | **0.0592** | 0.0413 | 0.0159 | 0.0142 | 0.0049 | 0.0095 | 0.0023 | - | <0.0010 | 0.0286 |
| Antimony (Sb)-Dissolved | mg/L | | *0.2* | 0.00105 | 0.00037 | 0.00067 | 0.00052 | 0.00068 | 0.00084 | 0.00076 | 0.00067 | 0.0018 | - | 0.00184 | 0.00052 |
| Arsenic (As)-Dissolved | mg/L | **0.005** | *0.05* | **0.0134** | 0.00156 | **0.0109** | **0.00767** | ***0.0905*** | ***0.0876*** | **0.0367** | ***0.0603*** | 0.00144 | - | 0.00144 | ***0.0728*** |
| Barium (Ba)-Dissolved | mg/L | | *10* | 0.0790 | 0.0696 | 0.106 | 0.0982 | 0.161 | 0.162 | 0.142 | 0.143 | 0.09220 | - | 0.0954 | 0.110 |
| Beryllium (Be)-Dissolved | mg/L | | *0.053* | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00020 | - | <0.00010 | <0.00020 |
| Bismuth (Bi)-Dissolved | mg/L | | | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.0010 | - | <0.00050 | <0.0010 |
| Boron (B)-Dissolved | mg/L | **1.5** | | 0.722 | 0.337 | 0.159 | 0.100 | 0.053 | 0.039 | 0.057 | 0.067 | <0.020 | - | 0.016 | 0.095 |
| Cadmium (Cd)-Dissolved | mg/L | **0.00004 to 0.00037 [H]** | *0.0001 if H<30; 0.0003 if H 30-90; 0.0005 if H 90-150; 0.0006 if H 150-210* | 0.000296 | 0.000020 | <0.000010 | 0.000010 | 0.000021 | 0.000013 | 0.000028 | 0.000027 | 0.000104 | - | 0.000114 | 0.000315 |
| Calcium (Ca)-Dissolved | mg/L | | | 135 | 129 | 36 | 31 | 148 | 148 | 143 | 144 | 310 | - | 295 | 451 |
| Chromium (Cr)-Dissolved | mg/L | | | 0.00084 | <0.00010 | 0.00091 | 0.00081 | 0.00021 | <0.00010 | <0.00010 | <0.00010 | 0.00050 | - | 0.00048 | 0.00060 |
| Cobalt (Co)-Dissolved | mg/L | | *0.009* | 0.00776 | 0.00387 | 0.00099 | 0.00063 | 0.00133 | 0.00138 | 0.00143 | 0.00155 | 0.00028 | - | 0.00036 | *0.0154* |
| Copper (Cu)-Dissolved | mg/L | **0.002 to 0.004 [H]** | *0.02 if H<50; 0.03 if H 50-75; 0.04 if H 75-100; 0.05 if H 100-125; 0.06 if H 125-150; 0.7 If H 150-175; 0.8 if H 175-200;0.9 if H>200* | **0.0529** | 0.00206 | 0.00113 | 0.00036 | 0.00044 | 0.00028 | 0.00025 | 0.00060 | 0.00298 | - | 0.00320 | 0.00150 |
| Iron (Fe)-Dissolved | mg/L | **0.3** | | **27.2** | **2.4** | **20.0** | **17.5** | **26.1** | **24.1** | **4.7** | **1.5** | <0.010 | - | <0.010 | **53.4** |
| Lead (Pb)-Dissolved | mg/L | **0.001 to 0.007 [H]** | *0.04 if H<50; 0.05 if H 50-100; 0.06 If H 100-200; 0.11 if H 200-300; 0.160 if H>300* | 0.00148 | <0.000050 | 0.000122 | <0.000050 | 0.000130 | 0.000123 | <0.000050 | 0.000092 | <0.00010 | - | <0.000050 | 0.00013 |
| Lithium (Li)-Dissolved | mg/L | | | 0.00066 | 0.00095 | 0.00158 | 0.00100 | 0.00136 | 0.00099 | 0.00096 | 0.00077 | <0.0010 | - | <0.00050 | <0.0010 |
| Magnesium (Mg)-Dissolved | mg/L | | | 46.6 | 52.1 | 7.5 | 6.4 | 46.0 | 46.4 | 51.9 | 51.6 | 93.6 | - | 99.0 | 52.6 |
| Manganese (Mn)-Dissolved | mg/L | | | 8.50 | 6.62 | 1.72 | 1.58 | 4.18 | 4.06 | 4.36 | 4.46 | 0.0023 | - | 0.0024 | 12.10 |
| Mercury (Hg)-Dissolved | mg/L | **0.000026** | *0.001* | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | - | <0.000010 | <0.000010 |
| Molybdenum (Mo)-Dissolved | mg/L | **0.073** | *10* | 0.00475 | 0.00177 | 0.00119 | 0.000710 | 0.000929 | 0.000808 | 0.000755 | 0.000840 | 0.00034 | - | 0.000358 | 0.00073 |
| Nickel (Ni)-Dissolved | mg/L | **0.025 to 0.15 [H]** | *0.25 if H<60; 0.65 if H 60-120; 1.1 If H 120-180; 1.5 if H>180* | 0.0378 | 0.0124 | 0.00907 | 0.00656 | 0.00819 | 0.00854 | 0.00769 | 0.00823 | <0.0010 | - | 0.00059 | 0.0052 |
| Phosphorus (P)-Dissolved | mg/L | | | <0.050 | <0.050 | 0.179 | 0.223 | 0.071 | <0.050 | <0.050 | <0.050 | <0.050 | - | <0.050 | <0.25 |
| Potassium (K)-Dissolved | mg/L | | | 3.63 | 2.78 | 0.36 | 0.30 | 2.13 | 2.11 | 2.09 | 2.14 | 2.65 | - | 2.60 | 8.40 |
| Selenium (Se)-Dissolved | mg/L | **0.001** | *0.01* | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | 0.00031 | - | 0.00023 | 0.00034 |
| Silicon (Si)-Dissolved | mg/L | | | 7.61 | 6.68 | 11.4 | 11.7 | 7.52 | 7.53 | 6.81 | 6.60 | 5.08000 | - | 5.02 | 6.30 |
| Silver (Ag)-Dissolved | mg/L | **0.0001** | *0.0005 if H<100; 0.015 if H>100* | 0.000055 | <0.000010 | <0.000010 | <0.000010 | 0.000012 | <0.000010 | <0.000010 | <0.000010 | <0.000020 | - | <0.000010 | 0.000023 |
| Sodium (Na)-Dissolved | mg/L | | | 8.74 | 6.29 | 3.54 | 3.33 | 5.57 | 5.59 | 5.66 | 5.79 | 8.9 | - | 9.11 | 78.0 |
| Strontium (Sr)-Dissolved | mg/L | | | 0.408 | 0.375 | 0.121 | 0.115 | 0.381 | 0.363 | 0.383 | 0.369 | 0.97 | - | 0.979 | 1.14 |
| Sulphur (S)-Dissolved | mg/L | | | 129 | 117 | 35 | 28 | 123 | 123 | 113 | 111 | 260 | - | 240 | 426 |
| Thallium (Tl)-Dissolved | mg/L | **0.0008** | *0.003* | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000020 | - | <0.000010 | 0.000037 |
| Tin (Sn)-Dissolved | mg/L | | | 0.00017 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00020 | - | <0.00010 | <0.00020 |
| Titanium (Ti)-Dissolved | mg/L | | *1* | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.020 | - | <0.010 | <0.020 |
| Uranium (U)-Dissolved | mg/L | | *3* | 0.000437 | 0.000404 | 0.000042 | 0.000032 | 0.000164 | 0.000192 | 0.000205 | 0.000172 | 0.0131 | - | 0.0128 | 0.00126 |
| Vanadium (V)-Dissolved | mg/L | | | <0.0010 | <0.0010 | 0.0015 | <0.0010 | <0.0010 | 0.0011 | <0.0010 | <0.0010 | <0.0020 | - | <0.0010 | <0.0020 |
| Zinc (Zn)-Dissolved | mg/L | **0.03** | *0.075 if H<90; 0.15 if H 90-100; 0.9 If H 100-200; 1.65 if H 200-300; 2.4 if H 300 - 400* | **0.165** | 0.0209 | 0.0070 | 0.0035 | **0.0594** | **0.0728** | **0.0549** | **0.0624** | 0.006 | - | 0.0073 | 0.0151 |

Note:
Bold font indicates CCME exceedances; italicized font indicates Yukon CSR exceedances
[H], Cd: The CWQG for cadmium is related to water hardness (as CaCO3)
When the water hardness is > 0 to < 17 mg/L, the CWQG is 0.04 µg/L; At hardness > 280 mg/L, the CWQG is 0.37 µg/L
At hardness ≥ 17 to ≤ 280 mg/L, the CWQG is calculated using this equation: CWQG (µg/L) = 10{0.83(log[hardness]) – 2.46 }
[H], Cu: The CWQG for copper is related to water hardness (as CaCO3):
When the water hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L; At hardness >180 mg/L, the CWQG is 4 µg/L
At hardness ≥82 to ≤180 mg/L the CWQG is calculated using this equation: CWQG (µg/L) = 0.2 * e{0.8545[ln(hardness)]-1.465}
[H], Pb:The CWQG for lead is related to water hardness (as CaCO3):
When the hardness is 0 to ≤ 60 mg/L, the CWQG is 1 µg/L; At hardness >180 mg/L, the CWQG is 7 µg/L
At hardness >60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L)= e{1.273[ln(hardness)]-4.705}
[H], Ni:The CWQG for nickel is related to water hardness (as CaCO3):
When the water hardness is 0 to ≤ 60 mg/L, the CWQG is 25 µg/L; At hardness >180 mg/L, the CWQG is 150 µg/L
At hardness > 60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L) = e{0.76[ln(hardness)]+1.06}

**Table D3-1: Groundwater Analytical Results 2013**

| Sample ID | UNITS | Comparison Guidelines | | MW09-08 STANDARD PRESERVATION | FIELD DUP C STANDARD PRESERVATION | MW09-08 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | FIELD DUP C ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-08 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | FIELD DUP C ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MW09-08 ALTERNATE PRESERVATION #3 (UNPRESERVED) | FIELD DUP C ALTERNATE PRESERVATIO N #3 (UNPRESERVE | MW09-21 STANDARD PRESERVATION | MW09-21 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-21 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-22 STANDARD PRESERVATION | MW09-22 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-22 ALTERNATE PRESERVATION #3 (UNPRESERVED) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Water Quality Guideline For Protection Aquatic Life | Yukon Contaminated Site Regulation O.I.C. 2002/171 | | | | | | | | | | | | | | |
| **Location** | | | | SEEPAGE POND AREA | | | | | | | | SEEPAGE POND AREA | | | SEEPAGE POND AREA | | |
| **Date Sampled** | | | | 18-Sep-13 | 18-Sep-13 | 18-Sep-13 | 18-Sep-13 | 18-Sep-13 | 18-Sep-13 | 18-Sep-13 | 18-Sep-13 | 19-Sep-13 | 19-Sep-13 | 19-Sep-13 | 18-Sep-13 | 18-Sep-13 | 18-Sep-13 |
| **ALS Sample ID** | | | | L1367036-1 | L1367036-12 | L1367036-2 | L1367036-13 | L1367036-3 | L1367036-14 | L1367036-4 | L1367036-15 | L1367036-46 | L1367036-47 | L1367036-48 | L1367036-24 | L1367036-25 | L1367036-26 |
| **Physical Tests** | | | | | | | | | | | | | | | | | |
| Conductivity | uS/cm | | | 193 | 194 | - | - | - | - | - | - | 1240 | - | - | 1030 | - | - |
| Hardness (as CaCO3) | mg/L | | | 95.0 | 89.2 | - | - | - | - | 81.1 | 87.5 | 786 | - | 832 | 637 | - | 650 |
| pH | pH | **6.5 to 9.0** | | 6.51 | **6.49** | - | - | - | - | - | - | 6.52 | - | - | **6.05** | - | - |
| **Anions and Nutrients** | | | | | | | | | | | | | | | | | |
| Alkalinity, Bicarbonate (as CaCO3) | mg/L | | | 113 | 112 | - | - | - | - | - | - | 319 | - | - | 61.4 | - | - |
| Alkalinity, Carbonate (as CaCO3) | mg/L | | | <1.0 | <1.0 | - | - | - | - | - | - | <1.0 | - | - | <1.0 | - | - |
| Alkalinity, Hydroxide (as CaCO3) | mg/L | | | <1.0 | <1.0 | - | - | - | - | - | - | <1.0 | - | - | <1.0 | - | - |
| Alkalinity, Total (as CaCO3) | mg/L | | | 113 | 112 | - | - | - | - | - | - | 319 | - | - | 61.4 | - | - |
| Ammonia, Total (as N) | mg/L | | *18.4 if pH<7.0; 18.5 if pH 7.0-7.5; 11.3 if pH 7.5-* | 1.97 | 2.02 | - | - | - | - | - | - | 12.40 | - | - | 1.34 | - | - |
| Chloride (Cl) | mg/L | **120** | | <0.50 | <0.50 | - | - | - | - | - | - | <5.0 | - | - | <5.0 | - | - |
| Fluoride (F) | mg/L | **0.12** | *2 if H<50; 3 if H>50* | **0.170** | **0.181** | - | - | - | - | - | - | **<0.20** | - | - | **<0.20** | - | - |
| Nitrate (as N) | mg/L | **2.94** | *0.004* | *0.0138* | *<0.0050* | - | - | - | - | - | - | *<0.050* | - | - | ***3.67*** | - | - |
| Nitrite (as N) | mg/L | **0.06** | *0.2 if Cl<2 mg/L; 0.4 if Cl 2-4 mg/L; 0.6 if Cl 4-6* | 0.0028 | 0.0011 | - | - | - | - | - | - | <0.010 | - | - | ***0.601*** | - | - |
| Total Kjeldahl Nitrogen | mg/L | | | 3.05 | 2.83 | - | - | - | - | - | - | 16.3 | - | - | 4.01 | - | - |
| Sulphate (SO4) | mg/L | | *1000* | <0.50 | <0.50 | - | - | - | - | - | - | 538 | - | - | 569 | - | - |
| Sulphide as S | mg/L | | *0.019* | *0.074* | *0.069* | - | - | - | - | - | - | - | - | - | - | - | - |
| Anion Sum | meq/L | | | 2.28 | 2.24 | - | - | - | - | - | - | 17.6 | - | - | 13.4 | - | - |
| Cation Sum | meq/L | | | 4.16 | 4.05 | - | - | - | - | - | - | 20.3 | - | - | 17.6 | - | - |
| Cation - Anion Balance | % | | | 29.2 | 28.7 | - | - | - | - | - | - | 07.2 | - | - | 13.7 | - | - |
| **Cyanides** | | | | | | | | | | | | | | | | | |
| Cyanide, Weak Acid Diss | mg/L | | *0.05* | <0.0050 | <0.0050 | - | - | <0.0050 | <0.0050 | - | - | <0.0050 | - | - | 0.0529 | - | - |
| Cyanide, Total | mg/L | | | <0.0050 | <0.0050 | - | - | <0.0050 | <0.0050 | - | - | 0.008 | - | - | 0.178 | - | - |
| Thiocyanate (SCN) | mg/L | | | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | - | - | 1.1100 | 0.70 | - | 0.57 | <0.50 | - |
| Cyanide, Free | mg/L | **0.005** | | <0.0050 | <0.0050 | - | - | <0.0050 | <0.0050 | - | - | <0.0050 | - | - | **0.0496** | - | - |
| **Organic / Inorganic Carbon** | | | | | | | | | | | | | | | | | |
| Total Inorganic Carbon | mg/L | | | 24.1 | 23.6 | - | - | - | - | - | - | 78.8 | - | - | 8.5 | - | - |
| Total Organic Carbon | mg/L | | | 24.5 | 28.4 | - | - | - | - | - | - | 90.9 | - | - | 28.0 | - | - |
| **Dissolved Metals** | | | | | | | | | | | | | | | | | |
| Dissolved Mercury Filtration Location | - | | | FIELD | FIELD | - | - | - | - | FIELD | FIELD | FIELD | - | FIELD | FIELD | - | FIELD |
| Dissolved Metals Filtration Location | - | | | FIELD | FIELD | - | - | - | - | FIELD | FIELD | FIELD | - | FIELD | FIELD | - | FIELD |
| Aluminum (Al)-Dissolved | mg/L | **0.005 if pH<6.5; 0.1 if pH≥6.5** | | 0.0938 | **0.0904** | - | - | - | - | 0.0900 | 0.0923 | **0.128** | - | 0.0877 | 0.0421 | - | 0.0235 |
| Antimony (Sb)-Dissolved | mg/L | | *0.2* | 0.00026 | 0.00026 | - | - | - | - | 0.00028 | 0.00026 | 0.00018 | - | 0.00019 | 0.00017 | - | 0.00012 |
| Arsenic (As)-Dissolved | mg/L | **0.005** | *0.05* | ***0.377*** | ***0.362*** | - | - | - | - | ***0.369*** | ***0.386*** | ***0.104*** | - | ***0.0837*** | **0.00727** | - | 0.00393 |
| Barium (Ba)-Dissolved | mg/L | | *10* | 0.107 | 0.107 | - | - | - | - | 0.106 | 0.109 | 0.166 | - | 0.148 | 0.132 | - | 0.126 |
| Beryllium (Be)-Dissolved | mg/L | | *0.053* | <0.00010 | <0.00010 | - | - | - | - | <0.00010 | <0.00010 | <0.00010 | - | <0.00010 | <0.00010 | - | <0.00010 |
| Bismuth (Bi)-Dissolved | mg/L | | | <0.00050 | <0.00050 | - | - | - | - | <0.00050 | <0.00050 | <0.00050 | - | <0.00050 | <0.00050 | - | <0.00050 |
| Boron (B)-Dissolved | mg/L | **1.5** | | <0.010 | <0.010 | - | - | - | - | <0.010 | <0.010 | 0.022 | - | 0.022 | 0.020 | - | 0.019 |
| Cadmium (Cd)-Dissolved | mg/L | **0.00004 to 0.00037 [H]** | *0.0001 if H<30; 0.0003 if H 30-90; 0.0005 If H 90-150; 0.0006 if H 150-210* | <0.000010 | <0.000010 | - | - | - | - | <0.000010 | 0.000016 | 0.000048 | - | 0.000057 | 0.000034 | - | 0.000023 |
| Calcium (Ca)-Dissolved | mg/L | | | 29 | 27 | - | - | - | - | 24 | 26 | 251 | - | 270 | 208 | - | 215 |
| Chromium (Cr)-Dissolved | mg/L | | | 0.00119 | 0.00121 | - | - | - | - | 0.00114 | 0.00122 | 000 | - | 0.00157 | 0.00063 | - | 0.00036 |
| Cobalt (Co)-Dissolved | mg/L | | *0.009* | 0.00090 | 0.00089 | - | - | - | - | 0.00096 | 0.00096 | *0.01350* | - | *0.0135* | *0.0117* | - | *0.0102* |
| Copper (Cu)-Dissolved | mg/L | **0.002 to 0.004 [H]** | *0.02 if H<50; 0.03 if H 50-75; 0.04 If H 75-100; 0.05 if H 100-125; 0.06 if H 125-150; 0.7 If H 150-175; 0.8 if H 175-200;0.9 if H>200* | 0.00021 | 0.00020 | - | - | - | - | <0.00020 | <0.00020 | 0.0004 | - | 0.00043 | 0.00151 | - | 0.00107 |
| Iron (Fe)-Dissolved | mg/L | **0.3** | | **35.9** | **36.1** | - | - | - | - | **38.4** | **33.7** | **52.1** | - | **50.9** | **51.3** | - | **42.8** |
| Lead (Pb)-Dissolved | mg/L | **0.001 to 0.007 [H]** | *0.04 if H<50; 0.05 if H 50-100; 0.06 If H 100-200; 0.11 if H 200-300; 0.160 if H>300* | 0.000155 | 0.00102 | - | - | - | - | 0.000109 | 0.000126 | 0.000071 | - | 0.000120 | 0.000428 | - | 0.000089 |
| Lithium (Li)-Dissolved | mg/L | | | <0.00050 | <0.00050 | - | - | - | - | <0.00050 | <0.00050 | 0.000640 | - | <0.00050 | <0.00050 | - | <0.00050 |
| Magnesium (Mg)-Dissolved | mg/L | | | 5.4 | 5.4 | - | - | - | - | 4.9 | 5.3 | 38.4 | - | 38.2 | 28.6 | - | 27.2 |
| Manganese (Mn)-Dissolved | mg/L | | | 2.26 | 2.18 | - | - | - | - | 2.21 | 2.27 | 4.36 | - | 4.77 | 7.09 | - | 7.72 |
| Mercury (Hg)-Dissolved | mg/L | **0.000026** | *0.001* | <0.000010 | <0.000010 | - | - | - | - | <0.000010 | <0.000010 | <0.000010 | - | <0.000010 | <0.000010 | - | <0.000010 |
| Molybdenum (Mo)-Dissolved | mg/L | **0.073** | *10* | 0.000097 | 0.000090 | - | - | - | - | 0.000089 | 0.000107 | 0.000304 | - | 0.000338 | 0.000113 | - | 0.000096 |
| Nickel (Ni)-Dissolved | mg/L | **0.025 to 0.15 [H]** | *0.25 if H<60; 0.65 if H 60-120; 1.1 If H 120-180; 1.5 if H>180* | <0.00050 | <0.00050 | - | - | - | - | <0.00050 | <0.00050 | 0.001860 | - | 0.00190 | 0.00125 | - | 0.00112 |
| Phosphorus (P)-Dissolved | mg/L | | | 0.107 | 0.107 | - | - | - | - | 0.120 | <0.25 | <0.050 | - | <0.25 | <0.050 | - | <0.25 |
| Potassium (K)-Dissolved | mg/L | | | 1.36 | 1.36 | - | - | - | - | 1.21 | 1.27 | 10.2 | - | 10.6 | 3.53 | - | 3.48 |
| Selenium (Se)-Dissolved | mg/L | **0.001** | *0.01* | 0.00013 | 0.00014 | - | - | - | - | 0.00013 | 0.00017 | 0.00036 | - | 0.00039 | 0.00043 | - | 0.00039 |
| Silicon (Si)-Dissolved | mg/L | | | 9.57 | 9.55 | - | - | - | - | 9.67 | 9.10 | 5.40000 | - | 5.47 | 4.90 | - | 4.72 |
| Silver (Ag)-Dissolved | mg/L | **0.0001** | *0.0005 if H<100; 0.015 if H>100* | <0.000010 | <0.000010 | - | - | - | - | <0.000010 | 0.000013 | <0.000010 | - | <0.000010 | 0.000026 | - | 0.000030 |
| Sodium (Na)-Dissolved | mg/L | | | 1.41 | 1.41 | - | - | - | - | 1.43 | 1.45 | 10.9 | - | 10.6 | 39.1 | - | 38.6 |
| Strontium (Sr)-Dissolved | mg/L | | | 0.119 | 0.118 | - | - | - | - | 0.120 | 0.115 | 00.7 | - | 0.689 | 0.700 | - | 0.750 |
| Sulphur (S)-Dissolved | mg/L | | | <0.50 | 1 | - | - | - | - | <0.50 | <2.5 | 162 | - | 171 | 214 | - | 217 |
| Thallium (Tl)-Dissolved | mg/L | **0.0008** | *0.003* | <0.000010 | <0.000010 | - | - | - | - | <0.000010 | <0.000010 | 0.000011 | - | 0.000014 | <0.000010 | - | <0.000010 |
| Tin (Sn)-Dissolved | mg/L | | | <0.00010 | <0.00010 | - | - | - | - | <0.00010 | <0.00010 | <0.00010 | - | <0.00010 | <0.00010 | - | <0.00010 |
| Titanium (Ti)-Dissolved | mg/L | | *1* | <0.010 | <0.010 | - | - | - | - | <0.010 | <0.010 | <0.010 | - | <0.010 | <0.010 | - | <0.010 |
| Uranium (U)-Dissolved | mg/L | | *3* | 0.000093 | 0.000095 | - | - | - | - | 0.000088 | 0.000090 | 0.000562 | - | 0.000633 | 0.000366 | - | 0.000244 |
| Vanadium (V)-Dissolved | mg/L | | | 0.0040 | 0.0038 | - | - | - | - | 0.0038 | 0.0041 | 0.007300 | - | 0.0053 | 0.0011 | - | <0.0010 |
| Zinc (Zn)-Dissolved | mg/L | **0.03** | *0.075 if H<90; 0.15 if H 90-100; 0.9 If H 100-200; 1.65 if H 200-300; 2.4 if H 300 - 400* | 0.0017 | 0.0019 | - | - | - | - | <0.0010 | <0.0010 | 0.0040 | - | 0.0034 | 0.0039 | - | 0.0030 |

Note:
Bold font indicates CCME exceedances; italicized font indicates Yukon CSR exceedances
[H], Cd: The CWQG for cadmium is related to water hardness (as CaCO3)
When the water hardness is > 0 to < 17 mg/L, the CWQG is 0.04 µg/L; At hardness > 280 mg/L, the CWQG is 0.37 µg/L
At hardness ≥ 17 to ≤ 280 mg/L, the CWQG is calculated using this equation: CWQG (µg/L) = 10{0.83(log[hardness]) – 2.46 }
[H], Cu: The CWQG for copper is related to water hardness (as CaCO3):
When the water hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L; At hardness >180 mg/L, the CWQG is 4 µg/L
At hardness ≥82 to ≤180 mg/L the CWQG is calculated using this equation: CWQG (µg/L) = 0.2 * e{0.8545[ln(hardness)]-1.465}
[H], Pb:The CWQG for lead is related to water hardness (as CaCO3):
When the hardness is 0 to ≤ 60 mg/L, the CWQG is 1 µg/L; At hardness >180 mg/L, the CWQG is 7 µg/L
At hardness >60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L)= e{1.273[ln(hardness)]-4.705}
[H], Ni:The CWQG for nickel is related to water hardness (as CaCO3):
When the water hardness is 0 to ≤ 60 mg/L, the CWQG is 25 µg/L; At hardness >180 mg/L, the CWQG is 150 µg/L
At hardness > 60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L) = e{0.76[ln(hardness)]+1.06}

**Table D3-1: Groundwater Analytical Results 2013**

| Sample ID | UNITS | Comparison Guidelines | | MW09-23 STANDARD PRESERVATION | MW09-23 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-23 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-24 STANDARD PRESERVATION | MW09-24 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-24 ALTERNATE PRESERVATION #3 (UNPRESERVED) | W1410383-BH02 STANDARD PRESERVATION | W1410383-BH02 ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | W1410383-BH02 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MP09-09 STANDARD PRESERVATION | MP09-09 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MP09-09 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MP09-09 ALTERNATE PRESERVATION #3 (UNPRESERVED) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Water Quality Guideline For Protection Aquatic Life | Yukon Contaminated Site Regulation O.I.C. 2002/171 | | | | | | | | | | | | | |
| **Location** | | | | SEEPAGE POND AREA | | | SEEPAGE POND AREA | | | SEEPAGE POND AREA | | | TAILINGS POND AREA | | | |
| **Date Sampled** | | | | 19-Sep-13 | 19-Sep-13 | 19-Sep-13 | 18-Sep-13 | 18-Sep-13 | 18-Sep-13 | 18-Sep-13 | 18-Sep-13 | 18-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 |
| **ALS Sample ID** | | | | L1367036-43 | L1367036-44 | L1367036-45 | L1367036-5 | L1367036-6 | L1367036-7 | L1368203-1 | L1368203-2 | L1368203-3 | L1365603-17 | L1365603-18 | L1365603-19 | L1365603-20 |
| **Physical Tests** | | | | | | | | | | | | | | | | |
| Conductivity | uS/cm | | | 1960 | - | - | 808 | - | - | 920 | - | - | 457 | - | - | - |
| Hardness (as CaCO3) | mg/L | | | 1540 | - | 1530 | 590 | - | 612 | 501 | - | 511 | 200 | - | - | 203 |
| pH | pH | **6.5 to 9.0** | | 6.84 | - | - | 7.41 | - | - | 7.65 | - | - | 8.54 | - | - | - |
| **Anions and Nutrients** | | | | | | | | | | | | | | | | |
| Alkalinity, Bicarbonate (as CaCO3) | mg/L | | | 256 | - | - | 201 | - | - | 264 | - | - | 113 | - | - | - |
| Alkalinity, Carbonate (as CaCO3) | mg/L | | | <1.0 | - | - | <1.0 | - | - | 0.0224 | - | - | 11.2 | - | - | - |
| Alkalinity, Hydroxide (as CaCO3) | mg/L | | | <1.0 | - | - | <1.0 | - | - | <5.0 | - | - | <1.0 | - | - | - |
| Alkalinity, Total (as CaCO3) | mg/L | | | 256 | - | - | 201 | - | - | <0.20 | - | - | 124 | - | - | - |
| Ammonia, Total (as N) | mg/L | | *18.4 if pH<7.0; 18.5 if pH 7.0-7.5; 11.3 if pH 7.5-* | 3.86 | - | - | 0.0079 | - | - | 0.808 | - | - | *3.21* | - | - | - |
| Chloride (Cl) | mg/L | **120** | | <10 | - | - | <5.0 | - | - | <0.010 | - | - | 2.26 | - | - | - |
| Fluoride (F) | mg/L | **0.12** | *2 if H<50; 3 if H>50* | **<0.40** | - | - | **<0.20** | - | - | **0.489** | - | - | **1.45** | - | - | - |
| Nitrate (as N) | mg/L | **2.94** | *0.004* | *<0.10* | - | - | ***4.10*** | - | - | ***368*** | - | - | *0.0096* | - | - | - |
| Nitrite (as N) | mg/L | **0.06** | *0.2 if Cl<2 mg/L; 0.4 if Cl 2-4 mg/L; 0.6 if Cl 4-6* | <0.020 | - | - | <0.010 | - | - | ***13.0*** | - | - | 0.0066 | - | - | - |
| Total Kjeldahl Nitrogen | mg/L | | | 7.00 | - | - | 0.305 | - | - | 10.6 | - | - | 6.59 | - | - | - |
| Sulphate (SO4) | mg/L | | *1000* | *1330* | - | - | 327 | - | - | -10 | - | - | 101 | - | - | - |
| Sulphide as S | mg/L | | *0.019* | - | - | - | - | - | - | | | | *<0.20* | - | - | - |
| Anion Sum | meq/L | | | 32.9 | - | - | 11.1 | - | - | | | | 4.72 | - | - | - |
| Cation Sum | meq/L | | | 33.5 | - | - | 12.2 | - | - | | | | 5.22 | - | - | - |
| Cation - Anion Balance | % | | | 1.0 | - | - | 4.5 | - | - | | | | 5.0 | - | - | - |
| **Cyanides** | | | | | | | | | | | | | | | | |
| Cyanide, Weak Acid Diss | mg/L | | *0.05* | <0.0050 | - | - | <0.0050 | - | - | <0.0050 | - | - | 0.0058 | - | *0.320* | - |
| Cyanide, Total | mg/L | | | 0.0081 | - | - | 0.0270 | - | - | <0.0050 | - | - | 2.37 | - | 0.324 | - |
| Thiocyanate (SCN) | mg/L | | | <0.50 | <0.50 | - | 0.51 | <0.50 | - | 0.53 | <0.50 | - | 0.99 | <0.50 | <0.50 | - |
| Cyanide, Free | mg/L | **0.005** | | <0.0050 | - | - | <0.0050 | - | - | <0.0050 | - | - | <0.0050 | - | **0.278** | - |
| **Organic / Inorganic Carbon** | | | | | | | | | | | | | | | | |
| Total Inorganic Carbon | mg/L | | | 52.6 | - | - | 46.7 | - | - | 63.6 | - | - | 21.1 | - | - | - |
| Total Organic Carbon | mg/L | | | 22.2 | - | - | 8.59 | - | - | 9.74 | - | - | 28.5 | - | - | - |
| **Dissolved Metals** | | | | | | | | | | | | | | | | |
| Dissolved Mercury Filtration Location | - | | | FIELD | - | FIELD | FIELD | - | FIELD | FIELD | - | FIELD | FIELD | - | - | FIELD |
| Dissolved Metals Filtration Location | - | | | FIELD | - | FIELD | FIELD | - | FIELD | FIELD | - | FIELD | FIELD | - | - | FIELD |
| Aluminum (Al)-Dissolved | mg/L | **0.005 if pH<6.5; 0.1 if pH≥6.5** | | 0.0194 | - | 0.0162 | 0.0028 | - | 0.0014 | 0.0025 | - | <0.0010 | 0.0021 | - | - | <0.0020 |
| Antimony (Sb)-Dissolved | mg/L | | *0.2* | 0.00042 | - | 0.00042 | 0.00020 | - | 0.00019 | 0.00021 | - | 0.00022 | 0.127 | - | - | 0.130 |
| Arsenic (As)-Dissolved | mg/L | **0.005** | *0.05* | **0.0108** | - | **0.0104** | 0.00163 | - | 0.00152 | 0.00243 | - | 0.00278 | ***16*** | - | - | ***17.7*** |
| Barium (Ba)-Dissolved | mg/L | | *10* | 0.0958 | - | 0.0976 | 0.0451 | - | 0.0463 | 0.124 | - | 0.127 | 0.00381 | - | - | 0.00371 |
| Beryllium (Be)-Dissolved | mg/L | | *0.053* | <0.00020 | - | <0.00020 | <0.00010 | - | <0.00010 | <0.00010 | - | <0.00010 | <0.00020 | - | - | <0.00020 |
| Bismuth (Bi)-Dissolved | mg/L | | | <0.0010 | - | <0.0010 | <0.00050 | - | <0.00050 | <0.00050 | - | <0.00050 | <0.0010 | - | - | <0.0010 |
| Boron (B)-Dissolved | mg/L | **1.5** | | 0.127 | - | 0.125 | 0.015 | - | 0.014 | 0.015 | - | 0.015 | <0.020 | - | - | <0.020 |
| Cadmium (Cd)-Dissolved | mg/L | **0.00004 to 0.00037 [H]** | *0.0001 if H<30; 0.0003 if H 30-90; 0.0005 If H 90-150; 0.0006 if H 150-210* | 0.000041 | - | 0.000066 | 0.000058 | - | 0.000057 | **0.000445** | - | 0.000395 | 0.000072 | - | - | 0.000077 |
| Calcium (Ca)-Dissolved | mg/L | | | 454 | - | 459 | 172 | - | 172 | 132 | - | 127 | 76 | - | - | 77 |
| Chromium (Cr)-Dissolved | mg/L | | | 0.00043 | - | 0.00046 | 0.00051 | - | 0.00049 | 0.00015 | - | 0.00016 | <0.00020 | - | - | <0.00020 |
| Cobalt (Co)-Dissolved | mg/L | | *0.009* | *0.0199* | - | *0.0205* | 0.00068 | - | 0.00064 | 0.00024 | - | 0.00014 | *0.0153* | - | - | *0.0181* |
| Copper (Cu)-Dissolved | mg/L | **0.002 to 0.004 [H]** | *0.02 if H<50; 0.03 if H 50-75; 0.04 If H 75-100; 0.05 if H 100-125; 0.06 if H 125-150; 0.7 If H 150-175; 0.8 if H 175-200;0.9 if H>200* | <0.00040 | - | 0.00063 | **0.00844** | - | **0.00708** | 0.00377 | - | 0.00317 | **0.171** | - | - | **0.285** |
| Iron (Fe)-Dissolved | mg/L | **0.3** | | **18.8** | - | **17.8** | <0.010 | - | <0.010 | <0.010 | - | <0.010 | 0.05 | - | - | 0.1 |
| Lead (Pb)-Dissolved | mg/L | **0.001 to 0.007 [H]** | *0.04 if H<50; 0.05 if H 50-100; 0.06 If H 100-200; 0.11 if H 200-300; 0.160 if H>300* | <0.00010 | - | <0.00010 | 0.000073 | - | <0.000050 | <0.000050 | - | <0.000050 | 0.00252 | - | - | 0.00215 |
| Lithium (Li)-Dissolved | mg/L | | | <0.0010 | - | <0.0010 | <0.00050 | - | <0.00050 | 0.00065 | - | 0.00059 | <0.0010 | - | - | <0.0010 |
| Magnesium (Mg)-Dissolved | mg/L | | | 99.7 | - | 93.0 | 38.7 | - | 44.4 | 41.3 | - | 46.8 | 2.5 | - | - | 2.4 |
| Manganese (Mn)-Dissolved | mg/L | | | 5.65 | - | 5.81 | 0.00 | - | 0.00 | 0.15 | - | 0.11 | 0.39 | - | - | 0.41 |
| Mercury (Hg)-Dissolved | mg/L | **0.000026** | *0.001* | <0.000010 | - | <0.000010 | <0.000010 | - | <0.000010 | <0.000010 | - | <0.000010 | <0.000010 | - | - | <0.000010 |
| Molybdenum (Mo)-Dissolved | mg/L | **0.073** | *10* | 0.00338 | - | 0.00335 | 0.000337 | - | 0.000387 | 0.00128 | - | 0.00123 | 0.0145 | - | - | 0.0134 |
| Nickel (Ni)-Dissolved | mg/L | **0.025 to 0.15 [H]** | *0.25 if H<60; 0.65 if H 60-120; 1.1 If H 120-180; 1.5 if H>180* | 0.0022 | - | 0.0020 | <0.00050 | - | <0.00050 | 0.00124 | - | 0.00097 | 0.0098 | - | - | 0.0120 |
| Phosphorus (P)-Dissolved | mg/L | | | <0.050 | - | <0.25 | <0.050 | - | <0.050 | <0.050 | - | <0.050 | 0.430 | - | - | 0.449 |
| Potassium (K)-Dissolved | mg/L | | | 9.43 | - | 9.07 | 1.68 | - | 1.61 | 3.14 | - | 3.15 | 11.2 | - | - | 10.2 |
| Selenium (Se)-Dissolved | mg/L | **0.001** | *0.01* | <0.00020 | - | <0.00020 | 0.00038 | - | 0.00054 | 0.00094 | - | 0.00117 | 0.00057 | - | - | 0.00067 |
| Silicon (Si)-Dissolved | mg/L | | | 5.57 | - | 5.35 | 4.71 | - | 4.70 | 5.96 | - | 6.18 | 14.9 | - | - | 16.2 |
| Silver (Ag)-Dissolved | mg/L | **0.0001** | *0.0005 if H<100; 0.015 if H>100* | <0.000020 | - | <0.000020 | <0.000010 | - | <0.000010 | <0.000010 | - | <0.000010 | 0.000056 | - | - | 0.000083 |
| Sodium (Na)-Dissolved | mg/L | | | 21.6 | - | 21.9 | 8.06 | - | 8.45 | 12.2 | - | 12.5 | 15.8 | - | - | 17.2 |
| Strontium (Sr)-Dissolved | mg/L | | | 1.00 | - | 1.00 | 0.651 | - | 0.663 | 0.603 | - | 0.611 | 0.234 | - | - | 0.226 |
| Sulphur (S)-Dissolved | mg/L | | | 428 | - | 427 | 117 | - | 112 | 84 | - | 78 | 58 | - | - | 38 |
| Thallium (Tl)-Dissolved | mg/L | **0.0008** | *0.003* | <0.000020 | - | <0.000020 | <0.000010 | - | <0.000010 | <0.000010 | - | <0.000010 | <0.000020 | - | - | <0.000020 |
| Tin (Sn)-Dissolved | mg/L | | | <0.00020 | - | <0.00020 | <0.00010 | - | <0.00010 | 0.00016 | - | 0.00010 | <0.00020 | - | - | <0.00020 |
| Titanium (Ti)-Dissolved | mg/L | | *1* | <0.020 | - | <0.020 | <0.010 | - | <0.010 | <0.010 | - | <0.010 | <0.020 | - | - | <0.020 |
| Uranium (U)-Dissolved | mg/L | | *3* | 0.00173 | - | 0.00173 | 0.00969 | - | 0.00958 | 0.00517 | - | 0.00498 | 0.00194 | - | - | 0.00215 |
| Vanadium (V)-Dissolved | mg/L | | | <0.0020 | - | <0.0020 | <0.0010 | - | <0.0010 | <0.0010 | - | <0.0010 | <0.0020 | - | - | <0.0020 |
| Zinc (Zn)-Dissolved | mg/L | **0.03** | *0.075 if H<90; 0.15 if H 90-100; 0.9 If H 100-200; 1.65 if H 200-300; 2.4 if H 300 - 400* | **0.0873** | - | **0.0840** | 0.0019 | - | 0.0021 | 0.0057 | - | 0.0015 | 0.0052 | - | - | 0.0035 |

Note:
Bold font indicates CCME exceedances; italicized font indicates Yukon CSR exceedances
[H], Cd: The CWQG for cadmium is related to water hardness (as CaCO3)
When the water hardness is > 0 to < 17 mg/L, the CWQG is 0.04 µg/L; At hardness > 280 mg/L, the CWQG is 0.37 µg/L
At hardness ≥ 17 to ≤ 280 mg/L, the CWQG is calculated using this equation: CWQG (µg/L) = 10{0.83(log[hardness]) – 2.46 }
[H], Cu: The CWQG for copper is related to water hardness (as CaCO3):
When the water hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L; At hardness >180 mg/L, the CWQG is 4 µg/L
At hardness ≥82 to ≤180 mg/L the CWQG is calculated using this equation: CWQG (µg/L) = 0.2 * e{0.8545[ln(hardness)]-1.465}
[H], Pb:The CWQG for lead is related to water hardness (as CaCO3):
When the hardness is 0 to ≤ 60 mg/L, the CWQG is 1 µg/L; At hardness >180 mg/L, the CWQG is 7 µg/L
At hardness >60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L)= e{1.273[ln(hardness)]-4.705}
[H], Ni:The CWQG for nickel is related to water hardness (as CaCO3):
When the water hardness is 0 to ≤ 60 mg/L, the CWQG is 25 µg/L; At hardness >180 mg/L, the CWQG is 150 µg/L
At hardness > 60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L) = e{0.76[ln(hardness)]+1.06}

**Table D3-1: Groundwater Analytical Results 2013**

| Sample ID | UNITS | Comparison Guidelines | | MP09-10 STANDARD PRESERVATION | MP09-10 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MP09-11 STANDARD PRESERVATION | FIELD DUP A STANDARD PRESERVATION | MP09-11 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | FIELD DUP A ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MP09-11 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | FIELD DUP A ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | FIELD DUP A ALTERNATE PRESERVATION #3 (UNPRESERVED) | MP09-12 STANDARD PRESERVATION | MP09-12 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MP09-12 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MP09-12 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-01 STANDARD PRESERVATION | MW09-01 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-01 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MW09-01 ALTERNATE PRESERVATION #3 (UNPRESERVED) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Water Quality Guideline For Protection Aquatic Life | Yukon Contaminated Site Regulation O.I.C. 2002/171 | | | | | | | | | | | | | | | | | |
| **Location** | | | | TAILINGS POND AREA | | TAILINGS POND AREA | | | | | | | TAILINGS POND AREA | | | | TAILINGS POND AREA | | | |
| **Date Sampled** | | | | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 |
| **ALS Sample ID** | | | | L1365603-21 | L1365603-24 | L1365603-25 | L1365603-33 | L1365603-26 | L1365603-34 | L1365603-27 | L1365603-35 | L1365603-36 | L1365603-29 | L1365603-30 | L1365603-31 | L1365603-32 | L1365603-1 | L1365603-2 | L1365603-3 | L1365603-4 |
| **Physical Tests** | | | | | | | | | | | | | | | | | | | | |
| Conductivity | uS/cm | | | 495 | - | 1080 | 1120 | - | - | - | - | - | 929 | - | - | - | 1740 | - | - | - |
| Hardness (as CaCO3) | mg/L | | | - | 705 | 642 | 630 | - | - | - | - | 665 | 602 | - | - | 585 | 858 | - | - | 882 |
| pH | pH | **6.5 to 9.0** | | **9.15** | - | 7.84 | 7.78 | - | - | - | - | - | 7.71 | - | - | - | 7.42 | - | - | - |
| **Anions and Nutrients** | | | | | | | | | | | | | | | | | | | | |
| Alkalinity, Bicarbonate (as CaCO3) | mg/L | | | 90.9 | - | 686 | 709 | - | - | - | - | - | 430 | - | - | - | 341 | - | - | - |
| Alkalinity, Carbonate (as CaCO3) | mg/L | | | 49.9 | - | <1.0 | <1.0 | - | - | - | - | - | <1.0 | - | - | - | <1.0 | - | - | - |
| Alkalinity, Hydroxide (as CaCO3) | mg/L | | | <1.0 | - | <1.0 | <1.0 | - | - | - | - | - | <1.0 | - | - | - | <1.0 | - | - | - |
| Alkalinity, Total (as CaCO3) | mg/L | | | 141 | - | 686 | 709 | - | - | - | - | - | 430 | - | - | - | 341 | - | - | - |
| Ammonia, Total (as N) | mg/L | | *18.4 if pH<7.0; 18.5 if pH 7.0-7.5; 11.3 if pH 7.5-* | *3.23* | - | 4.40 | 4.02 | - | - | - | - | - | 4.67 | - | - | - | 12.8 | - | - | - |
| Chloride (Cl) | mg/L | **120** | | 2.79 | - | <5.0 | <5.0 | - | - | - | - | - | <5.0 | - | - | - | <5.0 | - | - | - |
| Fluoride (F) | mg/L | **0.12** | *2 if H<50; 3 if H>50* | **1.62** | - | **0.50** | **0.57** | - | - | - | - | - | **0.35** | - | - | - | **<0.20** | - | - | - |
| Nitrate (as N) | mg/L | **2.94** | *0.004* | *0.0330* | - | *<0.050* | *<0.050* | - | - | - | - | - | *0.056* | - | - | - | *<0.050* | - | - | - |
| Nitrite (as N) | mg/L | **0.06** | *0.2 if Cl<2 mg/L; 0.4 if Cl 2-4 mg/L; 0.6 if Cl 4-6* | 0.0053 | - | 0.029 | 0.012 | - | - | - | - | - | 0.019 | - | - | - | <0.010 | - | - | - |
| Total Kjeldahl Nitrogen | mg/L | | | 35.2 | - | 11.2 | 10.5 | - | - | - | - | - | 9.30 | - | - | - | 18.1 | - | - | - |
| Sulphate (SO4) | mg/L | | *1000* | 108 | - | 15 | 16 | - | - | - | - | - | 145 | - | - | - | 753 | - | - | - |
| Sulphide as S | mg/L | | *0.019* | - | - | - | - | - | - | - | - | - | - | - | - | - | *0.272* | - | - | - |
| Anion Sum | meq/L | | | - | - | 14.1 | 14.5 | - | - | - | - | - | 11.6 | - | - | - | 22.5 | - | - | - |
| Cation Sum | meq/L | | | - | - | 15.0 | 14.7 | - | - | - | - | - | 13.3 | - | - | - | 23.1 | - | - | - |
| Cation - Anion Balance | % | | | - | - | 3.2 | 0.5 | - | - | - | - | - | 6.6 | - | - | - | 1.3 | - | - | - |
| **Cyanides** | | | | | | | | | | | | | | | | | | | | |
| Cyanide, Weak Acid Diss | mg/L | | *0.05* | 0.0196 | - | <0.0050 | <0.0050 | - | - | <0.0050 | <0.0050 | - | <0.0050 | - | <0.0050 | - | <0.0050 | - | 0.0100 | - |
| Cyanide, Total | mg/L | | | 2.07 | - | 0.901 | 0.909 | - | - | <0.0050 | <0.0050 | - | 0.158 | - | <0.0050 | - | 0.506 | - | 0.512 | - |
| Thiocyanate (SCN) | mg/L | | | - | - | 1.18 | 0.70 | 0.80 | 0.84 | <0.50 | <0.50 | - | 0.70 | <0.50 | <0.50 | - | 7.11 | 7.38 | 8.99 | - |
| Cyanide, Free | mg/L | **0.005** | | **0.0071** | - | <0.0050 | <0.0050 | - | - | <0.0050 | <0.0050 | - | <0.0050 | - | <0.0050 | - | <0.0050 | - | <0.0050 | - |
| **Organic / Inorganic Carbon** | | | | | | | | | | | | | | | | | | | | |
| Total Inorganic Carbon | mg/L | | | 37.3 | - | 146 | 158 | - | - | - | - | - | 81.0 | - | - | - | 76.3 | - | - | - |
| Total Organic Carbon | mg/L | | | 52.5 | - | 62.8 | 61.1 | - | - | - | - | - | 19.6 | - | - | - | 76.0 | - | - | - |
| **Dissolved Metals** | | | | | | | | | | | | | | | | | | | | |
| Dissolved Mercury Filtration Location | - | | | - | FIELD | FIELD | FIELD | - | - | - | - | FIELD | FIELD | - | - | FIELD | FIELD | - | - | FIELD |
| Dissolved Metals Filtration Location | - | | | - | FIELD | FIELD | FIELD | - | - | - | - | FIELD | FIELD | - | - | FIELD | FIELD | - | - | FIELD |
| Aluminum (Al)-Dissolved | mg/L | **0.005 if pH<6.5; 0.1 if pH≥6.5** | | - | 0.0070 | 0.0094 | 0.0082 | - | - | - | - | 0.0061 | 0.0031 | - | - | 0.0029 | 0.0422 | - | - | 0.0311 |
| Antimony (Sb)-Dissolved | mg/L | | *0.2* | - | 0.0132 | 0.0101 | 0.0104 | - | - | - | - | 0.0129 | 0.0220 | - | - | 0.0269 | 0.00081 | - | - | 0.00071 |
| Arsenic (As)-Dissolved | mg/L | **0.005** | *0.05* | - | ***9.75*** | ***6.65*** | ***5.86*** | - | - | - | - | ***6.2*** | ***3.98*** | - | - | ***4.15*** | ***0.087*** | - | - | ***0.0671*** |
| Barium (Ba)-Dissolved | mg/L | | *10* | - | 0.155 | 0.145 | 0.136 | - | - | - | - | 0.123 | 0.208 | - | - | 0.195 | 0.116 | - | - | 0.110 |
| Beryllium (Be)-Dissolved | mg/L | | *0.053* | - | <0.00010 | <0.00010 | <0.00010 | - | - | - | - | <0.00010 | <0.00010 | - | - | <0.00010 | <0.00010 | - | - | <0.00010 |
| Bismuth (Bi)-Dissolved | mg/L | | | - | <0.00050 | <0.00050 | <0.00050 | - | - | - | - | <0.00050 | <0.00050 | - | - | <0.00050 | <0.00050 | - | - | <0.00050 |
| Boron (B)-Dissolved | mg/L | **1.5** | | - | 0.056 | 0.054 | 0.045 | - | - | - | - | 0.048 | 0.036 | - | - | 0.044 | 0.101 | - | - | 0.102 |
| Cadmium (Cd)-Dissolved | mg/L | **0.00004 to 0.00037 [H]** | *0.0001 if H<30; 0.0003 if H 30-90; 0.0005 If H 90-150; 0.0006 if H 150-210* | - | 0.000085 | 0.000112 | 0.000098 | - | - | - | - | 0.000061 | **0.000629** | - | - | **0.000634** | 0.000328 | - | - | 0.000319 |
| Calcium (Ca)-Dissolved | mg/L | | | - | 146 | 132 | 129 | - | - | - | - | 135 | 132 | - | - | 125 | 257 | - | - | 269 |
| Chromium (Cr)-Dissolved | mg/L | | | - | 0.00186 | 0.00182 | 0.00191 | - | - | - | - | 0.00173 | 0.00080 | - | - | 0.00074 | 0.00168 | - | - | 0.00131 |
| Cobalt (Co)-Dissolved | mg/L | | *0.009* | - | 0.00355 | 0.00350 | 0.00356 | - | - | - | - | 0.00374 | 0.00147 | - | - | 0.00142 | 0.00582 | - | - | 0.00579 |
| Copper (Cu)-Dissolved | mg/L | **0.002 to 0.004 [H]** | *0.02 if H<50; 0.03 if H 50-75; 0.04 If H 75-100; 0.05 if H 100-125; 0.06 if H 125-150; 0.7 if H 150-175; 0.8 if H 175-200;0.9 if H>200* | - | 0.00162 | 0.00255 | 0.00214 | - | - | - | - | 0.00172 | 0.00273 | - | - | **0.00448** | 0.00064 | - | - | 0.00091 |
| Iron (Fe)-Dissolved | mg/L | **0.3** | | - | **4.8** | **8.8** | **7.8** | - | - | - | - | **6.5** | **3.5** | - | - | **2.7** | **27.9** | - | - | **28.3** |
| Lead (Pb)-Dissolved | mg/L | **0.001 to 0.007 [H]** | *0.04 if H<50; 0.05 if H 50-100; 0.06 If H 100-200; 0.11 if H 200-300; 0.160 if H>300* | - | 0.00276 | 0.00480 | 0.00286 | - | - | - | - | 0.00241 | 0.0105 | - | - | **0.0111** | 0.000696 | - | - | 0.000562 |
| Lithium (Li)-Dissolved | mg/L | | | - | 0.00445 | 0.00504 | 0.00447 | - | - | - | - | 0.00455 | 0.00206 | - | - | 0.00248 | 0.00141 | - | - | 0.00106 |
| Magnesium (Mg)-Dissolved | mg/L | | | - | 82.6 | 76.1 | 74.5 | - | - | - | - | 79.7 | 66.3 | - | - | 66.4 | 52.6 | - | - | 50.9 |
| Manganese (Mn)-Dissolved | mg/L | | | - | 6.56 | 6.02 | 6.18 | - | - | - | - | 5.54 | 3.23 | - | - | 3.10 | 5.84 | - | - | 5.98 |
| Mercury (Hg)-Dissolved | mg/L | **0.000026** | *0.001* | - | <0.000010 | <0.000010 | <0.000010 | - | - | - | - | <0.000010 | <0.000010 | - | - | <0.000010 | <0.000010 | - | - | <0.000010 |
| Molybdenum (Mo)-Dissolved | mg/L | **0.073** | *10* | - | 0.0109 | 0.00996 | 0.00940 | - | - | - | - | 0.0108 | 0.00217 | - | - | 0.00260 | 0.00123 | - | - | 0.00133 |
| Nickel (Ni)-Dissolved | mg/L | **0.025 to 0.15 [H]** | *0.25 if H<60; 0.65 if N 60-120; 1.1 If H 120-180; 1.5 if H>180* | - | 0.0146 | 0.0154 | 0.0157 | - | - | - | - | 0.0164 | 0.00547 | - | - | 0.00569 | 0.00289 | - | - | 0.00308 |
| Phosphorus (P)-Dissolved | mg/L | | | - | 0.072 | 0.086 | 0.082 | - | - | - | - | 0.063 | 0.097 | - | - | 0.083 | 0.119 | - | - | <0.25 |
| Potassium (K)-Dissolved | mg/L | | | - | 9.11 | 8.71 | 8.61 | - | - | - | - | 9.99 | 5.94 | - | - | 5.88 | 10.4 | - | - | 10.5 |
| Selenium (Se)-Dissolved | mg/L | **0.001** | *0.01* | - | 0.00071 | 0.00041 | 0.00038 | - | - | - | - | 0.00049 | 0.00016 | - | - | 0.00027 | 0.00024 | - | - | 0.00049 |
| Silicon (Si)-Dissolved | mg/L | | | - | 10.8 | 10.0 | 9.85 | - | - | - | - | 10.5 | 10.1 | - | - | 9.67 | 7.04 | - | - | 7.08 |
| Silver (Ag)-Dissolved | mg/L | **0.0001** | *0.0005 if H<100; 0.015 if H>100* | - | 0.000028 | 0.000019 | 0.000020 | - | - | - | - | 0.000015 | <0.000010 | - | - | 0.000021 | 0.000010 | - | - | 0.000015 |
| Sodium (Na)-Dissolved | mg/L | | | - | 22.5 | 21.4 | 21.8 | - | - | - | - | 22.7 | 10.8 | - | - | 9.91 | 69.9 | - | - | 69.1 |
| Strontium (Sr)-Dissolved | mg/L | | | - | 0.907 | 0.836 | 0.789 | - | - | - | - | 0.854 | 0.800 | - | - | 0.920 | 0.744 | - | - | 0.742 |
| Sulphur (S)-Dissolved | mg/L | | | - | 8 | 7 | 7 | - | - | - | - | 8 | 56 | - | - | 51 | 237 | - | - | 245 |
| Thallium (Tl)-Dissolved | mg/L | **0.0008** | *0.003* | - | 0.000011 | <0.000010 | <0.000010 | - | - | - | - | <0.000010 | 0.000108 | - | - | 0.000125 | <0.000010 | - | - | <0.000010 |
| Tin (Sn)-Dissolved | mg/L | | | - | 0.00017 | 0.00041 | 0.00019 | - | - | - | - | 0.00013 | <0.00010 | - | - | <0.00010 | <0.00010 | - | - | <0.00010 |
| Titanium (Ti)-Dissolved | mg/L | | *1* | - | <0.010 | <0.010 | <0.010 | - | - | - | - | <0.010 | <0.010 | - | - | <0.010 | <0.010 | - | - | <0.010 |
| Uranium (U)-Dissolved | mg/L | | *3* | - | 0.000904 | 0.000760 | 0.000750 | - | - | - | - | 0.000865 | 0.000670 | - | - | 0.000764 | 0.000804 | - | - | 0.000812 |
| Vanadium (V)-Dissolved | mg/L | | | - | 0.0074 | 0.0074 | 0.0071 | - | - | - | - | 0.0060 | 0.0029 | - | - | 0.0025 | 0.0085 | - | - | 0.0064 |
| Zinc (Zn)-Dissolved | mg/L | **0.03** | *0.075 if H<90; 0.15 if H 90-100; 0.9 If H 100-200; 1.65 if H 200-300; 2.4 if H 300 - 400* | - | 0.0258 | **0.0313** | 0.0260 | - | - | - | - | 0.0188 | **0.0585** | - | - | **0.0614** | **0.469** | - | - | **0.422** |

Note:
Bold font indicates CCME exceedances; italicized font indicates Yukon CSR exceedances
[H], Cd: The CWQG for cadmium is related to water hardness (as CaCO3)
When the water hardness is > 0 to < 17 mg/L, the CWQG is 0.04 µg/L; At hardness > 280 mg/L, the CWQG is 0.37 µg/L
At hardness ≥ 17 to ≤ 280 mg/L, the CWQG is calculated using this equation: CWQG (µg/L) = 10{0.83(log[hardness]) – 2.46 }
[H], Cu: The CWQG for copper is related to water hardness (as CaCO3):
When the water hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L; At hardness >180 mg/L, the CWQG is 4 µg/L
At hardness ≥82 to ≤180 mg/L the CWQG is calculated using this equation: CWQG (µg/L) = 0.2 * e{0.8545[ln(hardness)]-1.465}
[H], Pb:The CWQG for lead is related to water hardness (as CaCO3):
When the hardness is 0 to ≤ 60 mg/L, the CWQG is 1 µg/L; At hardness >180 mg/L, the CWQG is 7 µg/L
At hardness >60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L)= e{1.273[ln(hardness)]-4.705}
[H], Ni:The CWQG for nickel is related to water hardness (as CaCO3):
When the water hardness is 0 to ≤ 60 mg/L, the CWQG is 25 µg/L; At hardness >180 mg/L, the CWQG is 150 µg/L
At hardness > 60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L) = e{0.76[ln(hardness)]+1.06}

**Table D3-1: Groundwater Analytical Results 2013**

| Sample ID | UNITS | Comparison Guidelines | | MW09-02 STANDARD PRESERVATION | FIELD DUP B STANDARD PRESERVATION | MW09-02 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | FIELD DUP B ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-02 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | FIELD DUP B ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MW09-02 ALTERNATE PRESERVATION #3 (UNPRESERVED) | FIELD DUP B ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-03 STANDARD PRESERVATIO N | MW09-03 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-03 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MW09-03 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-04 STANDARD PRESERVATION | MW09-04 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-04 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MW09-04 ALTERNATE PRESERVATION #3 (UNPRESERVED) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Water Quality Guideline For Protection Aquatic Life | Yukon Contaminated Site Regulation O.I.C. 2002/171 | | | | | | | | | | | | | | | | |
| **Location** | | | | TAILINGS POND AREA | | | | | | | | TAILINGS POND AREA | | | | TAILINGS POND AREA | | | |
| **Date Sampled** | | | | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 |
| **ALS Sample ID** | | | | L1365603-5 | L1365603-37 | L1365603-6 | L1365603-38 | L1365603-7 | L1365603-39 | L1365603-8 | L1365603-40 | L1365603-9 | L1365603-10 | L1365603-11 | L1365603-12 | L1365603-13 | L1365603-14 | L1365603-15 | L1365603-16 |
| **Physical Tests** | | | | | | | | | | | | | | | | | | | |
| Conductivity | uS/cm | | | 2750 | 2790 | - | - | - | - | - | - | 2490 | - | - | - | 2480 | - | - | - |
| Hardness (as CaCO3) | mg/L | | | 1860 | 1860 | - | - | - | - | 1930 | 1930 | 1520 | - | - | 1600 | 1610 | - | - | 1670 |
| pH | pH | **6.5 to 9.0** | | 7.25 | 7.33 | - | - | - | - | - | - | 7.45 | - | - | - | 7.77 | - | - | - |
| **Anions and Nutrients** | | | | | | | | | | | | | | | | | | | |
| Alkalinity, Bicarbonate (as CaCO3) | mg/L | | | 97.4 | 97.9 | - | - | - | - | - | - | 41.7 | - | - | - | 40.0 | - | - | - |
| Alkalinity, Carbonate (as CaCO3) | mg/L | | | <1.0 | <1.0 | - | - | - | - | - | - | <1.0 | - | - | - | <1.0 | - | - | - |
| Alkalinity, Hydroxide (as CaCO3) | mg/L | | | <1.0 | <1.0 | - | - | - | - | - | - | <1.0 | - | - | - | <1.0 | - | - | - |
| Alkalinity, Total (as CaCO3) | mg/L | | | 97.4 | 97.9 | - | - | - | - | - | - | 41.7 | - | - | - | 40.0 | - | - | - |
| Ammonia, Total (as N) | mg/L | | *18.4 if pH<7.0; 18.5 if pH 7.0-7.5; 11.3 if pH 7.5-* | 10.3 | 9.86 | - | - | - | - | - | - | 7.72 | - | - | - | 8.75 | - | - | - |
| Chloride (Cl) | mg/L | **120** | | <10 | <10 | - | - | - | - | - | - | <10 | - | - | - | <10 | - | - | - |
| Fluoride (F) | mg/L | **0.12** | *2 if H<50; 3 if H>50* | **0.75** | **0.73** | - | - | - | - | - | - | **0.64** | - | - | - | **0.66** | - | - | - |
| Nitrate (as N) | mg/L | **2.94** | *0.004* | *<0.10* | *0.16* | - | - | - | - | - | - | *2.68* | - | - | - | *<0.10* | - | - | - |
| Nitrite (as N) | mg/L | **0.06** | *0.2 if Cl<2 mg/L; 0.4 if Cl 2-4 mg/L; 0.6 if Cl 4-6* | 0.024 | 0.031 | - | - | - | - | - | - | **0.098** | - | - | - | <0.020 | - | - | - |
| Total Kjeldahl Nitrogen | mg/L | | | 11.5 | 10.4 | - | - | - | - | - | - | 9.87 | - | - | - | 9.86 | - | - | - |
| Sulphate (SO4) | mg/L | | *1000* | *1860* | *1890* | - | - | - | - | - | - | *1660* | - | - | - | *1660* | - | - | - |
| Sulphide as S | mg/L | | *0.019* | *<0.020* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Anion Sum | meq/L | | | 40.8 | 41.3 | - | - | - | - | - | - | 35.7 | - | - | - | 35.4 | - | - | - |
| Cation Sum | meq/L | | | 41.7 | 41.4 | - | - | - | - | - | - | 34.6 | - | - | - | 36.3 | - | - | - |
| Cation - Anion Balance | % | | | 1.1 | 0.2 | - | - | - | - | - | - | -1.5 | - | - | - | 1.3 | - | - | - |
| **Cyanides** | | | | | | | | | | | | | | | | | | | |
| Cyanide, Weak Acid Diss | mg/L | | *0.05* | <0.0050 | <0.0050 | - | - | 0.0060 | <0.0050 | - | - | <0.0050 | - | <0.0050 | - | <0.0050 | - | <0.0050 | - |
| Cyanide, Total | mg/L | | | <0.0050 | 0.0072 | - | - | 0.0200 | 0.0093 | - | - | 0.0066 | - | <0.0050 | - | <0.0050 | - | <0.0050 | - |
| Thiocyanate (SCN) | mg/L | | | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | - | - | 0.57 | <0.50 | <0.50 | - | 0.56 | <0.50 | <0.50 | - |
| Cyanide, Free | mg/L | **0.005** | | <0.0050 | <0.0050 | - | - | <0.0050 | <0.0050 | - | - | <0.0050 | - | <0.0050 | - | <0.0050 | - | <0.0050 | - |
| **Organic / Inorganic Carbon** | | | | | | | | | | | | | | | | | | | |
| Total Inorganic Carbon | mg/L | | | 17.2 | 17.6 | - | - | - | - | - | - | 7.94 | - | - | - | 7.40 | - | - | - |
| Total Organic Carbon | mg/L | | | 6.31 | 6.35 | - | - | - | - | - | - | 11.9 | - | - | - | 5.92 | - | - | - |
| **Dissolved Metals** | | | | | | | | | | | | | | | | | | | |
| Dissolved Mercury Filtration Location | - | | | FIELD | FIELD | - | - | - | - | FIELD | FIELD | FIELD | - | - | FIELD | FIELD | - | - | FIELD |
| Dissolved Metals Filtration Location | - | | | FIELD | FIELD | - | - | - | - | FIELD | FIELD | FIELD | - | - | FIELD | FIELD | - | - | FIELD |
| Aluminum (Al)-Dissolved | mg/L | **0.005 if pH<6.5; 0.1 if pH≥6.5** | | <0.0020 | 0.0024 | - | - | - | - | <0.0020 | <0.0020 | <0.0020 | - | - | <0.0020 | 0.0031 | - | - | <0.0020 |
| Antimony (Sb)-Dissolved | mg/L | | *0.2* | 0.00397 | 0.00429 | - | - | - | - | 0.00440 | 0.00462 | *0.654* | - | - | *0.777* | *0.222* | - | - | *0.268* |
| Arsenic (As)-Dissolved | mg/L | **0.005** | *0.05* | ***11*** | ***10.2*** | - | - | - | - | ***9.15*** | ***11.7*** | ***3.55*** | - | - | ***3.78*** | ***1.42*** | - | - | ***1.04*** |
| Barium (Ba)-Dissolved | mg/L | | *10* | 0.00676 | 0.00687 | - | - | - | - | 0.00671 | 0.007 | 0.00998 | - | - | 0.0106 | 0.00705 | - | - | 0.00644 |
| Beryllium (Be)-Dissolved | mg/L | | *0.053* | <0.00020 | <0.00020 | - | - | - | - | <0.00020 | <0.00020 | <0.00020 | - | - | <0.00020 | <0.00020 | - | - | <0.00020 |
| Bismuth (Bi)-Dissolved | mg/L | | | <0.0010 | <0.0010 | - | - | - | - | <0.0010 | <0.0010 | <0.0010 | - | - | <0.0010 | <0.0010 | - | - | <0.0010 |
| Boron (B)-Dissolved | mg/L | **1.5** | | 0.095 | 0.102 | - | - | - | - | 0.101 | 0.098 | 0.152 | - | - | 0.183 | 0.251 | - | - | 0.255 |
| Cadmium (Cd)-Dissolved | mg/L | **0.00004 to 0.00037 [H]** | *0.0001 if H<30; 0.0003 if H 30-90; 0.0005 If H 90-150; 0.0006 if H 150-210* | **0.000825** | **0.000948** | - | - | - | - | **0.000940** | **0.001** | 0.000318 | - | - | 0.000333 | 0.000050 | - | - | 0.000051 |
| Calcium (Ca)-Dissolved | mg/L | | | 476 | 463 | - | - | - | - | 495 | 492 | 487 | - | - | 515 | 479 | - | - | 507 |
| Chromium (Cr)-Dissolved | mg/L | | | <0.00020 | <0.00020 | - | - | - | - | <0.00020 | <0.00020 | <0.00020 | - | - | <0.00020 | <0.00020 | - | - | <0.00020 |
| Cobalt (Co)-Dissolved | mg/L | | *0.009* | *0.0119* | *0.0124* | - | - | - | - | *0.0122* | *0.0125* | 0.00155 | - | - | 0.00165 | 0.00119 | - | - | 0.00126 |
| Copper (Cu)-Dissolved | mg/L | **0.002 to 0.004 [H]** | *0.02 if H<50; 0.03 if H 50-75; 0.04 If H 75-100; 0.05 if H 100-125; 0.06 if H 125-150; 0.7 If H 150-175; 0.8 if H 175-200;0.9 if H>200* | 0.00045 | <0.00040 | - | - | - | - | <0.00040 | 0.0006 | 0.00369 | - | - | 0.00380 | 0.00079 | - | - | <0.00040 |
| Iron (Fe)-Dissolved | mg/L | **0.3** | | **18.6** | **17.1** | - | - | - | - | **15.0** | **1.1** | <0.010 | - | - | <0.010 | <0.010 | - | - | <0.010 |
| Lead (Pb)-Dissolved | mg/L | **0.001 to 0.007 [H]** | *0.04 if H<50; 0.05 if H 50-100; 0.06 If H 100-200; 0.11 if H 200-300; 0.160 if H>300* | 0.00075 | 0.00092 | - | - | - | - | 0.00064 | 0.00075 | 0.00066 | - | - | 0.00073 | **0.0162** | - | - | 0.00152 |
| Lithium (Li)-Dissolved | mg/L | | | 0.0140 | 0.0130 | - | - | - | - | 0.0131 | 0.01340 | <0.0010 | - | - | 0.0014 | 0.0034 | - | - | 0.0033 |
| Magnesium (Mg)-Dissolved | mg/L | | | 164.0 | 171.0 | - | - | - | - | 169.0 | 171.0 | 73.7 | - | - | 77.1 | 102.0 | - | - | 97.0 |
| Manganese (Mn)-Dissolved | mg/L | | | 16.30 | 16.00 | - | - | - | - | 15.90 | 16.50 | 1.21 | - | - | 1.26 | 2.77 | - | - | 2.62 |
| Mercury (Hg)-Dissolved | mg/L | **0.000026** | *0.001* | <0.000010 | <0.000010 | - | - | - | - | <0.000010 | <0.000010 | <0.000010 | - | - | <0.000010 | <0.000010 | - | - | <0.000010 |
| Molybdenum (Mo)-Dissolved | mg/L | **0.073** | *10* | 0.00767 | 0.00825 | - | - | - | - | 0.00836 | 0.00811 | 0.00768 | - | - | 0.00889 | 0.00708 | - | - | 0.00722 |
| Nickel (Ni)-Dissolved | mg/L | **0.025 to 0.15 [H]** | *0.25 if H<60; 0.65 if H 60-120; 1.1 If H 120-180; 1.5 if H>180* | 0.0040 | 0.0041 | - | - | - | - | 0.0041 | 0.00420 | 0.0014 | - | - | 0.0014 | <0.0010 | - | - | <0.0010 |
| Phosphorus (P)-Dissolved | mg/L | | | <0.050 | <0.050 | - | - | - | - | <0.10 | <0.050 | 0.066 | - | - | 0.069 | <0.050 | - | - | <0.050 |
| Potassium (K)-Dissolved | mg/L | | | 29.0 | 28.1 | - | - | - | - | 25.5 | 30 | 39.5 | - | - | 41.8 | 41.2 | - | - | 41.3 |
| Selenium (Se)-Dissolved | mg/L | **0.001** | *0.01* | <0.00020 | <0.00020 | - | - | - | - | <0.00020 | <0.00020 | <0.00020 | - | - | <0.00020 | <0.00020 | - | - | <0.00020 |
| Silicon (Si)-Dissolved | mg/L | | | 7.99 | 8.16 | - | - | - | - | 8.12 | 7.76 | 9.95 | - | - | 10.3 | 8.21 | - | - | 7.16 |
| Silver (Ag)-Dissolved | mg/L | **0.0001** | *0.0005 if H<100; 0.015 if H>100* | <0.000020 | <0.000020 | - | - | - | - | <0.000020 | <0.000020 | 0.000021 | - | - | 0.000030 | <0.000020 | - | - | <0.000020 |
| Sodium (Na)-Dissolved | mg/L | | | 32.3 | 31.6 | - | - | - | - | 31.4 | 33 | 60.6 | - | - | 63.9 | 51.1 | - | - | 56.7 |
| Strontium (Sr)-Dissolved | mg/L | | | 0.872 | 0.894 | - | - | - | - | 0.910 | 00.9 | 1.19 | - | - | 1.41 | 1.24 | - | - | 1.26 |
| Sulphur (S)-Dissolved | mg/L | | | 616 | 632 | - | - | - | - | 638 | 617 | 527 | - | - | 528 | 552 | - | - | 540 |
| Thallium (Tl)-Dissolved | mg/L | **0.0008** | *0.003* | 0.000381 | 0.000402 | - | - | - | - | 0.000408 | 0.000399 | <0.000020 | - | - | <0.000020 | <0.000020 | - | - | <0.000020 |
| Tin (Sn)-Dissolved | mg/L | | | <0.00020 | <0.00020 | - | - | - | - | <0.00020 | <0.00020 | 0.00046 | - | - | 0.00042 | <0.00020 | - | - | <0.00020 |
| Titanium (Ti)-Dissolved | mg/L | | *1* | <0.020 | <0.020 | - | - | - | - | <0.020 | <0.020 | <0.020 | - | - | <0.020 | <0.020 | - | - | <0.020 |
| Uranium (U)-Dissolved | mg/L | | *3* | 0.00101 | 0.00106 | - | - | - | - | 0.00106 | 0.00103 | 0.000395 | - | - | 0.000456 | 0.000143 | - | - | 0.000121 |
| Vanadium (V)-Dissolved | mg/L | | | <0.0020 | <0.0020 | - | - | - | - | <0.0020 | <0.0020 | <0.0020 | - | - | <0.0020 | <0.0020 | - | - | <0.0020 |
| Zinc (Zn)-Dissolved | mg/L | **0.03** | *0.075 if H<90; 0.15 if H 90-100; 0.9 If H 100-200; 1.65 if H 200-300; 2.4 if H 300 - 400* | **0.417** | **0.454** | - | - | - | - | **0.435** | **0.44** | 0.0300 | - | - | **0.0313** | ***2.78*** | - | - | ***3.78*** |

Note:
Bold font indicates CCME exceedances; italicized font indicates Yukon CSR exceedances
[H], Cd: The CWQG for cadmium is related to water hardness (as CaCO3)
When the water hardness is > 0 to < 17 mg/L, the CWQG is 0.04 µg/L; At hardness > 280 mg/L, the CWQG is 0.37 µg/L
At hardness ≥ 17 to ≤ 280 mg/L, the CWQG is calculated using this equation: CWQG (µg/L) = 10{0.83(log[hardness]) – 2.46 }
[H], Cu: The CWQG for copper is related to water hardness (as CaCO3):
When the water hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L; At hardness >180 mg/L, the CWQG is 4 µg/L
At hardness ≥82 to ≤180 mg/L the CWQG is calculated using this equation: CWQG (µg/L) = 0.2 * e{0.8545[ln(hardness)]-1.465}
[H], Pb:The CWQG for lead is related to water hardness (as CaCO3):
When the hardness is 0 to ≤ 60 mg/L, the CWQG is 1 µg/L; At hardness >180 mg/L, the CWQG is 7 µg/L
At hardness >60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L)= e{1.273[ln(hardness)]-4.705}
[H], Ni:The CWQG for nickel is related to water hardness (as CaCO3):
When the water hardness is 0 to ≤ 60 mg/L, the CWQG is 25 µg/L; At hardness >180 mg/L, the CWQG is 150 µg/L
At hardness > 60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L) = e{0.76[ln(hardness)]+1.06}

**Table D3-1: Groundwater Analytical Results 2013**

| Sample ID | UNITS | Comparison Guidelines | | MW09-07 STANDARD PRESERVATION | MW09-07 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-07 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MW09-07 ALTERNATE PRESERVATION #3 (UNPRESERVED) | W1410383 BH03 STANDARD PRESERVATION | W1410383 BH03 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | W1410383 BH03 ALTERNATE PRESERVATION #3 (UNPRESERVED) | PC-01 | PC-01 (UNPRESERVED) | PC-02 | PC-05 | PC-05 (UNPRESERVED) | GLL07-02 STANDARD PRESERVATION | GLL07-02 ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | GLL07-02 ALTERNATE PRESERVATION #3 (UNPRESERVED) | DC-01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Water Quality Guideline For Protection Aquatic Life | Yukon Contaminated Site Regulation O.I.C. 2002/171 | | | | | | | | | | | | | | | | |
| **Location** | | | | TAILINGS POND AREA | | | | TAILINGS POND AREA | | | PONY CREEK | | PONY CREEK | PONY CREEK | | | PONY CREEK | | DOME CREEK |
| **Date Sampled** | | | | 18-Sep-13 | 18-Sep-13 | 18-Sep-13 | 18-Sep-13 | 20-Sep-13 | 20-Sep-13 | 20-Sep-13 | 30-Sep-13 | 30-Sep-13 | 27-Sep-13 | 30-Sep-13 | 30-Sep-13 | 19-Sep-13 | 19-Sep-13 | 19-Sep-13 | 28-Sep-13 |
| **ALS Sample ID** | | | | L1367036-8 | L1367036-9 | L1367036-10 | L1367036-11 | L1367036-57 | L1367036-58 | L1367036-59 | L1371904-9 | L1371904-29 | L1371904-10 | L1371904-11 | L1371904-30 | L1367036-40 | L1367036-41 | L1367036-42 | L1371904-1 |
| **Physical Tests** | | | | | | | | | | | | | | | | | | | |
| Conductivity | uS/cm | | | 1180 | - | - | - | 807 | - | - | 362 | - | 334 | 285 | - | 329 | - | - | 456 |
| Hardness (as CaCO3) | mg/L | | | 787 | - | - | 718 | 423 | - | 457 | 167 | 89.6 | - | 156 | 143 | 179 | - | 168 | - |
| pH | pH | **6.5 to 9.0** | | **6.38** | - | - | - | **6.44** | - | - | 6.99 | - | 7.90 | 7.25 | - | 6.55 | - | - | 7.79 |
| **Anions and Nutrients** | | | | | | | | | | | | | | | | | | | |
| Alkalinity, Bicarbonate (as CaCO3) | mg/L | | | 172 | - | - | - | 200 | - | - | 142 | - | 69.9 | 79.6 | - | 83.9 | - | - | 86.7 |
| Alkalinity, Carbonate (as CaCO3) | mg/L | | | <1.0 | - | - | - | <1.0 | - | - | <1.0 | - | <1.0 | <1.0 | - | <1.0 | - | - | <1.0 |
| Alkalinity, Hydroxide (as CaCO3) | mg/L | | | <1.0 | - | - | - | <1.0 | - | - | <1.0 | - | <1.0 | <1.0 | - | <1.0 | - | - | <1.0 |
| Alkalinity, Total (as CaCO3) | mg/L | | | 172 | - | - | - | 200 | - | - | 142 | - | 69.9 | 79.6 | - | 83.9 | - | - | 86.7 |
| Ammonia, Total (as N) | mg/L | | *18.4 if pH<7.0; 18.5 if pH 7.0-7.5; 11.3 if pH 7.5-* | 1.48 | - | - | - | 8.53 | - | - | - | - | - | 0.0146 | - | 6.80 | - | - | - |
| Chloride (Cl) | mg/L | **120** | | <5.0 | - | - | - | <5.0 | - | - | 1.98 | - | 0.67 | 0.54 | - | <0.50 | - | - | 1.76 |
| Fluoride (F) | mg/L | **0.12** | *2 if H<50; 3 if H>50* | **<0.20** | - | - | - | **<0.20** | - | - | **0.216** | - | **0.172** | 0.073 | - | 0.053 | - | - | 0.091 |
| Nitrate (as N) | mg/L | **2.94** | *0.004* | *0.477* | - | - | - | *<0.050* | - | - | *0.0738* | - | *0.0468* | *0.0668* | - | *0.697* | - | - | *0.207* |
| Nitrite (as N) | mg/L | **0.06** | *0.2 if Cl<2 mg/L; 0.4 if Cl 2-4 mg/L; 0.6 if Cl 4-6* | 0.034 | - | - | - | <0.010 | - | - | 0.0064 | - | 0.0032 | 0.0015 | - | <0.0010 | - | - | 0.0016 |
| Total Kjeldahl Nitrogen | mg/L | | | 3.400 | - | - | - | 12.2 | - | - | - | - | - | 0.579 | - | 0.588 | - | - | - |
| Sulphate (SO4) | mg/L | | *1000* | 624 | - | - | - | 269 | - | - | 51 | - | 92 | 76 | - | 98 | - | - | 175 |
| Sulphide as S | mg/L | | *0.019* | *0.026* | - | - | - | - | - | - | *3.98* | - | - | *3.19* | - | - | - | - | - |
| Anion Sum | meq/L | | | 16.500 | - | - | - | 9.58 | - | - | 4.02 | - | - | 3.33 | - | 3.78 | - | - | - |
| Cation Sum | meq/L | | | 19.0 | - | - | - | 14.2 | - | - | 0.6 | - | - | 2.1 | - | 4.26 | - | - | - |
| Cation - Anion Balance | % | | | 07.2 | - | - | - | 19.4 | - | - | | | | | | 6.10 | - | - | |
| **Cyanides** | | | | | | | | | | | | | | | | | | | |
| Cyanide, Weak Acid Diss | mg/L | | *0.05* | <0.0050 | - | <0.0050 | - | <0.0050 | - | - | <0.0050 | - | - | <0.0050 | - | <0.0050 | - | - | - |
| Cyanide, Total | mg/L | | | <0.0050 | - | <0.0050 | - | <0.0050 | - | - | <0.0050 | - | - | <0.0050 | - | <0.0050 | - | - | - |
| Thiocyanate (SCN) | mg/L | | | 0.61 | <0.50 | <0.50 | - | 0.72 | 0.73 | - | <0.50 | - | - | <0.50 | - | 0.59 | <0.50 | - | - |
| Cyanide, Free | mg/L | **0.005** | | <0.0050 | - | <0.0050 | - | <0.0050 | - | - | <0.0050 | - | - | <0.0050 | - | <0.0050 | - | - | - |
| **Organic / Inorganic Carbon** | | | | | | | | | | | | | | | | | | | |
| Total Inorganic Carbon | mg/L | | | 31.1 | - | - | - | 33.9 | - | - | - | - | - | 20.4 | - | 19.1 | - | - | - |
| Total Organic Carbon | mg/L | | | 31.4 | - | - | - | 88.2 | - | - | - | - | - | 18.5 | - | 11.6 | - | - | - |
| **Dissolved Metals** | | | | | | | | | | | | | | | | | | | |
| Dissolved Mercury Filtration Location | - | | | FIELD | - | - | FIELD | FIELD | - | FIELD | FIELD | FIELD | - | FIELD | FIELD | FIELD | - | FIELD | - |
| Dissolved Metals Filtration Location | - | | | FIELD | - | - | FIELD | FIELD | - | FIELD | FIELD | FIELD | - | FIELD | FIELD | FIELD | - | FIELD | - |
| Aluminum (Al)-Dissolved | mg/L | **0.005 if pH<6.5; 0.1 if pH≥6.5** | | **0.0414** | - | - | **0.0310** | 0.0487 | - | 0.0303 | **0.107** | 0.0419 | - | 0.0179 | 0.0098 | 0.0109 | - | 0.0113 | - |
| Antimony (Sb)-Dissolved | mg/L | | *0.2* | 0.0039 | - | - | 0.00522 | 0.00041 | - | 0.00037 | 0.00094 | 0.00066 | - | 0.00113 | 0.00135 | 0.0006 | - | 0.00058 | - |
| Arsenic (As)-Dissolved | mg/L | **0.005** | *0.05* | ***0.512*** | - | - | ***0.418*** | ***0.0914*** | - | ***0.0724*** | **0.0126** | 0.00352 | - | 0.00252 | 0.0021 | 0.00127 | - | 0.00121 | - |
| Barium (Ba)-Dissolved | mg/L | | *10* | 0.024 | - | - | 0.0205 | 0.296 | - | 0.252 | 0.129 | 0.0555 | - | 0.0338 | 0.0303 | 0.02690 | - | 0.0264 | - |
| Beryllium (Be)-Dissolved | mg/L | | *0.053* | <0.00020 | - | - | <0.00020 | <0.00010 | - | <0.00010 | <0.00010 | <0.00010 | - | <0.00010 | <0.00010 | <0.00010 | - | <0.00010 | - |
| Bismuth (Bi)-Dissolved | mg/L | | | <0.0010 | - | - | <0.0010 | <0.00050 | - | <0.00050 | <0.00050 | <0.00050 | - | <0.00050 | <0.00050 | <0.00050 | - | <0.00050 | - |
| Boron (B)-Dissolved | mg/L | **1.5** | | 0.062 | - | - | 0.057 | 0.017 | - | 0.017 | 0.373 | 0.080 | - | 0.023 | 0.020 | <0.010 | - | <0.010 | - |
| Cadmium (Cd)-Dissolved | mg/L | **0.00004 to 0.00037 [H]** | *0.0001 if H<30; 0.0003 if H 30-90; 0.0005 If H 90-150; 0.0006 if H 150-210* | 0.00013 | - | - | 0.000208 | 0.000022 | - | 0.000020 | 0.000300 | 0.000152 | - | **0.000251** | 0.000137 | 0.000205 | - | 0.000170 | - |
| Calcium (Ca)-Dissolved | mg/L | | | 247 | - | - | 220 | 118 | - | 128 | 50 | 26 | - | 45 | 41 | 52 | - | 49 | - |
| Chromium (Cr)-Dissolved | mg/L | | | 000 | - | - | 0.00072 | 0.00077 | - | 0.00056 | 0.0117 | 0.00291 | - | 0.00045 | <0.00010 | 00.0 | - | 0.00013 | - |
| Cobalt (Co)-Dissolved | mg/L | | *0.009* | *0.02180* | - | - | *0.0192* | 0.00159 | - | 0.00175 | 0.00312 | 0.00104 | - | 0.00031 | 0.00014 | <0.00010 | - | <0.00010 | - |
| Copper (Cu)-Dissolved | mg/L | **0.002 to 0.004 [H]** | *0.02 if H<50; 0.03 if H 50-75; 0.04 If H 75-100; 0.05 if H 100-125; 0.06 if H 125-150; 0.7 If H 150-175; 0.8 if H 175-200;0.9 if H>200* | **0.0069** | - | - | **0.00687** | 0.00048 | - | 0.00028 | **0.123** | ***0.0413*** | - | **0.0140** | **0.0106** | 0.00331 | - | 0.00287 | - |
| Iron (Fe)-Dissolved | mg/L | **0.3** | | **4.0** | - | - | **3.2** | **82.7** | - | **72.8** | **6.5** | **1.3** | - | 0.1 | 0.03 | 0.028 | - | 0.022 | - |
| Lead (Pb)-Dissolved | mg/L | **0.001 to 0.007 [H]** | *0.04 if H<50; 0.05 if H 50-100; 0.06 If H 100-200; 0.11 if H 200-300; 0.160 if H>300* | 0.0015 | - | - | 0.00162 | 0.000138 | - | 0.000058 | **0.0140** | 0.00286 | - | 0.000430 | 0.000143 | 0.00022 | - | 0.000122 | - |
| Lithium (Li)-Dissolved | mg/L | | | 0.00170 | - | - | 0.0013 | <0.00050 | - | 0.00072 | <0.00050 | <0.00050 | - | <0.00050 | <0.00050 | <0.00050 | - | 0.00051 | - |
| Magnesium (Mg)-Dissolved | mg/L | | | 41.4 | - | - | 41.3 | 31.1 | - | 33.0 | 10.6 | 6.2 | - | 11.0 | 10.3 | 12.0 | - | 11.4 | - |
| Manganese (Mn)-Dissolved | mg/L | | | 15.60 | - | - | 13.80 | 3.53 | - | 4.68 | 0.93 | 0.21 | - | 0.03 | 0.03 | 0.00 | - | 0.00 | - |
| Mercury (Hg)-Dissolved | mg/L | **0.000026** | *0.001* | <0.000010 | - | - | <0.000010 | <0.000010 | - | <0.000010 | <0.000010 | <0.000010 | - | <0.000010 | <0.000010 | <0.000010 | - | <0.000010 | - |
| Molybdenum (Mo)-Dissolved | mg/L | **0.073** | *10* | 0.00066 | - | - | 0.00059 | 0.000553 | - | 0.000552 | 0.0132 | 0.00474 | - | 0.00186 | 0.00159 | 0.000101 | - | 0.000095 | - |
| Nickel (Ni)-Dissolved | mg/L | **0.025 to 0.15 [H]** | *0.25 if H<60; 0.65 if H 60-120; 1.1 If H 120-180; 1.5 if H>180* | 0.02180 | - | - | 0.0192 | 0.00139 | - | 0.00146 | 0.0422 | 0.0172 | - | 0.0102 | 0.00755 | 0.000730 | - | 0.00064 | - |
| Phosphorus (P)-Dissolved | mg/L | | | <0.050 | - | - | <0.050 | 0.124 | - | <0.25 | 0.248 | <0.050 | - | <0.050 | <0.050 | <0.050 | - | <0.050 | - |
| Potassium (K)-Dissolved | mg/L | | | 11.4 | - | - | 10.7 | 2.40 | - | 2.70 | 1.16 | 0.40 | - | 0.88 | 0.75 | 0.63 | - | 0.57 | - |
| Selenium (Se)-Dissolved | mg/L | **0.001** | *0.01* | <0.00020 | - | - | <0.00020 | 0.00017 | - | 0.00023 | 0.00010 | <0.00010 | - | <0.00010 | <0.00010 | <0.00010 | - | <0.00010 | - |
| Silicon (Si)-Dissolved | mg/L | | | 10.1 | - | - | 9.22 | 10.3 | - | 10.6 | 9.90 | 8.20 | - | 5.68 | 5.83 | 6.22 | - | 6.35 | - |
| Silver (Ag)-Dissolved | mg/L | **0.0001** | *0.0005 if H<100; 0.015 if H>100* | **0.00019** | - | - | **0.000197** | <0.000010 | - | <0.000010 | 0.000051 | 0.000013 | - | <0.000010 | <0.000010 | 0.000023 | - | 0.000020 | - |
| Sodium (Na)-Dissolved | mg/L | | | 48.300000 | - | - | 44.4 | 11.4 | - | 14.4 | 5.56 | 3.89 | - | 4.03 | 3.63 | 4.020000 | - | 4.08 | - |
| Strontium (Sr)-Dissolved | mg/L | | | 00.6 | - | - | 0.554 | 0.388 | - | 0.453 | 0.282 | 0.183 | - | 0.274 | 0.290 | 0.29 | - | 0.298 | - |
| Sulphur (S)-Dissolved | mg/L | | | 232 | - | - | 200 | 64 | - | 66 | 22 | 20 | - | 27 | 23 | 33 | - | 31 | - |
| Thallium (Tl)-Dissolved | mg/L | **0.0008** | *0.003* | <0.000020 | - | - | <0.000020 | <0.000010 | - | <0.000010 | 0.000013 | <0.000010 | - | 0.000014 | 0.000013 | <0.000010 | - | <0.000010 | - |
| Tin (Sn)-Dissolved | mg/L | | | <0.00020 | - | - | <0.00020 | <0.00010 | - | <0.00010 | 0.00022 | <0.00010 | - | <0.00010 | <0.00010 | <0.00010 | - | <0.00010 | - |
| Titanium (Ti)-Dissolved | mg/L | | *1* | <0.020 | - | - | <0.020 | <0.010 | - | <0.010 | <0.010 | <0.010 | - | <0.010 | <0.010 | <0.010 | - | <0.010 | - |
| Uranium (U)-Dissolved | mg/L | | *3* | 0.000718 | - | - | 0.000607 | 0.000597 | - | 0.000782 | 0.000212 | 0.000053 | - | 0.000184 | 0.000145 | 0.000275 | - | 0.000228 | - |
| Vanadium (V)-Dissolved | mg/L | | | <0.0020 | - | - | <0.0020 | 0.0025 | - | 0.0015 | <0.0010 | <0.0010 | - | <0.0010 | <0.0010 | <0.0010 | - | <0.0010 | - |
| Zinc (Zn)-Dissolved | mg/L | **0.03** | *0.075 if H<90; 0.15 if H 90-100; 0.9 If H 100-200; 1.65 if H 200-300; 2.4 if H 300 - 400* | **0.316** | - | - | **0.245** | 0.0089 | - | 0.0029 | **0.144** | **0.0658** | - | 0.0169 | 0.0079 | 0.0205 | - | 0.0187 | - |

Note:
Bold font indicates CCME exceedances; italicized font indicates Yukon CSR exceedances
[H], Cd: The CWQG for cadmium is related to water hardness (as CaCO3)
When the water hardness is > 0 to < 17 mg/L, the CWQG is 0.04 µg/L; At hardness > 280 mg/L, the CWQG is 0.37 µg/L
At hardness ≥ 17 to ≤ 280 mg/L, the CWQG is calculated using this equation: CWQG (µg/L) = 10{0.83(log[hardness]) – 2.46 }
[H], Cu: The CWQG for copper is related to water hardness (as CaCO3):
When the water hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L; At hardness >180 mg/L, the CWQG is 4 µg/L
At hardness ≥82 to ≤180 mg/L the CWQG is calculated using this equation: CWQG (µg/L) = 0.2 * e{0.8545[ln(hardness)]-1.465}
[H], Pb:The CWQG for lead is related to water hardness (as CaCO3):
When the hardness is 0 to ≤ 60 mg/L, the CWQG is 1 µg/L; At hardness >180 mg/L, the CWQG is 7 µg/L
At hardness >60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L)= e{1.273[ln(hardness)]-4.705}
[H], Ni:The CWQG for nickel is related to water hardness (as CaCO3):
When the water hardness is 0 to ≤ 60 mg/L, the CWQG is 25 µg/L; At hardness >180 mg/L, the CWQG is 150 µg/L
At hardness > 60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L) = e{0.76[ln(hardness)]+1.06}

**Table D3-1: Groundwater Analytical Results 2013**

| Sample ID | UNITS | Comparison Guidelines | | DC-02 | DC-02 (UNPRESERVED) | DC-03 | DC-03 (UNPRESERVED) | DC-05 | DC-05 (UNPRESERVED) | DC-06 | DUP_01 | DC-06 (UNPRESERVED) | DUP_01 (UNPRESERVED) | DC-07 | DC-07 (UNPRESERVED) | DC-09 | DC-09 (UNPRESERVED) | DC-10 | DC-10 (UNPRESERVED) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Water Quality Guideline For Protection Aquatic Life | Yukon Contaminated Site Regulation O.I.C. 2002/171 | | | | | | | | | | | | | | | | |
| **Location** | | | | DOMCE CREEK | | DOMCE CREEK | | DOME CREEK | | DOME CREEK | | | | DOME CREEK | | DOME CREEK | | DOME CREEK | |
| **Date Sampled** | | | | 27-Sep-13 | 28-Sep-13 | 30-Sep-13 | 30-Sep-13 | 30-Sep-13 | 30-Sep-13 | 28-Sep-13 | 28-Sep-13 | 28-Sep-13 | 28-Sep-13 | 28-Sep-13 | 28-Sep-13 | 28-Sep-13 | 28-Sep-13 | 29-Sep-13 | 29-Sep-13 |
| **ALS Sample ID** | | | | L1371904-2 | L1371904-22 | L1371904-3 | L1371904-23 | L1371904-4 | L1371904-24 | L1371904-5 | L1371904-20 | L1371904-25 | L1371904-39 | L1371904-6 | L1371904-26 | L1371904-7 | L1371904-27 | L1371904-8 | L1371904-28 |
| **Physical Tests** | | | | | | | | | | | | | | | | | | | |
| Conductivity | uS/cm | | | 838 | - | 924 | - | 1280 | - | 1090 | 1090 | - | - | 474 | - | 459 | - | 666 | - |
| Hardness (as CaCO3) | mg/L | | | 586 | 599 | 667 | 676 | 759 | 680 | 795 | 788 | 781 | 777 | 222 | 196 | 272 | 257 | 382 | 345 |
| pH | pH | **6.5 to 9.0** | | 6.99 | - | 7.68 | - | 7.27 | - | 7.35 | 7.35 | - | - | 7.05 | - | **6.33** | - | **6.32** | - |
| **Anions and Nutrients** | | | | | | | | | | | | | | | | | | | |
| Alkalinity, Bicarbonate (as CaCO3) | mg/L | | | 300 | - | 251 | - | 250 | - | 785 | 789 | - | - | 137 | - | 51.6 | - | 127 | - |
| Alkalinity, Carbonate (as CaCO3) | mg/L | | | <1.0 | - | <1.0 | - | <1.0 | - | <1.0 | <1.0 | - | - | <1.0 | - | <1.0 | - | <1.0 | - |
| Alkalinity, Hydroxide (as CaCO3) | mg/L | | | <1.0 | - | <1.0 | - | <1.0 | - | <1.0 | <1.0 | - | - | <1.0 | - | <1.0 | - | <1.0 | - |
| Alkalinity, Total (as CaCO3) | mg/L | | | 300 | - | 251 | - | 250 | - | 785 | 789 | - | - | 137 | - | 51.6 | - | 127 | - |
| Ammonia, Total (as N) | mg/L | | *18.4 if pH<7.0; 18.5 if pH 7.0-7.5; 11.3 if pH 7.5-* | 1.96 | - | 0.505 | - | 0.419 | - | 2.41 | 2.27 | - | - | 1.56 | - | 4.70 | - | 1.84 | - |
| Chloride (Cl) | mg/L | **120** | | <5.0 | - | <5.0 | - | <5.0 | - | 7.8 | 7.8 | - | - | 1.50 | - | 0.51 | - | 2.04 | - |
| Fluoride (F) | mg/L | **0.12** | *2 if H<50; 3 if H>50* | **<0.20** | - | **0.25** | - | **0.20** | - | **0.51** | **0.42** | - | - | **0.145** | - | 0.041 | - | **0.155** | - |
| Nitrate (as N) | mg/L | **2.94** | *0.004* | *0.053* | - | *<0.050* | - | *<0.050* | - | *<0.050* | *<0.050* | - | - | *0.0306* | - | *0.0209* | - | *0.0650* | - |
| Nitrite (as N) | mg/L | **0.06** | *0.2 if Cl<2 mg/L; 0.4 if Cl 2-4 mg/L; 0.6 if Cl 4-6* | <0.010 | - | <0.010 | - | <0.010 | - | <0.010 | <0.010 | - | - | 0.0046 | - | 0.0018 | - | 0.0047 | - |
| Total Kjeldahl Nitrogen | mg/L | | | 13.9 | - | 16.7 | - | 2.17 | - | 7.94 | 6.77 | - | - | 4.35 | - | 7.41 | - | 5.05 | - |
| Sulphate (SO4) | mg/L | | *1000* | 257 | - | 404 | - | 681 | - | <5.0 | <5.0 | - | - | 132 | - | 191 | - | 277 | - |
| Sulphide as S | mg/L | | *0.019* | *11.4* | - | *13.4* | - | *19.2* | - | *15.9* | *16.0* | - | - | *5.55* | - | *5.03* | - | *8.38* | - |
| Anion Sum | meq/L | | | 14.2 | - | 13.9 | - | 16.5 | - | 18.3 | 18.1 | - | - | 6.09 | - | 7.84 | - | 13.8 | - |
| Cation Sum | meq/L | | | 11.1 | - | 1.8 | - | -7.7 | - | 7.0 | 6.2 | - | - | 4.6 | - | 21.8 | - | 24.4 | - |
| Cation - Anion Balance | % | | | | | | | | | | | | | | | | | | |
| **Cyanides** | | | | | | | | | | | | | | | | | | | |
| Cyanide, Weak Acid Diss | mg/L | | *0.05* | <0.0050 | - | <0.0050 | - | <0.0050 | - | <0.0050 | <0.0050 | - | - | <0.0050 | - | <0.0050 | - | <0.0050 | - |
| Cyanide, Total | mg/L | | | <0.0050 | - | <0.0050 | - | <0.0050 | - | <0.0050 | <0.0050 | - | - | <0.0050 | - | <0.0050 | - | <0.0050 | - |
| Thiocyanate (SCN) | mg/L | | | <0.50 | - | <0.50 | - | <0.50 | - | <0.50 | <0.50 | - | - | <0.50 | - | <0.50 | - | 0.66 | - |
| Cyanide, Free | mg/L | **0.005** | | <0.0050 | - | <0.0050 | - | <0.0050 | - | <0.0050 | <0.0050 | - | - | <0.0050 | - | <0.0050 | - | <0.0050 | - |
| **Organic / Inorganic Carbon** | | | | | | | | | | | | | | | | | | | |
| Total Inorganic Carbon | mg/L | | | 71.4 | - | 58.9 | - | - | - | 174 | 183 | - | - | 30.9 | - | 12.4 | - | 25.8 | - |
| Total Organic Carbon | mg/L | | | 127 | - | 220 | - | 19.1 | - | 128 | 131 | - | - | 42.8 | - | 64.7 | - | 73.2 | - |
| **Dissolved Metals** | | | | | | | | | | | | | | | | | | | |
| Dissolved Mercury Filtration Location | - | | | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD |
| Dissolved Metals Filtration Location | - | | | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD | FIELD |
| Aluminum (Al)-Dissolved | mg/L | **0.005 if pH<6.5; 0.1 if pH≥6.5** | | 0.0167 | <0.0010 | 0.0041 | 0.0019 | 0.0068 | <0.0010 | 0.0254 | 0.0262 | 0.0210 | 0.0210 | 0.0194 | 0.0150 | 0.0554 | 0.0498 | **0.237** | **0.212** |
| Antimony (Sb)-Dissolved | mg/L | | *0.2* | 0.00065 | 0.00033 | 0.00386 | 0.00393 | 0.00292 | 0.00151 | 0.00065 | 0.00056 | 0.00085 | 0.00082 | 0.00174 | 0.00129 | 0.00081 | 0.00086 | 0.00252 | 0.00180 |
| Arsenic (As)-Dissolved | mg/L | **0.005** | *0.05* | ***0.186*** | **0.0135** | **0.00648** | **0.00647** | **0.0438** | **0.0143** | ***0.225*** | ***0.223*** | ***0.225*** | ***0.222*** | ***0.131*** | ***0.136*** | ***0.103*** | ***0.0936*** | ***0.0652*** | **0.0425** |
| Barium (Ba)-Dissolved | mg/L | | *10* | 0.211 | 0.147 | 0.0357 | 0.0348 | 0.0710 | 0.0578 | 0.332 | 0.329 | 0.331 | 0.322 | 0.0933 | 0.0899 | 0.0820 | 0.0802 | 0.362 | 0.308 |
| Beryllium (Be)-Dissolved | mg/L | | *0.053* | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 |
| Bismuth (Bi)-Dissolved | mg/L | | | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 |
| Boron (B)-Dissolved | mg/L | **1.5** | | 0.026 | 0.019 | 0.550 | 0.564 | 0.194 | 0.255 | 0.093 | 0.077 | 0.379 | 0.320 | 0.302 | 0.172 | 0.749 | 0.766 | 0.655 | 0.682 |
| Cadmium (Cd)-Dissolved | mg/L | **0.00004 to 0.00037 [H]** | *0.0001 if H<30; 0.0003 if H 30-90; 0.0005 If H 90-150; 0.0006 if H 150-210* | 0.000086 | <0.000010 | **0.00170** | **0.00142** | 0.000164 | 0.000268 | <0.000010 | 0.000015 | 0.000018 | <0.000010 | 0.000122 | 0.000011 | 0.000029 | 0.000014 | 0.000281 | 0.000276 |
| Calcium (Ca)-Dissolved | mg/L | | | 150 | 147 | 171 | 167 | 179 | 155 | 199 | 197 | 194 | 193 | 63 | 55 | 74 | 70 | 112 | 101 |
| Chromium (Cr)-Dissolved | mg/L | | | 0.00027 | <0.00010 | 0.00071 | 0.00065 | 0.00060 | 0.00030 | 0.00181 | 0.00182 | 0.00239 | 0.00223 | 0.00094 | 0.00061 | 0.00216 | 0.00178 | 0.00976 | 0.00640 |
| Cobalt (Co)-Dissolved | mg/L | | *0.009* | 0.00234 | 0.00167 | 0.00430 | 0.00427 | 0.0108 | 0.0121 | 0.00444 | 0.00431 | 0.00469 | 0.00475 | 0.00320 | 0.00299 | 0.00435 | 0.00388 | *0.0268* | *0.0242* |
| Copper (Cu)-Dissolved | mg/L | **0.002 to 0.004 [H]** | *0.02 if H<50; 0.03 if H 50-75; 0.04 If H 75-100; 0.05 if H 100-125; 0.06 if H 125-150; 0.7 If H 150-175; 0.8 if H 175-200;0.9 if H>200* | 0.00052 | <0.00020 | **0.0995** | **0.0740** | 0.00232 | **0.00476** | 0.00063 | 0.00032 | 0.00120 | 0.00124 | **0.00529** | 0.00209 | **0.0153** | **0.0112** | **0.0429** | **0.0343** |
| Iron (Fe)-Dissolved | mg/L | **0.3** | | **34.8** | **5.9** | 0.042 | 0.044 | **6.9** | **3.1** | **18.2** | **17.7** | **9.1** | **6.2** | **11.5** | **11.4** | **21.0** | **19.3** | **82.9** | **55.7** |
| Lead (Pb)-Dissolved | mg/L | **0.001 to 0.007 [H]** | *0.04 if H<50; 0.05 if H 50-100; 0.06 If H 100-200; 0.11 if H 200-300; 0.160 if H>300* | 0.000277 | <0.000050 | 0.000477 | 0.000510 | 0.000548 | 0.000246 | 0.000070 | 0.000059 | 0.000176 | 0.000165 | 0.00140 | 0.000398 | 0.00194 | 0.00142 | **0.00985** | **0.00858** |
| Lithium (Li)-Dissolved | mg/L | | | <0.00050 | <0.00050 | 0.00456 | 0.00660 | 0.00355 | 0.00450 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | 0.00123 | <0.00050 | 0.00149 | 0.0167 | 0.00683 |
| Magnesium (Mg)-Dissolved | mg/L | | | 51.4 | 56.6 | 58.4 | 62.7 | 75.9 | 71.1 | 72.4 | 71.6 | 72.3 | 71.4 | 15.6 | 13.9 | 21.2 | 20.1 | 24.8 | 22.7 |
| Manganese (Mn)-Dissolved | mg/L | | | 4.20 | 3.97 | 3.47 | 3.45 | 4.57 | 4.32 | 5.77 | 5.48 | 5.73 | 5.63 | 1.18 | 1.08 | 1.80 | 1.81 | 9.80 | 9.41 |
| Mercury (Hg)-Dissolved | mg/L | **0.000026** | *0.001* | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | 0.000013 | <0.000010 |
| Molybdenum (Mo)-Dissolved | mg/L | **0.073** | *10* | 0.00430 | 0.00334 | 0.0133 | 0.0146 | 0.0506 | 0.0486 | 0.00851 | 0.00754 | 0.0127 | 0.0138 | 0.00639 | 0.00409 | 0.0183 | 0.0188 | 0.0218 | 0.0141 |
| Nickel (Ni)-Dissolved | mg/L | **0.025 to 0.15 [H]** | *0.25 if H<60; 0.65 if H 60-120; 1.1 If H 120-180; 1.5 if H>180* | 0.0149 | 0.0117 | 0.0565 | 0.0570 | **0.182** | **0.190** | 0.0223 | 0.0210 | 0.0342 | 0.0336 | 0.0231 | 0.0184 | 0.0409 | 0.0366 | 0.113 | 0.0908 |
| Phosphorus (P)-Dissolved | mg/L | | | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.092 | 0.090 | 0.083 | 0.081 | <0.050 | <0.050 | 0.130 | 0.114 | 0.077 | 0.081 |
| Potassium (K)-Dissolved | mg/L | | | 3.91 | 3.90 | 4.39 | 4.23 | 5.76 | 5.17 | 3.42 | 3.25 | 4.50 | 4.38 | 3.24 | 2.71 | 3.11 | 2.91 | 7.78 | 5.65 |
| Selenium (Se)-Dissolved | mg/L | **0.001** | *0.01* | <0.00010 | <0.00010 | 0.00010 | 0.00012 | <0.00010 | 0.00011 | 0.00051 | 0.00049 | 0.00066 | 0.00068 | 0.00014 | 0.00017 | 0.00013 | 0.00014 | 0.00045 | 0.00045 |
| Silicon (Si)-Dissolved | mg/L | | | 9.02 | 7.86 | 7.45 | 7.59 | 7.52 | 7.31 | 8.83 | 8.65 | 8.36 | 8.09 | 6.94 | 7.00 | 8.17 | 8.21 | 9.56 | 8.61 |
| Silver (Ag)-Dissolved | mg/L | **0.0001** | *0.0005 if H<100; 0.015 if H>100* | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | 0.000014 | <0.000010 | <0.000010 | 0.000033 | 0.000026 | 0.000062 | 0.000055 |
| Sodium (Na)-Dissolved | mg/L | | | 5.53 | 6.01 | 6.86 | 7.12 | 13.3 | 11.2 | 22.9 | 22.8 | 24.5 | 24.0 | 18.4 | 18.0 | 18.1 | 18.3 | 22.6 | 22.8 |
| Strontium (Sr)-Dissolved | mg/L | | | 0.358 | 0.335 | 0.409 | 0.441 | 0.599 | 0.555 | 0.894 | 0.828 | 0.890 | 0.794 | 0.215 | 0.198 | 0.257 | 0.275 | 0.497 | 0.467 |
| Sulphur (S)-Dissolved | mg/L | | | 98 | 91 | 137 | 126 | 183 | 147 | 2 | 2 | 2 | 2 | 43 | 37 | 76 | 69 | 101 | 91 |
| Thallium (Tl)-Dissolved | mg/L | **0.0008** | *0.003* | <0.000010 | <0.000010 | 0.000058 | 0.000054 | 0.000045 | 0.000038 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | 0.00002 |
| Tin (Sn)-Dissolved | mg/L | | | <0.00010 | <0.00010 | 0.00015 | 0.00016 | <0.00010 | <0.00010 | <0.00010 | 0.00030 | 0.00010 | <0.00010 | <0.00010 | <0.00010 | 0.00014 | 0.00013 | 0.00024 | 0.00016 |
| Titanium (Ti)-Dissolved | mg/L | | *1* | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 |
| Uranium (U)-Dissolved | mg/L | | *3* | 0.000298 | 0.000212 | 0.00151 | 0.00157 | 0.00187 | 0.00119 | 0.000406 | 0.000340 | 0.000535 | 0.000485 | 0.000155 | 0.000089 | 0.000241 | 0.000194 | 0.000900 | 0.000721 |
| Vanadium (V)-Dissolved | mg/L | | | <0.0010 | <0.0010 | <0.0010 | <0.0010 | <0.0010 | <0.0010 | 0.0156 | 0.0152 | 0.0133 | 0.0128 | 0.0023 | 0.0024 | 0.0053 | 0.0047 | 0.0175 | 0.0141 |
| Zinc (Zn)-Dissolved | mg/L | **0.03** | *0.075 if H<90; 0.15 if H 90-100; 0.9 If H 100-200; 1.65 if H 200-300; 2.4 if H 300 - 400* | 0.0198 | 0.0063 | **0.167** | **0.152** | **0.0351** | **0.0422** | 0.0061 | 0.0073 | 0.0053 | 0.0052 | 0.0194 | 0.0148 | **0.0308** | 0.0188 | **0.108** | **0.118** |

Note:

Bold font indicates CCME exceedances; italicized font indicates Yukon CSR exceedances

[H], Cd: The CWQG for cadmium is related to water hardness (as CaCO3)

When the water hardness is > 0 to < 17 mg/L, the CWQG is 0.04 µg/L; At hardness > 280 mg/L, the CWQG is 0.37 µg/L

At hardness ≥ 17 to ≤ 280 mg/L, the CWQG is calculated using this equation: CWQG (µg/L) = 10{0.83(log[hardness]) – 2.46 }

[H], Cu: The CWQG for copper is related to water hardness (as CaCO3):

When the water hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L; At hardness >180 mg/L, the CWQG is 4 µg/L

At hardness ≥82 to ≤180 mg/L the CWQG is calculated using this equation: CWQG (µg/L) = 0.2 * e{0.8545[ln(hardness)]-1.465}

[H], Pb:The CWQG for lead is related to water hardness (as CaCO3):

When the hardness is 0 to ≤ 60 mg/L, the CWQG is 1 µg/L; At hardness >180 mg/L, the CWQG is 7 µg/L

At hardness >60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L)= e{1.273[ln(hardness)]-4.705}

[H], Ni:The CWQG for nickel is related to water hardness (as CaCO3):

When the water hardness is 0 to ≤ 60 mg/L, the CWQG is 25 µg/L; At hardness >180 mg/L, the CWQG is 150 µg/L

At hardness > 60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L) = e{0.76[ln(hardness)]+1.06}

## Table D3-2: Surface Water Analytical Results 2013

| Sample ID | UNITS | Comparison Guidelines | | SEEP STANDARD PRESERVATION | SEEP ALTERNATE PRESERVATION #1 (SCN WITH HN03) | SEEP ALTERNATE PRESERVATION #3 (UNPRESERVED) | OPEN PIT-UPPER STANDARD PRESERVATION | OPEN PIT-UPPER STANDARD PRESERVATION-RECEIVED 1-OCT-13 | OPEN PIT-UPPER ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | OPEN PIT-UPPER ALTERNATE PRESERVATION #3 (UNPRESERVED) | OPEN PIT-MIDDLE STANDARD PRESERVATION | OPEN PIT-MIDDLE ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | OPEN PIT-MIDDLE ALTERNATE PRESERVATION #3 (UNPRESERVED) | OPEN PIT-BOTTOM STANDARD PRESERVATION | OPEN PIT-BOTTOM ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | OPEN PIT-BOTTOM ALTERNATE PRESERVATION #3 (UNPRESERVED) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Water Quality Guideline For Protection Aquatic Life | Yukon Contaminated Site Regulation O.I.C. 2002/171 | | | | | | | | | | | | | |
| **Area** | | | | SEEPAGE POND | | | OPEN PIT | | | | OPEN PIT | | | OPEN PIT | | |
| **Date Sampled** | | | | 17-Sep-13 | 17-Sep-13 | 17-Sep-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 |
| **ALS Sample ID** | | | | L1365603-41 | L1365603-42 | L1365603-44 | L1368203-10 | L1368203-18 | L1368203-11 | L1368203-12 | L1368203-7 | L1368203-8 | L1368203-9 | L1368203-4 | L1368203-5 | L1368203-6 |
| **Physical Tests** | | | | | | | | | | | | | | | | |
| Conductivity | uS/cm | | | 1630 | - | - | 1500 | - | - | - | 1500 | - | - | 1480 | - | - |
| Hardness (as CaCO3) | mg/L | | | 924 | - | 946 | 1140 | - | - | 1120 | 1120 | - | 1130 | 1110 | - | 1130 |
| pH | pH | **6.5 to 9.0** | | 7.52 | - | - | 8.03 | - | - | - | 8.05 | - | - | 8.02 | - | - |
| **Anions and Nutrients** | | | | | | | | | | | | | | | | |
| Alkalinity, Bicarbonate (as CaCO3) | mg/L | | | 266 | - | - | | | | | | | | | | |
| Alkalinity, Carbonate (as CaCO3) | mg/L | | | <1.0 | - | - | | | | | | | | | | |
| Alkalinity, Hydroxide (as CaCO3) | mg/L | | | <1.0 | - | - | | | | | | | | | | |
| Alkalinity, Total (as CaCO3) | mg/L | | | 266 | - | - | 160 | - | - | - | 158 | - | - | 158 | - | - |
| Ammonia, Total (as N) | mg/L | | *18.4 if pH<7.0; 18.5 if pH 7.0-7.5; 11.3 if pH 7.5-8.0; 3.7 if pH 8.0-8.5; 1.31 if pH≥8.5* | 3.94 | - | - | <0.0050 | - | - | - | <0.0050 | - | - | 0.0058 | - | - |
| Chloride (Cl) | mg/L | **120** | | <5.0 | - | - | <5.0 | - | - | - | <5.0 | - | - | <5.0 | - | - |
| Fluoride (F) | mg/L | **0.12** | *2 if H<50; 3 if H>50* | **<0.20** | - | - | **0.22** | - | - | - | **0.21** | - | - | **0.21** | - | - |
| Nitrate (as N) | mg/L | **2.94** | *0.004* | *1.21* | - | - | *<0.050* | - | - | - | *<0.050* | - | - | *<0.050* | - | - |
| Nitrite (as N) | mg/L | **0.06** | *0.2 if Cl<2 mg/L; 0.4 if Cl 2-4 mg/L; 0.6 if Cl 4-6 mg/L; 0.8 if Cl 6-8 mg/L; 1.0 if Cl8-10 mg/L; 2.0 if Cl≥10 mg/L* | 0.029 | - | - | <0.010 | - | - | - | <0.010 | - | - | <0.010 | - | - |
| Total Kjeldahl Nitrogen | mg/L | | | 5.69 | - | - | 0.093 | - | - | - | 0.087 | - | - | 0.096 | - | - |
| Sulphate (SO4) | mg/L | | *1000* | 754 | - | - | 951 | - | - | - | 947 | - | - | 950 | - | - |
| Sulphide as S | mg/L | | *0.019* | *<0.020* | - | - | | | | | | | | | | |
| Anion Sum | meq/L | | | 21.1 | - | - | 23 | - | - | - | 22.9 | - | - | 23 | - | - |
| Cation Sum | meq/L | | | 21.2 | - | - | 23.4 | - | - | - | 23 | - | - | 22.7 | - | - |
| Cation - Anion Balance | % | | | 0.3 | - | - | 0.8 | - | - | - | 0.3 | - | - | -0.5 | - | - |
| **Cyanides** | | | | | | | | | | | | | | | | |
| Cyanide, Weak Acid Diss | mg/L | | *0.05* | 0.0088 | - | - | - | <0.0050 | - | - | <0.0050 | - | - | <0.0050 | - | - |
| Cyanide, Total | mg/L | | | 0.0899 | - | - | - | <0.0050 | - | - | <0.0050 | - | - | <0.0050 | - | - |
| Thiocyanate (SCN) | mg/L | | | 2.97 | 2.90 | - | - | <0.50 | <0.50 | - | <0.50 | <0.50 | - | 0.95 | <0.50 | - |
| Cyanide, Free | mg/L | **0.005** | | **0.0053** | - | - | - | <0.0050 | - | - | <0.0050 | - | - | <0.0050 | - | - |
| **Organic / Inorganic Carbon** | | | | | | | | | | | | | | | | |
| Total Inorganic Carbon | mg/L | | | 57.5 | - | - | - | 36 | - | - | 34.4 | - | - | 33.8 | - | - |
| Total Organic Carbon | mg/L | | | 17.0 | - | - | 1.5 | - | - | - | 1.36 | - | - | 1.32 | - | - |
| **Total Metals** | | | | | | | | | | | | | | | | |
| Aluminum (Al)-Total | mg/L | **0.005 if pH<6.5; 0.1 if pH≥6.5** | | 0.0208 | - | 0.0220 | 0.0054 | - | - | 0.0079 | 0.0056 | - | 0.0159 | 0.0108 | - | 0.0446 |
| Antimony (Sb)-Total | mg/L | | *0.2* | 0.00070 | - | 0.00061 | 0.0037 | - | - | 0.00372 | 0.00361 | - | 0.00365 | 0.00364 | - | 0.00366 |
| Arsenic (As)-Total | mg/L | **0.005** | *0.05* | **0.0487** | - | **0.0467** | **0.0116** | - | - | **0.0109** | **0.0114** | - | **0.0109** | **0.0114** | - | **0.0111** |
| Barium (Ba)-Total | mg/L | | *10* | 0.0682 | - | 0.0693 | 0.0121 | - | - | 0.0119 | 0.012 | - | 0.0121 | 0.012 | - | 0.0122 |
| Beryllium (Be)-Total | mg/L | | *0.053* | <0.00010 | - | <0.00010 | <0.00010 | - | - | <0.00010 | <0.00010 | - | <0.00010 | <0.00010 | - | <0.00010 |
| Bismuth (Bi)-Total | mg/L | | | <0.00050 | - | <0.00050 | <0.00050 | - | - | <0.00050 | <0.00050 | - | <0.00050 | <0.00050 | - | <0.00050 |
| Boron (B)-Total | mg/L | **1.5** | | 0.067 | - | 0.076 | <0.010 | - | - | <0.010 | <0.010 | - | <0.010 | <0.010 | - | <0.010 |
| Cadmium (Cd)-Total | mg/L | **0.00004 to 0.00037 [H]** | *0.0001 if H<30; 0.0003 if H 30-90; 0.0005 If H 90-150; 0.0006 if H 150-210* | ***0.000544*** | - | ***0.000546*** | ***0.00282*** | - | - | ***0.00273*** | ***0.00276*** | - | ***0.00274*** | ***0.00269*** | - | ***0.00278*** |
| Calcium (Ca)-Total | mg/L | | | 276 | - | 282 | 311 | - | - | 307 | 307 | - | 310 | 301 | - | 309 |
| Chromium (Cr)-Total | mg/L | | | 0.00056 | - | 0.00052 | 0.00024 | - | - | 0.00017 | 0.00019 | - | 0.00012 | 0.00017 | - | 0.00011 |
| Cobalt (Co)-Total | mg/L | | *0.009* | 0.00738 | - | 0.00745 | <0.00010 | - | - | <0.00010 | <0.00010 | - | <0.00010 | <0.00010 | - | <0.00010 |
| Copper (Cu)-Total | mg/L | **0.002 to 0.004 [H]** | *0.02 if H<50; 0.03 if H 50-75; 0.04 If H 75-100; 0.05 if H 100-125; 0.06 if H 125-150; 0.7 If H 150-175; 0.8 if H 175-200;0.9 if H>200* | **0.00468** | - | **0.00479** | 0.0021 | - | - | 0.00182 | 0.00197 | - | 0.00192 | 0.00195 | - | 0.00191 |
| Iron (Fe)-Total | mg/L | **0.3** | | **9.18** | - | **8.74** | 0.037 | - | - | 0.026 | 0.036 | - | 0.028 | 0.048 | - | 0.032 |
| Lead (Pb)-Total | mg/L | **0.001 to 0.007 [H]** | *0.04 if H<50; 0.05 if H 50-100; 0.06 If H 100-200; 0.11 if H 200-300; 0.160 if H>300* | 0.000129 | - | 0.000103 | 0.000435 | - | - | 0.00034 | 0.000457 | - | 0.000357 | 0.000685 | - | 0.000424 |
| Lithium (Li)-Total | mg/L | | | 0.00068 | - | 0.00080 | 0.00877 | - | - | 0.00874 | 0.00842 | - | 0.00856 | 0.00835 | - | 0.00861 |
| Magnesium (Mg)-Total | mg/L | | | 57.0 | - | 59.2 | 87.9 | - | - | 86.4 | 86.5 | - | 86.8 | 86.2 | - | 87.9 |
| Manganese (Mn)-Total | mg/L | | | 5.60 | - | 5.61 | 0.0535 | - | - | 0.0525 | 0.0521 | - | 0.0523 | 0.0525 | - | 0.0527 |
| Mercury (Hg)-Total | mg/L | **0.000026** | *0.001* | <0.000010 | - | <0.000010 | <0.000010 | - | - | <0.000010 | <0.000010 | - | <0.000010 | **<0.000050** | - | <0.000010 |
| Molybdenum (Mo)-Total | mg/L | **0.073** | *10* | 0.000914 | - | 0.00106 | 0.000149 | - | - | 0.000173 | 0.000164 | - | 0.00015 | 0.00019 | - | 0.000162 |
| Nickel (Ni)-Total | mg/L | **0.025 to 0.15 [H]** | *0.25 if H<60; 0.65 if H 60-120; 1.1 If H 120-180; 1.5 if H>180* | 0.00280 | - | 0.00275 | <0.00050 | - | - | <0.00050 | <0.00050 | - | <0.00050 | <0.00050 | - | <0.00050 |
| Phosphorus (P)-Total | mg/L | | | <0.050 | - | <0.050 | <0.050 | - | - | <0.050 | <0.050 | - | <0.050 | <0.050 | - | <0.050 |
| Potassium (K)-Total | mg/L | | | 5.76 | - | 5.93 | 3.89 | - | - | 3.72 | 3.79 | - | 3.76 | 3.71 | - | 3.8 |
| Selenium (Se)-Total | mg/L | **0.001** | *0.01* | 0.00020 | - | 0.00020 | <0.00010 | - | - | <0.00010 | <0.00010 | - | <0.00010 | <0.00010 | - | <0.00010 |
| Silicon (Si)-Total | mg/L | | | 6.56 | - | 6.67 | 2.96 | - | - | 2.86 | 2.87 | - | 2.9 | 2.84 | - | 2.9 |
| Silver (Ag)-Total | mg/L | **0.0001** | *0.0005 if H<100; 0.015 if H>100* | 0.000025 | - | 0.000035 | <0.000010 | - | - | <0.000010 | <0.000010 | - | <0.000010 | 0.000012 | - | 0.000012 |
| Sodium (Na)-Total | mg/L | | | 37.5 | - | 38.3 | 11.7 | - | - | 11.7 | 11.5 | - | 11.5 | 11.2 | - | 11.5 |
| Strontium (Sr)-Total | mg/L | | | 0.703 | - | 0.830 | 0.969 | - | - | 0.965 | 0.95 | - | 0.957 | 0.924 | - | 0.959 |
| Sulphur (S)-Total | mg/L | | | 249 | - | 254 | 331 | - | - | 327 | 326 | - | 329 | 320 | - | 330 |
| Thallium (Tl)-Total | mg/L | **0.0008** | *0.003* | <0.000010 | - | <0.000010 | 0.000079 | - | - | 0.000076 | 0.00008 | - | 0.000078 | 0.000076 | - | 0.000077 |
| Tin (Sn)-Total | mg/L | | | <0.00010 | - | <0.00010 | <0.00010 | - | - | <0.00010 | <0.00010 | - | <0.00010 | <0.00010 | - | <0.00010 |
| Titanium (Ti)-Total | mg/L | | *1* | <0.010 | - | <0.010 | <0.010 | - | - | <0.010 | <0.010 | - | <0.010 | <0.010 | - | <0.010 |
| Uranium (U)-Total | mg/L | | *3* | 0.00307 | - | 0.00361 | 0.00402 | - | - | 0.00402 | 0.00398 | - | 0.004 | 0.00398 | - | 0.00401 |
| Vanadium (V)-Total | mg/L | | | 0.0019 | - | 0.0019 | <0.0010 | - | - | <0.0010 | <0.0010 | - | <0.0010 | <0.0010 | - | <0.0010 |
| Zinc (Zn)-Total | mg/L | **0.03** | *0.075 if H<90; 0.15 if H 90-100; 0.9 If H 100-200; 1.65 if H 200-300; 2.4 if H 300 - 400* | 0.0084 | - | 0.0084 | **0.293** | - | - | **0.29** | **0.288** | - | **0.29** | **0.283** | - | **0.292** |

Note:
Bold font indicates CCME exceedances; italicized font indicates Yukon CSR exceedances
[H], Cd: The CWQG for cadmium is related to water hardness (as CaCO3)
When the water hardness is > 0 to < 17 mg/L, the CWQG is 0.04 µg/L; At hardness > 280 mg/L, the CWQG is 0.37 µg/L□
At hardness ≥ 17 to ≤ 280 mg/L, the CWQG is calculated using this equation: CWQG (µg/L) = 10{0.83(log[hardness]) – 2.46 }□
[H], Cu: The CWQG for copper is related to water hardness (as CaCO3):
When the water hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L; At hardness >180 mg/L, the CWQG is 4 µg/L
At hardness ≥82 to ≤180 mg/L the CWQG is calculated using this equation: CWQG (µg/L) = 0.2 * e{0.8545[ln(hardness)]-1.465}□
[H], Pb:The CWQG for lead is related to water hardness (as CaCO3):
When the hardness is 0 to ≤ 60 mg/L, the CWQG is 1 µg/L; At hardness >180 mg/L, the CWQG is 7 µg/L□
At hardness >60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L)= e{1.273[ln(hardness)]-4.705}□
[H], Ni:The CWQG for nickel is related to water hardness (as CaCO3):
When the water hardness is 0 to ≤ 60 mg/L, the CWQG is 25 µg/L; At hardness >180 mg/L, the CWQG is 150 µg/L□
At hardness > 60 to ≤ 180 mg/L the CWQG is calculated using this equation CWQG (µg/L) = e{0.76[ln(hardness)]+1.06}□

# WATER QUALITY LABORATORY CERTIFICATE RESULTS

SUMMIT ENVIRONMENTAL CONSULTANTS INC.
ATTN: Nicole Jacques
# 301 - 4109 4th Avenue
Whitehorse YT Y1A 1H6

Date Received: 17-MAY-13
Report Date: 29-MAY-13 18:42 (MT)
Version: FINAL

Client Phone: 867-456-2711

# Certificate of Analysis

**Lab Work Order #: L1303472**

| | |
|---|---|
| Project P.O. #: | NOT SUBMITTED |
| Job Reference: | 2013-2333.300.323 |
| C of C Numbers: | 1 |
| Legal Site Desc: | |

Dean Watt
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | | | | | | |
|---|---|---|---|---|---|---|
| | **Sample ID** | L1303472-1 | L1303472-2 | | | |
| | **Description** | Groundwater | Groundwater | | | |
| | **Sampled Date** | 16-MAY-13 | 16-MAY-13 | | | |
| | **Sampled Time** | 12:00 | 12:00 | | | |
| | **Client ID** | MW09-02 | MW09-24 | | | |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | 3040 | 889 | | | |
| | Hardness (as CaCO3) (mg/L) | 1670 | 504 | | | |
| | pH (pH) | 6.91 | 7.76 | | | |
| **Anions and Nutrients** | Acidity (as CaCO3) (mg/L) | 53.3 | 6.6 | | | |
| | Alkalinity, Total (as CaCO3) (mg/L) | 46.3 | 167 | | | |
| | Chloride (Cl) (mg/L) | <10 DLA | <2.5 DLA | | | |
| | Fluoride (F) (mg/L) | 0.56 | <0.10 DLA | | | |
| | Nitrate (as N) (mg/L) | <0.10 DLA | 1.55 | | | |
| | Nitrite (as N) (mg/L) | <0.020 DLA | <0.0050 DLA | | | |
| | Total Kjeldahl Nitrogen (mg/L) | 18.3 | 0.285 | | | |
| | Sulfate (SO4) (mg/L) | 2010 | 358 | | | |
| **Total Metals** | Aluminum (Al)-Total (mg/L) | 0.407 | 9.34 | | | |
| | Antimony (Sb)-Total (mg/L) | 0.0393 | 0.00250 | | | |
| | Arsenic (As)-Total (mg/L) | 21.0 | 0.0868 | | | |
| | Barium (Ba)-Total (mg/L) | 0.021 | 0.450 | | | |
| | Beryllium (Be)-Total (mg/L) | <0.0010 DLA | <0.0010 | | | |
| | Boron (B)-Total (mg/L) | <0.10 | <0.10 | | | |
| | Cadmium (Cd)-Total (mg/L) | 0.00746 | 0.000607 | | | |
| | Calcium (Ca)-Total (mg/L) | 426 | 141 | | | |
| | Chromium (Cr)-Total (mg/L) | <0.0010 DLA | 0.0230 | | | |
| | Cobalt (Co)-Total (mg/L) | 0.0130 | 0.00896 | | | |
| | Copper (Cu)-Total (mg/L) | 0.0179 | 0.103 | | | |
| | Iron (Fe)-Total (mg/L) | 36.9 | 21.9 | | | |
| | Lead (Pb)-Total (mg/L) | 0.178 | 0.0159 | | | |
| | Lithium (Li)-Total (mg/L) | 0.0205 | 0.0073 | | | |
| | Magnesium (Mg)-Total (mg/L) | 157 | 38.4 | | | |
| | Manganese (Mn)-Total (mg/L) | 35.5 | 0.684 | | | |
| | Mercury (Hg)-Total (mg/L) | 0.000020 | 0.000013 | | | |
| | Molybdenum (Mo)-Total (mg/L) | 0.0059 | 0.0018 | | | |
| | Nickel (Ni)-Total (mg/L) | <0.0050 DLA | 0.0132 | | | |
| | Potassium (K)-Total (mg/L) | 80.3 | 4.1 | | | |
| | Selenium (Se)-Total (mg/L) | <0.0010 DLA | 0.00051 | | | |
| | Silver (Ag)-Total (mg/L) | 0.00274 | 0.000811 | | | |
| | Sodium (Na)-Total (mg/L) | 87.5 | 11.0 | | | |
| | Thallium (Tl)-Total (mg/L) | 0.00076 | <0.00020 | | | |
| | Tin (Sn)-Total (mg/L) | 0.0010 | 0.00143 | | | |
| | Titanium (Ti)-Total (mg/L) | 0.014 | 0.614 | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | | | | | | |
|---|---|---|---|---|---|---|
| | **Sample ID** | L1303472-1 | L1303472-2 | | | |
| | **Description** | Groundwater | Groundwater | | | |
| | **Sampled Date** | 16-MAY-13 | 16-MAY-13 | | | |
| | **Sampled Time** | 12:00 | 12:00 | | | |
| | **Client ID** | MW09-02 | MW09-24 | | | |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Total Metals** | Uranium (U)-Total (mg/L) | 0.00065 | 0.00402 | | | |
| | Vanadium (V)-Total (mg/L) | <0.010 DLA | 0.0420 | | | |
| | Zinc (Zn)-Total (mg/L) | 0.877 | 0.0602 | | | |
| **Dissolved Metals** | Dissolved Metals Filtration Location | LAB | LAB | | | |
| | Aluminum (Al)-Dissolved (mg/L) | <0.010 DLA | 0.0076 | | | |
| | Antimony (Sb)-Dissolved (mg/L) | 0.0028 | <0.00050 | | | |
| | Arsenic (As)-Dissolved (mg/L) | 10.4 | 0.00162 | | | |
| | Barium (Ba)-Dissolved (mg/L) | <0.020 | 0.139 | | | |
| | Beryllium (Be)-Dissolved (mg/L) | <0.0010 DLA | <0.0010 | | | |
| | Boron (B)-Dissolved (mg/L) | <0.10 | <0.10 | | | |
| | Cadmium (Cd)-Dissolved (mg/L) | <0.00010 DLA | 0.000200 | | | |
| | Calcium (Ca)-Dissolved (mg/L) | 422 | 144 | | | |
| | Chromium (Cr)-Dissolved (mg/L) | <0.0010 DLA | <0.0010 | | | |
| | Cobalt (Co)-Dissolved (mg/L) | 0.0127 | 0.00038 | | | |
| | Copper (Cu)-Dissolved (mg/L) | <0.0020 DLA | 0.0094 | | | |
| | Iron (Fe)-Dissolved (mg/L) | 16.8 | <0.030 | | | |
| | Lead (Pb)-Dissolved (mg/L) | <0.00050 DLA | <0.00050 | | | |
| | Lithium (Li)-Dissolved (mg/L) | 0.0186 | <0.0050 | | | |
| | Magnesium (Mg)-Dissolved (mg/L) | 151 | 35.3 | | | |
| | Manganese (Mn)-Dissolved (mg/L) | 34.3 | 0.0204 | | | |
| | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | <0.000010 | | | |
| | Molybdenum (Mo)-Dissolved (mg/L) | 0.0051 | <0.0010 | | | |
| | Nickel (Ni)-Dissolved (mg/L) | <0.0050 DLA | <0.0010 | | | |
| | Potassium (K)-Dissolved (mg/L) | 74.2 | 2.0 | | | |
| | Selenium (Se)-Dissolved (mg/L) | <0.0010 DLA | 0.00034 | | | |
| | Silver (Ag)-Dissolved (mg/L) | <0.00010 DLA | <0.000020 | | | |
| | Sodium (Na)-Dissolved (mg/L) | 83.0 | 10.7 | | | |
| | Thallium (Tl)-Dissolved (mg/L) | 0.00030 | <0.00020 | | | |
| | Tin (Sn)-Dissolved (mg/L) | <0.0010 DLA | <0.00050 | | | |
| | Titanium (Ti)-Dissolved (mg/L) | <0.010 | <0.010 | | | |
| | Uranium (U)-Dissolved (mg/L) | 0.00040 | 0.00343 | | | |
| | Vanadium (V)-Dissolved (mg/L) | <0.010 DLA | <0.0010 | | | |
| | Zinc (Zn)-Dissolved (mg/L) | 0.422 | 0.0054 | | | |

* 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) |
|---|---|---|---|
| Method Blank | Aluminum (Al)-Dissolved | MB-LOR | L1303472-1, -2 |
| Matrix Spike | Sulfate (SO4) | MS-B | L1303472-1, -2 |
| Matrix Spike | Sulfate (SO4) | MS-B | L1303472-1, -2 |
| Matrix Spike | Fluoride (F) | MS-B | L1303472-1, -2 |
| Matrix Spike | Sulfate (SO4) | MS-B | L1303472-1, -2 |
| Matrix Spike | Calcium (Ca)-Dissolved | MS-B | L1303472-1, -2 |
| Matrix Spike | Antimony (Sb)-Dissolved | MS-B | L1303472-1, -2 |
| Matrix Spike | Arsenic (As)-Dissolved | MS-B | L1303472-1, -2 |
| Matrix Spike | Manganese (Mn)-Dissolved | MS-B | L1303472-1, -2 |
| Duplicate | Total Kjeldahl Nitrogen | TKND | L1303472-1, -2 |
| Duplicate | Total Kjeldahl Nitrogen | TKND | L1303472-1, -2 |

**Qualifiers for Individual Parameters Listed:**

| Qualifier | Description |
|---|---|
| DLA | Detection Limit Adjusted For required dilution |
| MB-LOR | Method Blank exceeds ALS DQO. LORs adjusted for samples with positive hits below 5 times blank level. |
| MS-B | Matrix Spike recovery could not be accurately calculated due to high analyte background in sample. |
| TKND | TKN duplication was poor due to interference from high nitrate, which causes negative bias on TKN. |

**Test Method References:**

| ALS Test Code | Matrix | Test Description | Method Reference** |
|---|---|---|---|
| **ACY-PCT-VA** | Water | Acidity by Automatic Titration | APHA 2310 "Acidity" |

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

| | | | |
|---|---|---|---|
| **ACY-PCT-VA** | Water | Acidity by Automatic Titration | APHA 2310 Acidity |

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

| | | | |
|---|---|---|---|
| **ALK-COL-VA** | Water | Alkalinity by Colourimetric (Automated) | EPA 310.2 |

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

| | | | |
|---|---|---|---|
| **ANIONS-CL-IC-WR** | Water | Chloride by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

| | | | |
|---|---|---|---|
| **ANIONS-F-IC-WR** | Water | Fluoride by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

| | | | |
|---|---|---|---|
| **ANIONS-NO2-IC-WR** | Water | Nitrite Nitrogen by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

| | | | |
|---|---|---|---|
| **ANIONS-NO3-IC-WR** | Water | Nitrate Nitrogen by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

| | | | |
|---|---|---|---|
| **ANIONS-SO4-IC-WR** | Water | Sulphate by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

| | | | |
|---|---|---|---|
| **EC-PCT-VA** | Water | Conductivity (Automated) | APHA 2510 Auto. Conduc. |

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

| | | | |
|---|---|---|---|
| **HARDNESS-CALC-VA** | Water | Hardness | APHA 2340B |

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents.

# Reference Information

Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

**HG-DIS-LOW-CVAFS-VA** Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

**HG-TOT-LOW-CVAFS-VA** Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

**MET-D-CCMS-VA** Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

**MET-DIS-ICP-VA** Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

**MET-T-CCMS-VA** Water Total Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

**MET-TOT-ICP-VA** Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

**PH-PCT-VA** Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

**PH-PCT-VA** Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

**TKN-F-VA** Water TKN in Water by Fluorescence APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

** 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 |
|---|---|
| WR | ALS ENVIRONMENTAL - WHITEHORSE, YUKON, CANADA |
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |

**Chain of Custody Numbers:**

1

# Reference Information

**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 wwt - 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.*

ALS Environmental

# Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____



| Report To | | Report Format / Distribution | Service Requested (Rush for routine analysis subject to availability) |
|---|---|---|---|
| Company: | Summit Environmental Consultants Inc. | ☐ Standard ☐ Other | ◉ Regular (Standard Turnaround Times - Business Days) |
| Contact: | Nicole Jacques | ☑ PDF ☑ Excel ☐ Digital ☐ Fax | ○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT |
| Address: | 301 - 4109 4th Avenue | Email 1: nrj@summit-environmental.com | ○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT |
| | Whitehorse, YT, Y1A iH6 | Email 2: | ○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT |
| Phone: | 867 - 456 - 2711 Fax: 604 - 291 - 6163 | Email 3: | |
| Invoice To | Same as Report ? ☑ Yes ☐ No | Client / Project Information | |
| Hardcopy of Invoice with Report? | ☐ Yes ☑ No | Job #: 2013-2333.300.323 | |
| Company: | | PO / AFE: | |
| Contact: | | LSD: | |
| Address: | | | |
| Phone: | Fax: | Quote #: Summit Environmental - General Price List | |
| Lab Work Order # (lab use only) | | ALS Contact: | Sampler: NJ and SG |

**Analysis Request**

Please indicate below Filtered, Preserved or both (F, P, F/P)

| Sample # | Sample Identification (This description will appear on the report) | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | F/P Metals - Dissolved | P Metals - Total | P Total Kinetic Nitrogen | General | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|
| | MW09-02 | 16-Mar-13 | - | Groundwater | X | X | X | X | 4 |
| | MW09-24 | 16-Mar-13 | - | Groundwater | X | X | X | X | 4 |
| | | | | | | | | | |
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L1303472-COFC

**Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details**

**Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

**Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.**

| SHIPMENT RELEASE (client use) | | | SHIPMENT RECEPTION (lab use only) | | | | SHIPMENT VERIFICATION (lab use only) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Released by: | Date (dd-mmm-yy) | Time (hh-mm) | Received by: | Date: | Time: | Temperature: | Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
| | | | | 17-May-13 | 1:40 | 9.8 °C | | | | |

AMEC EARTH & ENVIRONMENTAL
ATTN: Leslie Hardy
5681 - 70 Street
Edmonton AB T6B 3P6

Date Received: 01-OCT-13
Report Date: 11-OCT-13 13:17 (MT)
Version: FINAL

Client Phone: 780-436-2152

# Certificate of Analysis

**Lab Work Order #: L1368203**

Project P.O. #: NOT SUBMITTED
Job Reference: VM00605E.5230
C of C Numbers: 1, 2
Legal Site Desc:

Selam Worku
Account Manager

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# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1368203-1 Water 18-SEP-13 W1410383-BH02 STANDARD PRESERVATION | L1368203-2 Water 18-SEP-13 W1410383-BH02 ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | L1368203-3 Water 18-SEP-13 W1410383-BH02 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1368203-4 Water 18-SEP-13 OPEN PIT-BOTTOM STANDARD PRESERVATION | L1368203-5 Water 18-SEP-13 OPEN PIT-BOTTOM ALTERNATE PRESERVATION #1 (SCN WITH HNO3) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | 920 | | | 1480 | |
| | Hardness (as CaCO3) (mg/L) | 501 | | 511 | 1110 | |
| | pH (pH) | 7.65 | | | 8.02 | |
| **Anions and Nutrients** | Alkalinity, Total (as CaCO3) (mg/L) | 264 | | | 158 | |
| | Ammonia, Total (as N) (mg/L) | 0.0224 | | | 0.0058 | |
| | Chloride (Cl) (mg/L) | <5.0 DLA | | | <5.0 DLA | |
| | Fluoride (F) (mg/L) | <0.20 DLA | | | 0.21 | |
| | Nitrate (as N) (mg/L) | 0.808 | | | <0.050 DLA | |
| | Nitrite (as N) (mg/L) | <0.010 DLA | | | <0.010 DLA | |
| | Total Kjeldahl Nitrogen (mg/L) | 0.489 | | | 0.096 | |
| | Sulfate (SO4) (mg/L) | 368 | | | 950 | |
| | Anion Sum (meq/L) | 13.0 | | | 23.0 | |
| | Cation Sum (meq/L) | 10.6 | | | 22.7 | |
| | Cation - Anion Balance (%) | -10.0 | | | -0.5 | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | <0.0050 | | | <0.0050 | |
| | Cyanide, Total (mg/L) | <0.0050 | | | <0.0050 | |
| | Thiocyanate (SCN) (mg/L) | 0.53 SRU | <0.50 | | 0.95 SRU | <0.50 |
| | Cyanide, Free (mg/L) | <0.0050 | | | <0.0050 | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | 63.6 | | | 33.8 | |
| | Total Organic Carbon (mg/L) | 9.74 | | | 1.32 | |
| **Total Metals** | Aluminum (Al)-Total (mg/L) | | | | 0.0108 | |
| | Antimony (Sb)-Total (mg/L) | | | | 0.00364 | |
| | Arsenic (As)-Total (mg/L) | | | | 0.0114 | |
| | Barium (Ba)-Total (mg/L) | | | | 0.0120 | |
| | Beryllium (Be)-Total (mg/L) | | | | <0.00010 | |
| | Bismuth (Bi)-Total (mg/L) | | | | <0.00050 | |
| | Boron (B)-Total (mg/L) | | | | <0.010 | |
| | Cadmium (Cd)-Total (mg/L) | | | | 0.00269 | |
| | Calcium (Ca)-Total (mg/L) | | | | 301 | |
| | Chromium (Cr)-Total (mg/L) | | | | 0.00017 | |
| | Cobalt (Co)-Total (mg/L) | | | | <0.00010 | |
| | Copper (Cu)-Total (mg/L) | | | | 0.00195 | |
| | Iron (Fe)-Total (mg/L) | | | | 0.048 | |
| | Lead (Pb)-Total (mg/L) | | | | 0.000685 | |
| | Lithium (Li)-Total (mg/L) | | | | 0.00835 | |
| | Magnesium (Mg)-Total (mg/L) | | | | 86.2 | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1368203-6 Water 18-SEP-13 OPEN PIT-BOTTOM ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1368203-7 Water 18-SEP-13 OPEN PIT-MIDDLE STANDARD PRESERVATION | L1368203-8 Water 18-SEP-13 OPEN PIT-MIDDLE ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | L1368203-9 Water 18-SEP-13 OPEN PIT-MIDDLE ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1368203-10 Water 18-SEP-13 OPEN PIT-UPPER STANDARD PRESERVATION |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | 1500 | | | 1500 |
| | Hardness (as CaCO3) (mg/L) | 1130 | 1120 | | 1130 | 1140 |
| | pH (pH) | | 8.05 | | | 8.03 |
| **Anions and Nutrients** | Alkalinity, Total (as CaCO3) (mg/L) | | 158 | | | 160 |
| | Ammonia, Total (as N) (mg/L) | | <0.0050 | | | <0.0050 |
| | Chloride (Cl) (mg/L) | | <5.0 DLA | | | <5.0 DLA |
| | Fluoride (F) (mg/L) | | 0.21 | | | 0.22 |
| | Nitrate (as N) (mg/L) | | <0.050 DLA | | | <0.050 DLA |
| | Nitrite (as N) (mg/L) | | <0.010 DLA | | | <0.010 DLA |
| | Total Kjeldahl Nitrogen (mg/L) | | 0.087 | | | 0.093 |
| | Sulfate (SO4) (mg/L) | | 947 | | | 951 |
| | Anion Sum (meq/L) | | 22.9 | | | 23.0 |
| | Cation Sum (meq/L) | | 23.0 | | | 23.4 |
| | Cation - Anion Balance (%) | | 0.3 | | | 0.8 |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | <0.0050 | | | |
| | Cyanide, Total (mg/L) | | <0.0050 | | | |
| | Thiocyanate (SCN) (mg/L) | | <0.50 SRU | <0.50 | | |
| | Cyanide, Free (mg/L) | | <0.0050 | | | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | 34.4 | | | |
| | Total Organic Carbon (mg/L) | | 1.36 | | | 1.50 |
| **Total Metals** | Aluminum (Al)-Total (mg/L) | 0.0446 | 0.0056 | | 0.0159 | 0.0054 |
| | Antimony (Sb)-Total (mg/L) | 0.00366 | 0.00361 | | 0.00365 | 0.00370 |
| | Arsenic (As)-Total (mg/L) | 0.0111 | 0.0114 | | 0.0109 | 0.0116 |
| | Barium (Ba)-Total (mg/L) | 0.0122 | 0.0120 | | 0.0121 | 0.0121 |
| | Beryllium (Be)-Total (mg/L) | <0.00010 | <0.00010 | | <0.00010 | <0.00010 |
| | Bismuth (Bi)-Total (mg/L) | <0.00050 | <0.00050 | | <0.00050 | <0.00050 |
| | Boron (B)-Total (mg/L) | <0.010 | <0.010 | | <0.010 | <0.010 |
| | Cadmium (Cd)-Total (mg/L) | 0.00278 | 0.00276 | | 0.00274 | 0.00282 |
| | Calcium (Ca)-Total (mg/L) | 309 | 307 | | 310 | 311 |
| | Chromium (Cr)-Total (mg/L) | 0.00011 | 0.00019 | | 0.00012 | 0.00024 |
| | Cobalt (Co)-Total (mg/L) | <0.00010 | <0.00010 | | <0.00010 | <0.00010 |
| | Copper (Cu)-Total (mg/L) | 0.00191 | 0.00197 | | 0.00192 | 0.00210 |
| | Iron (Fe)-Total (mg/L) | 0.032 | 0.036 | | 0.028 | 0.037 |
| | Lead (Pb)-Total (mg/L) | 0.000424 | 0.000457 | | 0.000357 | 0.000435 |
| | Lithium (Li)-Total (mg/L) | 0.00861 | 0.00842 | | 0.00856 | 0.00877 |
| | Magnesium (Mg)-Total (mg/L) | 87.9 | 86.5 | | 86.8 | 87.9 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1368203-11 Water 18-SEP-13 OPEN PIT-UPPER ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | L1368203-12 Water 18-SEP-13 OPEN PIT-UPPER ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1368203-13 Water 18-SEP-13 ORE LEACHATE | L1368203-14 Water 18-SEP-13 TAILINGS + ORG | L1368203-15 Water 18-SEP-13 TAILINGS SAND LEACHATE |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | | 2570 | 1960 | 1640 |
| | Hardness (as CaCO3) (mg/L) | | 1120 | 2530 | 1800 | 1250 |
| | pH (pH) | | | 7.54 | 6.85 | 8.08 |
| **Anions and Nutrients** | Alkalinity, Total (as CaCO3) (mg/L) | | | 28.0 | 65.3 | 27.0 |
| | Ammonia, Total (as N) (mg/L) | | | | | |
| | Chloride (Cl) (mg/L) | | | <10 DLA | <10 DLA | <5.0 DLA |
| | Fluoride (F) (mg/L) | | | <0.40 DLA | <0.40 DLA | 0.28 |
| | Nitrate (as N) (mg/L) | | | <0.10 DLA | <0.10 DLA | <0.050 DLA |
| | Nitrite (as N) (mg/L) | | | <0.020 DLA | <0.020 DLA | <0.010 DLA |
| | Total Kjeldahl Nitrogen (mg/L) | | | | | |
| | Sulfate (SO4) (mg/L) | | | 2540 | 1670 | 1210 |
| | Anion Sum (meq/L) | | | 53.4 | 36.0 | 25.7 |
| | Cation Sum (meq/L) | | | 50.9 | 37.3 | 25.2 |
| | Cation - Anion Balance (%) | | | -2.3 | 1.8 | -1.1 |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | | | | |
| | Cyanide, Total (mg/L) | | | | | |
| | Thiocyanate (SCN) (mg/L) | <0.50 | | | | |
| | Cyanide, Free (mg/L) | | | | | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | | | | |
| | Total Organic Carbon (mg/L) | | | | | |
| **Total Metals** | Aluminum (Al)-Total (mg/L) | | 0.0079 | 0.0872 | 0.0202 | 0.0073 |
| | Antimony (Sb)-Total (mg/L) | | 0.00372 | 0.0368 | 0.0134 | 0.0808 |
| | Arsenic (As)-Total (mg/L) | | 0.0109 | 0.119 | 0.00373 | 0.00185 |
| | Barium (Ba)-Total (mg/L) | | 0.0119 | 0.0112 | 0.0219 | 0.0389 |
| | Beryllium (Be)-Total (mg/L) | | <0.00010 | <0.00020 DLA | <0.00020 DLA | <0.00020 DLA |
| | Bismuth (Bi)-Total (mg/L) | | <0.00050 | <0.0010 DLA | <0.0010 DLA | <0.0010 DLA |
| | Boron (B)-Total (mg/L) | | <0.010 | <0.020 DLA | 0.036 | <0.020 DLA |
| | Cadmium (Cd)-Total (mg/L) | | 0.00273 | 0.0181 | 0.0150 | 0.000924 |
| | Calcium (Ca)-Total (mg/L) | | 307 | 400 | 566 | 445 |
| | Chromium (Cr)-Total (mg/L) | | 0.00017 | 0.00021 | 0.00020 | <0.00020 DLA |
| | Cobalt (Co)-Total (mg/L) | | <0.00010 | <0.00020 DLA | 0.00562 | 0.00834 |
| | Copper (Cu)-Total (mg/L) | | 0.00182 | 0.0093 | 0.0051 | 0.0013 |
| | Iron (Fe)-Total (mg/L) | | 0.026 | 0.314 | 0.042 | 0.012 |
| | Lead (Pb)-Total (mg/L) | | 0.000340 | 0.0188 | 0.00034 | <0.00010 DLA |
| | Lithium (Li)-Total (mg/L) | | 0.00874 | 0.0073 | 0.0141 | 0.0014 |
| | Magnesium (Mg)-Total (mg/L) | | 86.4 | 357 | 86.7 | 38.6 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1368203-16 | L1368203-17 | L1368203-18 | | |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | | |
| | Sampled Date | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | | |
| | Sampled Time | | | | | |
| | Client ID | WASTE ROCK + ORG | WASTE ROCK LEACHATE | OPEN PIT-UPPER STANDARD PRESERVATION-RECIEVED 1-OCT-13 | | |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | 2290 | 2750 | | | |
| | Hardness (as CaCO3) (mg/L) | 1980 | 2150 | | | |
| | pH (pH) | 7.52 | 6.17 | | | |
| **Anions and Nutrients** | Alkalinity, Total (as CaCO3) (mg/L) | 35.0 | 77.5 | | | |
| | Ammonia, Total (as N) (mg/L) | | | | | |
| | Chloride (Cl) (mg/L) | <10 DLA | <10 DLA | | | |
| | Fluoride (F) (mg/L) | <0.40 DLA | <0.40 DLA | | | |
| | Nitrate (as N) (mg/L) | <0.10 DLA | 0.12 | | | |
| | Nitrite (as N) (mg/L) | <0.020 DLA | <0.020 DLA | | | |
| | Total Kjeldahl Nitrogen (mg/L) | | | | | |
| | Sulfate (SO4) (mg/L) | 1950 | 2410 | | | |
| | Anion Sum (meq/L) | 41.4 | 51.8 | | | |
| | Cation Sum (meq/L) | 39.8 | 48.4 | | | |
| | Cation - Anion Balance (%) | -2.0 | -3.3 | | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | | <0.0050 | | |
| | Cyanide, Total (mg/L) | | | <0.0050 | | |
| | Thiocyanate (SCN) (mg/L) | | | <0.50 | | |
| | Cyanide, Free (mg/L) | | | <0.0050 | | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | | 36.0 | | |
| | Total Organic Carbon (mg/L) | | | | | |
| **Total Metals** | Aluminum (Al)-Total (mg/L) | 0.605 | 0.059 | | | |
| | Antimony (Sb)-Total (mg/L) | 0.00801 | <0.0010 DLA | | | |
| | Arsenic (As)-Total (mg/L) | 0.0503 | 0.0037 | | | |
| | Barium (Ba)-Total (mg/L) | 0.0536 | 0.0266 | | | |
| | Beryllium (Be)-Total (mg/L) | <0.00020 DLA | <0.0010 DLA | | | |
| | Bismuth (Bi)-Total (mg/L) | <0.0010 DLA | <0.0050 DLA | | | |
| | Boron (B)-Total (mg/L) | <0.020 DLA | <0.10 DLA | | | |
| | Cadmium (Cd)-Total (mg/L) | 0.00642 | 0.0304 | | | |
| | Calcium (Ca)-Total (mg/L) | 445 | 477 | | | |
| | Chromium (Cr)-Total (mg/L) | 0.00030 | <0.0010 DLA | | | |
| | Cobalt (Co)-Total (mg/L) | 0.00028 | 0.0231 | | | |
| | Copper (Cu)-Total (mg/L) | 0.0175 | <0.0050 DLA | | | |
| | Iron (Fe)-Total (mg/L) | 2.38 | 0.353 | | | |
| | Lead (Pb)-Total (mg/L) | 0.0379 | <0.00050 DLA | | | |
| | Lithium (Li)-Total (mg/L) | 0.0038 | 0.0284 | | | |
| | Magnesium (Mg)-Total (mg/L) | 191 | 263 | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | | | | | | |
|---|---|---|---|---|---|---|
| | **Sample ID** | L1368203-1 | L1368203-2 | L1368203-3 | L1368203-4 | L1368203-5 |
| | **Description** | Water | Water | Water | Water | Water |
| | **Sampled Date** | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 |
| | **Sampled Time** | | | | | |
| | **Client ID** | W1410383-BH02 STANDARD PRESERVATION | W1410383-BH02 ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | W1410383-BH02 ALTERNATE PRESERVATION #3 (UNPRESERVED) | OPEN PIT-BOTTOM STANDARD PRESERVATION | OPEN PIT-BOTTOM ALTERNATE PRESERVATION #1 (SCN WITH HNO3) |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Total Metals** | Manganese (Mn)-Total (mg/L) | | | | 0.0525 | |
| | Mercury (Hg)-Total (mg/L) | | | | <0.000050 DLM | |
| | Molybdenum (Mo)-Total (mg/L) | | | | 0.000190 | |
| | Nickel (Ni)-Total (mg/L) | | | | <0.00050 | |
| | Phosphorus (P)-Total (mg/L) | | | | <0.050 | |
| | Potassium (K)-Total (mg/L) | | | | 3.71 | |
| | Selenium (Se)-Total (mg/L) | | | | <0.00010 | |
| | Silicon (Si)-Total (mg/L) | | | | 2.84 | |
| | Silver (Ag)-Total (mg/L) | | | | 0.000012 | |
| | Sodium (Na)-Total (mg/L) | | | | 11.2 | |
| | Strontium (Sr)-Total (mg/L) | | | | 0.924 | |
| | Sulfur (S)-Total (mg/L) | | | | 320 | |
| | Thallium (Tl)-Total (mg/L) | | | | 0.000076 | |
| | Tin (Sn)-Total (mg/L) | | | | <0.00010 | |
| | Titanium (Ti)-Total (mg/L) | | | | <0.010 | |
| | Uranium (U)-Total (mg/L) | | | | 0.00398 | |
| | Vanadium (V)-Total (mg/L) | | | | <0.0010 | |
| | Zinc (Zn)-Total (mg/L) | | | | 0.283 | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | | FIELD | | |
| | Dissolved Metals Filtration Location | FIELD | | FIELD | | |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0025 | | <0.0010 | | |
| | Antimony (Sb)-Dissolved (mg/L) | 0.00021 | | 0.00022 | | |
| | Arsenic (As)-Dissolved (mg/L) | 0.00243 | | 0.00278 | | |
| | Barium (Ba)-Dissolved (mg/L) | 0.124 | | 0.127 | | |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00010 | | <0.00010 | | |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.00050 | | <0.00050 | | |
| | Boron (B)-Dissolved (mg/L) | 0.015 | | 0.015 | | |
| | Cadmium (Cd)-Dissolved (mg/L) | 0.000445 | | 0.000395 | | |
| | Calcium (Ca)-Dissolved (mg/L) | 132 | | 127 | | |
| | Chromium (Cr)-Dissolved (mg/L) | 0.00015 | | 0.00016 | | |
| | Cobalt (Co)-Dissolved (mg/L) | 0.00024 | | 0.00014 | | |
| | Copper (Cu)-Dissolved (mg/L) | 0.00377 | | 0.00317 | | |
| | Iron (Fe)-Dissolved (mg/L) | <0.010 | | <0.010 | | |
| | Lead (Pb)-Dissolved (mg/L) | <0.000050 | | <0.000050 | | |
| | Lithium (Li)-Dissolved (mg/L) | 0.00065 | | 0.00059 | | |
| | Magnesium (Mg)-Dissolved (mg/L) | 41.3 | | 46.8 | | |
| | Manganese (Mn)-Dissolved (mg/L) | 0.145 | | 0.113 | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | | | | | | |
|---|---|---|---|---|---|---|
| | **Sample ID** | L1368203-6 | L1368203-7 | L1368203-8 | L1368203-9 | L1368203-10 |
| | **Description** | Water | Water | Water | Water | Water |
| | **Sampled Date** | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 |
| | **Sampled Time** | | | | | |
| | **Client ID** | OPEN PIT-BOTTOM ALTERNATE PRESERVATION #3 (UNPRESERVED) | OPEN PIT-MIDDLE STANDARD PRESERVATION | OPEN PIT-MIDDLE ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | OPEN PIT-MIDDLE ALTERNATE PRESERVATION #3 (UNPRESERVED) | OPEN PIT-UPPER STANDARD PRESERVATION |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Total Metals** | Manganese (Mn)-Total (mg/L) | 0.0527 | 0.0521 | | 0.0523 | 0.0535 |
| | Mercury (Hg)-Total (mg/L) | <0.000010 | <0.000010 | | <0.000010 | <0.000010 |
| | Molybdenum (Mo)-Total (mg/L) | 0.000162 | 0.000164 | | 0.000150 | 0.000149 |
| | Nickel (Ni)-Total (mg/L) | <0.00050 | <0.00050 | | <0.00050 | <0.00050 |
| | Phosphorus (P)-Total (mg/L) | <0.050 | <0.050 | | <0.050 | <0.050 |
| | Potassium (K)-Total (mg/L) | 3.80 | 3.79 | | 3.76 | 3.89 |
| | Selenium (Se)-Total (mg/L) | <0.00010 | <0.00010 | | <0.00010 | <0.00010 |
| | Silicon (Si)-Total (mg/L) | 2.90 | 2.87 | | 2.90 | 2.96 |
| | Silver (Ag)-Total (mg/L) | 0.000012 | <0.000010 | | <0.000010 | <0.000010 |
| | Sodium (Na)-Total (mg/L) | 11.5 | 11.5 | | 11.5 | 11.7 |
| | Strontium (Sr)-Total (mg/L) | 0.959 | 0.950 | | 0.957 | 0.969 |
| | Sulfur (S)-Total (mg/L) | 330 | 326 | | 329 | 331 |
| | Thallium (Tl)-Total (mg/L) | 0.000077 | 0.000080 | | 0.000078 | 0.000079 |
| | Tin (Sn)-Total (mg/L) | <0.00010 | <0.00010 | | <0.00010 | <0.00010 |
| | Titanium (Ti)-Total (mg/L) | <0.010 | <0.010 | | <0.010 | <0.010 |
| | Uranium (U)-Total (mg/L) | 0.00401 | 0.00398 | | 0.00400 | 0.00402 |
| | Vanadium (V)-Total (mg/L) | <0.0010 | <0.0010 | | <0.0010 | <0.0010 |
| | Zinc (Zn)-Total (mg/L) | 0.292 | 0.288 | | 0.290 | 0.293 |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | | | | | |
| | Dissolved Metals Filtration Location | | | | | |
| | Aluminum (Al)-Dissolved (mg/L) | | | | | |
| | Antimony (Sb)-Dissolved (mg/L) | | | | | |
| | Arsenic (As)-Dissolved (mg/L) | | | | | |
| | Barium (Ba)-Dissolved (mg/L) | | | | | |
| | Beryllium (Be)-Dissolved (mg/L) | | | | | |
| | Bismuth (Bi)-Dissolved (mg/L) | | | | | |
| | Boron (B)-Dissolved (mg/L) | | | | | |
| | Cadmium (Cd)-Dissolved (mg/L) | | | | | |
| | Calcium (Ca)-Dissolved (mg/L) | | | | | |
| | Chromium (Cr)-Dissolved (mg/L) | | | | | |
| | Cobalt (Co)-Dissolved (mg/L) | | | | | |
| | Copper (Cu)-Dissolved (mg/L) | | | | | |
| | Iron (Fe)-Dissolved (mg/L) | | | | | |
| | Lead (Pb)-Dissolved (mg/L) | | | | | |
| | Lithium (Li)-Dissolved (mg/L) | | | | | |
| | Magnesium (Mg)-Dissolved (mg/L) | | | | | |
| | Manganese (Mn)-Dissolved (mg/L) | | | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1368203-11 Water 18-SEP-13 OPEN PIT-UPPER ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | L1368203-12 Water 18-SEP-13 OPEN PIT-UPPER ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1368203-13 Water 18-SEP-13 ORE LEACHATE | L1368203-14 Water 18-SEP-13 TAILINGS + ORG | L1368203-15 Water 18-SEP-13 TAILINGS SAND LEACHATE |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Total Metals** | Manganese (Mn)-Total (mg/L) | | 0.0525 | 0.625 | 5.17 | 0.00603 |
| | Mercury (Hg)-Total (mg/L) | | <0.000010 | 0.000015 | <0.000010 | <0.000010 |
| | Molybdenum (Mo)-Total (mg/L) | | 0.000173 | 0.00011 | 0.00015 | 0.00094 |
| | Nickel (Ni)-Total (mg/L) | | <0.00050 | 0.0011 | 0.0173 | 0.0035 |
| | Phosphorus (P)-Total (mg/L) | | <0.050 | <0.050 | <0.050 | <0.050 |
| | Potassium (K)-Total (mg/L) | | 3.72 | 6.30 | 31.3 | 4.78 |
| | Selenium (Se)-Total (mg/L) | | <0.00010 | <0.00020 DLA | <0.00020 DLA | <0.00020 DLA |
| | Silicon (Si)-Total (mg/L) | | 2.86 | 5.56 | 6.23 | 4.74 |
| | Silver (Ag)-Total (mg/L) | | <0.000010 | 0.000390 | <0.000020 DLA | <0.000020 DLA |
| | Sodium (Na)-Total (mg/L) | | 11.7 | 2.26 | 4.17 | 0.96 |
| | Strontium (Sr)-Total (mg/L) | | 0.965 | 0.698 | 1.40 | 0.448 |
| | Sulfur (S)-Total (mg/L) | | 327 | 809 | 591 | 411 |
| | Thallium (Tl)-Total (mg/L) | | 0.000076 | 0.000135 | 0.000168 | 0.000036 |
| | Tin (Sn)-Total (mg/L) | | <0.00010 | <0.00020 DLA | <0.00020 DLA | <0.00020 DLA |
| | Titanium (Ti)-Total (mg/L) | | <0.010 | <0.020 DLA | <0.020 DLA | <0.020 DLA |
| | Uranium (U)-Total (mg/L) | | 0.00402 | 0.000134 | 0.000272 | 0.000767 |
| | Vanadium (V)-Total (mg/L) | | <0.0010 | <0.0020 DLA | <0.0020 DLA | <0.0020 DLA |
| | Zinc (Zn)-Total (mg/L) | | 0.290 | 1.24 | 1.16 | 0.0204 |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | | | FIELD | FIELD | FIELD |
| | Dissolved Metals Filtration Location | | | FIELD | FIELD | FIELD |
| | Aluminum (Al)-Dissolved (mg/L) | | | 0.0046 | 0.0044 | 0.0071 |
| | Antimony (Sb)-Dissolved (mg/L) | | | 0.0330 | 0.0155 | 0.0811 |
| | Arsenic (As)-Dissolved (mg/L) | | | 0.0987 | 0.00192 | 0.00170 |
| | Barium (Ba)-Dissolved (mg/L) | | | 0.0100 | 0.0220 | 0.0389 |
| | Beryllium (Be)-Dissolved (mg/L) | | | <0.00020 DLA | <0.00020 DLA | <0.00020 DLA |
| | Bismuth (Bi)-Dissolved (mg/L) | | | <0.0010 DLA | <0.0010 DLA | <0.0010 DLA |
| | Boron (B)-Dissolved (mg/L) | | | <0.020 DLA | 0.030 | <0.020 DLA |
| | Cadmium (Cd)-Dissolved (mg/L) | | | 0.0178 | 0.0219 DTC | 0.000901 |
| | Calcium (Ca)-Dissolved (mg/L) | | | 411 | 568 | 437 |
| | Chromium (Cr)-Dissolved (mg/L) | | | <0.00020 DLA | <0.00020 DLA | 0.00029 |
| | Cobalt (Co)-Dissolved (mg/L) | | | <0.00020 DLA | 0.00497 | 0.00822 |
| | Copper (Cu)-Dissolved (mg/L) | | | 0.00608 | 0.00418 | 0.00109 |
| | Iron (Fe)-Dissolved (mg/L) | | | <0.010 | 0.018 | 0.010 |
| | Lead (Pb)-Dissolved (mg/L) | | | 0.00022 | <0.00010 DLA | <0.00010 DLA |
| | Lithium (Li)-Dissolved (mg/L) | | | 0.0068 | 0.0144 | 0.0014 |
| | Magnesium (Mg)-Dissolved (mg/L) | | | 366 | 92.0 | 38.9 |
| | Manganese (Mn)-Dissolved (mg/L) | | | 0.601 | 7.99 DTC | 0.00176 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | Sample ID: L1368203-16<br>Description: Water<br>Sampled Date: 18-SEP-13<br>Sampled Time:<br>Client ID: WASTE ROCK + ORG | Sample ID: L1368203-17<br>Description: Water<br>Sampled Date: 18-SEP-13<br>Sampled Time:<br>Client ID: WASTE ROCK LEACHATE | Sample ID: L1368203-18<br>Description: Water<br>Sampled Date: 18-SEP-13<br>Sampled Time:<br>Client ID: OPEN PIT-UPPER STANDARD PRESERVATION-RECIEVED 1-OCT-13 | | |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Total Metals** | Manganese (Mn)-Total (mg/L) | 0.158 | 96.2 | | | |
| | Mercury (Hg)-Total (mg/L) | 0.000012 | <0.000010 | | | |
| | Molybdenum (Mo)-Total (mg/L) | 0.00015 | DLA <0.00050 | | | |
| | Nickel (Ni)-Total (mg/L) | DLA <0.0010 | 0.0980 | | | |
| | Phosphorus (P)-Total (mg/L) | <0.050 | <0.050 | | | |
| | Potassium (K)-Total (mg/L) | 5.42 | 37.1 | | | |
| | Selenium (Se)-Total (mg/L) | DLA <0.00020 | DLA <0.0010 | | | |
| | Silicon (Si)-Total (mg/L) | 2.80 | 8.89 | | | |
| | Silver (Ag)-Total (mg/L) | 0.000901 | DLA <0.00010 | | | |
| | Sodium (Na)-Total (mg/L) | 1.43 | 6.83 | | | |
| | Strontium (Sr)-Total (mg/L) | 0.714 | 1.48 | | | |
| | Sulfur (S)-Total (mg/L) | 628 | 812 | | | |
| | Thallium (Tl)-Total (mg/L) | 0.000198 | 0.00037 | | | |
| | Tin (Sn)-Total (mg/L) | DLA <0.00020 | DLA <0.0010 | | | |
| | Titanium (Ti)-Total (mg/L) | DLA <0.020 | DLA <0.10 | | | |
| | Uranium (U)-Total (mg/L) | 0.000749 | DLA <0.00010 | | | |
| | Vanadium (V)-Total (mg/L) | DLA <0.0020 | DLA <0.010 | | | |
| | Zinc (Zn)-Total (mg/L) | 0.207 | 7.21 | | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | FIELD | | | |
| | Dissolved Metals Filtration Location | FIELD | FIELD | | | |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0030 | 0.011 | | | |
| | Antimony (Sb)-Dissolved (mg/L) | 0.00246 | 0.0012 | | | |
| | Arsenic (As)-Dissolved (mg/L) | 0.00312 | 0.0034 | | | |
| | Barium (Ba)-Dissolved (mg/L) | 0.0116 | 0.0255 | | | |
| | Beryllium (Be)-Dissolved (mg/L) | DLA <0.00020 | DLA <0.0010 | | | |
| | Bismuth (Bi)-Dissolved (mg/L) | DLA <0.0010 | DLA <0.0050 | | | |
| | Boron (B)-Dissolved (mg/L) | DLA <0.020 | DLA <0.10 | | | |
| | Cadmium (Cd)-Dissolved (mg/L) | 0.00528 | 0.00841 | | | |
| | Calcium (Ca)-Dissolved (mg/L) | 468 | 453 | | | |
| | Chromium (Cr)-Dissolved (mg/L) | DLA <0.00020 | DLA <0.0010 | | | |
| | Cobalt (Co)-Dissolved (mg/L) | DLA <0.00020 | DTC 0.0369 | | | |
| | Copper (Cu)-Dissolved (mg/L) | 0.00206 | 0.0025 | | | |
| | Iron (Fe)-Dissolved (mg/L) | <0.010 | 0.187 | | | |
| | Lead (Pb)-Dissolved (mg/L) | DLA <0.00010 | DLA <0.00050 | | | |
| | Lithium (Li)-Dissolved (mg/L) | 0.0035 | 0.0268 | | | |
| | Magnesium (Mg)-Dissolved (mg/L) | 197 | 248 | | | |
| | Manganese (Mn)-Dissolved (mg/L) | 0.0576 | 109 | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1368203-1 | L1368203-2 | L1368203-3 | L1368203-4 | L1368203-5 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 |
| | Sampled Time | | | | | |
| | Client ID | W1410383-BH02 STANDARD PRESERVATION | W1410383-BH02 ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | W1410383-BH02 ALTERNATE PRESERVATION #3 (UNPRESERVED) | OPEN PIT-BOTTOM STANDARD PRESERVATION | OPEN PIT-BOTTOM ALTERNATE PRESERVATION #1 (SCN WITH HNO3) |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Dissolved Metals** | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | | <0.000010 | | |
| | Molybdenum (Mo)-Dissolved (mg/L) | 0.00128 | | 0.00123 | | |
| | Nickel (Ni)-Dissolved (mg/L) | 0.00124 | | 0.00097 | | |
| | Phosphorus (P)-Dissolved (mg/L) | <0.050 | | <0.050 | | |
| | Potassium (K)-Dissolved (mg/L) | 3.14 | | 3.15 | | |
| | Selenium (Se)-Dissolved (mg/L) | 0.00094 | | 0.00117 | | |
| | Silicon (Si)-Dissolved (mg/L) | 5.96 | | 6.18 | | |
| | Silver (Ag)-Dissolved (mg/L) | <0.000010 | | <0.000010 | | |
| | Sodium (Na)-Dissolved (mg/L) | 12.2 | | 12.5 | | |
| | Strontium (Sr)-Dissolved (mg/L) | 0.603 | | 0.611 | | |
| | Sulfur (S)-Dissolved (mg/L) | 83.9 | | 77.8 | | |
| | Thallium (Tl)-Dissolved (mg/L) | <0.000010 | | <0.000010 | | |
| | Tin (Sn)-Dissolved (mg/L) | 0.00016 | | 0.00010 | | |
| | Titanium (Ti)-Dissolved (mg/L) | <0.010 | | <0.010 | | |
| | Uranium (U)-Dissolved (mg/L) | 0.00517 | | 0.00498 | | |
| | Vanadium (V)-Dissolved (mg/L) | <0.0010 | | <0.0010 | | |
| | Zinc (Zn)-Dissolved (mg/L) | 0.0057 | | 0.0015 | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1368203-6 | L1368203-7 | L1368203-8 | L1368203-9 | L1368203-10 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 |
| | Sampled Time | | | | | |
| | Client ID | OPEN PIT-BOTTOM ALTERNATE PRESERVATION #3 (UNPRESERVED) | OPEN PIT-MIDDLE STANDARD PRESERVATION | OPEN PIT-MIDDLE ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | OPEN PIT-MIDDLE ALTERNATE PRESERVATION #3 (UNPRESERVED) | OPEN PIT-UPPER STANDARD PRESERVATION |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Dissolved Metals** | Mercury (Hg)-Dissolved (mg/L) | | | | | |
| | Molybdenum (Mo)-Dissolved (mg/L) | | | | | |
| | Nickel (Ni)-Dissolved (mg/L) | | | | | |
| | Phosphorus (P)-Dissolved (mg/L) | | | | | |
| | Potassium (K)-Dissolved (mg/L) | | | | | |
| | Selenium (Se)-Dissolved (mg/L) | | | | | |
| | Silicon (Si)-Dissolved (mg/L) | | | | | |
| | Silver (Ag)-Dissolved (mg/L) | | | | | |
| | Sodium (Na)-Dissolved (mg/L) | | | | | |
| | Strontium (Sr)-Dissolved (mg/L) | | | | | |
| | Sulfur (S)-Dissolved (mg/L) | | | | | |
| | Thallium (Tl)-Dissolved (mg/L) | | | | | |
| | Tin (Sn)-Dissolved (mg/L) | | | | | |
| | Titanium (Ti)-Dissolved (mg/L) | | | | | |
| | Uranium (U)-Dissolved (mg/L) | | | | | |
| | Vanadium (V)-Dissolved (mg/L) | | | | | |
| | Zinc (Zn)-Dissolved (mg/L) | | | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1368203-11 Water 18-SEP-13 OPEN PIT-UPPER ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | L1368203-12 Water 18-SEP-13 OPEN PIT-UPPER ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1368203-13 Water 18-SEP-13 ORE LEACHATE | L1368203-14 Water 18-SEP-13 TAILINGS + ORG | L1368203-15 Water 18-SEP-13 TAILINGS SAND LEACHATE |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Dissolved Metals** | Mercury (Hg)-Dissolved (mg/L) | | | <0.000010 | <0.000010 | <0.000010 |
| | Molybdenum (Mo)-Dissolved (mg/L) | | | <0.00010 DLA | 0.00019 | 0.00089 |
| | Nickel (Ni)-Dissolved (mg/L) | | | 0.0010 | 0.0274 DTC | 0.0033 |
| | Phosphorus (P)-Dissolved (mg/L) | | | <0.050 | <0.050 | <0.050 |
| | Potassium (K)-Dissolved (mg/L) | | | 6.56 | 33.7 | 4.91 |
| | Selenium (Se)-Dissolved (mg/L) | | | <0.00020 DLA | <0.00020 DLA | <0.00020 DLA |
| | Silicon (Si)-Dissolved (mg/L) | | | 5.61 | 6.34 | 4.67 |
| | Silver (Ag)-Dissolved (mg/L) | | | 0.000032 | <0.000020 DLA | <0.000020 DLA |
| | Sodium (Na)-Dissolved (mg/L) | | | 2.25 | 4.07 | 0.96 |
| | Strontium (Sr)-Dissolved (mg/L) | | | 0.673 | 1.35 | 0.441 |
| | Sulfur (S)-Dissolved (mg/L) | | | 813 | 592 | 403 |
| | Thallium (Tl)-Dissolved (mg/L) | | | 0.000117 | 0.000184 | 0.000035 |
| | Tin (Sn)-Dissolved (mg/L) | | | <0.00020 DLA | <0.00020 DLA | <0.00020 DLA |
| | Titanium (Ti)-Dissolved (mg/L) | | | <0.020 DLA | <0.020 DLA | <0.020 DLA |
| | Uranium (U)-Dissolved (mg/L) | | | 0.000119 | 0.000320 | 0.000743 |
| | Vanadium (V)-Dissolved (mg/L) | | | <0.0020 DLA | <0.0020 DLA | <0.0020 DLA |
| | Zinc (Zn)-Dissolved (mg/L) | | | 1.20 | 1.52 DTC | 0.0185 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1368203-16 | L1368203-17 | L1368203-18 | | |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | | |
| | Sampled Date | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | | |
| | Sampled Time | | | | | |
| | Client ID | WASTE ROCK + ORG | WASTE ROCK LEACHATE | OPEN PIT-UPPER STANDARD PRESERVATION-RECIEVED 1-OCT-13 | | |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Dissolved Metals** | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | <0.000010 | | | |
| | Molybdenum (Mo)-Dissolved (mg/L) | <0.00010 DLA | <0.00050 DLA | | | |
| | Nickel (Ni)-Dissolved (mg/L) | <0.0010 DLA | 0.0970 | | | |
| | Phosphorus (P)-Dissolved (mg/L) | <0.050 | <0.050 | | | |
| | Potassium (K)-Dissolved (mg/L) | 4.98 | 35.6 | | | |
| | Selenium (Se)-Dissolved (mg/L) | <0.00020 DLA | <0.0010 DLA | | | |
| | Silicon (Si)-Dissolved (mg/L) | 1.94 | 8.29 | | | |
| | Silver (Ag)-Dissolved (mg/L) | <0.000020 DLA | <0.00010 DLA | | | |
| | Sodium (Na)-Dissolved (mg/L) | 1.40 | 6.69 | | | |
| | Strontium (Sr)-Dissolved (mg/L) | 0.692 | 1.36 | | | |
| | Sulfur (S)-Dissolved (mg/L) | 642 | 749 | | | |
| | Thallium (Tl)-Dissolved (mg/L) | 0.000091 | 0.00039 | | | |
| | Tin (Sn)-Dissolved (mg/L) | <0.00020 DLA | <0.0010 DLA | | | |
| | Titanium (Ti)-Dissolved (mg/L) | <0.020 DLA | <0.10 DLA | | | |
| | Uranium (U)-Dissolved (mg/L) | 0.000638 | 0.00014 | | | |
| | Vanadium (V)-Dissolved (mg/L) | <0.0020 DLA | <0.010 DLA | | | |
| | Zinc (Zn)-Dissolved (mg/L) | 0.110 | 7.42 | | | |

* 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 | Chloride (Cl) | DLA | L1368203-1, -10, -13, -14, -15, -16, -17, -4, -7 |
| Duplicate | Nitrite (as N) | DLA | L1368203-1, -10, -13, -14, -15, -16, -17, -4, -7 |
| Duplicate | Nitrate (as N) | DLA | L1368203-1, -10, -13, -14, -15, -16, -17, -4, -7 |
| Duplicate | Beryllium (Be)-Total | DLA | L1368203-10, -12, -13, -14, -15, -16, -17, -4, -6, -7, -9 |
| Duplicate | Bismuth (Bi)-Total | DLA | L1368203-10, -12, -13, -14, -15, -16, -17, -4, -6, -7, -9 |
| Duplicate | Lead (Pb)-Total | DLA | L1368203-10, -12, -13, -14, -15, -16, -17, -4, -6, -7, -9 |
| Duplicate | Tin (Sn)-Total | DLA | L1368203-10, -12, -13, -14, -15, -16, -17, -4, -6, -7, -9 |
| Duplicate | Titanium (Ti)-Total | DLA | L1368203-10, -12, -13, -14, -15, -16, -17, -4, -6, -7, -9 |
| Duplicate | Cadmium (Cd)-Dissolved | DLM | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Sulfate (SO4) | MS-B | L1368203-1, -10, -13, -14, -15, -16, -17, -4, -7 |
| Matrix Spike | Sulfate (SO4) | MS-B | L1368203-1, -10, -13, -14, -15, -16, -17, -4, -7 |
| Matrix Spike | Barium (Ba)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Boron (B)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Manganese (Mn)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Sodium (Na)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Barium (Ba)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Manganese (Mn)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Barium (Ba)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Sodium (Na)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Barium (Ba)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Molybdenum (Mo)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Sodium (Na)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Barium (Ba)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Manganese (Mn)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Barium (Ba)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Manganese (Mn)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Sodium (Na)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Antimony (Sb)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Arsenic (As)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Barium (Ba)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Manganese (Mn)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Barium (Ba)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Nickel (Ni)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Sodium (Na)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Uranium (U)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Calcium (Ca)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |
| Matrix Spike | Magnesium (Mg)-Dissolved | MS-B | L1368203-1, -13, -14, -15, -16, -17, -3 |

**Qualifiers for Individual Parameters Listed:**

| Qualifier | Description |
|---|---|
| DLA | Detection Limit Adjusted For required dilution |
| DLM | Detection Limit Adjusted due to sample matrix effects. |
| DTC | Dissolved concentration exceeds total. Results were confirmed by re-analysis. |
| MS-B | Matrix Spike recovery could not be accurately calculated due to high analyte background in sample. |

# Reference Information

SRU Sample Received Unpreserved. Results may be biased low for indicated parameter(s)

**Test Method References:**

| ALS Test Code | Matrix | Test Description | Method Reference** |
|---|---|---|---|
| **ALK-MAN-WR** | Water | Alkalinity by Manual Titration | APHA 2320 |

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

| | | | |
|---|---|---|---|
| **ANIONS-CL-IC-WR** | Water | Chloride by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

| | | | |
|---|---|---|---|
| **ANIONS-F-IC-WR** | Water | Fluoride by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

| | | | |
|---|---|---|---|
| **ANIONS-NO2-IC-WR** | Water | Nitrite Nitrogen by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

| | | | |
|---|---|---|---|
| **ANIONS-NO3-IC-WR** | Water | Nitrate Nitrogen by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

| | | | |
|---|---|---|---|
| **ANIONS-SO4-IC-WR** | Water | Sulphate by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

| | | | |
|---|---|---|---|
| **CARBONS-TIC-VA** | Water | Total inorganic carbon by CO2 purge | APHA 5310 TOTAL ORGANIC CARBON (TOC) |

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

| | | | |
|---|---|---|---|
| **CARBONS-TOC-VA** | Water | Total organic carbon by combustion | APHA 5310 TOTAL ORGANIC CARBON (TOC) |

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

| | | | |
|---|---|---|---|
| **CN-FREE-CFA-VA** | Water | Free Cyanide in water by CFA | ASTM 7237 |

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

| | | | |
|---|---|---|---|
| **CN-SCN-VA** | Water | Thiocyanate by Colour | APHA 4500-CN CYANIDE |

This analysis is carried out using procedures adapted from APHA Method 4500-CN- M "Thiocyanate" Thiocyanate is determined by the ferric nitrate colourimetric method.

| | | | |
|---|---|---|---|
| **CN-T-CFA-VA** | Water | Total Cyanide in water by CFA | ISO 14403:2002 |

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

| | | | |
|---|---|---|---|
| **CN-WAD-CFA-VA** | Water | Weak Acid Diss. Cyanide in water by CFA | APHA 4500-CN CYANIDE |

This analysis is carried out using procedures adapted from APHA Method 4500-CN I. "Weak Acid Dissociable Cyanide". Weak Acid Dissociable (WAD) cyanide is determined by in-line sample distillation with final determination by colourimetric analysis.

| | | | |
|---|---|---|---|
| **EC-MAN-WR** | Water | Conductivity by Meter | APHA 2510 (B) |

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using an electrode.

| | | | |
|---|---|---|---|
| **HARDNESS-CALC-VA** | Water | Hardness | APHA 2340B |

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

| | | | |
|---|---|---|---|
| **HG-DIS-LOW-CVAFS-VA** | Water | Dissolved Mercury in Water by CVAFS(Low) | EPA SW-846 3005A & EPA 245.7 |

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental

# Reference Information

analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

**HG-TOT-LOW-CVAFS-VA** Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

**IONBALANCE-VA** Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

**MET-D-CCMS-VA** Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

**MET-DIS-LOW-ICP-VA** Water Dissolved Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

**MET-T-CCMS-VA** Water Total Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

**MET-TOT-LOW-ICP-VA** Water Total Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

**NH3-F-VA** Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, 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.

**PH-MAN-WR** Water pH by Meter APHA 4500-H (B)

"This analysis is carried out using procedures adapted from APHA Method 4500-H ""pH Value"". The pH is determined in the laboratory using a pH electrode."

**S-DIS-ICP-VA** Water Dissolved Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

**S-TOT-ICP-VA** Water Total Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA

# Reference Information

Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

**TKN-F-VA** Water TKN in Water by Fluorescence APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

** 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 |
|---|---|
| WR | ALS ENVIRONMENTAL - WHITEHORSE, YUKON, CANADA |
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |

**Chain of Custody Numbers:**

1 2

**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 wwt - 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.*

# Quality Control Report



Client: AMEC EARTH & ENVIRONMENTAL
5681 - 70 Street
Edmonton AB T6B 3P6
Contact: Leslie Hardy

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ALK-MAN-WR** | **Water** | | | | | | | |
| **Batch R2706821** | | | | | | | | |
| **WG1759313-2 LCS** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 102.3 | | % | | 85-115 | 01-OCT-13 |
| **WG1759313-1 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <2.0 | | mg/L | | 2 | 01-OCT-13 |
| **ANIONS-CL-IC-WR** | **Water** | | | | | | | |
| **Batch R2705887** | | | | | | | | |
| **WG1755534-7 DUP** | | **L1368203-7** | | | | | | |
| Chloride (Cl) | | <5.0 | <5.0 | RPD-NA | mg/L | N/A | 20 | 25-SEP-13 |
| **WG1755534-2 LCS** | | | | | | | | |
| Chloride (Cl) | | | 100.9 | | % | | 85-115 | 25-SEP-13 |
| **WG1755534-6 LCS** | | | | | | | | |
| Chloride (Cl) | | | 100.7 | | % | | 85-115 | 25-SEP-13 |
| **WG1755534-1 MB** | | | | | | | | |
| Chloride (Cl) | | | <0.50 | | mg/L | | 0.5 | 25-SEP-13 |
| **WG1755534-5 MB** | | | | | | | | |
| Chloride (Cl) | | | <0.50 | | mg/L | | 0.5 | 25-SEP-13 |
| **WG1755534-4 MS** | | **L1368052-3** | | | | | | |
| Chloride (Cl) | | | 100.8 | | % | | 75-125 | 25-SEP-13 |
| **ANIONS-F-IC-WR** | **Water** | | | | | | | |
| **Batch R2705887** | | | | | | | | |
| **WG1755534-7 DUP** | | **L1368203-7** | | | | | | |
| Fluoride (F) | | 0.21 | 0.21 | | mg/L | 1.7 | 20 | 25-SEP-13 |
| **WG1755534-2 LCS** | | | | | | | | |
| Fluoride (F) | | | 102.0 | | % | | 85-115 | 25-SEP-13 |
| **WG1755534-6 LCS** | | | | | | | | |
| Fluoride (F) | | | 101.6 | | % | | 85-115 | 25-SEP-13 |
| **WG1755534-1 MB** | | | | | | | | |
| Fluoride (F) | | | <0.020 | | mg/L | | 0.02 | 25-SEP-13 |
| **WG1755534-5 MB** | | | | | | | | |
| Fluoride (F) | | | <0.020 | | mg/L | | 0.02 | 25-SEP-13 |
| **WG1755534-4 MS** | | **L1368052-3** | | | | | | |
| Fluoride (F) | | | 101.6 | | % | | 75-125 | 25-SEP-13 |
| **ANIONS-NO2-IC-WR** | **Water** | | | | | | | |
| **Batch R2705887** | | | | | | | | |
| **WG1755534-7 DUP** | | **L1368203-7** | | | | | | |
| Nitrite (as N) | | <0.010 | <0.010 | RPD-NA | mg/L | N/A | 20 | 25-SEP-13 |
| **WG1755534-2 LCS** | | | | | | | | |
| Nitrite (as N) | | | 100.7 | | % | | 85-115 | 25-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ANIONS-NO2-IC-WR** | **Water** | | | | | | | |
| **Batch R2705887** | | | | | | | | |
| **WG1755534-6 LCS** | | | | | | | | |
| Nitrite (as N) | | | 101.8 | | % | | 85-115 | 25-SEP-13 |
| **WG1755534-1 MB** | | | | | | | | |
| Nitrite (as N) | | | <0.0010 | | mg/L | | 0.001 | 25-SEP-13 |
| **WG1755534-5 MB** | | | | | | | | |
| Nitrite (as N) | | | <0.0010 | | mg/L | | 0.001 | 25-SEP-13 |
| **WG1755534-4 MS** | | **L1368052-3** | | | | | | |
| Nitrite (as N) | | | 104.3 | | % | | 75-125 | 25-SEP-13 |
| **ANIONS-NO3-IC-WR** | **Water** | | | | | | | |
| **Batch R2705887** | | | | | | | | |
| **WG1755534-7 DUP** | | **L1368203-7** | | | | | | |
| Nitrate (as N) | | <0.050 | <0.050 | RPD-NA | mg/L | N/A | 20 | 25-SEP-13 |
| **WG1755534-2 LCS** | | | | | | | | |
| Nitrate (as N) | | | 101.0 | | % | | 85-115 | 25-SEP-13 |
| **WG1755534-6 LCS** | | | | | | | | |
| Nitrate (as N) | | | 100.8 | | % | | 85-115 | 25-SEP-13 |
| **WG1755534-1 MB** | | | | | | | | |
| Nitrate (as N) | | | <0.0050 | | mg/L | | 0.005 | 25-SEP-13 |
| **WG1755534-5 MB** | | | | | | | | |
| Nitrate (as N) | | | <0.0050 | | mg/L | | 0.005 | 25-SEP-13 |
| **WG1755534-4 MS** | | **L1368052-3** | | | | | | |
| Nitrate (as N) | | | 100.2 | | % | | 75-125 | 25-SEP-13 |
| **ANIONS-SO4-IC-WR** | **Water** | | | | | | | |
| **Batch R2705887** | | | | | | | | |
| **WG1755534-7 DUP** | | **L1368203-7** | | | | | | |
| Sulfate (SO4) | | 947 | 946 | | mg/L | 0.1 | 20 | 25-SEP-13 |
| **WG1755534-2 LCS** | | | | | | | | |
| Sulfate (SO4) | | | 99.2 | | % | | 85-115 | 25-SEP-13 |
| **WG1755534-6 LCS** | | | | | | | | |
| Sulfate (SO4) | | | 99.1 | | % | | 85-115 | 25-SEP-13 |
| **WG1755534-1 MB** | | | | | | | | |
| Sulfate (SO4) | | | <0.50 | | mg/L | | 0.5 | 25-SEP-13 |
| **WG1755534-5 MB** | | | | | | | | |
| Sulfate (SO4) | | | <0.50 | | mg/L | | 0.5 | 25-SEP-13 |
| **WG1755534-4 MS** | | **L1368052-3** | | | | | | |
| Sulfate (SO4) | | | N/A | MS-B | % | | - | 25-SEP-13 |
| **WG1755534-8 MS** | | **L1368203-10** | | | | | | |
| Sulfate (SO4) | | | N/A | MS-B | % | | - | 25-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CARBONS-TIC-VA** | **Water** | | | | | | | |
| **Batch R2706626** | | | | | | | | |
| **WG1759287-3 LCS** | | | | | | | | |
| Total Inorganic Carbon | | | 100.9 | | % | | 80-120 | 01-OCT-13 |
| **WG1759287-2 MB** | | | | | | | | |
| Total Inorganic Carbon | | | <0.50 | | mg/L | | 0.5 | 01-OCT-13 |
| **Batch R2711902** | | | | | | | | |
| **WG1762723-3 DUP** | | **L1368203-18** | | | | | | |
| Total Inorganic Carbon | | 36.0 | 34.1 | | mg/L | 5.2 | 20 | 08-OCT-13 |
| **WG1762723-2 LCS** | | | | | | | | |
| Total Inorganic Carbon | | | 110.3 | | % | | 80-120 | 08-OCT-13 |
| **WG1762723-7 LCS** | | | | | | | | |
| Total Inorganic Carbon | | | 99.4 | | % | | 80-120 | 08-OCT-13 |
| **WG1762723-1 MB** | | | | | | | | |
| Total Inorganic Carbon | | | <0.50 | | mg/L | | 0.5 | 08-OCT-13 |
| **WG1762723-6 MB** | | | | | | | | |
| Total Inorganic Carbon | | | <0.50 | | mg/L | | 0.5 | 08-OCT-13 |
| **CARBONS-TOC-VA** | **Water** | | | | | | | |
| **Batch R2705755** | | | | | | | | |
| **WG1757625-1 LCS** | | | | | | | | |
| Total Organic Carbon | | | 91.3 | | % | | 80-120 | 30-SEP-13 |
| **WG1757625-4 LCS** | | | | | | | | |
| Total Organic Carbon | | | 94.1 | | % | | 80-120 | 30-SEP-13 |
| **WG1757625-9 LCS** | | | | | | | | |
| Total Organic Carbon | | | 96.0 | | % | | 80-120 | 30-SEP-13 |
| **WG1757625-3 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 30-SEP-13 |
| **WG1757625-8 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 30-SEP-13 |
| **WG1757625-7 MS** | | **L1368203-10** | | | | | | |
| Total Organic Carbon | | | 101.6 | | % | | 70-130 | 30-SEP-13 |
| **CN-FREE-CFA-VA** | **Water** | | | | | | | |
| **Batch R2707863** | | | | | | | | |
| **WG1759835-11 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.8 | | % | | 80-120 | 02-OCT-13 |
| **WG1759835-2 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.2 | | % | | 80-120 | 02-OCT-13 |
| **WG1759835-5 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.6 | | % | | 80-120 | 02-OCT-13 |
| **WG1759835-9 LCS** | | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-FREE-CFA-VA** | **Water** | | | | | | | |
| **Batch R2707863** | | | | | | | | |
| **WG1759835-9 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.6 | | % | | 80-120 | 02-OCT-13 |
| **WG1759835-1 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759835-10 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759835-4 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759835-8 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759835-7 MS** | | **L1366424-2** | | | | | | |
| Cyanide, Free | | | 95.7 | | % | | 70-130 | 02-OCT-13 |
| **Batch R2708901** | | | | | | | | |
| **WG1760854-3 DUP** | | **L1368203-4** | | | | | | |
| Cyanide, Free | | <0.0050 | <0.0050 | RPD-NA | mg/L | N/A | 20 | 03-OCT-13 |
| **WG1760854-13 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.9 | | % | | 80-120 | 03-OCT-13 |
| **WG1760854-16 LCS** | | | | | | | | |
| Cyanide, Free | | | 101.0 | | % | | 80-120 | 03-OCT-13 |
| **WG1760854-2 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.6 | | % | | 80-120 | 03-OCT-13 |
| **WG1760854-7 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.6 | | % | | 80-120 | 03-OCT-13 |
| **WG1760854-9 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.4 | | % | | 80-120 | 03-OCT-13 |
| **WG1760854-1 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760854-12 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760854-15 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760854-6 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760854-8 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **Batch R2710533** | | | | | | | | |
| **WG1761476-12 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.6 | | % | | 80-120 | 04-OCT-13 |
| **WG1761476-14 LCS** | | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-FREE-CFA-VA** | **Water** | | | | | | | |
| **Batch R2710533** | | | | | | | | |
| **WG1761476-14 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.2 | | % | | 80-120 | 04-OCT-13 |
| **WG1761476-16 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.7 | | % | | 80-120 | 04-OCT-13 |
| **WG1761476-18 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.4 | | % | | 80-120 | 04-OCT-13 |
| **WG1761476-2 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.7 | | % | | 80-120 | 04-OCT-13 |
| **WG1761476-4 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.0 | | % | | 80-120 | 04-OCT-13 |
| **WG1761476-8 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.1 | | % | | 80-120 | 04-OCT-13 |
| **WG1761476-1 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761476-11 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761476-13 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761476-15 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761476-17 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761476-3 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761476-7 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761476-10 MS** | | **L1370205-1** | | | | | | |
| Cyanide, Free | | | 95.7 | | % | | 70-130 | 04-OCT-13 |
| **CN-SCN-VA** | **Water** | | | | | | | |
| **Batch R2709250** | | | | | | | | |
| **WG1761460-2 CRM** | | **VA-SCN-LOW-CONTROL** | | | | | | |
| Thiocyanate (SCN) | | | 99.5 | | % | | 85-115 | 04-OCT-13 |
| **WG1761460-6 CRM** | | **VA-SCN-HIGH-CONTROL** | | | | | | |
| Thiocyanate (SCN) | | | 85.1 | | % | | 85-115 | 04-OCT-13 |
| **WG1761460-1 MB** | | | | | | | | |
| Thiocyanate (SCN) | | | <0.50 | | mg/L | | 0.5 | 04-OCT-13 |
| **WG1761460-5 MB** | | | | | | | | |
| Thiocyanate (SCN) | | | <0.50 | | mg/L | | 0.5 | 04-OCT-13 |
| **WG1761460-4 MS** | | **L1370405-1** | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-SCN-VA** | **Water** | | | | | | | |
| **Batch R2709250** | | | | | | | | |
| **WG1761460-4 MS** | | **L1370405-1** | | | | | | |
| Thiocyanate (SCN) | | | 92.3 | | % | | 75-125 | 04-OCT-13 |
| **WG1761460-8 MS** | | **L1371904-17** | | | | | | |
| Thiocyanate (SCN) | | | 89.2 | | % | | 75-125 | 04-OCT-13 |
| **Batch R2711704** | | | | | | | | |
| **WG1762881-2 CRM** | | **VA-SCN-LOW-CONTROL** | | | | | | |
| Thiocyanate (SCN) | | | 99.5 | | % | | 85-115 | 07-OCT-13 |
| **WG1762881-6 CRM** | | **VA-SCN-HIGH-CONTROL** | | | | | | |
| Thiocyanate (SCN) | | | 85.4 | | % | | 85-115 | 07-OCT-13 |
| **WG1762881-3 DUP** | | **L1368203-11** | | | | | | |
| Thiocyanate (SCN) | | <0.50 | <0.50 | RPD-NA | mg/L | N/A | 20 | 07-OCT-13 |
| **WG1762881-1 MB** | | | | | | | | |
| Thiocyanate (SCN) | | | <0.50 | | mg/L | | 0.5 | 07-OCT-13 |
| **WG1762881-5 MB** | | | | | | | | |
| Thiocyanate (SCN) | | | <0.50 | | mg/L | | 0.5 | 07-OCT-13 |
| **WG1762881-4 MS** | | **L1371869-1** | | | | | | |
| Thiocyanate (SCN) | | | 89.3 | | % | | 75-125 | 07-OCT-13 |
| **CN-T-CFA-VA** | **Water** | | | | | | | |
| **Batch R2707828** | | | | | | | | |
| **WG1759824-13 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 94.0 | | % | | 75-105 | 02-OCT-13 |
| **WG1759824-18 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 94.4 | | % | | 75-105 | 02-OCT-13 |
| **WG1759824-21 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 92.0 | | % | | 75-105 | 02-OCT-13 |
| **WG1759824-26 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 95.0 | | % | | 75-105 | 02-OCT-13 |
| **WG1759824-3 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 91.0 | | % | | 75-105 | 02-OCT-13 |
| **WG1759824-32 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 92.5 | | % | | 75-105 | 02-OCT-13 |
| **WG1759824-6 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 92.6 | | % | | 75-105 | 02-OCT-13 |
| **WG1759824-12 LCS** | | | | | | | | |
| Cyanide, Total | | | 104.4 | | % | | 80-120 | 02-OCT-13 |
| **WG1759824-17 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.9 | | % | | 80-120 | 02-OCT-13 |
| **WG1759824-2 LCS** | | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-T-CFA-VA** | **Water** | | | | | | | |
| **Batch R2707828** | | | | | | | | |
| **WG1759824-2 LCS** | | | | | | | | |
| Cyanide, Total | | | 102.7 | | % | | 80-120 | 02-OCT-13 |
| **WG1759824-20 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.8 | | % | | 80-120 | 02-OCT-13 |
| **WG1759824-25 LCS** | | | | | | | | |
| Cyanide, Total | | | 104.3 | | % | | 80-120 | 02-OCT-13 |
| **WG1759824-31 LCS** | | | | | | | | |
| Cyanide, Total | | | 101.8 | | % | | 80-120 | 02-OCT-13 |
| **WG1759824-5 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.3 | | % | | 80-120 | 02-OCT-13 |
| **WG1759824-1 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759824-11 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759824-16 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759824-19 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759824-24 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759824-30 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759824-4 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759824-28 MS** | | **L1368575-2** | | | | | | |
| Cyanide, Total | | | 100.0 | | % | | 70-130 | 02-OCT-13 |
| **WG1759824-8 MS** | | **L1366424-2** | | | | | | |
| Cyanide, Total | | | 100.0 | | % | | 70-130 | 02-OCT-13 |
| **Batch R2708841** | | | | | | | | |
| **WG1760838-4 DUP** | | **L1368203-4** | | | | | | |
| Cyanide, Total | | <0.0050 | <0.0050 | RPD-NA | mg/L | N/A | 20 | 03-OCT-13 |
| **WG1760838-14 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 91.5 | | % | | 75-105 | 03-OCT-13 |
| **WG1760838-19 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 92.1 | | % | | 75-105 | 03-OCT-13 |
| **WG1760838-22 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 87.4 | | % | | 75-105 | 03-OCT-13 |
| **WG1760838-3 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 88.1 | | % | | 75-105 | 03-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-T-CFA-VA** | **Water** | | | | | | | |
| **Batch R2708841** | | | | | | | | |
| **WG1760838-9 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 91.8 | | % | | 75-105 | 03-OCT-13 |
| **WG1760838-13 LCS** | | | | | | | | |
| Cyanide, Total | | | 102.8 | | % | | 80-120 | 03-OCT-13 |
| **WG1760838-18 LCS** | | | | | | | | |
| Cyanide, Total | | | 102.8 | | % | | 80-120 | 03-OCT-13 |
| **WG1760838-2 LCS** | | | | | | | | |
| Cyanide, Total | | | 101.3 | | % | | 80-120 | 03-OCT-13 |
| **WG1760838-21 LCS** | | | | | | | | |
| Cyanide, Total | | | 99.2 | | % | | 80-120 | 03-OCT-13 |
| **WG1760838-8 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.5 | | % | | 80-120 | 03-OCT-13 |
| **WG1760838-1 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760838-12 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760838-17 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760838-20 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760838-7 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760838-11 MS** | | **L1368575-20** | | | | | | |
| Cyanide, Total | | | 99.4 | | % | | 70-130 | 03-OCT-13 |
| **Batch R2710486** | | | | | | | | |
| **WG1761470-11 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 91.2 | | % | | 75-105 | 04-OCT-13 |
| **WG1761470-16 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 90.6 | | % | | 75-105 | 04-OCT-13 |
| **WG1761470-21 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 90.7 | | % | | 75-105 | 04-OCT-13 |
| **WG1761470-26 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 90.6 | | % | | 75-105 | 04-OCT-13 |
| **WG1761470-3 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 89.8 | | % | | 75-105 | 04-OCT-13 |
| **WG1761470-31 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 86.6 | | % | | 75-105 | 04-OCT-13 |
| **WG1761470-6 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 91.4 | | % | | 75-105 | 04-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-T-CFA-VA** | **Water** | | | | | | | |
| **Batch R2710486** | | | | | | | | |
| **WG1761470-10 LCS** | | | | | | | | |
| Cyanide, Total | | | 102.7 | | % | | 80-120 | 04-OCT-13 |
| **WG1761470-15 LCS** | | | | | | | | |
| Cyanide, Total | | | 102.3 | | % | | 80-120 | 04-OCT-13 |
| **WG1761470-2 LCS** | | | | | | | | |
| Cyanide, Total | | | 100.5 | | % | | 80-120 | 04-OCT-13 |
| **WG1761470-20 LCS** | | | | | | | | |
| Cyanide, Total | | | 101.4 | | % | | 80-120 | 04-OCT-13 |
| **WG1761470-25 LCS** | | | | | | | | |
| Cyanide, Total | | | 100.8 | | % | | 80-120 | 04-OCT-13 |
| **WG1761470-30 LCS** | | | | | | | | |
| Cyanide, Total | | | 97.0 | | % | | 80-120 | 04-OCT-13 |
| **WG1761470-5 LCS** | | | | | | | | |
| Cyanide, Total | | | 100.6 | | % | | 80-120 | 04-OCT-13 |
| **WG1761470-1 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761470-14 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761470-19 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761470-24 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761470-29 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761470-4 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761470-9 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761470-13 MS** | | **L1370205-1** | | | | | | |
| Cyanide, Total | | | 95.9 | | % | | 70-130 | 04-OCT-13 |
| **WG1761470-23 MS** | | **L1370014-5** | | | | | | |
| Cyanide, Total | | | 95.2 | | % | | 70-130 | 04-OCT-13 |
| **WG1761470-28 MS** | | **L1370667-11** | | | | | | |
| Cyanide, Total | | | 96.0 | | % | | 70-130 | 04-OCT-13 |
| **CN-WAD-CFA-VA** | **Water** | | | | | | | |
| **Batch R2707855** | | | | | | | | |
| **WG1759829-12 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 105.1 | | % | | 80-120 | 02-OCT-13 |
| **WG1759829-14 LCS** | | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-WAD-CFA-VA** | **Water** | | | | | | | |
| **Batch R2707855** | | | | | | | | |
| **WG1759829-14 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 105.0 | | % | | 80-120 | 02-OCT-13 |
| **WG1759829-18 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.2 | | % | | 80-120 | 02-OCT-13 |
| **WG1759829-2 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 101.7 | | % | | 80-120 | 02-OCT-13 |
| **WG1759829-23 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.0 | | % | | 80-120 | 02-OCT-13 |
| **WG1759829-4 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 104.0 | | % | | 80-120 | 02-OCT-13 |
| **WG1759829-8 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.4 | | % | | 80-120 | 02-OCT-13 |
| **WG1759829-1 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759829-11 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759829-13 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759829-17 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759829-22 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759829-3 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759829-7 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759829-20 MS** | | **L1368575-2** | | | | | | |
| Cyanide, Weak Acid Diss | | | 101.4 | | % | | 70-130 | 02-OCT-13 |
| **Batch R2708891** | | | | | | | | |
| **WG1760849-3 DUP** | | **L1368203-4** | | | | | | |
| Cyanide, Weak Acid Diss | | <0.0050 | <0.0050 | RPD-NA | mg/L | N/A | 20 | 03-OCT-13 |
| **WG1760849-13 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 100.6 | | % | | 80-120 | 03-OCT-13 |
| **WG1760849-15 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 104.0 | | % | | 80-120 | 03-OCT-13 |
| **WG1760849-2 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.0 | | % | | 80-120 | 03-OCT-13 |
| **WG1760849-5 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.0 | | % | | 80-120 | 03-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-WAD-CFA-VA** | **Water** | | | | | | | |
| **Batch R2708891** | | | | | | | | |
| **WG1760849-9 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 102.3 | | % | | 80-120 | 03-OCT-13 |
| **WG1760849-1 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760849-12 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760849-14 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760849-4 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760849-8 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760849-7 MS** | | **L1368575-20** | | | | | | |
| Cyanide, Weak Acid Diss | | | 99.8 | | % | | 70-130 | 03-OCT-13 |
| **Batch R2710494** | | | | | | | | |
| **WG1761473-10 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 99.4 | | % | | 80-120 | 04-OCT-13 |
| **WG1761473-14 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 101.4 | | % | | 80-120 | 04-OCT-13 |
| **WG1761473-18 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 98.3 | | % | | 80-120 | 04-OCT-13 |
| **WG1761473-2 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 100.1 | | % | | 80-120 | 04-OCT-13 |
| **WG1761473-22 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 101.0 | | % | | 80-120 | 04-OCT-13 |
| **WG1761473-4 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 100.4 | | % | | 80-120 | 04-OCT-13 |
| **WG1761473-6 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 100.1 | | % | | 80-120 | 04-OCT-13 |
| **WG1761473-1 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761473-13 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761473-17 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761473-21 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761473-3 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-WAD-CFA-VA** | **Water** | | | | | | | |
| **Batch R2710494** | | | | | | | | |
| **WG1761473-5 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761473-9 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 04-OCT-13 |
| **WG1761473-16 MS** | | **L1370014-5** | | | | | | |
| Cyanide, Weak Acid Diss | | | 100.4 | | % | | 70-130 | 04-OCT-13 |
| **WG1761473-20 MS** | | **L1370667-11** | | | | | | |
| Cyanide, Weak Acid Diss | | | 99.5 | | % | | 70-130 | 04-OCT-13 |
| **WG1761473-8 MS** | | **L1370205-1** | | | | | | |
| Cyanide, Weak Acid Diss | | | 95.1 | | % | | 70-130 | 04-OCT-13 |
| **EC-MAN-WR** | **Water** | | | | | | | |
| **Batch R2706843** | | | | | | | | |
| **WG1757694-3 DUP** | | **L1368203-1** | | | | | | |
| Conductivity | | 920 | 926 | | uS/cm | 0.7 | 10 | 27-SEP-13 |
| **WG1757694-2 LCS** | | | | | | | | |
| Conductivity | | | 100.9 | | % | | 90-110 | 27-SEP-13 |
| **WG1757694-5 LCS** | | | | | | | | |
| Conductivity | | | 101.5 | | % | | 90-110 | 27-SEP-13 |
| **WG1757694-8 LCS** | | | | | | | | |
| Conductivity | | | 101.5 | | % | | 90-110 | 27-SEP-13 |
| **WG1757694-1 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 27-SEP-13 |
| **WG1757694-4 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 27-SEP-13 |
| **WG1757694-7 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 27-SEP-13 |
| **HG-DIS-LOW-CVAFS-VA** | **Water** | | | | | | | |
| **Batch R2702610** | | | | | | | | |
| **WG1756003-11 MS** | | **L1368028-2** | | | | | | |
| Mercury (Hg)-Dissolved | | | 99.3 | | % | | 70-130 | 27-SEP-13 |
| **Batch R2703030** | | | | | | | | |
| **WG1756003-1 MB** | | | | | | | | |
| Mercury (Hg)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 28-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **HG-DIS-LOW-CVAFS-VA** | **Water** | | | | | | | |
| **Batch R2703079** | | | | | | | | |
| **WG1756003-12 MS** | | **L1367708-7** | | | | | | |
| Mercury (Hg)-Dissolved | | | 89.6 | | % | | 70-130 | 28-SEP-13 |
| **WG1756003-14 MS** | | **L1368575-17** | | | | | | |
| Mercury (Hg)-Dissolved | | | 96.6 | | % | | 70-130 | 28-SEP-13 |
| **WG1756003-16 MS** | | **L1369282-6** | | | | | | |
| Mercury (Hg)-Dissolved | | | 86.2 | | % | | 70-130 | 28-SEP-13 |
| **WG1756003-18 MS** | | **L1369607-4** | | | | | | |
| Mercury (Hg)-Dissolved | | | 83.9 | | % | | 70-130 | 28-SEP-13 |
| **Batch R2703646** | | | | | | | | |
| **WG1756003-3 LCS** | | | | | | | | |
| Mercury (Hg)-Dissolved | | | 99.0 | | % | | 80-120 | 29-SEP-13 |
| **WG1756003-21 MS** | | **L1369871-3** | | | | | | |
| Mercury (Hg)-Dissolved | | | 99.1 | | % | | 70-130 | 29-SEP-13 |
| **WG1756003-27 MS** | | **L1369810-13** | | | | | | |
| Mercury (Hg)-Dissolved | | | 96.2 | | % | | 70-130 | 29-SEP-13 |
| **HG-TOT-LOW-CVAFS-VA** | **Water** | | | | | | | |
| **Batch R2703646** | | | | | | | | |
| **WG1757417-8 DUP** | | **L1368203-12** | | | | | | |
| Mercury (Hg)-Total | | <0.000010 | <0.000010 | RPD-NA | mg/L | N/A | 20 | 29-SEP-13 |
| **WG1757417-4 LCS** | | | | | | | | |
| Mercury (Hg)-Total | | | 94.6 | | % | | 80-120 | 29-SEP-13 |
| **WG1757417-5 LCS** | | | | | | | | |
| Mercury (Hg)-Total | | | 99.2 | | % | | 80-120 | 29-SEP-13 |
| **WG1757417-6 LCS** | | | | | | | | |
| Mercury (Hg)-Total | | | 98.1 | | % | | 80-120 | 29-SEP-13 |
| **WG1757417-1 MB** | | | | | | | | |
| Mercury (Hg)-Total | | | <0.000010 | | mg/L | | 0.00001 | 29-SEP-13 |
| **WG1757417-2 MB** | | | | | | | | |
| Mercury (Hg)-Total | | | <0.000010 | | mg/L | | 0.00001 | 29-SEP-13 |
| **WG1757417-3 MB** | | | | | | | | |
| Mercury (Hg)-Total | | | <0.000010 | | mg/L | | 0.00001 | 29-SEP-13 |
| **WG1757417-11 MS** | | **L1369810-12** | | | | | | |
| Mercury (Hg)-Total | | | 98.2 | | % | | 70-130 | 29-SEP-13 |
| **WG1757417-12 MS** | | **L1368052-1** | | | | | | |
| Mercury (Hg)-Total | | | 96.3 | | % | | 70-130 | 29-SEP-13 |
| **MET-D-CCMS-VA** | **Water** | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2704140** | | | | | | | | |
| **WG1756003-1 MB** | | | | | | | | |
| Aluminum (Al)-Dissolved | | | <0.0010 | | mg/L | | 0.001 | 27-SEP-13 |
| Antimony (Sb)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 27-SEP-13 |
| Arsenic (As)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 27-SEP-13 |
| Barium (Ba)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 27-SEP-13 |
| Beryllium (Be)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 27-SEP-13 |
| Bismuth (Bi)-Dissolved | | | <0.00050 | | mg/L | | 0.0005 | 27-SEP-13 |
| Boron (B)-Dissolved | | | <0.010 | | mg/L | | 0.01 | 27-SEP-13 |
| Cadmium (Cd)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 27-SEP-13 |
| Chromium (Cr)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 27-SEP-13 |
| Cobalt (Co)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 27-SEP-13 |
| Copper (Cu)-Dissolved | | | <0.00020 | | mg/L | | 0.0002 | 27-SEP-13 |
| Lead (Pb)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 27-SEP-13 |
| Lithium (Li)-Dissolved | | | <0.00050 | | mg/L | | 0.0005 | 27-SEP-13 |
| Manganese (Mn)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 27-SEP-13 |
| Molybdenum (Mo)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 27-SEP-13 |
| Nickel (Ni)-Dissolved | | | <0.00050 | | mg/L | | 0.0005 | 27-SEP-13 |
| Selenium (Se)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 27-SEP-13 |
| Silver (Ag)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 27-SEP-13 |
| Sodium (Na)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 27-SEP-13 |
| Strontium (Sr)-Dissolved | | | <0.00020 | | mg/L | | 0.0002 | 27-SEP-13 |
| Thallium (Tl)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 27-SEP-13 |
| Tin (Sn)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 27-SEP-13 |
| Titanium (Ti)-Dissolved | | | <0.010 | | mg/L | | 0.01 | 27-SEP-13 |
| Uranium (U)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 27-SEP-13 |
| Vanadium (V)-Dissolved | | | <0.0010 | | mg/L | | 0.001 | 27-SEP-13 |
| Zinc (Zn)-Dissolved | | | <0.0010 | | mg/L | | 0.001 | 27-SEP-13 |
| **Batch R2704185** | | | | | | | | |
| **WG1756003-2 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Aluminum (Al)-Dissolved | | | 101.0 | | % | | 80-120 | 27-SEP-13 |
| Antimony (Sb)-Dissolved | | | 97.7 | | % | | 80-120 | 27-SEP-13 |
| Arsenic (As)-Dissolved | | | 98.6 | | % | | 80-120 | 27-SEP-13 |
| Barium (Ba)-Dissolved | | | 98.8 | | % | | 80-120 | 27-SEP-13 |
| Beryllium (Be)-Dissolved | | | 100.2 | | % | | 80-120 | 27-SEP-13 |
| Bismuth (Bi)-Dissolved | | | 97.7 | | % | | 80-120 | 27-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch** | **R2704185** | | | | | | | |
| **WG1756003-2** | **CRM** | **VA-HIGH-WATRM** | | | | | | |
| Boron (B)-Dissolved | | | 90.4 | | % | | 80-120 | 27-SEP-13 |
| Cadmium (Cd)-Dissolved | | | 100.3 | | % | | 80-120 | 27-SEP-13 |
| Chromium (Cr)-Dissolved | | | 97.8 | | % | | 80-120 | 27-SEP-13 |
| Cobalt (Co)-Dissolved | | | 99.9 | | % | | 80-120 | 27-SEP-13 |
| Copper (Cu)-Dissolved | | | 96.0 | | % | | 80-120 | 27-SEP-13 |
| Lead (Pb)-Dissolved | | | 98.7 | | % | | 80-120 | 27-SEP-13 |
| Lithium (Li)-Dissolved | | | 100.6 | | % | | 80-120 | 27-SEP-13 |
| Manganese (Mn)-Dissolved | | | 99.5 | | % | | 80-120 | 27-SEP-13 |
| Molybdenum (Mo)-Dissolved | | | 100.4 | | % | | 80-120 | 27-SEP-13 |
| Nickel (Ni)-Dissolved | | | 100.2 | | % | | 80-120 | 27-SEP-13 |
| Selenium (Se)-Dissolved | | | 98.2 | | % | | 80-120 | 27-SEP-13 |
| Silver (Ag)-Dissolved | | | 98.0 | | % | | 80-120 | 27-SEP-13 |
| Sodium (Na)-Dissolved | | | 100.7 | | % | | 80-120 | 27-SEP-13 |
| Strontium (Sr)-Dissolved | | | 99.1 | | % | | 80-120 | 27-SEP-13 |
| Thallium (Tl)-Dissolved | | | 99.3 | | % | | 80-120 | 27-SEP-13 |
| Tin (Sn)-Dissolved | | | 99.3 | | % | | 80-120 | 27-SEP-13 |
| Titanium (Ti)-Dissolved | | | 103.0 | | % | | 80-120 | 27-SEP-13 |
| Uranium (U)-Dissolved | | | 98.5 | | % | | 80-120 | 27-SEP-13 |
| Vanadium (V)-Dissolved | | | 103.0 | | % | | 80-120 | 27-SEP-13 |
| Zinc (Zn)-Dissolved | | | 99.0 | | % | | 80-120 | 27-SEP-13 |
| **Batch** | **R2710595** | | | | | | | |
| **WG1756003-25** | **MS** | **L1369720-2** | | | | | | |
| Aluminum (Al)-Dissolved | | | 98.0 | | % | | 70-130 | 04-OCT-13 |
| Antimony (Sb)-Dissolved | | | 101.2 | | % | | 70-130 | 04-OCT-13 |
| Arsenic (As)-Dissolved | | | 99.6 | | % | | 70-130 | 04-OCT-13 |
| Barium (Ba)-Dissolved | | | N/A | MS-B | % | | - | 04-OCT-13 |
| Beryllium (Be)-Dissolved | | | 98.6 | | % | | 70-130 | 04-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 87.7 | | % | | 70-130 | 04-OCT-13 |
| Boron (B)-Dissolved | | | 97.7 | | % | | 70-130 | 04-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 96.7 | | % | | 70-130 | 04-OCT-13 |
| Chromium (Cr)-Dissolved | | | 95.2 | | % | | 70-130 | 04-OCT-13 |
| Cobalt (Co)-Dissolved | | | 92.7 | | % | | 70-130 | 04-OCT-13 |
| Copper (Cu)-Dissolved | | | 90.5 | | % | | 70-130 | 04-OCT-13 |
| Lead (Pb)-Dissolved | | | 94.4 | | % | | 70-130 | 04-OCT-13 |

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2710595** | | | | | | | | |
| **WG1756003-25 MS** | | **L1369720-2** | | | | | | |
| Lithium (Li)-Dissolved | | | 99.3 | | % | | 70-130 | 04-OCT-13 |
| Manganese (Mn)-Dissolved | | | N/A | MS-B | % | | - | 04-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 96.5 | | % | | 70-130 | 04-OCT-13 |
| Nickel (Ni)-Dissolved | | | 91.9 | | % | | 70-130 | 04-OCT-13 |
| Selenium (Se)-Dissolved | | | 107.6 | | % | | 70-130 | 04-OCT-13 |
| Silver (Ag)-Dissolved | | | 71.1 | | % | | 70-130 | 04-OCT-13 |
| Sodium (Na)-Dissolved | | | 94.6 | | % | | 70-130 | 04-OCT-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 04-OCT-13 |
| Thallium (Tl)-Dissolved | | | 96.9 | | % | | 70-130 | 04-OCT-13 |
| Tin (Sn)-Dissolved | | | 99.0 | | % | | 70-130 | 04-OCT-13 |
| Titanium (Ti)-Dissolved | | | 94.6 | | % | | 70-130 | 04-OCT-13 |
| Uranium (U)-Dissolved | | | 99.8 | | % | | 70-130 | 04-OCT-13 |
| Vanadium (V)-Dissolved | | | 98.2 | | % | | 70-130 | 04-OCT-13 |
| Zinc (Zn)-Dissolved | | | 95.9 | | % | | 70-130 | 04-OCT-13 |
| **Batch R2710606** | | | | | | | | |
| **WG1756003-10 MS** | | **L1369397-6** | | | | | | |
| Aluminum (Al)-Dissolved | | | 99.5 | | % | | 70-130 | 05-OCT-13 |
| Antimony (Sb)-Dissolved | | | 101.2 | | % | | 70-130 | 05-OCT-13 |
| Arsenic (As)-Dissolved | | | 101.6 | | % | | 70-130 | 05-OCT-13 |
| Barium (Ba)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Beryllium (Be)-Dissolved | | | 94.1 | | % | | 70-130 | 05-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 85.9 | | % | | 70-130 | 05-OCT-13 |
| Boron (B)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 98.5 | | % | | 70-130 | 05-OCT-13 |
| Chromium (Cr)-Dissolved | | | 95.2 | | % | | 70-130 | 05-OCT-13 |
| Cobalt (Co)-Dissolved | | | 93.1 | | % | | 70-130 | 05-OCT-13 |
| Copper (Cu)-Dissolved | | | 94.2 | | % | | 70-130 | 05-OCT-13 |
| Lead (Pb)-Dissolved | | | 92.1 | | % | | 70-130 | 05-OCT-13 |
| Lithium (Li)-Dissolved | | | 90.7 | | % | | 70-130 | 05-OCT-13 |
| Manganese (Mn)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 92.4 | | % | | 70-130 | 05-OCT-13 |
| Nickel (Ni)-Dissolved | | | 94.4 | | % | | 70-130 | 05-OCT-13 |
| Selenium (Se)-Dissolved | | | 102.9 | | % | | 70-130 | 05-OCT-13 |
| Sodium (Na)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2710606** | | | | | | | | |
| **WG1756003-10 MS** | | **L1369397-6** | | | | | | |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Thallium (Tl)-Dissolved | | | 91.7 | | % | | 70-130 | 05-OCT-13 |
| Tin (Sn)-Dissolved | | | 98.5 | | % | | 70-130 | 05-OCT-13 |
| Titanium (Ti)-Dissolved | | | 106.6 | | % | | 70-130 | 05-OCT-13 |
| Uranium (U)-Dissolved | | | 96.5 | | % | | 70-130 | 05-OCT-13 |
| Vanadium (V)-Dissolved | | | 98.6 | | % | | 70-130 | 05-OCT-13 |
| Zinc (Zn)-Dissolved | | | 93.5 | | % | | 70-130 | 05-OCT-13 |
| **Batch R2710879** | | | | | | | | |
| **WG1756003-16 MS** | | **L1369282-6** | | | | | | |
| Aluminum (Al)-Dissolved | | | 96.7 | | % | | 70-130 | 04-OCT-13 |
| Antimony (Sb)-Dissolved | | | 101.4 | | % | | 70-130 | 04-OCT-13 |
| Arsenic (As)-Dissolved | | | 104.1 | | % | | 70-130 | 04-OCT-13 |
| Barium (Ba)-Dissolved | | | N/A | MS-B | % | | - | 04-OCT-13 |
| Beryllium (Be)-Dissolved | | | 94.7 | | % | | 70-130 | 04-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 83.3 | | % | | 70-130 | 04-OCT-13 |
| Boron (B)-Dissolved | | | 99.8 | | % | | 70-130 | 04-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 101.6 | | % | | 70-130 | 04-OCT-13 |
| Chromium (Cr)-Dissolved | | | 96.5 | | % | | 70-130 | 04-OCT-13 |
| Cobalt (Co)-Dissolved | | | 96.8 | | % | | 70-130 | 04-OCT-13 |
| Copper (Cu)-Dissolved | | | 94.1 | | % | | 70-130 | 04-OCT-13 |
| Lead (Pb)-Dissolved | | | 93.8 | | % | | 70-130 | 04-OCT-13 |
| Lithium (Li)-Dissolved | | | 97.2 | | % | | 70-130 | 04-OCT-13 |
| Manganese (Mn)-Dissolved | | | 95.9 | | % | | 70-130 | 04-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 94.2 | | % | | 70-130 | 04-OCT-13 |
| Nickel (Ni)-Dissolved | | | 97.6 | | % | | 70-130 | 04-OCT-13 |
| Selenium (Se)-Dissolved | | | 108.2 | | % | | 70-130 | 04-OCT-13 |
| Silver (Ag)-Dissolved | | | 94.4 | | % | | 70-130 | 04-OCT-13 |
| Sodium (Na)-Dissolved | | | N/A | MS-B | % | | - | 04-OCT-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 04-OCT-13 |
| Thallium (Tl)-Dissolved | | | 94.6 | | % | | 70-130 | 04-OCT-13 |
| Tin (Sn)-Dissolved | | | 98.0 | | % | | 70-130 | 04-OCT-13 |
| Titanium (Ti)-Dissolved | | | 102.2 | | % | | 70-130 | 04-OCT-13 |
| Uranium (U)-Dissolved | | | 96.0 | | % | | 70-130 | 04-OCT-13 |
| Vanadium (V)-Dissolved | | | 98.8 | | % | | 70-130 | 04-OCT-13 |

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2710879** | | | | | | | | |
| **WG1756003-16 MS** | | **L1369282-6** | | | | | | |
| Zinc (Zn)-Dissolved | | | 96.7 | | % | | 70-130 | 04-OCT-13 |
| **WG1756003-9 MS** | | **L1369388-2** | | | | | | |
| Aluminum (Al)-Dissolved | | | 98.8 | | % | | 70-130 | 04-OCT-13 |
| Antimony (Sb)-Dissolved | | | 102.1 | | % | | 70-130 | 04-OCT-13 |
| Arsenic (As)-Dissolved | | | 105.0 | | % | | 70-130 | 04-OCT-13 |
| Barium (Ba)-Dissolved | | | N/A | MS-B | % | | - | 04-OCT-13 |
| Beryllium (Be)-Dissolved | | | 96.3 | | % | | 70-130 | 04-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 85.2 | | % | | 70-130 | 04-OCT-13 |
| Boron (B)-Dissolved | | | 97.3 | | % | | 70-130 | 04-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 99.4 | | % | | 70-130 | 04-OCT-13 |
| Chromium (Cr)-Dissolved | | | 94.9 | | % | | 70-130 | 04-OCT-13 |
| Cobalt (Co)-Dissolved | | | 94.5 | | % | | 70-130 | 04-OCT-13 |
| Copper (Cu)-Dissolved | | | 91.1 | | % | | 70-130 | 04-OCT-13 |
| Lead (Pb)-Dissolved | | | 93.0 | | % | | 70-130 | 04-OCT-13 |
| Lithium (Li)-Dissolved | | | 99.2 | | % | | 70-130 | 04-OCT-13 |
| Manganese (Mn)-Dissolved | | | 97.8 | | % | | 70-130 | 04-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | N/A | MS-B | % | | - | 04-OCT-13 |
| Nickel (Ni)-Dissolved | | | 96.0 | | % | | 70-130 | 04-OCT-13 |
| Selenium (Se)-Dissolved | | | 115.3 | | % | | 70-130 | 04-OCT-13 |
| Silver (Ag)-Dissolved | | | 86.8 | | % | | 70-130 | 04-OCT-13 |
| Sodium (Na)-Dissolved | | | N/A | MS-B | % | | - | 04-OCT-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 04-OCT-13 |
| Thallium (Tl)-Dissolved | | | 93.3 | | % | | 70-130 | 04-OCT-13 |
| Tin (Sn)-Dissolved | | | 126.8 | | % | | 70-130 | 04-OCT-13 |
| Titanium (Ti)-Dissolved | | | 105.1 | | % | | 70-130 | 04-OCT-13 |
| Uranium (U)-Dissolved | | | 100.9 | | % | | 70-130 | 04-OCT-13 |
| Vanadium (V)-Dissolved | | | 98.6 | | % | | 70-130 | 04-OCT-13 |
| Zinc (Zn)-Dissolved | | | 94.1 | | % | | 70-130 | 04-OCT-13 |
| **Batch R2710961** | | | | | | | | |
| **WG1756003-14 MS** | | **L1368575-17** | | | | | | |
| Aluminum (Al)-Dissolved | | | 93.2 | | % | | 70-130 | 05-OCT-13 |
| Antimony (Sb)-Dissolved | | | 101.3 | | % | | 70-130 | 05-OCT-13 |
| Arsenic (As)-Dissolved | | | 101.0 | | % | | 70-130 | 05-OCT-13 |
| Barium (Ba)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2710961** | | | | | | | | |
| **WG1756003-14 MS** | | **L1368575-17** | | | | | | |
| Beryllium (Be)-Dissolved | | | 93.0 | | % | | 70-130 | 05-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 88.8 | | % | | 70-130 | 05-OCT-13 |
| Boron (B)-Dissolved | | | 92.1 | | % | | 70-130 | 05-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 98.9 | | % | | 70-130 | 05-OCT-13 |
| Chromium (Cr)-Dissolved | | | 95.3 | | % | | 70-130 | 05-OCT-13 |
| Cobalt (Co)-Dissolved | | | 98.5 | | % | | 70-130 | 05-OCT-13 |
| Copper (Cu)-Dissolved | | | 97.5 | | % | | 70-130 | 05-OCT-13 |
| Lead (Pb)-Dissolved | | | 93.0 | | % | | 70-130 | 05-OCT-13 |
| Lithium (Li)-Dissolved | | | 99.8 | | % | | 70-130 | 05-OCT-13 |
| Manganese (Mn)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 92.7 | | % | | 70-130 | 05-OCT-13 |
| Nickel (Ni)-Dissolved | | | 97.2 | | % | | 70-130 | 05-OCT-13 |
| Selenium (Se)-Dissolved | | | 104.9 | | % | | 70-130 | 05-OCT-13 |
| Silver (Ag)-Dissolved | | | 94.5 | | % | | 70-130 | 05-OCT-13 |
| Sodium (Na)-Dissolved | | | 96.4 | | % | | 70-130 | 05-OCT-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Thallium (Tl)-Dissolved | | | 94.2 | | % | | 70-130 | 05-OCT-13 |
| Tin (Sn)-Dissolved | | | 97.8 | | % | | 70-130 | 05-OCT-13 |
| Titanium (Ti)-Dissolved | | | 96.4 | | % | | 70-130 | 05-OCT-13 |
| Uranium (U)-Dissolved | | | 95.6 | | % | | 70-130 | 05-OCT-13 |
| Vanadium (V)-Dissolved | | | 99.0 | | % | | 70-130 | 05-OCT-13 |
| Zinc (Zn)-Dissolved | | | 99.0 | | % | | 70-130 | 05-OCT-13 |
| **WG1756003-21 MS** | | **L1369871-3** | | | | | | |
| Aluminum (Al)-Dissolved | | | 95.9 | | % | | 70-130 | 05-OCT-13 |
| Antimony (Sb)-Dissolved | | | 101.4 | | % | | 70-130 | 05-OCT-13 |
| Arsenic (As)-Dissolved | | | 102.1 | | % | | 70-130 | 05-OCT-13 |
| Barium (Ba)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Beryllium (Be)-Dissolved | | | 95.8 | | % | | 70-130 | 05-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 85.5 | | % | | 70-130 | 05-OCT-13 |
| Boron (B)-Dissolved | | | 97.7 | | % | | 70-130 | 05-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 99.0 | | % | | 70-130 | 05-OCT-13 |
| Chromium (Cr)-Dissolved | | | 94.6 | | % | | 70-130 | 05-OCT-13 |
| Cobalt (Co)-Dissolved | | | 93.7 | | % | | 70-130 | 05-OCT-13 |
| Copper (Cu)-Dissolved | | | 91.6 | | % | | 70-130 | 05-OCT-13 |

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2710961** | | | | | | | | |
| **WG1756003-21 MS** | | **L1369871-3** | | | | | | |
| Lead (Pb)-Dissolved | | | 92.4 | | % | | 70-130 | 05-OCT-13 |
| Lithium (Li)-Dissolved | | | 103.7 | | % | | 70-130 | 05-OCT-13 |
| Manganese (Mn)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 93.9 | | % | | 70-130 | 05-OCT-13 |
| Nickel (Ni)-Dissolved | | | 93.3 | | % | | 70-130 | 05-OCT-13 |
| Selenium (Se)-Dissolved | | | 107.8 | | % | | 70-130 | 05-OCT-13 |
| Sodium (Na)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Thallium (Tl)-Dissolved | | | 94.8 | | % | | 70-130 | 05-OCT-13 |
| Tin (Sn)-Dissolved | | | 98.7 | | % | | 70-130 | 05-OCT-13 |
| Titanium (Ti)-Dissolved | | | 99.6 | | % | | 70-130 | 05-OCT-13 |
| Uranium (U)-Dissolved | | | 96.1 | | % | | 70-130 | 05-OCT-13 |
| Vanadium (V)-Dissolved | | | 97.0 | | % | | 70-130 | 05-OCT-13 |
| Zinc (Zn)-Dissolved | | | 90.6 | | % | | 70-130 | 05-OCT-13 |
| **Batch R2711772** | | | | | | | | |
| **WG1756003-12 MS** | | **L1367708-7** | | | | | | |
| Aluminum (Al)-Dissolved | | | 94.5 | | % | | 70-130 | 05-OCT-13 |
| Antimony (Sb)-Dissolved | | | 97.3 | | % | | 70-130 | 05-OCT-13 |
| Arsenic (As)-Dissolved | | | 95.6 | | % | | 70-130 | 05-OCT-13 |
| Barium (Ba)-Dissolved | | | 95.6 | | % | | 70-130 | 05-OCT-13 |
| Beryllium (Be)-Dissolved | | | 94.1 | | % | | 70-130 | 05-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 84.9 | | % | | 70-130 | 05-OCT-13 |
| Boron (B)-Dissolved | | | 89.9 | | % | | 70-130 | 05-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 101.4 | | % | | 70-130 | 05-OCT-13 |
| Chromium (Cr)-Dissolved | | | 93.3 | | % | | 70-130 | 05-OCT-13 |
| Cobalt (Co)-Dissolved | | | 94.6 | | % | | 70-130 | 05-OCT-13 |
| Copper (Cu)-Dissolved | | | 95.6 | | % | | 70-130 | 05-OCT-13 |
| Lead (Pb)-Dissolved | | | 94.5 | | % | | 70-130 | 05-OCT-13 |
| Lithium (Li)-Dissolved | | | 97.3 | | % | | 70-130 | 05-OCT-13 |
| Manganese (Mn)-Dissolved | | | 96.2 | | % | | 70-130 | 05-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 93.1 | | % | | 70-130 | 05-OCT-13 |
| Nickel (Ni)-Dissolved | | | 96.8 | | % | | 70-130 | 05-OCT-13 |
| Selenium (Se)-Dissolved | | | 100.2 | | % | | 70-130 | 05-OCT-13 |
| Sodium (Na)-Dissolved | | | 91.3 | | % | | 70-130 | 05-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2711772** | | | | | | | | |
| **WG1756003-12 MS** | | **L1367708-7** | | | | | | |
| Strontium (Sr)-Dissolved | | | 95.3 | | % | | 70-130 | 05-OCT-13 |
| Thallium (Tl)-Dissolved | | | 95.0 | | % | | 70-130 | 05-OCT-13 |
| Tin (Sn)-Dissolved | | | 94.5 | | % | | 70-130 | 05-OCT-13 |
| Titanium (Ti)-Dissolved | | | 96.7 | | % | | 70-130 | 05-OCT-13 |
| Uranium (U)-Dissolved | | | 93.6 | | % | | 70-130 | 05-OCT-13 |
| Vanadium (V)-Dissolved | | | 93.2 | | % | | 70-130 | 05-OCT-13 |
| Zinc (Zn)-Dissolved | | | 96.8 | | % | | 70-130 | 05-OCT-13 |
| **Batch R2711892** | | | | | | | | |
| **WG1756003-10 MS** | | **L1369397-6** | | | | | | |
| Silver (Ag)-Dissolved | | | 77.6 | | % | | 70-130 | 07-OCT-13 |
| **Batch R2711992** | | | | | | | | |
| **WG1756003-11 MS** | | **L1368028-2** | | | | | | |
| Aluminum (Al)-Dissolved | | | 94.6 | | % | | 70-130 | 05-OCT-13 |
| Antimony (Sb)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Arsenic (As)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Barium (Ba)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Beryllium (Be)-Dissolved | | | 94.3 | | % | | 70-130 | 05-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 94.4 | | % | | 70-130 | 05-OCT-13 |
| Boron (B)-Dissolved | | | 98.7 | | % | | 70-130 | 05-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 96.9 | | % | | 70-130 | 05-OCT-13 |
| Chromium (Cr)-Dissolved | | | 92.7 | | % | | 70-130 | 05-OCT-13 |
| Cobalt (Co)-Dissolved | | | 95.1 | | % | | 70-130 | 05-OCT-13 |
| Copper (Cu)-Dissolved | | | 95.1 | | % | | 70-130 | 05-OCT-13 |
| Lead (Pb)-Dissolved | | | 98.0 | | % | | 70-130 | 05-OCT-13 |
| Lithium (Li)-Dissolved | | | 92.1 | | % | | 70-130 | 05-OCT-13 |
| Manganese (Mn)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 97.4 | | % | | 70-130 | 05-OCT-13 |
| Nickel (Ni)-Dissolved | | | 97.0 | | % | | 70-130 | 05-OCT-13 |
| Selenium (Se)-Dissolved | | | 100.9 | | % | | 70-130 | 05-OCT-13 |
| Silver (Ag)-Dissolved | | | 71.8 | | % | | 70-130 | 05-OCT-13 |
| Sodium (Na)-Dissolved | | | 94.4 | | % | | 70-130 | 05-OCT-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Thallium (Tl)-Dissolved | | | 97.8 | | % | | 70-130 | 05-OCT-13 |
| Tin (Sn)-Dissolved | | | 99.4 | | % | | 70-130 | 05-OCT-13 |

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2711992** | | | | | | | | |
| **WG1756003-11 MS** | | **L1368028-2** | | | | | | |
| Titanium (Ti)-Dissolved | | | 96.2 | | % | | 70-130 | 05-OCT-13 |
| Uranium (U)-Dissolved | | | 99.4 | | % | | 70-130 | 05-OCT-13 |
| Vanadium (V)-Dissolved | | | 96.2 | | % | | 70-130 | 05-OCT-13 |
| Zinc (Zn)-Dissolved | | | 93.7 | | % | | 70-130 | 05-OCT-13 |
| **Batch R2712486** | | | | | | | | |
| **WG1756003-12 MS** | | **L1367708-7** | | | | | | |
| Silver (Ag)-Dissolved | | | 93.4 | | % | | 70-130 | 08-OCT-13 |
| **Batch R2712742** | | | | | | | | |
| **WG1756003-27 MS** | | **L1369810-13** | | | | | | |
| Aluminum (Al)-Dissolved | | | 93.0 | | % | | 70-130 | 08-OCT-13 |
| Antimony (Sb)-Dissolved | | | 105.0 | | % | | 70-130 | 08-OCT-13 |
| Arsenic (As)-Dissolved | | | 104.8 | | % | | 70-130 | 08-OCT-13 |
| Barium (Ba)-Dissolved | | | N/A | MS-B | % | | - | 08-OCT-13 |
| Beryllium (Be)-Dissolved | | | 95.1 | | % | | 70-130 | 08-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 78.0 | | % | | 70-130 | 08-OCT-13 |
| Boron (B)-Dissolved | | | 91.7 | | % | | 70-130 | 08-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 97.6 | | % | | 70-130 | 08-OCT-13 |
| Chromium (Cr)-Dissolved | | | 97.1 | | % | | 70-130 | 08-OCT-13 |
| Cobalt (Co)-Dissolved | | | 92.1 | | % | | 70-130 | 08-OCT-13 |
| Copper (Cu)-Dissolved | | | 87.1 | | % | | 70-130 | 08-OCT-13 |
| Lead (Pb)-Dissolved | | | 90.5 | | % | | 70-130 | 08-OCT-13 |
| Lithium (Li)-Dissolved | | | 102.5 | | % | | 70-130 | 08-OCT-13 |
| Manganese (Mn)-Dissolved | | | 96.1 | | % | | 70-130 | 08-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 99.4 | | % | | 70-130 | 08-OCT-13 |
| Nickel (Ni)-Dissolved | | | N/A | MS-B | % | | - | 08-OCT-13 |
| Selenium (Se)-Dissolved | | | 111.5 | | % | | 70-130 | 08-OCT-13 |
| Sodium (Na)-Dissolved | | | N/A | MS-B | % | | - | 08-OCT-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 08-OCT-13 |
| Thallium (Tl)-Dissolved | | | 90.5 | | % | | 70-130 | 08-OCT-13 |
| Tin (Sn)-Dissolved | | | 100.7 | | % | | 70-130 | 08-OCT-13 |
| Titanium (Ti)-Dissolved | | | 98.7 | | % | | 70-130 | 08-OCT-13 |
| Uranium (U)-Dissolved | | | N/A | MS-B | % | | - | 08-OCT-13 |
| Vanadium (V)-Dissolved | | | 101.1 | | % | | 70-130 | 08-OCT-13 |
| Zinc (Zn)-Dissolved | | | 86.8 | | % | | 70-130 | 08-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-DIS-LOW-ICP-VA** | **Water** | | | | | | | |
| **Batch R2704375** | | | | | | | | |
| **WG1756003-2 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Calcium (Ca)-Dissolved | | | 98.0 | | % | | 80-120 | 27-SEP-13 |
| Iron (Fe)-Dissolved | | | 96.9 | | % | | 80-120 | 27-SEP-13 |
| Magnesium (Mg)-Dissolved | | | 97.9 | | % | | 80-120 | 27-SEP-13 |
| Phosphorus (P)-Dissolved | | | 97.5 | | % | | 80-120 | 27-SEP-13 |
| Potassium (K)-Dissolved | | | 98.0 | | % | | 80-120 | 27-SEP-13 |
| Silicon (Si)-Dissolved | | | 104.0 | | % | | 80-120 | 27-SEP-13 |
| **WG1756003-1 MB** | | | | | | | | |
| Calcium (Ca)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 27-SEP-13 |
| Iron (Fe)-Dissolved | | | <0.010 | | mg/L | | 0.01 | 27-SEP-13 |
| Magnesium (Mg)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 27-SEP-13 |
| Phosphorus (P)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 27-SEP-13 |
| Potassium (K)-Dissolved | | | <0.10 | | mg/L | | 0.1 | 27-SEP-13 |
| Silicon (Si)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 27-SEP-13 |
| **Batch R2710438** | | | | | | | | |
| **WG1756003-14 MS** | | **L1368575-17** | | | | | | |
| Calcium (Ca)-Dissolved | | | 99.7 | | % | | 70-130 | 06-OCT-13 |
| Iron (Fe)-Dissolved | | | 97.0 | | % | | 70-130 | 06-OCT-13 |
| Magnesium (Mg)-Dissolved | | | 98.7 | | % | | 70-130 | 06-OCT-13 |
| Potassium (K)-Dissolved | | | 105.4 | | % | | 70-130 | 06-OCT-13 |
| **Batch R2710922** | | | | | | | | |
| **WG1756003-21 MS** | | **L1369871-3** | | | | | | |
| Calcium (Ca)-Dissolved | | | 98.9 | | % | | 70-130 | 06-OCT-13 |
| Iron (Fe)-Dissolved | | | 95.8 | | % | | 70-130 | 06-OCT-13 |
| Magnesium (Mg)-Dissolved | | | 102.1 | | % | | 70-130 | 06-OCT-13 |
| Potassium (K)-Dissolved | | | 105.1 | | % | | 70-130 | 06-OCT-13 |
| **Batch R2712852** | | | | | | | | |
| **WG1756003-12 MS** | | **L1367708-7** | | | | | | |
| Calcium (Ca)-Dissolved | | | 102.3 | | % | | 70-130 | 09-OCT-13 |
| Iron (Fe)-Dissolved | | | 96.0 | | % | | 70-130 | 09-OCT-13 |
| Magnesium (Mg)-Dissolved | | | 102.5 | | % | | 70-130 | 09-OCT-13 |
| Potassium (K)-Dissolved | | | 104.8 | | % | | 70-130 | 09-OCT-13 |
| **Batch R2713868** | | | | | | | | |
| **WG1756003-27 MS** | | **L1369810-13** | | | | | | |
| Calcium (Ca)-Dissolved | | | N/A | MS-B | % | | - | 09-OCT-13 |
| Iron (Fe)-Dissolved | | | 91.9 | | % | | 70-130 | 09-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-DIS-LOW-ICP-VA** | **Water** | | | | | | | |
| **Batch R2713868** | | | | | | | | |
| **WG1756003-27 MS** | | **L1369810-13** | | | | | | |
| Magnesium (Mg)-Dissolved | | | N/A | MS-B | % | | - | 09-OCT-13 |
| Potassium (K)-Dissolved | | | 99.9 | | % | | 70-130 | 09-OCT-13 |
| **MET-T-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2704622** | | | | | | | | |
| **WG1756907-1 MB** | | | | | | | | |
| Aluminum (Al)-Total | | | <0.0030 | | mg/L | | 0.003 | 30-SEP-13 |
| Antimony (Sb)-Total | | | <0.00010 | | mg/L | | 0.0001 | 30-SEP-13 |
| Arsenic (As)-Total | | | <0.00010 | | mg/L | | 0.0001 | 30-SEP-13 |
| Barium (Ba)-Total | | | <0.000050 | | mg/L | | 0.00005 | 30-SEP-13 |
| Beryllium (Be)-Total | | | <0.00010 | | mg/L | | 0.0001 | 30-SEP-13 |
| Bismuth (Bi)-Total | | | <0.00050 | | mg/L | | 0.0005 | 30-SEP-13 |
| Boron (B)-Total | | | <0.010 | | mg/L | | 0.01 | 30-SEP-13 |
| Cadmium (Cd)-Total | | | <0.000010 | | mg/L | | 0.00001 | 30-SEP-13 |
| Chromium (Cr)-Total | | | <0.00010 | | mg/L | | 0.0001 | 30-SEP-13 |
| Cobalt (Co)-Total | | | <0.00010 | | mg/L | | 0.0001 | 30-SEP-13 |
| Copper (Cu)-Total | | | <0.00050 | | mg/L | | 0.0005 | 30-SEP-13 |
| Lead (Pb)-Total | | | <0.000050 | | mg/L | | 0.00005 | 30-SEP-13 |
| Lithium (Li)-Total | | | <0.00050 | | mg/L | | 0.0005 | 30-SEP-13 |
| Manganese (Mn)-Total | | | <0.000050 | | mg/L | | 0.00005 | 30-SEP-13 |
| Molybdenum (Mo)-Total | | | <0.000050 | | mg/L | | 0.00005 | 30-SEP-13 |
| Nickel (Ni)-Total | | | <0.00050 | | mg/L | | 0.0005 | 30-SEP-13 |
| Selenium (Se)-Total | | | <0.00010 | | mg/L | | 0.0001 | 30-SEP-13 |
| Silver (Ag)-Total | | | <0.000010 | | mg/L | | 0.00001 | 30-SEP-13 |
| Sodium (Na)-Total | | | <0.050 | | mg/L | | 0.05 | 30-SEP-13 |
| Strontium (Sr)-Total | | | <0.00020 | | mg/L | | 0.0002 | 30-SEP-13 |
| Thallium (Tl)-Total | | | <0.000010 | | mg/L | | 0.00001 | 30-SEP-13 |
| Tin (Sn)-Total | | | <0.00010 | | mg/L | | 0.0001 | 30-SEP-13 |
| Titanium (Ti)-Total | | | <0.010 | | mg/L | | 0.01 | 30-SEP-13 |
| Uranium (U)-Total | | | <0.000010 | | mg/L | | 0.00001 | 30-SEP-13 |
| Vanadium (V)-Total | | | <0.0010 | | mg/L | | 0.001 | 30-SEP-13 |
| Zinc (Zn)-Total | | | <0.0030 | | mg/L | | 0.003 | 30-SEP-13 |
| **Batch R2705571** | | | | | | | | |
| **WG1756907-3 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Aluminum (Al)-Total | | | 104.9 | | % | | 80-120 | 30-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-T-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2705571** | | | | | | | | |
| **WG1756907-3 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Antimony (Sb)-Total | | | 100.2 | | % | | 80-120 | 30-SEP-13 |
| Arsenic (As)-Total | | | 100.0 | | % | | 80-120 | 30-SEP-13 |
| Barium (Ba)-Total | | | 103.3 | | % | | 80-120 | 30-SEP-13 |
| Beryllium (Be)-Total | | | 99.4 | | % | | 80-120 | 30-SEP-13 |
| Bismuth (Bi)-Total | | | 99.1 | | % | | 80-120 | 30-SEP-13 |
| Boron (B)-Total | | | 91.5 | | % | | 80-120 | 30-SEP-13 |
| Cadmium (Cd)-Total | | | 99.7 | | % | | 80-120 | 30-SEP-13 |
| Chromium (Cr)-Total | | | 99.8 | | % | | 80-120 | 30-SEP-13 |
| Cobalt (Co)-Total | | | 100.6 | | % | | 80-120 | 30-SEP-13 |
| Copper (Cu)-Total | | | 98.0 | | % | | 80-120 | 30-SEP-13 |
| Lead (Pb)-Total | | | 99.3 | | % | | 80-120 | 30-SEP-13 |
| Lithium (Li)-Total | | | 99.2 | | % | | 80-120 | 30-SEP-13 |
| Molybdenum (Mo)-Total | | | 99.6 | | % | | 80-120 | 30-SEP-13 |
| Nickel (Ni)-Total | | | 101.0 | | % | | 80-120 | 30-SEP-13 |
| Selenium (Se)-Total | | | 97.6 | | % | | 80-120 | 30-SEP-13 |
| Silver (Ag)-Total | | | 100.5 | | % | | 80-120 | 30-SEP-13 |
| Sodium (Na)-Total | | | 103.8 | | % | | 80-120 | 30-SEP-13 |
| Strontium (Sr)-Total | | | 100.1 | | % | | 80-120 | 30-SEP-13 |
| Thallium (Tl)-Total | | | 99.9 | | % | | 80-120 | 30-SEP-13 |
| Tin (Sn)-Total | | | 100.7 | | % | | 80-120 | 30-SEP-13 |
| Titanium (Ti)-Total | | | 98.2 | | % | | 80-120 | 30-SEP-13 |
| Uranium (U)-Total | | | 107.9 | | % | | 80-120 | 30-SEP-13 |
| Vanadium (V)-Total | | | 102.7 | | % | | 80-120 | 30-SEP-13 |
| **Batch R2706795** | | | | | | | | |
| **WG1756907-3 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Manganese (Mn)-Total | | | 105.0 | | % | | 80-120 | 01-OCT-13 |
| Zinc (Zn)-Total | | | 103.8 | | % | | 80-120 | 01-OCT-13 |
| **MET-TOT-LOW-ICP-VA** | **Water** | | | | | | | |
| **Batch R2704443** | | | | | | | | |
| **WG1756907-3 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Calcium (Ca)-Total | | | 105.9 | | % | | 80-120 | 30-SEP-13 |
| Iron (Fe)-Total | | | 98.2 | | % | | 80-120 | 30-SEP-13 |
| Magnesium (Mg)-Total | | | 102.9 | | % | | 80-120 | 30-SEP-13 |
| Phosphorus (P)-Total | | | 99.3 | | % | | 80-120 | 30-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-TOT-LOW-ICP-VA** | **Water** | | | | | | | |
| **Batch R2704443** | | | | | | | | |
| **WG1756907-3 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Potassium (K)-Total | | | 109.4 | | % | | 80-120 | 30-SEP-13 |
| Silicon (Si)-Total | | | 105.8 | | % | | 80-120 | 30-SEP-13 |
| **WG1756907-1 MB** | | | | | | | | |
| Calcium (Ca)-Total | | | <0.050 | | mg/L | | 0.05 | 30-SEP-13 |
| Iron (Fe)-Total | | | <0.010 | | mg/L | | 0.01 | 30-SEP-13 |
| Magnesium (Mg)-Total | | | <0.050 | | mg/L | | 0.05 | 30-SEP-13 |
| Phosphorus (P)-Total | | | <0.050 | | mg/L | | 0.05 | 30-SEP-13 |
| Potassium (K)-Total | | | <0.10 | | mg/L | | 0.1 | 30-SEP-13 |
| Silicon (Si)-Total | | | <0.050 | | mg/L | | 0.05 | 30-SEP-13 |
| **NH3-F-VA** | **Water** | | | | | | | |
| **Batch R2707750** | | | | | | | | |
| **WG1759997-2 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 100.0 | | % | | 85-115 | 03-OCT-13 |
| **WG1759997-4 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 102.4 | | % | | 85-115 | 03-OCT-13 |
| **WG1759997-6 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 102.0 | | % | | 85-115 | 03-OCT-13 |
| **WG1759997-9 DUP** | | **L1368203-1** | | | | | | |
| Ammonia, Total (as N) | | 0.0224 | 0.0219 | | mg/L | 2.4 | 20 | 03-OCT-13 |
| **WG1759997-1 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1759997-3 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1759997-5 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1759997-10 MS** | | **L1368203-1** | | | | | | |
| Ammonia, Total (as N) | | | 98.6 | | % | | 75-125 | 03-OCT-13 |
| **PH-MAN-WR** | **Water** | | | | | | | |
| **Batch R2707019** | | | | | | | | |
| **WG1756904-1 LCS** | | | | | | | | |
| pH | | | 7.02 | | pH | | 6.9-7.1 | 27-SEP-13 |
| **WG1756904-3 LCS** | | | | | | | | |
| pH | | | 7.02 | | pH | | 6.9-7.1 | 27-SEP-13 |
| **S-DIS-ICP-VA** | **Water** | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **S-DIS-ICP-VA** | **Water** | | | | | | | |
| **Batch R2704375** | | | | | | | | |
| **WG1756003-2 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Sulfur (S)-Dissolved | | | 98.1 | | % | | 80-120 | 27-SEP-13 |
| **WG1756003-1 MB** | | | | | | | | |
| Sulfur (S)-Dissolved | | | <0.50 | | mg/L | | 0.5 | 27-SEP-13 |
| **Batch R2710438** | | | | | | | | |
| **WG1756003-14 MS** | | **L1368575-17** | | | | | | |
| Sulfur (S)-Dissolved | | | 101.4 | | % | | 70-130 | 06-OCT-13 |
| **Batch R2710922** | | | | | | | | |
| **WG1756003-21 MS** | | **L1369871-3** | | | | | | |
| Sulfur (S)-Dissolved | | | 97.2 | | % | | 70-130 | 06-OCT-13 |
| **Batch R2712852** | | | | | | | | |
| **WG1756003-12 MS** | | **L1367708-7** | | | | | | |
| Sulfur (S)-Dissolved | | | 101.8 | | % | | 70-130 | 09-OCT-13 |
| **Batch R2712922** | | | | | | | | |
| **WG1756003-11 MS** | | **L1368028-2** | | | | | | |
| Sulfur (S)-Dissolved | | | 106.6 | | % | | 70-130 | 08-OCT-13 |
| **S-TOT-ICP-VA** | **Water** | | | | | | | |
| **Batch R2704443** | | | | | | | | |
| **WG1756907-3 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Sulfur (S)-Total | | | 98.2 | | % | | 80-120 | 30-SEP-13 |
| **WG1756907-1 MB** | | | | | | | | |
| Sulfur (S)-Total | | | <0.50 | | mg/L | | 0.5 | 30-SEP-13 |
| **TKN-F-VA** | **Water** | | | | | | | |
| **Batch R2706610** | | | | | | | | |
| **WG1758711-3 DUP** | | **L1368203-10** | | | | | | |
| Total Kjeldahl Nitrogen | | 0.093 | 0.096 | | mg/L | 3.0 | 20 | 01-OCT-13 |
| **WG1758711-2 LCS** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | 95.5 | | % | | 75-125 | 01-OCT-13 |
| **WG1758711-6 LCS** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | 99.2 | | % | | 75-125 | 01-OCT-13 |
| **WG1758711-1 MB** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | <0.050 | | mg/L | | 0.05 | 01-OCT-13 |
| **WG1758711-5 MB** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | <0.050 | | mg/L | | 0.05 | 01-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **TKN-F-VA** | **Water** | | | | | | | |
| **Batch R2706610** | | | | | | | | |
| **WG1758711-4 MS** | | **L1368439-7** | | | | | | |
| Total Kjeldahl Nitrogen | | | 97.5 | | % | | 70-130 | 01-OCT-13 |
| **WG1758711-8 MS** | | **L1368938-3** | | | | | | |
| Total Kjeldahl Nitrogen | | | 91.6 | | % | | 70-130 | 01-OCT-13 |

**Legend:**

| | |
|---|---|
| Limit | ALS Control Limit (Data Quality Objectives) |
| DUP | Duplicate |
| RPD | Relative Percent Difference |
| N/A | Not Available |
| LCS | Laboratory Control Sample |
| SRM | Standard Reference Material |
| MS | Matrix Spike |
| MSD | Matrix Spike Duplicate |
| ADE | Average Desorption Efficiency |
| MB | Method Blank |
| IRM | Internal Reference Material |
| CRM | Certified Reference Material |
| CCV | Continuing Calibration Verification |
| CVS | Calibration Verification Standard |
| LCSD | Laboratory Control Sample Duplicate |

**Sample Parameter Qualifier Definitions:**

| Qualifier | Description |
|---|---|
| J | Duplicate results and limits are expressed in terms of absolute difference. |
| MS-B | Matrix Spike recovery could not be accurately calculated due to high analyte background in sample. |
| RPD-NA | Relative Percent Difference Not Available due to result(s) being less than detection limit. |

**Hold Time Exceedances:**

| ALS Product Description | Sample ID | Sampling Date | Date Processed | Rec. HT | Actual HT | Units | Qualifier |
|---|---|---|---|---|---|---|---|
| **Physical Tests** | | | | | | | |
| pH by Meter | | | | | | | |
| | 1 | 18-SEP-13 | 27-SEP-13 09:23 | 24 | 213 | hours | EHTR |
| | 4 | 18-SEP-13 | 27-SEP-13 09:23 | 24 | 213 | hours | EHTR |
| | 7 | 18-SEP-13 | 27-SEP-13 09:23 | 24 | 213 | hours | EHTR |
| | 10 | 18-SEP-13 | 27-SEP-13 09:23 | 24 | 213 | hours | EHTR |
| | 13 | 18-SEP-13 | 27-SEP-13 09:23 | 24 | 213 | hours | EHTR |
| | 14 | 18-SEP-13 | 27-SEP-13 09:23 | 24 | 213 | hours | EHTR |
| | 15 | 18-SEP-13 | 27-SEP-13 09:23 | 24 | 213 | hours | EHTR |
| | 16 | 18-SEP-13 | 27-SEP-13 09:23 | 24 | 213 | hours | EHTR |
| | 17 | 18-SEP-13 | 27-SEP-13 09:23 | 24 | 213 | hours | EHTR |
| **Anions and Nutrients** | | | | | | | |
| Nitrate Nitrogen by Ion Chromatography | | | | | | | |
| | 1 | 18-SEP-13 | 25-SEP-13 18:36 | 3 | 7 | days | EHT |
| | 4 | 18-SEP-13 | 25-SEP-13 18:36 | 3 | 7 | days | EHT |
| | 7 | 18-SEP-13 | 25-SEP-13 18:36 | 3 | 7 | days | EHT |
| | 10 | 18-SEP-13 | 25-SEP-13 18:36 | 3 | 7 | days | EHT |
| | 13 | 18-SEP-13 | 25-SEP-13 18:36 | 3 | 7 | days | EHT |
| | 14 | 18-SEP-13 | 25-SEP-13 18:36 | 3 | 7 | days | EHT |
| | 15 | 18-SEP-13 | 25-SEP-13 18:36 | 3 | 7 | days | EHT |
| | 16 | 18-SEP-13 | 25-SEP-13 18:36 | 3 | 7 | days | EHT |
| | 17 | 18-SEP-13 | 25-SEP-13 18:36 | 3 | 7 | days | EHT |
| Nitrite Nitrogen by Ion Chromatography | | | | | | | |
| | 1 | 18-SEP-13 | 25-SEP-13 18:36 | 3 | 7 | days | EHT |
| | 4 | 18-SEP-13 | 25-SEP-13 18:36 | 3 | 7 | days | EHT |
| | 7 | 18-SEP-13 | 25-SEP-13 18:36 | 3 | 7 | days | EHT |
| | 10 | 18-SEP-13 | 25-SEP-13 18:36 | 3 | 7 | days | EHT |
| | 13 | 18-SEP-13 | 25-SEP-13 18:36 | 3 | 7 | days | EHT |
| | 14 | 18-SEP-13 | 25-SEP-13 18:36 | 3 | 7 | days | EHT |
| | 15 | 18-SEP-13 | 25-SEP-13 18:36 | 3 | 7 | days | EHT |
| | 16 | 18-SEP-13 | 25-SEP-13 18:36 | 3 | 7 | days | EHT |
| | 17 | 18-SEP-13 | 25-SEP-13 18:36 | 3 | 7 | days | EHT |
| **Cyanides** | | | | | | | |
| Free Cyanide in water by CFA | | | | | | | |
| | 4 | 18-SEP-13 | 03-OCT-13 12:27 | 14 | 15 | days | EHT |
| | 7 | 18-SEP-13 | 03-OCT-13 12:27 | 14 | 15 | days | EHT |
| | 18 | 18-SEP-13 | 04-OCT-13 11:28 | 14 | 16 | days | EHTL |
| Thiocyanate by Colour | | | | | | | |
| | 1 | 18-SEP-13 | 07-OCT-13 14:03 | 14 | 19 | days | EHT |
| | 2 | 18-SEP-13 | 07-OCT-13 14:03 | 14 | 19 | days | EHT |
| | 4 | 18-SEP-13 | 07-OCT-13 14:03 | 14 | 19 | days | EHT |
| | 5 | 18-SEP-13 | 07-OCT-13 14:03 | 14 | 19 | days | EHT |
| | 7 | 18-SEP-13 | 07-OCT-13 14:03 | 14 | 19 | days | EHT |
| | 8 | 18-SEP-13 | 07-OCT-13 14:03 | 14 | 19 | days | EHT |
| | 11 | 18-SEP-13 | 07-OCT-13 14:06 | 14 | 19 | days | EHT |
| | 18 | 18-SEP-13 | 04-OCT-13 12:58 | 14 | 16 | days | EHTL |
| Total Cyanide in water by CFA | | | | | | | |
| | 4 | 18-SEP-13 | 03-OCT-13 12:06 | 14 | 15 | days | EHT |
| | 7 | 18-SEP-13 | 03-OCT-13 12:06 | 14 | 15 | days | EHT |
| | 18 | 18-SEP-13 | 04-OCT-13 10:45 | 14 | 16 | days | EHTL |
| Weak Acid Diss. Cyanide in water by CFA | | | | | | | |
| | 4 | 18-SEP-13 | 03-OCT-13 12:22 | 14 | 15 | days | EHT |
| | 7 | 18-SEP-13 | 03-OCT-13 12:22 | 14 | 15 | days | EHT |
| | 18 | 18-SEP-13 | 04-OCT-13 10:54 | 14 | 16 | days | EHTL |
| **Organic / Inorganic Carbon** | | | | | | | |
| Total inorganic carbon by CO2 purge | | | | | | | |

# Quality Control Report



**Hold Time Exceedances:**

| ALS Product Description | Sample ID | Sampling Date | Date Processed | Rec. HT | Actual HT | Units | Qualifier |
|---|---|---|---|---|---|---|---|
| **Organic / Inorganic Carbon** | | | | | | | |
| Total inorganic carbon by CO2 purge | | | | | | | |
| | 4 | 18-SEP-13 | 08-OCT-13 09:18 | 14 | 20 | days | EHT |
| | 7 | 18-SEP-13 | 08-OCT-13 09:18 | 14 | 20 | days | EHT |
| | 18 | 18-SEP-13 | 08-OCT-13 09:18 | 14 | 20 | days | EHTL |

**Legend & Qualifier Definitions:**

| | |
|---|---|
| EHTR-FM: | Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended. |
| EHTR: | Exceeded ALS recommended hold time prior to sample receipt. |
| EHTL: | Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry. |
| EHT: | Exceeded ALS recommended hold time prior to analysis. |
| Rec. HT: | ALS recommended hold time (see units). |

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1368203 were received on 01-OCT-13 16:30.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

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The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

**Chain of Custody / Analytical Request Form**
**Canada Toll Free: 1 800 668 9878**
www.alsglobal.com

COC # _____



| Report To | | | | Report Format / Distribution | | | | Service Requested (Rush for routine analysis subject to availability) |
|---|---|---|---|---|---|---|---|---|
| Company: | AMEC Environment & Infrastructure | | | ☑ Standard ☐ Other | | | | ◉ Regular (Standard Turnaround Times - Business Days) |
| Contact: | Leslie Hardy | | | ☑ PDF ☑ Excel ☐ Digital ☐ Fax | | | | ○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT |
| Address: | 5681-70 Street, Edmonton, AB | | | Email 1: leslie.hardy@amec.com | | | | ○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT |
| | | | | Email 2: | | | | ○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT |
| Phone: | 780-989-4581 | Fax: | 780-435-8425 | Email 3: | | | | |
| Invoice To | Same as Report ? | ☑ Yes | ☐ No | Client / Project Information | | | | |
| Hardcopy of Invoice with Report? | | ☑ Yes | ☐ No | Job #: VM00605E.5230 | | | | |
| Company: | | | | PO / AFE: | | | | |
| Contact: | | | | LSD: | | | | |
| Address: | | | | | | | | |
| Phone: | | Fax: | | Quote #: Q40561 AMEC (Yukon) v3 | | | | |
| Lab Work Order # (lab use only) | | | | ALS Contact: | | Sampler: | | |

| Sample # | Sample Identification (This description will appear on the report) | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | General Chemistry | Diss Metals (F/P, HNO3) | Thiocyanate (P, NaOH) | Cyanides (P, NaOH) | TIC | Nutrients (P, H2SO4) | Tot Metals (P, HNO3) | Tot Metals (DO NOT ADD ACID) | | Diss Metals (DO NOT ADD ACID) | Thiocyanate (P, HNO3) | Sulphide | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | W1410383-BH02 Standard Preservation | 18-Sep-13 | | Water | X | X | X | X | X | X | | | | | | | 6 |
| 2 | W1410383-BH02 Alternate Preservation #1 (SCN with HNO3) | 18-Sep-13 | | Water | | | | | | | | | | | X | | 1 |
| 3 | W1410383-BH02 Alternate Preservation #3 (Unpreserved) | 18-Sep-13 | | Water | | | | | | | | | | X | | | 1 |
| | | | | | | | | | | | | | | | | | |
| 4 | Open Pit-Bottom Standard Preservation | | | Water | X | | X | X | X | X | X | | | | | | 6 |
| 5 | Open Pit-Bottom Alternate Preservation #1 (SCN with HNO3) | | | Water | | | | | | | | | | | X | | 1 |
| 6 | Open Pit-Bottom Alternate Preservation #3 (Unpreserved) | | | Water | | | | | | | | X | | | | | 1 |
| | | | | | | | | | | | | | | | | | |
| 7 | Open Pit-Middle Standard Preservation | | | Water | X | | X | X | X | X | X | | | | | | 6 |
| 8 | Open Pit-Middle Alternate Preservation #1 (SCN with HNO3) | | | Water | | | | | | | | | | | X | | 1 |
| 9 | Open Pit-Middle Alternate Preservation #3 (Unpreserved) | | | Water | | | | | | | | X | | | | | 1 |
| | | | | | | | | | | | | | | | | | |
| 10 | Open Pit-Upper Standard Preservation | | | Water | X | | | | | X | X | | | | | | 3 |
| 11 | Open Pit-Upper Alternate Preservation #1 (SCN with HNO3) | | | Water | | | | | | | | | | | X | | 1 |
| 12 | Open Pit-Upper Alternate Preservation #3 (Unpreserved) | | | Water | | | | | | | | X | | | | | 1 |
| | | | | | | | | | | | | | | | | | |

L1368203-COFC

**Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details**

*DO NOT ADD ACID to dissolved metals samples that are to remain unpreserved (as noted on bottle labels).*
***Bottle labels should match analysis. If there are issues please contact Leslie.*

**Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

**Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.**

| SHIPMENT RELEASE (client use) | | | SHIPMENT RECEPTION (lab use only) | | | | SHIPMENT VERIFICATION (lab use only) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Released by: | Date (dd-mmm-yy) | Time (hh-mm) | Received by: | Date: | Time: | Temperature: | Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
| Nicole Fulcher | 20-Sep-13 | 17:00 | | 20-Sept-13 | 5:10 | °C | | | | |

NA-FM-0325d v07 Front / 19 August 2013

3.8, 6.8, 3.0, 3.3°C

ALS Environmental

# Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____



| Report To | | Report Format / Distribution | Service Requested (Rush for routine analysis subject to availability) |
|---|---|---|---|
| Company: | AMEC Environment & Infrastructure | ☑ Standard ☐ Other | ◉ Regular (Standard Turnaround Times - Business Days) |
| Contact: | Leslie Hardy | ☑ PDF ☑ Excel ☐ Digital ☐ Fax | ○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT |
| Address: | 5681-70 Street, Edmonton, AB | Email 1: leslie.hardy@amec.com | ○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT |
| | | Email 2: | ○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT |
| Phone: | 780-989-4581 Fax: 780-435-8425 | Email 3: | |
| Invoice To | Same as Report ? ☑ Yes ☐ No | Client / Project Information | Analysis Request |
| Hardcopy of Invoice with Report? | ☑ Yes ☐ No | Job #: VM00605E.5230 | Please indicate below Filtered, Preserved or both (F, P, F/P) |
| Company: | | PO / AFE: | |
| Contact: | | LSD: | |
| Address: | | | |
| Phone: | Fax: | Quote #: Q40561 AMEC (Yukon) v3 | |
| Lab Work Order # (lab use only) | | ALS Contact: | Sampler: |

| Sample # | Sample Identification (This description will appear on the report) | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | General Chemistry | Diss Metals (F/P, HNO3) | Tot Metals (P,HNO3) | Number of Containers |
|---|---|---|---|---|---|---|---|---|
| 13 | Ore Leachate | 18-Sep-13 | | Water | X | X | X | 3 |
| 14 | Tailings + Org | 19-Sep-13 | | Water | X | X | X | 3 |
| 15 | Tailings Sand Leachate | 18-Sep-13 | | Water | X | X | X | 3 |
| 16 | Waste Rock + Org | 19-Sep-13 | | Water | X | X | X | 3 |
| 17 | Waste Rock Leachate | 18-Sep-13 | | Water | X | X | X | 3 |
| | | | | | | | | |
| | | | | | | | | |
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L1368203-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aqu

B Tier 1 - Natural, etc) / Hazardous Details

*DO NOT ADD ACID to dissolved metals samples that are to remain unpreserved (as noted on bottle labels).*

***Bottle labels should match analysis. If there are issues please contact Leslie.*

**Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

AMEC EARTH & ENVIRONMENTAL
ATTN: Leslie Hardy
5681 - 70 Street
Edmonton AB T6B 3P6

Date Received: 20-SEP-13
Report Date: 16-OCT-13 16:14 (MT)
Version: FINAL

Client Phone: 780-436-2152

# Certificate of Analysis

**Lab Work Order #: L1367036**

Project P.O. #: NOT SUBMITTED
Job Reference: VM00605E.5230
C of C Numbers: 1, 2, 3, 4
Legal Site Desc:

**Comments:** Please note that sample IDs MW09-05 and MW09-04 was changed to MP09-05 and MP09-04, respectively.

Selam Worku
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1367036-1 | L1367036-2 | L1367036-3 | L1367036-4 | L1367036-5 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | MW09-08 STANDARD PRESERVATION | MW09-08 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-08 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MW09-08 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-24 STANDARD PRESERVATION |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | 193 | | | | 808 |
| | Hardness (as CaCO3) (mg/L) | 95.0 | | | 81.1 | 590 |
| | pH (pH) | 6.51 | | | | 7.41 |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | 113 | | | | 201 |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | <1.0 | | | | <1.0 |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | <1.0 | | | | <1.0 |
| | Alkalinity, Total (as CaCO3) (mg/L) | 113 | | | | 201 |
| | Ammonia, Total (as N) (mg/L) | 1.97 | | | | 0.0079 |
| | Chloride (Cl) (mg/L) | <0.50 | | | | <5.0 DLA |
| | Fluoride (F) (mg/L) | 0.170 | | | | <0.20 DLA |
| | Nitrate (as N) (mg/L) | 0.0138 | | | | 4.10 |
| | Nitrite (as N) (mg/L) | 0.0028 | | | | <0.010 DLA |
| | Total Kjeldahl Nitrogen (mg/L) | 3.05 | | | | 0.305 TKNI |
| | Sulfate (SO4) (mg/L) | <0.50 | | | | 327 |
| | Sulphide as S (mg/L) | 0.074 | | | | |
| | Anion Sum (meq/L) | 2.28 | | | | 11.1 |
| | Cation Sum (meq/L) | 4.16 | | | | 12.2 |
| | Cation - Anion Balance (%) | 29.2 | | | | 4.5 |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | <0.0050 | | <0.0050 | | <0.0050 |
| | Cyanide, Total (mg/L) | <0.0050 | | <0.0050 | | 0.0270 |
| | Thiocyanate (SCN) (mg/L) | <0.50 | <0.50 | <0.50 | | 0.51 |
| | Cyanide, Free (mg/L) | <0.0050 | | <0.0050 | | <0.0050 |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | 24.1 | | | | 46.7 |
| | Total Organic Carbon (mg/L) | 24.5 | | | | 8.59 |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | | | FIELD | FIELD |
| | Dissolved Metals Filtration Location | FIELD | | | FIELD | FIELD |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0938 | | | 0.0900 | 0.0028 |
| | Antimony (Sb)-Dissolved (mg/L) | 0.00026 | | | 0.00028 | 0.00020 |
| | Arsenic (As)-Dissolved (mg/L) | 0.377 | | | 0.369 | 0.00163 |
| | Barium (Ba)-Dissolved (mg/L) | 0.107 | | | 0.106 | 0.0451 |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00010 | | | <0.00010 | <0.00010 |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.00050 | | | <0.00050 | <0.00050 |
| | Boron (B)-Dissolved (mg/L) | <0.010 | | | <0.010 | 0.015 |
| | Cadmium (Cd)-Dissolved (mg/L) | <0.000010 | | | <0.000010 | 0.000058 |
| | Calcium (Ca)-Dissolved (mg/L) | 29.1 | | | 24.4 | 172 |
| | Chromium (Cr)-Dissolved (mg/L) | 0.00119 | | | 0.00114 | 0.00051 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1367036-6 Water 18-SEP-13 12:00 MW09-24 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1367036-7 Water 18-SEP-13 12:00 MW09-24 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1367036-8 Water 18-SEP-13 12:00 MW09-07 STANDARD PRESERVATION | L1367036-9 Water 18-SEP-13 12:00 MW09-07 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1367036-10 Water 18-SEP-13 12:00 MW09-07 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | | 1180 | | |
| | Hardness (as CaCO3) (mg/L) | | 612 | 787 | | |
| | pH (pH) | | | 6.38 | | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | | | 172 | | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | | | <1.0 | | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | | | <1.0 | | |
| | Alkalinity, Total (as CaCO3) (mg/L) | | | 172 | | |
| | Ammonia, Total (as N) (mg/L) | | | 1.48 | | |
| | Chloride (Cl) (mg/L) | | | <5.0 DLA | | |
| | Fluoride (F) (mg/L) | | | <0.20 DLA | | |
| | Nitrate (as N) (mg/L) | | | 0.477 | | |
| | Nitrite (as N) (mg/L) | | | 0.034 | | |
| | Total Kjeldahl Nitrogen (mg/L) | | | 3.40 | | |
| | Sulfate (SO4) (mg/L) | | | 624 | | |
| | Sulphide as S (mg/L) | | | 0.026 | | |
| | Anion Sum (meq/L) | | | 16.5 | | |
| | Cation Sum (meq/L) | | | 19.0 | | |
| | Cation - Anion Balance (%) | | | 7.2 | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | | <0.0050 | | <0.0050 |
| | Cyanide, Total (mg/L) | | | <0.0050 | | <0.0050 |
| | Thiocyanate (SCN) (mg/L) | <0.50 | | 0.61 | <0.50 | <0.50 |
| | Cyanide, Free (mg/L) | | | <0.0050 | | <0.0050 |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | | 31.1 | | |
| | Total Organic Carbon (mg/L) | | | 31.4 | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | | FIELD | FIELD | | |
| | Dissolved Metals Filtration Location | | FIELD | FIELD | | |
| | Aluminum (Al)-Dissolved (mg/L) | | 0.0014 | 0.0414 | | |
| | Antimony (Sb)-Dissolved (mg/L) | | 0.00019 | 0.00394 | | |
| | Arsenic (As)-Dissolved (mg/L) | | 0.00152 | 0.512 | | |
| | Barium (Ba)-Dissolved (mg/L) | | 0.0463 | 0.0236 | | |
| | Beryllium (Be)-Dissolved (mg/L) | | <0.00010 | <0.00020 DLA | | |
| | Bismuth (Bi)-Dissolved (mg/L) | | <0.00050 | <0.0010 DLA | | |
| | Boron (B)-Dissolved (mg/L) | | 0.014 | 0.062 | | |
| | Cadmium (Cd)-Dissolved (mg/L) | | 0.000057 | 0.000127 | | |
| | Calcium (Ca)-Dissolved (mg/L) | | 172 | 247 | | |
| | Chromium (Cr)-Dissolved (mg/L) | | 0.00049 | 0.00075 | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1367036-11 Water 18-SEP-13 12:00 MW09-07 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1367036-12 Water 18-SEP-13 12:00 FIELD DUP C STANDARD PRESERVATION | L1367036-13 Water 18-SEP-13 12:00 FIELD DUP C ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1367036-14 Water 18-SEP-13 12:00 FIELD DUP C ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | L1367036-15 Water 18-SEP-13 12:00 FIELD DUP C ALTERNATE PRESERVATION #3 (UNPRESERVED) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | 194 | | | |
| | Hardness (as CaCO3) (mg/L) | 718 | 89.2 | | | 87.5 |
| | pH (pH) | | 6.49 | | | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | | 112 | | | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | | <1.0 | | | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | | <1.0 | | | |
| | Alkalinity, Total (as CaCO3) (mg/L) | | 112 | | | |
| | Ammonia, Total (as N) (mg/L) | | 2.02 | | | |
| | Chloride (Cl) (mg/L) | | <0.50 | | | |
| | Fluoride (F) (mg/L) | | 0.181 | | | |
| | Nitrate (as N) (mg/L) | | <0.0050 | | | |
| | Nitrite (as N) (mg/L) | | 0.0011 | | | |
| | Total Kjeldahl Nitrogen (mg/L) | | 2.83 | | | |
| | Sulfate (SO4) (mg/L) | | <0.50 | | | |
| | Sulphide as S (mg/L) | | 0.069 | | | |
| | Anion Sum (meq/L) | | 2.24 | | | |
| | Cation Sum (meq/L) | | 4.05 | | | |
| | Cation - Anion Balance (%) | | 28.7 | | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | <0.0050 | | <0.0050 | |
| | Cyanide, Total (mg/L) | | <0.0050 | | <0.0050 | |
| | Thiocyanate (SCN) (mg/L) | | <0.50 | <0.50 | <0.50 | |
| | Cyanide, Free (mg/L) | | <0.0050 | | <0.0050 | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | 23.6 | | | |
| | Total Organic Carbon (mg/L) | | 28.4 | | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | FIELD | | | FIELD |
| | Dissolved Metals Filtration Location | FIELD | FIELD | | | FIELD |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0310 | 0.0904 | | | 0.0923 |
| | Antimony (Sb)-Dissolved (mg/L) | 0.00522 | 0.00026 | | | 0.00026 |
| | Arsenic (As)-Dissolved (mg/L) | 0.418 | 0.362 | | | 0.386 |
| | Barium (Ba)-Dissolved (mg/L) | 0.0205 | 0.107 | | | 0.109 |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00020 DLA | <0.00010 | | | <0.00010 |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.0010 DLA | <0.00050 | | | <0.00050 |
| | Boron (B)-Dissolved (mg/L) | 0.057 | <0.010 | | | <0.010 |
| | Cadmium (Cd)-Dissolved (mg/L) | 0.000208 | <0.000010 | | | 0.000016 |
| | Calcium (Ca)-Dissolved (mg/L) | 220 | 26.8 | | | 26.3 |
| | Chromium (Cr)-Dissolved (mg/L) | 0.00072 | 0.00121 | | | 0.00122 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1367036-16 Water 18-SEP-13 12:00 MP09-05 STANDARD PRESERVATION | L1367036-17 Water 18-SEP-13 12:00 MP09-05 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1367036-19 Water 18-SEP-13 12:00 MP09-05 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1367036-20 Water 18-SEP-13 12:00 MP09-04 STANDARD PRESERVATION | L1367036-21 Water 18-SEP-13 12:00 MP09-04 ALTERNATE PRESERVATION #1 (SCN WITH HN03) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | 1950 | | | 1500 | |
| | Hardness (as CaCO3) (mg/L) | 1290 | | 1340 | 1160 | |
| | pH (pH) | 6.59 | | | 7.19 | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | 226 | | | 341 | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | <1.0 | | | <1.0 | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | <1.0 | | | <1.0 | |
| | Alkalinity, Total (as CaCO3) (mg/L) | 226 | | | 341 | |
| | Ammonia, Total (as N) (mg/L) | 9.41 | | | 0.0102 | |
| | Chloride (Cl) (mg/L) | <10 DLA | | | <5.0 DLA | |
| | Fluoride (F) (mg/L) | <0.40 DLA | | | <0.20 DLA | |
| | Nitrate (as N) (mg/L) | 0.26 | | | 0.166 | |
| | Nitrite (as N) (mg/L) | 0.041 | | | <0.010 DLA | |
| | Total Kjeldahl Nitrogen (mg/L) | 21.3 | | | 0.373 | |
| | Sulfate (SO4) (mg/L) | 1220 | | | 783 | |
| | Sulphide as S (mg/L) | | | | | |
| | Anion Sum (meq/L) | 30.0 | | | 23.1 | |
| | Cation Sum (meq/L) | 33.4 | | | 23.6 | |
| | Cation - Anion Balance (%) | 5.4 | | | 1.1 | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | <0.0050 | | | <0.0050 | |
| | Cyanide, Total (mg/L) | 0.0915 | | | 0.0109 | |
| | Thiocyanate (SCN) (mg/L) | 2.87 | 2.89 | | <0.50 | <0.50 |
| | Cyanide, Free (mg/L) | <0.0050 | | | <0.0050 | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | 48.6 | | | 78.2 | |
| | Total Organic Carbon (mg/L) | 104 | | | 2.17 | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | | FIELD | FIELD | |
| | Dissolved Metals Filtration Location | FIELD | | FIELD | FIELD | |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0409 | | 0.0286 | 0.0023 | |
| | Antimony (Sb)-Dissolved (mg/L) | 0.00052 | | 0.00052 | 0.00183 | |
| | Arsenic (As)-Dissolved (mg/L) | 0.118 | | 0.0728 | 0.00144 | |
| | Barium (Ba)-Dissolved (mg/L) | 0.115 | | 0.110 | 0.0922 | |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00020 DLA | | <0.00020 DLA | <0.00020 DLA | |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.0010 DLA | | <0.0010 DLA | <0.0010 DLA | |
| | Boron (B)-Dissolved (mg/L) | 0.106 | | 0.095 | <0.020 DLA | |
| | Cadmium (Cd)-Dissolved (mg/L) | 0.000381 | | 0.000315 | 0.000104 | |
| | Calcium (Ca)-Dissolved (mg/L) | 428 | | 451 | 310 | |
| | Chromium (Cr)-Dissolved (mg/L) | 0.00092 | | 0.00060 | 0.00050 | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1367036-23 | L1367036-24 | L1367036-25 | L1367036-26 | L1367036-27 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 19-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | MP09-04 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-22 STANDARD PRESERVATION | MW09-22 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-22 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-16 STANDARD PRESERVATION |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | 1030 | | | 1420 |
| | Hardness (as CaCO3) (mg/L) | 1140 | 637 | | 650 | 1050 |
| | pH (pH) | | 6.05 | | | 6.89 |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | | 61.4 | | | 319 |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | | <1.0 | | | <1.0 |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | | <1.0 | | | <1.0 |
| | Alkalinity, Total (as CaCO3) (mg/L) | | 61.4 | | | 319 |
| | Ammonia, Total (as N) (mg/L) | | 1.34 | | | <0.0050 |
| | Chloride (Cl) (mg/L) | | <5.0 DLA | | | <5.0 DLA |
| | Fluoride (F) (mg/L) | | <0.20 DLA | | | 0.20 |
| | Nitrate (as N) (mg/L) | | 3.67 | | | 0.200 |
| | Nitrite (as N) (mg/L) | | 0.601 | | | <0.010 DLA |
| | Total Kjeldahl Nitrogen (mg/L) | | 4.01 | | | 0.333 |
| | Sulfate (SO4) (mg/L) | | 569 | | | 747 |
| | Sulphide as S (mg/L) | | | | | |
| | Anion Sum (meq/L) | | 13.4 | | | 21.9 |
| | Cation Sum (meq/L) | | 17.6 | | | 21.6 |
| | Cation - Anion Balance (%) | | 13.7 | | | -0.8 |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | 0.0529 | | | <0.0050 |
| | Cyanide, Total (mg/L) | | 0.178 | | | <0.0050 |
| | Thiocyanate (SCN) (mg/L) | | 0.57 | <0.50 | | <0.50 |
| | Cyanide, Free (mg/L) | | 0.0496 | | | <0.0050 |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | 8.5 | | | 78.7 |
| | Total Organic Carbon (mg/L) | | 28.0 | | | 6.08 |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | FIELD | | FIELD | FIELD |
| | Dissolved Metals Filtration Location | FIELD | FIELD | | FIELD | FIELD |
| | Aluminum (Al)-Dissolved (mg/L) | <0.0010 | 0.0421 | | 0.0235 | 0.0013 |
| | Antimony (Sb)-Dissolved (mg/L) | 0.00184 | 0.00017 | | 0.00012 | 0.0610 |
| | Arsenic (As)-Dissolved (mg/L) | 0.00144 | 0.00727 | | 0.00393 | 0.0106 |
| | Barium (Ba)-Dissolved (mg/L) | 0.0954 | 0.132 | | 0.126 | 0.0127 |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00010 | <0.00010 | | <0.00010 | <0.00010 |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.00050 | <0.00050 | | <0.00050 | <0.00050 |
| | Boron (B)-Dissolved (mg/L) | 0.016 | 0.020 | | 0.019 | 0.085 |
| | Cadmium (Cd)-Dissolved (mg/L) | 0.000114 | 0.000034 | | 0.000023 | 0.0194 |
| | Calcium (Ca)-Dissolved (mg/L) | 295 | 208 | | 215 | 249 |
| | Chromium (Cr)-Dissolved (mg/L) | 0.00048 | 0.00063 | | 0.00036 | <0.00010 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1367036-28 Water 19-SEP-13 12:00 MW09-16 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1367036-29 Water 19-SEP-13 12:00 MW09-16 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1367036-30 Water 19-SEP-13 12:00 MW09-18 STANDARD PRESERVATION | L1367036-31 Water 19-SEP-13 12:00 MW09-18 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1367036-32 Water 19-SEP-13 12:00 MW09-18 ALTERNATE PRESERVATION #3 (UNPRESERVED) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | | 1970 | | |
| | Hardness (as CaCO3) (mg/L) | | 1090 | 1890 | | 1980 |
| | pH (pH) | | | 7.01 | | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | | | 402 | | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | | | <1.0 | | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | | | <1.0 | | |
| | Alkalinity, Total (as CaCO3) (mg/L) | | | 402 | | |
| | Ammonia, Total (as N) (mg/L) | | | 0.0166 | | |
| | Chloride (Cl) (mg/L) | | | <10 DLA | | |
| | Fluoride (F) (mg/L) | | | <0.40 DLA | | |
| | Nitrate (as N) (mg/L) | | | 0.23 | | |
| | Nitrite (as N) (mg/L) | | | <0.020 DLA | | |
| | Total Kjeldahl Nitrogen (mg/L) | | | 0.244 | | |
| | Sulfate (SO4) (mg/L) | | | 1180 | | |
| | Sulphide as S (mg/L) | | | | | |
| | Anion Sum (meq/L) | | | 32.7 | | |
| | Cation Sum (meq/L) | | | 38.4 | | |
| | Cation - Anion Balance (%) | | | 8.0 | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | | <0.0050 | | |
| | Cyanide, Total (mg/L) | | | <0.0050 | | |
| | Thiocyanate (SCN) (mg/L) | <0.50 | | <0.50 | <0.50 | |
| | Cyanide, Free (mg/L) | | | <0.0050 | | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | | 80.6 | | |
| | Total Organic Carbon (mg/L) | | | 5.75 | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | | FIELD | FIELD | | FIELD |
| | Dissolved Metals Filtration Location | | FIELD | FIELD | | FIELD |
| | Aluminum (Al)-Dissolved (mg/L) | | <0.0010 | <0.0020 DLA | | <0.0020 DLA |
| | Antimony (Sb)-Dissolved (mg/L) | | 0.0591 | 0.00022 | | 0.00021 |
| | Arsenic (As)-Dissolved (mg/L) | | 0.0106 | 0.0613 | | 0.0649 |
| | Barium (Ba)-Dissolved (mg/L) | | 0.0123 | 0.00885 | | 0.00919 |
| | Beryllium (Be)-Dissolved (mg/L) | | <0.00010 | <0.00020 DLA | | <0.00020 DLA |
| | Bismuth (Bi)-Dissolved (mg/L) | | <0.00050 | <0.0010 DLA | | <0.0010 DLA |
| | Boron (B)-Dissolved (mg/L) | | 0.082 | <0.020 DLA | | <0.020 DLA |
| | Cadmium (Cd)-Dissolved (mg/L) | | 0.0192 | 0.000055 | | 0.000053 |
| | Calcium (Ca)-Dissolved (mg/L) | | 249 | 366 | | 374 |
| | Chromium (Cr)-Dissolved (mg/L) | | <0.00010 | <0.00020 DLA | | <0.00020 DLA |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1367036-33 Water 19-SEP-13 12:00 MW09-17 STANDARD PRESERVATION | L1367036-34 Water 19-SEP-13 12:00 MW09-17 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1367036-35 Water 19-SEP-13 12:00 MW09-17 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1367036-36 Water 19-SEP-13 12:00 MP09-10 STANDARD PRESERVATION | L1367036-37 Water 19-SEP-13 12:00 MP09-10 ALTERNATE PRESERVATION #1 (SCN WITH HN03) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | 2390 | | | | |
| | Hardness (as CaCO3) (mg/L) | 2010 | | 2080 | 216 | |
| | pH (pH) | 6.94 | | | | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | 503 | | | | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | <1.0 | | | | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | <1.0 | | | | |
| | Alkalinity, Total (as CaCO3) (mg/L) | 503 | | | | |
| | Ammonia, Total (as N) (mg/L) | <0.0050 | | | | |
| | Chloride (Cl) (mg/L) | <10 DLA | | | | |
| | Fluoride (F) (mg/L) | <0.40 DLA | | | | |
| | Nitrate (as N) (mg/L) | 0.11 | | | | |
| | Nitrite (as N) (mg/L) | <0.020 | | | | |
| | Total Kjeldahl Nitrogen (mg/L) | 0.283 | | | | |
| | Sulfate (SO4) (mg/L) | 1580 | | | | |
| | Sulphide as S (mg/L) | | | | | |
| | Anion Sum (meq/L) | 43.0 | | | | |
| | Cation Sum (meq/L) | 40.8 | | | | |
| | Cation - Anion Balance (%) | -2.5 | | | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | <0.0050 | | | | |
| | Cyanide, Total (mg/L) | <0.0050 | | | | |
| | Thiocyanate (SCN) (mg/L) | <0.50 | <0.50 | | 0.66 | <0.50 |
| | Cyanide, Free (mg/L) | <0.0050 | | | | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | 59.7 | | | | |
| | Total Organic Carbon (mg/L) | 5.7 | | | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | | FIELD | FIELD | |
| | Dissolved Metals Filtration Location | FIELD | | FIELD | FIELD | |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0022 | | <0.0020 DLA | 0.0214 | |
| | Antimony (Sb)-Dissolved (mg/L) | 0.00037 | | 0.00040 | 0.117 | |
| | Arsenic (As)-Dissolved (mg/L) | 0.0225 | | 0.0243 | 15.1 | |
| | Barium (Ba)-Dissolved (mg/L) | 0.00781 | | 0.00860 | 0.00383 | |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00020 DLA | | <0.00020 DLA | <0.00020 DLA | |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.0010 DLA | | <0.0010 DLA | <0.0010 DLA | |
| | Boron (B)-Dissolved (mg/L) | 0.043 | | 0.044 | 0.153 | |
| | Cadmium (Cd)-Dissolved (mg/L) | <0.000020 DLA | | <0.000020 DLA | 0.000382 | |
| | Calcium (Ca)-Dissolved (mg/L) | 365 | | 378 | 84.7 | |
| | Chromium (Cr)-Dissolved (mg/L) | <0.00020 DLA | | <0.00020 DLA | <0.00020 DLA | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1367036-38 Water 19-SEP-13 12:00 MP09-10 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1367036-39 Water 19-SEP-13 12:00 MP09-11 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1367036-40 Water 19-SEP-13 12:00 GLL07-02 STANDARD PRESERVATION | L1367036-41 Water 19-SEP-13 12:00 GLL07-02 ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | L1367036-42 Water 19-SEP-13 12:00 GLL07-02 ALTERNATE PRESERVATION #3 (UNPRESERVED) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | | 329 | | |
| | Hardness (as CaCO3) (mg/L) | 207 | 716 | 179 | | 168 |
| | pH (pH) | | | 6.55 | | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | | | 83.9 | | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | | | <1.0 | | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | | | <1.0 | | |
| | Alkalinity, Total (as CaCO3) (mg/L) | | | 83.9 | | |
| | Ammonia, Total (as N) (mg/L) | | | 6.80 | | |
| | Chloride (Cl) (mg/L) | | | <0.50 | | |
| | Fluoride (F) (mg/L) | | | 0.053 | | |
| | Nitrate (as N) (mg/L) | | | 0.697 | | |
| | Nitrite (as N) (mg/L) | | | <0.0010 | | |
| | Total Kjeldahl Nitrogen (mg/L) | | | 0.588 TKNI | | |
| | Sulfate (SO4) (mg/L) | | | 98.3 | | |
| | Sulphide as S (mg/L) | | | | | |
| | Anion Sum (meq/L) | | | 3.78 | | |
| | Cation Sum (meq/L) | | | 4.26 | | |
| | Cation - Anion Balance (%) | | | 6.1 | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | | <0.0050 | | |
| | Cyanide, Total (mg/L) | | | <0.0050 | | |
| | Thiocyanate (SCN) (mg/L) | | | 0.59 | <0.50 | |
| | Cyanide, Free (mg/L) | | | <0.0050 | | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | | 19.1 | | |
| | Total Organic Carbon (mg/L) | | | 11.6 | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | FIELD | FIELD | | FIELD |
| | Dissolved Metals Filtration Location | FIELD | FIELD | FIELD | | FIELD |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0045 | 0.0061 | 0.0109 | | 0.0113 |
| | Antimony (Sb)-Dissolved (mg/L) | 0.121 | 0.0190 | 0.00058 | | 0.00058 |
| | Arsenic (As)-Dissolved (mg/L) | 15.3 | 7.69 | 0.00127 | | 0.00121 |
| | Barium (Ba)-Dissolved (mg/L) | 0.00267 | 0.162 | 0.0269 | | 0.0264 |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00020 DLA | <0.00010 | <0.00010 | | <0.00010 |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.0010 DLA | <0.00050 | <0.00050 | | <0.00050 |
| | Boron (B)-Dissolved (mg/L) | 0.164 | 0.059 | <0.010 | | <0.010 |
| | Cadmium (Cd)-Dissolved (mg/L) | 0.000344 | 0.000041 | 0.000205 | | 0.000170 |
| | Calcium (Ca)-Dissolved (mg/L) | 81.3 | 154 | 52.0 | | 48.6 |
| | Chromium (Cr)-Dissolved (mg/L) | <0.00020 DLA | 0.00166 | 0.00016 | | 0.00013 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1367036-43 Water 19-SEP-13 12:00 MW09-23 STANDARD PRESERVATION | L1367036-44 Water 19-SEP-13 12:00 MW09-23 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1367036-45 Water 19-SEP-13 12:00 MW09-23 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1367036-46 Water 19-SEP-13 12:00 MW09-21 STANDARD PRESERVATION | L1367036-47 Water 19-SEP-13 12:00 MW09-21 ALTERNATE PRESERVATION #1 (SCN WITH HN03) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | 1960 | | | 1240 | |
| | Hardness (as CaCO3) (mg/L) | 1540 | | 1530 | 786 | |
| | pH (pH) | 6.84 | | | 6.52 | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | 256 | | | 319 | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | <1.0 | | | <1.0 | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | <1.0 | | | <1.0 | |
| | Alkalinity, Total (as CaCO3) (mg/L) | 256 | | | 319 | |
| | Ammonia, Total (as N) (mg/L) | 3.86 | | | 12.4 | |
| | Chloride (Cl) (mg/L) | <10 DLA | | | <5.0 DLA | |
| | Fluoride (F) (mg/L) | <0.40 DLA | | | <0.20 DLA | |
| | Nitrate (as N) (mg/L) | <0.10 DLA | | | <0.050 DLA | |
| | Nitrite (as N) (mg/L) | <0.020 DLA | | | <0.010 DLA | |
| | Total Kjeldahl Nitrogen (mg/L) | 7.00 | | | 16.3 | |
| | Sulfate (SO4) (mg/L) | 1330 | | | 538 | |
| | Sulphide as S (mg/L) | | | | | |
| | Anion Sum (meq/L) | 32.9 | | | 17.6 | |
| | Cation Sum (meq/L) | 33.5 | | | 20.3 | |
| | Cation - Anion Balance (%) | 1.0 | | | 7.2 | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | <0.0050 | | | <0.0050 | |
| | Cyanide, Total (mg/L) | 0.0081 | | | 0.0080 | |
| | Thiocyanate (SCN) (mg/L) | <0.50 | <0.50 | | 1.11 | 0.70 |
| | Cyanide, Free (mg/L) | <0.0050 | | | <0.0050 | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | 52.6 | | | 78.8 | |
| | Total Organic Carbon (mg/L) | 22.2 | | | 90.9 | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | | FIELD | FIELD | |
| | Dissolved Metals Filtration Location | FIELD | | FIELD | FIELD | |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0194 | | 0.0162 | 0.128 | |
| | Antimony (Sb)-Dissolved (mg/L) | 0.00042 | | 0.00042 | 0.00018 | |
| | Arsenic (As)-Dissolved (mg/L) | 0.0108 | | 0.0104 | 0.104 | |
| | Barium (Ba)-Dissolved (mg/L) | 0.0958 | | 0.0976 | 0.166 | |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00020 DLA | | <0.00020 DLA | <0.00010 | |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.0010 DLA | | <0.0010 DLA | <0.00050 | |
| | Boron (B)-Dissolved (mg/L) | 0.127 | | 0.125 | 0.022 | |
| | Cadmium (Cd)-Dissolved (mg/L) | 0.000041 | | 0.000066 | 0.000048 | |
| | Calcium (Ca)-Dissolved (mg/L) | 454 | | 459 | 251 | |
| | Chromium (Cr)-Dissolved (mg/L) | 0.00043 | | 0.00046 | 0.00205 | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1367036-48 Water 19-SEP-13 12:00 MW09-21 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1367036-49 Water 19-SEP-13 12:00 MW09-19 STANDARD PRESERVATION | L1367036-50 Water 19-SEP-13 12:00 MW09-19 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1367036-51 Water 19-SEP-13 12:00 MW09-19 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | L1367036-52 Water 19-SEP-13 12:00 MW09-19 ALTERNATE PRESERVATION #3 (UNPRESERVED) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | 1650 | | | |
| | Hardness (as CaCO3) (mg/L) | 832 | 1410 | | | 1460 |
| | pH (pH) | | 6.84 | | | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | | 493 | | | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | | <1.0 | | | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | | <1.0 | | | |
| | Alkalinity, Total (as CaCO3) (mg/L) | | 493 | | | |
| | Ammonia, Total (as N) (mg/L) | | 2.76 | | | |
| | Chloride (Cl) (mg/L) | | <5.0 DLA | | | |
| | Fluoride (F) (mg/L) | | <0.20 DLA | | | |
| | Nitrate (as N) (mg/L) | | 0.146 | | | |
| | Nitrite (as N) (mg/L) | | <0.010 DLA | | | |
| | Total Kjeldahl Nitrogen (mg/L) | | 4.90 | | | |
| | Sulfate (SO4) (mg/L) | | 794 | | | |
| | Sulphide as S (mg/L) | | 0.184 | | | |
| | Anion Sum (meq/L) | | 26.4 | | | |
| | Cation Sum (meq/L) | | 30.0 | | | |
| | Cation - Anion Balance (%) | | 6.4 | | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | <0.0050 | | <0.0050 | |
| | Cyanide, Total (mg/L) | | <0.0050 | | <0.0050 | |
| | Thiocyanate (SCN) (mg/L) | | 0.51 | <0.50 | <0.50 | |
| | Cyanide, Free (mg/L) | | <0.0050 | | <0.0050 | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | 115 | | | |
| | Total Organic Carbon (mg/L) | | 35.2 | | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | FIELD | | | FIELD |
| | Dissolved Metals Filtration Location | FIELD | FIELD | | | FIELD |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0877 | 0.0097 | | | 0.0100 |
| | Antimony (Sb)-Dissolved (mg/L) | 0.00019 | 0.00020 | | | 0.00023 |
| | Arsenic (As)-Dissolved (mg/L) | 0.0837 | 0.0994 | | | 0.0955 |
| | Barium (Ba)-Dissolved (mg/L) | 0.148 | 0.0518 | | | 0.0530 |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00010 | <0.00010 | | | <0.00020 DLA |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.00050 | <0.00050 | | | <0.0010 DLA |
| | Boron (B)-Dissolved (mg/L) | 0.022 | 0.324 | | | 0.364 |
| | Cadmium (Cd)-Dissolved (mg/L) | 0.000057 | <0.000010 | | | <0.000020 DLA |
| | Calcium (Ca)-Dissolved (mg/L) | 270 | 306 | | | 325 |
| | Chromium (Cr)-Dissolved (mg/L) | 0.00157 | 0.00034 | | | 0.00032 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1367036-53 | L1367036-54 | L1367036-55 | L1367036-56 | L1367036-57 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 19-SEP-13 | 19-SEP-13 | 19-SEP-13 | 19-SEP-13 | 20-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | GLL07-03 STANDARD PRESERVATION | GLL07-03 ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | GLL07-03 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | GLL07-03 ALTERNATE PRESERVATION #3 (UNPRESERVED) | W1410383 BH03 STANDARD PRESERVATION |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | 1130 | | | | 807 |
| | Hardness (as CaCO3) (mg/L) | 736 | | | 731 | 423 |
| | pH (pH) | 6.22 | | | | 6.44 |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | 39.6 | | | | 200 |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | <1.0 | | | | <1.0 |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | <1.0 | | | | <1.0 |
| | Alkalinity, Total (as CaCO3) (mg/L) | 39.6 | | | | 200 |
| | Ammonia, Total (as N) (mg/L) | 0.144 | | | | 8.53 |
| | Chloride (Cl) (mg/L) | <5.0 DLA | | | | <5.0 DLA |
| | Fluoride (F) (mg/L) | 0.28 | | | | <0.20 DLA |
| | Nitrate (as N) (mg/L) | <0.050 DLA | | | | <0.050 DLA |
| | Nitrite (as N) (mg/L) | <0.010 DLA | | | | <0.010 DLA |
| | Total Kjeldahl Nitrogen (mg/L) | 0.420 | | | | 12.2 |
| | Sulfate (SO4) (mg/L) | 732 | | | | 269 |
| | Sulphide as S (mg/L) | 0.82 | | | | |
| | Anion Sum (meq/L) | 16.0 | | | | 9.58 |
| | Cation Sum (meq/L) | 16.4 | | | | 14.2 |
| | Cation - Anion Balance (%) | 1.1 | | | | 19.4 |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | <0.0050 | | <0.0050 | | <0.0050 |
| | Cyanide, Total (mg/L) | <0.0050 | | <0.0050 | | <0.0050 |
| | Thiocyanate (SCN) (mg/L) | <0.50 | <0.50 | <0.50 | | 0.72 |
| | Cyanide, Free (mg/L) | <0.0050 | | <0.0050 | | <0.0050 |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | 5.74 | | | | 33.9 |
| | Total Organic Carbon (mg/L) | 1.97 | | | | 88.2 |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | | | FIELD | FIELD |
| | Dissolved Metals Filtration Location | FIELD | | | FIELD | FIELD |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0213 | | | <0.0010 | 0.0487 |
| | Antimony (Sb)-Dissolved (mg/L) | <0.00010 | | | <0.00010 | 0.00041 |
| | Arsenic (As)-Dissolved (mg/L) | 0.00044 | | | <0.00010 | 0.0914 |
| | Barium (Ba)-Dissolved (mg/L) | 0.00956 | | | 0.00939 | 0.296 |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00010 | | | <0.00010 | <0.00010 |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.00050 | | | <0.00050 | <0.00050 |
| | Boron (B)-Dissolved (mg/L) | <0.010 | | | <0.010 | 0.017 |
| | Cadmium (Cd)-Dissolved (mg/L) | 0.00437 | | | 0.00448 | 0.000022 |
| | Calcium (Ca)-Dissolved (mg/L) | 226 | | | 220 | 118 |
| | Chromium (Cr)-Dissolved (mg/L) | <0.00010 | | | <0.00010 | 0.00077 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1367036-58 Water 20-SEP-13 12:00 W1410383 BH03 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1367036-59 Water 20-SEP-13 12:00 W1410383 BH03 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1367036-60 Water 19-SEP-13 12:00 FIELP DUP D STANDARD PRESERVATION | L1367036-61 Water 19-SEP-13 12:00 FIELP DUP D ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1367036-62 Water 19-SEP-13 12:00 FIELP DUP D ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | | 1560 | | |
| | Hardness (as CaCO3) (mg/L) | | 457 | 1430 | | |
| | pH (pH) | | | 6.83 | | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | | | 491 | | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | | | <1.0 | | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | | | <1.0 | | |
| | Alkalinity, Total (as CaCO3) (mg/L) | | | 491 | | |
| | Ammonia, Total (as N) (mg/L) | | | 3.03 | | |
| | Chloride (Cl) (mg/L) | | | <5.0 DLA | | |
| | Fluoride (F) (mg/L) | | | 0.21 | | |
| | Nitrate (as N) (mg/L) | | | 0.139 | | |
| | Nitrite (as N) (mg/L) | | | <0.010 DLA | | |
| | Total Kjeldahl Nitrogen (mg/L) | | | 4.85 | | |
| | Sulfate (SO4) (mg/L) | | | 797 | | |
| | Sulphide as S (mg/L) | | | | | |
| | Anion Sum (meq/L) | | | 26.4 | | |
| | Cation Sum (meq/L) | | | 30.5 | | |
| | Cation - Anion Balance (%) | | | 7.1 | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | | <0.0050 | | <0.0050 |
| | Cyanide, Total (mg/L) | | | <0.0050 | | <0.0050 |
| | Thiocyanate (SCN) (mg/L) | 0.73 | | <0.50 | <0.50 | <0.50 |
| | Cyanide, Free (mg/L) | | | <0.0050 | | <0.0050 |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | | 116 | | |
| | Total Organic Carbon (mg/L) | | | 37.6 | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | | FIELD | FIELD | | |
| | Dissolved Metals Filtration Location | | FIELD | FIELD | | |
| | Aluminum (Al)-Dissolved (mg/L) | | 0.0303 | 0.0105 | | |
| | Antimony (Sb)-Dissolved (mg/L) | | 0.00037 | 0.00021 | | |
| | Arsenic (As)-Dissolved (mg/L) | | 0.0724 | 0.0867 | | |
| | Barium (Ba)-Dissolved (mg/L) | | 0.252 | 0.0541 | | |
| | Beryllium (Be)-Dissolved (mg/L) | | <0.00010 | <0.00010 | | |
| | Bismuth (Bi)-Dissolved (mg/L) | | <0.00050 | <0.00050 | | |
| | Boron (B)-Dissolved (mg/L) | | 0.017 | 0.344 | | |
| | Cadmium (Cd)-Dissolved (mg/L) | | 0.000020 | <0.000010 | | |
| | Calcium (Ca)-Dissolved (mg/L) | | 128 | 309 | | |
| | Chromium (Cr)-Dissolved (mg/L) | | 0.00056 | 0.00037 | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1367036-63 | L1367036-64 | | | |
|---|---|---|---|---|---|---|
| | Description | Water | Water | | | |
| | Sampled Date | 19-SEP-13 | | | | |
| | Sampled Time | 12:00 | | | | |
| | Client ID | FIELP DUP D ALTERNATE PRESERVATION #3 (UNPRESERVED) | MP09-10 ANIONS | | | |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | 531 | | | |
| | Hardness (as CaCO3) (mg/L) | 1460 | | | | |
| | pH (pH) | | 8.68 | | | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | | | | | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | | | | | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | | | | | |
| | Alkalinity, Total (as CaCO3) (mg/L) | | 98.1 | | | |
| | Ammonia, Total (as N) (mg/L) | | | | | |
| | Chloride (Cl) (mg/L) | | 3.21 | | | |
| | Fluoride (F) (mg/L) | | | | | |
| | Nitrate (as N) (mg/L) | | | | | |
| | Nitrite (as N) (mg/L) | | | | | |
| | Total Kjeldahl Nitrogen (mg/L) | | | | | |
| | Sulfate (SO4) (mg/L) | | 161 | | | |
| | Sulphide as S (mg/L) | | | | | |
| | Anion Sum (meq/L) | | | | | |
| | Cation Sum (meq/L) | | | | | |
| | Cation - Anion Balance (%) | | | | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | | | | |
| | Cyanide, Total (mg/L) | | | | | |
| | Thiocyanate (SCN) (mg/L) | | | | | |
| | Cyanide, Free (mg/L) | | | | | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | | | | |
| | Total Organic Carbon (mg/L) | | | | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | | | | |
| | Dissolved Metals Filtration Location | FIELD | | | | |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0074 | | | | |
| | Antimony (Sb)-Dissolved (mg/L) | 0.00022 | | | | |
| | Arsenic (As)-Dissolved (mg/L) | 0.0687 | | | | |
| | Barium (Ba)-Dissolved (mg/L) | 0.0516 | | | | |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00010 | | | | |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.00050 | | | | |
| | Boron (B)-Dissolved (mg/L) | 0.346 | | | | |
| | Cadmium (Cd)-Dissolved (mg/L) | <0.000010 | | | | |
| | Calcium (Ca)-Dissolved (mg/L) | 308 | | | | |
| | Chromium (Cr)-Dissolved (mg/L) | 0.00032 | | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1367036-1 | L1367036-2 | L1367036-3 | L1367036-4 | L1367036-5 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | MW09-08 STANDARD PRESERVATION | MW09-08 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-08 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MW09-08 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-24 STANDARD PRESERVATION |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Dissolved Metals** | Cobalt (Co)-Dissolved (mg/L) | 0.00090 | | | 0.00096 | 0.00068 |
| | Copper (Cu)-Dissolved (mg/L) | 0.00021 | | | <0.00020 | 0.00844 |
| | Iron (Fe)-Dissolved (mg/L) | 35.9 | | | 38.4 | <0.010 |
| | Lead (Pb)-Dissolved (mg/L) | 0.000155 | | | 0.000109 | 0.000073 |
| | Lithium (Li)-Dissolved (mg/L) | <0.00050 | | | <0.00050 | <0.00050 |
| | Magnesium (Mg)-Dissolved (mg/L) | 5.40 | | | 4.94 | 38.7 |
| | Manganese (Mn)-Dissolved (mg/L) | 2.26 | | | 2.21 | 0.00144 |
| | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | | | <0.000010 | <0.000010 |
| | Molybdenum (Mo)-Dissolved (mg/L) | 0.000097 | | | 0.000089 | 0.000337 |
| | Nickel (Ni)-Dissolved (mg/L) | <0.00050 | | | <0.00050 | <0.00050 |
| | Phosphorus (P)-Dissolved (mg/L) | 0.107 | | | 0.120 | <0.050 |
| | Potassium (K)-Dissolved (mg/L) | 1.36 | | | 1.21 | 1.68 |
| | Selenium (Se)-Dissolved (mg/L) | 0.00013 | | | 0.00013 | 0.00038 |
| | Silicon (Si)-Dissolved (mg/L) | 9.57 | | | 9.67 | 4.71 |
| | Silver (Ag)-Dissolved (mg/L) | <0.000010 | | | <0.000010 | <0.000010 |
| | Sodium (Na)-Dissolved (mg/L) | 1.41 | | | 1.43 | 8.06 |
| | Strontium (Sr)-Dissolved (mg/L) | 0.119 | | | 0.120 | 0.651 |
| | Sulfur (S)-Dissolved (mg/L) | <0.50 | | | <0.50 | 117 |
| | Thallium (Tl)-Dissolved (mg/L) | <0.000010 | | | <0.000010 | <0.000010 |
| | Tin (Sn)-Dissolved (mg/L) | <0.00010 | | | <0.00010 | <0.00010 |
| | Titanium (Ti)-Dissolved (mg/L) | <0.010 | | | <0.010 | <0.010 |
| | Uranium (U)-Dissolved (mg/L) | 0.000093 | | | 0.000088 | 0.00969 |
| | Vanadium (V)-Dissolved (mg/L) | 0.0040 | | | 0.0038 | <0.0010 |
| | Zinc (Zn)-Dissolved (mg/L) | 0.0017 | | | <0.0010 | 0.0019 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1367036-6 Water 18-SEP-13 12:00 MW09-24 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1367036-7 Water 18-SEP-13 12:00 MW09-24 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1367036-8 Water 18-SEP-13 12:00 MW09-07 STANDARD PRESERVATION | L1367036-9 Water 18-SEP-13 12:00 MW09-07 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1367036-10 Water 18-SEP-13 12:00 MW09-07 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Dissolved Metals** | Cobalt (Co)-Dissolved (mg/L) | | 0.00064 | 0.0218 | | |
| | Copper (Cu)-Dissolved (mg/L) | | 0.00708 | 0.00693 | | |
| | Iron (Fe)-Dissolved (mg/L) | | <0.010 | 3.98 | | |
| | Lead (Pb)-Dissolved (mg/L) | | <0.000050 | 0.00147 | | |
| | Lithium (Li)-Dissolved (mg/L) | | <0.00050 | 0.0017 | | |
| | Magnesium (Mg)-Dissolved (mg/L) | | 44.4 | 41.4 | | |
| | Manganese (Mn)-Dissolved (mg/L) | | 0.00112 | 15.6 | | |
| | Mercury (Hg)-Dissolved (mg/L) | | <0.000010 | <0.000010 | | |
| | Molybdenum (Mo)-Dissolved (mg/L) | | 0.000387 | 0.00066 | | |
| | Nickel (Ni)-Dissolved (mg/L) | | <0.00050 | 0.0218 | | |
| | Phosphorus (P)-Dissolved (mg/L) | | <0.050 | <0.050 | | |
| | Potassium (K)-Dissolved (mg/L) | | 1.61 | 11.4 | | |
| | Selenium (Se)-Dissolved (mg/L) | | 0.00054 | <0.00020 DLA | | |
| | Silicon (Si)-Dissolved (mg/L) | | 4.70 | 10.1 | | |
| | Silver (Ag)-Dissolved (mg/L) | | <0.000010 | 0.000190 | | |
| | Sodium (Na)-Dissolved (mg/L) | | 8.45 | 48.3 | | |
| | Strontium (Sr)-Dissolved (mg/L) | | 0.663 | 0.614 | | |
| | Sulfur (S)-Dissolved (mg/L) | | 112 | 232 | | |
| | Thallium (Tl)-Dissolved (mg/L) | | <0.000010 | <0.000020 DLA | | |
| | Tin (Sn)-Dissolved (mg/L) | | <0.00010 | <0.00020 DLA | | |
| | Titanium (Ti)-Dissolved (mg/L) | | <0.010 | <0.020 DLA | | |
| | Uranium (U)-Dissolved (mg/L) | | 0.00958 | 0.000718 | | |
| | Vanadium (V)-Dissolved (mg/L) | | <0.0010 | <0.0020 DLA | | |
| | Zinc (Zn)-Dissolved (mg/L) | | 0.0021 | 0.316 | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1367036-11 Water 18-SEP-13 12:00 MW09-07 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1367036-12 Water 18-SEP-13 12:00 FIELD DUP C STANDARD PRESERVATION | L1367036-13 Water 18-SEP-13 12:00 FIELD DUP C ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1367036-14 Water 18-SEP-13 12:00 FIELD DUP C ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | L1367036-15 Water 18-SEP-13 12:00 FIELD DUP C ALTERNATE PRESERVATION #3 (UNPRESERVED) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Dissolved Metals** | Cobalt (Co)-Dissolved (mg/L) | 0.0192 | 0.00089 | | | 0.00096 |
| | Copper (Cu)-Dissolved (mg/L) | 0.00687 | 0.00020 | | | <0.00020 |
| | Iron (Fe)-Dissolved (mg/L) | 3.18 | 36.1 | | | 33.7 |
| | Lead (Pb)-Dissolved (mg/L) | 0.00162 | 0.00102 | | | 0.000126 |
| | Lithium (Li)-Dissolved (mg/L) | 0.0013 | <0.00050 | | | <0.00050 |
| | Magnesium (Mg)-Dissolved (mg/L) | 41.3 | 5.41 | | | 5.31 |
| | Manganese (Mn)-Dissolved (mg/L) | 13.8 | 2.18 | | | 2.27 |
| | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | <0.000010 | | | <0.000010 |
| | Molybdenum (Mo)-Dissolved (mg/L) | 0.00059 | 0.000090 | | | 0.000107 |
| | Nickel (Ni)-Dissolved (mg/L) | 0.0192 | <0.00050 | | | <0.00050 |
| | Phosphorus (P)-Dissolved (mg/L) | <0.050 | 0.107 | | | <0.25 DLM |
| | Potassium (K)-Dissolved (mg/L) | 10.7 | 1.36 | | | 1.27 |
| | Selenium (Se)-Dissolved (mg/L) | <0.00020 DLA | 0.00014 | | | 0.00017 |
| | Silicon (Si)-Dissolved (mg/L) | 9.22 | 9.55 | | | 9.10 |
| | Silver (Ag)-Dissolved (mg/L) | 0.000197 | <0.000010 | | | 0.000013 |
| | Sodium (Na)-Dissolved (mg/L) | 44.4 | 1.41 | | | 1.45 |
| | Strontium (Sr)-Dissolved (mg/L) | 0.554 | 0.118 | | | 0.115 |
| | Sulfur (S)-Dissolved (mg/L) | 200 | 0.51 | | | <2.5 DLM |
| | Thallium (Tl)-Dissolved (mg/L) | <0.000020 DLA | <0.000010 | | | <0.000010 |
| | Tin (Sn)-Dissolved (mg/L) | <0.00020 DLA | <0.00010 | | | <0.00010 |
| | Titanium (Ti)-Dissolved (mg/L) | <0.020 DLA | <0.010 | | | <0.010 |
| | Uranium (U)-Dissolved (mg/L) | 0.000607 | 0.000095 | | | 0.000090 |
| | Vanadium (V)-Dissolved (mg/L) | <0.0020 DLA | 0.0038 | | | 0.0041 |
| | Zinc (Zn)-Dissolved (mg/L) | 0.245 | 0.0019 | | | <0.0010 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1367036-16 | L1367036-17 | L1367036-19 | L1367036-20 | L1367036-21 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | MP09-05 STANDARD PRESERVATION | MP09-05 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MP09-05 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MP09-04 STANDARD PRESERVATION | MP09-04 ALTERNATE PRESERVATION #1 (SCN WITH HN03) |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Dissolved Metals** | Cobalt (Co)-Dissolved (mg/L) | 0.0152 | | 0.0154 | 0.00028 | |
| | Copper (Cu)-Dissolved (mg/L) | 0.00165 | | 0.00150 | 0.00298 | |
| | Iron (Fe)-Dissolved (mg/L) | 56.1 | | 53.4 | <0.010 | |
| | Lead (Pb)-Dissolved (mg/L) | 0.00012 | | 0.00013 | <0.00010 DLA | |
| | Lithium (Li)-Dissolved (mg/L) | <0.0010 DLA | | <0.0010 DLA | <0.0010 DLA | |
| | Magnesium (Mg)-Dissolved (mg/L) | 54.2 | | 52.6 | 93.6 | |
| | Manganese (Mn)-Dissolved (mg/L) | 10.7 | | 12.1 | 0.00233 | |
| | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | | <0.000010 | <0.000010 | |
| | Molybdenum (Mo)-Dissolved (mg/L) | 0.00073 | | 0.00073 | 0.00034 | |
| | Nickel (Ni)-Dissolved (mg/L) | 0.0063 | | 0.0052 | <0.0010 DLA | |
| | Phosphorus (P)-Dissolved (mg/L) | <0.050 | | <0.25 DLM | <0.050 | |
| | Potassium (K)-Dissolved (mg/L) | 8.50 | | 8.40 | 2.65 | |
| | Selenium (Se)-Dissolved (mg/L) | 0.00027 | | 0.00034 | 0.00031 | |
| | Silicon (Si)-Dissolved (mg/L) | 6.38 | | 6.30 | 5.08 | |
| | Silver (Ag)-Dissolved (mg/L) | <0.000020 DLA | | 0.000023 | <0.000020 DLA | |
| | Sodium (Na)-Dissolved (mg/L) | 76.1 | | 78.0 | 8.90 | |
| | Strontium (Sr)-Dissolved (mg/L) | 1.09 | | 1.14 | 0.969 | |
| | Sulfur (S)-Dissolved (mg/L) | 408 | | 426 | 260 | |
| | Thallium (Tl)-Dissolved (mg/L) | 0.000036 | | 0.000037 | <0.000020 DLA | |
| | Tin (Sn)-Dissolved (mg/L) | <0.00020 DLA | | <0.00020 DLA | <0.00020 DLA | |
| | Titanium (Ti)-Dissolved (mg/L) | <0.020 DLA | | <0.020 DLA | <0.020 DLA | |
| | Uranium (U)-Dissolved (mg/L) | 0.00133 | | 0.00126 | 0.0131 | |
| | Vanadium (V)-Dissolved (mg/L) | 0.0026 | | <0.0020 DLA | <0.0020 DLA | |
| | Zinc (Zn)-Dissolved (mg/L) | 0.0187 | | 0.0151 | 0.0060 | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1367036-23 | L1367036-24 | L1367036-25 | L1367036-26 | L1367036-27 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 18-SEP-13 | 19-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | MP09-04 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-22 STANDARD PRESERVATION | MW09-22 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-22 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-16 STANDARD PRESERVATION |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Dissolved Metals** | Cobalt (Co)-Dissolved (mg/L) | 0.00036 | 0.0117 | | 0.0102 | 0.00013 |
| | Copper (Cu)-Dissolved (mg/L) | 0.00320 | 0.00151 | | 0.00107 | 0.00571 |
| | Iron (Fe)-Dissolved (mg/L) | <0.010 | 51.3 | | 42.8 | <0.010 |
| | Lead (Pb)-Dissolved (mg/L) | <0.000050 | 0.000428 | | 0.000089 | 0.00623 |
| | Lithium (Li)-Dissolved (mg/L) | <0.00050 | <0.00050 | | <0.00050 | 0.00840 |
| | Magnesium (Mg)-Dissolved (mg/L) | 99.0 | 28.6 | | 27.2 | 105 |
| | Manganese (Mn)-Dissolved (mg/L) | 0.00243 | 7.09 | | 7.72 | 0.0103 |
| | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | <0.000010 | | <0.000010 | <0.000010 |
| | Molybdenum (Mo)-Dissolved (mg/L) | 0.000358 | 0.000113 | | 0.000096 | 0.000108 |
| | Nickel (Ni)-Dissolved (mg/L) | 0.00059 | 0.00125 | | 0.00112 | 0.00279 |
| | Phosphorus (P)-Dissolved (mg/L) | <0.050 | <0.050 | | <0.25 DLM | <0.050 |
| | Potassium (K)-Dissolved (mg/L) | 2.60 | 3.53 | | 3.48 | 6.01 |
| | Selenium (Se)-Dissolved (mg/L) | 0.00023 | 0.00043 | | 0.00039 | <0.00010 |
| | Silicon (Si)-Dissolved (mg/L) | 5.02 | 4.90 | | 4.72 | 5.21 |
| | Silver (Ag)-Dissolved (mg/L) | <0.000010 | 0.000026 | | 0.000030 | 0.000026 |
| | Sodium (Na)-Dissolved (mg/L) | 9.11 | 39.1 | | 38.6 | 6.88 |
| | Strontium (Sr)-Dissolved (mg/L) | 0.979 | 0.700 | | 0.750 | 0.509 |
| | Sulfur (S)-Dissolved (mg/L) | 240 | 214 | | 217 | 241 |
| | Thallium (Tl)-Dissolved (mg/L) | <0.000010 | <0.000010 | | <0.000010 | 0.000250 |
| | Tin (Sn)-Dissolved (mg/L) | <0.00010 | <0.00010 | | <0.00010 | <0.00010 |
| | Titanium (Ti)-Dissolved (mg/L) | <0.010 | <0.010 | | <0.010 | <0.010 |
| | Uranium (U)-Dissolved (mg/L) | 0.0128 | 0.000366 | | 0.000244 | 0.00291 |
| | Vanadium (V)-Dissolved (mg/L) | <0.0010 | 0.0011 | | <0.0010 | <0.0010 |
| | Zinc (Zn)-Dissolved (mg/L) | 0.0073 | 0.0039 | | 0.0030 | 2.49 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1367036-28 | L1367036-29 | L1367036-30 | L1367036-31 | L1367036-32 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 19-SEP-13 | 19-SEP-13 | 19-SEP-13 | 19-SEP-13 | 19-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | MW09-16 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-16 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-18 STANDARD PRESERVATION | MW09-18 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-18 ALTERNATE PRESERVATION #3 (UNPRESERVED) |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Dissolved Metals** | Cobalt (Co)-Dissolved (mg/L) | | <0.00010 | <0.00020 DLA | | <0.00020 DLA |
| | Copper (Cu)-Dissolved (mg/L) | | 0.00413 | 0.00041 | | 0.00041 |
| | Iron (Fe)-Dissolved (mg/L) | | <0.010 | 0.038 | | 0.025 |
| | Lead (Pb)-Dissolved (mg/L) | | 0.00302 | <0.00010 DLA | | <0.00010 DLA |
| | Lithium (Li)-Dissolved (mg/L) | | 0.00808 | 0.0160 | | 0.0164 |
| | Magnesium (Mg)-Dissolved (mg/L) | | 113 | 237 | | 254 |
| | Manganese (Mn)-Dissolved (mg/L) | | 0.0116 | 0.480 | | 0.520 |
| | Mercury (Hg)-Dissolved (mg/L) | | <0.000010 | <0.000010 | | <0.000010 |
| | Molybdenum (Mo)-Dissolved (mg/L) | | 0.000163 | <0.00010 DLA | | <0.00010 DLA |
| | Nickel (Ni)-Dissolved (mg/L) | | 0.00272 | <0.0010 DLA | | 0.0011 |
| | Phosphorus (P)-Dissolved (mg/L) | | <0.050 | <0.050 | | <0.050 |
| | Potassium (K)-Dissolved (mg/L) | | 5.96 | 6.86 | | 6.94 |
| | Selenium (Se)-Dissolved (mg/L) | | 0.00011 | 0.00033 | | 0.00026 |
| | Silicon (Si)-Dissolved (mg/L) | | 5.29 | 4.76 | | 4.84 |
| | Silver (Ag)-Dissolved (mg/L) | | 0.000016 | <0.000020 DLA | | <0.000020 DLA |
| | Sodium (Na)-Dissolved (mg/L) | | 7.56 | 10.4 | | 10.8 |
| | Strontium (Sr)-Dissolved (mg/L) | | 0.466 | 1.05 | | 1.08 |
| | Sulfur (S)-Dissolved (mg/L) | | 227 | 458 | | 455 |
| | Thallium (Tl)-Dissolved (mg/L) | | 0.000267 | 0.000265 | | 0.000262 |
| | Tin (Sn)-Dissolved (mg/L) | | <0.00010 | <0.00020 DLA | | <0.00020 DLA |
| | Titanium (Ti)-Dissolved (mg/L) | | <0.010 | <0.020 DLA | | <0.020 DLA |
| | Uranium (U)-Dissolved (mg/L) | | 0.00284 | 0.00853 | | 0.00882 |
| | Vanadium (V)-Dissolved (mg/L) | | <0.0010 | <0.0020 DLA | | <0.0020 DLA |
| | Zinc (Zn)-Dissolved (mg/L) | | 2.69 | 0.0057 | | 0.0041 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1367036-33 | L1367036-34 | L1367036-35 | L1367036-36 | L1367036-37 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 19-SEP-13 | 19-SEP-13 | 19-SEP-13 | 19-SEP-13 | 19-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | MW09-17 STANDARD PRESERVATION | MW09-17 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-17 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MP09-10 STANDARD PRESERVATION | MP09-10 ALTERNATE PRESERVATION #1 (SCN WITH HN03) |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Dissolved Metals** | Cobalt (Co)-Dissolved (mg/L) | <0.00020 DLA | | <0.00020 DLA | 0.0322 | |
| | Copper (Cu)-Dissolved (mg/L) | 0.00070 | | 0.00095 | 0.345 | |
| | Iron (Fe)-Dissolved (mg/L) | <0.010 | | <0.010 | 0.327 | |
| | Lead (Pb)-Dissolved (mg/L) | <0.00010 DLA | | <0.00010 DLA | 0.00866 | |
| | Lithium (Li)-Dissolved (mg/L) | 0.0169 | | 0.0171 | <0.0010 DLA | |
| | Magnesium (Mg)-Dissolved (mg/L) | 267 | | 276 | 1.17 | |
| | Manganese (Mn)-Dissolved (mg/L) | 0.00052 | | 0.00039 | 0.0221 | |
| | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | | <0.000010 | 0.000030 | |
| | Molybdenum (Mo)-Dissolved (mg/L) | <0.00010 DLA | | <0.00010 DLA | 0.0136 | |
| | Nickel (Ni)-Dissolved (mg/L) | <0.0010 DLA | | <0.0010 DLA | 0.0201 | |
| | Phosphorus (P)-Dissolved (mg/L) | <0.050 | | <0.050 | 0.216 | |
| | Potassium (K)-Dissolved (mg/L) | 6.95 | | 7.27 | 8.80 | |
| | Selenium (Se)-Dissolved (mg/L) | <0.00020 DLA | | <0.00020 DLA | 0.00184 | |
| | Silicon (Si)-Dissolved (mg/L) | 4.75 | | 4.97 | 12.7 | |
| | Silver (Ag)-Dissolved (mg/L) | <0.000020 DLA | | <0.000020 DLA | 0.000963 | |
| | Sodium (Na)-Dissolved (mg/L) | 11.2 | | 11.7 | 23.9 | |
| | Strontium (Sr)-Dissolved (mg/L) | 1.12 | | 1.14 | 0.195 | |
| | Sulfur (S)-Dissolved (mg/L) | 493 | | 484 | 62.6 | |
| | Thallium (Tl)-Dissolved (mg/L) | 0.000157 | | 0.000165 | 0.000089 | |
| | Tin (Sn)-Dissolved (mg/L) | <0.00020 DLA | | <0.00020 DLA | <0.00020 DLA | |
| | Titanium (Ti)-Dissolved (mg/L) | <0.020 DLA | | <0.020 DLA | <0.020 DLA | |
| | Uranium (U)-Dissolved (mg/L) | 0.00902 | | 0.00910 | 0.00116 | |
| | Vanadium (V)-Dissolved (mg/L) | <0.0020 DLA | | <0.0020 DLA | <0.0020 DLA | |
| | Zinc (Zn)-Dissolved (mg/L) | 0.0021 | | 0.0033 | 0.0048 | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1367036-38 Water 19-SEP-13 12:00 MP09-10 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1367036-39 Water 19-SEP-13 12:00 MP09-11 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1367036-40 Water 19-SEP-13 12:00 GLL07-02 STANDARD PRESERVATION | L1367036-41 Water 19-SEP-13 12:00 GLL07-02 ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | L1367036-42 Water 19-SEP-13 12:00 GLL07-02 ALTERNATE PRESERVATION #3 (UNPRESERVED) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Dissolved Metals** | Cobalt (Co)-Dissolved (mg/L) | 0.0362 | 0.00402 | <0.00010 | | <0.00010 |
| | Copper (Cu)-Dissolved (mg/L) | 0.529 | 0.00155 | 0.00331 | | 0.00287 |
| | Iron (Fe)-Dissolved (mg/L) | 0.384 | 5.72 | 0.028 | | 0.022 |
| | Lead (Pb)-Dissolved (mg/L) | 0.00249 | 0.00147 | 0.000217 | | 0.000122 |
| | Lithium (Li)-Dissolved (mg/L) | <0.0010 DLA | 0.00379 | <0.00050 | | 0.00051 |
| | Magnesium (Mg)-Dissolved (mg/L) | 1.02 | 80.7 | 12.0 | | 11.4 |
| | Manganese (Mn)-Dissolved (mg/L) | 0.0153 | 6.54 | 0.00201 | | 0.00184 |
| | Mercury (Hg)-Dissolved (mg/L) | 0.000022 | <0.000010 | <0.000010 | | <0.000010 |
| | Molybdenum (Mo)-Dissolved (mg/L) | 0.0142 | 0.0125 | 0.000101 | | 0.000095 |
| | Nickel (Ni)-Dissolved (mg/L) | 0.0221 | 0.0179 | 0.00073 | | 0.00064 |
| | Phosphorus (P)-Dissolved (mg/L) | 0.214 | <0.050 | <0.050 | | <0.050 |
| | Potassium (K)-Dissolved (mg/L) | 8.18 | 7.81 | 0.63 | | 0.57 |
| | Selenium (Se)-Dissolved (mg/L) | 0.00193 | 0.00064 | <0.00010 | | <0.00010 |
| | Silicon (Si)-Dissolved (mg/L) | 12.6 | 10.9 | 6.22 | | 6.35 |
| | Silver (Ag)-Dissolved (mg/L) | 0.00140 | 0.000014 | 0.000023 | | 0.000020 |
| | Sodium (Na)-Dissolved (mg/L) | 25.0 | 23.9 | 4.02 | | 4.08 |
| | Strontium (Sr)-Dissolved (mg/L) | 0.201 | 0.881 | 0.293 | | 0.298 |
| | Sulfur (S)-Dissolved (mg/L) | 52.0 | 9.50 | 32.5 | | 30.9 |
| | Thallium (Tl)-Dissolved (mg/L) | 0.000093 | 0.000026 | <0.000010 | | <0.000010 |
| | Tin (Sn)-Dissolved (mg/L) | <0.00020 DLA | <0.00010 | <0.00010 | | <0.00010 |
| | Titanium (Ti)-Dissolved (mg/L) | <0.020 DLA | <0.010 | <0.010 | | <0.010 |
| | Uranium (U)-Dissolved (mg/L) | 0.00115 | 0.00129 | 0.000275 | | 0.000228 |
| | Vanadium (V)-Dissolved (mg/L) | <0.0020 DLA | 0.0046 | <0.0010 | | <0.0010 |
| | Zinc (Zn)-Dissolved (mg/L) | <0.0020 DLA | 0.0203 | 0.0205 | | 0.0187 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1367036-43<br>Water<br>19-SEP-13<br>12:00<br>MW09-23<br>STANDARD<br>PRESERVATION | L1367036-44<br>Water<br>19-SEP-13<br>12:00<br>MW09-23<br>ALTERNATE<br>PRESERVATION<br>#1 (SCN WITH<br>HN03) | L1367036-45<br>Water<br>19-SEP-13<br>12:00<br>MW09-23<br>ALTERNATE<br>PRESERVATION<br>#3<br>(UNPRESERVED) | L1367036-46<br>Water<br>19-SEP-13<br>12:00<br>MW09-21<br>STANDARD<br>PRESERVATION | L1367036-47<br>Water<br>19-SEP-13<br>12:00<br>MW09-21<br>ALTERNATE<br>PRESERVATION<br>#1 (SCN WITH<br>HN03) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Dissolved Metals** | Cobalt (Co)-Dissolved (mg/L) | 0.0199 | | 0.0205 | 0.0135 | |
| | Copper (Cu)-Dissolved (mg/L) | <0.00040 DLA | | 0.00063 | 0.00040 | |
| | Iron (Fe)-Dissolved (mg/L) | 18.8 | | 17.8 | 52.1 | |
| | Lead (Pb)-Dissolved (mg/L) | <0.00010 DLA | | <0.00010 DLA | 0.000071 | |
| | Lithium (Li)-Dissolved (mg/L) | <0.0010 DLA | | <0.0010 DLA | 0.00064 | |
| | Magnesium (Mg)-Dissolved (mg/L) | 99.7 | | 93.0 | 38.4 | |
| | Manganese (Mn)-Dissolved (mg/L) | 5.65 | | 5.81 | 4.36 | |
| | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | | <0.000010 | <0.000010 | |
| | Molybdenum (Mo)-Dissolved (mg/L) | 0.00338 | | 0.00335 | 0.000304 | |
| | Nickel (Ni)-Dissolved (mg/L) | 0.0022 | | 0.0020 | 0.00186 | |
| | Phosphorus (P)-Dissolved (mg/L) | <0.050 | | <0.25 DLM | <0.050 | |
| | Potassium (K)-Dissolved (mg/L) | 9.43 | | 9.07 | 10.2 | |
| | Selenium (Se)-Dissolved (mg/L) | <0.00020 DLA | | <0.00020 DLA | 0.00036 | |
| | Silicon (Si)-Dissolved (mg/L) | 5.57 | | 5.35 | 5.40 | |
| | Silver (Ag)-Dissolved (mg/L) | <0.000020 DLA | | <0.000020 DLA | <0.000010 | |
| | Sodium (Na)-Dissolved (mg/L) | 21.6 | | 21.9 | 10.9 | |
| | Strontium (Sr)-Dissolved (mg/L) | 1.00 | | 1.00 | 0.659 | |
| | Sulfur (S)-Dissolved (mg/L) | 428 | | 427 | 162 | |
| | Thallium (Tl)-Dissolved (mg/L) | <0.000020 DLA | | <0.000020 DLA | 0.000011 | |
| | Tin (Sn)-Dissolved (mg/L) | <0.00020 DLA | | <0.00020 DLA | <0.00010 | |
| | Titanium (Ti)-Dissolved (mg/L) | <0.020 DLA | | <0.020 DLA | <0.010 | |
| | Uranium (U)-Dissolved (mg/L) | 0.00173 | | 0.00173 | 0.000562 | |
| | Vanadium (V)-Dissolved (mg/L) | <0.0020 DLA | | <0.0020 DLA | 0.0073 | |
| | Zinc (Zn)-Dissolved (mg/L) | 0.0873 | | 0.0840 | 0.0040 | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1367036-48 | L1367036-49 | L1367036-50 | L1367036-51 | L1367036-52 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 19-SEP-13 | 19-SEP-13 | 19-SEP-13 | 19-SEP-13 | 19-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | MW09-21 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-19 STANDARD PRESERVATION | MW09-19 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-19 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MW09-19 ALTERNATE PRESERVATION #3 (UNPRESERVED) |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Dissolved Metals** | Cobalt (Co)-Dissolved (mg/L) | 0.0135 | 0.00206 | | | 0.00204 |
| | Copper (Cu)-Dissolved (mg/L) | 0.00043 | <0.00020 | | | <0.00040 DLA |
| | Iron (Fe)-Dissolved (mg/L) | 50.9 | 14.1 | | | 14.4 |
| | Lead (Pb)-Dissolved (mg/L) | 0.000120 | <0.000050 | | | <0.00010 DLA |
| | Lithium (Li)-Dissolved (mg/L) | <0.00050 | 0.00944 | | | 0.0094 |
| | Magnesium (Mg)-Dissolved (mg/L) | 38.2 | 157 | | | 159 |
| | Manganese (Mn)-Dissolved (mg/L) | 4.77 | 2.97 | | | 2.99 |
| | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | <0.000010 | | | <0.000010 |
| | Molybdenum (Mo)-Dissolved (mg/L) | 0.000338 | 0.000127 | | | 0.00014 |
| | Nickel (Ni)-Dissolved (mg/L) | 0.00190 | 0.00145 | | | 0.0021 |
| | Phosphorus (P)-Dissolved (mg/L) | <0.25 DLM | 0.228 | | | 0.26 |
| | Potassium (K)-Dissolved (mg/L) | 10.6 | 6.69 | | | 6.41 |
| | Selenium (Se)-Dissolved (mg/L) | 0.00039 | 0.00034 | | | <0.00020 DLA |
| | Silicon (Si)-Dissolved (mg/L) | 5.47 | 8.60 | | | 8.56 |
| | Silver (Ag)-Dissolved (mg/L) | <0.000010 | <0.000010 | | | <0.000020 DLA |
| | Sodium (Na)-Dissolved (mg/L) | 10.6 | 12.8 | | | 12.9 |
| | Strontium (Sr)-Dissolved (mg/L) | 0.689 | 0.885 | | | 0.935 |
| | Sulfur (S)-Dissolved (mg/L) | 171 | 294 | | | 312 |
| | Thallium (Tl)-Dissolved (mg/L) | 0.000014 | <0.000010 | | | <0.000020 DLA |
| | Tin (Sn)-Dissolved (mg/L) | <0.00010 | <0.00010 | | | <0.00020 DLA |
| | Titanium (Ti)-Dissolved (mg/L) | <0.010 | <0.010 | | | <0.020 DLA |
| | Uranium (U)-Dissolved (mg/L) | 0.000633 | 0.000976 | | | 0.000999 |
| | Vanadium (V)-Dissolved (mg/L) | 0.0053 | 0.0010 | | | <0.0020 DLA |
| | Zinc (Zn)-Dissolved (mg/L) | 0.0034 | 0.0023 | | | <0.0020 DLA |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1367036-53 | L1367036-54 | L1367036-55 | L1367036-56 | L1367036-57 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 19-SEP-13 | 19-SEP-13 | 19-SEP-13 | 19-SEP-13 | 20-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | GLL07-03 STANDARD PRESERVATION | GLL07-03 ALTERNATE PRESERVATION #1 (SCN WITH HNO3) | GLL07-03 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | GLL07-03 ALTERNATE PRESERVATION #3 (UNPRESERVED) | W1410383 BH03 STANDARD PRESERVATION |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Dissolved Metals** | Cobalt (Co)-Dissolved (mg/L) | 0.00685 | | | 0.00695 | 0.00159 |
| | Copper (Cu)-Dissolved (mg/L) | 0.00030 | | | <0.00020 | 0.00048 |
| | Iron (Fe)-Dissolved (mg/L) | 18.9 | | | 3.75 | 82.7 |
| | Lead (Pb)-Dissolved (mg/L) | 0.000053 | | | <0.000050 | 0.000138 |
| | Lithium (Li)-Dissolved (mg/L) | 0.0173 | | | 0.0158 | <0.00050 |
| | Magnesium (Mg)-Dissolved (mg/L) | 41.8 | | | 44.2 | 31.1 |
| | Manganese (Mn)-Dissolved (mg/L) | 4.08 | | | 4.12 | 3.53 |
| | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | | | <0.000010 | <0.000010 |
| | Molybdenum (Mo)-Dissolved (mg/L) | 0.000368 | | | <0.000050 | 0.000553 |
| | Nickel (Ni)-Dissolved (mg/L) | 0.0160 | | | 0.0161 | 0.00139 |
| | Phosphorus (P)-Dissolved (mg/L) | <0.050 | | | <0.050 | 0.124 |
| | Potassium (K)-Dissolved (mg/L) | 1.80 | | | 1.80 | 2.40 |
| | Selenium (Se)-Dissolved (mg/L) | <0.00010 | | | <0.00010 | 0.00017 |
| | Silicon (Si)-Dissolved (mg/L) | 3.04 | | | 2.85 | 10.3 |
| | Silver (Ag)-Dissolved (mg/L) | <0.000010 | | | <0.000010 | <0.000010 |
| | Sodium (Na)-Dissolved (mg/L) | 6.33 | | | 6.45 | 11.4 |
| | Strontium (Sr)-Dissolved (mg/L) | 0.239 | | | 0.223 | 0.388 |
| | Sulfur (S)-Dissolved (mg/L) | 234 | | | 224 | 64.2 |
| | Thallium (Tl)-Dissolved (mg/L) | 0.000030 | | | 0.000029 | <0.000010 |
| | Tin (Sn)-Dissolved (mg/L) | <0.00010 | | | <0.00010 | <0.00010 |
| | Titanium (Ti)-Dissolved (mg/L) | <0.010 | | | <0.010 | <0.010 |
| | Uranium (U)-Dissolved (mg/L) | 0.000096 | | | 0.000013 | 0.000597 |
| | Vanadium (V)-Dissolved (mg/L) | <0.0010 | | | <0.0010 | 0.0025 |
| | Zinc (Zn)-Dissolved (mg/L) | 6.36 | | | 6.19 | 0.0089 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1367036-58 Water 20-SEP-13 12:00 W1410383 BH03 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1367036-59 Water 20-SEP-13 12:00 W1410383 BH03 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1367036-60 Water 19-SEP-13 12:00 FIELP DUP D STANDARD PRESERVATION | L1367036-61 Water 19-SEP-13 12:00 FIELP DUP D ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1367036-62 Water 19-SEP-13 12:00 FIELP DUP D ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Dissolved Metals** | Cobalt (Co)-Dissolved (mg/L) | | 0.00175 | 0.00183 | | |
| | Copper (Cu)-Dissolved (mg/L) | | 0.00028 | <0.00020 | | |
| | Iron (Fe)-Dissolved (mg/L) | | 72.8 | 14.7 | | |
| | Lead (Pb)-Dissolved (mg/L) | | 0.000058 | 0.000052 | | |
| | Lithium (Li)-Dissolved (mg/L) | | 0.00072 | 0.0101 | | |
| | Magnesium (Mg)-Dissolved (mg/L) | | 33.0 | 161 | | |
| | Manganese (Mn)-Dissolved (mg/L) | | 4.68 | 2.87 | | |
| | Mercury (Hg)-Dissolved (mg/L) | | <0.000010 | <0.000010 | | |
| | Molybdenum (Mo)-Dissolved (mg/L) | | 0.000552 | 0.000123 | | |
| | Nickel (Ni)-Dissolved (mg/L) | | 0.00146 | 0.00141 | | |
| | Phosphorus (P)-Dissolved (mg/L) | | <0.25 DLM | 0.253 | | |
| | Potassium (K)-Dissolved (mg/L) | | 2.70 | 6.84 | | |
| | Selenium (Se)-Dissolved (mg/L) | | 0.00023 | 0.00031 | | |
| | Silicon (Si)-Dissolved (mg/L) | | 10.6 | 8.51 | | |
| | Silver (Ag)-Dissolved (mg/L) | | <0.000010 | <0.000010 | | |
| | Sodium (Na)-Dissolved (mg/L) | | 14.4 | 12.4 | | |
| | Strontium (Sr)-Dissolved (mg/L) | | 0.453 | 0.901 | | |
| | Sulfur (S)-Dissolved (mg/L) | | 65.6 | 310 | | |
| | Thallium (Tl)-Dissolved (mg/L) | | <0.000010 | <0.000010 | | |
| | Tin (Sn)-Dissolved (mg/L) | | <0.00010 | <0.00010 | | |
| | Titanium (Ti)-Dissolved (mg/L) | | <0.010 | <0.010 | | |
| | Uranium (U)-Dissolved (mg/L) | | 0.000782 | 0.000870 | | |
| | Vanadium (V)-Dissolved (mg/L) | | 0.0015 | <0.0010 | | |
| | Zinc (Zn)-Dissolved (mg/L) | | 0.0029 | 0.0027 | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1367036-63 | L1367036-64 | | | |
|---|---|---|---|---|---|---|
| | Description | Water | Water | | | |
| | Sampled Date | 19-SEP-13 | | | | |
| | Sampled Time | 12:00 | | | | |
| | Client ID | FIELP DUP D ALTERNATE PRESERVATION #3 (UNPRESERVED) | MP09-10 ANIONS | | | |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Dissolved Metals** | Cobalt (Co)-Dissolved (mg/L) | 0.00188 | | | | |
| | Copper (Cu)-Dissolved (mg/L) | <0.00020 | | | | |
| | Iron (Fe)-Dissolved (mg/L) | 11.3 | | | | |
| | Lead (Pb)-Dissolved (mg/L) | <0.000050 | | | | |
| | Lithium (Li)-Dissolved (mg/L) | 0.0104 | | | | |
| | Magnesium (Mg)-Dissolved (mg/L) | 167 | | | | |
| | Manganese (Mn)-Dissolved (mg/L) | 3.01 | | | | |
| | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | | | | |
| | Molybdenum (Mo)-Dissolved (mg/L) | 0.000141 | | | | |
| | Nickel (Ni)-Dissolved (mg/L) | 0.00140 | | | | |
| | Phosphorus (P)-Dissolved (mg/L) | 0.183 | | | | |
| | Potassium (K)-Dissolved (mg/L) | 7.09 | | | | |
| | Selenium (Se)-Dissolved (mg/L) | 0.00022 | | | | |
| | Silicon (Si)-Dissolved (mg/L) | 8.53 | | | | |
| | Silver (Ag)-Dissolved (mg/L) | <0.000010 | | | | |
| | Sodium (Na)-Dissolved (mg/L) | 13.0 | | | | |
| | Strontium (Sr)-Dissolved (mg/L) | 0.914 | | | | |
| | Sulfur (S)-Dissolved (mg/L) | 300 | | | | |
| | Thallium (Tl)-Dissolved (mg/L) | <0.000010 | | | | |
| | Tin (Sn)-Dissolved (mg/L) | <0.00010 | | | | |
| | Titanium (Ti)-Dissolved (mg/L) | <0.010 | | | | |
| | Uranium (U)-Dissolved (mg/L) | 0.000872 | | | | |
| | Vanadium (V)-Dissolved (mg/L) | <0.0010 | | | | |
| | Zinc (Zn)-Dissolved (mg/L) | 0.0015 | | | | |

* 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)-Dissolved | DLA | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Duplicate | Beryllium (Be)-Dissolved | DLA | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Duplicate | Bismuth (Bi)-Dissolved | DLA | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Duplicate | Chromium (Cr)-Dissolved | DLA | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Duplicate | Cobalt (Co)-Dissolved | DLA | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Duplicate | Lead (Pb)-Dissolved | DLA | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Duplicate | Silver (Ag)-Dissolved | DLA | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Duplicate | Tin (Sn)-Dissolved | DLA | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Duplicate | Titanium (Ti)-Dissolved | DLA | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Duplicate | Chloride (Cl) | DLM | L1367036-64 |
| Matrix Spike | Fluoride (F) | MS-B | L1367036-1, -12, -16, -20, -24, -27, -30, -33, -40, -43, -46, -49, -5, -53, -57, -60, -8 |
| Matrix Spike | Total Organic Carbon | MS-B | L1367036-16, -43, -53, -57, -60 |
| Matrix Spike | Sodium (Na)-Dissolved | MS-B | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Matrix Spike | Barium (Ba)-Dissolved | MS-B | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Matrix Spike | Sodium (Na)-Dissolved | MS-B | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Matrix Spike | Barium (Ba)-Dissolved | MS-B | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Matrix Spike | Barium (Ba)-Dissolved | MS-B | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Matrix Spike | Manganese (Mn)-Dissolved | MS-B | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Matrix Spike | Sodium (Na)-Dissolved | MS-B | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Matrix Spike | Aluminum (Al)-Dissolved | MS-B | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, |

# Reference Information

| | Parameter | Qualifier | Applies to Sample Number(s) |
|---|---|---|---|
| | | | -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Matrix Spike | Barium (Ba)-Dissolved | MS-B | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Matrix Spike | Cadmium (Cd)-Dissolved | MS-B | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Matrix Spike | Copper (Cu)-Dissolved | MS-B | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Matrix Spike | Manganese (Mn)-Dissolved | MS-B | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Matrix Spike | Nickel (Ni)-Dissolved | MS-B | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1367036-1, -11, -12, -15, -16, -19, -20, -23, -24, -26, -27, -29, -30, -32, -33, -35, -36, -38, -39, -4, -40, -42, -43, -45, -46, -48, -49, -5, -52, -53, -56, -57, -59, -60, -63, -7, -8 |
| Matrix Spike | Total Kjeldahl Nitrogen | MSTN | L1367036-5 |

**Qualifiers for Individual Parameters Listed:**

| Qualifier | Description |
|---|---|
| DLA | Detection Limit Adjusted For required dilution |
| DLM | Detection Limit Adjusted due to sample matrix effects. |
| MS-B | Matrix Spike recovery could not be accurately calculated due to high analyte background in sample. |
| MSTN | TKN Matrix Spike recovery was low due to interference from high nitrate, which causes negative bias on TKN. |
| TKNI | TKN result is likely biased low due to Nitrate interference. Nitrate-N is > 10x TKN. |

## Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** |
|---|---|---|---|
| **ALK-COL-VA** | Water | Alkalinity by Colourimetric (Automated) | EPA 310.2 |

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

| | | | |
|---|---|---|---|
| **ALK-PCT-VA** | Water | Alkalinity by Auto. Titration | APHA 2320 "Alkalinity" |

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

| | | | |
|---|---|---|---|
| **ALK-PCT-VA** | Water | Alkalinity by Auto. Titration | APHA 2320 Alkalinity |

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

| | | | |
|---|---|---|---|
| **ANIONS-CL-IC-VA** | Water | Chloride by Ion Chromatography | APHA 4110 B. |

This 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-CL-IC-WR** | Water | Chloride by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

| | | | |
|---|---|---|---|
| **ANIONS-F-IC-WR** | Water | Fluoride by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

| | | | |
|---|---|---|---|
| **ANIONS-NO2-IC-WR** | Water | Nitrite Nitrogen by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

| | | | |
|---|---|---|---|
| **ANIONS-NO3-IC-WR** | Water | Nitrate Nitrogen by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

# Reference Information

| | | | |
|---|---|---|---|
| **ANIONS-SO4-IC-VA** | Water | Sulfate by Ion Chromatography | APHA 4110 B. |

This 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-SO4-IC-WR** | Water | Sulphate by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

| | | | |
|---|---|---|---|
| **CARBONS-TIC-VA** | Water | Total inorganic carbon by CO2 purge | APHA 5310 TOTAL ORGANIC CARBON (TOC) |

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

| | | | |
|---|---|---|---|
| **CARBONS-TOC-VA** | Water | Total organic carbon by combustion | APHA 5310 TOTAL ORGANIC CARBON (TOC) |

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

| | | | |
|---|---|---|---|
| **CN-FREE-CFA-VA** | Water | Free Cyanide in water by CFA | ASTM 7237 |

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

| | | | |
|---|---|---|---|
| **CN-SCN-VA** | Water | Thiocyanate by Colour | APHA 4500-CN CYANIDE |

This analysis is carried out using procedures adapted from APHA Method 4500-CN- M "Thiocyanate" Thiocyanate is determined by the ferric nitrate colourimetric method.

| | | | |
|---|---|---|---|
| **CN-T-CFA-VA** | Water | Total Cyanide in water by CFA | ISO 14403:2002 |

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

| | | | |
|---|---|---|---|
| **CN-WAD-CFA-VA** | Water | Weak Acid Diss. Cyanide in water by CFA | APHA 4500-CN CYANIDE |

This analysis is carried out using procedures adapted from APHA Method 4500-CN I. "Weak Acid Dissociable Cyanide". Weak Acid Dissociable (WAD) cyanide is determined by in-line sample distillation with final determination by colourimetric analysis.

| | | | |
|---|---|---|---|
| **EC-MAN-WR** | Water | Conductivity by Meter | APHA 2510 (B) |

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using an electrode.

| | | | |
|---|---|---|---|
| **EC-PCT-VA** | Water | Conductivity (Automated) | APHA 2510 Auto. Conduc. |

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

| | | | |
|---|---|---|---|
| **HARDNESS-CALC-VA** | Water | Hardness | APHA 2340B |

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

| | | | |
|---|---|---|---|
| **HG-DIS-LOW-CVAFS-VA** | Water | Dissolved Mercury in Water by CVAFS(Low) | EPA SW-846 3005A & EPA 245.7 |

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

| | | | |
|---|---|---|---|
| **IONBALANCE-VA** | Water | Ion Balance Calculation | APHA 1030E |

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

| | | | |
|---|---|---|---|
| **MET-D-CCMS-VA** | Water | Dissolved Metals in Water by CRC ICPMS | APHA 3030 B&E / EPA SW-846 6020A |

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

| | | | |
|---|---|---|---|
| **MET-DIS-LOW-ICP-VA** | Water | Dissolved Metals in Water by ICPOES | EPA 3005A/6010B |

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United

# Reference Information

States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

**NH3-F-VA** Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, 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.

**PH-MAN-WR** Water pH by Meter APHA 4500-H (B)

"This analysis is carried out using procedures adapted from APHA Method 4500-H ""pH Value"". The pH is determined in the laboratory using a pH electrode."

**PH-PCT-VA** Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

**PH-PCT-VA** Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

**S-DIS-ICP-VA** Water Dissolved Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

**S2-T-COL-VA** Water Total Sulphide by Colorimetric APHA 4500-S2 Sulphide

This analysis is carried out using procedures adapted from APHA Method 4500-S2 "Sulphide". Sulphide is determined using the methlyene blue colourimetric method.

**TKN-F-VA** Water TKN in Water by Fluorescence APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

** 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 |
|---|---|
| WR | ALS ENVIRONMENTAL - WHITEHORSE, YUKON, CANADA |
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |

**Chain of Custody Numbers:**

1 2 3 4

# Reference Information

**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 wwt - 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.*

# Quality Control Report



Client: AMEC EARTH & ENVIRONMENTAL
5681 - 70 Street
Edmonton AB T6B 3P6
Contact: Leslie Hardy

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ALK-COL-VA** | **Water** | | | | | | | |
| **Batch R2714915** | | | | | | | | |
| **WG1766067-2 CRM** | | **VA-ALKL-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 94.1 | | % | | 85-115 | 11-OCT-13 |
| **WG1766067-5 CRM** | | **VA-ALKM-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 101.3 | | % | | 85-115 | 11-OCT-13 |
| **WG1766067-8 CRM** | | **VA-ALKH-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 99.6 | | % | | 85-115 | 11-OCT-13 |
| **WG1766067-1 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <2.0 | | mg/L | | 2 | 11-OCT-13 |
| **WG1766067-4 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <2.0 | | mg/L | | 2 | 11-OCT-13 |
| **WG1766067-7 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <2.0 | | mg/L | | 2 | 11-OCT-13 |
| **ALK-PCT-VA** | **Water** | | | | | | | |
| **Batch R2702341** | | | | | | | | |
| **WG1756099-10 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 101.2 | | % | | 85-115 | 27-SEP-13 |
| **WG1756099-11 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 102.8 | | % | | 85-115 | 27-SEP-13 |
| **WG1756099-12 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 102.5 | | % | | 85-115 | 27-SEP-13 |
| **WG1756099-13 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 99.2 | | % | | 85-115 | 27-SEP-13 |
| **WG1756099-14 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 105.1 | | % | | 85-115 | 27-SEP-13 |
| **WG1756099-15 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 102.6 | | % | | 85-115 | 27-SEP-13 |
| **WG1756099-16 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 103.2 | | % | | 85-115 | 27-SEP-13 |
| **WG1756099-9 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 97.2 | | % | | 85-115 | 27-SEP-13 |
| **WG1756099-33 DUP** | | **L1367036-33** | | | | | | |
| Alkalinity, Total (as CaCO3) | | 503 | 502 | | mg/L | 0.2 | 20 | 27-SEP-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | 503 | 502 | | mg/L | 0.2 | 20 | 27-SEP-13 |
| Alkalinity, Carbonate (as CaCO3) | | <1.0 | <1.0 | RPD-NA | mg/L | N/A | 25 | 27-SEP-13 |
| Alkalinity, Hydroxide (as CaCO3) | | <1.0 | <1.0 | RPD-NA | mg/L | N/A | 20 | 27-SEP-13 |
| **WG1756099-1 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ALK-PCT-VA** | **Water** | | | | | | | |
| **Batch R2702341** | | | | | | | | |
| **WG1756099-1 MB** | | | | | | | | |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| **WG1756099-2 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| **WG1756099-3 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| **WG1756099-4 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| **WG1756099-5 MB** | | | | | | | | |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| **WG1756099-6 MB** | | | | | | | | |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| **WG1756099-7 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| **WG1756099-8 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 27-SEP-13 |
| **ANIONS-CL-IC-VA** | **Water** | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ANIONS-CL-IC-VA** | **Water** | | | | | | | |
| **Batch R2716591** | | | | | | | | |
| **WG1766282-2 LCS** | | | | | | | | |
| Chloride (Cl) | | | 101.5 | | % | | 90-110 | 11-OCT-13 |
| **WG1766282-21 LCS** | | | | | | | | |
| Chloride (Cl) | | | 101.0 | | % | | 90-110 | 11-OCT-13 |
| **WG1766282-1 MB** | | | | | | | | |
| Chloride (Cl) | | | <0.50 | | mg/L | | 0.5 | 11-OCT-13 |
| **WG1766282-10 MB** | | | | | | | | |
| Chloride (Cl) | | | <0.50 | | mg/L | | 0.5 | 11-OCT-13 |
| **WG1766282-13 MB** | | | | | | | | |
| Chloride (Cl) | | | <0.50 | | mg/L | | 0.5 | 11-OCT-13 |
| **WG1766282-16 MB** | | | | | | | | |
| Chloride (Cl) | | | <0.50 | | mg/L | | 0.5 | 11-OCT-13 |
| **WG1766282-19 MB** | | | | | | | | |
| Chloride (Cl) | | | <0.50 | | mg/L | | 0.5 | 11-OCT-13 |
| **WG1766282-4 MB** | | | | | | | | |
| Chloride (Cl) | | | <0.50 | | mg/L | | 0.5 | 11-OCT-13 |
| **WG1766282-7 MB** | | | | | | | | |
| Chloride (Cl) | | | <0.50 | | mg/L | | 0.5 | 11-OCT-13 |
| **WG1766282-14 MS** | | **L1376886-11** | | | | | | |
| Chloride (Cl) | | | 99.8 | | % | | 75-125 | 11-OCT-13 |
| **WG1766282-17 MS** | | **L1376954-11** | | | | | | |
| Chloride (Cl) | | | 101.9 | | % | | 75-125 | 11-OCT-13 |
| **WG1766282-20 MS** | | **L1376954-13** | | | | | | |
| Chloride (Cl) | | | 100.2 | | % | | 75-125 | 11-OCT-13 |
| **ANIONS-CL-IC-WR** | **Water** | | | | | | | |
| **Batch R2700762** | | | | | | | | |
| **WG1753763-3 DUP** | | **L1367036-1** | | | | | | |
| Chloride (Cl) | | <0.50 | <0.50 | RPD-NA | mg/L | N/A | 20 | 23-SEP-13 |
| **WG1753763-2 LCS** | | | | | | | | |
| Chloride (Cl) | | | 101.4 | | % | | 85-115 | 23-SEP-13 |
| **WG1753763-6 LCS** | | | | | | | | |
| Chloride (Cl) | | | 101.1 | | % | | 85-115 | 23-SEP-13 |
| **WG1753763-1 MB** | | | | | | | | |
| Chloride (Cl) | | | <0.50 | | mg/L | | 0.5 | 23-SEP-13 |
| **WG1753763-5 MB** | | | | | | | | |
| Chloride (Cl) | | | <0.50 | | mg/L | | 0.5 | 23-SEP-13 |
| **WG1753763-4 MS** | | **L1367036-1** | | | | | | |
| Chloride (Cl) | | | 102.3 | | % | | 75-125 | 23-SEP-13 |
| **WG1753763-8 MS** | | **L1367057-4** | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ANIONS-CL-IC-WR** | **Water** | | | | | | | |
| **Batch R2700762** | | | | | | | | |
| **WG1753763-8 MS** | | **L1367057-4** | | | | | | |
| Chloride (Cl) | | | 97.1 | | % | | 75-125 | 23-SEP-13 |
| **ANIONS-F-IC-WR** | **Water** | | | | | | | |
| **Batch R2700762** | | | | | | | | |
| **WG1753763-3 DUP** | | **L1367036-1** | | | | | | |
| Fluoride (F) | | 0.170 | 0.167 | | mg/L | 1.5 | 20 | 23-SEP-13 |
| **WG1753763-2 LCS** | | | | | | | | |
| Fluoride (F) | | | 102.3 | | % | | 85-115 | 23-SEP-13 |
| **WG1753763-6 LCS** | | | | | | | | |
| Fluoride (F) | | | 102.2 | | % | | 85-115 | 23-SEP-13 |
| **WG1753763-1 MB** | | | | | | | | |
| Fluoride (F) | | | <0.020 | | mg/L | | 0.02 | 23-SEP-13 |
| **WG1753763-5 MB** | | | | | | | | |
| Fluoride (F) | | | <0.020 | | mg/L | | 0.02 | 23-SEP-13 |
| **WG1753763-4 MS** | | **L1367036-1** | | | | | | |
| Fluoride (F) | | | 107.6 | | % | | 75-125 | 23-SEP-13 |
| **WG1753763-8 MS** | | **L1367057-4** | | | | | | |
| Fluoride (F) | | | N/A | MS-B | % | | - | 23-SEP-13 |
| **ANIONS-NO2-IC-WR** | **Water** | | | | | | | |
| **Batch R2700762** | | | | | | | | |
| **WG1753763-3 DUP** | | **L1367036-1** | | | | | | |
| Nitrite (as N) | | 0.0028 | 0.0029 | | mg/L | 6.6 | 20 | 23-SEP-13 |
| **WG1753763-2 LCS** | | | | | | | | |
| Nitrite (as N) | | | 102.2 | | % | | 85-115 | 23-SEP-13 |
| **WG1753763-6 LCS** | | | | | | | | |
| Nitrite (as N) | | | 102.7 | | % | | 85-115 | 23-SEP-13 |
| **WG1753763-1 MB** | | | | | | | | |
| Nitrite (as N) | | | <0.0010 | | mg/L | | 0.001 | 23-SEP-13 |
| **WG1753763-5 MB** | | | | | | | | |
| Nitrite (as N) | | | <0.0010 | | mg/L | | 0.001 | 23-SEP-13 |
| **WG1753763-4 MS** | | **L1367036-1** | | | | | | |
| Nitrite (as N) | | | 106.8 | | % | | 75-125 | 23-SEP-13 |
| **WG1753763-8 MS** | | **L1367057-4** | | | | | | |
| Nitrite (as N) | | | 101.3 | | % | | 75-125 | 23-SEP-13 |
| **ANIONS-NO3-IC-WR** | **Water** | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ANIONS-NO3-IC-WR** | **Water** | | | | | | | |
| **Batch R2700762** | | | | | | | | |
| **WG1753763-3 DUP** | | **L1367036-1** | | | | | | |
| Nitrate (as N) | | 0.0138 | 0.0135 | | mg/L | 1.9 | 20 | 23-SEP-13 |
| **WG1753763-2 LCS** | | | | | | | | |
| Nitrate (as N) | | | 101.7 | | % | | 85-115 | 23-SEP-13 |
| **WG1753763-6 LCS** | | | | | | | | |
| Nitrate (as N) | | | 101.6 | | % | | 85-115 | 23-SEP-13 |
| **WG1753763-1 MB** | | | | | | | | |
| Nitrate (as N) | | | <0.0050 | | mg/L | | 0.005 | 23-SEP-13 |
| **WG1753763-5 MB** | | | | | | | | |
| Nitrate (as N) | | | <0.0050 | | mg/L | | 0.005 | 23-SEP-13 |
| **WG1753763-4 MS** | | **L1367036-1** | | | | | | |
| Nitrate (as N) | | | 102.7 | | % | | 75-125 | 23-SEP-13 |
| **WG1753763-8 MS** | | **L1367057-4** | | | | | | |
| Nitrate (as N) | | | 96.8 | | % | | 75-125 | 23-SEP-13 |
| **ANIONS-SO4-IC-VA** | **Water** | | | | | | | |
| **Batch R2716591** | | | | | | | | |
| **WG1766282-2 LCS** | | | | | | | | |
| Sulfate (SO4) | | | 101.6 | | % | | 90-110 | 11-OCT-13 |
| **WG1766282-21 LCS** | | | | | | | | |
| Sulfate (SO4) | | | 100.9 | | % | | 90-110 | 11-OCT-13 |
| **WG1766282-1 MB** | | | | | | | | |
| Sulfate (SO4) | | | <0.50 | | mg/L | | 0.5 | 11-OCT-13 |
| **WG1766282-10 MB** | | | | | | | | |
| Sulfate (SO4) | | | <0.50 | | mg/L | | 0.5 | 11-OCT-13 |
| **WG1766282-13 MB** | | | | | | | | |
| Sulfate (SO4) | | | <0.50 | | mg/L | | 0.5 | 11-OCT-13 |
| **WG1766282-16 MB** | | | | | | | | |
| Sulfate (SO4) | | | <0.50 | | mg/L | | 0.5 | 11-OCT-13 |
| **WG1766282-19 MB** | | | | | | | | |
| Sulfate (SO4) | | | <0.50 | | mg/L | | 0.5 | 11-OCT-13 |
| **WG1766282-4 MB** | | | | | | | | |
| Sulfate (SO4) | | | <0.50 | | mg/L | | 0.5 | 11-OCT-13 |
| **WG1766282-7 MB** | | | | | | | | |
| Sulfate (SO4) | | | <0.50 | | mg/L | | 0.5 | 11-OCT-13 |
| **WG1766282-14 MS** | | **L1376886-11** | | | | | | |
| Sulfate (SO4) | | | 99.7 | | % | | 75-125 | 11-OCT-13 |
| **WG1766282-17 MS** | | **L1376954-11** | | | | | | |
| Sulfate (SO4) | | | 101.6 | | % | | 75-125 | 11-OCT-13 |
| **WG1766282-20 MS** | | **L1376954-13** | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ANIONS-SO4-IC-VA** | **Water** | | | | | | | |
| **Batch R2716591** | | | | | | | | |
| **WG1766282-20 MS** | | **L1376954-13** | | | | | | |
| Sulfate (SO4) | | | 95.8 | | % | | 75-125 | 11-OCT-13 |
| **ANIONS-SO4-IC-WR** | **Water** | | | | | | | |
| **Batch R2700762** | | | | | | | | |
| **WG1753763-3 DUP** | | **L1367036-1** | | | | | | |
| Sulfate (SO4) | | <0.50 | <0.50 | RPD-NA | mg/L | N/A | 20 | 23-SEP-13 |
| **WG1753763-2 LCS** | | | | | | | | |
| Sulfate (SO4) | | | 99.8 | | % | | 85-115 | 23-SEP-13 |
| **WG1753763-6 LCS** | | | | | | | | |
| Sulfate (SO4) | | | 99.5 | | % | | 85-115 | 23-SEP-13 |
| **WG1753763-1 MB** | | | | | | | | |
| Sulfate (SO4) | | | <0.50 | | mg/L | | 0.5 | 23-SEP-13 |
| **WG1753763-5 MB** | | | | | | | | |
| Sulfate (SO4) | | | <0.50 | | mg/L | | 0.5 | 23-SEP-13 |
| **WG1753763-4 MS** | | **L1367036-1** | | | | | | |
| Sulfate (SO4) | | | 100.7 | | % | | 75-125 | 23-SEP-13 |
| **WG1753763-8 MS** | | **L1367057-4** | | | | | | |
| Sulfate (SO4) | | | 89.6 | | % | | 75-125 | 23-SEP-13 |
| **CARBONS-TIC-VA** | **Water** | | | | | | | |
| **Batch R2701522** | | | | | | | | |
| **WG1754470-1 LCS** | | | | | | | | |
| Total Inorganic Carbon | | | 97.8 | | % | | 80-120 | 25-SEP-13 |
| **WG1754470-4 LCS** | | | | | | | | |
| Total Inorganic Carbon | | | 105.5 | | % | | 80-120 | 25-SEP-13 |
| **WG1754470-3 MB** | | | | | | | | |
| Total Inorganic Carbon | | | <0.50 | | mg/L | | 0.5 | 25-SEP-13 |
| **Batch R2705730** | | | | | | | | |
| **WG1755442-1 DUP** | | **L1367036-20** | | | | | | |
| Total Inorganic Carbon | | 78.2 | 78.3 | | mg/L | 0.1 | 20 | 30-SEP-13 |
| **WG1755442-3 LCS** | | | | | | | | |
| Total Inorganic Carbon | | | 107.4 | | % | | 80-120 | 30-SEP-13 |
| **WG1755442-2 MB** | | | | | | | | |
| Total Inorganic Carbon | | | <0.50 | | mg/L | | 0.5 | 30-SEP-13 |
| **Batch R2706626** | | | | | | | | |
| **WG1759287-1 DUP** | | **L1367036-53** | | | | | | |
| Total Inorganic Carbon | | 5.74 | 5.48 | | mg/L | 4.6 | 20 | 01-OCT-13 |
| **WG1759287-3 LCS** | | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CARBONS-TIC-VA** | **Water** | | | | | | | |
| **Batch R2706626** | | | | | | | | |
| **WG1759287-3 LCS** | | | | | | | | |
| Total Inorganic Carbon | | | 100.9 | | % | | 80-120 | 01-OCT-13 |
| **WG1759287-2 MB** | | | | | | | | |
| Total Inorganic Carbon | | | <0.50 | | mg/L | | 0.5 | 01-OCT-13 |
| **CARBONS-TOC-VA** | **Water** | | | | | | | |
| **Batch R2703696** | | | | | | | | |
| **WG1755310-2 DUP** | | **L1367036-20** | | | | | | |
| Total Organic Carbon | | 2.17 | 1.93 | | mg/L | 12 | 20 | 26-SEP-13 |
| **WG1755310-1 LCS** | | | | | | | | |
| Total Organic Carbon | | | 104.0 | | % | | 80-120 | 26-SEP-13 |
| **WG1755310-4 LCS** | | | | | | | | |
| Total Organic Carbon | | | 96.9 | | % | | 80-120 | 26-SEP-13 |
| **WG1755310-7 LCS** | | | | | | | | |
| Total Organic Carbon | | | 95.7 | | % | | 80-120 | 26-SEP-13 |
| **WG1755310-3 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 26-SEP-13 |
| **WG1755310-6 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 26-SEP-13 |
| **Batch R2704252** | | | | | | | | |
| **WG1757583-1 LCS** | | | | | | | | |
| Total Organic Carbon | | | 98.6 | | % | | 80-120 | 29-SEP-13 |
| **WG1757583-13 LCS** | | | | | | | | |
| Total Organic Carbon | | | 99.8 | | % | | 80-120 | 29-SEP-13 |
| **WG1757583-5 LCS** | | | | | | | | |
| Total Organic Carbon | | | 100.5 | | % | | 80-120 | 29-SEP-13 |
| **WG1757583-9 LCS** | | | | | | | | |
| Total Organic Carbon | | | 100.6 | | % | | 80-120 | 29-SEP-13 |
| **WG1757583-12 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 29-SEP-13 |
| **WG1757583-4 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 29-SEP-13 |
| **WG1757583-8 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 29-SEP-13 |
| **WG1757583-11 MS** | | **L1368276-2** | | | | | | |
| Total Organic Carbon | | | 95.5 | | % | | 70-130 | 29-SEP-13 |
| **WG1757583-3 MS** | | **L1370207-2** | | | | | | |
| Total Organic Carbon | | | 112.9 | | % | | 70-130 | 29-SEP-13 |
| **WG1757583-7 MS** | | **L1367539-5** | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CARBONS-TOC-VA** | **Water** | | | | | | | |
| **Batch R2704252** | | | | | | | | |
| **WG1757583-7 MS** | | **L1367539-5** | | | | | | |
| Total Organic Carbon | | | N/A | MS-B | % | | - | 29-SEP-13 |
| **Batch R2705695** | | | | | | | | |
| **WG1757766-6 DUP** | | **L1367036-24** | | | | | | |
| Total Organic Carbon | | 28.0 | 29.6 | | mg/L | 5.7 | 20 | 30-SEP-13 |
| **WG1757766-1 LCS** | | | | | | | | |
| Total Organic Carbon | | | 96.5 | | % | | 80-120 | 30-SEP-13 |
| **WG1757766-12 LCS** | | | | | | | | |
| Total Organic Carbon | | | 95.5 | | % | | 80-120 | 30-SEP-13 |
| **WG1757766-16 LCS** | | | | | | | | |
| Total Organic Carbon | | | 96.2 | | % | | 80-120 | 30-SEP-13 |
| **WG1757766-4 LCS** | | | | | | | | |
| Total Organic Carbon | | | 97.8 | | % | | 80-120 | 30-SEP-13 |
| **WG1757766-9 LCS** | | | | | | | | |
| Total Organic Carbon | | | 96.5 | | % | | 80-120 | 30-SEP-13 |
| **WG1757766-11 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 30-SEP-13 |
| **WG1757766-15 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 30-SEP-13 |
| **WG1757766-3 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 30-SEP-13 |
| **WG1757766-8 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 30-SEP-13 |
| **WG1757766-14 MS** | | **L1369871-9** | | | | | | |
| Total Organic Carbon | | | 104.6 | | % | | 70-130 | 30-SEP-13 |
| **WG1757766-7 MS** | | **L1367477-5** | | | | | | |
| Total Organic Carbon | | | 96.2 | | % | | 70-130 | 30-SEP-13 |
| **CN-FREE-CFA-VA** | **Water** | | | | | | | |
| **Batch R2706709** | | | | | | | | |
| **WG1758927-17 DUP** | | **L1367036-5** | | | | | | |
| Cyanide, Free | | <0.0050 | <0.0050 | RPD-NA | mg/L | N/A | 20 | 01-OCT-13 |
| **WG1758927-14 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.2 | | % | | 80-120 | 01-OCT-13 |
| **WG1758927-16 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.5 | | % | | 80-120 | 01-OCT-13 |
| **WG1758927-19 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.0 | | % | | 80-120 | 01-OCT-13 |
| **WG1758927-4 LCS** | | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-FREE-CFA-VA** | **Water** | | | | | | | |
| **Batch R2706709** | | | | | | | | |
| **WG1758927-4 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.5 | | % | | 80-120 | 01-OCT-13 |
| **WG1758927-6 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.0 | | % | | 80-120 | 01-OCT-13 |
| **WG1758927-8 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.8 | | % | | 80-120 | 01-OCT-13 |
| **WG1758927-13 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758927-15 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758927-18 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758927-3 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758927-5 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758927-7 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758927-10 MS** | | **L1367539-10** | | | | | | |
| Cyanide, Free | | | 97.7 | | % | | 70-130 | 01-OCT-13 |
| **Batch R2707863** | | | | | | | | |
| **WG1759835-11 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.8 | | % | | 80-120 | 02-OCT-13 |
| **WG1759835-2 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.2 | | % | | 80-120 | 02-OCT-13 |
| **WG1759835-5 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.6 | | % | | 80-120 | 02-OCT-13 |
| **WG1759835-9 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.6 | | % | | 80-120 | 02-OCT-13 |
| **WG1759835-1 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759835-10 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759835-4 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759835-8 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759835-7 MS** | | **L1366424-2** | | | | | | |
| Cyanide, Free | | | 95.7 | | % | | 70-130 | 02-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-FREE-CFA-VA** | **Water** | | | | | | | |
| **Batch R2708901** | | | | | | | | |
| **WG1760854-13 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.9 | | % | | 80-120 | 03-OCT-13 |
| **WG1760854-16 LCS** | | | | | | | | |
| Cyanide, Free | | | 101.0 | | % | | 80-120 | 03-OCT-13 |
| **WG1760854-2 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.6 | | % | | 80-120 | 03-OCT-13 |
| **WG1760854-7 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.6 | | % | | 80-120 | 03-OCT-13 |
| **WG1760854-9 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.4 | | % | | 80-120 | 03-OCT-13 |
| **WG1760854-1 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760854-12 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760854-15 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760854-6 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760854-8 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **CN-SCN-VA** | **Water** | | | | | | | |
| **Batch R2700445** | | | | | | | | |
| **WG1754209-2 CRM** | | **VA-SCN-LOW-CONTROL** | | | | | | |
| Thiocyanate (SCN) | | | 100.4 | | % | | 85-115 | 25-SEP-13 |
| **WG1754209-6 CRM** | | **VA-SCN-HIGH-CONTROL** | | | | | | |
| Thiocyanate (SCN) | | | 96.7 | | % | | 85-115 | 25-SEP-13 |
| **WG1754209-11 DUP** | | **L1367036-54** | | | | | | |
| Thiocyanate (SCN) | | <0.50 | <0.50 | RPD-NA | mg/L | N/A | 20 | 25-SEP-13 |
| **WG1754209-7 DUP** | | **L1367036-2** | | | | | | |
| Thiocyanate (SCN) | | <0.50 | <0.50 | RPD-NA | mg/L | N/A | 20 | 25-SEP-13 |
| **WG1754209-9 DUP** | | **L1367036-27** | | | | | | |
| Thiocyanate (SCN) | | <0.50 | <0.50 | RPD-NA | mg/L | N/A | 20 | 25-SEP-13 |
| **WG1754209-1 MB** | | | | | | | | |
| Thiocyanate (SCN) | | | <0.50 | | mg/L | | 0.5 | 25-SEP-13 |
| **WG1754209-5 MB** | | | | | | | | |
| Thiocyanate (SCN) | | | <0.50 | | mg/L | | 0.5 | 25-SEP-13 |
| **WG1754209-10 MS** | | **L1367036-28** | | | | | | |
| Thiocyanate (SCN) | | | 86.2 | | % | | 75-125 | 25-SEP-13 |
| **WG1754209-12 MS** | | **L1367036-55** | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-SCN-VA** | **Water** | | | | | | | |
| **Batch R2700445** | | | | | | | | |
| **WG1754209-12 MS** | | **L1367036-55** | | | | | | |
| Thiocyanate (SCN) | | | 95.2 | | % | | 75-125 | 25-SEP-13 |
| **WG1754209-4 MS** | | **L1365603-25** | | | | | | |
| Thiocyanate (SCN) | | | 93.4 | | % | | 75-125 | 25-SEP-13 |
| **WG1754209-8 MS** | | **L1367036-3** | | | | | | |
| Thiocyanate (SCN) | | | 98.4 | | % | | 75-125 | 25-SEP-13 |
| **CN-T-CFA-VA** | **Water** | | | | | | | |
| **Batch R2706676** | | | | | | | | |
| **WG1758914-23 DUP** | | **L1367036-5** | | | | | | |
| Cyanide, Total | | 0.0270 | 0.0281 | | mg/L | 4.0 | 20 | 01-OCT-13 |
| **WG1758914-12 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 94.3 | | % | | 75-105 | 01-OCT-13 |
| **WG1758914-19 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 93.9 | | % | | 75-105 | 01-OCT-13 |
| **WG1758914-22 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 95.2 | | % | | 75-105 | 01-OCT-13 |
| **WG1758914-26 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 94.0 | | % | | 75-105 | 01-OCT-13 |
| **WG1758914-5 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 94.1 | | % | | 75-105 | 01-OCT-13 |
| **WG1758914-9 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 91.5 | | % | | 75-105 | 01-OCT-13 |
| **WG1758914-11 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.4 | | % | | 80-120 | 01-OCT-13 |
| **WG1758914-18 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.1 | | % | | 80-120 | 01-OCT-13 |
| **WG1758914-21 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.6 | | % | | 80-120 | 01-OCT-13 |
| **WG1758914-25 LCS** | | | | | | | | |
| Cyanide, Total | | | 104.0 | | % | | 80-120 | 01-OCT-13 |
| **WG1758914-4 LCS** | | | | | | | | |
| Cyanide, Total | | | 104.5 | | % | | 80-120 | 01-OCT-13 |
| **WG1758914-8 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.4 | | % | | 80-120 | 01-OCT-13 |
| **WG1758914-10 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758914-17 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758914-20 MB** | | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-T-CFA-VA** | **Water** | | | | | | | |
| **Batch R2706676** | | | | | | | | |
| **WG1758914-20 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758914-24 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758914-3 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758914-7 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758914-14 MS** | | **L1367539-10** | | | | | | |
| Cyanide, Total | | | 99.0 | | % | | 70-130 | 01-OCT-13 |
| **Batch R2707828** | | | | | | | | |
| **WG1759824-13 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 94.0 | | % | | 75-105 | 02-OCT-13 |
| **WG1759824-18 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 94.4 | | % | | 75-105 | 02-OCT-13 |
| **WG1759824-21 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 92.0 | | % | | 75-105 | 02-OCT-13 |
| **WG1759824-26 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 95.0 | | % | | 75-105 | 02-OCT-13 |
| **WG1759824-3 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 91.0 | | % | | 75-105 | 02-OCT-13 |
| **WG1759824-32 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 92.5 | | % | | 75-105 | 02-OCT-13 |
| **WG1759824-6 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 92.6 | | % | | 75-105 | 02-OCT-13 |
| **WG1759824-12 LCS** | | | | | | | | |
| Cyanide, Total | | | 104.4 | | % | | 80-120 | 02-OCT-13 |
| **WG1759824-17 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.9 | | % | | 80-120 | 02-OCT-13 |
| **WG1759824-2 LCS** | | | | | | | | |
| Cyanide, Total | | | 102.7 | | % | | 80-120 | 02-OCT-13 |
| **WG1759824-20 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.8 | | % | | 80-120 | 02-OCT-13 |
| **WG1759824-25 LCS** | | | | | | | | |
| Cyanide, Total | | | 104.3 | | % | | 80-120 | 02-OCT-13 |
| **WG1759824-31 LCS** | | | | | | | | |
| Cyanide, Total | | | 101.8 | | % | | 80-120 | 02-OCT-13 |
| **WG1759824-5 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.3 | | % | | 80-120 | 02-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-T-CFA-VA** | **Water** | | | | | | | |
| **Batch R2707828** | | | | | | | | |
| **WG1759824-1 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759824-11 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759824-16 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759824-19 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759824-24 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759824-30 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759824-4 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759824-28 MS** | | **L1368575-2** | | | | | | |
| Cyanide, Total | | | 100.0 | | % | | 70-130 | 02-OCT-13 |
| **WG1759824-8 MS** | | **L1366424-2** | | | | | | |
| Cyanide, Total | | | 100.0 | | % | | 70-130 | 02-OCT-13 |
| **Batch R2708841** | | | | | | | | |
| **WG1760838-14 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 91.5 | | % | | 75-105 | 03-OCT-13 |
| **WG1760838-19 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 92.1 | | % | | 75-105 | 03-OCT-13 |
| **WG1760838-22 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 87.4 | | % | | 75-105 | 03-OCT-13 |
| **WG1760838-3 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 88.1 | | % | | 75-105 | 03-OCT-13 |
| **WG1760838-9 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 91.8 | | % | | 75-105 | 03-OCT-13 |
| **WG1760838-13 LCS** | | | | | | | | |
| Cyanide, Total | | | 102.8 | | % | | 80-120 | 03-OCT-13 |
| **WG1760838-18 LCS** | | | | | | | | |
| Cyanide, Total | | | 102.8 | | % | | 80-120 | 03-OCT-13 |
| **WG1760838-2 LCS** | | | | | | | | |
| Cyanide, Total | | | 101.3 | | % | | 80-120 | 03-OCT-13 |
| **WG1760838-21 LCS** | | | | | | | | |
| Cyanide, Total | | | 99.2 | | % | | 80-120 | 03-OCT-13 |
| **WG1760838-8 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.5 | | % | | 80-120 | 03-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-T-CFA-VA** | **Water** | | | | | | | |
| **Batch R2708841** | | | | | | | | |
| **WG1760838-1 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760838-12 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760838-17 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760838-20 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760838-7 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760838-11 MS** | | **L1368575-20** | | | | | | |
| Cyanide, Total | | | 99.4 | | % | | 70-130 | 03-OCT-13 |
| **CN-WAD-CFA-VA** | **Water** | | | | | | | |
| **Batch R2706691** | | | | | | | | |
| **WG1758922-17 DUP** | | **L1367036-5** | | | | | | |
| Cyanide, Weak Acid Diss | | <0.0050 | <0.0050 | RPD-NA | mg/L | N/A | 20 | 01-OCT-13 |
| **WG1758922-14 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 102.5 | | % | | 80-120 | 01-OCT-13 |
| **WG1758922-16 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.8 | | % | | 80-120 | 01-OCT-13 |
| **WG1758922-19 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.4 | | % | | 80-120 | 01-OCT-13 |
| **WG1758922-2 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 102.8 | | % | | 80-120 | 01-OCT-13 |
| **WG1758922-5 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 102.3 | | % | | 80-120 | 01-OCT-13 |
| **WG1758922-8 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.8 | | % | | 80-120 | 01-OCT-13 |
| **WG1758922-1 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758922-13 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758922-15 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758922-18 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758922-4 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758922-7 MB** | | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-WAD-CFA-VA** | **Water** | | | | | | | |
| **Batch R2706691** | | | | | | | | |
| **WG1758922-7 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758922-10 MS** | | **L1367539-10** | | | | | | |
| Cyanide, Weak Acid Diss | | | 101.4 | | % | | 70-130 | 01-OCT-13 |
| **Batch R2707855** | | | | | | | | |
| **WG1759829-12 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 105.1 | | % | | 80-120 | 02-OCT-13 |
| **WG1759829-14 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 105.0 | | % | | 80-120 | 02-OCT-13 |
| **WG1759829-18 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.2 | | % | | 80-120 | 02-OCT-13 |
| **WG1759829-2 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 101.7 | | % | | 80-120 | 02-OCT-13 |
| **WG1759829-23 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.0 | | % | | 80-120 | 02-OCT-13 |
| **WG1759829-4 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 104.0 | | % | | 80-120 | 02-OCT-13 |
| **WG1759829-8 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.4 | | % | | 80-120 | 02-OCT-13 |
| **WG1759829-1 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759829-11 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759829-13 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759829-17 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759829-22 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759829-3 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759829-7 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1759829-20 MS** | | **L1368575-2** | | | | | | |
| Cyanide, Weak Acid Diss | | | 101.4 | | % | | 70-130 | 02-OCT-13 |
| **Batch R2708891** | | | | | | | | |
| **WG1760849-13 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 100.6 | | % | | 80-120 | 03-OCT-13 |
| **WG1760849-15 LCS** | | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-WAD-CFA-VA** | **Water** | | | | | | | |
| **Batch R2708891** | | | | | | | | |
| **WG1760849-15 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 104.0 | | % | | 80-120 | 03-OCT-13 |
| **WG1760849-2 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.0 | | % | | 80-120 | 03-OCT-13 |
| **WG1760849-5 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.0 | | % | | 80-120 | 03-OCT-13 |
| **WG1760849-9 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 102.3 | | % | | 80-120 | 03-OCT-13 |
| **WG1760849-1 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760849-12 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760849-14 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760849-4 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760849-8 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760849-7 MS** | | **L1368575-20** | | | | | | |
| Cyanide, Weak Acid Diss | | | 99.8 | | % | | 70-130 | 03-OCT-13 |
| **EC-MAN-WR** | **Water** | | | | | | | |
| **Batch R2700815** | | | | | | | | |
| **WG1754073-3 DUP** | | **L1367036-1** | | | | | | |
| Conductivity | | 193 | 195 | | uS/cm | 1.2 | 10 | 24-SEP-13 |
| **WG1754073-2 LCS** | | | | | | | | |
| Conductivity | | | 99.4 | | % | | 90-110 | 24-SEP-13 |
| **WG1754073-1 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 24-SEP-13 |
| **EC-PCT-VA** | **Water** | | | | | | | |
| **Batch R2714789** | | | | | | | | |
| **WG1765901-17 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 98.2 | | % | | 90-110 | 11-OCT-13 |
| **WG1765901-18 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 96.9 | | % | | 90-110 | 12-OCT-13 |
| **WG1765901-19 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 97.5 | | % | | 90-110 | 12-OCT-13 |
| **WG1765901-20 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 97.5 | | % | | 90-110 | 12-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **EC-PCT-VA** | **Water** | | | | | | | |
| **Batch R2714789** | | | | | | | | |
| **WG1765901-21 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 97.6 | | % | | 90-110 | 12-OCT-13 |
| **WG1765901-22 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 97.8 | | % | | 90-110 | 12-OCT-13 |
| **WG1765901-23 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 98.0 | | % | | 90-110 | 12-OCT-13 |
| **WG1765901-24 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 98.2 | | % | | 90-110 | 12-OCT-13 |
| **WG1765901-1 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 11-OCT-13 |
| **WG1765901-2 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 12-OCT-13 |
| **WG1765901-3 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 12-OCT-13 |
| **WG1765901-4 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 12-OCT-13 |
| **WG1765901-5 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 12-OCT-13 |
| **WG1765901-6 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 12-OCT-13 |
| **WG1765901-7 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 12-OCT-13 |
| **WG1765901-8 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 12-OCT-13 |
| **HG-DIS-LOW-CVAFS-VA** | **Water** | | | | | | | |
| **Batch R2700758** | | | | | | | | |
| **WG1754155-3 LCS** | | | | | | | | |
| Mercury (Hg)-Dissolved | | | 98.8 | | % | | 80-120 | 25-SEP-13 |
| **Batch R2701440** | | | | | | | | |
| **WG1754155-11 MS** | | **L1367793-1** | | | | | | |
| Mercury (Hg)-Dissolved | | | 72.8 | | % | | 70-130 | 25-SEP-13 |
| **WG1754155-12 MS** | | **L1368384-3** | | | | | | |
| Mercury (Hg)-Dissolved | | | 94.8 | | % | | 70-130 | 25-SEP-13 |
| **WG1754155-17 MS** | | **L1367477-3** | | | | | | |
| Mercury (Hg)-Dissolved | | | 97.9 | | % | | 70-130 | 25-SEP-13 |
| **WG1754155-19 MS** | | **L1367477-7** | | | | | | |
| Mercury (Hg)-Dissolved | | | 101.9 | | % | | 70-130 | 25-SEP-13 |
| **WG1754155-4 MS** | | **L1366731-4** | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **HG-DIS-LOW-CVAFS-VA** | **Water** | | | | | | | |
| **Batch R2701440** | | | | | | | | |
| **WG1754155-4 MS** | | **L1366731-4** | | | | | | |
| Mercury (Hg)-Dissolved | | | 99.0 | | % | | 70-130 | 25-SEP-13 |
| **Batch R2701700** | | | | | | | | |
| **WG1754155-1 MB** | | | | | | | | |
| Mercury (Hg)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 26-SEP-13 |
| **Batch R2702133** | | | | | | | | |
| **WG1754155-24 MS** | | **L1367715-1** | | | | | | |
| Mercury (Hg)-Dissolved | | | 101.2 | | % | | 70-130 | 26-SEP-13 |
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2701467** | | | | | | | | |
| **WG1754155-2 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Aluminum (Al)-Dissolved | | | 98.1 | | % | | 80-120 | 25-SEP-13 |
| Antimony (Sb)-Dissolved | | | 94.6 | | % | | 80-120 | 25-SEP-13 |
| Arsenic (As)-Dissolved | | | 96.6 | | % | | 80-120 | 25-SEP-13 |
| Barium (Ba)-Dissolved | | | 100.9 | | % | | 80-120 | 25-SEP-13 |
| Beryllium (Be)-Dissolved | | | 95.6 | | % | | 80-120 | 25-SEP-13 |
| Bismuth (Bi)-Dissolved | | | 100.0 | | % | | 80-120 | 25-SEP-13 |
| Boron (B)-Dissolved | | | 90.0 | | % | | 80-120 | 25-SEP-13 |
| Cadmium (Cd)-Dissolved | | | 97.9 | | % | | 80-120 | 25-SEP-13 |
| Chromium (Cr)-Dissolved | | | 97.7 | | % | | 80-120 | 25-SEP-13 |
| Cobalt (Co)-Dissolved | | | 94.3 | | % | | 80-120 | 25-SEP-13 |
| Copper (Cu)-Dissolved | | | 92.8 | | % | | 80-120 | 25-SEP-13 |
| Lead (Pb)-Dissolved | | | 98.4 | | % | | 80-120 | 25-SEP-13 |
| Lithium (Li)-Dissolved | | | 94.6 | | % | | 80-120 | 25-SEP-13 |
| Manganese (Mn)-Dissolved | | | 96.0 | | % | | 80-120 | 25-SEP-13 |
| Molybdenum (Mo)-Dissolved | | | 96.6 | | % | | 80-120 | 25-SEP-13 |
| Nickel (Ni)-Dissolved | | | 95.5 | | % | | 80-120 | 25-SEP-13 |
| Selenium (Se)-Dissolved | | | 97.2 | | % | | 80-120 | 25-SEP-13 |
| Silver (Ag)-Dissolved | | | 98.1 | | % | | 80-120 | 25-SEP-13 |
| Sodium (Na)-Dissolved | | | 99.1 | | % | | 80-120 | 25-SEP-13 |
| Strontium (Sr)-Dissolved | | | 96.6 | | % | | 80-120 | 25-SEP-13 |
| Thallium (Tl)-Dissolved | | | 100.9 | | % | | 80-120 | 25-SEP-13 |
| Tin (Sn)-Dissolved | | | 98.7 | | % | | 80-120 | 25-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2701467** | | | | | | | | |
| **WG1754155-2 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Titanium (Ti)-Dissolved | | | 92.7 | | % | | 80-120 | 25-SEP-13 |
| Uranium (U)-Dissolved | | | 98.3 | | % | | 80-120 | 25-SEP-13 |
| Vanadium (V)-Dissolved | | | 97.8 | | % | | 80-120 | 25-SEP-13 |
| Zinc (Zn)-Dissolved | | | 96.5 | | % | | 80-120 | 25-SEP-13 |
| **WG1754155-1 MB** | | | | | | | | |
| Aluminum (Al)-Dissolved | | | <0.0010 | | mg/L | | 0.001 | 25-SEP-13 |
| Antimony (Sb)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 25-SEP-13 |
| Arsenic (As)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 25-SEP-13 |
| Barium (Ba)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 25-SEP-13 |
| Beryllium (Be)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 25-SEP-13 |
| Bismuth (Bi)-Dissolved | | | <0.00050 | | mg/L | | 0.0005 | 25-SEP-13 |
| Boron (B)-Dissolved | | | <0.010 | | mg/L | | 0.01 | 25-SEP-13 |
| Cadmium (Cd)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 25-SEP-13 |
| Chromium (Cr)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 25-SEP-13 |
| Cobalt (Co)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 25-SEP-13 |
| Copper (Cu)-Dissolved | | | <0.00020 | | mg/L | | 0.0002 | 25-SEP-13 |
| Lead (Pb)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 25-SEP-13 |
| Lithium (Li)-Dissolved | | | <0.00050 | | mg/L | | 0.0005 | 25-SEP-13 |
| Manganese (Mn)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 25-SEP-13 |
| Molybdenum (Mo)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 25-SEP-13 |
| Nickel (Ni)-Dissolved | | | <0.00050 | | mg/L | | 0.0005 | 25-SEP-13 |
| Selenium (Se)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 25-SEP-13 |
| Silver (Ag)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 25-SEP-13 |
| Sodium (Na)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 25-SEP-13 |
| Strontium (Sr)-Dissolved | | | <0.00020 | | mg/L | | 0.0002 | 25-SEP-13 |
| Thallium (Tl)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 25-SEP-13 |
| Tin (Sn)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 25-SEP-13 |
| Titanium (Ti)-Dissolved | | | <0.010 | | mg/L | | 0.01 | 25-SEP-13 |
| Uranium (U)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 25-SEP-13 |
| Vanadium (V)-Dissolved | | | <0.0010 | | mg/L | | 0.001 | 25-SEP-13 |
| Zinc (Zn)-Dissolved | | | <0.0010 | | mg/L | | 0.001 | 25-SEP-13 |
| **Batch R2706795** | | | | | | | | |
| **WG1754155-17 MS** | | **L1367477-3** | | | | | | |
| Aluminum (Al)-Dissolved | | | 96.3 | | % | | 70-130 | 01-OCT-13 |
| Antimony (Sb)-Dissolved | | | 102.1 | | % | | 70-130 | 01-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2706795** | | | | | | | | |
| **WG1754155-17 MS** | | **L1367477-3** | | | | | | |
| Arsenic (As)-Dissolved | | | 97.9 | | % | | 70-130 | 01-OCT-13 |
| Barium (Ba)-Dissolved | | | 92.0 | | % | | 70-130 | 01-OCT-13 |
| Beryllium (Be)-Dissolved | | | 96.4 | | % | | 70-130 | 01-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 92.8 | | % | | 70-130 | 01-OCT-13 |
| Boron (B)-Dissolved | | | 92.5 | | % | | 70-130 | 01-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 98.9 | | % | | 70-130 | 01-OCT-13 |
| Chromium (Cr)-Dissolved | | | 95.8 | | % | | 70-130 | 01-OCT-13 |
| Cobalt (Co)-Dissolved | | | 96.1 | | % | | 70-130 | 01-OCT-13 |
| Copper (Cu)-Dissolved | | | 93.2 | | % | | 70-130 | 01-OCT-13 |
| Lead (Pb)-Dissolved | | | 96.6 | | % | | 70-130 | 01-OCT-13 |
| Lithium (Li)-Dissolved | | | 96.2 | | % | | 70-130 | 01-OCT-13 |
| Manganese (Mn)-Dissolved | | | 96.8 | | % | | 70-130 | 01-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 97.5 | | % | | 70-130 | 01-OCT-13 |
| Nickel (Ni)-Dissolved | | | 97.3 | | % | | 70-130 | 01-OCT-13 |
| Selenium (Se)-Dissolved | | | 104.1 | | % | | 70-130 | 01-OCT-13 |
| Silver (Ag)-Dissolved | | | 93.0 | | % | | 70-130 | 01-OCT-13 |
| Sodium (Na)-Dissolved | | | N/A | MS-B | % | | - | 01-OCT-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 01-OCT-13 |
| Thallium (Tl)-Dissolved | | | 95.6 | | % | | 70-130 | 01-OCT-13 |
| Tin (Sn)-Dissolved | | | 99.5 | | % | | 70-130 | 01-OCT-13 |
| Titanium (Ti)-Dissolved | | | 94.4 | | % | | 70-130 | 01-OCT-13 |
| Uranium (U)-Dissolved | | | 99.2 | | % | | 70-130 | 01-OCT-13 |
| Vanadium (V)-Dissolved | | | 98.1 | | % | | 70-130 | 01-OCT-13 |
| Zinc (Zn)-Dissolved | | | 95.0 | | % | | 70-130 | 01-OCT-13 |
| **WG1754155-19 MS** | | **L1367477-7** | | | | | | |
| Aluminum (Al)-Dissolved | | | 94.3 | | % | | 70-130 | 01-OCT-13 |
| Antimony (Sb)-Dissolved | | | 100.1 | | % | | 70-130 | 01-OCT-13 |
| Arsenic (As)-Dissolved | | | 95.8 | | % | | 70-130 | 01-OCT-13 |
| Barium (Ba)-Dissolved | | | 96.1 | | % | | 70-130 | 01-OCT-13 |
| Beryllium (Be)-Dissolved | | | 97.1 | | % | | 70-130 | 01-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 89.6 | | % | | 70-130 | 01-OCT-13 |
| Boron (B)-Dissolved | | | 94.0 | | % | | 70-130 | 01-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 101.0 | | % | | 70-130 | 01-OCT-13 |
| Chromium (Cr)-Dissolved | | | 95.8 | | % | | 70-130 | 01-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2706795** | | | | | | | | |
| **WG1754155-19 MS** | | **L1367477-7** | | | | | | |
| Cobalt (Co)-Dissolved | | | 96.7 | | % | | 70-130 | 01-OCT-13 |
| Lead (Pb)-Dissolved | | | 98.3 | | % | | 70-130 | 01-OCT-13 |
| Lithium (Li)-Dissolved | | | 99.8 | | % | | 70-130 | 01-OCT-13 |
| Manganese (Mn)-Dissolved | | | 99.0 | | % | | 70-130 | 01-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 94.2 | | % | | 70-130 | 01-OCT-13 |
| Nickel (Ni)-Dissolved | | | 99.1 | | % | | 70-130 | 01-OCT-13 |
| Selenium (Se)-Dissolved | | | 102.4 | | % | | 70-130 | 01-OCT-13 |
| Silver (Ag)-Dissolved | | | 95.3 | | % | | 70-130 | 01-OCT-13 |
| Sodium (Na)-Dissolved | | | 106.3 | | % | | 70-130 | 01-OCT-13 |
| Strontium (Sr)-Dissolved | | | 95.5 | | % | | 70-130 | 01-OCT-13 |
| Thallium (Tl)-Dissolved | | | 98.4 | | % | | 70-130 | 01-OCT-13 |
| Tin (Sn)-Dissolved | | | 97.0 | | % | | 70-130 | 01-OCT-13 |
| Titanium (Ti)-Dissolved | | | 93.8 | | % | | 70-130 | 01-OCT-13 |
| Uranium (U)-Dissolved | | | 97.4 | | % | | 70-130 | 01-OCT-13 |
| Vanadium (V)-Dissolved | | | 95.8 | | % | | 70-130 | 01-OCT-13 |
| Zinc (Zn)-Dissolved | | | 99.4 | | % | | 70-130 | 01-OCT-13 |
| **Batch R2708716** | | | | | | | | |
| **WG1754155-12 MS** | | **L1368384-3** | | | | | | |
| Aluminum (Al)-Dissolved | | | 95.9 | | % | | 70-130 | 03-OCT-13 |
| Antimony (Sb)-Dissolved | | | 104.7 | | % | | 70-130 | 03-OCT-13 |
| Arsenic (As)-Dissolved | | | 101.3 | | % | | 70-130 | 03-OCT-13 |
| Barium (Ba)-Dissolved | | | N/A | MS-B | % | | - | 03-OCT-13 |
| Beryllium (Be)-Dissolved | | | 96.9 | | % | | 70-130 | 03-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 85.7 | | % | | 70-130 | 03-OCT-13 |
| Boron (B)-Dissolved | | | 93.5 | | % | | 70-130 | 03-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 98.6 | | % | | 70-130 | 03-OCT-13 |
| Chromium (Cr)-Dissolved | | | 96.4 | | % | | 70-130 | 03-OCT-13 |
| Cobalt (Co)-Dissolved | | | 94.2 | | % | | 70-130 | 03-OCT-13 |
| Copper (Cu)-Dissolved | | | 94.1 | | % | | 70-130 | 03-OCT-13 |
| Lead (Pb)-Dissolved | | | 94.5 | | % | | 70-130 | 03-OCT-13 |
| Lithium (Li)-Dissolved | | | 96.2 | | % | | 70-130 | 03-OCT-13 |
| Manganese (Mn)-Dissolved | | | 96.9 | | % | | 70-130 | 03-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 97.1 | | % | | 70-130 | 03-OCT-13 |
| Nickel (Ni)-Dissolved | | | 94.2 | | % | | 70-130 | 03-OCT-13 |

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2708716** | | | | | | | | |
| **WG1754155-12 MS** | | **L1368384-3** | | | | | | |
| Selenium (Se)-Dissolved | | | 103.8 | | % | | 70-130 | 03-OCT-13 |
| Sodium (Na)-Dissolved | | | N/A | MS-B | % | | - | 03-OCT-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 03-OCT-13 |
| Thallium (Tl)-Dissolved | | | 95.4 | | % | | 70-130 | 03-OCT-13 |
| Tin (Sn)-Dissolved | | | 100.1 | | % | | 70-130 | 03-OCT-13 |
| Titanium (Ti)-Dissolved | | | 95.5 | | % | | 70-130 | 03-OCT-13 |
| Uranium (U)-Dissolved | | | 98.3 | | % | | 70-130 | 03-OCT-13 |
| Vanadium (V)-Dissolved | | | 97.3 | | % | | 70-130 | 03-OCT-13 |
| Zinc (Zn)-Dissolved | | | 93.7 | | % | | 70-130 | 03-OCT-13 |
| **Batch R2709214** | | | | | | | | |
| **WG1754155-12 MS** | | **L1368384-3** | | | | | | |
| Silver (Ag)-Dissolved | | | 96.7 | | % | | 70-130 | 04-OCT-13 |
| **Batch R2710879** | | | | | | | | |
| **WG1754155-4 MS** | | **L1366731-4** | | | | | | |
| Aluminum (Al)-Dissolved | | | 94.4 | | % | | 70-130 | 04-OCT-13 |
| Antimony (Sb)-Dissolved | | | 100.1 | | % | | 70-130 | 04-OCT-13 |
| Arsenic (As)-Dissolved | | | 99.2 | | % | | 70-130 | 04-OCT-13 |
| Barium (Ba)-Dissolved | | | N/A | MS-B | % | | - | 04-OCT-13 |
| Beryllium (Be)-Dissolved | | | 95.5 | | % | | 70-130 | 04-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 93.2 | | % | | 70-130 | 04-OCT-13 |
| Boron (B)-Dissolved | | | 99.7 | | % | | 70-130 | 04-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 100.2 | | % | | 70-130 | 04-OCT-13 |
| Chromium (Cr)-Dissolved | | | 98.2 | | % | | 70-130 | 04-OCT-13 |
| Cobalt (Co)-Dissolved | | | 97.3 | | % | | 70-130 | 04-OCT-13 |
| Copper (Cu)-Dissolved | | | 97.5 | | % | | 70-130 | 04-OCT-13 |
| Lead (Pb)-Dissolved | | | 95.2 | | % | | 70-130 | 04-OCT-13 |
| Lithium (Li)-Dissolved | | | 99.4 | | % | | 70-130 | 04-OCT-13 |
| Manganese (Mn)-Dissolved | | | 98.1 | | % | | 70-130 | 04-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 96.5 | | % | | 70-130 | 04-OCT-13 |
| Nickel (Ni)-Dissolved | | | 100.0 | | % | | 70-130 | 04-OCT-13 |
| Selenium (Se)-Dissolved | | | 101.0 | | % | | 70-130 | 04-OCT-13 |
| Silver (Ag)-Dissolved | | | 92.1 | | % | | 70-130 | 04-OCT-13 |
| Sodium (Na)-Dissolved | | | 95.0 | | % | | 70-130 | 04-OCT-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 04-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2710879** | | | | | | | | |
| **WG1754155-4 MS** | | **L1366731-4** | | | | | | |
| Thallium (Tl)-Dissolved | | | 94.8 | | % | | 70-130 | 04-OCT-13 |
| Tin (Sn)-Dissolved | | | 98.3 | | % | | 70-130 | 04-OCT-13 |
| Titanium (Ti)-Dissolved | | | 103.9 | | % | | 70-130 | 04-OCT-13 |
| Uranium (U)-Dissolved | | | 93.7 | | % | | 70-130 | 04-OCT-13 |
| Vanadium (V)-Dissolved | | | 97.2 | | % | | 70-130 | 04-OCT-13 |
| Zinc (Zn)-Dissolved | | | 97.2 | | % | | 70-130 | 04-OCT-13 |
| **Batch R2710958** | | | | | | | | |
| **WG1754155-26 MS** | | **L1368462-1** | | | | | | |
| Aluminum (Al)-Dissolved | | | 97.0 | | % | | 70-130 | 04-OCT-13 |
| Antimony (Sb)-Dissolved | | | 98.3 | | % | | 70-130 | 04-OCT-13 |
| Arsenic (As)-Dissolved | | | 96.2 | | % | | 70-130 | 04-OCT-13 |
| Barium (Ba)-Dissolved | | | N/A | MS-B | % | | - | 04-OCT-13 |
| Beryllium (Be)-Dissolved | | | 95.5 | | % | | 70-130 | 04-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 89.6 | | % | | 70-130 | 04-OCT-13 |
| Boron (B)-Dissolved | | | 80.0 | | % | | 70-130 | 04-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 96.9 | | % | | 70-130 | 04-OCT-13 |
| Chromium (Cr)-Dissolved | | | 94.6 | | % | | 70-130 | 04-OCT-13 |
| Cobalt (Co)-Dissolved | | | 95.1 | | % | | 70-130 | 04-OCT-13 |
| Copper (Cu)-Dissolved | | | 94.4 | | % | | 70-130 | 04-OCT-13 |
| Lead (Pb)-Dissolved | | | 92.5 | | % | | 70-130 | 04-OCT-13 |
| Lithium (Li)-Dissolved | | | 95.4 | | % | | 70-130 | 04-OCT-13 |
| Manganese (Mn)-Dissolved | | | N/A | MS-B | % | | - | 04-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 97.8 | | % | | 70-130 | 04-OCT-13 |
| Nickel (Ni)-Dissolved | | | 92.6 | | % | | 70-130 | 04-OCT-13 |
| Selenium (Se)-Dissolved | | | 103.0 | | % | | 70-130 | 04-OCT-13 |
| Silver (Ag)-Dissolved | | | 82.8 | | % | | 70-130 | 04-OCT-13 |
| Sodium (Na)-Dissolved | | | N/A | MS-B | % | | - | 04-OCT-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 04-OCT-13 |
| Thallium (Tl)-Dissolved | | | 94.5 | | % | | 70-130 | 04-OCT-13 |
| Tin (Sn)-Dissolved | | | 96.3 | | % | | 70-130 | 04-OCT-13 |
| Titanium (Ti)-Dissolved | | | 100.9 | | % | | 70-130 | 04-OCT-13 |
| Uranium (U)-Dissolved | | | 96.9 | | % | | 70-130 | 04-OCT-13 |
| Vanadium (V)-Dissolved | | | 96.6 | | % | | 70-130 | 04-OCT-13 |
| Zinc (Zn)-Dissolved | | | 92.9 | | % | | 70-130 | 04-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch** **R2711951** | | | | | | | | |
| **WG1754155-24 MS** | | **L1367715-1** | | | | | | |
| Aluminum (Al)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Antimony (Sb)-Dissolved | | | 99.7 | | % | | 70-130 | 05-OCT-13 |
| Arsenic (As)-Dissolved | | | 97.3 | | % | | 70-130 | 05-OCT-13 |
| Barium (Ba)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Beryllium (Be)-Dissolved | | | 94.3 | | % | | 70-130 | 05-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 91.1 | | % | | 70-130 | 05-OCT-13 |
| Boron (B)-Dissolved | | | 96.0 | | % | | 70-130 | 05-OCT-13 |
| Cadmium (Cd)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Chromium (Cr)-Dissolved | | | 93.4 | | % | | 70-130 | 05-OCT-13 |
| Cobalt (Co)-Dissolved | | | 93.4 | | % | | 70-130 | 05-OCT-13 |
| Copper (Cu)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Lead (Pb)-Dissolved | | | 94.5 | | % | | 70-130 | 05-OCT-13 |
| Lithium (Li)-Dissolved | | | 101.6 | | % | | 70-130 | 05-OCT-13 |
| Manganese (Mn)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 95.1 | | % | | 70-130 | 05-OCT-13 |
| Nickel (Ni)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Selenium (Se)-Dissolved | | | 99.7 | | % | | 70-130 | 05-OCT-13 |
| Silver (Ag)-Dissolved | | | 76.8 | | % | | 70-130 | 05-OCT-13 |
| Sodium (Na)-Dissolved | | | 94.5 | | % | | 70-130 | 05-OCT-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 05-OCT-13 |
| Thallium (Tl)-Dissolved | | | 95.4 | | % | | 70-130 | 05-OCT-13 |
| Tin (Sn)-Dissolved | | | 96.9 | | % | | 70-130 | 05-OCT-13 |
| Titanium (Ti)-Dissolved | | | 90.5 | | % | | 70-130 | 05-OCT-13 |
| Uranium (U)-Dissolved | | | 97.1 | | % | | 70-130 | 05-OCT-13 |
| Vanadium (V)-Dissolved | | | 95.4 | | % | | 70-130 | 05-OCT-13 |
| Zinc (Zn)-Dissolved | | | 93.9 | | % | | 70-130 | 05-OCT-13 |
| **MET-DIS-LOW-ICP-VA** | **Water** | | | | | | | |
| **Batch** **R2701362** | | | | | | | | |
| **WG1754155-2 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Calcium (Ca)-Dissolved | | | 99.5 | | % | | 80-120 | 25-SEP-13 |
| Iron (Fe)-Dissolved | | | 97.9 | | % | | 80-120 | 25-SEP-13 |
| Magnesium (Mg)-Dissolved | | | 98.8 | | % | | 80-120 | 25-SEP-13 |
| Phosphorus (P)-Dissolved | | | 97.5 | | % | | 80-120 | 25-SEP-13 |
| Potassium (K)-Dissolved | | | 98.2 | | % | | 80-120 | 25-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-DIS-LOW-ICP-VA** | **Water** | | | | | | | |
| **Batch R2701362** | | | | | | | | |
| **WG1754155-2 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Silicon (Si)-Dissolved | | | 102.8 | | % | | 80-120 | 25-SEP-13 |
| **WG1754155-1 MB** | | | | | | | | |
| Calcium (Ca)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 25-SEP-13 |
| Iron (Fe)-Dissolved | | | <0.010 | | mg/L | | 0.01 | 25-SEP-13 |
| Magnesium (Mg)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 25-SEP-13 |
| Phosphorus (P)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 25-SEP-13 |
| Potassium (K)-Dissolved | | | <0.10 | | mg/L | | 0.1 | 25-SEP-13 |
| Silicon (Si)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 25-SEP-13 |
| **NH3-F-VA** | **Water** | | | | | | | |
| **Batch R2705547** | | | | | | | | |
| **WG1758133-2 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 99.0 | | % | | 85-115 | 30-SEP-13 |
| **WG1758133-4 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 97.8 | | % | | 85-115 | 30-SEP-13 |
| **WG1758133-6 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 101.1 | | % | | 85-115 | 30-SEP-13 |
| **WG1758133-1 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1758133-3 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1758133-5 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1758133-10 MS** | | **L1368905-2** | | | | | | |
| Ammonia, Total (as N) | | | 101.9 | | % | | 75-125 | 30-SEP-13 |
| **WG1758133-8 MS** | | **L1367671-10** | | | | | | |
| Ammonia, Total (as N) | | | 97.6 | | % | | 75-125 | 30-SEP-13 |
| **Batch R2706015** | | | | | | | | |
| **WG1758881-10 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 93.2 | | % | | 85-115 | 01-OCT-13 |
| **WG1758881-2 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 98.4 | | % | | 85-115 | 01-OCT-13 |
| **WG1758881-4 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 96.1 | | % | | 85-115 | 01-OCT-13 |
| **WG1758881-6 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 96.2 | | % | | 85-115 | 01-OCT-13 |
| **WG1758881-8 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 96.2 | | % | | 85-115 | 01-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **NH3-F-VA** | **Water** | | | | | | | |
| **Batch R2706015** | | | | | | | | |
| **WG1758881-1 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758881-3 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758881-5 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758881-7 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758881-9 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758881-12 MS** | | **L1369725-1** | | | | | | |
| Ammonia, Total (as N) | | | 94.3 | | % | | 75-125 | 01-OCT-13 |
| **WG1758881-14 MS** | | **L1369725-11** | | | | | | |
| Ammonia, Total (as N) | | | 95.5 | | % | | 75-125 | 01-OCT-13 |
| **WG1758881-16 MS** | | **L1366437-1** | | | | | | |
| Ammonia, Total (as N) | | | 93.6 | | % | | 75-125 | 01-OCT-13 |
| **PH-MAN-WR** | **Water** | | | | | | | |
| **Batch R2700817** | | | | | | | | |
| **WG1754057-2 DUP** | | **L1367036-1** | | | | | | |
| pH | | 6.51 | 6.52 | J | pH | 0.01 | 0.2 | 24-SEP-13 |
| **WG1754057-1 LCS** | | | | | | | | |
| pH | | | 7 | | pH | | 6.9-7.1 | 24-SEP-13 |
| **WG1754057-3 LCS** | | | | | | | | |
| pH | | | 7.03 | | pH | | 6.9-7.1 | 24-SEP-13 |
| **PH-PCT-VA** | **Water** | | | | | | | |
| **Batch R2714789** | | | | | | | | |
| **WG1765901-25 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.03 | | pH | | 6.9-7.1 | 11-OCT-13 |
| **WG1765901-26 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.04 | | pH | | 6.9-7.1 | 12-OCT-13 |
| **WG1765901-27 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.04 | | pH | | 6.9-7.1 | 12-OCT-13 |
| **WG1765901-28 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.01 | | pH | | 6.9-7.1 | 12-OCT-13 |
| **WG1765901-29 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.00 | | pH | | 6.9-7.1 | 12-OCT-13 |
| **WG1765901-30 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.04 | | pH | | 6.9-7.1 | 12-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **PH-PCT-VA** | **Water** | | | | | | | |
| **Batch R2714789** | | | | | | | | |
| **WG1765901-31 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.02 | | pH | | 6.9-7.1 | 12-OCT-13 |
| **WG1765901-32 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.02 | | pH | | 6.9-7.1 | 12-OCT-13 |
| **S-DIS-ICP-VA** | **Water** | | | | | | | |
| **Batch R2701362** | | | | | | | | |
| **WG1754155-2 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Sulfur (S)-Dissolved | | | 99.5 | | % | | 80-120 | 25-SEP-13 |
| **WG1754155-1 MB** | | | | | | | | |
| Sulfur (S)-Dissolved | | | <0.50 | | mg/L | | 0.5 | 25-SEP-13 |
| **Batch R2708986** | | | | | | | | |
| **WG1754155-4 MS** | | **L1366731-4** | | | | | | |
| Sulfur (S)-Dissolved | | | 101.8 | | % | | 70-130 | 03-OCT-13 |
| **Batch R2710910** | | | | | | | | |
| **WG1754155-24 MS** | | **L1367715-1** | | | | | | |
| Sulfur (S)-Dissolved | | | 98.9 | | % | | 70-130 | 05-OCT-13 |
| **S2-T-COL-VA** | **Water** | | | | | | | |
| **Batch R2702996** | | | | | | | | |
| **WG1755085-2 CRM** | | **VA-S2-C** | | | | | | |
| Sulphide as S | | | 109.4 | | % | | 75-125 | 25-SEP-13 |
| **WG1755085-5 CRM** | | **VA-S2-C** | | | | | | |
| Sulphide as S | | | 108.9 | | % | | 75-125 | 25-SEP-13 |
| **WG1755085-3 DUP** | | **L1367036-1** | | | | | | |
| Sulphide as S | | 0.074 | 0.071 | | mg/L | 3.4 | 20 | 25-SEP-13 |
| **WG1755085-1 MB** | | | | | | | | |
| Sulphide as S | | | <0.020 | | mg/L | | 0.02 | 25-SEP-13 |
| **WG1755085-4 MB** | | | | | | | | |
| Sulphide as S | | | <0.020 | | mg/L | | 0.02 | 25-SEP-13 |
| **TKN-F-VA** | **Water** | | | | | | | |
| **Batch R2704314** | | | | | | | | |
| **WG1756958-2 LCS** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | 94.4 | | % | | 75-125 | 28-SEP-13 |
| **WG1756958-6 LCS** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | 89.3 | | % | | 75-125 | 28-SEP-13 |
| **WG1756958-1 MB** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | <0.050 | | mg/L | | 0.05 | 28-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **TKN-F-VA** | **Water** | | | | | | | |
| **Batch R2704314** | | | | | | | | |
| **WG1756958-5 MB** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | <0.050 | | mg/L | | 0.05 | 28-SEP-13 |
| **WG1756958-4 MS** | | **L1366819-1** | | | | | | |
| Total Kjeldahl Nitrogen | | | 98.4 | | % | | 70-130 | 28-SEP-13 |
| **WG1756958-8 MS** | | **L1367671-7** | | | | | | |
| Total Kjeldahl Nitrogen | | | 2.2 | MSTN | % | | 70-130 | 28-SEP-13 |
| **Batch R2705930** | | | | | | | | |
| **WG1757930-9 DUP** | | **L1367036-43** | | | | | | |
| Total Kjeldahl Nitrogen | | 7.00 | 7.51 | | mg/L | 7.0 | 20 | 01-OCT-13 |
| **WG1757930-2 LCS** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | 91.4 | | % | | 75-125 | 01-OCT-13 |
| **WG1757930-6 LCS** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | 99.9 | | % | | 75-125 | 01-OCT-13 |
| **WG1757930-1 MB** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | <0.050 | | mg/L | | 0.05 | 01-OCT-13 |
| **WG1757930-5 MB** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | <0.050 | | mg/L | | 0.05 | 01-OCT-13 |
| **WG1757930-4 MS** | | **L1367057-2** | | | | | | |
| Total Kjeldahl Nitrogen | | | 109.3 | | % | | 70-130 | 01-OCT-13 |
| **WG1757930-8 MS** | | **L1370207-3** | | | | | | |
| Total Kjeldahl Nitrogen | | | 101.2 | | % | | 70-130 | 01-OCT-13 |
| **Batch R2706562** | | | | | | | | |
| **WG1758228-2 LCS** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | 103.6 | | % | | 75-125 | 01-OCT-13 |
| **WG1758228-6 LCS** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | 96.3 | | % | | 75-125 | 01-OCT-13 |
| **WG1758228-1 MB** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | <0.050 | | mg/L | | 0.05 | 01-OCT-13 |
| **WG1758228-5 MB** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | <0.050 | | mg/L | | 0.05 | 01-OCT-13 |
| **WG1758228-4 MS** | | **L1366437-1** | | | | | | |
| Total Kjeldahl Nitrogen | | | 92.4 | | % | | 70-130 | 01-OCT-13 |
| **WG1758228-8 MS** | | **L1368340-1** | | | | | | |
| Total Kjeldahl Nitrogen | | | 93.6 | | % | | 70-130 | 01-OCT-13 |

**Legend:**

| | |
|---|---|
| Limit | ALS Control Limit (Data Quality Objectives) |
| DUP | Duplicate |
| RPD | Relative Percent Difference |
| N/A | Not Available |
| LCS | Laboratory Control Sample |
| SRM | Standard Reference Material |
| MS | Matrix Spike |
| MSD | Matrix Spike Duplicate |
| ADE | Average Desorption Efficiency |
| MB | Method Blank |
| IRM | Internal Reference Material |
| CRM | Certified Reference Material |
| CCV | Continuing Calibration Verification |
| CVS | Calibration Verification Standard |
| LCSD | Laboratory Control Sample Duplicate |

**Sample Parameter Qualifier Definitions:**

| Qualifier | Description |
|---|---|
| J | Duplicate results and limits are expressed in terms of absolute difference. |
| MS-B | Matrix Spike recovery could not be accurately calculated due to high analyte background in sample. |
| MSTN | TKN Matrix Spike recovery was low due to interference from high nitrate, which causes negative bias on TKN. |
| RPD-NA | Relative Percent Difference Not Available due to result(s) being less than detection limit. |

**Hold Time Exceedances:**

| ALS Product Description | Sample ID | Sampling Date | Date Processed | Rec. HT | Actual HT | Units | Qualifier |
|---|---|---|---|---|---|---|---|
| **Physical Tests** | | | | | | | |
| pH by Meter | | | | | | | |
| | 1 | 18-SEP-13 12:00 | 24-SEP-13 16:01 | 24 | 148 | hours | EHTR |
| | 5 | 18-SEP-13 12:00 | 24-SEP-13 16:01 | 24 | 148 | hours | EHTR |
| | 8 | 18-SEP-13 12:00 | 24-SEP-13 16:01 | 24 | 148 | hours | EHTR |
| | 12 | 18-SEP-13 12:00 | 24-SEP-13 16:01 | 24 | 148 | hours | EHTR |
| | 16 | 18-SEP-13 12:00 | 24-SEP-13 16:01 | 24 | 148 | hours | EHTR |
| | 20 | 18-SEP-13 12:00 | 24-SEP-13 16:01 | 24 | 148 | hours | EHTR |
| | 24 | 18-SEP-13 12:00 | 24-SEP-13 16:01 | 24 | 148 | hours | EHTR |
| | 27 | 19-SEP-13 12:00 | 24-SEP-13 16:01 | 24 | 124 | hours | EHTR |
| | 30 | 19-SEP-13 12:00 | 24-SEP-13 16:01 | 24 | 124 | hours | EHTR |
| | 33 | 19-SEP-13 12:00 | 24-SEP-13 16:01 | 24 | 124 | hours | EHTR |
| | 40 | 19-SEP-13 12:00 | 24-SEP-13 16:01 | 24 | 124 | hours | EHTR |
| | 43 | 19-SEP-13 12:00 | 24-SEP-13 16:01 | 24 | 124 | hours | EHTR |
| | 46 | 19-SEP-13 12:00 | 24-SEP-13 16:01 | 24 | 124 | hours | EHTR |
| | 49 | 19-SEP-13 12:00 | 24-SEP-13 16:01 | 24 | 124 | hours | EHTR |
| | 53 | 19-SEP-13 12:00 | 24-SEP-13 16:01 | 24 | 124 | hours | EHTR |
| | 57 | 20-SEP-13 12:00 | 24-SEP-13 16:01 | 24 | 100 | hours | EHTL |
| | 60 | 19-SEP-13 12:00 | 24-SEP-13 16:01 | 24 | 124 | hours | EHTR |
| pH by Meter (Automated) | | | | | | | |
| | 64 | Not provided | 12-OCT-13 23:00 | 0.25 | 558 | hours | EHTR-FM |
| **Anions and Nutrients** | | | | | | | |
| Alkalinity by Colourimetric (Automated) | | | | | | | |
| | 64 | Not provided | 11-OCT-13 13:15 | 14 | 22 | days | EHT |
| Nitrate Nitrogen by Ion Chromatography | | | | | | | |
| | 1 | 18-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 5 | days | EHTL |
| | 5 | 18-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 5 | days | EHTL |
| | 8 | 18-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 5 | days | EHTL |
| | 12 | 18-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 5 | days | EHTL |
| | 16 | 18-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 5 | days | EHTL |
| | 20 | 18-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 5 | days | EHTL |
| | 24 | 18-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 5 | days | EHTL |
| | 27 | 19-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 4 | days | EHT |
| | 30 | 19-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 4 | days | EHT |
| | 33 | 19-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 4 | days | EHT |
| | 40 | 19-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 4 | days | EHT |
| | 43 | 19-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 4 | days | EHT |
| | 46 | 19-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 4 | days | EHT |
| | 49 | 19-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 4 | days | EHT |
| | 53 | 19-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 4 | days | EHT |
| | 60 | 19-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 4 | days | EHT |
| Nitrite Nitrogen by Ion Chromatography | | | | | | | |
| | 1 | 18-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 5 | days | EHTL |
| | 5 | 18-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 5 | days | EHTL |
| | 8 | 18-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 5 | days | EHTL |
| | 12 | 18-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 5 | days | EHTL |
| | 16 | 18-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 5 | days | EHTL |
| | 20 | 18-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 5 | days | EHTL |
| | 24 | 18-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 5 | days | EHTL |
| | 27 | 19-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 4 | days | EHT |
| | 30 | 19-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 4 | days | EHT |
| | 33 | 19-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 4 | days | EHT |
| | 40 | 19-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 4 | days | EHT |
| | 43 | 19-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 4 | days | EHT |
| | 46 | 19-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 4 | days | EHT |
| | 49 | 19-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 4 | days | EHT |
| | 53 | 19-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 4 | days | EHT |
| | 60 | 19-SEP-13 12:00 | 23-SEP-13 20:30 | 3 | 4 | days | EHT |

**Hold Time Exceedances:**

| ALS Product Description | Sample ID | Sampling Date | Date Processed | Rec. HT | Actual HT | Units | Qualifier |
|---|---|---|---|---|---|---|---|
| **Cyanides** | | | | | | | |
| Free Cyanide in water by CFA | | | | | | | |
| | 20 | 18-SEP-13 12:00 | 03-OCT-13 12:27 | 14 | 15 | days | EHT |
| Total Cyanide in water by CFA | | | | | | | |
| | 20 | 18-SEP-13 12:00 | 03-OCT-13 12:06 | 14 | 15 | days | EHT |
| Weak Acid Diss. Cyanide in water by CFA | | | | | | | |
| | 20 | 18-SEP-13 12:00 | 03-OCT-13 12:22 | 14 | 15 | days | EHT |

**Legend & Qualifier Definitions:**

| | |
|---|---|
| EHTR-FM: | Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended. |
| EHTR: | Exceeded ALS recommended hold time prior to sample receipt. |
| EHTL: | Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry. |
| EHT: | Exceeded ALS recommended hold time prior to analysis. |
| Rec. HT: | ALS recommended hold time (see units). |

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1367036 were received on 20-SEP-13 17:10.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

---

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

**Chain of Custody / Analytical Request Form**
**Canada Toll Free: 1 800 668 9878**
www.alsglobal.com

COC # _____



| Report To | | Report Format / Distribution | Service Requested *(Rush for routine analysis subject to availability)* |
|---|---|---|---|
| Company: | AMEC Environment & Infrastructure | ☑ Standard ☐ Other | ◉ Regular (Standard Turnaround Times - Business Days) |
| Contact: | Leslie Hardy | ☑ PDF ☑ Excel ☐ Digital ☐ Fax | ○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT |
| Address: | 5681-70 Street, Edmonton, AB | Email 1: leslie.hardy@amec.com | ○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT |
| | | Email 2: | ○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT |
| Phone: | 780-989-4581 Fax: 780-435-8425 | Email 3: | |
| Invoice To | Same as Report ? ☑ Yes ☐ No | Client / Project Information | Analysis Request |
| Hardcopy of Invoice with Report? | ☑ Yes ☐ No | Job #: VM00605E.5230 | *Please indicate below Filtered, Preserved or both (F, P, F/P)* |
| Company: | | PO / AFE: | |
| Contact: | | LSD: | |
| Address: | | | |
| Phone: | Fax: | Quote #: Q40561 AMEC (Yukon) v3 | |
| Lab Work Order # (lab use only) | | ALS Contact: | Sampler: |

| Sample # | Sample Identification (This description will appear on the report) | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | General Chemistry | Diss Metals (F/P, HNO3) | Thiocyanate (P, NaOH) | Cyanides (P, NaOH) | TIC | Nutrients (P, H2SO4) | Cyanides (Pb ace, F/P, NaOH) | Thiocyanate (Pb Ace,F/P,HNO3) | | Diss Metals (DO NOT ADD ACID | Thiocyanate (P, HNO3) | Sulphide | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MW09-08 Standard Preservation | 18-Sep-13 | | Water | X | X | X | X | X | X | | | | | | X | 7 |
| | MW09-08 Alternate Preservation #1 (SCN with HNO3) | 18-Sep-13 | | Water | | | | | | | | | | | X | | 1 |
| | MW09-08 Alternate Preservation #2 (Sulphide Removed) | 18-Sep-13 | | Water | | | | | | | X | X | | | | | 2 |
| | MW09-08 Alternate Preservation #3 (Unpreserved) | 18-Sep-13 | | Water | | | | | | | | | | X | | | 1 |
| | MW09-24 Standard Preservation | 18-Sep-13 | | Water | X | X | X | X | X | X | | | | | | | 6 |
| | MW09-24 Alternate Preservation #1 (SCN with HNO3) | 18-Sep-13 | | | | | | | | | | | | | X | | 1 |
| | MW09-24 Alternate Preservation #3 (Unpreserved) | 18-Sep-13 | | | | | | | | | | | | X | | | 1 |
| | | | | | | | | | | | | | | | | | |
| | MW09-07 Standard Preservation | 18-Sep-13 | | | X | X | X | X | X | X | | | | | | X | 7 |
| | MW09-07 Alternate Preservation #1 (SCN with HNO3) | 18-Sep-13 | | | | | | | | | | | | | X | | 1 |
| | MW09-07 Alternate Preservation #2 (Sulphide Removed) | 18-Sep-13 | | | | | | | | | X | X | | | | | 2 |
| | MW09-07 Alternate Preservation #3 (Unpreserved) | 18-Sep-13 | | | | | | | | | | | | X | | | 1 |
| | Field Duplicate C Standard Preservation | 18-Sep-13 | | | X | X | X | X | X | X | | | | | | X | 7 |
| | Field Duplicate C Alternate Preservation #1 (SCN with HNO3) | 18-Sep-13 | | | | | | | | | | | | | X | | 1 |
| | Field Duplicate C Alternate Preservation #2 (Sulphide Removed) | 18-Sep-13 | | | | | | | | | X | X | | | | | 2 |
| | Field Duplicate C Alternate Preservation #3 (Unpreserved) | 18-Sep-13 | | | | | | | | | | | | X | | | 1 |

L1367036-COFC

**Special Instructions / Regulations with water or land use (CCME-Freshwater A**

**al/AB Tier 1 - Natural, etc) / Hazardous Details**

*DO NOT ADD ACID to dissolved metals samples that are to remain unpreserved (as noted on bottle labels).*

**Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

**Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.**

| SHIPMENT RELEASE (client use) | | | SHIPMENT RECEPTION (lab use only) | | | | SHIPMENT VERIFICATION (lab use only) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Released by: | Date (dd-mmm-yy) | Time (hh-mm) | Received by: | Date: | Time: | Temperature: | Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
| Nicole Fulcher | 20-Sep-13 | 17:00 | | 20-Sept-13 | 5:10 | °C | | | | |



3.8, 6.8, 3.0, 3.3 °C

ALS Environmental

# Chain of Custody / Analytical Request Form

**Canada Toll Free: 1 800 668 9878**

www.alsglobal.com

COC # _____



| Report To | | | | Report Format / Distribution | | | | Service Requested *(Rush for routine analysis subject to availability)* |
|---|---|---|---|---|---|---|---|---|
| Company: | AMEC Environment & Infrastructure | | | ☑ Standard ☐ Other | | | | ◉ Regular (Standard Turnaround Times - Business Days) |
| Contact: | Leslie Hardy | | | ☑ PDF ☑ Excel ☐ Digital ☐ Fax | | | | ○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT |
| Address: | 5681-70 Street, Edmonton, AB | | | Email 1: leslie.hardy@amec.com | | | | ○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT |
| | | | | Email 2: | | | | ○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT |
| Phone: | 780-989-4581 | Fax: | 780-435-8425 | Email 3: | | | | |
| Invoice To | Same as Report ? | ☑ Yes | ☐ No | Client / Project Information | | | | Analysis Request |
| Hardcopy of Invoice with Report? | | ☑ Yes | ☐ No | Job #: | VM00605E.5230 | | | *Please indicate below Filtered, Preserved or both (F, P, F/P)* |
| Company: | | | | PO / AFE: | | | | |
| Contact: | | | | LSD: | | | | |
| Address: | | | | | | | | |
| Phone: | | Fax: | | Quote #: | Q40561 AMEC (Yukon) v3 | | | |
| Lab Work Order # (lab use only) | | | | ALS Contact: | | Sampler: | | |

| Sample # | Sample Identification (This description will appear on the report) | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | General Chemistry | Diss Metals (F/P, HNO3) | Thiocyanate (P, NaOH) | Cyanides (P, NaOH) | TIC | Nutrients (P, H2SO4) | Cyanides (Pb ace, F/P, NaOH) | Thiocyanate (Pb Ace,F/P,HNO3) | | Diss Metals (DO NOT ADD ACID | Thiocyanate (P, HNO3) | Sulphide | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MW09-05 Standard Preservation | 18-Sep-13 | | Water | X | X | X | X | X | X | | | | | | | 6 |
| | MW09-05 Alternate Preservation #1 (SCN with HNO3) | 18-Sep-13 | | Water | | | | | | | | | | | X | | 1 |
| | MW09-05 Alternate Preservation #3 (Unpreserved) | 18-Sep-13 | | Water | | | | | | | | | | X | | | 1 |
| | | | | | | | | | | | | | | | | | |
| | MW09-04 Standard Preservation | 18-Sep-13 | | Water | X | X | X | X | X | X | | | | | | | 6 |
| | MW09-04 Alternate Preservation #1 (SCN with HNO3) | 18-Sep-13 | | | | | | | | | | | | | X | | 1 |
| | MW09-04 Alternate Preservation #3 (Unpreserved) | 18-Sep-13 | | | | | | | | | | | | X | | | 1 |
| | | | | | | | | | | | | | | | | | |
| | MW09-22 Standard Preservation | 18-Sep-13 | | | X | X | X | X | X | X | | | | | | | 6 |
| | MW09-22 Alternate Preservation #1 (SCN with HNO3) | 18-Sep-13 | | | | | | | | | | | | | X | | 1 |
| | MW09-22 Alternate Preservation #3 (Unpreserved) | 18-Sep-13 | | | | | | | | | | | | X | | | 1 |
| | | | | | | | | | | | | | | | | | |
| | MW09-16 Standard Preservation | 19-Sep-13 | | | X | X | X | X | X | X | | | | | | | 6 |
| | MW09-16 Alternate Preservation #1 (SCN with HNO3) | 19-Sep-13 | | | | | | | | | | | | | X | | 1 |
| | MW09-16 Alternate Preservation #3 (Unpreserved) | 19-Sep-13 | | | | | | | | | | | | X | | | 1 |
| | | | | | | | | | | | | | | | | | |

L1367036-COFC

**Special Instructions / Regulations with water or land use (CCME-Freshwater Ac** **/AB Tier 1 - Natural, etc) / Hazardous Details**

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***Bottle labels should match analysis. If there are issues please contact Leslie.*

**Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

ALS Environmental

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**Canada Toll Free: 1 800 668 9878**

www.alsglobal.com

COC # _____



| Report To | | Report Format / Distribution | Service Requested *(Rush for routine analysis subject to availability)* |
|---|---|---|---|
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| | | Email 2: | ○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT |
| Phone: | 780-989-4581 Fax: 780-435-8425 | Email 3: | |
| Invoice To | Same as Report ? ☑ Yes ☐ No | Client / Project Information | Analysis Request |
| Hardcopy of Invoice with Report? | ☑ Yes ☐ No | Job #: VM00605E.5230 | *Please indicate below Filtered, Preserved or both (F, P, F/P)* |
| Company: | | PO / AFE: | |
| Contact: | | LSD: | |
| Address: | | | |
| Phone: | Fax: | Quote #: Q40561 AMEC (Yukon) v3 | |
| Lab Work Order # (lab use only) | | ALS Contact: | Sampler: |

| Sample # | Sample Identification (This description will appear on the report) | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | General Chemistry | Diss Metals (F/P, HNO3) | Thiocyanate (P, NaOH) | Cyanides (P, NaOH) | TIC | Nutrients (P, H2SO4) | Cyanides (Pb ace, F/P, NaOH) | Thiocyanate (Pb Ace,F/P,HNO3) | | Diss Metals (DO NOT ADD ACID | Thiocyanate (P, HNO3) | Sulphide | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MW09-18 Standard Preservation | 19-Sep-13 | | Water | X | X | X | X | X | X | | | | | | | 6 |
| | MW09-18 Alternate Preservation #1 (SCN with HNO3) | 19-Sep-13 | | Water | | | | | | | | | | | X | | 1 |
| | MW09-18 Alternate Preservation #3 (Unpreserved) | 19-Sep-13 | | Water | | | | | | | | | | X | | | 1 |
| | MW09-17 Standard Preservation | 19-Sep-13 | | Water | X | X | X | X | X | X | | | | | | | 6 |
| | MW09-17 Alternate Preservation #1 (SCN with HNO3) | 19-Sep-13 | | | | | | | | | | | | | X | | 1 |
| | MW09-17 Alternate Preservation #3 (Unpreserved) | 19-Sep-13 | | | | | | | | | | | | X | | | 1 |
| | MP09-10 Standard Preservation | 19-Sep-13 | | | | X | X | | | | | | | | | | 2 |
| | MP09-10 Alternate Preservation #1 (SCN with HNO3) | 19-Sep-13 | | | | | | | | | | | | X | X | | 2 |
| | MP09-11 Alternate Preservation #3 (Unpreserved) | 19-Sep-13 | | | | | | | | | | | | X | | | 1 |
| | GLL07-02 Standard Preservation | 19-Sep-13 | | | X | X | X | X | X | X | | | | | | | 6 |
| | GLL07-02 Alternate Preservation #1 (SCN with HNO3) | 19-Sep-13 | | | | | | | | | | | | | X | | 1 |
| | GLL07-02 Alternate Preservation #3 (Unpreserved) | 19-Sep-13 | | | | | | | | | | | | X | | | 1 |
| | MW09-23 Standard Preservation | 19-Sep-13 | | | X | X | X | X | X | X | | | | | | | 6 |
| | MW09-23 Alternate Preservation #1 (SCN with HNO3) | 19-Sep-13 | | | | | | | | | | | | | X | | 1 |
| | MW09-23 Alternate Preservation #3 (Unpreserved) | 19-Sep-13 | | | | | | | | | | | | X | | | 1 |
| | | | | | | | | | | | | | | | | | |

L1367036-COFC

**Special Instructions / Regulations with water or land use (CCME-Freshwater A... ...al/AB Tier 1 - Natural, etc) / Hazardous Details**

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***Bottle labels should match analysis. If there are issues please contact Leslie.*

**Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

ALS Environmental

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**Canada Toll Free: 1 800 668 9878**

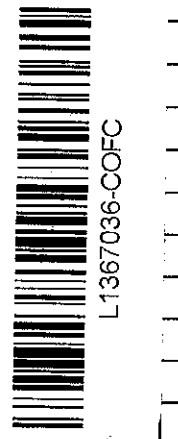
www.alsglobal.com

COC # _____



| Report To | | Report Format / Distribution | Service Requested *(Rush for routine analysis subject to availability)* |
|---|---|---|---|
| Company: | AMEC Environment & Infrastructure | ☑ Standard ☐ Other | ◉ Regular (Standard Turnaround Times - Business Days) |
| Contact: | Leslie Hardy | ☑ PDF ☑ Excel ☐ Digital ☐ Fax | ○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT |
| Address: | 5681-70 Street, Edmonton, AB | Email 1: leslie.hardy@amec.com | ○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT |
| | | Email 2: | ○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT |
| Phone: | 780-989-4581 Fax: 780-435-8425 | Email 3: | **Analysis Request** |
| **Invoice To** | Same as Report ? ☑ Yes ☐ No | **Client / Project Information** | *Please indicate below Filtered, Preserved or both (F, P, F/P)* |
| Hardcopy of Invoice with Report? | ☑ Yes ☐ No | Job #: VM00605E.5230 | |
| Company: | | PO / AFE: | |
| Contact: | | LSD: | |
| Address: | | | |
| Phone: | Fax: | Quote #: Q40561 AMEC (Yukon) v3 | |
| Lab Work Order # (lab use only) | | **ALS Contact:** | **Sampler:** |

| Sample # | Sample Identification (This description will appear on the report) | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | General Chemistry | Diss Metals (F/P, HNO3) | Thiocyanate (P, NaOH) | Cyanides (P, NaOH) | TIC | Nutrients (P, H2SO4) | Cyanides (Pb ace, F/P, NaOH) | Thiocyanate (Pb Ace,F/P,HNO3) | | Diss Metals (DO NOT ADD ACID | Thiocyanate (P, HNO3) | Sulphide | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MW09-21 Standard Preservation | 19-Sep-13 | | Water | X | X | X | X | X | X | | | | | | | 6 |
| | MW09-21 Alternate Preservation #1 (SCN with HNO3) | 19-Sep-13 | | Water | | | | | | | | | | | X | | 1 |
| | MW09-21 Alternate Preservation #3 (Unpreserved) | 19-Sep-13 | | Water | | | | | | | | | | X | | | 1 |
| | MW09-19 Standard Preservation | 19-Sep-13 | | Water | X | X | X | X | X | X | | | | | | X | 7 |
| | MW09-19 Alternate Preservation #1 (SCN with HNO3) | 19-Sep-13 | | Water | | | | | | | | | | | X | | 1 |
| | MW09-19 Alternate Preservation #2 (Sulphide Removed) | 19-Sep-13 | | | | | | | | | X | X | | | | | 2 |
| | MW09-19 Alternate Preservation #3 (Unpreserved) | 19-Sep-13 | | | | | | | | | | | | X | | | 1 |
| | GLL07-03 Standard Preservation | 19-Sep-13 | | | X | X | X | X | X | X | | | | | | X | 7 |
| | GLL07-03 Alternate Preservation #1 (SCN with HNO3) | 19-Sep-13 | | | | | | | | | | | | | X | | 1 |
| | GLL07-03 Alternate Preservation #2 (Sulphide Removed) | 19-Sep-13 | | | | | | | | | X | X | | | | | 2 |
| | GLL07-03 Alternate Preservation #3 (Unpreserved) | 19-Sep-13 | | | | | | | | | | | | X | | | 1 |
| | W1410383-BH03 Standard Preservation | 20-Sep-13 | | | X | X | X | X | X | X | | | | | | | 6 |
| | W1410383-BH03 Alternate Preservation #1 (SCN with HNO3) | 20-Sep-13 | | | | | | | | | | | | | X | | 1 |
| | W1410383-BH03 Alternate Preservation #3 (Unpreserved) | 20-Sep-13 | | | | | | | | | | | | X | | | 1 |
| | Field Duplicate D Standard Preservation | 19-Sep-13 | | | X | X | X | X | X | X | | | | | | | 6 |
| | Field Duplicate D Alternate Preservation #1 (SCN with HNO3) | 19-Sep-13 | | | | | | | | | | | | | X | | 1 |
| | Field Duplicate D Alternate Preservation #2 (Sulphide Removed) | 19-Sep-13 | | | | | | | | | X | X | | | | | 2 |
| | Field Duplicate D Alternate Preservation #3 (Unpreserved) | 19-Sep-13 | | | | | | | | | | | | X | | | 1 |
| | | | | | | | | | | | | | | | | | |



AMEC EARTH & ENVIRONMENTAL
ATTN: Leslie Hardy
5681 - 70 Street
Edmonton AB T6B 3P6

Date Received: 19-SEP-13
Report Date: 16-OCT-13 17:20 (MT)
Version: FINAL

Client Phone: 780-436-2152

# Certificate of Analysis

**Lab Work Order #: L1365603**

Project P.O. #: NOT SUBMITTED
Job Reference: VM00605E.5230
C of C Numbers: 1, 2, 3, 4, 5
Legal Site Desc:

Dean Watt
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1365603-1 | L1365603-2 | L1365603-3 | L1365603-4 | L1365603-5 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | MW09-01 STANDARD PRESERVATION | MW09-01 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-01 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MW09-01 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-02 STANDARD PRESERVATION |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | 1740 | | | | 2750 |
| | Hardness (as CaCO3) (mg/L) | 858 | | | 882 | 1860 |
| | pH (pH) | 7.42 | | | | 7.25 |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | 341 | | | | 97.4 |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | <1.0 | | | | <1.0 |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | <1.0 | | | | <1.0 |
| | Alkalinity, Total (as CaCO3) (mg/L) | 341 | | | | 97.4 |
| | Ammonia, Total (as N) (mg/L) | 12.8 | | | | 10.3 |
| | Chloride (Cl) (mg/L) | <5.0 DLA | | | | <10 DLA |
| | Fluoride (F) (mg/L) | <0.20 DLA | | | | 0.75 |
| | Nitrate (as N) (mg/L) | <0.050 DLA | | | | <0.10 DLA |
| | Nitrite (as N) (mg/L) | <0.010 DLA | | | | 0.024 |
| | Total Kjeldahl Nitrogen (mg/L) | 18.1 | | | | 11.5 |
| | Sulfate (SO4) (mg/L) | 753 | | | | 1860 |
| | Sulphide as S (mg/L) | 0.272 | | | | <0.020 |
| | Anion Sum (meq/L) | 22.5 | | | | 40.8 |
| | Cation Sum (meq/L) | 23.1 | | | | 41.7 |
| | Cation - Anion Balance (%) | 1.3 | | | | 1.1 |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | <0.0050 | | 0.0100 | | <0.0050 |
| | Cyanide, Total (mg/L) | 0.506 | | 0.512 | | <0.0050 |
| | Thiocyanate (SCN) (mg/L) | 7.11 | 7.38 | 8.99 | | <0.50 |
| | Cyanide, Free (mg/L) | <0.0050 | | <0.0050 | | <0.0050 |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | 76.3 | | | | 17.2 |
| | Total Organic Carbon (mg/L) | 76.0 | | | | 6.31 |
| **Total Metals** | Aluminum (Al)-Total (mg/L) | | | | | |
| | Antimony (Sb)-Total (mg/L) | | | | | |
| | Arsenic (As)-Total (mg/L) | | | | | |
| | Barium (Ba)-Total (mg/L) | | | | | |
| | Beryllium (Be)-Total (mg/L) | | | | | |
| | Bismuth (Bi)-Total (mg/L) | | | | | |
| | Boron (B)-Total (mg/L) | | | | | |
| | Cadmium (Cd)-Total (mg/L) | | | | | |
| | Calcium (Ca)-Total (mg/L) | | | | | |
| | Chromium (Cr)-Total (mg/L) | | | | | |
| | Cobalt (Co)-Total (mg/L) | | | | | |
| | Copper (Cu)-Total (mg/L) | | | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1365603-6 | L1365603-7 | L1365603-8 | L1365603-9 | L1365603-10 |
|---|---|---|---|---|---|---|
| Sample ID | | L1365603-6 | L1365603-7 | L1365603-8 | L1365603-9 | L1365603-10 |
| Description | | Water | Water | Water | Water | Water |
| Sampled Date | | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 |
| Sampled Time | | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| Client ID | | MW09-02 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-02 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MW09-02 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-03 STANDARD PRESERVATION | MW09-03 ALTERNATE PRESERVATION #1 (SCN WITH HN03) |
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | | | 2490 | |
| | Hardness (as CaCO3) (mg/L) | | | 1930 | 1520 | |
| | pH (pH) | | | | 7.45 | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | | | | 41.7 | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | | | | <1.0 | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | | | | <1.0 | |
| | Alkalinity, Total (as CaCO3) (mg/L) | | | | 41.7 | |
| | Ammonia, Total (as N) (mg/L) | | | | 7.72 | |
| | Chloride (Cl) (mg/L) | | | | <10 DLA | |
| | Fluoride (F) (mg/L) | | | | 0.64 | |
| | Nitrate (as N) (mg/L) | | | | 2.68 | |
| | Nitrite (as N) (mg/L) | | | | 0.098 | |
| | Total Kjeldahl Nitrogen (mg/L) | | | | 9.87 | |
| | Sulfate (SO4) (mg/L) | | | | 1660 | |
| | Sulphide as S (mg/L) | | | | | |
| | Anion Sum (meq/L) | | | | 35.7 | |
| | Cation Sum (meq/L) | | | | 34.6 | |
| | Cation - Anion Balance (%) | | | | -1.5 | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | 0.0060 | | <0.0050 | |
| | Cyanide, Total (mg/L) | | 0.0200 | | 0.0066 | |
| | Thiocyanate (SCN) (mg/L) | <0.50 | <0.50 | | 0.57 | <0.50 |
| | Cyanide, Free (mg/L) | | <0.0050 | | <0.0050 | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | | | 7.94 | |
| | Total Organic Carbon (mg/L) | | | | 11.9 | |
| **Total Metals** | Aluminum (Al)-Total (mg/L) | | | | | |
| | Antimony (Sb)-Total (mg/L) | | | | | |
| | Arsenic (As)-Total (mg/L) | | | | | |
| | Barium (Ba)-Total (mg/L) | | | | | |
| | Beryllium (Be)-Total (mg/L) | | | | | |
| | Bismuth (Bi)-Total (mg/L) | | | | | |
| | Boron (B)-Total (mg/L) | | | | | |
| | Cadmium (Cd)-Total (mg/L) | | | | | |
| | Calcium (Ca)-Total (mg/L) | | | | | |
| | Chromium (Cr)-Total (mg/L) | | | | | |
| | Cobalt (Co)-Total (mg/L) | | | | | |
| | Copper (Cu)-Total (mg/L) | | | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | Sample ID | L1365603-11 | L1365603-12 | L1365603-13 | L1365603-14 | L1365603-15 |
|---|---|---|---|---|---|---|---|
| | | Description | Water | Water | Water | Water | Water |
| | | Sampled Date | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 |
| | | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | | Client ID | MW09-03 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MW09-03 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-04 STANDARD PRESERVATION | MW09-04 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-04 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) |
| **WATER** | | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | | | 2480 | | |
| | Hardness (as CaCO3) (mg/L) | | | 1600 | 1610 | | |
| | pH (pH) | | | | 7.77 | | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | | | | 40.0 | | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | | | | <1.0 | | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | | | | <1.0 | | |
| | Alkalinity, Total (as CaCO3) (mg/L) | | | | 40.0 | | |
| | Ammonia, Total (as N) (mg/L) | | | | 8.75 | | |
| | Chloride (Cl) (mg/L) | | | | <10 DLA | | |
| | Fluoride (F) (mg/L) | | | | 0.66 | | |
| | Nitrate (as N) (mg/L) | | | | <0.10 DLA | | |
| | Nitrite (as N) (mg/L) | | | | <0.020 DLA | | |
| | Total Kjeldahl Nitrogen (mg/L) | | | | 9.86 | | |
| | Sulfate (SO4) (mg/L) | | | | 1660 | | |
| | Sulphide as S (mg/L) | | | | | | |
| | Anion Sum (meq/L) | | | | 35.4 | | |
| | Cation Sum (meq/L) | | | | 36.3 | | |
| | Cation - Anion Balance (%) | | | | 1.3 | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | <0.0050 | | <0.0050 | | <0.0050 |
| | Cyanide, Total (mg/L) | | <0.0050 | | <0.0050 | | <0.0050 |
| | Thiocyanate (SCN) (mg/L) | | <0.50 | | 0.56 | <0.50 | <0.50 |
| | Cyanide, Free (mg/L) | | <0.0050 | | <0.0050 | | <0.0050 |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | | | 7.40 | | |
| | Total Organic Carbon (mg/L) | | | | 5.92 | | |
| **Total Metals** | Aluminum (Al)-Total (mg/L) | | | | | | |
| | Antimony (Sb)-Total (mg/L) | | | | | | |
| | Arsenic (As)-Total (mg/L) | | | | | | |
| | Barium (Ba)-Total (mg/L) | | | | | | |
| | Beryllium (Be)-Total (mg/L) | | | | | | |
| | Bismuth (Bi)-Total (mg/L) | | | | | | |
| | Boron (B)-Total (mg/L) | | | | | | |
| | Cadmium (Cd)-Total (mg/L) | | | | | | |
| | Calcium (Ca)-Total (mg/L) | | | | | | |
| | Chromium (Cr)-Total (mg/L) | | | | | | |
| | Cobalt (Co)-Total (mg/L) | | | | | | |
| | Copper (Cu)-Total (mg/L) | | | | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1365603-16 Water 17-SEP-13 12:00 MW09-04 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1365603-17 Water 17-SEP-13 12:00 MP09-09 STANDARD PRESERVATION | L1365603-18 Water 17-SEP-13 12:00 MP09-09 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1365603-19 Water 17-SEP-13 12:00 MP09-09 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | L1365603-20 Water 17-SEP-13 12:00 MP09-09 ALTERNATE PRESERVATION #3 (UNPRESERVED) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | 457 | | | |
| | Hardness (as CaCO3) (mg/L) | 1670 | 200 | | | 203 |
| | pH (pH) | | 8.54 | | | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | | 113 | | | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | | 11.2 | | | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | | <1.0 | | | |
| | Alkalinity, Total (as CaCO3) (mg/L) | | 124 | | | |
| | Ammonia, Total (as N) (mg/L) | | 3.21 | | | |
| | Chloride (Cl) (mg/L) | | 2.26 | | | |
| | Fluoride (F) (mg/L) | | 1.45 | | | |
| | Nitrate (as N) (mg/L) | | 0.0096 | | | |
| | Nitrite (as N) (mg/L) | | 0.0066 | | | |
| | Total Kjeldahl Nitrogen (mg/L) | | 6.59 | | | |
| | Sulfate (SO4) (mg/L) | | 101 | | | |
| | Sulphide as S (mg/L) | | <0.20 DLM | | | |
| | Anion Sum (meq/L) | | 4.72 | | | |
| | Cation Sum (meq/L) | | 5.22 | | | |
| | Cation - Anion Balance (%) | | 5.0 | | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | 0.0058 | | 0.320 | |
| | Cyanide, Total (mg/L) | | 2.37 | | 0.324 | |
| | Thiocyanate (SCN) (mg/L) | | 0.99 | <0.50 | <0.50 | |
| | Cyanide, Free (mg/L) | | <0.0050 | | 0.278 | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | 21.1 | | | |
| | Total Organic Carbon (mg/L) | | 28.5 | | | |
| **Total Metals** | Aluminum (Al)-Total (mg/L) | | | | | |
| | Antimony (Sb)-Total (mg/L) | | | | | |
| | Arsenic (As)-Total (mg/L) | | | | | |
| | Barium (Ba)-Total (mg/L) | | | | | |
| | Beryllium (Be)-Total (mg/L) | | | | | |
| | Bismuth (Bi)-Total (mg/L) | | | | | |
| | Boron (B)-Total (mg/L) | | | | | |
| | Cadmium (Cd)-Total (mg/L) | | | | | |
| | Calcium (Ca)-Total (mg/L) | | | | | |
| | Chromium (Cr)-Total (mg/L) | | | | | |
| | Cobalt (Co)-Total (mg/L) | | | | | |
| | Copper (Cu)-Total (mg/L) | | | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | Sample ID | L1365603-21 | L1365603-24 | L1365603-25 | L1365603-26 | L1365603-27 |
|---|---|---|---|---|---|---|---|
| | | Description | Water | Water | Water | Water | Water |
| | | Sampled Date | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 |
| | | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | | Client ID | MP09-10 STANDARD PRESERVATION | MP09-10 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MP09-11 STANDARD PRESERVATION | MP09-11 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MP09-11 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) |
| **WATER** | | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | 495 | | 1080 | | |
| | Hardness (as CaCO3) (mg/L) | | | 705 | 642 | | |
| | pH (pH) | | 9.15 | | 7.84 | | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | | 90.9 | | 686 | | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | | 49.9 | | <1.0 | | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | | <1.0 | | <1.0 | | |
| | Alkalinity, Total (as CaCO3) (mg/L) | | 141 | | 686 | | |
| | Ammonia, Total (as N) (mg/L) | | 3.23 | | 4.40 | | |
| | Chloride (Cl) (mg/L) | | 2.79 | | <5.0 DLA | | |
| | Fluoride (F) (mg/L) | | 1.62 | | 0.50 | | |
| | Nitrate (as N) (mg/L) | | 0.0330 | | <0.050 DLA | | |
| | Nitrite (as N) (mg/L) | | 0.0053 | | 0.029 | | |
| | Total Kjeldahl Nitrogen (mg/L) | | 35.2 | | 11.2 | | |
| | Sulfate (SO4) (mg/L) | | 108 | | 15.4 | | |
| | Sulphide as S (mg/L) | | | | | | |
| | Anion Sum (meq/L) | | | | 14.1 | | |
| | Cation Sum (meq/L) | | | | 15.0 | | |
| | Cation - Anion Balance (%) | | | | 3.2 | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | 0.0196 | | <0.0050 | | <0.0050 |
| | Cyanide, Total (mg/L) | | 2.07 | | 0.901 | | <0.0050 |
| | Thiocyanate (SCN) (mg/L) | | | | 1.18 | 0.80 | <0.50 |
| | Cyanide, Free (mg/L) | | 0.0071 | | <0.0050 | | <0.0050 |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | 37.3 | | 146 | | |
| | Total Organic Carbon (mg/L) | | 52.5 | | 62.8 | | |
| **Total Metals** | Aluminum (Al)-Total (mg/L) | | | | | | |
| | Antimony (Sb)-Total (mg/L) | | | | | | |
| | Arsenic (As)-Total (mg/L) | | | | | | |
| | Barium (Ba)-Total (mg/L) | | | | | | |
| | Beryllium (Be)-Total (mg/L) | | | | | | |
| | Bismuth (Bi)-Total (mg/L) | | | | | | |
| | Boron (B)-Total (mg/L) | | | | | | |
| | Cadmium (Cd)-Total (mg/L) | | | | | | |
| | Calcium (Ca)-Total (mg/L) | | | | | | |
| | Chromium (Cr)-Total (mg/L) | | | | | | |
| | Cobalt (Co)-Total (mg/L) | | | | | | |
| | Copper (Cu)-Total (mg/L) | | | | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1365603-29 Water 17-SEP-13 12:00 MP09-12 STANDARD PRESERVATION | L1365603-30 Water 17-SEP-13 12:00 MP09-12 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1365603-31 Water 17-SEP-13 12:00 MP09-12 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | L1365603-32 Water 17-SEP-13 12:00 MP09-12 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1365603-33 Water 17-SEP-13 12:00 FIELD DUP A STANDARD PRESERVATION |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | 929 | | | | 1120 |
| | Hardness (as CaCO3) (mg/L) | 602 | | | 585 | 630 |
| | pH (pH) | 7.71 | | | | 7.78 |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | 430 | | | | 709 |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | <1.0 | | | | <1.0 |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | <1.0 | | | | <1.0 |
| | Alkalinity, Total (as CaCO3) (mg/L) | 430 | | | | 709 |
| | Ammonia, Total (as N) (mg/L) | 4.67 | | | | 4.02 |
| | Chloride (Cl) (mg/L) | <5.0 DLA | | | | <5.0 DLA |
| | Fluoride (F) (mg/L) | 0.35 | | | | 0.57 |
| | Nitrate (as N) (mg/L) | 0.056 | | | | <0.050 DLA |
| | Nitrite (as N) (mg/L) | 0.019 | | | | 0.012 |
| | Total Kjeldahl Nitrogen (mg/L) | 9.30 | | | | 10.5 |
| | Sulfate (SO4) (mg/L) | 145 | | | | 15.9 |
| | Sulphide as S (mg/L) | | | | | |
| | Anion Sum (meq/L) | 11.6 | | | | 14.5 |
| | Cation Sum (meq/L) | 13.3 | | | | 14.7 |
| | Cation - Anion Balance (%) | 6.6 | | | | 0.5 |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | <0.0050 | | <0.0050 | | <0.0050 |
| | Cyanide, Total (mg/L) | 0.158 | | <0.0050 | | 0.909 |
| | Thiocyanate (SCN) (mg/L) | 0.70 | <0.50 | <0.50 | | 0.70 |
| | Cyanide, Free (mg/L) | <0.0050 | | <0.0050 | | <0.0050 |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | 81.0 | | | | 158 |
| | Total Organic Carbon (mg/L) | 19.6 | | | | 61.1 |
| **Total Metals** | Aluminum (Al)-Total (mg/L) | | | | | |
| | Antimony (Sb)-Total (mg/L) | | | | | |
| | Arsenic (As)-Total (mg/L) | | | | | |
| | Barium (Ba)-Total (mg/L) | | | | | |
| | Beryllium (Be)-Total (mg/L) | | | | | |
| | Bismuth (Bi)-Total (mg/L) | | | | | |
| | Boron (B)-Total (mg/L) | | | | | |
| | Cadmium (Cd)-Total (mg/L) | | | | | |
| | Calcium (Ca)-Total (mg/L) | | | | | |
| | Chromium (Cr)-Total (mg/L) | | | | | |
| | Cobalt (Co)-Total (mg/L) | | | | | |
| | Copper (Cu)-Total (mg/L) | | | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1365603-34 Water 17-SEP-13 12:00 FIELD DUP A ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1365603-35 Water 17-SEP-13 12:00 FIELD DUP A ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | L1365603-36 Water 17-SEP-13 12:00 FIELD DUP A ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1365603-37 Water 17-SEP-13 12:00 FIELD DUP B STANDARD PRESERVATION | L1365603-38 Water 17-SEP-13 12:00 FIELD DUP B ALTERNATE PRESERVATION #1 (SCN WITH HN03) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | | | 2790 | |
| | Hardness (as CaCO3) (mg/L) | | | 665 | 1860 | |
| | pH (pH) | | | | 7.33 | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | | | | 97.9 | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | | | | <1.0 | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | | | | <1.0 | |
| | Alkalinity, Total (as CaCO3) (mg/L) | | | | 97.9 | |
| | Ammonia, Total (as N) (mg/L) | | | | 9.86 | |
| | Chloride (Cl) (mg/L) | | | | <10 DLA | |
| | Fluoride (F) (mg/L) | | | | 0.73 | |
| | Nitrate (as N) (mg/L) | | | | 0.16 | |
| | Nitrite (as N) (mg/L) | | | | 0.031 | |
| | Total Kjeldahl Nitrogen (mg/L) | | | | 10.4 | |
| | Sulfate (SO4) (mg/L) | | | | 1890 | |
| | Sulphide as S (mg/L) | | | | | |
| | Anion Sum (meq/L) | | | | 41.3 | |
| | Cation Sum (meq/L) | | | | 41.4 | |
| | Cation - Anion Balance (%) | | | | 0.2 | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | <0.0050 | | <0.0050 | |
| | Cyanide, Total (mg/L) | | <0.0050 | | 0.0072 | |
| | Thiocyanate (SCN) (mg/L) | 0.84 | <0.50 | | <0.50 | <0.50 |
| | Cyanide, Free (mg/L) | | <0.0050 | | <0.0050 | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | | | 17.6 | |
| | Total Organic Carbon (mg/L) | | | | 6.35 | |
| **Total Metals** | Aluminum (Al)-Total (mg/L) | | | | | |
| | Antimony (Sb)-Total (mg/L) | | | | | |
| | Arsenic (As)-Total (mg/L) | | | | | |
| | Barium (Ba)-Total (mg/L) | | | | | |
| | Beryllium (Be)-Total (mg/L) | | | | | |
| | Bismuth (Bi)-Total (mg/L) | | | | | |
| | Boron (B)-Total (mg/L) | | | | | |
| | Cadmium (Cd)-Total (mg/L) | | | | | |
| | Calcium (Ca)-Total (mg/L) | | | | | |
| | Chromium (Cr)-Total (mg/L) | | | | | |
| | Cobalt (Co)-Total (mg/L) | | | | | |
| | Copper (Cu)-Total (mg/L) | | | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | Sample ID | L1365603-39 | L1365603-40 | L1365603-41 | L1365603-42 | L1365603-44 |
|---|---|---|---|---|---|---|---|
| | | Description | Water | Water | Water | Water | Water |
| | | Sampled Date | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 |
| | | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | | Client ID | FIELD DUP B ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | FIELD DUP B ALTERNATE PRESERVATION #3 (UNPRESERVED) | SEEP STANDARD PRESERVATION | SEEP ALTERNATE PRESERVATION #1 (SCN WITH HN03) | SEEP ALTERNATE PRESERVATION #3 (UNPRESERVED) |
| **WATER** | | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | | | 1630 | | |
| | Hardness (as CaCO3) (mg/L) | | | 1930 | 924 | | 946 |
| | pH (pH) | | | | 7.52 | | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | | | | 266 | | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | | | | <1.0 | | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | | | | <1.0 | | |
| | Alkalinity, Total (as CaCO3) (mg/L) | | | | 266 | | |
| | Ammonia, Total (as N) (mg/L) | | | | 3.94 | | |
| | Chloride (Cl) (mg/L) | | | | <5.0 DLA | | |
| | Fluoride (F) (mg/L) | | | | <0.20 DLA | | |
| | Nitrate (as N) (mg/L) | | | | 1.21 | | |
| | Nitrite (as N) (mg/L) | | | | 0.029 | | |
| | Total Kjeldahl Nitrogen (mg/L) | | | | 5.69 | | |
| | Sulfate (SO4) (mg/L) | | | | 754 | | |
| | Sulphide as S (mg/L) | | | | <0.020 | | |
| | Anion Sum (meq/L) | | | | 21.1 | | |
| | Cation Sum (meq/L) | | | | 21.2 | | |
| | Cation - Anion Balance (%) | | | | 0.3 | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | <0.0050 | | 0.0088 | | |
| | Cyanide, Total (mg/L) | | 0.0093 | | 0.0899 | | |
| | Thiocyanate (SCN) (mg/L) | | <0.50 | | 2.97 | 2.90 | |
| | Cyanide, Free (mg/L) | | <0.0050 | | 0.0053 | | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | | | 57.5 | | |
| | Total Organic Carbon (mg/L) | | | | 17.0 | | |
| **Total Metals** | Aluminum (Al)-Total (mg/L) | | | | 0.0208 | | 0.0220 |
| | Antimony (Sb)-Total (mg/L) | | | | 0.00070 | | 0.00061 |
| | Arsenic (As)-Total (mg/L) | | | | 0.0487 | | 0.0467 |
| | Barium (Ba)-Total (mg/L) | | | | 0.0682 | | 0.0693 |
| | Beryllium (Be)-Total (mg/L) | | | | <0.00010 | | <0.00010 |
| | Bismuth (Bi)-Total (mg/L) | | | | <0.00050 | | <0.00050 |
| | Boron (B)-Total (mg/L) | | | | 0.067 | | 0.076 |
| | Cadmium (Cd)-Total (mg/L) | | | | 0.000544 | | 0.000546 |
| | Calcium (Ca)-Total (mg/L) | | | | 276 | | 282 |
| | Chromium (Cr)-Total (mg/L) | | | | 0.00056 | | 0.00052 |
| | Cobalt (Co)-Total (mg/L) | | | | 0.00738 | | 0.00745 |
| | Copper (Cu)-Total (mg/L) | | | | 0.00468 | | 0.00479 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1365603-1 | L1365603-2 | L1365603-3 | L1365603-4 | L1365603-5 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | MW09-01 STANDARD PRESERVATION | MW09-01 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-01 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MW09-01 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-02 STANDARD PRESERVATION |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Total Metals** | Iron (Fe)-Total (mg/L) | | | | | |
| | Lead (Pb)-Total (mg/L) | | | | | |
| | Lithium (Li)-Total (mg/L) | | | | | |
| | Magnesium (Mg)-Total (mg/L) | | | | | |
| | Manganese (Mn)-Total (mg/L) | | | | | |
| | Mercury (Hg)-Total (mg/L) | | | | | |
| | Molybdenum (Mo)-Total (mg/L) | | | | | |
| | Nickel (Ni)-Total (mg/L) | | | | | |
| | Phosphorus (P)-Total (mg/L) | | | | | |
| | Potassium (K)-Total (mg/L) | | | | | |
| | Selenium (Se)-Total (mg/L) | | | | | |
| | Silicon (Si)-Total (mg/L) | | | | | |
| | Silver (Ag)-Total (mg/L) | | | | | |
| | Sodium (Na)-Total (mg/L) | | | | | |
| | Strontium (Sr)-Total (mg/L) | | | | | |
| | Sulfur (S)-Total (mg/L) | | | | | |
| | Thallium (Tl)-Total (mg/L) | | | | | |
| | Tin (Sn)-Total (mg/L) | | | | | |
| | Titanium (Ti)-Total (mg/L) | | | | | |
| | Uranium (U)-Total (mg/L) | | | | | |
| | Vanadium (V)-Total (mg/L) | | | | | |
| | Zinc (Zn)-Total (mg/L) | | | | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | | | FIELD | FIELD |
| | Dissolved Metals Filtration Location | FIELD | | | FIELD | FIELD |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0422 | | | 0.0311 | <0.0020 DLA |
| | Antimony (Sb)-Dissolved (mg/L) | 0.00081 | | | 0.00071 | 0.00397 |
| | Arsenic (As)-Dissolved (mg/L) | 0.0870 | | | 0.0671 | 11.0 |
| | Barium (Ba)-Dissolved (mg/L) | 0.116 | | | 0.110 | 0.00676 |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00010 | | | <0.00010 | <0.00020 DLA |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.00050 | | | <0.00050 | <0.0010 DLA |
| | Boron (B)-Dissolved (mg/L) | 0.101 | | | 0.102 | 0.095 |
| | Cadmium (Cd)-Dissolved (mg/L) | 0.000328 | | | 0.000319 | 0.000825 |
| | Calcium (Ca)-Dissolved (mg/L) | 257 | | | 269 | 476 |
| | Chromium (Cr)-Dissolved (mg/L) | 0.00168 | | | 0.00131 | <0.00020 DLA |
| | Cobalt (Co)-Dissolved (mg/L) | 0.00582 | | | 0.00579 | 0.0119 |
| | Copper (Cu)-Dissolved (mg/L) | 0.00064 | | | 0.00091 | 0.00045 |
| | Iron (Fe)-Dissolved (mg/L) | 27.9 | | | 28.3 | 18.6 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1365603-6 | L1365603-7 | L1365603-8 | L1365603-9 | L1365603-10 |
|---|---|---|---|---|---|---|
| Sample ID | | L1365603-6 | L1365603-7 | L1365603-8 | L1365603-9 | L1365603-10 |
| Description | | Water | Water | Water | Water | Water |
| Sampled Date | | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 |
| Sampled Time | | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| Client ID | | MW09-02 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-02 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MW09-02 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-03 STANDARD PRESERVATION | MW09-03 ALTERNATE PRESERVATION #1 (SCN WITH HN03) |
| **WATER** | | | | | | |
| **Total Metals** | Iron (Fe)-Total (mg/L) | | | | | |
| | Lead (Pb)-Total (mg/L) | | | | | |
| | Lithium (Li)-Total (mg/L) | | | | | |
| | Magnesium (Mg)-Total (mg/L) | | | | | |
| | Manganese (Mn)-Total (mg/L) | | | | | |
| | Mercury (Hg)-Total (mg/L) | | | | | |
| | Molybdenum (Mo)-Total (mg/L) | | | | | |
| | Nickel (Ni)-Total (mg/L) | | | | | |
| | Phosphorus (P)-Total (mg/L) | | | | | |
| | Potassium (K)-Total (mg/L) | | | | | |
| | Selenium (Se)-Total (mg/L) | | | | | |
| | Silicon (Si)-Total (mg/L) | | | | | |
| | Silver (Ag)-Total (mg/L) | | | | | |
| | Sodium (Na)-Total (mg/L) | | | | | |
| | Strontium (Sr)-Total (mg/L) | | | | | |
| | Sulfur (S)-Total (mg/L) | | | | | |
| | Thallium (Tl)-Total (mg/L) | | | | | |
| | Tin (Sn)-Total (mg/L) | | | | | |
| | Titanium (Ti)-Total (mg/L) | | | | | |
| | Uranium (U)-Total (mg/L) | | | | | |
| | Vanadium (V)-Total (mg/L) | | | | | |
| | Zinc (Zn)-Total (mg/L) | | | | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | | | FIELD | FIELD | |
| | Dissolved Metals Filtration Location | | | FIELD | FIELD | |
| | Aluminum (Al)-Dissolved (mg/L) | | | DLA <0.0020 | DLA <0.0020 | |
| | Antimony (Sb)-Dissolved (mg/L) | | | 0.00440 | 0.654 | |
| | Arsenic (As)-Dissolved (mg/L) | | | 9.15 | 3.55 | |
| | Barium (Ba)-Dissolved (mg/L) | | | 0.00671 | 0.00998 | |
| | Beryllium (Be)-Dissolved (mg/L) | | | DLA <0.00020 | DLA <0.00020 | |
| | Bismuth (Bi)-Dissolved (mg/L) | | | DLA <0.0010 | DLA <0.0010 | |
| | Boron (B)-Dissolved (mg/L) | | | 0.101 | 0.152 | |
| | Cadmium (Cd)-Dissolved (mg/L) | | | 0.000940 | 0.000318 | |
| | Calcium (Ca)-Dissolved (mg/L) | | | 495 | 487 | |
| | Chromium (Cr)-Dissolved (mg/L) | | | DLA <0.00020 | DLA <0.00020 | |
| | Cobalt (Co)-Dissolved (mg/L) | | | 0.0122 | 0.00155 | |
| | Copper (Cu)-Dissolved (mg/L) | | | DLA <0.00040 | 0.00369 | |
| | Iron (Fe)-Dissolved (mg/L) | | | 15.0 | <0.010 | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1365603-11 | L1365603-12 | L1365603-13 | L1365603-14 | L1365603-15 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | MW09-03 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MW09-03 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-04 STANDARD PRESERVATION | MW09-04 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-04 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Total Metals** | Iron (Fe)-Total (mg/L) | | | | | |
| | Lead (Pb)-Total (mg/L) | | | | | |
| | Lithium (Li)-Total (mg/L) | | | | | |
| | Magnesium (Mg)-Total (mg/L) | | | | | |
| | Manganese (Mn)-Total (mg/L) | | | | | |
| | Mercury (Hg)-Total (mg/L) | | | | | |
| | Molybdenum (Mo)-Total (mg/L) | | | | | |
| | Nickel (Ni)-Total (mg/L) | | | | | |
| | Phosphorus (P)-Total (mg/L) | | | | | |
| | Potassium (K)-Total (mg/L) | | | | | |
| | Selenium (Se)-Total (mg/L) | | | | | |
| | Silicon (Si)-Total (mg/L) | | | | | |
| | Silver (Ag)-Total (mg/L) | | | | | |
| | Sodium (Na)-Total (mg/L) | | | | | |
| | Strontium (Sr)-Total (mg/L) | | | | | |
| | Sulfur (S)-Total (mg/L) | | | | | |
| | Thallium (Tl)-Total (mg/L) | | | | | |
| | Tin (Sn)-Total (mg/L) | | | | | |
| | Titanium (Ti)-Total (mg/L) | | | | | |
| | Uranium (U)-Total (mg/L) | | | | | |
| | Vanadium (V)-Total (mg/L) | | | | | |
| | Zinc (Zn)-Total (mg/L) | | | | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | | FIELD | FIELD | | |
| | Dissolved Metals Filtration Location | | FIELD | FIELD | | |
| | Aluminum (Al)-Dissolved (mg/L) | | <0.0020 DLA | 0.0031 | | |
| | Antimony (Sb)-Dissolved (mg/L) | | 0.777 | 0.222 | | |
| | Arsenic (As)-Dissolved (mg/L) | | 3.78 | 1.42 | | |
| | Barium (Ba)-Dissolved (mg/L) | | 0.0106 | 0.00705 | | |
| | Beryllium (Be)-Dissolved (mg/L) | | <0.00020 DLA | <0.00020 DLA | | |
| | Bismuth (Bi)-Dissolved (mg/L) | | <0.0010 DLA | <0.0010 DLA | | |
| | Boron (B)-Dissolved (mg/L) | | 0.183 | 0.251 | | |
| | Cadmium (Cd)-Dissolved (mg/L) | | 0.000333 | 0.000050 | | |
| | Calcium (Ca)-Dissolved (mg/L) | | 515 | 479 | | |
| | Chromium (Cr)-Dissolved (mg/L) | | <0.00020 DLA | <0.00020 DLA | | |
| | Cobalt (Co)-Dissolved (mg/L) | | 0.00165 | 0.00119 | | |
| | Copper (Cu)-Dissolved (mg/L) | | 0.00380 | 0.00079 | | |
| | Iron (Fe)-Dissolved (mg/L) | | <0.010 | <0.010 | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | | | | | | |
|---|---|---|---|---|---|---|
| | **Sample ID** | L1365603-16 | L1365603-17 | L1365603-18 | L1365603-19 | L1365603-20 |
| | **Description** | Water | Water | Water | Water | Water |
| | **Sampled Date** | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 |
| | **Sampled Time** | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | **Client ID** | MW09-04 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MP09-09 STANDARD PRESERVATION | MP09-09 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MP09-09 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MP09-09 ALTERNATE PRESERVATION #3 (UNPRESERVED) |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Total Metals** | Iron (Fe)-Total (mg/L) | | | | | |
| | Lead (Pb)-Total (mg/L) | | | | | |
| | Lithium (Li)-Total (mg/L) | | | | | |
| | Magnesium (Mg)-Total (mg/L) | | | | | |
| | Manganese (Mn)-Total (mg/L) | | | | | |
| | Mercury (Hg)-Total (mg/L) | | | | | |
| | Molybdenum (Mo)-Total (mg/L) | | | | | |
| | Nickel (Ni)-Total (mg/L) | | | | | |
| | Phosphorus (P)-Total (mg/L) | | | | | |
| | Potassium (K)-Total (mg/L) | | | | | |
| | Selenium (Se)-Total (mg/L) | | | | | |
| | Silicon (Si)-Total (mg/L) | | | | | |
| | Silver (Ag)-Total (mg/L) | | | | | |
| | Sodium (Na)-Total (mg/L) | | | | | |
| | Strontium (Sr)-Total (mg/L) | | | | | |
| | Sulfur (S)-Total (mg/L) | | | | | |
| | Thallium (Tl)-Total (mg/L) | | | | | |
| | Tin (Sn)-Total (mg/L) | | | | | |
| | Titanium (Ti)-Total (mg/L) | | | | | |
| | Uranium (U)-Total (mg/L) | | | | | |
| | Vanadium (V)-Total (mg/L) | | | | | |
| | Zinc (Zn)-Total (mg/L) | | | | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | FIELD | | | FIELD |
| | Dissolved Metals Filtration Location | FIELD | FIELD | | | FIELD |
| | Aluminum (Al)-Dissolved (mg/L) | <0.0020 DLA | 0.0021 | | | <0.0020 DLA |
| | Antimony (Sb)-Dissolved (mg/L) | 0.268 | 0.127 | | | 0.130 |
| | Arsenic (As)-Dissolved (mg/L) | 1.04 | 16.0 | | | 17.7 |
| | Barium (Ba)-Dissolved (mg/L) | 0.00644 | 0.00381 | | | 0.00371 |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00020 DLA | <0.00020 DLA | | | <0.00020 DLA |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.0010 DLA | <0.0010 DLA | | | <0.0010 DLA |
| | Boron (B)-Dissolved (mg/L) | 0.255 | <0.020 DLA | | | <0.020 DLA |
| | Cadmium (Cd)-Dissolved (mg/L) | 0.000051 | 0.000072 | | | 0.000077 |
| | Calcium (Ca)-Dissolved (mg/L) | 507 | 75.9 | | | 77.2 |
| | Chromium (Cr)-Dissolved (mg/L) | <0.00020 DLA | <0.00020 DLA | | | <0.00020 DLA |
| | Cobalt (Co)-Dissolved (mg/L) | 0.00126 | 0.0153 | | | 0.0181 |
| | Copper (Cu)-Dissolved (mg/L) | <0.00040 DLA | 0.171 | | | 0.285 |
| | Iron (Fe)-Dissolved (mg/L) | <0.010 | 0.048 | | | 0.067 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1365603-21 | L1365603-24 | L1365603-25 | L1365603-26 | L1365603-27 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | MP09-10 STANDARD PRESERVATION | MP09-10 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MP09-11 STANDARD PRESERVATION | MP09-11 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MP09-11 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Total Metals** | Iron (Fe)-Total (mg/L) | | | | | |
| | Lead (Pb)-Total (mg/L) | | | | | |
| | Lithium (Li)-Total (mg/L) | | | | | |
| | Magnesium (Mg)-Total (mg/L) | | | | | |
| | Manganese (Mn)-Total (mg/L) | | | | | |
| | Mercury (Hg)-Total (mg/L) | | | | | |
| | Molybdenum (Mo)-Total (mg/L) | | | | | |
| | Nickel (Ni)-Total (mg/L) | | | | | |
| | Phosphorus (P)-Total (mg/L) | | | | | |
| | Potassium (K)-Total (mg/L) | | | | | |
| | Selenium (Se)-Total (mg/L) | | | | | |
| | Silicon (Si)-Total (mg/L) | | | | | |
| | Silver (Ag)-Total (mg/L) | | | | | |
| | Sodium (Na)-Total (mg/L) | | | | | |
| | Strontium (Sr)-Total (mg/L) | | | | | |
| | Sulfur (S)-Total (mg/L) | | | | | |
| | Thallium (Tl)-Total (mg/L) | | | | | |
| | Tin (Sn)-Total (mg/L) | | | | | |
| | Titanium (Ti)-Total (mg/L) | | | | | |
| | Uranium (U)-Total (mg/L) | | | | | |
| | Vanadium (V)-Total (mg/L) | | | | | |
| | Zinc (Zn)-Total (mg/L) | | | | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | | FIELD | FIELD | | |
| | Dissolved Metals Filtration Location | | FIELD | FIELD | | |
| | Aluminum (Al)-Dissolved (mg/L) | | 0.0070 | 0.0094 | | |
| | Antimony (Sb)-Dissolved (mg/L) | | 0.0132 | 0.0101 | | |
| | Arsenic (As)-Dissolved (mg/L) | | 9.75 | 6.65 | | |
| | Barium (Ba)-Dissolved (mg/L) | | 0.155 | 0.145 | | |
| | Beryllium (Be)-Dissolved (mg/L) | | <0.00010 | <0.00010 | | |
| | Bismuth (Bi)-Dissolved (mg/L) | | <0.00050 | <0.00050 | | |
| | Boron (B)-Dissolved (mg/L) | | 0.056 | 0.054 | | |
| | Cadmium (Cd)-Dissolved (mg/L) | | 0.000085 | 0.000112 | | |
| | Calcium (Ca)-Dissolved (mg/L) | | 146 | 132 | | |
| | Chromium (Cr)-Dissolved (mg/L) | | 0.00186 | 0.00182 | | |
| | Cobalt (Co)-Dissolved (mg/L) | | 0.00355 | 0.00350 | | |
| | Copper (Cu)-Dissolved (mg/L) | | 0.00162 | 0.00255 | | |
| | Iron (Fe)-Dissolved (mg/L) | | 4.75 | 8.81 | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1365603-29 | L1365603-30 | L1365603-31 | L1365603-32 | L1365603-33 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | MP09-12 STANDARD PRESERVATION | MP09-12 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MP09-12 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MP09-12 ALTERNATE PRESERVATION #3 (UNPRESERVED) | FIELD DUP A STANDARD PRESERVATION |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Total Metals** | Iron (Fe)-Total (mg/L) | | | | | |
| | Lead (Pb)-Total (mg/L) | | | | | |
| | Lithium (Li)-Total (mg/L) | | | | | |
| | Magnesium (Mg)-Total (mg/L) | | | | | |
| | Manganese (Mn)-Total (mg/L) | | | | | |
| | Mercury (Hg)-Total (mg/L) | | | | | |
| | Molybdenum (Mo)-Total (mg/L) | | | | | |
| | Nickel (Ni)-Total (mg/L) | | | | | |
| | Phosphorus (P)-Total (mg/L) | | | | | |
| | Potassium (K)-Total (mg/L) | | | | | |
| | Selenium (Se)-Total (mg/L) | | | | | |
| | Silicon (Si)-Total (mg/L) | | | | | |
| | Silver (Ag)-Total (mg/L) | | | | | |
| | Sodium (Na)-Total (mg/L) | | | | | |
| | Strontium (Sr)-Total (mg/L) | | | | | |
| | Sulfur (S)-Total (mg/L) | | | | | |
| | Thallium (Tl)-Total (mg/L) | | | | | |
| | Tin (Sn)-Total (mg/L) | | | | | |
| | Titanium (Ti)-Total (mg/L) | | | | | |
| | Uranium (U)-Total (mg/L) | | | | | |
| | Vanadium (V)-Total (mg/L) | | | | | |
| | Zinc (Zn)-Total (mg/L) | | | | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | | | FIELD | FIELD |
| | Dissolved Metals Filtration Location | FIELD | | | FIELD | FIELD |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0031 | | | 0.0029 | 0.0082 |
| | Antimony (Sb)-Dissolved (mg/L) | 0.0220 | | | 0.0269 | 0.0104 |
| | Arsenic (As)-Dissolved (mg/L) | 3.98 | | | 4.15 | 5.86 |
| | Barium (Ba)-Dissolved (mg/L) | 0.208 | | | 0.195 | 0.136 |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00010 | | | <0.00010 | <0.00010 |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.00050 | | | <0.00050 | <0.00050 |
| | Boron (B)-Dissolved (mg/L) | 0.036 | | | 0.044 | 0.045 |
| | Cadmium (Cd)-Dissolved (mg/L) | 0.000629 | | | 0.000634 | 0.000098 |
| | Calcium (Ca)-Dissolved (mg/L) | 132 | | | 125 | 129 |
| | Chromium (Cr)-Dissolved (mg/L) | 0.00080 | | | 0.00074 | 0.00191 |
| | Cobalt (Co)-Dissolved (mg/L) | 0.00147 | | | 0.00142 | 0.00356 |
| | Copper (Cu)-Dissolved (mg/L) | 0.00273 | | | 0.00448 | 0.00214 |
| | Iron (Fe)-Dissolved (mg/L) | 3.49 | | | 2.69 | 7.75 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1365603-34 Water 17-SEP-13 12:00 FIELD DUP A ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1365603-35 Water 17-SEP-13 12:00 FIELD DUP A ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | L1365603-36 Water 17-SEP-13 12:00 FIELD DUP A ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1365603-37 Water 17-SEP-13 12:00 FIELD DUP B STANDARD PRESERVATION | L1365603-38 Water 17-SEP-13 12:00 FIELD DUP B ALTERNATE PRESERVATION #1 (SCN WITH HN03) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Total Metals** | Iron (Fe)-Total (mg/L) | | | | | |
| | Lead (Pb)-Total (mg/L) | | | | | |
| | Lithium (Li)-Total (mg/L) | | | | | |
| | Magnesium (Mg)-Total (mg/L) | | | | | |
| | Manganese (Mn)-Total (mg/L) | | | | | |
| | Mercury (Hg)-Total (mg/L) | | | | | |
| | Molybdenum (Mo)-Total (mg/L) | | | | | |
| | Nickel (Ni)-Total (mg/L) | | | | | |
| | Phosphorus (P)-Total (mg/L) | | | | | |
| | Potassium (K)-Total (mg/L) | | | | | |
| | Selenium (Se)-Total (mg/L) | | | | | |
| | Silicon (Si)-Total (mg/L) | | | | | |
| | Silver (Ag)-Total (mg/L) | | | | | |
| | Sodium (Na)-Total (mg/L) | | | | | |
| | Strontium (Sr)-Total (mg/L) | | | | | |
| | Sulfur (S)-Total (mg/L) | | | | | |
| | Thallium (Tl)-Total (mg/L) | | | | | |
| | Tin (Sn)-Total (mg/L) | | | | | |
| | Titanium (Ti)-Total (mg/L) | | | | | |
| | Uranium (U)-Total (mg/L) | | | | | |
| | Vanadium (V)-Total (mg/L) | | | | | |
| | Zinc (Zn)-Total (mg/L) | | | | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | | | FIELD | FIELD | |
| | Dissolved Metals Filtration Location | | | FIELD | FIELD | |
| | Aluminum (Al)-Dissolved (mg/L) | | | 0.0061 | 0.0024 | |
| | Antimony (Sb)-Dissolved (mg/L) | | | 0.0129 | 0.00429 | |
| | Arsenic (As)-Dissolved (mg/L) | | | 6.20 | 10.2 | |
| | Barium (Ba)-Dissolved (mg/L) | | | 0.123 | 0.00687 | |
| | Beryllium (Be)-Dissolved (mg/L) | | | <0.00010 | <0.00020 DLA | |
| | Bismuth (Bi)-Dissolved (mg/L) | | | <0.00050 | <0.0010 DLA | |
| | Boron (B)-Dissolved (mg/L) | | | 0.048 | 0.102 | |
| | Cadmium (Cd)-Dissolved (mg/L) | | | 0.000061 | 0.000948 | |
| | Calcium (Ca)-Dissolved (mg/L) | | | 135 | 463 | |
| | Chromium (Cr)-Dissolved (mg/L) | | | 0.00173 | <0.00020 DLA | |
| | Cobalt (Co)-Dissolved (mg/L) | | | 0.00374 | 0.0124 | |
| | Copper (Cu)-Dissolved (mg/L) | | | 0.00172 | <0.00040 DLA | |
| | Iron (Fe)-Dissolved (mg/L) | | | 6.47 | 17.1 | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1365603-39 | L1365603-40 | L1365603-41 | L1365603-42 | L1365603-44 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | FIELD DUP B ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | FIELD DUP B ALTERNATE PRESERVATION #3 (UNPRESERVED) | SEEP STANDARD PRESERVATION | SEEP ALTERNATE PRESERVATION #1 (SCN WITH HN03) | SEEP ALTERNATE PRESERVATION #3 (UNPRESERVED) |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Total Metals** | Iron (Fe)-Total (mg/L) | | | 9.18 | | 8.74 |
| | Lead (Pb)-Total (mg/L) | | | 0.000129 | | 0.000103 |
| | Lithium (Li)-Total (mg/L) | | | 0.00068 | | 0.00080 |
| | Magnesium (Mg)-Total (mg/L) | | | 57.0 | | 59.2 |
| | Manganese (Mn)-Total (mg/L) | | | 5.60 | | 5.61 |
| | Mercury (Hg)-Total (mg/L) | | | <0.000010 | | <0.000010 |
| | Molybdenum (Mo)-Total (mg/L) | | | 0.000914 | | 0.00106 |
| | Nickel (Ni)-Total (mg/L) | | | 0.00280 | | 0.00275 |
| | Phosphorus (P)-Total (mg/L) | | | <0.050 | | <0.050 |
| | Potassium (K)-Total (mg/L) | | | 5.76 | | 5.93 |
| | Selenium (Se)-Total (mg/L) | | | 0.00020 | | 0.00020 |
| | Silicon (Si)-Total (mg/L) | | | 6.56 | | 6.67 |
| | Silver (Ag)-Total (mg/L) | | | 0.000025 | | 0.000035 |
| | Sodium (Na)-Total (mg/L) | | | 37.5 | | 38.3 |
| | Strontium (Sr)-Total (mg/L) | | | 0.703 | | 0.830 |
| | Sulfur (S)-Total (mg/L) | | | 249 | | 254 |
| | Thallium (Tl)-Total (mg/L) | | | <0.000010 | | <0.000010 |
| | Tin (Sn)-Total (mg/L) | | | <0.00010 | | <0.00010 |
| | Titanium (Ti)-Total (mg/L) | | | <0.010 | | <0.010 |
| | Uranium (U)-Total (mg/L) | | | 0.00307 | | 0.00361 |
| | Vanadium (V)-Total (mg/L) | | | 0.0019 | | 0.0019 |
| | Zinc (Zn)-Total (mg/L) | | | 0.0084 | | 0.0084 |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | | FIELD | | | |
| | Dissolved Metals Filtration Location | | FIELD | | | |
| | Aluminum (Al)-Dissolved (mg/L) | | <0.0020 DLA | | | |
| | Antimony (Sb)-Dissolved (mg/L) | | 0.00462 | | | |
| | Arsenic (As)-Dissolved (mg/L) | | 11.7 | | | |
| | Barium (Ba)-Dissolved (mg/L) | | 0.00697 | | | |
| | Beryllium (Be)-Dissolved (mg/L) | | <0.00020 DLA | | | |
| | Bismuth (Bi)-Dissolved (mg/L) | | <0.0010 DLA | | | |
| | Boron (B)-Dissolved (mg/L) | | 0.098 | | | |
| | Cadmium (Cd)-Dissolved (mg/L) | | 0.000908 | | | |
| | Calcium (Ca)-Dissolved (mg/L) | | 492 | | | |
| | Chromium (Cr)-Dissolved (mg/L) | | <0.00020 DLA | | | |
| | Cobalt (Co)-Dissolved (mg/L) | | 0.0125 | | | |
| | Copper (Cu)-Dissolved (mg/L) | | 0.00057 | | | |
| | Iron (Fe)-Dissolved (mg/L) | | 1.10 | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1365603-1 Water 17-SEP-13 12:00 MW09-01 STANDARD PRESERVATION | L1365603-2 Water 17-SEP-13 12:00 MW09-01 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1365603-3 Water 17-SEP-13 12:00 MW09-01 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | L1365603-4 Water 17-SEP-13 12:00 MW09-01 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1365603-5 Water 17-SEP-13 12:00 MW09-02 STANDARD PRESERVATION |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Dissolved Metals** | Lead (Pb)-Dissolved (mg/L) | 0.000696 | | | 0.000562 | 0.00075 |
| | Lithium (Li)-Dissolved (mg/L) | 0.00141 | | | 0.00106 | 0.0140 |
| | Magnesium (Mg)-Dissolved (mg/L) | 52.6 | | | 50.9 | 164 |
| | Manganese (Mn)-Dissolved (mg/L) | 5.84 | | | 5.98 | 16.3 |
| | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | | | <0.000010 | <0.000010 |
| | Molybdenum (Mo)-Dissolved (mg/L) | 0.00123 | | | 0.00133 | 0.00767 |
| | Nickel (Ni)-Dissolved (mg/L) | 0.00289 | | | 0.00308 | 0.0040 |
| | Phosphorus (P)-Dissolved (mg/L) | 0.119 | | | <0.25 DLA | <0.050 |
| | Potassium (K)-Dissolved (mg/L) | 10.4 | | | 10.5 | 29.0 |
| | Selenium (Se)-Dissolved (mg/L) | 0.00024 | | | 0.00049 | <0.00020 DLA |
| | Silicon (Si)-Dissolved (mg/L) | 7.04 | | | 7.08 | 7.99 |
| | Silver (Ag)-Dissolved (mg/L) | 0.000010 | | | 0.000015 | <0.000020 DLA |
| | Sodium (Na)-Dissolved (mg/L) | 69.9 | | | 69.1 | 32.3 |
| | Strontium (Sr)-Dissolved (mg/L) | 0.744 | | | 0.742 | 0.872 |
| | Sulfur (S)-Dissolved (mg/L) | 237 | | | 245 | 616 |
| | Thallium (Tl)-Dissolved (mg/L) | <0.000010 | | | <0.000010 | 0.000381 |
| | Tin (Sn)-Dissolved (mg/L) | <0.00010 | | | <0.00010 | <0.00020 DLA |
| | Titanium (Ti)-Dissolved (mg/L) | <0.010 | | | <0.010 | <0.020 DLA |
| | Uranium (U)-Dissolved (mg/L) | 0.000804 | | | 0.000812 | 0.00101 |
| | Vanadium (V)-Dissolved (mg/L) | 0.0085 | | | 0.0064 | <0.0020 DLA |
| | Zinc (Zn)-Dissolved (mg/L) | 0.469 | | | 0.422 | 0.417 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1365603-6 | L1365603-7 | L1365603-8 | L1365603-9 | L1365603-10 |
|---|---|---|---|---|---|---|
| | Sample ID | L1365603-6 | L1365603-7 | L1365603-8 | L1365603-9 | L1365603-10 |
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | MW09-02 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MW09-02 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MW09-02 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MW09-03 STANDARD PRESERVATION | MW09-03 ALTERNATE PRESERVATION #1 (SCN WITH HN03) |
| **WATER** | | | | | | |
| **Dissolved Metals** | Lead (Pb)-Dissolved (mg/L) | | | 0.00064 | 0.00066 | |
| | Lithium (Li)-Dissolved (mg/L) | | | 0.0131 | <0.0010 DLA | |
| | Magnesium (Mg)-Dissolved (mg/L) | | | 169 | 73.7 | |
| | Manganese (Mn)-Dissolved (mg/L) | | | 15.9 | 1.21 | |
| | Mercury (Hg)-Dissolved (mg/L) | | | <0.000010 | <0.000010 | |
| | Molybdenum (Mo)-Dissolved (mg/L) | | | 0.00836 | 0.00768 | |
| | Nickel (Ni)-Dissolved (mg/L) | | | 0.0041 | 0.0014 | |
| | Phosphorus (P)-Dissolved (mg/L) | | | <0.10 DLA | 0.066 | |
| | Potassium (K)-Dissolved (mg/L) | | | 25.5 | 39.5 | |
| | Selenium (Se)-Dissolved (mg/L) | | | <0.00020 DLA | <0.00020 DLA | |
| | Silicon (Si)-Dissolved (mg/L) | | | 8.12 | 9.95 | |
| | Silver (Ag)-Dissolved (mg/L) | | | <0.000020 DLA | 0.000021 | |
| | Sodium (Na)-Dissolved (mg/L) | | | 31.4 | 60.6 | |
| | Strontium (Sr)-Dissolved (mg/L) | | | 0.910 | 1.19 | |
| | Sulfur (S)-Dissolved (mg/L) | | | 638 | 527 | |
| | Thallium (Tl)-Dissolved (mg/L) | | | 0.000408 | <0.000020 DLA | |
| | Tin (Sn)-Dissolved (mg/L) | | | <0.00020 DLA | 0.00046 | |
| | Titanium (Ti)-Dissolved (mg/L) | | | <0.020 DLA | <0.020 DLA | |
| | Uranium (U)-Dissolved (mg/L) | | | 0.00106 | 0.000395 | |
| | Vanadium (V)-Dissolved (mg/L) | | | <0.0020 DLA | <0.0020 DLA | |
| | Zinc (Zn)-Dissolved (mg/L) | | | 0.435 | 0.0300 | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1365603-11 Water 17-SEP-13 12:00 MW09-03 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | L1365603-12 Water 17-SEP-13 12:00 MW09-03 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1365603-13 Water 17-SEP-13 12:00 MW09-04 STANDARD PRESERVATION | L1365603-14 Water 17-SEP-13 12:00 MW09-04 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1365603-15 Water 17-SEP-13 12:00 MW09-04 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Dissolved Metals** | Lead (Pb)-Dissolved (mg/L) | | 0.00073 | 0.0162 | | |
| | Lithium (Li)-Dissolved (mg/L) | | 0.0014 | 0.0034 | | |
| | Magnesium (Mg)-Dissolved (mg/L) | | 77.1 | 102 | | |
| | Manganese (Mn)-Dissolved (mg/L) | | 1.26 | 2.77 | | |
| | Mercury (Hg)-Dissolved (mg/L) | | <0.000010 | <0.000010 | | |
| | Molybdenum (Mo)-Dissolved (mg/L) | | 0.00889 | 0.00708 | | |
| | Nickel (Ni)-Dissolved (mg/L) | | 0.0014 | <0.0010 DLA | | |
| | Phosphorus (P)-Dissolved (mg/L) | | 0.069 | <0.050 | | |
| | Potassium (K)-Dissolved (mg/L) | | 41.8 | 41.2 | | |
| | Selenium (Se)-Dissolved (mg/L) | | <0.00020 DLA | <0.00020 DLA | | |
| | Silicon (Si)-Dissolved (mg/L) | | 10.3 | 8.21 | | |
| | Silver (Ag)-Dissolved (mg/L) | | 0.000030 | <0.000020 DLA | | |
| | Sodium (Na)-Dissolved (mg/L) | | 63.9 | 51.1 | | |
| | Strontium (Sr)-Dissolved (mg/L) | | 1.41 | 1.24 | | |
| | Sulfur (S)-Dissolved (mg/L) | | 528 | 552 | | |
| | Thallium (Tl)-Dissolved (mg/L) | | <0.000020 DLA | <0.000020 DLA | | |
| | Tin (Sn)-Dissolved (mg/L) | | 0.00042 | <0.00020 DLA | | |
| | Titanium (Ti)-Dissolved (mg/L) | | <0.020 DLA | <0.020 DLA | | |
| | Uranium (U)-Dissolved (mg/L) | | 0.000456 | 0.000143 | | |
| | Vanadium (V)-Dissolved (mg/L) | | <0.0020 DLA | <0.0020 DLA | | |
| | Zinc (Zn)-Dissolved (mg/L) | | 0.0313 | 2.78 | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1365603-16 Water 17-SEP-13 12:00 MW09-04 ALTERNATE PRESERVATION #3 (UNPRESERVED) | L1365603-17 Water 17-SEP-13 12:00 MP09-09 STANDARD PRESERVATION | L1365603-18 Water 17-SEP-13 12:00 MP09-09 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | L1365603-19 Water 17-SEP-13 12:00 MP09-09 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | L1365603-20 Water 17-SEP-13 12:00 MP09-09 ALTERNATE PRESERVATION #3 (UNPRESERVED) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Dissolved Metals** | Lead (Pb)-Dissolved (mg/L) | 0.00152 | 0.00252 | | | 0.00215 |
| | Lithium (Li)-Dissolved (mg/L) | 0.0033 | DLA <0.0010 | | | DLA <0.0010 |
| | Magnesium (Mg)-Dissolved (mg/L) | 97.0 | 2.51 | | | 2.39 |
| | Manganese (Mn)-Dissolved (mg/L) | 2.62 | 0.390 | | | 0.408 |
| | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | <0.000010 | | | <0.000010 |
| | Molybdenum (Mo)-Dissolved (mg/L) | 0.00722 | 0.0145 | | | 0.0134 |
| | Nickel (Ni)-Dissolved (mg/L) | DLA <0.0010 | 0.0098 | | | 0.0120 |
| | Phosphorus (P)-Dissolved (mg/L) | <0.050 | 0.430 | | | 0.449 |
| | Potassium (K)-Dissolved (mg/L) | 41.3 | 11.2 | | | 10.2 |
| | Selenium (Se)-Dissolved (mg/L) | DLA <0.00020 | 0.00057 | | | 0.00067 |
| | Silicon (Si)-Dissolved (mg/L) | 7.16 | 14.9 | | | 16.2 |
| | Silver (Ag)-Dissolved (mg/L) | DLA <0.000020 | 0.000056 | | | 0.000083 |
| | Sodium (Na)-Dissolved (mg/L) | 56.7 | 15.8 | | | 17.2 |
| | Strontium (Sr)-Dissolved (mg/L) | 1.26 | 0.234 | | | 0.226 |
| | Sulfur (S)-Dissolved (mg/L) | 540 | 57.9 | | | 38.2 |
| | Thallium (Tl)-Dissolved (mg/L) | DLA <0.000020 | DLA <0.000020 | | | DLA <0.000020 |
| | Tin (Sn)-Dissolved (mg/L) | DLA <0.00020 | DLA <0.00020 | | | DLA <0.00020 |
| | Titanium (Ti)-Dissolved (mg/L) | DLA <0.020 | DLA <0.020 | | | DLA <0.020 |
| | Uranium (U)-Dissolved (mg/L) | 0.000121 | 0.00194 | | | 0.00215 |
| | Vanadium (V)-Dissolved (mg/L) | DLA <0.0020 | DLA <0.0020 | | | DLA <0.0020 |
| | Zinc (Zn)-Dissolved (mg/L) | 3.78 | 0.0052 | | | 0.0035 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1365603-21 | L1365603-24 | L1365603-25 | L1365603-26 | L1365603-27 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | MP09-10 STANDARD PRESERVATION | MP09-10 ALTERNATE PRESERVATION #3 (UNPRESERVED) | MP09-11 STANDARD PRESERVATION | MP09-11 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MP09-11 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Dissolved Metals** | Lead (Pb)-Dissolved (mg/L) | | 0.00276 | 0.00480 | | |
| | Lithium (Li)-Dissolved (mg/L) | | 0.00445 | 0.00504 | | |
| | Magnesium (Mg)-Dissolved (mg/L) | | 82.6 | 76.1 | | |
| | Manganese (Mn)-Dissolved (mg/L) | | 6.56 | 6.02 | | |
| | Mercury (Hg)-Dissolved (mg/L) | | <0.000010 | <0.000010 | | |
| | Molybdenum (Mo)-Dissolved (mg/L) | | 0.0109 | 0.00996 | | |
| | Nickel (Ni)-Dissolved (mg/L) | | 0.0146 | 0.0154 | | |
| | Phosphorus (P)-Dissolved (mg/L) | | 0.072 | 0.086 | | |
| | Potassium (K)-Dissolved (mg/L) | | 9.11 | 8.71 | | |
| | Selenium (Se)-Dissolved (mg/L) | | 0.00071 | 0.00041 | | |
| | Silicon (Si)-Dissolved (mg/L) | | 10.8 | 10.0 | | |
| | Silver (Ag)-Dissolved (mg/L) | | 0.000028 | 0.000019 | | |
| | Sodium (Na)-Dissolved (mg/L) | | 22.5 | 21.4 | | |
| | Strontium (Sr)-Dissolved (mg/L) | | 0.907 | 0.836 | | |
| | Sulfur (S)-Dissolved (mg/L) | | 8.30 | 7.37 | | |
| | Thallium (Tl)-Dissolved (mg/L) | | 0.000011 | <0.000010 | | |
| | Tin (Sn)-Dissolved (mg/L) | | 0.00017 | 0.00041 | | |
| | Titanium (Ti)-Dissolved (mg/L) | | <0.010 | <0.010 | | |
| | Uranium (U)-Dissolved (mg/L) | | 0.000904 | 0.000760 | | |
| | Vanadium (V)-Dissolved (mg/L) | | 0.0074 | 0.0074 | | |
| | Zinc (Zn)-Dissolved (mg/L) | | 0.0258 | 0.0313 | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1365603-29 | L1365603-30 | L1365603-31 | L1365603-32 | L1365603-33 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | MP09-12 STANDARD PRESERVATION | MP09-12 ALTERNATE PRESERVATION #1 (SCN WITH HN03) | MP09-12 ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | MP09-12 ALTERNATE PRESERVATION #3 (UNPRESERVED) | FIELD DUP A STANDARD PRESERVATION |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Dissolved Metals** | Lead (Pb)-Dissolved (mg/L) | 0.0105 | | | 0.0111 | 0.00286 |
| | Lithium (Li)-Dissolved (mg/L) | 0.00206 | | | 0.00248 | 0.00447 |
| | Magnesium (Mg)-Dissolved (mg/L) | 66.3 | | | 66.4 | 74.5 |
| | Manganese (Mn)-Dissolved (mg/L) | 3.23 | | | 3.10 | 6.18 |
| | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | | | <0.000010 | <0.000010 |
| | Molybdenum (Mo)-Dissolved (mg/L) | 0.00217 | | | 0.00260 | 0.00940 |
| | Nickel (Ni)-Dissolved (mg/L) | 0.00547 | | | 0.00569 | 0.0157 |
| | Phosphorus (P)-Dissolved (mg/L) | 0.097 | | | 0.083 | 0.082 |
| | Potassium (K)-Dissolved (mg/L) | 5.94 | | | 5.88 | 8.61 |
| | Selenium (Se)-Dissolved (mg/L) | 0.00016 | | | 0.00027 | 0.00038 |
| | Silicon (Si)-Dissolved (mg/L) | 10.1 | | | 9.67 | 9.85 |
| | Silver (Ag)-Dissolved (mg/L) | <0.000010 | | | 0.000021 | 0.000020 |
| | Sodium (Na)-Dissolved (mg/L) | 10.8 | | | 9.91 | 21.8 |
| | Strontium (Sr)-Dissolved (mg/L) | 0.800 | | | 0.920 | 0.789 |
| | Sulfur (S)-Dissolved (mg/L) | 55.8 | | | 51.1 | 7.42 |
| | Thallium (Tl)-Dissolved (mg/L) | 0.000108 | | | 0.000125 | <0.000010 |
| | Tin (Sn)-Dissolved (mg/L) | <0.00010 | | | <0.00010 | 0.00019 |
| | Titanium (Ti)-Dissolved (mg/L) | <0.010 | | | <0.010 | <0.010 |
| | Uranium (U)-Dissolved (mg/L) | 0.000670 | | | 0.000764 | 0.000750 |
| | Vanadium (V)-Dissolved (mg/L) | 0.0029 | | | 0.0025 | 0.0071 |
| | Zinc (Zn)-Dissolved (mg/L) | 0.0585 | | | 0.0614 | 0.0260 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1365603-34 | L1365603-35 | L1365603-36 | L1365603-37 | L1365603-38 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | FIELD DUP A ALTERNATE PRESERVATION #1 (SCN WITH HN03) | FIELD DUP A ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | FIELD DUP A ALTERNATE PRESERVATION #3 (UNPRESERVED) | FIELD DUP B STANDARD PRESERVATION | FIELD DUP B ALTERNATE PRESERVATION #1 (SCN WITH HN03) |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Dissolved Metals** | Lead (Pb)-Dissolved (mg/L) | | | 0.00241 | 0.00092 | |
| | Lithium (Li)-Dissolved (mg/L) | | | 0.00455 | 0.0130 | |
| | Magnesium (Mg)-Dissolved (mg/L) | | | 79.7 | 171 | |
| | Manganese (Mn)-Dissolved (mg/L) | | | 5.54 | 16.0 | |
| | Mercury (Hg)-Dissolved (mg/L) | | | <0.000010 | <0.000010 | |
| | Molybdenum (Mo)-Dissolved (mg/L) | | | 0.0108 | 0.00825 | |
| | Nickel (Ni)-Dissolved (mg/L) | | | 0.0164 | 0.0041 | |
| | Phosphorus (P)-Dissolved (mg/L) | | | 0.063 | <0.050 | |
| | Potassium (K)-Dissolved (mg/L) | | | 9.99 | 28.1 | |
| | Selenium (Se)-Dissolved (mg/L) | | | 0.00049 | <0.00020 DLA | |
| | Silicon (Si)-Dissolved (mg/L) | | | 10.5 | 8.16 | |
| | Silver (Ag)-Dissolved (mg/L) | | | 0.000015 | <0.000020 DLA | |
| | Sodium (Na)-Dissolved (mg/L) | | | 22.7 | 31.6 | |
| | Strontium (Sr)-Dissolved (mg/L) | | | 0.854 | 0.894 | |
| | Sulfur (S)-Dissolved (mg/L) | | | 8.21 | 632 | |
| | Thallium (Tl)-Dissolved (mg/L) | | | <0.000010 | 0.000402 | |
| | Tin (Sn)-Dissolved (mg/L) | | | 0.00013 | <0.00020 DLA | |
| | Titanium (Ti)-Dissolved (mg/L) | | | <0.010 | <0.020 DLA | |
| | Uranium (U)-Dissolved (mg/L) | | | 0.000865 | 0.00106 | |
| | Vanadium (V)-Dissolved (mg/L) | | | 0.0060 | <0.0020 DLA | |
| | Zinc (Zn)-Dissolved (mg/L) | | | 0.0188 | 0.454 | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1365603-39 | L1365603-40 | L1365603-41 | L1365603-42 | L1365603-44 |
|---|---|---|---|---|---|---|
| | Description | Water | Water | Water | Water | Water |
| | Sampled Date | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 | 17-SEP-13 |
| | Sampled Time | 12:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| | Client ID | FIELD DUP B ALTERNATE PRESERVATION #2 (SULPHIDE REMOVED) | FIELD DUP B ALTERNATE PRESERVATION #3 (UNPRESERVED) | SEEP STANDARD PRESERVATION | SEEP ALTERNATE PRESERVATION #1 (SCN WITH HN03) | SEEP ALTERNATE PRESERVATION #3 (UNPRESERVED) |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Dissolved Metals** | Lead (Pb)-Dissolved (mg/L) | | 0.00075 | | | |
| | Lithium (Li)-Dissolved (mg/L) | | 0.0134 | | | |
| | Magnesium (Mg)-Dissolved (mg/L) | | 171 | | | |
| | Manganese (Mn)-Dissolved (mg/L) | | 16.5 | | | |
| | Mercury (Hg)-Dissolved (mg/L) | | <0.000010 | | | |
| | Molybdenum (Mo)-Dissolved (mg/L) | | 0.00811 | | | |
| | Nickel (Ni)-Dissolved (mg/L) | | 0.0042 | | | |
| | Phosphorus (P)-Dissolved (mg/L) | | <0.050 | | | |
| | Potassium (K)-Dissolved (mg/L) | | 30.0 | | | |
| | Selenium (Se)-Dissolved (mg/L) | | <0.00020 DLA | | | |
| | Silicon (Si)-Dissolved (mg/L) | | 7.76 | | | |
| | Silver (Ag)-Dissolved (mg/L) | | <0.000020 DLA | | | |
| | Sodium (Na)-Dissolved (mg/L) | | 33.0 | | | |
| | Strontium (Sr)-Dissolved (mg/L) | | 0.905 | | | |
| | Sulfur (S)-Dissolved (mg/L) | | 617 | | | |
| | Thallium (Tl)-Dissolved (mg/L) | | 0.000399 | | | |
| | Tin (Sn)-Dissolved (mg/L) | | <0.00020 DLA | | | |
| | Titanium (Ti)-Dissolved (mg/L) | | <0.020 DLA | | | |
| | Uranium (U)-Dissolved (mg/L) | | 0.00103 | | | |
| | Vanadium (V)-Dissolved (mg/L) | | <0.0020 DLA | | | |
| | Zinc (Zn)-Dissolved (mg/L) | | 0.440 | | | |

* 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) |
|---|---|---|---|
| Matrix Spike | Fluoride (F) | MS-B | L1365603-1, -13, -17, -21, -25, -29, -33, -37, -41, -5, -9 |
| Matrix Spike | Sulfate (SO4) | MS-B | L1365603-1, -13, -17, -21, -25, -29, -33, -37, -41, -5, -9 |
| Matrix Spike | Manganese (Mn)-Dissolved | MS-B | L1365603-1, -12, -13, -16, -17, -20, -24, -25, -29, -32, -33, -36, -37, -4, -40, -5, -8, -9 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1365603-1, -12, -13, -16, -17, -20, -24, -25, -29, -32, -33, -36, -37, -4, -40, -5, -8, -9 |
| Matrix Spike | Total Organic Carbon | MS-B | L1365603-13, -17, -21, -37, -5, -9 |
| Matrix Spike | Barium (Ba)-Dissolved | MS-B | L1365603-1, -12, -13, -16, -17, -20, -24, -25, -29, -32, -33, -36, -37, -4, -40, -5, -8, -9 |
| Matrix Spike | Manganese (Mn)-Dissolved | MS-B | L1365603-1, -12, -13, -16, -17, -20, -24, -25, -29, -32, -33, -36, -37, -4, -40, -5, -8, -9 |
| Matrix Spike | Sodium (Na)-Dissolved | MS-B | L1365603-1, -12, -13, -16, -17, -20, -24, -25, -29, -32, -33, -36, -37, -4, -40, -5, -8, -9 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1365603-1, -12, -13, -16, -17, -20, -24, -25, -29, -32, -33, -36, -37, -4, -40, -5, -8, -9 |
| Matrix Spike | Sulfur (S)-Dissolved | MS-B | L1365603-1, -12, -13, -16, -17, -20, -24, -25, -29, -32, -33, -36, -37, -4, -40, -5, -8, -9 |

**Qualifiers for Individual Parameters Listed:**

| Qualifier | Description |
|---|---|
| DLA | Detection Limit Adjusted For required dilution |
| DLM | Detection Limit Adjusted due to sample matrix effects. |
| MS-B | Matrix Spike recovery could not be accurately calculated due to high analyte background in sample. |

**Test Method References:**

| ALS Test Code | Matrix | Test Description | Method Reference** |
|---|---|---|---|
| **ALK-PCT-VA** | Water | Alkalinity by Auto. Titration | APHA 2320 "Alkalinity" |

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

| | | | |
|---|---|---|---|
| **ALK-PCT-VA** | Water | Alkalinity by Auto. Titration | APHA 2320 Alkalinity |

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

| | | | |
|---|---|---|---|
| **ANIONS-CL-IC-WR** | Water | Chloride by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

| | | | |
|---|---|---|---|
| **ANIONS-F-IC-WR** | Water | Fluoride by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

| | | | |
|---|---|---|---|
| **ANIONS-NO2-IC-WR** | Water | Nitrite Nitrogen by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

| | | | |
|---|---|---|---|
| **ANIONS-NO3-IC-WR** | Water | Nitrate Nitrogen by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

| | | | |
|---|---|---|---|
| **ANIONS-SO4-IC-WR** | Water | Sulphate by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

| | | | |
|---|---|---|---|
| **CARBONS-TIC-VA** | Water | Total inorganic carbon by CO2 purge | APHA 5310 TOTAL ORGANIC CARBON (TOC) |

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

| | | | |
|---|---|---|---|
| **CARBONS-TOC-VA** | Water | Total organic carbon by combustion | APHA 5310 TOTAL ORGANIC CARBON (TOC) |

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

# Reference Information

| | | | |
|---|---|---|---|
| **CN-FREE-CFA-VA** | Water | Free Cyanide in water by CFA | ASTM 7237 |

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

| | | | |
|---|---|---|---|
| **CN-SCN-VA** | Water | Thiocyanate by Colour | APHA 4500-CN CYANIDE |

This analysis is carried out using procedures adapted from APHA Method 4500-CN- M "Thiocyanate" Thiocyanate is determined by the ferric nitrate colourimetric method.

| | | | |
|---|---|---|---|
| **CN-T-CFA-VA** | Water | Total Cyanide in water by CFA | ISO 14403:2002 |

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

| | | | |
|---|---|---|---|
| **CN-WAD-CFA-VA** | Water | Weak Acid Diss. Cyanide in water by CFA | APHA 4500-CN CYANIDE |

This analysis is carried out using procedures adapted from APHA Method 4500-CN I. "Weak Acid Dissociable Cyanide". Weak Acid Dissociable (WAD) cyanide is determined by in-line sample distillation with final determination by colourimetric analysis.

| | | | |
|---|---|---|---|
| **EC-PCT-VA** | Water | Conductivity (Automated) | APHA 2510 Auto. Conduc. |

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

| | | | |
|---|---|---|---|
| **HARDNESS-CALC-VA** | Water | Hardness | APHA 2340B |

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

| | | | |
|---|---|---|---|
| **HG-DIS-LOW-CVAFS-VA** | Water | Dissolved Mercury in Water by CVAFS(Low) | EPA SW-846 3005A & EPA 245.7 |

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

| | | | |
|---|---|---|---|
| **HG-TOT-LOW-CVAFS-VA** | Water | Total Mercury in Water by CVAFS(Low) | EPA 245.7 |

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

| | | | |
|---|---|---|---|
| **IONBALANCE-VA** | Water | Ion Balance Calculation | APHA 1030E |

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

| | | | |
|---|---|---|---|
| **MET-D-CCMS-VA** | Water | Dissolved Metals in Water by CRC ICPMS | APHA 3030 B&E / EPA SW-846 6020A |

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

| | | | |
|---|---|---|---|
| **MET-DIS-LOW-ICP-VA** | Water | Dissolved Metals in Water by ICPOES | EPA 3005A/6010B |

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

| | | | |
|---|---|---|---|
| **MET-T-CCMS-VA** | Water | Total Metals in Water by CRC ICPMS | APHA 3030 B&E / EPA SW-846 6020A |

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

| | | | |
|---|---|---|---|
| **MET-TOT-LOW-ICP-VA** | Water | Total Metals in Water by ICPOES | EPA 3005A/6010B |

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the

# Reference Information

American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

| | | | |
|---|---|---|---|
| **NH3-F-VA** | Water | Ammonia in Water by Fluorescence | J. ENVIRON. MONIT., 2005, 7, 37-42, RSC |

This analysis is carried out, on sulfuric acid preserved samples, 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.

| | | | |
|---|---|---|---|
| **PH-PCT-VA** | Water | pH by Meter (Automated) | APHA 4500-H "pH Value" |

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

| | | | |
|---|---|---|---|
| **PH-PCT-VA** | Water | pH by Meter (Automated) | APHA 4500-H pH Value |

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

| | | | |
|---|---|---|---|
| **S-DIS-ICP-VA** | Water | Dissolved Sulfur in Water by ICPOES | EPA SW-846 3005A/6010B |

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

| | | | |
|---|---|---|---|
| **S-TOT-ICP-VA** | Water | Total Sulfur in Water by ICPOES | EPA SW-846 3005A/6010B |

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

| | | | |
|---|---|---|---|
| **S2-T-COL-VA** | Water | Total Sulphide by Colorimetric | APHA 4500-S2 Sulphide |

This analysis is carried out using procedures adapted from APHA Method 4500-S2 "Sulphide". Sulphide is determined using the methlyene blue colourimetric method.

| | | | |
|---|---|---|---|
| **TKN-F-VA** | Water | TKN in Water by Fluorescence | APHA 4500-NORG D. |

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

** 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 |
|---|---|
| WR | ALS ENVIRONMENTAL - WHITEHORSE, YUKON, CANADA |
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |

**Chain of Custody Numbers:**

1 2 3 4 5

# Reference Information

**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 wwt - 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.*

# Quality Control Report



Client: AMEC EARTH & ENVIRONMENTAL
5681 - 70 Street
Edmonton AB T6B 3P6
Contact: Leslie Hardy

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ALK-PCT-VA** | **Water** | | | | | | | |
| **Batch R2701596** | | | | | | | | |
| **WG1755199-10 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 94.3 | | % | | 85-115 | 26-SEP-13 |
| **WG1755199-11 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 96.2 | | % | | 85-115 | 26-SEP-13 |
| **WG1755199-12 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 93.5 | | % | | 85-115 | 26-SEP-13 |
| **WG1755199-13 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 94.8 | | % | | 85-115 | 26-SEP-13 |
| **WG1755199-14 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 94.8 | | % | | 85-115 | 26-SEP-13 |
| **WG1755199-15 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 96.1 | | % | | 85-115 | 26-SEP-13 |
| **WG1755199-16 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 97.2 | | % | | 85-115 | 26-SEP-13 |
| **WG1755199-9 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 98.0 | | % | | 85-115 | 26-SEP-13 |
| **WG1755199-33 DUP** | | **L1365603-17** | | | | | | |
| Alkalinity, Total (as CaCO3) | | 124 | 126 | | mg/L | 1.6 | 20 | 26-SEP-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | 113 | 112 | | mg/L | 0.6 | 20 | 26-SEP-13 |
| Alkalinity, Carbonate (as CaCO3) | | 11.2 | 13.8 | | mg/L | 21 | 25 | 26-SEP-13 |
| Alkalinity, Hydroxide (as CaCO3) | | <1.0 | <1.0 | RPD-NA | mg/L | N/A | 20 | 26-SEP-13 |
| **WG1755199-1 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| **WG1755199-2 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| **WG1755199-3 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| **WG1755199-4 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ALK-PCT-VA** | **Water** | | | | | | | |
| **Batch R2701596** | | | | | | | | |
| **WG1755199-4 MB** | | | | | | | | |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| **WG1755199-5 MB** | | | | | | | | |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| **WG1755199-6 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| **WG1755199-7 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| **WG1755199-8 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 26-SEP-13 |
| **ANIONS-CL-IC-WR** | **Water** | | | | | | | |
| **Batch R2700447** | | | | | | | | |
| **WG1752907-7 DUP** | | **L1365603-17** | | | | | | |
| Chloride (Cl) | | 2.26 | 2.24 | | mg/L | 1.1 | 20 | 19-SEP-13 |
| **WG1752907-10 LCS** | | | | | | | | |
| Chloride (Cl) | | | 101.3 | | % | | 85-115 | 19-SEP-13 |
| **WG1752907-2 LCS** | | | | | | | | |
| Chloride (Cl) | | | 101.3 | | % | | 85-115 | 19-SEP-13 |
| **WG1752907-6 LCS** | | | | | | | | |
| Chloride (Cl) | | | 101.3 | | % | | 85-115 | 19-SEP-13 |
| **WG1752907-1 MB** | | | | | | | | |
| Chloride (Cl) | | | <0.50 | | mg/L | | 0.5 | 19-SEP-13 |
| **WG1752907-5 MB** | | | | | | | | |
| Chloride (Cl) | | | <0.50 | | mg/L | | 0.5 | 19-SEP-13 |
| **WG1752907-9 MB** | | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ANIONS-CL-IC-WR** | **Water** | | | | | | | |
| **Batch R2700447** | | | | | | | | |
| **WG1752907-9 MB** | | | | | | | | |
| Chloride (Cl) | | | <0.50 | | mg/L | | 0.5 | 19-SEP-13 |
| **WG1752907-12 MS** | | **L1363493-53** | | | | | | |
| Chloride (Cl) | | | 102.1 | | % | | 75-125 | 19-SEP-13 |
| **WG1752907-8 MS** | | **L1365603-21** | | | | | | |
| Chloride (Cl) | | | 100.1 | | % | | 75-125 | 19-SEP-13 |
| **ANIONS-F-IC-WR** | **Water** | | | | | | | |
| **Batch R2700447** | | | | | | | | |
| **WG1752907-7 DUP** | | **L1365603-17** | | | | | | |
| Fluoride (F) | | 1.45 | 1.43 | | mg/L | 1.9 | 20 | 19-SEP-13 |
| **WG1752907-10 LCS** | | | | | | | | |
| Fluoride (F) | | | 102.1 | | % | | 85-115 | 19-SEP-13 |
| **WG1752907-2 LCS** | | | | | | | | |
| Fluoride (F) | | | 102.3 | | % | | 85-115 | 19-SEP-13 |
| **WG1752907-6 LCS** | | | | | | | | |
| Fluoride (F) | | | 102.0 | | % | | 85-115 | 19-SEP-13 |
| **WG1752907-1 MB** | | | | | | | | |
| Fluoride (F) | | | <0.020 | | mg/L | | 0.02 | 19-SEP-13 |
| **WG1752907-5 MB** | | | | | | | | |
| Fluoride (F) | | | <0.020 | | mg/L | | 0.02 | 19-SEP-13 |
| **WG1752907-9 MB** | | | | | | | | |
| Fluoride (F) | | | <0.020 | | mg/L | | 0.02 | 19-SEP-13 |
| **WG1752907-8 MS** | | **L1365603-21** | | | | | | |
| Fluoride (F) | | | N/A | MS-B | % | | - | 19-SEP-13 |
| **ANIONS-NO2-IC-WR** | **Water** | | | | | | | |
| **Batch R2700447** | | | | | | | | |
| **WG1752907-7 DUP** | | **L1365603-17** | | | | | | |
| Nitrite (as N) | | 0.0066 | 0.0069 | | mg/L | 4.1 | 20 | 19-SEP-13 |
| **WG1752907-10 LCS** | | | | | | | | |
| Nitrite (as N) | | | 100.8 | | % | | 85-115 | 19-SEP-13 |
| **WG1752907-2 LCS** | | | | | | | | |
| Nitrite (as N) | | | 101.3 | | % | | 85-115 | 19-SEP-13 |
| **WG1752907-6 LCS** | | | | | | | | |
| Nitrite (as N) | | | 100.8 | | % | | 85-115 | 19-SEP-13 |
| **WG1752907-1 MB** | | | | | | | | |
| Nitrite (as N) | | | <0.0010 | | mg/L | | 0.001 | 19-SEP-13 |
| **WG1752907-5 MB** | | | | | | | | |
| Nitrite (as N) | | | <0.0010 | | mg/L | | 0.001 | 19-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ANIONS-NO2-IC-WR** | **Water** | | | | | | | |
| **Batch R2700447** | | | | | | | | |
| **WG1752907-9 MB** | | | | | | | | |
| Nitrite (as N) | | | <0.0010 | | mg/L | | 0.001 | 19-SEP-13 |
| **WG1752907-8 MS** | | **L1365603-21** | | | | | | |
| Nitrite (as N) | | | 102.2 | | % | | 75-125 | 19-SEP-13 |
| **ANIONS-NO3-IC-WR** | **Water** | | | | | | | |
| **Batch R2700447** | | | | | | | | |
| **WG1752907-7 DUP** | | **L1365603-17** | | | | | | |
| Nitrate (as N) | | 0.0096 | 0.0096 | | mg/L | 0.0 | 20 | 19-SEP-13 |
| **WG1752907-10 LCS** | | | | | | | | |
| Nitrate (as N) | | | 101.8 | | % | | 85-115 | 19-SEP-13 |
| **WG1752907-2 LCS** | | | | | | | | |
| Nitrate (as N) | | | 101.6 | | % | | 85-115 | 19-SEP-13 |
| **WG1752907-6 LCS** | | | | | | | | |
| Nitrate (as N) | | | 101.9 | | % | | 85-115 | 19-SEP-13 |
| **WG1752907-1 MB** | | | | | | | | |
| Nitrate (as N) | | | <0.0050 | | mg/L | | 0.005 | 19-SEP-13 |
| **WG1752907-5 MB** | | | | | | | | |
| Nitrate (as N) | | | <0.0050 | | mg/L | | 0.005 | 19-SEP-13 |
| **WG1752907-9 MB** | | | | | | | | |
| Nitrate (as N) | | | <0.0050 | | mg/L | | 0.005 | 19-SEP-13 |
| **WG1752907-4 MS** | | **L1365000-2** | | | | | | |
| Nitrate (as N) | | | 100.2 | | % | | 75-125 | 19-SEP-13 |
| **WG1752907-8 MS** | | **L1365603-21** | | | | | | |
| Nitrate (as N) | | | 100.4 | | % | | 75-125 | 19-SEP-13 |
| **ANIONS-SO4-IC-WR** | **Water** | | | | | | | |
| **Batch R2700447** | | | | | | | | |
| **WG1752907-7 DUP** | | **L1365603-17** | | | | | | |
| Sulfate (SO4) | | 101 | 101 | | mg/L | 0.2 | 20 | 19-SEP-13 |
| **WG1752907-10 LCS** | | | | | | | | |
| Sulfate (SO4) | | | 99.8 | | % | | 85-115 | 19-SEP-13 |
| **WG1752907-2 LCS** | | | | | | | | |
| Sulfate (SO4) | | | 99.7 | | % | | 85-115 | 19-SEP-13 |
| **WG1752907-6 LCS** | | | | | | | | |
| Sulfate (SO4) | | | 99.8 | | % | | 85-115 | 19-SEP-13 |
| **WG1752907-1 MB** | | | | | | | | |
| Sulfate (SO4) | | | <0.50 | | mg/L | | 0.5 | 19-SEP-13 |
| **WG1752907-5 MB** | | | | | | | | |
| Sulfate (SO4) | | | <0.50 | | mg/L | | 0.5 | 19-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ANIONS-SO4-IC-WR** | **Water** | | | | | | | |
| **Batch R2700447** | | | | | | | | |
| **WG1752907-9 MB** | | | | | | | | |
| Sulfate (SO4) | | | <0.50 | | mg/L | | 0.5 | 19-SEP-13 |
| **WG1752907-12 MS** | | **L1363493-53** | | | | | | |
| Sulfate (SO4) | | | 95.6 | | % | | 75-125 | 19-SEP-13 |
| **WG1752907-8 MS** | | **L1365603-21** | | | | | | |
| Sulfate (SO4) | | | N/A | MS-B | % | | - | 19-SEP-13 |
| **CARBONS-TIC-VA** | **Water** | | | | | | | |
| **Batch R2700487** | | | | | | | | |
| **WG1753641-5 LCS** | | | | | | | | |
| Total Inorganic Carbon | | | 104.8 | | % | | 80-120 | 24-SEP-13 |
| **WG1753641-4 MB** | | | | | | | | |
| Total Inorganic Carbon | | | <0.50 | | mg/L | | 0.5 | 24-SEP-13 |
| **Batch R2701522** | | | | | | | | |
| **WG1754470-2 DUP** | | **L1365603-25** | | | | | | |
| Total Inorganic Carbon | | 146 | 141 | | mg/L | 3.5 | 20 | 25-SEP-13 |
| **WG1754470-1 LCS** | | | | | | | | |
| Total Inorganic Carbon | | | 97.8 | | % | | 80-120 | 25-SEP-13 |
| **WG1754470-4 LCS** | | | | | | | | |
| Total Inorganic Carbon | | | 105.5 | | % | | 80-120 | 25-SEP-13 |
| **WG1754470-3 MB** | | | | | | | | |
| Total Inorganic Carbon | | | <0.50 | | mg/L | | 0.5 | 25-SEP-13 |
| **Batch R2705730** | | | | | | | | |
| **WG1755442-3 LCS** | | | | | | | | |
| Total Inorganic Carbon | | | 107.4 | | % | | 80-120 | 30-SEP-13 |
| **WG1755442-2 MB** | | | | | | | | |
| Total Inorganic Carbon | | | <0.50 | | mg/L | | 0.5 | 30-SEP-13 |
| **CARBONS-TOC-VA** | **Water** | | | | | | | |
| **Batch R2701316** | | | | | | | | |
| **WG1753869-10 DUP** | | **L1365603-13** | | | | | | |
| Total Organic Carbon | | 5.92 | 5.66 | | mg/L | 4.5 | 20 | 25-SEP-13 |
| **WG1753869-1 LCS** | | | | | | | | |
| Total Organic Carbon | | | 96.3 | | % | | 80-120 | 25-SEP-13 |
| **WG1753869-13 LCS** | | | | | | | | |
| Total Organic Carbon | | | 98.9 | | % | | 80-120 | 25-SEP-13 |
| **WG1753869-17 LCS** | | | | | | | | |
| Total Organic Carbon | | | 98.1 | | % | | 80-120 | 25-SEP-13 |
| **WG1753869-6 LCS** | | | | | | | | |
| Total Organic Carbon | | | 99.0 | | % | | 80-120 | 25-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CARBONS-TOC-VA** | **Water** | | | | | | | |
| **Batch R2701316** | | | | | | | | |
| **WG1753869-9 LCS** | | | | | | | | |
| Total Organic Carbon | | | 97.7 | | % | | 80-120 | 25-SEP-13 |
| **WG1753869-12 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 25-SEP-13 |
| **WG1753869-16 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 25-SEP-13 |
| **WG1753869-5 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 25-SEP-13 |
| **WG1753869-8 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 25-SEP-13 |
| **WG1753869-11 MS** | | **L1367070-2** | | | | | | |
| Total Organic Carbon | | | 103.7 | | % | | 70-130 | 25-SEP-13 |
| **WG1753869-15 MS** | | **L1367102-22** | | | | | | |
| Total Organic Carbon | | | 95.9 | | % | | 70-130 | 25-SEP-13 |
| **WG1753869-4 MS** | | **L1365721-5** | | | | | | |
| Total Organic Carbon | | | N/A | MS-B | % | | - | 25-SEP-13 |
| **Batch R2702563** | | | | | | | | |
| **WG1755676-1 LCS** | | | | | | | | |
| Total Organic Carbon | | | 95.1 | | % | | 80-120 | 26-SEP-13 |
| **WG1755676-12 LCS** | | | | | | | | |
| Total Organic Carbon | | | 98.0 | | % | | 80-120 | 26-SEP-13 |
| **WG1755676-6 LCS** | | | | | | | | |
| Total Organic Carbon | | | 95.1 | | % | | 80-120 | 26-SEP-13 |
| **WG1755676-8 LCS** | | | | | | | | |
| Total Organic Carbon | | | 97.8 | | % | | 80-120 | 26-SEP-13 |
| **WG1755676-11 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 26-SEP-13 |
| **WG1755676-5 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 26-SEP-13 |
| **WG1755676-7 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 26-SEP-13 |
| **WG1755676-10 MS** | | **L1368653-18** | | | | | | |
| Total Organic Carbon | | | 106.4 | | % | | 70-130 | 26-SEP-13 |
| **WG1755676-4 MS** | | **L1367477-3** | | | | | | |
| Total Organic Carbon | | | 98.2 | | % | | 70-130 | 26-SEP-13 |
| **CN-FREE-CFA-VA** | **Water** | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-FREE-CFA-VA** | **Water** | | | | | | | |
| **Batch R2705580** | | | | | | | | |
| **WG1757865-3 DUP** | | **L1365603-9** | | | | | | |
| Cyanide, Free | | <0.0050 | <0.0050 | RPD-NA | mg/L | N/A | 20 | 30-SEP-13 |
| **WG1757865-11 LCS** | | | | | | | | |
| Cyanide, Free | | | 100.1 | | % | | 80-120 | 30-SEP-13 |
| **WG1757865-13 LCS** | | | | | | | | |
| Cyanide, Free | | | 100.1 | | % | | 80-120 | 30-SEP-13 |
| **WG1757865-19 LCS** | | | | | | | | |
| Cyanide, Free | | | 101.8 | | % | | 80-120 | 30-SEP-13 |
| **WG1757865-2 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.6 | | % | | 80-120 | 30-SEP-13 |
| **WG1757865-5 LCS** | | | | | | | | |
| Cyanide, Free | | | 100.1 | | % | | 80-120 | 30-SEP-13 |
| **WG1757865-7 LCS** | | | | | | | | |
| Cyanide, Free | | | 100.5 | | % | | 80-120 | 30-SEP-13 |
| **WG1757865-8 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.8 | | % | | 80-120 | 30-SEP-13 |
| **WG1757865-1 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1757865-10 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1757865-12 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1757865-18 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1757865-4 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1757865-6 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1757865-15 MS** | | **L1366777-4** | | | | | | |
| Cyanide, Free | | | 95.4 | | % | | 70-130 | 30-SEP-13 |
| **WG1757865-17 MS** | | **L1366585-3** | | | | | | |
| Cyanide, Free | | | 95.9 | | % | | 70-130 | 30-SEP-13 |
| **Batch R2706709** | | | | | | | | |
| **WG1758927-14 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.2 | | % | | 80-120 | 01-OCT-13 |
| **WG1758927-16 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.5 | | % | | 80-120 | 01-OCT-13 |
| **WG1758927-19 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.0 | | % | | 80-120 | 01-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-FREE-CFA-VA** | **Water** | | | | | | | |
| **Batch R2706709** | | | | | | | | |
| **WG1758927-4 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.5 | | % | | 80-120 | 01-OCT-13 |
| **WG1758927-6 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.0 | | % | | 80-120 | 01-OCT-13 |
| **WG1758927-8 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.8 | | % | | 80-120 | 01-OCT-13 |
| **WG1758927-13 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758927-15 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758927-18 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758927-3 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758927-5 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758927-7 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758927-10 MS** | | **L1367539-10** | | | | | | |
| Cyanide, Free | | | 97.7 | | % | | 70-130 | 01-OCT-13 |
| **Batch R2708901** | | | | | | | | |
| **WG1760854-13 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.9 | | % | | 80-120 | 03-OCT-13 |
| **WG1760854-16 LCS** | | | | | | | | |
| Cyanide, Free | | | 101.0 | | % | | 80-120 | 03-OCT-13 |
| **WG1760854-2 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.6 | | % | | 80-120 | 03-OCT-13 |
| **WG1760854-7 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.6 | | % | | 80-120 | 03-OCT-13 |
| **WG1760854-9 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.4 | | % | | 80-120 | 03-OCT-13 |
| **WG1760854-1 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760854-12 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760854-15 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760854-6 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-FREE-CFA-VA** | **Water** | | | | | | | |
| **Batch R2708901** | | | | | | | | |
| **WG1760854-8 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **CN-SCN-VA** | **Water** | | | | | | | |
| **Batch R2700445** | | | | | | | | |
| **WG1754209-2 CRM** | | **VA-SCN-LOW-CONTROL** | | | | | | |
| Thiocyanate (SCN) | | | 100.4 | | % | | 85-115 | 25-SEP-13 |
| **WG1754209-6 CRM** | | **VA-SCN-HIGH-CONTROL** | | | | | | |
| Thiocyanate (SCN) | | | 96.7 | | % | | 85-115 | 25-SEP-13 |
| **WG1754209-3 DUP** | | **L1365603-19** | | | | | | |
| Thiocyanate (SCN) | | <0.50 | <0.50 | RPD-NA | mg/L | N/A | 20 | 25-SEP-13 |
| **WG1754209-1 MB** | | | | | | | | |
| Thiocyanate (SCN) | | | <0.50 | | mg/L | | 0.5 | 25-SEP-13 |
| **WG1754209-5 MB** | | | | | | | | |
| Thiocyanate (SCN) | | | <0.50 | | mg/L | | 0.5 | 25-SEP-13 |
| **WG1754209-10 MS** | | **L1367036-28** | | | | | | |
| Thiocyanate (SCN) | | | 86.2 | | % | | 75-125 | 25-SEP-13 |
| **WG1754209-12 MS** | | **L1367036-55** | | | | | | |
| Thiocyanate (SCN) | | | 95.2 | | % | | 75-125 | 25-SEP-13 |
| **WG1754209-4 MS** | | **L1365603-25** | | | | | | |
| Thiocyanate (SCN) | | | 93.4 | | % | | 75-125 | 25-SEP-13 |
| **WG1754209-8 MS** | | **L1367036-3** | | | | | | |
| Thiocyanate (SCN) | | | 98.4 | | % | | 75-125 | 25-SEP-13 |
| **CN-T-CFA-VA** | **Water** | | | | | | | |
| **Batch R2705567** | | | | | | | | |
| **WG1757853-4 DUP** | | **L1365603-9** | | | | | | |
| Cyanide, Total | | 0.0066 | 0.0068 | | mg/L | 2.8 | 20 | 30-SEP-13 |
| **WG1757853-12 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 91.4 | | % | | 75-105 | 30-SEP-13 |
| **WG1757853-16 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 89.5 | | % | | 75-105 | 30-SEP-13 |
| **WG1757853-20 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 92.0 | | % | | 75-105 | 30-SEP-13 |
| **WG1757853-23 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 92.9 | | % | | 75-105 | 30-SEP-13 |
| **WG1757853-3 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 90.3 | | % | | 75-105 | 30-SEP-13 |
| **WG1757853-30 IRM** | | **ALS-TCN-IRM1** | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-T-CFA-VA** | **Water** | | | | | | | |
| **Batch R2705567** | | | | | | | | |
| **WG1757853-30 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 88.8 | | % | | 75-105 | 30-SEP-13 |
| **WG1757853-7 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 92.2 | | % | | 75-105 | 30-SEP-13 |
| **WG1757853-11 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.5 | | % | | 80-120 | 30-SEP-13 |
| **WG1757853-15 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.2 | | % | | 80-120 | 30-SEP-13 |
| **WG1757853-19 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.8 | | % | | 80-120 | 30-SEP-13 |
| **WG1757853-2 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.0 | | % | | 80-120 | 30-SEP-13 |
| **WG1757853-22 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.0 | | % | | 80-120 | 30-SEP-13 |
| **WG1757853-29 LCS** | | | | | | | | |
| Cyanide, Total | | | 98.8 | | % | | 80-120 | 30-SEP-13 |
| **WG1757853-6 LCS** | | | | | | | | |
| Cyanide, Total | | | 104.8 | | % | | 80-120 | 30-SEP-13 |
| **WG1757853-1 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1757853-10 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1757853-18 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1757853-21 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1757853-28 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1757853-5 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1757853-14 MS** | | **L1367067-18** | | | | | | |
| Cyanide, Total | | | 99.9 | | % | | 70-130 | 30-SEP-13 |
| **WG1757853-25 MS** | | **L1366777-4** | | | | | | |
| Cyanide, Total | | | 97.8 | | % | | 70-130 | 30-SEP-13 |
| **WG1757853-27 MS** | | **L1366585-3** | | | | | | |
| Cyanide, Total | | | 98.8 | | % | | 70-130 | 30-SEP-13 |
| **WG1757853-9 MS** | | **L1367059-3** | | | | | | |
| Cyanide, Total | | | 100.9 | | % | | 70-130 | 30-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-T-CFA-VA** | **Water** | | | | | | | |
| **Batch R2706676** | | | | | | | | |
| **WG1758914-12 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 94.3 | | % | | 75-105 | 01-OCT-13 |
| **WG1758914-19 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 93.9 | | % | | 75-105 | 01-OCT-13 |
| **WG1758914-22 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 95.2 | | % | | 75-105 | 01-OCT-13 |
| **WG1758914-26 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 94.0 | | % | | 75-105 | 01-OCT-13 |
| **WG1758914-5 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 94.1 | | % | | 75-105 | 01-OCT-13 |
| **WG1758914-9 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 91.5 | | % | | 75-105 | 01-OCT-13 |
| **WG1758914-11 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.4 | | % | | 80-120 | 01-OCT-13 |
| **WG1758914-18 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.1 | | % | | 80-120 | 01-OCT-13 |
| **WG1758914-21 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.6 | | % | | 80-120 | 01-OCT-13 |
| **WG1758914-25 LCS** | | | | | | | | |
| Cyanide, Total | | | 104.0 | | % | | 80-120 | 01-OCT-13 |
| **WG1758914-4 LCS** | | | | | | | | |
| Cyanide, Total | | | 104.5 | | % | | 80-120 | 01-OCT-13 |
| **WG1758914-8 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.4 | | % | | 80-120 | 01-OCT-13 |
| **WG1758914-10 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758914-17 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758914-20 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758914-24 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758914-3 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758914-7 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758914-14 MS** | | **L1367539-10** | | | | | | |
| Cyanide, Total | | | 99.0 | | % | | 70-130 | 01-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-T-CFA-VA** | **Water** | | | | | | | |
| **Batch R2708841** | | | | | | | | |
| **WG1760838-14 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 91.5 | | % | | 75-105 | 03-OCT-13 |
| **WG1760838-19 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 92.1 | | % | | 75-105 | 03-OCT-13 |
| **WG1760838-22 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 87.4 | | % | | 75-105 | 03-OCT-13 |
| **WG1760838-3 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 88.1 | | % | | 75-105 | 03-OCT-13 |
| **WG1760838-9 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 91.8 | | % | | 75-105 | 03-OCT-13 |
| **WG1760838-13 LCS** | | | | | | | | |
| Cyanide, Total | | | 102.8 | | % | | 80-120 | 03-OCT-13 |
| **WG1760838-18 LCS** | | | | | | | | |
| Cyanide, Total | | | 102.8 | | % | | 80-120 | 03-OCT-13 |
| **WG1760838-2 LCS** | | | | | | | | |
| Cyanide, Total | | | 101.3 | | % | | 80-120 | 03-OCT-13 |
| **WG1760838-21 LCS** | | | | | | | | |
| Cyanide, Total | | | 99.2 | | % | | 80-120 | 03-OCT-13 |
| **WG1760838-8 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.5 | | % | | 80-120 | 03-OCT-13 |
| **WG1760838-1 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760838-12 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760838-17 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760838-20 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760838-7 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760838-11 MS** | | **L1368575-20** | | | | | | |
| Cyanide, Total | | | 99.4 | | % | | 70-130 | 03-OCT-13 |
| **CN-WAD-CFA-VA** | **Water** | | | | | | | |
| **Batch R2705574** | | | | | | | | |
| **WG1757861-3 DUP** | | **L1365603-9** | | | | | | |
| Cyanide, Weak Acid Diss | | <0.0050 | <0.0050 | RPD-NA | mg/L | N/A | 20 | 30-SEP-13 |
| **WG1757861-12 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 100.6 | | % | | 80-120 | 30-SEP-13 |
| **WG1757861-15 LCS** | | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-WAD-CFA-VA** | **Water** | | | | | | | |
| **Batch R2705574** | | | | | | | | |
| **WG1757861-15 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.1 | | % | | 80-120 | 30-SEP-13 |
| **WG1757861-17 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 101.4 | | % | | 80-120 | 30-SEP-13 |
| **WG1757861-19 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 106.0 | | % | | 80-120 | 30-SEP-13 |
| **WG1757861-2 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.6 | | % | | 80-120 | 30-SEP-13 |
| **WG1757861-5 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 102.8 | | % | | 80-120 | 30-SEP-13 |
| **WG1757861-9 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.7 | | % | | 80-120 | 30-SEP-13 |
| **WG1757861-1 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1757861-14 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1757861-16 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1757861-18 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1757861-4 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1757861-8 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1757861-11 MS** | | **L1367067-18** | | | | | | |
| Cyanide, Weak Acid Diss | | | 97.8 | | % | | 70-130 | 30-SEP-13 |
| **WG1757861-7 MS** | | **L1367059-3** | | | | | | |
| Cyanide, Weak Acid Diss | | | 100.3 | | % | | 70-130 | 30-SEP-13 |
| **Batch R2706691** | | | | | | | | |
| **WG1758922-14 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 102.5 | | % | | 80-120 | 01-OCT-13 |
| **WG1758922-16 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.8 | | % | | 80-120 | 01-OCT-13 |
| **WG1758922-19 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.4 | | % | | 80-120 | 01-OCT-13 |
| **WG1758922-2 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 102.8 | | % | | 80-120 | 01-OCT-13 |
| **WG1758922-5 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 102.3 | | % | | 80-120 | 01-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-WAD-CFA-VA** | **Water** | | | | | | | |
| **Batch R2706691** | | | | | | | | |
| **WG1758922-8 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.8 | | % | | 80-120 | 01-OCT-13 |
| **WG1758922-1 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758922-13 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758922-15 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758922-18 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758922-4 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758922-7 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 01-OCT-13 |
| **WG1758922-10 MS** | | **L1367539-10** | | | | | | |
| Cyanide, Weak Acid Diss | | | 101.4 | | % | | 70-130 | 01-OCT-13 |
| **Batch R2708891** | | | | | | | | |
| **WG1760849-13 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 100.6 | | % | | 80-120 | 03-OCT-13 |
| **WG1760849-15 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 104.0 | | % | | 80-120 | 03-OCT-13 |
| **WG1760849-2 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.0 | | % | | 80-120 | 03-OCT-13 |
| **WG1760849-5 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.0 | | % | | 80-120 | 03-OCT-13 |
| **WG1760849-9 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 102.3 | | % | | 80-120 | 03-OCT-13 |
| **WG1760849-1 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760849-12 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760849-14 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760849-4 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760849-8 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 03-OCT-13 |
| **WG1760849-7 MS** | | **L1368575-20** | | | | | | |
| Cyanide, Weak Acid Diss | | | 99.8 | | % | | 70-130 | 03-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **EC-PCT-VA** | **Water** | | | | | | | |
| **Batch R2701596** | | | | | | | | |
| **WG1755199-17 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 99.3 | | % | | 90-110 | 26-SEP-13 |
| **WG1755199-18 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 97.1 | | % | | 90-110 | 26-SEP-13 |
| **WG1755199-19 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 97.2 | | % | | 90-110 | 26-SEP-13 |
| **WG1755199-20 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 98.6 | | % | | 90-110 | 26-SEP-13 |
| **WG1755199-21 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 98.6 | | % | | 90-110 | 26-SEP-13 |
| **WG1755199-22 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 98.6 | | % | | 90-110 | 26-SEP-13 |
| **WG1755199-23 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 98.2 | | % | | 90-110 | 26-SEP-13 |
| **WG1755199-24 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 99.9 | | % | | 90-110 | 26-SEP-13 |
| **WG1755199-33 DUP** | | **L1365603-17** | | | | | | |
| Conductivity | | 457 | 454 | | uS/cm | 0.7 | 10 | 26-SEP-13 |
| **WG1755199-1 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 26-SEP-13 |
| **WG1755199-2 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 26-SEP-13 |
| **WG1755199-3 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 26-SEP-13 |
| **WG1755199-4 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 26-SEP-13 |
| **WG1755199-5 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 26-SEP-13 |
| **WG1755199-6 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 26-SEP-13 |
| **WG1755199-7 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 26-SEP-13 |
| **WG1755199-8 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 26-SEP-13 |
| **HG-DIS-LOW-CVAFS-VA** | **Water** | | | | | | | |
| **Batch R2699917** | | | | | | | | |
| **WG1753258-3 LCS** | | | | | | | | |
| Mercury (Hg)-Dissolved | | | 97.9 | | % | | 80-120 | 24-SEP-13 |
| **WG1753258-5 MS** | | **L1366897-2** | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **HG-DIS-LOW-CVAFS-VA** | **Water** | | | | | | | |
| **Batch R2699917** | | | | | | | | |
| **WG1753258-5 MS** | | **L1366897-2** | | | | | | |
| Mercury (Hg)-Dissolved | | | 84.1 | | % | | 70-130 | 24-SEP-13 |
| **WG1753258-6 MS** | | **L1365910-5** | | | | | | |
| Mercury (Hg)-Dissolved | | | 94.9 | | % | | 70-130 | 24-SEP-13 |
| **Batch R2700321** | | | | | | | | |
| **WG1753258-1 MB** | | | | | | | | |
| Mercury (Hg)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 24-SEP-13 |
| **HG-TOT-LOW-CVAFS-VA** | **Water** | | | | | | | |
| **Batch R2702133** | | | | | | | | |
| **WG1756269-2 LCS** | | | | | | | | |
| Mercury (Hg)-Total | | | 106.0 | | % | | 80-120 | 26-SEP-13 |
| **WG1756269-1 MB** | | | | | | | | |
| Mercury (Hg)-Total | | | <0.000010 | | mg/L | | 0.00001 | 26-SEP-13 |
| **WG1756269-6 MS** | | **L1368653-1** | | | | | | |
| Mercury (Hg)-Total | | | 99.7 | | % | | 70-130 | 26-SEP-13 |
| **WG1756269-7 MS** | | **L1367579-1** | | | | | | |
| Mercury (Hg)-Total | | | 84.7 | | % | | 70-130 | 26-SEP-13 |
| **WG1756269-8 MS** | | **L1369075-1** | | | | | | |
| Mercury (Hg)-Total | | | 91.8 | | % | | 70-130 | 26-SEP-13 |
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2699816** | | | | | | | | |
| **WG1753258-1 MB** | | | | | | | | |
| Aluminum (Al)-Dissolved | | | <0.0010 | | mg/L | | 0.001 | 24-SEP-13 |
| Antimony (Sb)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 24-SEP-13 |
| Arsenic (As)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 24-SEP-13 |
| Barium (Ba)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 24-SEP-13 |
| Beryllium (Be)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 24-SEP-13 |
| Bismuth (Bi)-Dissolved | | | <0.00050 | | mg/L | | 0.0005 | 24-SEP-13 |
| Boron (B)-Dissolved | | | <0.010 | | mg/L | | 0.01 | 24-SEP-13 |
| Cadmium (Cd)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 24-SEP-13 |
| Chromium (Cr)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 24-SEP-13 |
| Cobalt (Co)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 24-SEP-13 |
| Copper (Cu)-Dissolved | | | <0.00020 | | mg/L | | 0.0002 | 24-SEP-13 |
| Lead (Pb)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 24-SEP-13 |
| Lithium (Li)-Dissolved | | | <0.00050 | | mg/L | | 0.0005 | 24-SEP-13 |
| Manganese (Mn)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 24-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch** | **R2699816** | | | | | | | |
| **WG1753258-1** | **MB** | | | | | | | |
| Molybdenum (Mo)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 24-SEP-13 |
| Nickel (Ni)-Dissolved | | | <0.00050 | | mg/L | | 0.0005 | 24-SEP-13 |
| Selenium (Se)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 24-SEP-13 |
| Silver (Ag)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 24-SEP-13 |
| Sodium (Na)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 24-SEP-13 |
| Strontium (Sr)-Dissolved | | | <0.00020 | | mg/L | | 0.0002 | 24-SEP-13 |
| Thallium (Tl)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 24-SEP-13 |
| Tin (Sn)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 24-SEP-13 |
| Titanium (Ti)-Dissolved | | | <0.010 | | mg/L | | 0.01 | 24-SEP-13 |
| Uranium (U)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 24-SEP-13 |
| Vanadium (V)-Dissolved | | | <0.0010 | | mg/L | | 0.001 | 24-SEP-13 |
| Zinc (Zn)-Dissolved | | | <0.0010 | | mg/L | | 0.001 | 24-SEP-13 |
| **Batch** | **R2700658** | | | | | | | |
| **WG1753258-6** | **MS** | **L1365910-5** | | | | | | |
| Aluminum (Al)-Dissolved | | | 94.5 | | % | | 70-130 | 24-SEP-13 |
| Antimony (Sb)-Dissolved | | | 102.0 | | % | | 70-130 | 24-SEP-13 |
| Arsenic (As)-Dissolved | | | 99.3 | | % | | 70-130 | 24-SEP-13 |
| Barium (Ba)-Dissolved | | | 95.6 | | % | | 70-130 | 24-SEP-13 |
| Beryllium (Be)-Dissolved | | | 92.4 | | % | | 70-130 | 24-SEP-13 |
| Bismuth (Bi)-Dissolved | | | 94.5 | | % | | 70-130 | 24-SEP-13 |
| Boron (B)-Dissolved | | | 94.0 | | % | | 70-130 | 24-SEP-13 |
| Cadmium (Cd)-Dissolved | | | 99.0 | | % | | 70-130 | 24-SEP-13 |
| Chromium (Cr)-Dissolved | | | 96.7 | | % | | 70-130 | 24-SEP-13 |
| Cobalt (Co)-Dissolved | | | 97.2 | | % | | 70-130 | 24-SEP-13 |
| Copper (Cu)-Dissolved | | | 94.4 | | % | | 70-130 | 24-SEP-13 |
| Lead (Pb)-Dissolved | | | 95.6 | | % | | 70-130 | 24-SEP-13 |
| Lithium (Li)-Dissolved | | | 93.3 | | % | | 70-130 | 24-SEP-13 |
| Manganese (Mn)-Dissolved | | | N/A | MS-B | % | | - | 24-SEP-13 |
| Molybdenum (Mo)-Dissolved | | | 102.3 | | % | | 70-130 | 24-SEP-13 |
| Nickel (Ni)-Dissolved | | | 97.1 | | % | | 70-130 | 24-SEP-13 |
| Selenium (Se)-Dissolved | | | 110.4 | | % | | 70-130 | 24-SEP-13 |
| Silver (Ag)-Dissolved | | | 93.4 | | % | | 70-130 | 24-SEP-13 |
| Sodium (Na)-Dissolved | | | 97.5 | | % | | 70-130 | 24-SEP-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 24-SEP-13 |

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2700658** | | | | | | | | |
| **WG1753258-6 MS** | | **L1365910-5** | | | | | | |
| Thallium (Tl)-Dissolved | | | 95.5 | | % | | 70-130 | 24-SEP-13 |
| Tin (Sn)-Dissolved | | | 99.2 | | % | | 70-130 | 24-SEP-13 |
| Titanium (Ti)-Dissolved | | | 101.8 | | % | | 70-130 | 24-SEP-13 |
| Uranium (U)-Dissolved | | | 100.3 | | % | | 70-130 | 24-SEP-13 |
| Vanadium (V)-Dissolved | | | 98.7 | | % | | 70-130 | 24-SEP-13 |
| Zinc (Zn)-Dissolved | | | 92.7 | | % | | 70-130 | 24-SEP-13 |
| **Batch R2701804** | | | | | | | | |
| **WG1753258-2 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Aluminum (Al)-Dissolved | | | 96.4 | | % | | 80-120 | 25-SEP-13 |
| Antimony (Sb)-Dissolved | | | 99.0 | | % | | 80-120 | 25-SEP-13 |
| Arsenic (As)-Dissolved | | | 98.3 | | % | | 80-120 | 25-SEP-13 |
| Barium (Ba)-Dissolved | | | 99.7 | | % | | 80-120 | 25-SEP-13 |
| Beryllium (Be)-Dissolved | | | 99.5 | | % | | 80-120 | 25-SEP-13 |
| Bismuth (Bi)-Dissolved | | | 95.2 | | % | | 80-120 | 25-SEP-13 |
| Boron (B)-Dissolved | | | 87.9 | | % | | 80-120 | 25-SEP-13 |
| Cadmium (Cd)-Dissolved | | | 97.7 | | % | | 80-120 | 25-SEP-13 |
| Chromium (Cr)-Dissolved | | | 95.7 | | % | | 80-120 | 25-SEP-13 |
| Cobalt (Co)-Dissolved | | | 95.0 | | % | | 80-120 | 25-SEP-13 |
| Copper (Cu)-Dissolved | | | 92.5 | | % | | 80-120 | 25-SEP-13 |
| Lead (Pb)-Dissolved | | | 95.0 | | % | | 80-120 | 25-SEP-13 |
| Lithium (Li)-Dissolved | | | 98.5 | | % | | 80-120 | 25-SEP-13 |
| Manganese (Mn)-Dissolved | | | 95.9 | | % | | 80-120 | 25-SEP-13 |
| Molybdenum (Mo)-Dissolved | | | 100.6 | | % | | 80-120 | 25-SEP-13 |
| Nickel (Ni)-Dissolved | | | 94.8 | | % | | 80-120 | 25-SEP-13 |
| Selenium (Se)-Dissolved | | | 98.6 | | % | | 80-120 | 25-SEP-13 |
| Silver (Ag)-Dissolved | | | 98.5 | | % | | 80-120 | 25-SEP-13 |
| Sodium (Na)-Dissolved | | | 100.3 | | % | | 80-120 | 25-SEP-13 |
| Strontium (Sr)-Dissolved | | | 98.7 | | % | | 80-120 | 25-SEP-13 |
| Thallium (Tl)-Dissolved | | | 97.3 | | % | | 80-120 | 25-SEP-13 |
| Tin (Sn)-Dissolved | | | 96.4 | | % | | 80-120 | 25-SEP-13 |
| Titanium (Ti)-Dissolved | | | 89.9 | | % | | 80-120 | 25-SEP-13 |
| Uranium (U)-Dissolved | | | 98.8 | | % | | 80-120 | 25-SEP-13 |
| Vanadium (V)-Dissolved | | | 97.1 | | % | | 80-120 | 25-SEP-13 |
| Zinc (Zn)-Dissolved | | | 93.2 | | % | | 80-120 | 25-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2705823** | | | | | | | | |
| **WG1753258-5 MS** | | **L1366897-2** | | | | | | |
| Aluminum (Al)-Dissolved | | | 103.3 | | % | | 70-130 | 30-SEP-13 |
| Antimony (Sb)-Dissolved | | | 96.5 | | % | | 70-130 | 30-SEP-13 |
| Arsenic (As)-Dissolved | | | 115.0 | | % | | 70-130 | 30-SEP-13 |
| Barium (Ba)-Dissolved | | | N/A | MS-B | % | | - | 30-SEP-13 |
| Beryllium (Be)-Dissolved | | | 100.5 | | % | | 70-130 | 30-SEP-13 |
| Bismuth (Bi)-Dissolved | | | 90.0 | | % | | 70-130 | 30-SEP-13 |
| Boron (B)-Dissolved | | | 81.7 | | % | | 70-130 | 30-SEP-13 |
| Cadmium (Cd)-Dissolved | | | 102.4 | | % | | 70-130 | 30-SEP-13 |
| Chromium (Cr)-Dissolved | | | 102.9 | | % | | 70-130 | 30-SEP-13 |
| Cobalt (Co)-Dissolved | | | 100.5 | | % | | 70-130 | 30-SEP-13 |
| Copper (Cu)-Dissolved | | | 97.4 | | % | | 70-130 | 30-SEP-13 |
| Lead (Pb)-Dissolved | | | 97.0 | | % | | 70-130 | 30-SEP-13 |
| Lithium (Li)-Dissolved | | | 99.8 | | % | | 70-130 | 30-SEP-13 |
| Manganese (Mn)-Dissolved | | | N/A | MS-B | % | | - | 30-SEP-13 |
| Molybdenum (Mo)-Dissolved | | | 95.3 | | % | | 70-130 | 30-SEP-13 |
| Nickel (Ni)-Dissolved | | | 100.8 | | % | | 70-130 | 30-SEP-13 |
| Selenium (Se)-Dissolved | | | 111.0 | | % | | 70-130 | 30-SEP-13 |
| Sodium (Na)-Dissolved | | | N/A | MS-B | % | | - | 30-SEP-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 30-SEP-13 |
| Thallium (Tl)-Dissolved | | | 98.3 | | % | | 70-130 | 30-SEP-13 |
| Tin (Sn)-Dissolved | | | 93.9 | | % | | 70-130 | 30-SEP-13 |
| Titanium (Ti)-Dissolved | | | 97.6 | | % | | 70-130 | 30-SEP-13 |
| Uranium (U)-Dissolved | | | 104.1 | | % | | 70-130 | 30-SEP-13 |
| Vanadium (V)-Dissolved | | | 105.6 | | % | | 70-130 | 30-SEP-13 |
| Zinc (Zn)-Dissolved | | | 99.4 | | % | | 70-130 | 30-SEP-13 |
| **MET-DIS-LOW-ICP-VA** | **Water** | | | | | | | |
| **Batch R2699843** | | | | | | | | |
| **WG1753258-2 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Calcium (Ca)-Dissolved | | | 100.5 | | % | | 80-120 | 24-SEP-13 |
| Iron (Fe)-Dissolved | | | 96.2 | | % | | 80-120 | 24-SEP-13 |
| Magnesium (Mg)-Dissolved | | | 99.0 | | % | | 80-120 | 24-SEP-13 |
| Phosphorus (P)-Dissolved | | | 99.1 | | % | | 80-120 | 24-SEP-13 |
| Potassium (K)-Dissolved | | | 104.6 | | % | | 80-120 | 24-SEP-13 |
| Silicon (Si)-Dissolved | | | 101.8 | | % | | 80-120 | 24-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-DIS-LOW-ICP-VA** | **Water** | | | | | | | |
| **Batch R2699843** | | | | | | | | |
| **WG1753258-1 MB** | | | | | | | | |
| Calcium (Ca)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 24-SEP-13 |
| Iron (Fe)-Dissolved | | | <0.010 | | mg/L | | 0.01 | 24-SEP-13 |
| Magnesium (Mg)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 24-SEP-13 |
| Phosphorus (P)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 24-SEP-13 |
| Potassium (K)-Dissolved | | | <0.10 | | mg/L | | 0.1 | 24-SEP-13 |
| Silicon (Si)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 24-SEP-13 |
| **MET-T-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2700658** | | | | | | | | |
| **WG1753647-3 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Aluminum (Al)-Total | | | 105.0 | | % | | 80-120 | 24-SEP-13 |
| Antimony (Sb)-Total | | | 105.0 | | % | | 80-120 | 24-SEP-13 |
| Arsenic (As)-Total | | | 101.7 | | % | | 80-120 | 24-SEP-13 |
| Barium (Ba)-Total | | | 101.8 | | % | | 80-120 | 24-SEP-13 |
| Beryllium (Be)-Total | | | 101.7 | | % | | 80-120 | 24-SEP-13 |
| Bismuth (Bi)-Total | | | 104.7 | | % | | 80-120 | 24-SEP-13 |
| Boron (B)-Total | | | 95.4 | | % | | 80-120 | 24-SEP-13 |
| Cadmium (Cd)-Total | | | 99.1 | | % | | 80-120 | 24-SEP-13 |
| Chromium (Cr)-Total | | | 102.8 | | % | | 80-120 | 24-SEP-13 |
| Cobalt (Co)-Total | | | 101.5 | | % | | 80-120 | 24-SEP-13 |
| Copper (Cu)-Total | | | 99.6 | | % | | 80-120 | 24-SEP-13 |
| Lead (Pb)-Total | | | 100.1 | | % | | 80-120 | 24-SEP-13 |
| Lithium (Li)-Total | | | 103.8 | | % | | 80-120 | 24-SEP-13 |
| Manganese (Mn)-Total | | | 105.1 | | % | | 80-120 | 24-SEP-13 |
| Molybdenum (Mo)-Total | | | 102.1 | | % | | 80-120 | 24-SEP-13 |
| Nickel (Ni)-Total | | | 103.4 | | % | | 80-120 | 24-SEP-13 |
| Selenium (Se)-Total | | | 97.3 | | % | | 80-120 | 24-SEP-13 |
| Silver (Ag)-Total | | | 104.7 | | % | | 80-120 | 24-SEP-13 |
| Sodium (Na)-Total | | | 104.1 | | % | | 80-120 | 24-SEP-13 |
| Strontium (Sr)-Total | | | 103.8 | | % | | 80-120 | 24-SEP-13 |
| Thallium (Tl)-Total | | | 101.4 | | % | | 80-120 | 24-SEP-13 |
| Tin (Sn)-Total | | | 102.7 | | % | | 80-120 | 24-SEP-13 |
| Titanium (Ti)-Total | | | 98.2 | | % | | 80-120 | 24-SEP-13 |
| Uranium (U)-Total | | | 102.8 | | % | | 80-120 | 24-SEP-13 |
| Vanadium (V)-Total | | | 104.4 | | % | | 80-120 | 24-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-T-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2700658** | | | | | | | | |
| **WG1753647-3 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Zinc (Zn)-Total | | | 97.5 | | % | | 80-120 | 24-SEP-13 |
| **Batch R2702649** | | | | | | | | |
| **WG1753647-1 MB** | | | | | | | | |
| Aluminum (Al)-Total | | | <0.0030 | | mg/L | | 0.003 | 27-SEP-13 |
| Antimony (Sb)-Total | | | <0.00010 | | mg/L | | 0.0001 | 27-SEP-13 |
| Arsenic (As)-Total | | | <0.00010 | | mg/L | | 0.0001 | 27-SEP-13 |
| Barium (Ba)-Total | | | <0.000050 | | mg/L | | 0.00005 | 27-SEP-13 |
| Beryllium (Be)-Total | | | <0.00010 | | mg/L | | 0.0001 | 27-SEP-13 |
| Bismuth (Bi)-Total | | | <0.00050 | | mg/L | | 0.0005 | 27-SEP-13 |
| Boron (B)-Total | | | <0.010 | | mg/L | | 0.01 | 27-SEP-13 |
| Cadmium (Cd)-Total | | | <0.000010 | | mg/L | | 0.00001 | 27-SEP-13 |
| Chromium (Cr)-Total | | | <0.00010 | | mg/L | | 0.0001 | 27-SEP-13 |
| Cobalt (Co)-Total | | | <0.00010 | | mg/L | | 0.0001 | 27-SEP-13 |
| Copper (Cu)-Total | | | <0.00050 | | mg/L | | 0.0005 | 27-SEP-13 |
| Lead (Pb)-Total | | | <0.000050 | | mg/L | | 0.00005 | 27-SEP-13 |
| Lithium (Li)-Total | | | <0.00050 | | mg/L | | 0.0005 | 27-SEP-13 |
| Manganese (Mn)-Total | | | <0.000050 | | mg/L | | 0.00005 | 27-SEP-13 |
| Molybdenum (Mo)-Total | | | <0.000050 | | mg/L | | 0.00005 | 27-SEP-13 |
| Nickel (Ni)-Total | | | <0.00050 | | mg/L | | 0.0005 | 27-SEP-13 |
| Selenium (Se)-Total | | | <0.00010 | | mg/L | | 0.0001 | 27-SEP-13 |
| Silver (Ag)-Total | | | <0.000010 | | mg/L | | 0.00001 | 27-SEP-13 |
| Sodium (Na)-Total | | | <0.050 | | mg/L | | 0.05 | 27-SEP-13 |
| Strontium (Sr)-Total | | | <0.00020 | | mg/L | | 0.0002 | 27-SEP-13 |
| Thallium (Tl)-Total | | | <0.000010 | | mg/L | | 0.00001 | 27-SEP-13 |
| Tin (Sn)-Total | | | <0.00010 | | mg/L | | 0.0001 | 27-SEP-13 |
| Titanium (Ti)-Total | | | <0.010 | | mg/L | | 0.01 | 27-SEP-13 |
| Uranium (U)-Total | | | <0.000010 | | mg/L | | 0.00001 | 27-SEP-13 |
| Vanadium (V)-Total | | | <0.0010 | | mg/L | | 0.001 | 27-SEP-13 |
| Zinc (Zn)-Total | | | <0.0030 | | mg/L | | 0.003 | 27-SEP-13 |
| **MET-TOT-LOW-ICP-VA** | **Water** | | | | | | | |
| **Batch R2700350** | | | | | | | | |
| **WG1753647-3 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Calcium (Ca)-Total | | | 100.4 | | % | | 80-120 | 24-SEP-13 |
| Iron (Fe)-Total | | | 98.2 | | % | | 80-120 | 24-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-TOT-LOW-ICP-VA** | **Water** | | | | | | | |
| **Batch R2700350** | | | | | | | | |
| **WG1753647-3 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Magnesium (Mg)-Total | | | 97.2 | | % | | 80-120 | 24-SEP-13 |
| Phosphorus (P)-Total | | | 97.8 | | % | | 80-120 | 24-SEP-13 |
| Potassium (K)-Total | | | 101.6 | | % | | 80-120 | 24-SEP-13 |
| Silicon (Si)-Total | | | 105.3 | | % | | 80-120 | 24-SEP-13 |
| **WG1753647-1 MB** | | | | | | | | |
| Calcium (Ca)-Total | | | <0.050 | | mg/L | | 0.05 | 24-SEP-13 |
| Iron (Fe)-Total | | | <0.010 | | mg/L | | 0.01 | 24-SEP-13 |
| Magnesium (Mg)-Total | | | <0.050 | | mg/L | | 0.05 | 24-SEP-13 |
| Phosphorus (P)-Total | | | <0.050 | | mg/L | | 0.05 | 24-SEP-13 |
| Potassium (K)-Total | | | <0.10 | | mg/L | | 0.1 | 24-SEP-13 |
| Silicon (Si)-Total | | | <0.050 | | mg/L | | 0.05 | 24-SEP-13 |
| **NH3-F-VA** | **Water** | | | | | | | |
| **Batch R2704330** | | | | | | | | |
| **WG1756941-10 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 93.6 | | % | | 85-115 | 30-SEP-13 |
| **WG1756941-2 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 92.4 | | % | | 85-115 | 30-SEP-13 |
| **WG1756941-4 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 93.6 | | % | | 85-115 | 30-SEP-13 |
| **WG1756941-6 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 96.6 | | % | | 85-115 | 30-SEP-13 |
| **WG1756941-8 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 94.9 | | % | | 85-115 | 30-SEP-13 |
| **WG1756941-1 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1756941-3 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1756941-5 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1756941-7 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1756941-9 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 30-SEP-13 |
| **WG1756941-12 MS** | | **L1366790-2** | | | | | | |
| Ammonia, Total (as N) | | | 95.0 | | % | | 75-125 | 30-SEP-13 |
| **WG1756941-14 MS** | | **L1368773-5** | | | | | | |
| Ammonia, Total (as N) | | | 93.5 | | % | | 75-125 | 30-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **NH3-F-VA** | **Water** | | | | | | | |
| **Batch R2704330** | | | | | | | | |
| **WG1756941-16 MS** | | **L1366001-3** | | | | | | |
| Ammonia, Total (as N) | | | 92.7 | | % | | 75-125 | 30-SEP-13 |
| **PH-PCT-VA** | **Water** | | | | | | | |
| **Batch R2701596** | | | | | | | | |
| **WG1755199-25 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.01 | | pH | | 6.9-7.1 | 26-SEP-13 |
| **WG1755199-26 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.03 | | pH | | 6.9-7.1 | 26-SEP-13 |
| **WG1755199-27 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.03 | | pH | | 6.9-7.1 | 26-SEP-13 |
| **WG1755199-28 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.01 | | pH | | 6.9-7.1 | 26-SEP-13 |
| **WG1755199-29 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.03 | | pH | | 6.9-7.1 | 26-SEP-13 |
| **WG1755199-30 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.02 | | pH | | 6.9-7.1 | 26-SEP-13 |
| **WG1755199-31 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.02 | | pH | | 6.9-7.1 | 26-SEP-13 |
| **WG1755199-32 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.01 | | pH | | 6.9-7.1 | 26-SEP-13 |
| **WG1755199-33 DUP** | | **L1365603-17** | | | | | | |
| pH | | 8.54 | 8.60 | J | pH | 0.06 | 0.3 | 26-SEP-13 |
| **S-DIS-ICP-VA** | **Water** | | | | | | | |
| **Batch R2699843** | | | | | | | | |
| **WG1753258-2 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Sulfur (S)-Dissolved | | | 99.8 | | % | | 80-120 | 24-SEP-13 |
| **WG1753258-1 MB** | | | | | | | | |
| Sulfur (S)-Dissolved | | | <0.50 | | mg/L | | 0.5 | 24-SEP-13 |
| **Batch R2708824** | | | | | | | | |
| **WG1753258-6 MS** | | **L1365910-5** | | | | | | |
| Sulfur (S)-Dissolved | | | N/A | MS-B | % | | - | 02-OCT-13 |
| **S-TOT-ICP-VA** | **Water** | | | | | | | |
| **Batch R2700350** | | | | | | | | |
| **WG1753647-3 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Sulfur (S)-Total | | | 99.2 | | % | | 80-120 | 24-SEP-13 |
| **WG1753647-1 MB** | | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **S-TOT-ICP-VA** | **Water** | | | | | | | |
| **Batch R2700350** | | | | | | | | |
| **WG1753647-1 MB** | | | | | | | | |
| Sulfur (S)-Total | | | <0.50 | | mg/L | | 0.5 | 24-SEP-13 |
| **S2-T-COL-VA** | **Water** | | | | | | | |
| **Batch R2700428** | | | | | | | | |
| **WG1754023-2 CRM** | | **VA-S2-C** | | | | | | |
| Sulphide as S | | | 109.3 | | % | | 75-125 | 24-SEP-13 |
| **WG1754023-6 CRM** | | **VA-S2-C** | | | | | | |
| Sulphide as S | | | 114.7 | | % | | 75-125 | 24-SEP-13 |
| **WG1754023-7 CRM** | | **VA-S2-C** | | | | | | |
| Sulphide as S | | | 114.7 | | % | | 75-125 | 24-SEP-13 |
| **WG1754023-3 DUP** | | **L1365603-1** | | | | | | |
| Sulphide as S | | 0.272 | 0.284 | | mg/L | 4.6 | 20 | 24-SEP-13 |
| **WG1754023-1 MB** | | | | | | | | |
| Sulphide as S | | | <0.020 | | mg/L | | 0.02 | 24-SEP-13 |
| **WG1754023-4 MB** | | | | | | | | |
| Sulphide as S | | | <0.020 | | mg/L | | 0.02 | 24-SEP-13 |
| **WG1754023-5 MB** | | | | | | | | |
| Sulphide as S | | | <0.020 | | mg/L | | 0.02 | 24-SEP-13 |
| **Batch R2702996** | | | | | | | | |
| **WG1755085-2 CRM** | | **VA-S2-C** | | | | | | |
| Sulphide as S | | | 109.4 | | % | | 75-125 | 25-SEP-13 |
| **WG1755085-5 CRM** | | **VA-S2-C** | | | | | | |
| Sulphide as S | | | 108.9 | | % | | 75-125 | 25-SEP-13 |
| **WG1755085-1 MB** | | | | | | | | |
| Sulphide as S | | | <0.020 | | mg/L | | 0.02 | 25-SEP-13 |
| **WG1755085-4 MB** | | | | | | | | |
| Sulphide as S | | | <0.020 | | mg/L | | 0.02 | 25-SEP-13 |
| **TKN-F-VA** | **Water** | | | | | | | |
| **Batch R2702607** | | | | | | | | |
| **WG1755873-15 DUP** | | **L1365603-29** | | | | | | |
| Total Kjeldahl Nitrogen | | 9.30 | 8.45 | | mg/L | 9.5 | 20 | 27-SEP-13 |
| **WG1755873-10 LCS** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | 96.3 | | % | | 75-125 | 27-SEP-13 |
| **WG1755873-14 LCS** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | 93.4 | | % | | 75-125 | 27-SEP-13 |
| **WG1755873-13 MB** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | <0.050 | | mg/L | | 0.05 | 27-SEP-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **TKN-F-VA** | **Water** | | | | | | | |
| **Batch R2702607** | | | | | | | | |
| **WG1755873-9 MB** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | <0.050 | | mg/L | | 0.05 | 27-SEP-13 |
| **WG1755873-12 MS** | | **L1368653-18** | | | | | | |
| Total Kjeldahl Nitrogen | | | 89.7 | | % | | 70-130 | 27-SEP-13 |
| **WG1755873-16 MS** | | **L1367070-2** | | | | | | |
| Total Kjeldahl Nitrogen | | | 87.2 | | % | | 70-130 | 27-SEP-13 |

**Legend:**

| | |
|---|---|
| Limit | ALS Control Limit (Data Quality Objectives) |
| DUP | Duplicate |
| RPD | Relative Percent Difference |
| N/A | Not Available |
| LCS | Laboratory Control Sample |
| SRM | Standard Reference Material |
| MS | Matrix Spike |
| MSD | Matrix Spike Duplicate |
| ADE | Average Desorption Efficiency |
| MB | Method Blank |
| IRM | Internal Reference Material |
| CRM | Certified Reference Material |
| CCV | Continuing Calibration Verification |
| CVS | Calibration Verification Standard |
| LCSD | Laboratory Control Sample Duplicate |

**Sample Parameter Qualifier Definitions:**

| Qualifier | Description |
|---|---|
| J | Duplicate results and limits are expressed in terms of absolute difference. |
| MS-B | Matrix Spike recovery could not be accurately calculated due to high analyte background in sample. |
| RPD-NA | Relative Percent Difference Not Available due to result(s) being less than detection limit. |

# Quality Control Report



**Hold Time Exceedances:**

| ALS Product Description | Sample ID | Sampling Date | Date Processed | Rec. HT | Actual HT | Units | Qualifier |
|---|---|---|---|---|---|---|---|
| **Physical Tests** | | | | | | | |
| pH by Meter (Automated) | | | | | | | |
| | 1 | 17-SEP-13 12:00 | 26-SEP-13 13:08 | 0.25 | 217 | hours | EHTR-FM |
| | 5 | 17-SEP-13 12:00 | 26-SEP-13 13:08 | 0.25 | 217 | hours | EHTR-FM |
| | 9 | 17-SEP-13 12:00 | 26-SEP-13 13:08 | 0.25 | 217 | hours | EHTR-FM |
| | 13 | 17-SEP-13 12:00 | 26-SEP-13 13:08 | 0.25 | 217 | hours | EHTR-FM |
| | 17 | 17-SEP-13 12:00 | 26-SEP-13 13:08 | 0.25 | 217 | hours | EHTR-FM |
| | 21 | 17-SEP-13 12:00 | 26-SEP-13 13:08 | 0.25 | 217 | hours | EHTR-FM |
| | 25 | 17-SEP-13 12:00 | 26-SEP-13 13:08 | 0.25 | 217 | hours | EHTR-FM |
| | 29 | 17-SEP-13 12:00 | 26-SEP-13 13:08 | 0.25 | 217 | hours | EHTR-FM |
| | 33 | 17-SEP-13 12:00 | 26-SEP-13 13:08 | 0.25 | 217 | hours | EHTR-FM |
| | 37 | 17-SEP-13 12:00 | 26-SEP-13 13:08 | 0.25 | 217 | hours | EHTR-FM |
| | 41 | 17-SEP-13 12:00 | 26-SEP-13 13:08 | 0.25 | 217 | hours | EHTR-FM |
| **Anions and Nutrients** | | | | | | | |
| Total Sulphide by Colorimetric | | | | | | | |
| | 17 | 17-SEP-13 12:00 | 25-SEP-13 15:00 | 7 | 8 | days | EHT |
| **Cyanides** | | | | | | | |
| Free Cyanide in water by CFA | | | | | | | |
| | 35 | 17-SEP-13 12:00 | 03-OCT-13 12:27 | 14 | 16 | days | EHT |
| Total Cyanide in water by CFA | | | | | | | |
| | 35 | 17-SEP-13 12:00 | 03-OCT-13 12:06 | 14 | 16 | days | EHT |
| Weak Acid Diss. Cyanide in water by CFA | | | | | | | |
| | 35 | 17-SEP-13 12:00 | 03-OCT-13 12:22 | 14 | 16 | days | EHT |

**Legend & Qualifier Definitions:**

| | |
|---|---|
| EHTR-FM: | Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended. |
| EHTR: | Exceeded ALS recommended hold time prior to sample receipt. |
| EHTL: | Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry. |
| EHT: | Exceeded ALS recommended hold time prior to analysis. |
| Rec. HT: | ALS recommended hold time (see units). |

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1365603 were received on 19-SEP-13 23:50.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

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The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

# Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____



| Report To | | Report Format / Distribution | Service Requested (Rush for routine analysis subject to availability) |
|---|---|---|---|
| Company: | AMEC Environment & Infrastructure | ☑ Standard ☐ Other | ◉ Regular (Standard Turnaround Times - Business Days) |
| Contact: | Leslie Hardy | ☑ PDF ☑ Excel ☐ Digital ☐ Fax | ○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT |
| Address: | 5681-70 Street, Edmonton, AB | Email 1: leslie.hardy@amec.com | ○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT |
| | | Email 2: | ○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT |
| Phone: | 780-989-4581 Fax: 780-435-8425 | Email 3: | |
| Invoice To | Same as Report ? ☑ Yes ☐ No | Client / Project Information | Analysis Request |
| Hardcopy of Invoice with Report? | ☑ Yes ☐ No | Job #: VM00605E.5230 | Please indicate below Filtered, Preserved or both (F, P, F/P) |
| Company: | | PO / AFE: | |
| Contact: | | LSD: | |
| Address: | | | |
| Phone: | Fax: | Quote #: Q40561 AMEC (Yukon) v3 | |
| Lab Work Order # (lab use only) | | ALS Contact: | Sampler: |

| Sample # | Sample Identification (This description will appear on the report) | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | General Chemistry | Diss Metals (F/P, HNO3) | Thiocyanate (P, NaOH) | Cyanides (P, NaOH) | TIC | Nutrients (P, H2SO4) | Cyanides (Pb ace, F/P, NaOH) | Thiocyanate (Pb Ace,F/P,HNO3) | | Diss Metals (DO NOT ADD ACID | Thiocyanate (P, HNO3) | Sulphide | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MW09-01 Standard Preservation | 17-Sep-13 | | Water | X | X | X | X | X | X | | | | | | X | 7 |
| 2 | MW09-01 Alternate Preservation #1 (SCN with HNO3) | 17-Sep-13 | | Water | | | | | | | | | | | X | | 1 |
| 3 | MW09-01 Alternate Preservation #2 (Sulphide Removed) | 17-Sep-13 | | Water | | | | | | | X | X | | | | | 2 |
| 4 | MW09-01 Alternate Preservation #3 (Unpreserved) | 17-Sep-13 | | Water | | | | | | | | | | X | | | 1 |
| 5 | MW09-02 Standard Preservation | 17-Sep-13 | | Water | X | X | X | X | X | X | | | | | | X | 7 |
| 6 | MW09-02 Alternate Preservation #1 (SCN with HNO3) | 17-Sep-13 | | Water | | | | | | | | | | | X | | 1 |
| 7 | MW09-02 Alternate Preservation #2 (Sulphide Removed) | 17-Sep-13 | | Water | | | | | | | X | X | | | | | 2 |
| 8 | MW09-02 Alternate Preservation #3 (Unpreserved) | 17-Sep-13 | | Water | | | | | | | | | | X | | | 1 |
| 9 | MW09-03 Standard Preservation | 17-Sep-13 | | Water | X | X | X | X | X | X | | | | | | | 6 |
| 10 | MW09-03 Alternate Preservation #1 (SCN with HNO3) | 17-Sep-13 | | Water | | | | | | | | | | | X | | 1 |
| 11 | MW09-03 Alternate Preservation #2 (Sulphide Removed) | 17-Sep-13 | | Water | | | | | | | X | X | | | | | 2 |
| 12 | MW09-03 Alternate Preservation #3 (Unpreserved) | 17-Sep-13 | | Water | | | | | | | | | | X | | | 1 |

th water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

DO I

remain unpreserved (as noted on bottle labels).

o complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

e ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

| Rel | mm) | SHIPMENT RECEPTION (lab use only) Received by: | Date: | Time: | Temperature: | SHIPMENT VERIFICATION (lab use only) Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
|---|---|---|---|---|---|---|---|---|---|
| | | 18-Sept-13 | | 11:50 | 6.2, 7.1 °C | | | | |

L1365603-COFC

ALS Environmental

# Chain of Custody / Analytical Request Form

**Canada Toll Free: 1 800 668 9878**

www.alsglobal.com

COC # _____



| Report To | | Report Format / Distribution | Service Requested (Rush for routine analysis subject to availability) |
|---|---|---|---|
| Company: | AMEC Environment & Infrastructure | ☑ Standard ☐ Other | ◉ Regular (Standard Turnaround Times - Business Days) |
| Contact: | Leslie Hardy | ☑ PDF ☑ Excel ☐ Digital ☐ Fax | ○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT |
| Address: | 5681-70 Street, Edmonton, AB | Email 1: leslie.hardy@amec.com | ○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT |
| | | Email 2: | ○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT |
| Phone: | 780-989-4581 Fax: 780-435-8425 | Email 3: | |
| Invoice To | Same as Report ? ☑ Yes ☐ No | Client / Project Information | |
| Hardcopy of Invoice with Report? | ☑ Yes ☐ No | Job #: VM00605E.5230 | |
| Company: | | PO / AFE: | |
| Contact: | | LSD: | |
| Address: | | | |
| Phone: | Fax: | Quote #: Q40561 AMEC (Yukon) v3 | |
| Lab Work Order # (lab use only) | | ALS Contact: | Sampler: |

**Analysis Request**

Please indicate below Filtered, Preserved or both (F, P, F/P)

| Sample # | Sample Identification (This description will appear on the report) | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | General Chemistry | Diss Metals (F/P, HNO3) | Thiocyanate (P, NaOH) | Cyanides (P, NaOH) | TIC | Nutrients (P, H2SO4) | Cyanides (Pb ace, F/P, NaOH) | Thiocyanate (Pb Ace,F/P,HNO3) | | Diss Metals (DO NOT ADD ACID) | Thiocyanate (P, HNO3) | Sulphide | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MW09-04 Standard Preservation | 17-Sep-13 | | Water | X | X | X | X | X | X | | | | | | | 6 |
| | MW09-04 Alternate Preservation #1 (SCN with HNO3) | 17-Sep-13 | | Water | | | | | | | | | | | X | | 1 |
| | MW09-04 Alternate Preservation #2 (Sulphide Removed) | 17-Sep-13 | | Water | | | | | | | X | X | | | | | 2 |
| | MW09-04 Alternate Preservation #3 (Unpreserved) | 17-Sep-13 | | Water | | | | | | | | | | X | | | 1 |
| | MP09-09 Standard Preservation | 17-Sep-13 | | Water | X | X | X | X | X | X | | | | | | X | 7 |
| | MP09-09 Alternate Preservation #1 (SCN with HNO3) | 17-Sep-13 | | Water | | | | | | | | | | | X | | 1 |
| | MP09-09 Alternate Preservation #2 (Sulphide Removed) | 17-Sep-13 | | Water | | | | | | | X | X | | | | | 2 |
| | MP09-09 Alternate Preservation #3 (Unpreserved) | 17-Sep-13 | | Water | | | | | | | | | | X | | | 1 |
| | MP09-10 Standard Preservation | 17-Sep-13 | | Water | X | | | X | X | X | | | | | | | 4 |
| | MP09-10 Alternate Preservation #1 (SCN with HNO3) | 17-Sep-13 | | Water | | | | | | | | | | | | | |
| | MP09-10 Alternate Preservation #2 (Sulphide Removed) | 17-Sep-13 | | Water | | | | | | | | | | | | | |
| | MP09-10 Alternate Preservation #3 (Unpreserved) | 17-Sep-13 | | Water | | | | | | | | | | X | | | 1 |

**Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details**

DO NOT ...emain unpreserved (as noted on bottle labels).

**... complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

...he user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

**... ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.**

| Release | SHIPMENT RECEPTION (lab use only) | | | | SHIPMENT VERIFICATION (lab use only) | | | |
|---|---|---|---|---|---|---|---|---|
| | Received by: | Date: | Time: | Temperature: | Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
| | | 18-Sept-13 | 11:50 | 6.2, 7.1 °C | | | | |

L1365603-COFC

ALS Environmental

**Chain of Custody / Analytical Request Form**
**Canada Toll Free: 1 800 668 9878**
**www.alsglobal.com**

COC # _____



| Report To | | Report Format / Distribution | Service Requested (Rush for routine analysis subject to availability) |
|---|---|---|---|
| Company: | AMEC Environment & Infrastructure | ☑ Standard ☐ Other | ◉ Regular (Standard Turnaround Times - Business Days) |
| Contact: | Leslie Hardy | ☑ PDF ☑ Excel ☐ Digital ☐ Fax | ○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT |
| Address: | 5681-70 Street, Edmonton, AB | Email 1: leslie.hardy@amec.com | ○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT |
| | | Email 2: | ○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT |
| Phone: | 780-989-4581 Fax: 780-435-8425 | Email 3: | |
| Invoice To | Same as Report ? ☑ Yes ☐ No | Client / Project Information | Analysis Request |
| Hardcopy of Invoice with Report? | ☑ Yes ☐ No | Job #: VM00605E.5230 | Please indicate below Filtered, Preserved or both (F, P, F/P) |
| Company: | | PO / AFE: | |
| Contact: | | LSD: | |
| Address: | | | |
| Phone: | Fax: | Quote #: Q40561 AMEC (Yukon) v3 | |
| Lab Work Order # (lab use only) | | ALS Contact: | Sampler: |

| Sample # | Sample Identification (This description will appear on the report) | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | General Chemistry | Diss Metals (F/P, HNO3) | Thiocyanate (P, NaOH) | Cyanides (P, NaOH) | TIC | Nutrients (P, H2SO4) | Cyanides (Pb ace, F/P, NaOH) | Thiocyanate (Pb Ace,F/P,HNO3) | | Diss Metals (DO NOT ADD ACID) | Thiocyanate (P, HNO3) | Sulphide | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MP09-11 Standard Preservation | 17-Sep-13 | | Water | X | X | X | X | X | X | | | | | | | 6 |
| | MP09-11 Alternate Preservation #1 (SCN with HNO3) | 17-Sep-13 | | Water | | | | | | | | | | | X | | 1 |
| | MP09-11 Alternate Preservation #2 (Sulphide Removed) | 17-Sep-13 | | Water | | | | | | | X | X | | | | | 2 |
| | MP09-11 Alternate Preservation #3 (Unpreserved) | 17-Sep-13 | | Water | | | | | | | | | | | | | |
| | MP09-12 Standard Preservation | 17-Sep-13 | | Water | X | X | X | X | X | X | | | | | | X | 7 |
| | MP09-12 Alternate Preservation #1 (SCN with HNO3) | 17-Sep-13 | | Water | | | | | | | | | | | X | | 1 |
| | MP09-12 Alternate Preservation #2 (Sulphide Removed) | 17-Sep-13 | | Water | | | | | | | X | X | | | | | 2 |
| | MP09-12 Alternate Preservation #3 (Unpreserved) | 17-Sep-13 | | Water | | | | | | | | | | X | | | 1 |
| | Field Duplicate A Standard Preservation | 17-Sep-13 | | Water | X | X | X | X | X | X | | | | | | | 6 |
| | Field Duplicate A Alternate Preservation #1 (SCN with HNO3) | 17-Sep-13 | | Water | | | | | | | | | | | X | | 1 |
| | Field Duplicate A Alternate Preservation #2 (Sulphide Removed) | 17-Sep-13 | | Water | | | | | | | X | X | | | | | 2 |
| | Field Duplicate A Alternate Preservation #3 (Unpreserved) | 17-Sep-13 | | Water | | | | | | | | | | X | | | 1 |

**Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details**

DO NOT

nain unpreserved (as noted on bottle labels).

**omplete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

**LS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.**

Release

L1365603-COFC

| SHIPMENT RECEPTION (lab use only) | | | | SHIPMENT VERIFICATION (lab use only) | | | |
|---|---|---|---|---|---|---|---|
| Received by: | Date: | Time: | Temperature: | Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
| | 18-Sep-13 | 11:50 | 6.2, 7.1 °C | | | | |

ALS Environmental

# Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____



| Report To | | Report Format / Distribution | Service Requested (Rush for routine analysis subject to availability) |
|---|---|---|---|
| Company: | AMEC Environment & Infrastructure | ☑ Standard ☐ Other | ◉ Regular (Standard Turnaround Times - Business Days) |
| Contact: | Leslie Hardy | ☑ PDF ☑ Excel ☐ Digital ☐ Fax | ○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT |
| Address: | 5681-70 Street, Edmonton, AB | Email 1: leslie.hardy@amec.com | ○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT |
| | | Email 2: | ○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT |
| Phone: | 780-989-4581 Fax: 780-435-8425 | Email 3: | |
| Invoice To | Same as Report ? ☑ Yes ☐ No | Client / Project Information | |
| Hardcopy of Invoice with Report? | ☑ Yes ☐ No | Job #: VM00605E.5230 | |
| Company: | | PO / AFE: | |
| Contact: | | LSD: | |
| Address: | | | |
| Phone: | Fax: | Quote #: Q40561 AMEC (Yukon) v3 | |
| Lab Work Order # (lab use only) | | ALS Contact: | Sampler: |

| Sample # | Sample Identification (This description will appear on the report) | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | General Chemistry | Diss Metals (F/P, HNO3) | Thiocyanate (P, NaOH) | Cyanides (P, NaOH) | TIC | Nutrients (P, H2SO4) | Cyanides (Pb ace, F/P, NaOH) | Thiocyanate (Pb Ace,F/P,HNO3) | | Diss Metals (DO NOT ADD ACID | Thiocyanate (P, HNO3) | Sulphide | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 37 | Field Duplicate B Standard Preservation | 17-Sep-13 | | Water | X | X | X | X | X | X | | | | | | | 6 |
| 38 | Field Duplicate B Alternate Preservation #1 (SCN with HNO3) | 17-Sep-13 | | Water | | | | | | | | | | | X | | 1 |
| 39 | Field Duplicate B Alternate Preservation #2 (Sulphide Removed) | 17-Sep-13 | | Water | | | | | | | X | X | | | | | 2 |
| 40 | Field Duplicate B Alternate Preservation #3 (Unpreserved) | 17-Sep-13 | | Water | | | | | | | | | | X | | | 1 |

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

DO

o remain unpreserved (as noted on bottle labels).

to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

n the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

he ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

| SHIPMENT RECEPTION (lab use only) | | | | SHIPMENT VERIFICATION (lab use only) | | | |
|---|---|---|---|---|---|---|---|
| -mm) Received by: | Date: | Time: | Temperature: | Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
| | 18-Sept-13 | 11:50 | 6.2, 7.1 °C | | | | |

L1365603-COFC

ALS Environmental

**Chain of Custody / Analytical Request Form**
**Canada Toll Free: 1 800 668 9878**
www.alsglobal.com

COC # _____



| Report To | | Report Format / Distribution | Service Requested (Rush for routine analysis subject to availability) |
|---|---|---|---|
| Company: | AMEC Environment & Infrastructure | ☑ Standard ☐ Other | ◉ Regular (Standard Turnaround Times - Business Days) |
| Contact: | Leslie Hardy | ☑ PDF ☑ Excel ☐ Digital ☐ Fax | ○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT |
| Address: | 5681-70 Street, Edmonton, AB | Email 1: leslie.hardy@amec.com | ○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT |
| | | Email 2: | ○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT |
| Phone: | 780-989-4581 Fax: 780-435-8425 | Email 3: | |
| Invoice To | Same as Report ? ☑ Yes ☐ No | Client / Project Information | |
| Hardcopy of Invoice with Report? | ☑ Yes ☐ No | Job #: VM00605E.5230 | |
| Company: | | PO / AFE: | |
| Contact: | | LSD: | |
| Address: | | | |
| Phone: | Fax: | Quote #: Q40561 AMEC (Yukon) v3 | |
| Lab Work Order # (lab use only) | | ALS Contact: | Sampler: |

**Analysis Request**

Please indicate below Filtered, Preserved or both (F, P, F/P)

| Sample # | Sample Identification (This description will appear on the report) | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | General Chemistry | T Metals (P, HNO3) | Thiocyanate (P, NaOH) | Cyanides (P, NaOH) | TIC | Nutrients (P, H2SO4) | Cyanides (Pb ace, F/P, NaOH) | Thiocyanate (Pb Ace,F/P,HNO3) | | Tot Metals (DO NOT ADD ACID) | Thiocyanate (P, HNO3) | Sulphide | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41 | SEEP Standard Preservation | 17-Sep-13 | | Water | X | X | X | X | X | X | | | | | | X | 7 |
| 42 | SEEP Alternate Preservation #1 (SCN with HNO3) | 17-Sep-13 | | Water | | | | | | | | | | | X | | 1 |
| 43 | SEEP Alternate Preservation #2 (Sulphide Removed) | 17-Sep-13 | | Water | | | | | | | | | | | | | |
| 44 | SEEP Alternate Preservation #3 (Unpreserved) | 17-Sep-13 | | Water | | | | | | | | | | X | | | 1 |
| | | | | | | | | | | | | | | | | | |
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water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

DO N

emain unpreserved (as noted on bottle labels).

complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

he user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

| Relea | SHIPMENT RECEPTION (lab use only) | | | | SHIPMENT VERIFICATION (lab use only) | | | |
|---|---|---|---|---|---|---|---|---|
| m) | Received by: | Date: | Time: | Temperature: | Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
| | | 18-Sept-13 | 11:50 | 6.2, 7.1°C | | | | |

L1365603-COFC

AMEC EARTH & ENVIRONMENTAL
ATTN: Leslie Hardy
5681 - 70 Street
Edmonton AB T6B 3P6

Date Received: 01-OCT-13
Report Date: 15-OCT-13 17:54 (MT)
Version: FINAL

Client Phone: 780-436-2152

# Certificate of Analysis

**Lab Work Order #: L1371904**

Project P.O. #: NOT SUBMITTED
Job Reference: VM00605E.2380
C of C Numbers: 1, 2
Legal Site Desc:

Selam Worku
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1371904-1 | L1371904-2 | L1371904-3 | L1371904-4 | L1371904-5 |
|---|---|---|---|---|---|---|
| | Description | Groundwater | Groundwater | Groundwater | Groundwater | Groundwater |
| | Sampled Date | 28-SEP-13 | 27-SEP-13 | 30-SEP-13 | 30-SEP-13 | 28-SEP-13 |
| | Sampled Time | | | | | |
| | Client ID | DC-01 | DC-02 | DC-03 | DC-05 | DC-06 |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | 456 | 838 | 924 | 1280 | 1090 |
| | Hardness (as CaCO3) (mg/L) | | 586 | 667 | 759 | 795 |
| | pH (pH) | 7.79 | 6.99 | 7.68 | 7.27 | 7.35 |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | 86.7 | 300 | 251 | 250 | 785 |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| | Alkalinity, Total (as CaCO3) (mg/L) | 86.7 | 300 | 251 | 250 | 785 |
| | Ammonia, Total (as N) (mg/L) | | 1.96 | 0.505 | 0.419 | 2.41 |
| | Chloride (Cl) (mg/L) | 1.76 | <5.0 DLA | <5.0 DLA | <5.0 DLA | 7.8 |
| | Fluoride (F) (mg/L) | 0.091 | <0.20 DLA | 0.25 | 0.20 | 0.51 |
| | Nitrate (as N) (mg/L) | 0.207 | 0.053 | <0.050 DLA | <0.050 DLA | <0.050 DLA |
| | Nitrite (as N) (mg/L) | 0.0016 | <0.010 DLA | <0.010 DLA | <0.010 DLA | <0.010 DLA |
| | Total Kjeldahl Nitrogen (mg/L) | | 13.9 | 16.7 | 2.17 | 7.94 |
| | Sulfate (SO4) (mg/L) | 175 | 257 | 404 | 681 | <5.0 DLA |
| | Anion Sum (meq/L) | | 11.4 | 13.4 | 19.2 | 15.9 |
| | Cation Sum (meq/L) | | 14.2 | 13.9 | 16.5 | 18.3 |
| | Cation - Anion Balance (%) | | 11.1 | 1.8 | -7.7 | 7.0 |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| | Cyanide, Total (mg/L) | | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| | Thiocyanate (SCN) (mg/L) | | <0.50 | <0.50 | <0.50 | <0.50 |
| | Cyanide, Free (mg/L) | | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | 71.4 | 58.9 | | 174 |
| | Total Organic Carbon (mg/L) | | 127 | 220 | 19.1 | 128 |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | | FIELD | FIELD | FIELD | FIELD |
| | Dissolved Metals Filtration Location | | FIELD | FIELD | FIELD | FIELD |
| | Aluminum (Al)-Dissolved (mg/L) | | 0.0167 | 0.0041 | 0.0068 | 0.0254 |
| | Antimony (Sb)-Dissolved (mg/L) | | 0.00065 | 0.00386 | 0.00292 | 0.00065 |
| | Arsenic (As)-Dissolved (mg/L) | | 0.186 | 0.00648 | 0.0438 | 0.225 |
| | Barium (Ba)-Dissolved (mg/L) | | 0.211 | 0.0357 | 0.0710 | 0.332 |
| | Beryllium (Be)-Dissolved (mg/L) | | <0.00010 | <0.00010 | <0.00010 | <0.00010 |
| | Bismuth (Bi)-Dissolved (mg/L) | | <0.00050 | <0.00050 | <0.00050 | <0.00050 |
| | Boron (B)-Dissolved (mg/L) | | 0.026 | 0.550 | 0.194 | 0.093 |
| | Cadmium (Cd)-Dissolved (mg/L) | | 0.000086 | 0.00170 | 0.000164 | <0.000010 |
| | Calcium (Ca)-Dissolved (mg/L) | | 150 | 171 | 179 | 199 |
| | Chromium (Cr)-Dissolved (mg/L) | | 0.00027 | 0.00071 | 0.00060 | 0.00181 |
| | Cobalt (Co)-Dissolved (mg/L) | | 0.00234 | 0.00430 | 0.0108 | 0.00444 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1371904-6 | L1371904-7 | L1371904-8 | L1371904-9 | L1371904-10 |
|---|---|---|---|---|---|---|
| | Description | Groundwater | Groundwater | Groundwater | Groundwater | Groundwater |
| | Sampled Date | 28-SEP-13 | 28-SEP-13 | 29-SEP-13 | 30-SEP-13 | 27-SEP-13 |
| | Sampled Time | | | | | |
| | Client ID | DC-07 | DC-09 | DC-10 | PC-01 | PC-02 |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | 474 | 459 | 666 | 362 | 334 |
| | Hardness (as CaCO3) (mg/L) | 222 | 272 | 382 | 167 | |
| | pH (pH) | 7.05 | 6.33 | 6.32 | 6.99 | 7.90 |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | 137 | 51.6 | 127 | 142 | 69.9 |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| | Alkalinity, Total (as CaCO3) (mg/L) | 137 | 51.6 | 127 | 142 | 69.9 |
| | Ammonia, Total (as N) (mg/L) | 1.56 | 4.70 | 1.84 | | |
| | Chloride (Cl) (mg/L) | 1.50 | 0.51 | 2.04 | 1.98 | 0.67 |
| | Fluoride (F) (mg/L) | 0.145 | 0.041 | 0.155 | 0.216 | 0.172 |
| | Nitrate (as N) (mg/L) | 0.0306 | 0.0209 | 0.0650 | 0.0738 | 0.0468 |
| | Nitrite (as N) (mg/L) | 0.0046 | 0.0018 | 0.0047 | 0.0064 | 0.0032 |
| | Total Kjeldahl Nitrogen (mg/L) | 4.35 | 7.41 | 5.05 | | |
| | Sulfate (SO4) (mg/L) | 132 | 191 | 277 | 51.4 | 92.4 |
| | Anion Sum (meq/L) | 5.55 | 5.03 | 8.38 | 3.98 | |
| | Cation Sum (meq/L) | 6.09 | 7.84 | 13.8 | 4.02 | |
| | Cation - Anion Balance (%) | 4.6 | 21.8 | 24.4 | 0.6 | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | <0.0050 | <0.0050 | <0.0050 | <0.0050 | |
| | Cyanide, Total (mg/L) | <0.0050 | <0.0050 | <0.0050 | <0.0050 | |
| | Thiocyanate (SCN) (mg/L) | <0.50 | <0.50 | 0.66 | <0.50 | |
| | Cyanide, Free (mg/L) | <0.0050 | <0.0050 | <0.0050 | <0.0050 | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | 30.9 | 12.4 | 25.8 | | |
| | Total Organic Carbon (mg/L) | 42.8 | 64.7 | 73.2 | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | FIELD | FIELD | FIELD | |
| | Dissolved Metals Filtration Location | FIELD | FIELD | FIELD | FIELD | |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0194 | 0.0554 | 0.237 | 0.107 | |
| | Antimony (Sb)-Dissolved (mg/L) | 0.00174 | 0.00081 | 0.00252 | 0.00094 | |
| | Arsenic (As)-Dissolved (mg/L) | 0.131 | 0.103 | 0.0652 | 0.0126 | |
| | Barium (Ba)-Dissolved (mg/L) | 0.0933 | 0.0820 | 0.362 | 0.129 | |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00010 | <0.00010 | <0.00010 | <0.00010 | |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.00050 | <0.00050 | <0.00050 | <0.00050 | |
| | Boron (B)-Dissolved (mg/L) | 0.302 | 0.749 | 0.655 | 0.373 | |
| | Cadmium (Cd)-Dissolved (mg/L) | 0.000122 | 0.000029 | 0.000281 | 0.000300 | |
| | Calcium (Ca)-Dissolved (mg/L) | 63.1 | 74.0 | 112 | 49.6 | |
| | Chromium (Cr)-Dissolved (mg/L) | 0.00094 | 0.00216 | 0.00976 | 0.0117 | |
| | Cobalt (Co)-Dissolved (mg/L) | 0.00320 | 0.00435 | 0.0268 | 0.00312 | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1371904-11 Groundwater 30-SEP-13 PC-05 | L1371904-12 Groundwater 29-SEP-13 HA-01 | L1371904-13 Groundwater 29-SEP-13 HA-02 | L1371904-14 Groundwater 29-SEP-13 HA-03 | L1371904-15 Groundwater 29-SEP-13 HA-04 |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | 285 | 865 | 774 | 761 | 238 |
| | Hardness (as CaCO3) (mg/L) | 156 | 631 | 529 | 530 | 122 |
| | pH (pH) | 7.25 | 7.22 | 6.41 | 6.59 | 6.05 |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | 79.6 | 223 | 128 | 135 | 25.6 |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| | Alkalinity, Total (as CaCO3) (mg/L) | 79.6 | 223 | 128 | 135 | 25.6 |
| | Ammonia, Total (as N) (mg/L) | 0.0146 | 0.468 | 1.25 | 0.92 PEHT | 3.31 |
| | Chloride (Cl) (mg/L) | 0.54 | <5.0 DLA | <5.0 DLA | <5.0 DLA | <0.50 |
| | Fluoride (F) (mg/L) | 0.073 | 0.29 | <0.20 DLA | <0.20 DLA | 0.042 |
| | Nitrate (as N) (mg/L) | 0.0668 | 0.175 | <0.050 DLA | <0.050 DLA | 0.0276 |
| | Nitrite (as N) (mg/L) | 0.0015 | 0.021 | <0.010 DLA | <0.010 DLA | 0.0014 |
| | Total Kjeldahl Nitrogen (mg/L) | 0.579 | 8.28 | 10.3 | 13.1 | 16.7 |
| | Sulfate (SO4) (mg/L) | 75.8 | 383 | 365 | 384 | 85.5 |
| | Anion Sum (meq/L) | 3.19 | 12.5 | 10.1 | 10.7 | 2.30 |
| | Cation Sum (meq/L) | 3.33 | 13.2 | 13.9 | 12.9 | 3.98 |
| | Cation - Anion Balance (%) | 2.1 | 2.8 | 15.8 | 9.4 | 26.9 |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| | Cyanide, Total (mg/L) | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| | Thiocyanate (SCN) (mg/L) | <0.50 | <0.50 | <0.50 | <0.50 | 0.61 |
| | Cyanide, Free (mg/L) | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | 20.4 | 56.0 | 32.5 | 29.4 | 5.41 |
| | Total Organic Carbon (mg/L) | 18.5 | 145 | 93.9 | 396 | 124 |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | FIELD | FIELD | FIELD | FIELD |
| | Dissolved Metals Filtration Location | FIELD | FIELD | FIELD | FIELD | FIELD |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0179 | 0.0049 | 0.0355 | 0.0132 | 0.0592 |
| | Antimony (Sb)-Dissolved (mg/L) | 0.00113 | 0.00097 | 0.00055 | 0.00105 | 0.00067 |
| | Arsenic (As)-Dissolved (mg/L) | 0.00252 | 0.0246 | 0.0258 | 0.0134 | 0.0109 |
| | Barium (Ba)-Dissolved (mg/L) | 0.0338 | 0.198 | 0.0651 | 0.0790 | 0.106 |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 |
| | Boron (B)-Dissolved (mg/L) | 0.023 | 0.155 | 0.284 | 0.722 | 0.159 |
| | Cadmium (Cd)-Dissolved (mg/L) | 0.000251 | <0.000010 | 0.000022 | 0.000296 | <0.000010 |
| | Calcium (Ca)-Dissolved (mg/L) | 44.6 | 163 | 129 | 135 | 36.4 |
| | Chromium (Cr)-Dissolved (mg/L) | 0.00045 | 0.00019 | 0.00014 | 0.00084 | 0.00091 |
| | Cobalt (Co)-Dissolved (mg/L) | 0.00031 | 0.00060 | 0.00753 | 0.00776 | 0.00099 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1371904-16 Groundwater 29-SEP-13 HA-05 | L1371904-17 Groundwater 30-SEP-13 CH-13-03 | L1371904-18 Groundwater 30-SEP-13 CH-13-04 | L1371904-19 Groundwater 30-SEP-13 CH-13-05 | L1371904-20 Groundwater 28-SEP-13 DUP_01 |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | 803 | 948 | 505 | 1820 | 1090 |
| | Hardness (as CaCO3) (mg/L) | 558 | 690 | 310 | 1460 | 788 |
| | pH (pH) | 6.87 | 7.45 | 7.53 | 6.06 | 7.35 |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | 192 | 192 | 134 | 44.1 | 789 |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| | Alkalinity, Total (as CaCO3) (mg/L) | 192 | 192 | 134 | 44.1 | 789 |
| | Ammonia, Total (as N) (mg/L) | 0.81 | 0.113 | 0.0240 | 0.0730 | 2.27 |
| | Chloride (Cl) (mg/L) | <5.0 DLA | <5.0 DLA | 2.66 | <10 DLA | 7.8 |
| | Fluoride (F) (mg/L) | <0.20 DLA | <0.20 DLA | 0.079 | <0.40 DLA | 0.42 |
| | Nitrate (as N) (mg/L) | <0.050 DLA | 0.311 | 0.163 | 2.72 | <0.050 DLA |
| | Nitrite (as N) (mg/L) | <0.010 DLA | <0.010 DLA | 0.0072 | 0.029 | <0.010 DLA |
| | Total Kjeldahl Nitrogen (mg/L) | 1.73 | 1.52 | 0.856 | 0.548 | 6.77 |
| | Sulfate (SO4) (mg/L) | 365 | 491 | 169 | 1430 | <5.0 DLA |
| | Anion Sum (meq/L) | 11.4 | 14.1 | 6.29 | 30.9 | 16.0 |
| | Cation Sum (meq/L) | 13.1 | 14.5 | 6.60 | 30.1 | 18.1 |
| | Cation - Anion Balance (%) | 6.6 | 1.6 | 2.4 | -1.2 | 6.2 |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| | Cyanide, Total (mg/L) | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| | Thiocyanate (SCN) (mg/L) | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 |
| | Cyanide, Free (mg/L) | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | 44.4 | 44.1 | 31.6 | 8.59 | 183 |
| | Total Organic Carbon (mg/L) | 71.5 | 26.3 | 14.1 | 7.53 | 131 |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | FIELD | FIELD | FIELD | FIELD |
| | Dissolved Metals Filtration Location | FIELD | FIELD | FIELD | FIELD | FIELD |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0159 | 0.0085 | 0.0079 | 0.462 | 0.0262 |
| | Antimony (Sb)-Dissolved (mg/L) | 0.00068 | 0.00242 | 0.00090 | 0.00040 | 0.00056 |
| | Arsenic (As)-Dissolved (mg/L) | 0.0905 | 0.00272 | 0.00109 | 0.00073 | 0.223 |
| | Barium (Ba)-Dissolved (mg/L) | 0.161 | 0.0476 | 0.0341 | 0.0175 | 0.329 |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00010 | <0.00010 | <0.00010 | 0.00022 | <0.00010 |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.00050 | <0.00050 | <0.00050 | <0.0010 DLA | <0.00050 |
| | Boron (B)-Dissolved (mg/L) | 0.053 | 0.021 | <0.010 | <0.020 DLA | 0.077 |
| | Cadmium (Cd)-Dissolved (mg/L) | 0.000021 | 0.00108 | 0.000580 | 0.145 | 0.000015 |
| | Calcium (Ca)-Dissolved (mg/L) | 148 | 164 | 71.2 | 428 | 197 |
| | Chromium (Cr)-Dissolved (mg/L) | 0.00021 | 0.00057 | 0.00028 | 0.00026 | 0.00182 |
| | Cobalt (Co)-Dissolved (mg/L) | 0.00133 | 0.00348 | 0.00133 | 0.00719 | 0.00431 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Sample ID | L1371904-21 | L1371904-22 | L1371904-23 | L1371904-24 | L1371904-25 |
|---|---|---|---|---|---|
| Description | Groundwater | Groundwater | Groundwater | Groundwater | Groundwater |
| Sampled Date | 29-SEP-13 | 28-SEP-13 | 30-SEP-13 | 30-SEP-13 | 28-SEP-13 |
| Sampled Time | | | | | |
| Client ID | DUP_02 | DC-02 (UNPRESERVED) | DC-03 (UNPRESERVED) | DC-05 (UNPRESERVED) | DC-06 (UNPRESERVED) |
| **Grouping** / **Analyte** | | | | | |
| **WATER** | | | | | |
| **Physical Tests** | | | | | |
| Conductivity (uS/cm) | 795 | | | | |
| Hardness (as CaCO3) (mg/L) | 561 | 599 | 676 | 680 | 781 |
| pH (pH) | 6.82 | | | | |
| **Anions and Nutrients** | | | | | |
| Alkalinity, Bicarbonate (as CaCO3) (mg/L) | 197 | | | | |
| Alkalinity, Carbonate (as CaCO3) (mg/L) | <1.0 | | | | |
| Alkalinity, Hydroxide (as CaCO3) (mg/L) | <1.0 | | | | |
| Alkalinity, Total (as CaCO3) (mg/L) | 197 | | | | |
| Ammonia, Total (as N) (mg/L) | 0.78 | | | | |
| Chloride (Cl) (mg/L) | <5.0 DLA | | | | |
| Fluoride (F) (mg/L) | <0.20 DLA | | | | |
| Nitrate (as N) (mg/L) | <0.050 DLA | | | | |
| Nitrite (as N) (mg/L) | <0.010 DLA | | | | |
| Total Kjeldahl Nitrogen (mg/L) | 1.99 | | | | |
| Sulfate (SO4) (mg/L) | 359 | | | | |
| Anion Sum (meq/L) | 11.4 | | | | |
| Cation Sum (meq/L) | 13.0 | | | | |
| Cation - Anion Balance (%) | 6.5 | | | | |
| **Cyanides** | | | | | |
| Cyanide, Weak Acid Diss (mg/L) | <0.0050 | | | | |
| Cyanide, Total (mg/L) | <0.0050 | | | | |
| Thiocyanate (SCN) (mg/L) | <0.50 | | | | |
| Cyanide, Free (mg/L) | <0.0050 | | | | |
| **Organic / Inorganic Carbon** | | | | | |
| Total Inorganic Carbon (mg/L) | 45.3 | | | | |
| Total Organic Carbon (mg/L) | 16.2 | | | | |
| **Dissolved Metals** | | | | | |
| Dissolved Mercury Filtration Location | FIELD | FIELD | FIELD | FIELD | FIELD |
| Dissolved Metals Filtration Location | FIELD | FIELD | FIELD | FIELD | FIELD |
| Aluminum (Al)-Dissolved (mg/L) | 0.0142 | <0.0010 | 0.0019 | <0.0010 | 0.0210 |
| Antimony (Sb)-Dissolved (mg/L) | 0.00084 | 0.00033 | 0.00393 | 0.00151 | 0.00085 |
| Arsenic (As)-Dissolved (mg/L) | 0.0876 | 0.0135 | 0.00647 | 0.0143 | 0.225 |
| Barium (Ba)-Dissolved (mg/L) | 0.162 | 0.147 | 0.0348 | 0.0578 | 0.331 |
| Beryllium (Be)-Dissolved (mg/L) | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 |
| Bismuth (Bi)-Dissolved (mg/L) | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 |
| Boron (B)-Dissolved (mg/L) | 0.039 | 0.019 | 0.564 | 0.255 | 0.379 |
| Cadmium (Cd)-Dissolved (mg/L) | 0.000013 | <0.000010 | 0.00142 | 0.000268 | 0.000018 |
| Calcium (Ca)-Dissolved (mg/L) | 148 | 147 | 167 | 155 | 194 |
| Chromium (Cr)-Dissolved (mg/L) | <0.00010 | <0.00010 | 0.00065 | 0.00030 | 0.00239 |
| Cobalt (Co)-Dissolved (mg/L) | 0.00138 | 0.00167 | 0.00427 | 0.0121 | 0.00469 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1371904-26 Groundwater 28-SEP-13 DC-07 (UNPRESERVED) | L1371904-27 Groundwater 28-SEP-13 DC-09 (UNPRESERVED) | L1371904-28 Groundwater 29-SEP-13 DC-10 (UNPRESERVED) | L1371904-29 Groundwater 30-SEP-13 PC-01 (UNPRESERVED) | L1371904-30 Groundwater 30-SEP-13 PC-05 (UNPRESERVED) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | | | | |
| | Hardness (as CaCO3) (mg/L) | 196 | 257 | 345 | 89.6 | 143 |
| | pH (pH) | | | | | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | | | | | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | | | | | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | | | | | |
| | Alkalinity, Total (as CaCO3) (mg/L) | | | | | |
| | Ammonia, Total (as N) (mg/L) | | | | | |
| | Chloride (Cl) (mg/L) | | | | | |
| | Fluoride (F) (mg/L) | | | | | |
| | Nitrate (as N) (mg/L) | | | | | |
| | Nitrite (as N) (mg/L) | | | | | |
| | Total Kjeldahl Nitrogen (mg/L) | | | | | |
| | Sulfate (SO4) (mg/L) | | | | | |
| | Anion Sum (meq/L) | | | | | |
| | Cation Sum (meq/L) | | | | | |
| | Cation - Anion Balance (%) | | | | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | | | | |
| | Cyanide, Total (mg/L) | | | | | |
| | Thiocyanate (SCN) (mg/L) | | | | | |
| | Cyanide, Free (mg/L) | | | | | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | | | | |
| | Total Organic Carbon (mg/L) | | | | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | FIELD | FIELD | FIELD | FIELD |
| | Dissolved Metals Filtration Location | FIELD | FIELD | FIELD | FIELD | FIELD |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0150 | 0.0498 | 0.212 | 0.0419 | 0.0098 |
| | Antimony (Sb)-Dissolved (mg/L) | 0.00129 | 0.00086 | 0.00180 | 0.00066 | 0.00135 |
| | Arsenic (As)-Dissolved (mg/L) | 0.136 | 0.0936 | 0.0425 | 0.00352 | 0.00210 |
| | Barium (Ba)-Dissolved (mg/L) | 0.0899 | 0.0802 | 0.308 | 0.0555 | 0.0303 |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 |
| | Boron (B)-Dissolved (mg/L) | 0.172 | 0.766 | 0.682 | 0.080 | 0.020 |
| | Cadmium (Cd)-Dissolved (mg/L) | 0.000011 | 0.000014 | 0.000276 | 0.000152 | 0.000137 |
| | Calcium (Ca)-Dissolved (mg/L) | 55.4 | 69.8 | 101 | 25.7 | 40.5 |
| | Chromium (Cr)-Dissolved (mg/L) | 0.00061 | 0.00178 | 0.00640 | 0.00291 | <0.00010 |
| | Cobalt (Co)-Dissolved (mg/L) | 0.00299 | 0.00388 | 0.0242 | 0.00104 | 0.00014 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1371904-31 | L1371904-32 | L1371904-33 | L1371904-34 | L1371904-35 |
|---|---|---|---|---|---|---|
| | Description | Groundwater | Groundwater | Groundwater | Groundwater | Groundwater |
| | Sampled Date | 29-SEP-13 | 29-SEP-13 | 29-SEP-13 | 29-SEP-13 | 29-SEP-13 |
| | Sampled Time | | | | | |
| | Client ID | HA-01 (UNPRESERVED) | HA-02 (UNPRESERVED) | HA-03 (UNPRESERVED) | HA-04 (UNPRESERVED) | HA-05 (UNPRESERVED) |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | | | | |
| | Hardness (as CaCO3) (mg/L) | 667 | 530 | 536 | 104 | 570 |
| | pH (pH) | | | | | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | | | | | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | | | | | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | | | | | |
| | Alkalinity, Total (as CaCO3) (mg/L) | | | | | |
| | Ammonia, Total (as N) (mg/L) | | | | | |
| | Chloride (Cl) (mg/L) | | | | | |
| | Fluoride (F) (mg/L) | | | | | |
| | Nitrate (as N) (mg/L) | | | | | |
| | Nitrite (as N) (mg/L) | | | | | |
| | Total Kjeldahl Nitrogen (mg/L) | | | | | |
| | Sulfate (SO4) (mg/L) | | | | | |
| | Anion Sum (meq/L) | | | | | |
| | Cation Sum (meq/L) | | | | | |
| | Cation - Anion Balance (%) | | | | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | | | | |
| | Cyanide, Total (mg/L) | | | | | |
| | Thiocyanate (SCN) (mg/L) | | | | | |
| | Cyanide, Free (mg/L) | | | | | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | | | | |
| | Total Organic Carbon (mg/L) | | | | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | FIELD | FIELD | FIELD | FIELD |
| | Dissolved Metals Filtration Location | FIELD | FIELD | FIELD | FIELD | FIELD |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0047 | <0.0010 | <0.0010 | 0.0413 | 0.0049 |
| | Antimony (Sb)-Dissolved (mg/L) | 0.00134 | 0.00011 | 0.00037 | 0.00052 | 0.00076 |
| | Arsenic (As)-Dissolved (mg/L) | 0.0214 | 0.00125 | 0.00156 | 0.00767 | 0.0367 |
| | Barium (Ba)-Dissolved (mg/L) | 0.185 | 0.0714 | 0.0696 | 0.0982 | 0.142 |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 |
| | Boron (B)-Dissolved (mg/L) | 0.180 | 0.113 | 0.337 | 0.100 | 0.057 |
| | Cadmium (Cd)-Dissolved (mg/L) | <0.000010 | <0.000010 | 0.000020 | 0.000010 | 0.000028 |
| | Calcium (Ca)-Dissolved (mg/L) | 166 | 119 | 129 | 31.1 | 143 |
| | Chromium (Cr)-Dissolved (mg/L) | 0.00015 | <0.00010 | <0.00010 | 0.00081 | <0.00010 |
| | Cobalt (Co)-Dissolved (mg/L) | 0.00081 | 0.00435 | 0.00387 | 0.00063 | 0.00143 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1371904-36 | L1371904-37 | L1371904-38 | L1371904-39 | L1371904-40 |
|---|---|---|---|---|---|---|
| | Description | Groundwater | Groundwater | Groundwater | Groundwater | Groundwater |
| | Sampled Date | 30-SEP-13 | 30-SEP-13 | 30-SEP-13 | 28-SEP-13 | 29-SEP-13 |
| | Sampled Time | | | | | |
| | Client ID | CH-13-03 (UNPRESERVED) | CH-13-04 (UNPRESERVED) | CH-13-05 (UNPRESERVED) | DUP_01 (UNPRESERVED) | DUP_02 (UNPRESERVED) |
| **Grouping** | **Analyte** | | | | | |
| **WATER** | | | | | | |
| **Physical Tests** | Conductivity (uS/cm) | | | | | |
| | Hardness (as CaCO3) (mg/L) | 725 | 314 | 1530 | 777 | 573 |
| | pH (pH) | | | | | |
| **Anions and Nutrients** | Alkalinity, Bicarbonate (as CaCO3) (mg/L) | | | | | |
| | Alkalinity, Carbonate (as CaCO3) (mg/L) | | | | | |
| | Alkalinity, Hydroxide (as CaCO3) (mg/L) | | | | | |
| | Alkalinity, Total (as CaCO3) (mg/L) | | | | | |
| | Ammonia, Total (as N) (mg/L) | | | | | |
| | Chloride (Cl) (mg/L) | | | | | |
| | Fluoride (F) (mg/L) | | | | | |
| | Nitrate (as N) (mg/L) | | | | | |
| | Nitrite (as N) (mg/L) | | | | | |
| | Total Kjeldahl Nitrogen (mg/L) | | | | | |
| | Sulfate (SO4) (mg/L) | | | | | |
| | Anion Sum (meq/L) | | | | | |
| | Cation Sum (meq/L) | | | | | |
| | Cation - Anion Balance (%) | | | | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/L) | | | | | |
| | Cyanide, Total (mg/L) | | | | | |
| | Thiocyanate (SCN) (mg/L) | | | | | |
| | Cyanide, Free (mg/L) | | | | | |
| **Organic / Inorganic Carbon** | Total Inorganic Carbon (mg/L) | | | | | |
| | Total Organic Carbon (mg/L) | | | | | |
| **Dissolved Metals** | Dissolved Mercury Filtration Location | FIELD | FIELD | FIELD | FIELD | FIELD |
| | Dissolved Metals Filtration Location | FIELD | FIELD | FIELD | FIELD | FIELD |
| | Aluminum (Al)-Dissolved (mg/L) | 0.0054 | 0.0037 | 0.350 | 0.0210 | 0.0095 |
| | Antimony (Sb)-Dissolved (mg/L) | 0.00224 | 0.00094 | 0.00043 | 0.00082 | 0.00067 |
| | Arsenic (As)-Dissolved (mg/L) | 0.00277 | 0.00123 | 0.00066 | 0.222 | 0.0603 |
| | Barium (Ba)-Dissolved (mg/L) | 0.0481 | 0.0364 | 0.0183 | 0.322 | 0.143 |
| | Beryllium (Be)-Dissolved (mg/L) | <0.00010 | <0.00010 | 0.00021 | <0.00010 | <0.00010 |
| | Bismuth (Bi)-Dissolved (mg/L) | <0.00050 | <0.00050 | <0.0010 DLA | <0.00050 | <0.00050 |
| | Boron (B)-Dissolved (mg/L) | 0.020 | 0.011 | <0.020 DLA | 0.320 | 0.067 |
| | Cadmium (Cd)-Dissolved (mg/L) | 0.000967 | 0.000579 | 0.150 | <0.000010 | 0.000027 |
| | Calcium (Ca)-Dissolved (mg/L) | 167 | 66.0 | 444 | 193 | 144 |
| | Chromium (Cr)-Dissolved (mg/L) | 0.00054 | 0.00025 | 0.00025 | 0.00223 | <0.00010 |
| | Cobalt (Co)-Dissolved (mg/L) | 0.00337 | 0.00122 | 0.00748 | 0.00475 | 0.00155 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1371904-1 Groundwater 28-SEP-13 DC-01 | L1371904-2 Groundwater 27-SEP-13 DC-02 | L1371904-3 Groundwater 30-SEP-13 DC-03 | L1371904-4 Groundwater 30-SEP-13 DC-05 | L1371904-5 Groundwater 28-SEP-13 DC-06 |
|---|---|---|---|---|---|---|
| **Sample ID / Description / Sampled Date / Sampled Time / Client ID** | | | | | | |
| **WATER** | | | | | | |
| **Dissolved Metals** | Copper (Cu)-Dissolved (mg/L) | | 0.00052 | 0.0995 | 0.00232 | 0.00063 |
| | Iron (Fe)-Dissolved (mg/L) | | 34.8 | 0.042 | 6.86 | 18.2 |
| | Lead (Pb)-Dissolved (mg/L) | | 0.000277 | 0.000477 | 0.000548 | 0.000070 |
| | Lithium (Li)-Dissolved (mg/L) | | <0.00050 | 0.00456 | 0.00355 | <0.00050 |
| | Magnesium (Mg)-Dissolved (mg/L) | | 51.4 | 58.4 | 75.9 | 72.4 |
| | Manganese (Mn)-Dissolved (mg/L) | | 4.20 | 3.47 | 4.57 | 5.77 |
| | Mercury (Hg)-Dissolved (mg/L) | | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| | Molybdenum (Mo)-Dissolved (mg/L) | | 0.00430 | 0.0133 | 0.0506 | 0.00851 |
| | Nickel (Ni)-Dissolved (mg/L) | | 0.0149 | 0.0565 | 0.182 | 0.0223 |
| | Phosphorus (P)-Dissolved (mg/L) | | <0.050 | <0.050 | <0.050 | 0.092 |
| | Potassium (K)-Dissolved (mg/L) | | 3.91 | 4.39 | 5.76 | 3.42 |
| | Selenium (Se)-Dissolved (mg/L) | | <0.00010 | 0.00010 | <0.00010 | 0.00051 |
| | Silicon (Si)-Dissolved (mg/L) | | 9.02 | 7.45 | 7.52 | 8.83 |
| | Silver (Ag)-Dissolved (mg/L) | | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| | Sodium (Na)-Dissolved (mg/L) | | 5.53 | 6.86 | 13.3 | 22.9 |
| | Strontium (Sr)-Dissolved (mg/L) | | 0.358 | 0.409 | 0.599 | 0.894 |
| | Sulfur (S)-Dissolved (mg/L) | | 97.5 | 137 | 183 | 1.66 |
| | Thallium (Tl)-Dissolved (mg/L) | | <0.000010 | 0.000058 | 0.000045 | <0.000010 |
| | Tin (Sn)-Dissolved (mg/L) | | <0.00010 | 0.00015 | <0.00010 | <0.00010 |
| | Titanium (Ti)-Dissolved (mg/L) | | <0.010 | <0.010 | <0.010 | <0.010 |
| | Uranium (U)-Dissolved (mg/L) | | 0.000298 | 0.00151 | 0.00187 | 0.000406 |
| | Vanadium (V)-Dissolved (mg/L) | | <0.0010 | <0.0010 | <0.0010 | 0.0156 |
| | Zinc (Zn)-Dissolved (mg/L) | | 0.0198 | 0.167 | 0.0351 | 0.0061 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1371904-6 Groundwater 28-SEP-13 DC-07 | L1371904-7 Groundwater 28-SEP-13 DC-09 | L1371904-8 Groundwater 29-SEP-13 DC-10 | L1371904-9 Groundwater 30-SEP-13 PC-01 | L1371904-10 Groundwater 27-SEP-13 PC-02 |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Dissolved Metals** | Copper (Cu)-Dissolved (mg/L) | 0.00529 | 0.0153 | 0.0429 | 0.123 | |
| | Iron (Fe)-Dissolved (mg/L) | 11.5 | 21.0 | 82.9 | 6.49 | |
| | Lead (Pb)-Dissolved (mg/L) | 0.00140 | 0.00194 | 0.00985 | 0.0140 | |
| | Lithium (Li)-Dissolved (mg/L) | <0.00050 | <0.00050 | 0.0167 | <0.00050 | |
| | Magnesium (Mg)-Dissolved (mg/L) | 15.6 | 21.2 | 24.8 | 10.6 | |
| | Manganese (Mn)-Dissolved (mg/L) | 1.18 | 1.80 | 9.80 | 0.928 | |
| | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | <0.000010 | 0.000013 | <0.000010 | |
| | Molybdenum (Mo)-Dissolved (mg/L) | 0.00639 | 0.0183 | 0.0218 | 0.0132 | |
| | Nickel (Ni)-Dissolved (mg/L) | 0.0231 | 0.0409 | 0.113 | 0.0422 | |
| | Phosphorus (P)-Dissolved (mg/L) | <0.050 | 0.130 | 0.077 | 0.248 | |
| | Potassium (K)-Dissolved (mg/L) | 3.24 | 3.11 | 7.78 | 1.16 | |
| | Selenium (Se)-Dissolved (mg/L) | 0.00014 | 0.00013 | 0.00045 | 0.00010 | |
| | Silicon (Si)-Dissolved (mg/L) | 6.94 | 8.17 | 9.56 | 9.90 | |
| | Silver (Ag)-Dissolved (mg/L) | <0.000010 | 0.000033 | 0.000062 | 0.000051 | |
| | Sodium (Na)-Dissolved (mg/L) | 18.4 | 18.1 | 22.6 | 5.56 | |
| | Strontium (Sr)-Dissolved (mg/L) | 0.215 | 0.257 | 0.497 | 0.282 | |
| | Sulfur (S)-Dissolved (mg/L) | 43.3 | 76.1 | 101 | 21.6 | |
| | Thallium (Tl)-Dissolved (mg/L) | <0.000010 | <0.000010 | <0.000010 | 0.000013 | |
| | Tin (Sn)-Dissolved (mg/L) | <0.00010 | 0.00014 | 0.00024 | 0.00022 | |
| | Titanium (Ti)-Dissolved (mg/L) | <0.010 | <0.010 | <0.010 | <0.010 | |
| | Uranium (U)-Dissolved (mg/L) | 0.000155 | 0.000241 | 0.000900 | 0.000212 | |
| | Vanadium (V)-Dissolved (mg/L) | 0.0023 | 0.0053 | 0.0175 | <0.0010 | |
| | Zinc (Zn)-Dissolved (mg/L) | 0.0194 | 0.0308 | 0.108 | 0.144 | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | Sample ID: L1371904-11 | L1371904-12 | L1371904-13 | L1371904-14 | L1371904-15 |
|---|---|---|---|---|---|---|
| | Description: | Groundwater | Groundwater | Groundwater | Groundwater | Groundwater |
| | Sampled Date: | 30-SEP-13 | 29-SEP-13 | 29-SEP-13 | 29-SEP-13 | 29-SEP-13 |
| | Client ID: | PC-05 | HA-01 | HA-02 | HA-03 | HA-04 |
| **WATER** | | | | | | |
| **Dissolved Metals** | Copper (Cu)-Dissolved (mg/L) | 0.0140 | 0.00105 | 0.00261 | 0.0529 | 0.00113 |
| | Iron (Fe)-Dissolved (mg/L) | 0.057 | 3.77 | 47.2 | 27.2 | 20.0 |
| | Lead (Pb)-Dissolved (mg/L) | 0.000430 | 0.000098 | 0.000219 | 0.00148 | 0.000122 |
| | Lithium (Li)-Dissolved (mg/L) | <0.00050 | 0.00652 | <0.00050 | 0.00066 | 0.00158 |
| | Magnesium (Mg)-Dissolved (mg/L) | 11.0 | 54.1 | 50.1 | 46.6 | 7.54 |
| | Manganese (Mn)-Dissolved (mg/L) | 0.0336 | 0.458 | 9.87 | 8.50 | 1.72 |
| | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| | Molybdenum (Mo)-Dissolved (mg/L) | 0.00186 | 0.00235 | 0.00251 | 0.00475 | 0.00119 |
| | Nickel (Ni)-Dissolved (mg/L) | 0.0102 | 0.00460 | 0.0278 | 0.0378 | 0.00907 |
| | Phosphorus (P)-Dissolved (mg/L) | <0.050 | <0.050 | <0.050 | <0.050 | 0.179 |
| | Potassium (K)-Dissolved (mg/L) | 0.88 | 4.03 | 3.92 | 3.63 | 0.36 |
| | Selenium (Se)-Dissolved (mg/L) | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 |
| | Silicon (Si)-Dissolved (mg/L) | 5.68 | 6.06 | 7.24 | 7.61 | 11.4 |
| | Silver (Ag)-Dissolved (mg/L) | <0.000010 | <0.000010 | <0.000010 | 0.000055 | <0.000010 |
| | Sodium (Na)-Dissolved (mg/L) | 4.03 | 5.38 | 6.47 | 8.74 | 3.54 |
| | Strontium (Sr)-Dissolved (mg/L) | 0.274 | 0.387 | 0.404 | 0.408 | 0.121 |
| | Sulfur (S)-Dissolved (mg/L) | 26.5 | 131 | 126 | 129 | 35.0 |
| | Thallium (Tl)-Dissolved (mg/L) | 0.000014 | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| | Tin (Sn)-Dissolved (mg/L) | <0.00010 | <0.00010 | 0.00011 | 0.00017 | <0.00010 |
| | Titanium (Ti)-Dissolved (mg/L) | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 |
| | Uranium (U)-Dissolved (mg/L) | 0.000184 | 0.000575 | 0.000498 | 0.000437 | 0.000042 |
| | Vanadium (V)-Dissolved (mg/L) | <0.0010 | 0.0016 | 0.0010 | <0.0010 | 0.0015 |
| | Zinc (Zn)-Dissolved (mg/L) | 0.0169 | 0.0064 | 0.0491 | 0.165 | 0.0070 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1371904-16 Groundwater 29-SEP-13 HA-05 | L1371904-17 Groundwater 30-SEP-13 CH-13-03 | L1371904-18 Groundwater 30-SEP-13 CH-13-04 | L1371904-19 Groundwater 30-SEP-13 CH-13-05 | L1371904-20 Groundwater 28-SEP-13 DUP_01 |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Dissolved Metals** | Copper (Cu)-Dissolved (mg/L) | 0.00044 | 0.0100 | 0.0126 | 0.420 | 0.00032 |
| | Iron (Fe)-Dissolved (mg/L) | 26.1 | 0.017 | <0.010 | 1.53 | 17.7 |
| | Lead (Pb)-Dissolved (mg/L) | 0.000130 | 0.000281 | 0.000086 | 0.0110 | 0.000059 |
| | Lithium (Li)-Dissolved (mg/L) | 0.00136 | 0.00815 | 0.00609 | 0.0157 | <0.00050 |
| | Magnesium (Mg)-Dissolved (mg/L) | 46.0 | 68.2 | 32.1 | 94.8 | 71.6 |
| | Manganese (Mn)-Dissolved (mg/L) | 4.18 | 0.797 | 0.211 | 5.56 | 5.48 |
| | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| | Molybdenum (Mo)-Dissolved (mg/L) | 0.000929 | 0.00575 | 0.0264 | 0.00125 | 0.00754 |
| | Nickel (Ni)-Dissolved (mg/L) | 0.00819 | 0.00848 | 0.00337 | 0.0080 | 0.0210 |
| | Phosphorus (P)-Dissolved (mg/L) | 0.071 | <0.050 | <0.050 | <0.050 | 0.090 |
| | Potassium (K)-Dissolved (mg/L) | 2.13 | 5.81 | 3.05 | 2.41 | 3.25 |
| | Selenium (Se)-Dissolved (mg/L) | <0.00010 | 0.00020 | <0.00010 | 0.00032 | 0.00049 |
| | Silicon (Si)-Dissolved (mg/L) | 7.52 | 5.58 | 5.53 | 4.74 | 8.65 |
| | Silver (Ag)-Dissolved (mg/L) | 0.000012 | <0.000010 | <0.000010 | <0.000020 DLA | <0.000010 |
| | Sodium (Na)-Dissolved (mg/L) | 5.57 | 13.1 | 7.06 | 7.98 | 22.8 |
| | Strontium (Sr)-Dissolved (mg/L) | 0.381 | 0.524 | 0.391 | 0.438 | 0.828 |
| | Sulfur (S)-Dissolved (mg/L) | 123 | 169 | 60.4 | 472 | 1.58 |
| | Thallium (Tl)-Dissolved (mg/L) | <0.000010 | 0.000022 | 0.000015 | 0.000225 | <0.000010 |
| | Tin (Sn)-Dissolved (mg/L) | <0.00010 | 0.0157 | 0.00263 | 0.00375 | 0.00030 |
| | Titanium (Ti)-Dissolved (mg/L) | <0.010 | <0.010 | <0.010 | <0.020 DLA | <0.010 |
| | Uranium (U)-Dissolved (mg/L) | 0.000164 | 0.00204 | 0.000909 | 0.000199 | 0.000340 |
| | Vanadium (V)-Dissolved (mg/L) | <0.0010 | <0.0010 | <0.0010 | <0.0020 DLA | 0.0152 |
| | Zinc (Zn)-Dissolved (mg/L) | 0.0594 | 0.280 | 0.136 | 6.62 | 0.0073 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Sample ID | L1371904-21 | L1371904-22 | L1371904-23 | L1371904-24 | L1371904-25 |
|---|---|---|---|---|---|
| Description | Groundwater | Groundwater | Groundwater | Groundwater | Groundwater |
| Sampled Date | 29-SEP-13 | 28-SEP-13 | 30-SEP-13 | 30-SEP-13 | 28-SEP-13 |
| Sampled Time | | | | | |
| Client ID | DUP_02 | DC-02 (UNPRESERVED) | DC-03 (UNPRESERVED) | DC-05 (UNPRESERVED) | DC-06 (UNPRESERVED) |
| **Grouping** **Analyte** | | | | | |
| **WATER** | | | | | |
| **Dissolved Metals** Copper (Cu)-Dissolved (mg/L) | 0.00028 | <0.00020 | 0.0740 | 0.00476 | 0.00120 |
| Iron (Fe)-Dissolved (mg/L) | 24.1 | 5.93 | 0.044 | 3.14 | 9.08 |
| Lead (Pb)-Dissolved (mg/L) | 0.000123 | <0.000050 | 0.000510 | 0.000246 | 0.000176 |
| Lithium (Li)-Dissolved (mg/L) | 0.00099 | <0.00050 | 0.00660 | 0.00450 | <0.00050 |
| Magnesium (Mg)-Dissolved (mg/L) | 46.4 | 56.6 | 62.7 | 71.1 | 72.3 |
| Manganese (Mn)-Dissolved (mg/L) | 4.06 | 3.97 | 3.45 | 4.32 | 5.73 |
| Mercury (Hg)-Dissolved (mg/L) | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| Molybdenum (Mo)-Dissolved (mg/L) | 0.000808 | 0.00334 | 0.0146 | 0.0486 | 0.0127 |
| Nickel (Ni)-Dissolved (mg/L) | 0.00854 | 0.0117 | 0.0570 | 0.190 | 0.0342 |
| Phosphorus (P)-Dissolved (mg/L) | <0.050 | <0.050 | <0.050 | <0.050 | 0.083 |
| Potassium (K)-Dissolved (mg/L) | 2.11 | 3.90 | 4.23 | 5.17 | 4.50 |
| Selenium (Se)-Dissolved (mg/L) | <0.00010 | <0.00010 | 0.00012 | 0.00011 | 0.00066 |
| Silicon (Si)-Dissolved (mg/L) | 7.53 | 7.86 | 7.59 | 7.31 | 8.36 |
| Silver (Ag)-Dissolved (mg/L) | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| Sodium (Na)-Dissolved (mg/L) | 5.59 | 6.01 | 7.12 | 11.2 | 24.5 |
| Strontium (Sr)-Dissolved (mg/L) | 0.363 | 0.335 | 0.441 | 0.555 | 0.890 |
| Sulfur (S)-Dissolved (mg/L) | 123 | 90.8 | 126 | 147 | 2.09 |
| Thallium (Tl)-Dissolved (mg/L) | <0.000010 | <0.000010 | 0.000054 | 0.000038 | <0.000010 |
| Tin (Sn)-Dissolved (mg/L) | <0.00010 | <0.00010 | 0.00016 | <0.00010 | 0.00010 |
| Titanium (Ti)-Dissolved (mg/L) | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 |
| Uranium (U)-Dissolved (mg/L) | 0.000192 | 0.000212 | 0.00157 | 0.00119 | 0.000535 |
| Vanadium (V)-Dissolved (mg/L) | 0.0011 | <0.0010 | <0.0010 | <0.0010 | 0.0133 |
| Zinc (Zn)-Dissolved (mg/L) | 0.0728 | 0.0063 | 0.152 | 0.0422 | 0.0053 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Sample ID | L1371904-26 | L1371904-27 | L1371904-28 | L1371904-29 | L1371904-30 |
|---|---|---|---|---|---|
| Description | Groundwater | Groundwater | Groundwater | Groundwater | Groundwater |
| Sampled Date | 28-SEP-13 | 28-SEP-13 | 29-SEP-13 | 30-SEP-13 | 30-SEP-13 |
| Sampled Time | | | | | |
| Client ID | DC-07 (UNPRESERVED) | DC-09 (UNPRESERVED) | DC-10 (UNPRESERVED) | PC-01 (UNPRESERVED) | PC-05 (UNPRESERVED) |
| **Grouping** **Analyte** | | | | | |
| **WATER** | | | | | |
| **Dissolved Metals** Copper (Cu)-Dissolved (mg/L) | 0.00209 | 0.0112 | 0.0343 | 0.0413 | 0.0106 |
| Iron (Fe)-Dissolved (mg/L) | 11.4 | 19.3 | 55.7 | 1.27 | 0.029 |
| Lead (Pb)-Dissolved (mg/L) | 0.000398 | 0.00142 | 0.00858 | 0.00286 | 0.000143 |
| Lithium (Li)-Dissolved (mg/L) | 0.00123 | 0.00149 | 0.00683 | <0.00050 | <0.00050 |
| Magnesium (Mg)-Dissolved (mg/L) | 13.9 | 20.1 | 22.7 | 6.21 | 10.3 |
| Manganese (Mn)-Dissolved (mg/L) | 1.08 | 1.81 | 9.41 | 0.205 | 0.0301 |
| Mercury (Hg)-Dissolved (mg/L) | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| Molybdenum (Mo)-Dissolved (mg/L) | 0.00409 | 0.0188 | 0.0141 | 0.00474 | 0.00159 |
| Nickel (Ni)-Dissolved (mg/L) | 0.0184 | 0.0366 | 0.0908 | 0.0172 | 0.00755 |
| Phosphorus (P)-Dissolved (mg/L) | <0.050 | 0.114 | 0.081 | <0.050 | <0.050 |
| Potassium (K)-Dissolved (mg/L) | 2.71 | 2.91 | 5.65 | 0.40 | 0.75 |
| Selenium (Se)-Dissolved (mg/L) | 0.00017 | 0.00014 | 0.00045 | <0.00010 | <0.00010 |
| Silicon (Si)-Dissolved (mg/L) | 7.00 | 8.21 | 8.61 | 8.20 | 5.83 |
| Silver (Ag)-Dissolved (mg/L) | <0.000010 | 0.000026 | 0.000055 | 0.000013 | <0.000010 |
| Sodium (Na)-Dissolved (mg/L) | 18.0 | 18.3 | 22.8 | 3.89 | 3.63 |
| Strontium (Sr)-Dissolved (mg/L) | 0.198 | 0.275 | 0.467 | 0.183 | 0.290 |
| Sulfur (S)-Dissolved (mg/L) | 37.0 | 68.7 | 91.1 | 19.8 | 23.3 |
| Thallium (Tl)-Dissolved (mg/L) | <0.000010 | <0.000010 | 0.000020 | <0.000010 | 0.000013 |
| Tin (Sn)-Dissolved (mg/L) | <0.00010 | 0.00013 | 0.00016 | <0.00010 | <0.00010 |
| Titanium (Ti)-Dissolved (mg/L) | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 |
| Uranium (U)-Dissolved (mg/L) | 0.000089 | 0.000194 | 0.000721 | 0.000053 | 0.000145 |
| Vanadium (V)-Dissolved (mg/L) | 0.0024 | 0.0047 | 0.0141 | <0.0010 | <0.0010 |
| Zinc (Zn)-Dissolved (mg/L) | 0.0148 | 0.0188 | 0.118 | 0.0658 | 0.0079 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Sample ID | L1371904-31 | L1371904-32 | L1371904-33 | L1371904-34 | L1371904-35 |
|---|---|---|---|---|---|
| Description | Groundwater | Groundwater | Groundwater | Groundwater | Groundwater |
| Sampled Date | 29-SEP-13 | 29-SEP-13 | 29-SEP-13 | 29-SEP-13 | 29-SEP-13 |
| Sampled Time | | | | | |
| Client ID | HA-01 (UNPRESERVED) | HA-02 (UNPRESERVED) | HA-03 (UNPRESERVED) | HA-04 (UNPRESERVED) | HA-05 (UNPRESERVED) |
| **Grouping** **Analyte** | | | | | |
| **WATER** | | | | | |
| **Dissolved Metals** Copper (Cu)-Dissolved (mg/L) | 0.00145 | 0.00025 | 0.00206 | 0.00036 | 0.00025 |
| Iron (Fe)-Dissolved (mg/L) | 2.89 | 5.27 | 2.38 | 17.5 | 4.71 |
| Lead (Pb)-Dissolved (mg/L) | 0.000141 | <0.000050 | <0.000050 | <0.000050 | <0.000050 |
| Lithium (Li)-Dissolved (mg/L) | 0.00644 | <0.00050 | 0.00095 | 0.00100 | 0.00096 |
| Magnesium (Mg)-Dissolved (mg/L) | 61.3 | 56.2 | 52.1 | 6.43 | 51.9 |
| Manganese (Mn)-Dissolved (mg/L) | 0.487 | 9.46 | 6.62 | 1.58 | 4.36 |
| Mercury (Hg)-Dissolved (mg/L) | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| Molybdenum (Mo)-Dissolved (mg/L) | 0.00311 | 0.000429 | 0.00177 | 0.000710 | 0.000755 |
| Nickel (Ni)-Dissolved (mg/L) | 0.00498 | 0.0174 | 0.0124 | 0.00656 | 0.00769 |
| Phosphorus (P)-Dissolved (mg/L) | <0.050 | <0.050 | <0.050 | 0.223 | <0.050 |
| Potassium (K)-Dissolved (mg/L) | 4.26 | 3.65 | 2.78 | 0.30 | 2.09 |
| Selenium (Se)-Dissolved (mg/L) | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 |
| Silicon (Si)-Dissolved (mg/L) | 6.35 | 5.97 | 6.68 | 11.7 | 6.81 |
| Silver (Ag)-Dissolved (mg/L) | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| Sodium (Na)-Dissolved (mg/L) | 5.83 | 5.99 | 6.29 | 3.33 | 5.66 |
| Strontium (Sr)-Dissolved (mg/L) | 0.409 | 0.420 | 0.375 | 0.115 | 0.383 |
| Sulfur (S)-Dissolved (mg/L) | 126 | 119 | 117 | 27.9 | 113 |
| Thallium (Tl)-Dissolved (mg/L) | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| Tin (Sn)-Dissolved (mg/L) | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 |
| Titanium (Ti)-Dissolved (mg/L) | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 |
| Uranium (U)-Dissolved (mg/L) | 0.000910 | 0.000094 | 0.000404 | 0.000032 | 0.000205 |
| Vanadium (V)-Dissolved (mg/L) | 0.0012 | <0.0010 | <0.0010 | <0.0010 | <0.0010 |
| Zinc (Zn)-Dissolved (mg/L) | 0.0082 | 0.0134 | 0.0209 | 0.0035 | 0.0549 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1371904-36 Groundwater 30-SEP-13 CH-13-03 (UNPRESERVED) | L1371904-37 Groundwater 30-SEP-13 CH-13-04 (UNPRESERVED) | L1371904-38 Groundwater 30-SEP-13 CH-13-05 (UNPRESERVED) | L1371904-39 Groundwater 28-SEP-13 DUP_01 (UNPRESERVED) | L1371904-40 Groundwater 29-SEP-13 DUP_02 (UNPRESERVED) |
|---|---|---|---|---|---|---|
| **WATER** | | | | | | |
| **Dissolved Metals** | Copper (Cu)-Dissolved (mg/L) | 0.00800 | 0.0111 | 0.434 | 0.00124 | 0.00060 |
| | Iron (Fe)-Dissolved (mg/L) | <0.010 | <0.010 | 0.439 | 6.24 | 1.47 |
| | Lead (Pb)-Dissolved (mg/L) | 0.000092 | 0.000052 | 0.00912 | 0.000165 | 0.000092 |
| | Lithium (Li)-Dissolved (mg/L) | 0.00859 | 0.00661 | 0.0164 | <0.00050 | 0.00077 |
| | Magnesium (Mg)-Dissolved (mg/L) | 74.6 | 36.3 | 103 | 71.4 | 51.6 |
| | Manganese (Mn)-Dissolved (mg/L) | 0.797 | 0.199 | 5.84 | 5.63 | 4.46 |
| | Mercury (Hg)-Dissolved (mg/L) | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| | Molybdenum (Mo)-Dissolved (mg/L) | 0.00528 | 0.0258 | 0.00144 | 0.0138 | 0.000840 |
| | Nickel (Ni)-Dissolved (mg/L) | 0.00818 | 0.00345 | 0.0087 | 0.0336 | 0.00823 |
| | Phosphorus (P)-Dissolved (mg/L) | <0.050 | <0.050 | <0.050 | 0.081 | <0.050 |
| | Potassium (K)-Dissolved (mg/L) | 5.87 | 2.91 | 2.61 | 4.38 | 2.14 |
| | Selenium (Se)-Dissolved (mg/L) | 0.00022 | <0.00010 | 0.00028 | 0.00068 | <0.00010 |
| | Silicon (Si)-Dissolved (mg/L) | 5.77 | 5.67 | 4.87 | 8.09 | 6.60 |
| | Silver (Ag)-Dissolved (mg/L) | <0.000010 | <0.000010 | <0.000020 DLA | 0.000014 | <0.000010 |
| | Sodium (Na)-Dissolved (mg/L) | 12.6 | 7.33 | 8.92 | 24.0 | 5.79 |
| | Strontium (Sr)-Dissolved (mg/L) | 0.473 | 0.399 | 0.450 | 0.794 | 0.369 |
| | Sulfur (S)-Dissolved (mg/L) | 164 | 52.6 | 468 | 2.04 | 111 |
| | Thallium (Tl)-Dissolved (mg/L) | 0.000020 | 0.000017 | 0.000216 | <0.000010 | <0.000010 |
| | Tin (Sn)-Dissolved (mg/L) | 0.00720 | 0.00204 | 0.00323 | <0.00010 | <0.00010 |
| | Titanium (Ti)-Dissolved (mg/L) | <0.010 | <0.010 | <0.020 DLA | <0.010 | <0.010 |
| | Uranium (U)-Dissolved (mg/L) | 0.00185 | 0.000751 | 0.000202 | 0.000485 | 0.000172 |
| | Vanadium (V)-Dissolved (mg/L) | <0.0010 | <0.0010 | <0.0020 DLA | 0.0128 | <0.0010 |
| | Zinc (Zn)-Dissolved (mg/L) | 0.240 | 0.136 | 6.84 | 0.0052 | 0.0624 |

* 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 | Nitrite (as N) | DLA | L1371904-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8, -9 |
| Duplicate | Nitrate (as N) | DLA | L1371904-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8, -9 |
| Duplicate | Sulfate (SO4) | DLA | L1371904-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike | Total Kjeldahl Nitrogen | MS-B | L1371904-11, -12, -16, -17, -18, -19, -3, -5, -6, -7 |
| Matrix Spike | Total Inorganic Carbon | MS-B | L1371904-11, -12, -13, -14, -16, -19, -2, -21, -3, -6, -8 |
| Matrix Spike | Sulfate (SO4) | MS-B | L1371904-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike | Total Organic Carbon | MS-B | L1371904-4 |
| Matrix Spike | Calcium (Ca)-Dissolved | MS-B | L1371904-22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -33, -34, -35, -36, -37, -38, -39, -40 |
| Matrix Spike | Magnesium (Mg)-Dissolved | MS-B | L1371904-22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -33, -34, -35, -36, -37, -38, -39, -40 |
| Matrix Spike | Calcium (Ca)-Dissolved | MS-B | L1371904-11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike | Magnesium (Mg)-Dissolved | MS-B | L1371904-11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike | Calcium (Ca)-Dissolved | MS-B | L1371904-11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike | Barium (Ba)-Dissolved | MS-B | L1371904-22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -33, -34, -35, -36, -37, -38, -39, -40 |
| Matrix Spike | Nickel (Ni)-Dissolved | MS-B | L1371904-22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -33, -34, -35, -36, -37, -38, -39, -40 |
| Matrix Spike | Sodium (Na)-Dissolved | MS-B | L1371904-22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -33, -34, -35, -36, -37, -38, -39, -40 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1371904-22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -33, -34, -35, -36, -37, -38, -39, -40 |
| Matrix Spike | Uranium (U)-Dissolved | MS-B | L1371904-22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -33, -34, -35, -36, -37, -38, -39, -40 |
| Matrix Spike | Barium (Ba)-Dissolved | MS-B | L1371904-11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike | Manganese (Mn)-Dissolved | MS-B | L1371904-11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike | Nickel (Ni)-Dissolved | MS-B | L1371904-11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike | Sodium (Na)-Dissolved | MS-B | L1371904-11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1371904-11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike | Uranium (U)-Dissolved | MS-B | L1371904-11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike | Barium (Ba)-Dissolved | MS-B | L1371904-11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike | Nickel (Ni)-Dissolved | MS-B | L1371904-11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike | Sodium (Na)-Dissolved | MS-B | L1371904-11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1371904-11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike | Uranium (U)-Dissolved | MS-B | L1371904-11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike | Barium (Ba)-Dissolved | MS-B | L1371904-22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -33, -34, -35, -36, -37, -38, -39, -40 |
| Matrix Spike | Sodium (Na)-Dissolved | MS-B | L1371904-22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -33, -34, -35, -36, -37, -38, -39, -40 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1371904-22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -33, -34, -35, -36, -37, -38, -39, -40 |
| Matrix Spike | Barium (Ba)-Dissolved | MS-B | L1371904-22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -33, -34, -35, -36, -37, -38, -39, -40 |
| Matrix Spike | Sodium (Na)-Dissolved | MS-B | L1371904-22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -33, -34, -35, -36, -37, -38, -39, -40 |

# Reference Information

| | Parameter | Qualifier | Applies to Sample Number(s) |
|---|---|---|---|
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1371904-22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -33, -34, -35, -36, -37, -38, -39, -40 |
| Matrix Spike | Strontium (Sr)-Dissolved | MS-B | L1371904-22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -33, -34, -35, -36, -37, -38, -39, -40 |

**Qualifiers for Individual Parameters Listed:**

| Qualifier | Description |
|---|---|
| DLA | Detection Limit Adjusted For required dilution |
| MS-B | Matrix Spike recovery could not be accurately calculated due to high analyte background in sample. |
| PEHT | Parameter Exceeded Recommended Holding Time Prior to Analysis |

**Test Method References:**

| ALS Test Code | Matrix | Test Description | Method Reference** |
|---|---|---|---|
| **ALK-PCT-VA** | Water | Alkalinity by Auto. Titration | APHA 2320 "Alkalinity" |

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

| | | | |
|---|---|---|---|
| **ALK-PCT-VA** | Water | Alkalinity by Auto. Titration | APHA 2320 Alkalinity |

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

| | | | |
|---|---|---|---|
| **ANIONS-CL-IC-WR** | Water | Chloride by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

| | | | |
|---|---|---|---|
| **ANIONS-F-IC-WR** | Water | Fluoride by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

| | | | |
|---|---|---|---|
| **ANIONS-NO2-IC-WR** | Water | Nitrite Nitrogen by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

| | | | |
|---|---|---|---|
| **ANIONS-NO3-IC-WR** | Water | Nitrate Nitrogen by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

| | | | |
|---|---|---|---|
| **ANIONS-SO4-IC-WR** | Water | Sulphate by Ion Chromatography | EPA 300.1 |

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

| | | | |
|---|---|---|---|
| **CARBONS-TIC-VA** | Water | Total inorganic carbon by CO2 purge | APHA 5310 TOTAL ORGANIC CARBON (TOC) |

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

| | | | |
|---|---|---|---|
| **CARBONS-TOC-VA** | Water | Total organic carbon by combustion | APHA 5310 TOTAL ORGANIC CARBON (TOC) |

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

| | | | |
|---|---|---|---|
| **CN-FREE-CFA-VA** | Water | Free Cyanide in water by CFA | ASTM 7237 |

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

| | | | |
|---|---|---|---|
| **CN-SCN-VA** | Water | Thiocyanate by Colour | APHA 4500-CN CYANIDE |

This analysis is carried out using procedures adapted from APHA Method 4500-CN- M "Thiocyanate" Thiocyanate is determined by the ferric nitrate colourimetric method.

| | | | |
|---|---|---|---|
| **CN-T-CFA-VA** | Water | Total Cyanide in water by CFA | ISO 14403:2002 |

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

| | | | |
|---|---|---|---|
| **CN-WAD-CFA-VA** | Water | Weak Acid Diss. Cyanide in water by CFA | APHA 4500-CN CYANIDE |

# Reference Information

This analysis is carried out using procedures adapted from APHA Method 4500-CN I. "Weak Acid Dissociable Cyanide". Weak Acid Dissociable (WAD) cyanide is determined by in-line sample distillation with final determination by colourimetric analysis.

**EC-MAN-WR** Water Conductivity by Meter APHA 2510 (B)

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using an electrode.

**EC-PCT-VA** Water Conductivity (Automated) APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

**HARDNESS-CALC-VA** Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

**HG-DIS-LOW-CVAFS-VA** Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

**IONBALANCE-VA** Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

**MET-D-CCMS-VA** Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

**MET-DIS-LOW-ICP-VA** Water Dissolved Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

**NH3-F-VA** Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, 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.

**PH-MAN-WR** Water pH by Meter APHA 4500-H (B)

"This analysis is carried out using procedures adapted from APHA Method 4500-H ""pH Value"". The pH is determined in the laboratory using a pH electrode."

**PH-PCT-VA** Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

**PH-PCT-VA** Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

**S-DIS-ICP-VA** Water Dissolved Sulfur in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

# Reference Information

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

| | | | |
|---|---|---|---|
| **TKN-F-VA** | Water | TKN in Water by Fluorescence | APHA 4500-NORG D. |

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

** 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 |
|---|---|
| WR | ALS ENVIRONMENTAL - WHITEHORSE, YUKON, CANADA |
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |

**Chain of Custody Numbers:**

1 2

**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 wwt - 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.*

# Quality Control Report



Client: AMEC EARTH & ENVIRONMENTAL
5681 - 70 Street
Edmonton AB T6B 3P6
Contact: Leslie Hardy

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ALK-PCT-VA** | **Water** | | | | | | | |
| **Batch R2709179** | | | | | | | | |
| **WG1761033-10 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 88.3 | | % | | 85-115 | 04-OCT-13 |
| **WG1761033-11 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 86.7 | | % | | 85-115 | 04-OCT-13 |
| **WG1761033-12 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 98.0 | | % | | 85-115 | 04-OCT-13 |
| **WG1761033-13 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 98.1 | | % | | 85-115 | 04-OCT-13 |
| **WG1761033-14 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 93.2 | | % | | 85-115 | 04-OCT-13 |
| **WG1761033-15 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 91.8 | | % | | 85-115 | 04-OCT-13 |
| **WG1761033-16 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 90.0 | | % | | 85-115 | 04-OCT-13 |
| **WG1761033-40 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 89.3 | | % | | 85-115 | 04-OCT-13 |
| **WG1761033-9 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 93.3 | | % | | 85-115 | 04-OCT-13 |
| **WG1761033-36 DUP** | | **L1371904-20** | | | | | | |
| Alkalinity, Total (as CaCO3) | | 789 | 793 | | mg/L | 0.5 | 20 | 04-OCT-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | 789 | 793 | | mg/L | 0.5 | 20 | 04-OCT-13 |
| Alkalinity, Carbonate (as CaCO3) | | <1.0 | <1.0 | RPD-NA | mg/L | N/A | 25 | 04-OCT-13 |
| Alkalinity, Hydroxide (as CaCO3) | | <1.0 | <1.0 | RPD-NA | mg/L | N/A | 20 | 04-OCT-13 |
| **WG1761033-1 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| **WG1761033-2 MB** | | | | | | | | |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| **WG1761033-3 MB** | | | | | | | | |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| **WG1761033-39 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ALK-PCT-VA** | **Water** | | | | | | | |
| **Batch R2709179** | | | | | | | | |
| **WG1761033-39 MB** | | | | | | | | |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| **WG1761033-4 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| **WG1761033-5 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| **WG1761033-6 MB** | | | | | | | | |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| **WG1761033-7 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| **WG1761033-8 MB** | | | | | | | | |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 04-OCT-13 |
| **Batch R2711674** | | | | | | | | |
| **WG1762373-10 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 93.1 | | % | | 85-115 | 07-OCT-13 |
| **WG1762373-11 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 95.0 | | % | | 85-115 | 07-OCT-13 |
| **WG1762373-12 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 95.5 | | % | | 85-115 | 07-OCT-13 |
| **WG1762373-13 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 94.6 | | % | | 85-115 | 07-OCT-13 |
| **WG1762373-14 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 95.0 | | % | | 85-115 | 07-OCT-13 |
| **WG1762373-15 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 97.5 | | % | | 85-115 | 07-OCT-13 |
| **WG1762373-16 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 103.2 | | % | | 85-115 | 07-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ALK-PCT-VA** | **Water** | | | | | | | |
| **Batch R2711674** | | | | | | | | |
| **WG1762373-9 CRM** | | **VA-ALK-PCT-CONTROL** | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 91.5 | | % | | 85-115 | 07-OCT-13 |
| **WG1762373-2 MB** | | | | | | | | |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| **WG1762373-3 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| **WG1762373-4 MB** | | | | | | | | |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| **WG1762373-5 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| **WG1762373-6 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| **WG1762373-7 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| **WG1762373-8 MB** | | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| Alkalinity, Bicarbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| Alkalinity, Carbonate (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| Alkalinity, Hydroxide (as CaCO3) | | | <1.0 | | mg/L | | 1 | 07-OCT-13 |
| **ANIONS-CL-IC-WR** | **Water** | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ANIONS-CL-IC-WR** | **Water** | | | | | | | |
| **Batch R2712397** | | | | | | | | |
| **WG1760380-3 DUP** | | **L1371904-1** | | | | | | |
| Chloride (Cl) | | 1.76 | 1.63 | | mg/L | 7.4 | 20 | 02-OCT-13 |
| **WG1760380-6 DUP** | | **L1371904-20** | | | | | | |
| Chloride (Cl) | | 7.8 | 7.8 | | mg/L | 0.3 | 20 | 02-OCT-13 |
| **WG1760380-2 LCS** | | | | | | | | |
| Chloride (Cl) | | | 101.3 | | % | | 85-115 | 02-OCT-13 |
| **WG1760380-7 LCS** | | | | | | | | |
| Chloride (Cl) | | | 101.4 | | % | | 85-115 | 02-OCT-13 |
| **WG1760380-1 MB** | | | | | | | | |
| Chloride (Cl) | | | <0.50 | | mg/L | | 0.5 | 02-OCT-13 |
| **WG1760380-8 MB** | | | | | | | | |
| Chloride (Cl) | | | <0.50 | | mg/L | | 0.5 | 02-OCT-13 |
| **WG1760380-4 MS** | | **L1371904-1** | | | | | | |
| Chloride (Cl) | | | 100.0 | | % | | 75-125 | 02-OCT-13 |
| **WG1760380-5 MS** | | **L1371904-20** | | | | | | |
| Chloride (Cl) | | | 100.6 | | % | | 75-125 | 02-OCT-13 |
| **ANIONS-F-IC-WR** | **Water** | | | | | | | |
| **Batch R2712397** | | | | | | | | |
| **WG1760380-3 DUP** | | **L1371904-1** | | | | | | |
| Fluoride (F) | | 0.091 | 0.089 | | mg/L | 2.2 | 20 | 02-OCT-13 |
| **WG1760380-6 DUP** | | **L1371904-20** | | | | | | |
| Fluoride (F) | | 0.42 | 0.44 | | mg/L | 5.1 | 20 | 02-OCT-13 |
| **WG1760380-2 LCS** | | | | | | | | |
| Fluoride (F) | | | 102.4 | | % | | 85-115 | 02-OCT-13 |
| **WG1760380-7 LCS** | | | | | | | | |
| Fluoride (F) | | | 102.6 | | % | | 85-115 | 02-OCT-13 |
| **WG1760380-1 MB** | | | | | | | | |
| Fluoride (F) | | | <0.020 | | mg/L | | 0.02 | 02-OCT-13 |
| **WG1760380-8 MB** | | | | | | | | |
| Fluoride (F) | | | <0.020 | | mg/L | | 0.02 | 02-OCT-13 |
| **WG1760380-4 MS** | | **L1371904-1** | | | | | | |
| Fluoride (F) | | | 98.4 | | % | | 75-125 | 02-OCT-13 |
| **WG1760380-5 MS** | | **L1371904-20** | | | | | | |
| Fluoride (F) | | | 112.1 | | % | | 75-125 | 02-OCT-13 |
| **ANIONS-NO2-IC-WR** | **Water** | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ANIONS-NO2-IC-WR** | **Water** | | | | | | | |
| **Batch R2712397** | | | | | | | | |
| **WG1760380-3 DUP** | | **L1371904-1** | | | | | | |
| Nitrite (as N) | | 0.0016 | 0.0014 | | mg/L | 14 | 20 | 02-OCT-13 |
| **WG1760380-6 DUP** | | **L1371904-20** | | | | | | |
| Nitrite (as N) | | <0.010 | <0.010 | RPD-NA | mg/L | N/A | 20 | 02-OCT-13 |
| **WG1760380-2 LCS** | | | | | | | | |
| Nitrite (as N) | | | 101.9 | | % | | 85-115 | 02-OCT-13 |
| **WG1760380-7 LCS** | | | | | | | | |
| Nitrite (as N) | | | 101.8 | | % | | 85-115 | 02-OCT-13 |
| **WG1760380-1 MB** | | | | | | | | |
| Nitrite (as N) | | | <0.0010 | | mg/L | | 0.001 | 02-OCT-13 |
| **WG1760380-8 MB** | | | | | | | | |
| Nitrite (as N) | | | <0.0010 | | mg/L | | 0.001 | 02-OCT-13 |
| **WG1760380-4 MS** | | **L1371904-1** | | | | | | |
| Nitrite (as N) | | | 102.5 | | % | | 75-125 | 02-OCT-13 |
| **WG1760380-5 MS** | | **L1371904-20** | | | | | | |
| Nitrite (as N) | | | 105.1 | | % | | 75-125 | 02-OCT-13 |
| **ANIONS-NO3-IC-WR** | **Water** | | | | | | | |
| **Batch R2712397** | | | | | | | | |
| **WG1760380-3 DUP** | | **L1371904-1** | | | | | | |
| Nitrate (as N) | | 0.207 | 0.196 | | mg/L | 5.2 | 20 | 02-OCT-13 |
| **WG1760380-6 DUP** | | **L1371904-20** | | | | | | |
| Nitrate (as N) | | <0.050 | <0.050 | RPD-NA | mg/L | N/A | 20 | 02-OCT-13 |
| **WG1760380-2 LCS** | | | | | | | | |
| Nitrate (as N) | | | 101.9 | | % | | 85-115 | 02-OCT-13 |
| **WG1760380-7 LCS** | | | | | | | | |
| Nitrate (as N) | | | 101.7 | | % | | 85-115 | 02-OCT-13 |
| **WG1760380-1 MB** | | | | | | | | |
| Nitrate (as N) | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1760380-8 MB** | | | | | | | | |
| Nitrate (as N) | | | <0.0050 | | mg/L | | 0.005 | 02-OCT-13 |
| **WG1760380-4 MS** | | **L1371904-1** | | | | | | |
| Nitrate (as N) | | | 98.5 | | % | | 75-125 | 02-OCT-13 |
| **WG1760380-5 MS** | | **L1371904-20** | | | | | | |
| Nitrate (as N) | | | 102.0 | | % | | 75-125 | 02-OCT-13 |
| **ANIONS-SO4-IC-WR** | **Water** | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **ANIONS-SO4-IC-WR** | **Water** | | | | | | | |
| **Batch R2712397** | | | | | | | | |
| **WG1760380-3 DUP** | | **L1371904-1** | | | | | | |
| Sulfate (SO4) | | 175 | 174 | | mg/L | 0.2 | 20 | 02-OCT-13 |
| **WG1760380-6 DUP** | | **L1371904-20** | | | | | | |
| Sulfate (SO4) | | <5.0 | <5.0 | RPD-NA | mg/L | N/A | 20 | 02-OCT-13 |
| **WG1760380-2 LCS** | | | | | | | | |
| Sulfate (SO4) | | | 99.8 | | % | | 85-115 | 02-OCT-13 |
| **WG1760380-7 LCS** | | | | | | | | |
| Sulfate (SO4) | | | 99.7 | | % | | 85-115 | 02-OCT-13 |
| **WG1760380-1 MB** | | | | | | | | |
| Sulfate (SO4) | | | <0.50 | | mg/L | | 0.5 | 02-OCT-13 |
| **WG1760380-8 MB** | | | | | | | | |
| Sulfate (SO4) | | | <0.50 | | mg/L | | 0.5 | 02-OCT-13 |
| **WG1760380-4 MS** | | **L1371904-1** | | | | | | |
| Sulfate (SO4) | | | N/A | MS-B | % | | - | 02-OCT-13 |
| **WG1760380-5 MS** | | **L1371904-20** | | | | | | |
| Sulfate (SO4) | | | 113.3 | | % | | 75-125 | 02-OCT-13 |
| **CARBONS-TIC-VA** | **Water** | | | | | | | |
| **Batch R2710534** | | | | | | | | |
| **WG1762115-1 DUP** | | **L1371904-16** | | | | | | |
| Total Inorganic Carbon | | 44.4 | 44.2 | | mg/L | 0.2 | 20 | 06-OCT-13 |
| **WG1762115-5 LCS** | | | | | | | | |
| Total Inorganic Carbon | | | 105.5 | | % | | 80-120 | 06-OCT-13 |
| **WG1762115-4 MB** | | | | | | | | |
| Total Inorganic Carbon | | | <0.50 | | mg/L | | 0.5 | 06-OCT-13 |
| **WG1762115-3 MS** | | **L1371904-11** | | | | | | |
| Total Inorganic Carbon | | | N/A | MS-B | % | | - | 06-OCT-13 |
| **Batch R2712670** | | | | | | | | |
| **WG1763927-1 DUP** | | **L1371904-18** | | | | | | |
| Total Inorganic Carbon | | 31.6 | 31.6 | | mg/L | 0.0 | 20 | 08-OCT-13 |
| **WG1763927-4 LCS** | | | | | | | | |
| Total Inorganic Carbon | | | 103.9 | | % | | 80-120 | 08-OCT-13 |
| **WG1763927-3 MB** | | | | | | | | |
| Total Inorganic Carbon | | | <0.50 | | mg/L | | 0.5 | 08-OCT-13 |
| **CARBONS-TOC-VA** | **Water** | | | | | | | |
| **Batch R2710380** | | | | | | | | |
| **WG1761302-1 LCS** | | | | | | | | |
| Total Organic Carbon | | | 95.2 | | % | | 80-120 | 06-OCT-13 |
| **WG1761302-4 LCS** | | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CARBONS-TOC-VA** | **Water** | | | | | | | |
| **Batch R2710380** | | | | | | | | |
| **WG1761302-4 LCS** | | | | | | | | |
| Total Organic Carbon | | | 97.4 | | % | | 80-120 | 06-OCT-13 |
| **WG1761302-3 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 06-OCT-13 |
| **Batch R2711890** | | | | | | | | |
| **WG1762589-10 DUP** | | **L1371904-2** | | | | | | |
| Total Organic Carbon | | 127 | 127 | | mg/L | 0.0 | 20 | 10-OCT-13 |
| **WG1762589-6 DUP** | | **L1371904-21** | | | | | | |
| Total Organic Carbon | | 16.2 | 15.2 | | mg/L | 6.8 | 20 | 10-OCT-13 |
| **WG1762589-1 LCS** | | | | | | | | |
| Total Organic Carbon | | | 100.7 | | % | | 80-120 | 10-OCT-13 |
| **WG1762589-13 LCS** | | | | | | | | |
| Total Organic Carbon | | | 96.8 | | % | | 80-120 | 10-OCT-13 |
| **WG1762589-5 LCS** | | | | | | | | |
| Total Organic Carbon | | | 98.2 | | % | | 80-120 | 10-OCT-13 |
| **WG1762589-9 LCS** | | | | | | | | |
| Total Organic Carbon | | | 97.5 | | % | | 80-120 | 10-OCT-13 |
| **WG1762589-12 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 10-OCT-13 |
| **WG1762589-4 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 10-OCT-13 |
| **WG1762589-8 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 10-OCT-13 |
| **WG1762589-11 MS** | | **L1372663-5** | | | | | | |
| Total Organic Carbon | | | 109.2 | | % | | 70-130 | 10-OCT-13 |
| **WG1762589-3 MS** | | **L1373182-3** | | | | | | |
| Total Organic Carbon | | | 103.1 | | % | | 70-130 | 10-OCT-13 |
| **WG1762589-7 MS** | | **L1372866-2** | | | | | | |
| Total Organic Carbon | | | 104.1 | | % | | 70-130 | 10-OCT-13 |
| **Batch R2712721** | | | | | | | | |
| **WG1763397-12 DUP** | | **L1371904-14** | | | | | | |
| Total Organic Carbon | | 396 | 440 | | mg/L | 11 | 20 | 08-OCT-13 |
| **WG1763397-1 LCS** | | | | | | | | |
| Total Organic Carbon | | | 92.4 | | % | | 80-120 | 08-OCT-13 |
| **WG1763397-11 LCS** | | | | | | | | |
| Total Organic Carbon | | | 94.8 | | % | | 80-120 | 08-OCT-13 |
| **WG1763397-14 LCS** | | | | | | | | |
| Total Organic Carbon | | | 93.0 | | % | | 80-120 | 08-OCT-13 |
| **WG1763397-4 LCS** | | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CARBONS-TOC-VA** | **Water** | | | | | | | |
| **Batch R2712721** | | | | | | | | |
| **WG1763397-4 LCS** | | | | | | | | |
| Total Organic Carbon | | | 94.7 | | % | | 80-120 | 08-OCT-13 |
| **WG1763397-8 LCS** | | | | | | | | |
| Total Organic Carbon | | | 94.8 | | % | | 80-120 | 08-OCT-13 |
| **WG1763397-10 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 08-OCT-13 |
| **WG1763397-13 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 08-OCT-13 |
| **WG1763397-3 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 08-OCT-13 |
| **WG1763397-7 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 08-OCT-13 |
| **WG1763397-6 MS** | | **L1373183-1** | | | | | | |
| Total Organic Carbon | | | 99.4 | | % | | 70-130 | 08-OCT-13 |
| **Batch R2714110** | | | | | | | | |
| **WG1765695-1 LCS** | | | | | | | | |
| Total Organic Carbon | | | 92.5 | | % | | 80-120 | 09-OCT-13 |
| **WG1765695-5 LCS** | | | | | | | | |
| Total Organic Carbon | | | 93.2 | | % | | 80-120 | 09-OCT-13 |
| **WG1765695-4 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 09-OCT-13 |
| **WG1765695-3 MS** | | **L1372663-7** | | | | | | |
| Total Organic Carbon | | | N/A | MS-B | % | | - | 09-OCT-13 |
| **Batch R2714934** | | | | | | | | |
| **WG1764864-1 LCS** | | | | | | | | |
| Total Organic Carbon | | | 95.0 | | % | | 80-120 | 10-OCT-13 |
| **WG1764864-11 LCS** | | | | | | | | |
| Total Organic Carbon | | | 92.9 | | % | | 80-120 | 10-OCT-13 |
| **WG1764864-14 LCS** | | | | | | | | |
| Total Organic Carbon | | | 94.6 | | % | | 80-120 | 10-OCT-13 |
| **WG1764864-4 LCS** | | | | | | | | |
| Total Organic Carbon | | | 90.7 | | % | | 80-120 | 10-OCT-13 |
| **WG1764864-8 LCS** | | | | | | | | |
| Total Organic Carbon | | | 94.2 | | % | | 80-120 | 10-OCT-13 |
| **WG1764864-10 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 10-OCT-13 |
| **WG1764864-13 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 10-OCT-13 |
| **WG1764864-3 MB** | | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CARBONS-TOC-VA** | **Water** | | | | | | | |
| **Batch R2714934** | | | | | | | | |
| **WG1764864-3 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 10-OCT-13 |
| **WG1764864-7 MB** | | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 10-OCT-13 |
| **WG1764864-6 MS** | | **L1374861-20** | | | | | | |
| Total Organic Carbon | | | 107.5 | | % | | 70-130 | 10-OCT-13 |
| **CN-FREE-CFA-VA** | **Water** | | | | | | | |
| **Batch R2711582** | | | | | | | | |
| **WG1762833-5 DUP** | | **L1371904-13** | | | | | | |
| Cyanide, Free | | <0.0050 | <0.0050 | RPD-NA | mg/L | N/A | 20 | 07-OCT-13 |
| **WG1762833-10 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.4 | | % | | 80-120 | 07-OCT-13 |
| **WG1762833-12 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.0 | | % | | 80-120 | 07-OCT-13 |
| **WG1762833-17 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.7 | | % | | 80-120 | 07-OCT-13 |
| **WG1762833-19 LCS** | | | | | | | | |
| Cyanide, Free | | | 100.5 | | % | | 80-120 | 07-OCT-13 |
| **WG1762833-2 LCS** | | | | | | | | |
| Cyanide, Free | | | 97.7 | | % | | 80-120 | 07-OCT-13 |
| **WG1762833-4 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.2 | | % | | 80-120 | 07-OCT-13 |
| **WG1762833-7 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.4 | | % | | 80-120 | 07-OCT-13 |
| **WG1762833-1 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762833-11 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762833-16 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762833-18 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762833-3 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762833-6 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762833-9 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762833-14 MS** | | **L1372542-2** | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-FREE-CFA-VA** | **Water** | | | | | | | |
| **Batch R2711582** | | | | | | | | |
| **WG1762833-14 MS** | | **L1372542-2** | | | | | | |
| Cyanide, Free | | | 95.9 | | % | | 70-130 | 07-OCT-13 |
| **Batch R2712499** | | | | | | | | |
| **WG1763687-7 DUP** | | **L1371904-3** | | | | | | |
| Cyanide, Free | | <0.0050 | <0.0050 | RPD-NA | mg/L | N/A | 20 | 08-OCT-13 |
| **WG1763687-10 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.2 | | % | | 80-120 | 08-OCT-13 |
| **WG1763687-12 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.8 | | % | | 80-120 | 08-OCT-13 |
| **WG1763687-14 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.4 | | % | | 80-120 | 08-OCT-13 |
| **WG1763687-18 LCS** | | | | | | | | |
| Cyanide, Free | | | 100.5 | | % | | 80-120 | 08-OCT-13 |
| **WG1763687-2 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.2 | | % | | 80-120 | 08-OCT-13 |
| **WG1763687-6 LCS** | | | | | | | | |
| Cyanide, Free | | | 98.8 | | % | | 80-120 | 08-OCT-13 |
| **WG1763687-9 LCS** | | | | | | | | |
| Cyanide, Free | | | 99.0 | | % | | 80-120 | 08-OCT-13 |
| **WG1763687-1 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763687-11 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763687-13 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763687-17 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763687-5 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763687-8 MB** | | | | | | | | |
| Cyanide, Free | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763687-16 MS** | | **L1373660-4** | | | | | | |
| Cyanide, Free | | | 96.6 | | % | | 70-130 | 08-OCT-13 |
| **WG1763687-4 MS** | | **L1373660-1** | | | | | | |
| Cyanide, Free | | | 96.7 | | % | | 70-130 | 08-OCT-13 |
| **CN-SCN-VA** | **Water** | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-SCN-VA** | **Water** | | | | | | | |
| **Batch R2709250** | | | | | | | | |
| **WG1761460-2 CRM** | | **VA-SCN-LOW-CONTROL** | | | | | | |
| Thiocyanate (SCN) | | | 99.5 | | % | | 85-115 | 04-OCT-13 |
| **WG1761460-6 CRM** | | **VA-SCN-HIGH-CONTROL** | | | | | | |
| Thiocyanate (SCN) | | | 85.1 | | % | | 85-115 | 04-OCT-13 |
| **WG1761460-7 DUP** | | **L1371904-16** | | | | | | |
| Thiocyanate (SCN) | | <0.50 | <0.50 | RPD-NA | mg/L | N/A | 20 | 04-OCT-13 |
| **WG1761460-1 MB** | | | | | | | | |
| Thiocyanate (SCN) | | | <0.50 | | mg/L | | 0.5 | 04-OCT-13 |
| **WG1761460-5 MB** | | | | | | | | |
| Thiocyanate (SCN) | | | <0.50 | | mg/L | | 0.5 | 04-OCT-13 |
| **WG1761460-4 MS** | | **L1370405-1** | | | | | | |
| Thiocyanate (SCN) | | | 92.3 | | % | | 75-125 | 04-OCT-13 |
| **WG1761460-8 MS** | | **L1371904-17** | | | | | | |
| Thiocyanate (SCN) | | | 89.2 | | % | | 75-125 | 04-OCT-13 |
| **CN-T-CFA-VA** | **Water** | | | | | | | |
| **Batch R2711566** | | | | | | | | |
| **WG1762817-11 DUP** | | **L1371904-13** | | | | | | |
| Cyanide, Total | | <0.0050 | <0.0050 | RPD-NA | mg/L | N/A | 20 | 07-OCT-13 |
| **WG1762817-14 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 91.2 | | % | | 75-105 | 07-OCT-13 |
| **WG1762817-17 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 93.2 | | % | | 75-105 | 07-OCT-13 |
| **WG1762817-22 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 91.0 | | % | | 75-105 | 07-OCT-13 |
| **WG1762817-25 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 91.0 | | % | | 75-105 | 07-OCT-13 |
| **WG1762817-3 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 88.7 | | % | | 75-105 | 07-OCT-13 |
| **WG1762817-30 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 88.1 | | % | | 75-105 | 07-OCT-13 |
| **WG1762817-6 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 90.0 | | % | | 75-105 | 07-OCT-13 |
| **WG1762817-13 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.6 | | % | | 80-120 | 07-OCT-13 |
| **WG1762817-16 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.2 | | % | | 80-120 | 07-OCT-13 |
| **WG1762817-2 LCS** | | | | | | | | |
| Cyanide, Total | | | 102.2 | | % | | 80-120 | 07-OCT-13 |
| **WG1762817-21 LCS** | | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-T-CFA-VA** | **Water** | | | | | | | |
| **Batch R2711566** | | | | | | | | |
| **WG1762817-21 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.0 | | % | | 80-120 | 07-OCT-13 |
| **WG1762817-24 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.3 | | % | | 80-120 | 07-OCT-13 |
| **WG1762817-29 LCS** | | | | | | | | |
| Cyanide, Total | | | 99.2 | | % | | 80-120 | 07-OCT-13 |
| **WG1762817-5 LCS** | | | | | | | | |
| Cyanide, Total | | | 104.0 | | % | | 80-120 | 07-OCT-13 |
| **WG1762817-1 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762817-12 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762817-15 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762817-20 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762817-23 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762817-28 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762817-4 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762817-19 MS** | | **L1367708-1** | | | | | | |
| Cyanide, Total | | | 97.8 | | % | | 70-130 | 07-OCT-13 |
| **Batch R2712476** | | | | | | | | |
| **WG1763669-10 DUP** | | **L1371904-3** | | | | | | |
| Cyanide, Total | | <0.0050 | <0.0050 | RPD-NA | mg/L | N/A | 20 | 08-OCT-13 |
| **WG1763669-13 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 92.9 | | % | | 75-105 | 08-OCT-13 |
| **WG1763669-15 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 92.1 | | % | | 75-105 | 08-OCT-13 |
| **WG1763669-20 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 93.6 | | % | | 75-105 | 08-OCT-13 |
| **WG1763669-25 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 91.3 | | % | | 75-105 | 08-OCT-13 |
| **WG1763669-3 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 87.5 | | % | | 75-105 | 08-OCT-13 |
| **WG1763669-30 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 89.0 | | % | | 75-105 | 08-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-T-CFA-VA** | **Water** | | | | | | | |
| **Batch R2712476** | | | | | | | | |
| **WG1763669-8 IRM** | | **ALS-TCN-IRM1** | | | | | | |
| Cyanide, Total | | | 90.8 | | % | | 75-105 | 08-OCT-13 |
| **WG1763669-12 LCS** | | | | | | | | |
| Cyanide, Total | | | 102.9 | | % | | 80-120 | 08-OCT-13 |
| **WG1763669-14 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.1 | | % | | 80-120 | 08-OCT-13 |
| **WG1763669-19 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.5 | | % | | 80-120 | 08-OCT-13 |
| **WG1763669-2 LCS** | | | | | | | | |
| Cyanide, Total | | | 100.8 | | % | | 80-120 | 08-OCT-13 |
| **WG1763669-24 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.2 | | % | | 80-120 | 08-OCT-13 |
| **WG1763669-29 LCS** | | | | | | | | |
| Cyanide, Total | | | 99.9 | | % | | 80-120 | 08-OCT-13 |
| **WG1763669-7 LCS** | | | | | | | | |
| Cyanide, Total | | | 103.4 | | % | | 80-120 | 08-OCT-13 |
| **WG1763669-1 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763669-11 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763669-18 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763669-23 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763669-28 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763669-6 MB** | | | | | | | | |
| Cyanide, Total | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763669-22 MS** | | **L1373310-1** | | | | | | |
| Cyanide, Total | | | 98.5 | | % | | 70-130 | 08-OCT-13 |
| **WG1763669-27 MS** | | **L1373660-4** | | | | | | |
| Cyanide, Total | | | 97.9 | | % | | 70-130 | 08-OCT-13 |
| **WG1763669-5 MS** | | **L1373660-1** | | | | | | |
| Cyanide, Total | | | 96.5 | | % | | 70-130 | 08-OCT-13 |
| **CN-WAD-CFA-VA** | **Water** | | | | | | | |
| **Batch R2711567** | | | | | | | | |
| **WG1762823-9 DUP** | | **L1371904-13** | | | | | | |
| Cyanide, Weak Acid Diss | | <0.0050 | <0.0050 | RPD-NA | mg/L | N/A | 20 | 07-OCT-13 |
| **WG1762823-11 LCS** | | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-WAD-CFA-VA** | **Water** | | | | | | | |
| **Batch R2711567** | | | | | | | | |
| **WG1762823-11 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 101.3 | | % | | 80-120 | 07-OCT-13 |
| **WG1762823-13 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 102.2 | | % | | 80-120 | 07-OCT-13 |
| **WG1762823-15 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 99.6 | | % | | 80-120 | 07-OCT-13 |
| **WG1762823-17 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 99.2 | | % | | 80-120 | 07-OCT-13 |
| **WG1762823-2 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 100.1 | | % | | 80-120 | 07-OCT-13 |
| **WG1762823-21 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 101.0 | | % | | 80-120 | 07-OCT-13 |
| **WG1762823-4 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 101.2 | | % | | 80-120 | 07-OCT-13 |
| **WG1762823-1 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762823-10 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762823-12 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762823-14 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762823-16 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762823-20 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **WG1762823-3 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 07-OCT-13 |
| **Batch R2712488** | | | | | | | | |
| **WG1763677-8 DUP** | | **L1371904-3** | | | | | | |
| Cyanide, Weak Acid Diss | | <0.0050 | <0.0050 | RPD-NA | mg/L | N/A | 20 | 08-OCT-13 |
| **WG1763677-11 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 104.7 | | % | | 80-120 | 08-OCT-13 |
| **WG1763677-12 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 102.9 | | % | | 80-120 | 08-OCT-13 |
| **WG1763677-14 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 102.8 | | % | | 80-120 | 08-OCT-13 |
| **WG1763677-18 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 101.5 | | % | | 80-120 | 08-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **CN-WAD-CFA-VA** | **Water** | | | | | | | |
| **Batch R2712488** | | | | | | | | |
| **WG1763677-2 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 101.2 | | % | | 80-120 | 08-OCT-13 |
| **WG1763677-22 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 100.1 | | % | | 80-120 | 08-OCT-13 |
| **WG1763677-6 LCS** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | 103.7 | | % | | 80-120 | 08-OCT-13 |
| **WG1763677-1 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763677-10 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763677-13 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763677-17 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763677-21 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763677-5 MB** | | | | | | | | |
| Cyanide, Weak Acid Diss | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763677-16 MS** | | **L1373310-1** | | | | | | |
| Cyanide, Weak Acid Diss | | | 97.9 | | % | | 70-130 | 08-OCT-13 |
| **WG1763677-20 MS** | | **L1373660-4** | | | | | | |
| Cyanide, Weak Acid Diss | | | 97.0 | | % | | 70-130 | 08-OCT-13 |
| **WG1763677-4 MS** | | **L1373660-1** | | | | | | |
| Cyanide, Weak Acid Diss | | | 97.0 | | % | | 70-130 | 08-OCT-13 |
| **EC-MAN-WR** | **Water** | | | | | | | |
| **Batch R2710803** | | | | | | | | |
| **WG1762715-6 DUP** | | **L1371904-17** | | | | | | |
| Conductivity | | 948 | 954 | | uS/cm | 0.6 | 10 | 02-OCT-13 |
| **WG1762715-2 LCS** | | | | | | | | |
| Conductivity | | | 98.8 | | % | | 90-110 | 02-OCT-13 |
| **WG1762715-5 LCS** | | | | | | | | |
| Conductivity | | | 99.1 | | % | | 90-110 | 02-OCT-13 |
| **WG1762715-1 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 02-OCT-13 |
| **WG1762715-4 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 02-OCT-13 |
| **EC-PCT-VA** | **Water** | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **EC-PCT-VA** | **Water** | | | | | | | |
| **Batch R2711674** | | | | | | | | |
| **WG1762373-17 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 98.6 | | % | | 90-110 | 07-OCT-13 |
| **WG1762373-18 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 98.8 | | % | | 90-110 | 07-OCT-13 |
| **WG1762373-19 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 98.8 | | % | | 90-110 | 07-OCT-13 |
| **WG1762373-20 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 99.4 | | % | | 90-110 | 07-OCT-13 |
| **WG1762373-21 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 99.9 | | % | | 90-110 | 07-OCT-13 |
| **WG1762373-22 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 99.5 | | % | | 90-110 | 07-OCT-13 |
| **WG1762373-23 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 100.3 | | % | | 90-110 | 07-OCT-13 |
| **WG1762373-24 CRM** | | **VA-EC-PCT-CONTROL** | | | | | | |
| Conductivity | | | 100.3 | | % | | 90-110 | 07-OCT-13 |
| **WG1762373-1 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 07-OCT-13 |
| **WG1762373-2 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 07-OCT-13 |
| **WG1762373-3 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 07-OCT-13 |
| **WG1762373-4 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 07-OCT-13 |
| **WG1762373-5 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 07-OCT-13 |
| **WG1762373-6 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 07-OCT-13 |
| **WG1762373-7 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 07-OCT-13 |
| **WG1762373-8 MB** | | | | | | | | |
| Conductivity | | | <2.0 | | uS/cm | | 2 | 07-OCT-13 |
| **HG-DIS-LOW-CVAFS-VA** | **Water** | | | | | | | |
| **Batch R2709132** | | | | | | | | |
| **WG1760900-3 LCS** | | | | | | | | |
| Mercury (Hg)-Dissolved | | | 95.0 | | % | | 80-120 | 04-OCT-13 |
| **WG1760900-1 MB** | | | | | | | | |
| Mercury (Hg)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 04-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **HG-DIS-LOW-CVAFS-VA** | **Water** | | | | | | | |
| **Batch R2709248** | | | | | | | | |
| **WG1760900-19 MS** | | **L1372133-7** | | | | | | |
| Mercury (Hg)-Dissolved | | | 95.8 | | % | | 70-130 | 04-OCT-13 |
| **Batch R2709390** | | | | | | | | |
| **WG1760900-16 MS** | | **L1372907-2** | | | | | | |
| Mercury (Hg)-Dissolved | | | 90.8 | | % | | 70-130 | 04-OCT-13 |
| **WG1760900-17 MS** | | **L1372907-3** | | | | | | |
| Mercury (Hg)-Dissolved | | | 81.7 | | % | | 70-130 | 04-OCT-13 |
| **WG1760900-5 MS** | | **L1372681-17** | | | | | | |
| Mercury (Hg)-Dissolved | | | 75.2 | | % | | 70-130 | 04-OCT-13 |
| **WG1760900-7 MS** | | **L1372681-42** | | | | | | |
| Mercury (Hg)-Dissolved | | | 72.2 | | % | | 70-130 | 04-OCT-13 |
| **Batch R2709687** | | | | | | | | |
| **WG1761728-3 LCS** | | | | | | | | |
| Mercury (Hg)-Dissolved | | | 94.7 | | % | | 80-120 | 05-OCT-13 |
| **WG1761728-1 MB** | | | | | | | | |
| Mercury (Hg)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 05-OCT-13 |
| **Batch R2710843** | | | | | | | | |
| **WG1761728-19 MS** | | **L1372704-1** | | | | | | |
| Mercury (Hg)-Dissolved | | | 92.9 | | % | | 70-130 | 07-OCT-13 |
| **Batch R2711673** | | | | | | | | |
| **WG1761728-14 MS** | | **L1373185-3** | | | | | | |
| Mercury (Hg)-Dissolved | | | 89.6 | | % | | 70-130 | 07-OCT-13 |
| **WG1761728-15 MS** | | **L1373183-1** | | | | | | |
| Mercury (Hg)-Dissolved | | | 91.6 | | % | | 70-130 | 07-OCT-13 |
| **Batch R2711947** | | | | | | | | |
| **WG1761728-12 MS** | | **L1373310-2** | | | | | | |
| Mercury (Hg)-Dissolved | | | 95.7 | | % | | 70-130 | 08-OCT-13 |
| **WG1761728-18 MS** | | **L1373256-11** | | | | | | |
| Mercury (Hg)-Dissolved | | | 96.7 | | % | | 70-130 | 08-OCT-13 |
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2708623** | | | | | | | | |
| **WG1760900-1 MB** | | | | | | | | |
| Aluminum (Al)-Dissolved | | | <0.0010 | | mg/L | | 0.001 | 04-OCT-13 |
| Antimony (Sb)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 04-OCT-13 |
| Arsenic (As)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 04-OCT-13 |
| Barium (Ba)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 04-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2708623** | | | | | | | | |
| **WG1760900-1 MB** | | | | | | | | |
| Beryllium (Be)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 04-OCT-13 |
| Bismuth (Bi)-Dissolved | | | <0.00050 | | mg/L | | 0.0005 | 04-OCT-13 |
| Boron (B)-Dissolved | | | <0.010 | | mg/L | | 0.01 | 04-OCT-13 |
| Cadmium (Cd)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 04-OCT-13 |
| Chromium (Cr)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 04-OCT-13 |
| Cobalt (Co)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 04-OCT-13 |
| Copper (Cu)-Dissolved | | | <0.00020 | | mg/L | | 0.0002 | 04-OCT-13 |
| Lead (Pb)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 04-OCT-13 |
| Lithium (Li)-Dissolved | | | <0.00050 | | mg/L | | 0.0005 | 04-OCT-13 |
| Manganese (Mn)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 04-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 04-OCT-13 |
| Nickel (Ni)-Dissolved | | | <0.00050 | | mg/L | | 0.0005 | 04-OCT-13 |
| Selenium (Se)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 04-OCT-13 |
| Silver (Ag)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 04-OCT-13 |
| Sodium (Na)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 04-OCT-13 |
| Strontium (Sr)-Dissolved | | | <0.00020 | | mg/L | | 0.0002 | 04-OCT-13 |
| Thallium (Tl)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 04-OCT-13 |
| Tin (Sn)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 04-OCT-13 |
| Titanium (Ti)-Dissolved | | | <0.010 | | mg/L | | 0.01 | 04-OCT-13 |
| Uranium (U)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 04-OCT-13 |
| Vanadium (V)-Dissolved | | | <0.0010 | | mg/L | | 0.001 | 04-OCT-13 |
| Zinc (Zn)-Dissolved | | | <0.0010 | | mg/L | | 0.001 | 04-OCT-13 |
| **Batch R2710606** | | | | | | | | |
| **WG1761728-2 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Aluminum (Al)-Dissolved | | | 96.6 | | % | | 80-120 | 05-OCT-13 |
| Antimony (Sb)-Dissolved | | | 98.7 | | % | | 80-120 | 05-OCT-13 |
| Arsenic (As)-Dissolved | | | 95.9 | | % | | 80-120 | 05-OCT-13 |
| Barium (Ba)-Dissolved | | | 98.7 | | % | | 80-120 | 05-OCT-13 |
| Beryllium (Be)-Dissolved | | | 99.1 | | % | | 80-120 | 05-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 98.4 | | % | | 80-120 | 05-OCT-13 |
| Boron (B)-Dissolved | | | 94.4 | | % | | 80-120 | 05-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 95.8 | | % | | 80-120 | 05-OCT-13 |
| Chromium (Cr)-Dissolved | | | 96.5 | | % | | 80-120 | 05-OCT-13 |
| Cobalt (Co)-Dissolved | | | 93.3 | | % | | 80-120 | 05-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2710606** | | | | | | | | |
| **WG1761728-2 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Copper (Cu)-Dissolved | | | 93.0 | | % | | 80-120 | 05-OCT-13 |
| Lead (Pb)-Dissolved | | | 98.5 | | % | | 80-120 | 05-OCT-13 |
| Lithium (Li)-Dissolved | | | 99.3 | | % | | 80-120 | 05-OCT-13 |
| Manganese (Mn)-Dissolved | | | 98.8 | | % | | 80-120 | 05-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 98.2 | | % | | 80-120 | 05-OCT-13 |
| Nickel (Ni)-Dissolved | | | 94.3 | | % | | 80-120 | 05-OCT-13 |
| Selenium (Se)-Dissolved | | | 96.5 | | % | | 80-120 | 05-OCT-13 |
| Silver (Ag)-Dissolved | | | 96.6 | | % | | 80-120 | 05-OCT-13 |
| Sodium (Na)-Dissolved | | | 95.7 | | % | | 80-120 | 05-OCT-13 |
| Strontium (Sr)-Dissolved | | | 98.1 | | % | | 80-120 | 05-OCT-13 |
| Thallium (Tl)-Dissolved | | | 94.0 | | % | | 80-120 | 05-OCT-13 |
| Tin (Sn)-Dissolved | | | 95.4 | | % | | 80-120 | 05-OCT-13 |
| Titanium (Ti)-Dissolved | | | 99.3 | | % | | 80-120 | 05-OCT-13 |
| Uranium (U)-Dissolved | | | 96.5 | | % | | 80-120 | 05-OCT-13 |
| Vanadium (V)-Dissolved | | | 97.3 | | % | | 80-120 | 05-OCT-13 |
| Zinc (Zn)-Dissolved | | | 95.1 | | % | | 80-120 | 05-OCT-13 |
| **WG1761728-1 MB** | | | | | | | | |
| Aluminum (Al)-Dissolved | | | <0.0010 | | mg/L | | 0.001 | 05-OCT-13 |
| Antimony (Sb)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 05-OCT-13 |
| Arsenic (As)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 05-OCT-13 |
| Barium (Ba)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 05-OCT-13 |
| Beryllium (Be)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 05-OCT-13 |
| Bismuth (Bi)-Dissolved | | | <0.00050 | | mg/L | | 0.0005 | 05-OCT-13 |
| Boron (B)-Dissolved | | | <0.010 | | mg/L | | 0.01 | 05-OCT-13 |
| Cadmium (Cd)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 05-OCT-13 |
| Chromium (Cr)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 05-OCT-13 |
| Cobalt (Co)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 05-OCT-13 |
| Copper (Cu)-Dissolved | | | <0.00020 | | mg/L | | 0.0002 | 05-OCT-13 |
| Lead (Pb)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 05-OCT-13 |
| Lithium (Li)-Dissolved | | | <0.00050 | | mg/L | | 0.0005 | 05-OCT-13 |
| Manganese (Mn)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 05-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | <0.000050 | | mg/L | | 0.00005 | 05-OCT-13 |
| Nickel (Ni)-Dissolved | | | <0.00050 | | mg/L | | 0.0005 | 05-OCT-13 |
| Selenium (Se)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 05-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2710606** | | | | | | | | |
| **WG1761728-1 MB** | | | | | | | | |
| Silver (Ag)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 05-OCT-13 |
| Sodium (Na)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 05-OCT-13 |
| Strontium (Sr)-Dissolved | | | <0.00020 | | mg/L | | 0.0002 | 05-OCT-13 |
| Thallium (Tl)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 05-OCT-13 |
| Tin (Sn)-Dissolved | | | <0.00010 | | mg/L | | 0.0001 | 05-OCT-13 |
| Titanium (Ti)-Dissolved | | | <0.010 | | mg/L | | 0.01 | 05-OCT-13 |
| Uranium (U)-Dissolved | | | <0.000010 | | mg/L | | 0.00001 | 05-OCT-13 |
| Vanadium (V)-Dissolved | | | <0.0010 | | mg/L | | 0.001 | 05-OCT-13 |
| Zinc (Zn)-Dissolved | | | <0.0010 | | mg/L | | 0.001 | 05-OCT-13 |
| **Batch R2710958** | | | | | | | | |
| **WG1760900-2 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Aluminum (Al)-Dissolved | | | 98.5 | | % | | 80-120 | 04-OCT-13 |
| Antimony (Sb)-Dissolved | | | 93.3 | | % | | 80-120 | 04-OCT-13 |
| Arsenic (As)-Dissolved | | | 95.5 | | % | | 80-120 | 04-OCT-13 |
| Barium (Ba)-Dissolved | | | 92.4 | | % | | 80-120 | 04-OCT-13 |
| Beryllium (Be)-Dissolved | | | 87.9 | | % | | 80-120 | 04-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 90.0 | | % | | 80-120 | 04-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 95.3 | | % | | 80-120 | 04-OCT-13 |
| Chromium (Cr)-Dissolved | | | 96.5 | | % | | 80-120 | 04-OCT-13 |
| Cobalt (Co)-Dissolved | | | 96.8 | | % | | 80-120 | 04-OCT-13 |
| Copper (Cu)-Dissolved | | | 92.9 | | % | | 80-120 | 04-OCT-13 |
| Lead (Pb)-Dissolved | | | 86.9 | | % | | 80-120 | 04-OCT-13 |
| Lithium (Li)-Dissolved | | | 88.1 | | % | | 80-120 | 04-OCT-13 |
| Manganese (Mn)-Dissolved | | | 98.4 | | % | | 80-120 | 04-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 88.3 | | % | | 80-120 | 04-OCT-13 |
| Nickel (Ni)-Dissolved | | | 95.2 | | % | | 80-120 | 04-OCT-13 |
| Selenium (Se)-Dissolved | | | 97.2 | | % | | 80-120 | 04-OCT-13 |
| Silver (Ag)-Dissolved | | | 90.6 | | % | | 80-120 | 04-OCT-13 |
| Sodium (Na)-Dissolved | | | 94.7 | | % | | 80-120 | 04-OCT-13 |
| Strontium (Sr)-Dissolved | | | 87.9 | | % | | 80-120 | 04-OCT-13 |
| Thallium (Tl)-Dissolved | | | 89.0 | | % | | 80-120 | 04-OCT-13 |
| Tin (Sn)-Dissolved | | | 90.6 | | % | | 80-120 | 04-OCT-13 |
| Titanium (Ti)-Dissolved | | | 84.2 | | % | | 80-120 | 04-OCT-13 |
| Uranium (U)-Dissolved | | | 88.1 | | % | | 80-120 | 04-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2710958** | | | | | | | | |
| **WG1760900-2 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Vanadium (V)-Dissolved | | | 98.0 | | % | | 80-120 | 04-OCT-13 |
| Zinc (Zn)-Dissolved | | | 96.5 | | % | | 80-120 | 04-OCT-13 |
| **Batch R2714957** | | | | | | | | |
| **WG1761728-18 MS** | | **L1373256-11** | | | | | | |
| Aluminum (Al)-Dissolved | | | 96.9 | | % | | 70-130 | 10-OCT-13 |
| Antimony (Sb)-Dissolved | | | 112.7 | | % | | 70-130 | 10-OCT-13 |
| Arsenic (As)-Dissolved | | | 109.2 | | % | | 70-130 | 10-OCT-13 |
| Barium (Ba)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Beryllium (Be)-Dissolved | | | 106.7 | | % | | 70-130 | 10-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 77.4 | | % | | 70-130 | 10-OCT-13 |
| Boron (B)-Dissolved | | | 115.8 | | % | | 70-130 | 10-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 98.7 | | % | | 70-130 | 10-OCT-13 |
| Chromium (Cr)-Dissolved | | | 96.1 | | % | | 70-130 | 10-OCT-13 |
| Cobalt (Co)-Dissolved | | | 88.6 | | % | | 70-130 | 10-OCT-13 |
| Copper (Cu)-Dissolved | | | 85.9 | | % | | 70-130 | 10-OCT-13 |
| Lead (Pb)-Dissolved | | | 91.7 | | % | | 70-130 | 10-OCT-13 |
| Lithium (Li)-Dissolved | | | 93.7 | | % | | 70-130 | 10-OCT-13 |
| Manganese (Mn)-Dissolved | | | 94.9 | | % | | 70-130 | 10-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 96.0 | | % | | 70-130 | 10-OCT-13 |
| Nickel (Ni)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Selenium (Se)-Dissolved | | | 122.6 | | % | | 70-130 | 10-OCT-13 |
| Sodium (Na)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Thallium (Tl)-Dissolved | | | 94.2 | | % | | 70-130 | 10-OCT-13 |
| Tin (Sn)-Dissolved | | | 102.0 | | % | | 70-130 | 10-OCT-13 |
| Titanium (Ti)-Dissolved | | | 106.3 | | % | | 70-130 | 10-OCT-13 |
| Uranium (U)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Vanadium (V)-Dissolved | | | 100.2 | | % | | 70-130 | 10-OCT-13 |
| Zinc (Zn)-Dissolved | | | 91.2 | | % | | 70-130 | 10-OCT-13 |
| **Batch R2715070** | | | | | | | | |
| **WG1760900-5 MS** | | **L1372681-17** | | | | | | |
| Aluminum (Al)-Dissolved | | | 95.4 | | % | | 70-130 | 10-OCT-13 |
| Antimony (Sb)-Dissolved | | | 110.8 | | % | | 70-130 | 10-OCT-13 |
| Arsenic (As)-Dissolved | | | 103.0 | | % | | 70-130 | 10-OCT-13 |

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2715070** | | | | | | | | |
| **WG1760900-5 MS** | | **L1372681-17** | | | | | | |
| Barium (Ba)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Beryllium (Be)-Dissolved | | | 104.1 | | % | | 70-130 | 10-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 78.6 | | % | | 70-130 | 10-OCT-13 |
| Boron (B)-Dissolved | | | 106.8 | | % | | 70-130 | 10-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 96.2 | | % | | 70-130 | 10-OCT-13 |
| Chromium (Cr)-Dissolved | | | 95.0 | | % | | 70-130 | 10-OCT-13 |
| Cobalt (Co)-Dissolved | | | 88.3 | | % | | 70-130 | 10-OCT-13 |
| Copper (Cu)-Dissolved | | | 86.4 | | % | | 70-130 | 10-OCT-13 |
| Lead (Pb)-Dissolved | | | 92.1 | | % | | 70-130 | 10-OCT-13 |
| Lithium (Li)-Dissolved | | | 106.2 | | % | | 70-130 | 10-OCT-13 |
| Manganese (Mn)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 97.1 | | % | | 70-130 | 10-OCT-13 |
| Nickel (Ni)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Selenium (Se)-Dissolved | | | 104.7 | | % | | 70-130 | 10-OCT-13 |
| Silver (Ag)-Dissolved | | | 99.5 | | % | | 70-130 | 10-OCT-13 |
| Sodium (Na)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Thallium (Tl)-Dissolved | | | 94.1 | | % | | 70-130 | 10-OCT-13 |
| Tin (Sn)-Dissolved | | | 102.3 | | % | | 70-130 | 10-OCT-13 |
| Titanium (Ti)-Dissolved | | | 104.3 | | % | | 70-130 | 10-OCT-13 |
| Uranium (U)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Vanadium (V)-Dissolved | | | 97.8 | | % | | 70-130 | 10-OCT-13 |
| Zinc (Zn)-Dissolved | | | 89.9 | | % | | 70-130 | 10-OCT-13 |
| **WG1760900-7 MS** | | **L1372681-42** | | | | | | |
| Aluminum (Al)-Dissolved | | | 98.6 | | % | | 70-130 | 10-OCT-13 |
| Antimony (Sb)-Dissolved | | | 112.9 | | % | | 70-130 | 10-OCT-13 |
| Arsenic (As)-Dissolved | | | 106.3 | | % | | 70-130 | 10-OCT-13 |
| Barium (Ba)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Beryllium (Be)-Dissolved | | | 115.7 | | % | | 70-130 | 10-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 78.4 | | % | | 70-130 | 10-OCT-13 |
| Boron (B)-Dissolved | | | 120.0 | | % | | 70-130 | 10-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 97.4 | | % | | 70-130 | 10-OCT-13 |
| Chromium (Cr)-Dissolved | | | 93.2 | | % | | 70-130 | 10-OCT-13 |
| Cobalt (Co)-Dissolved | | | 91.0 | | % | | 70-130 | 10-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2715070** | | | | | | | | |
| **WG1760900-7 MS** | | **L1372681-42** | | | | | | |
| Copper (Cu)-Dissolved | | | 89.0 | | % | | 70-130 | 10-OCT-13 |
| Lead (Pb)-Dissolved | | | 91.0 | | % | | 70-130 | 10-OCT-13 |
| Lithium (Li)-Dissolved | | | 113.8 | | % | | 70-130 | 10-OCT-13 |
| Manganese (Mn)-Dissolved | | | 90.8 | | % | | 70-130 | 10-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 104.0 | | % | | 70-130 | 10-OCT-13 |
| Nickel (Ni)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Selenium (Se)-Dissolved | | | 101.4 | | % | | 70-130 | 10-OCT-13 |
| Silver (Ag)-Dissolved | | | 78.9 | | % | | 70-130 | 10-OCT-13 |
| Sodium (Na)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Thallium (Tl)-Dissolved | | | 92.3 | | % | | 70-130 | 10-OCT-13 |
| Tin (Sn)-Dissolved | | | 102.5 | | % | | 70-130 | 10-OCT-13 |
| Titanium (Ti)-Dissolved | | | 104.5 | | % | | 70-130 | 10-OCT-13 |
| Uranium (U)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Vanadium (V)-Dissolved | | | 97.9 | | % | | 70-130 | 10-OCT-13 |
| Zinc (Zn)-Dissolved | | | 93.6 | | % | | 70-130 | 10-OCT-13 |
| **Batch R2715130** | | | | | | | | |
| **WG1761728-15 MS** | | **L1373183-1** | | | | | | |
| Aluminum (Al)-Dissolved | | | 95.9 | | % | | 70-130 | 10-OCT-13 |
| Antimony (Sb)-Dissolved | | | 103.7 | | % | | 70-130 | 10-OCT-13 |
| Arsenic (As)-Dissolved | | | 99.0 | | % | | 70-130 | 10-OCT-13 |
| Barium (Ba)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Beryllium (Be)-Dissolved | | | 97.1 | | % | | 70-130 | 10-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 83.5 | | % | | 70-130 | 10-OCT-13 |
| Boron (B)-Dissolved | | | 108.0 | | % | | 70-130 | 10-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 101.5 | | % | | 70-130 | 10-OCT-13 |
| Chromium (Cr)-Dissolved | | | 98.3 | | % | | 70-130 | 10-OCT-13 |
| Cobalt (Co)-Dissolved | | | 96.3 | | % | | 70-130 | 10-OCT-13 |
| Copper (Cu)-Dissolved | | | 95.8 | | % | | 70-130 | 10-OCT-13 |
| Lead (Pb)-Dissolved | | | 95.5 | | % | | 70-130 | 10-OCT-13 |
| Lithium (Li)-Dissolved | | | 97.7 | | % | | 70-130 | 10-OCT-13 |
| Manganese (Mn)-Dissolved | | | 96.7 | | % | | 70-130 | 10-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 97.6 | | % | | 70-130 | 10-OCT-13 |
| Nickel (Ni)-Dissolved | | | 97.6 | | % | | 70-130 | 10-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2715130** | | | | | | | | |
| **WG1761728-15 MS** | | **L1373183-1** | | | | | | |
| Selenium (Se)-Dissolved | | | 106.1 | | % | | 70-130 | 10-OCT-13 |
| Silver (Ag)-Dissolved | | | 88.7 | | % | | 70-130 | 10-OCT-13 |
| Sodium (Na)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Thallium (Tl)-Dissolved | | | 96.2 | | % | | 70-130 | 10-OCT-13 |
| Tin (Sn)-Dissolved | | | 106.5 | | % | | 70-130 | 10-OCT-13 |
| Titanium (Ti)-Dissolved | | | 100.9 | | % | | 70-130 | 10-OCT-13 |
| Uranium (U)-Dissolved | | | 98.1 | | % | | 70-130 | 10-OCT-13 |
| Vanadium (V)-Dissolved | | | 98.8 | | % | | 70-130 | 10-OCT-13 |
| Zinc (Zn)-Dissolved | | | 93.6 | | % | | 70-130 | 10-OCT-13 |
| **Batch R2716393** | | | | | | | | |
| **WG1761728-14 MS** | | **L1373185-3** | | | | | | |
| Aluminum (Al)-Dissolved | | | 92.2 | | % | | 70-130 | 11-OCT-13 |
| Antimony (Sb)-Dissolved | | | 105.2 | | % | | 70-130 | 11-OCT-13 |
| Arsenic (As)-Dissolved | | | 100.5 | | % | | 70-130 | 11-OCT-13 |
| Barium (Ba)-Dissolved | | | N/A | MS-B | % | | - | 11-OCT-13 |
| Beryllium (Be)-Dissolved | | | 96.8 | | % | | 70-130 | 11-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 79.7 | | % | | 70-130 | 11-OCT-13 |
| Boron (B)-Dissolved | | | 98.7 | | % | | 70-130 | 11-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 98.5 | | % | | 70-130 | 11-OCT-13 |
| Chromium (Cr)-Dissolved | | | 96.1 | | % | | 70-130 | 11-OCT-13 |
| Cobalt (Co)-Dissolved | | | 93.3 | | % | | 70-130 | 11-OCT-13 |
| Copper (Cu)-Dissolved | | | 93.4 | | % | | 70-130 | 11-OCT-13 |
| Lead (Pb)-Dissolved | | | 95.5 | | % | | 70-130 | 11-OCT-13 |
| Lithium (Li)-Dissolved | | | 98.3 | | % | | 70-130 | 11-OCT-13 |
| Manganese (Mn)-Dissolved | | | 92.2 | | % | | 70-130 | 11-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 96.8 | | % | | 70-130 | 11-OCT-13 |
| Nickel (Ni)-Dissolved | | | 95.4 | | % | | 70-130 | 11-OCT-13 |
| Selenium (Se)-Dissolved | | | 105.8 | | % | | 70-130 | 11-OCT-13 |
| Silver (Ag)-Dissolved | | | 88.6 | | % | | 70-130 | 11-OCT-13 |
| Sodium (Na)-Dissolved | | | N/A | MS-B | % | | - | 11-OCT-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 11-OCT-13 |
| Thallium (Tl)-Dissolved | | | 96.2 | | % | | 70-130 | 11-OCT-13 |
| Tin (Sn)-Dissolved | | | 100.5 | | % | | 70-130 | 11-OCT-13 |

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-D-CCMS-VA** | **Water** | | | | | | | |
| **Batch R2716393** | | | | | | | | |
| **WG1761728-14 MS** | | **L1373185-3** | | | | | | |
| Titanium (Ti)-Dissolved | | | 97.7 | | % | | 70-130 | 11-OCT-13 |
| Uranium (U)-Dissolved | | | 100.0 | | % | | 70-130 | 11-OCT-13 |
| Vanadium (V)-Dissolved | | | 97.4 | | % | | 70-130 | 11-OCT-13 |
| Zinc (Zn)-Dissolved | | | 93.7 | | % | | 70-130 | 11-OCT-13 |
| **Batch R2716604** | | | | | | | | |
| **WG1761728-12 MS** | | **L1373310-2** | | | | | | |
| Aluminum (Al)-Dissolved | | | 96.4 | | % | | 70-130 | 11-OCT-13 |
| Antimony (Sb)-Dissolved | | | 97.3 | | % | | 70-130 | 11-OCT-13 |
| Arsenic (As)-Dissolved | | | 99.0 | | % | | 70-130 | 11-OCT-13 |
| Barium (Ba)-Dissolved | | | 95.4 | | % | | 70-130 | 11-OCT-13 |
| Beryllium (Be)-Dissolved | | | 96.3 | | % | | 70-130 | 11-OCT-13 |
| Bismuth (Bi)-Dissolved | | | 87.4 | | % | | 70-130 | 11-OCT-13 |
| Boron (B)-Dissolved | | | 98.0 | | % | | 70-130 | 11-OCT-13 |
| Cadmium (Cd)-Dissolved | | | 101.1 | | % | | 70-130 | 11-OCT-13 |
| Chromium (Cr)-Dissolved | | | 97.0 | | % | | 70-130 | 11-OCT-13 |
| Cobalt (Co)-Dissolved | | | 97.3 | | % | | 70-130 | 11-OCT-13 |
| Copper (Cu)-Dissolved | | | 100.6 | | % | | 70-130 | 11-OCT-13 |
| Lead (Pb)-Dissolved | | | 95.0 | | % | | 70-130 | 11-OCT-13 |
| Lithium (Li)-Dissolved | | | 96.3 | | % | | 70-130 | 11-OCT-13 |
| Manganese (Mn)-Dissolved | | | 97.7 | | % | | 70-130 | 11-OCT-13 |
| Molybdenum (Mo)-Dissolved | | | 101.0 | | % | | 70-130 | 11-OCT-13 |
| Nickel (Ni)-Dissolved | | | 99.96 | | % | | 70-130 | 11-OCT-13 |
| Selenium (Se)-Dissolved | | | 104.9 | | % | | 70-130 | 11-OCT-13 |
| Silver (Ag)-Dissolved | | | 89.2 | | % | | 70-130 | 11-OCT-13 |
| Sodium (Na)-Dissolved | | | 96.3 | | % | | 70-130 | 11-OCT-13 |
| Strontium (Sr)-Dissolved | | | N/A | MS-B | % | | - | 11-OCT-13 |
| Thallium (Tl)-Dissolved | | | 97.0 | | % | | 70-130 | 11-OCT-13 |
| Tin (Sn)-Dissolved | | | 95.9 | | % | | 70-130 | 11-OCT-13 |
| Titanium (Ti)-Dissolved | | | 95.3 | | % | | 70-130 | 11-OCT-13 |
| Uranium (U)-Dissolved | | | 98.0 | | % | | 70-130 | 11-OCT-13 |
| Vanadium (V)-Dissolved | | | 100.1 | | % | | 70-130 | 11-OCT-13 |
| Zinc (Zn)-Dissolved | | | 98.2 | | % | | 70-130 | 11-OCT-13 |
| **MET-DIS-LOW-ICP-VA** | **Water** | | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-DIS-LOW-ICP-VA** | **Water** | | | | | | | |
| **Batch** | **R2709087** | | | | | | | |
| **WG1760900-2** | **CRM** | **VA-HIGH-WATRM** | | | | | | |
| Calcium (Ca)-Dissolved | | | 101.5 | | % | | 80-120 | 04-OCT-13 |
| Iron (Fe)-Dissolved | | | 98.6 | | % | | 80-120 | 04-OCT-13 |
| Magnesium (Mg)-Dissolved | | | 102.3 | | % | | 80-120 | 04-OCT-13 |
| Phosphorus (P)-Dissolved | | | 100.4 | | % | | 80-120 | 04-OCT-13 |
| Potassium (K)-Dissolved | | | 101.0 | | % | | 80-120 | 04-OCT-13 |
| Silicon (Si)-Dissolved | | | 103.6 | | % | | 80-120 | 04-OCT-13 |
| **WG1760900-1** | **MB** | | | | | | | |
| Calcium (Ca)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 04-OCT-13 |
| Iron (Fe)-Dissolved | | | <0.010 | | mg/L | | 0.01 | 04-OCT-13 |
| Magnesium (Mg)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 04-OCT-13 |
| Phosphorus (P)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 04-OCT-13 |
| Potassium (K)-Dissolved | | | <0.10 | | mg/L | | 0.1 | 04-OCT-13 |
| Silicon (Si)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 04-OCT-13 |
| **Batch** | **R2710539** | | | | | | | |
| **WG1761728-1** | **MB** | | | | | | | |
| Calcium (Ca)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 05-OCT-13 |
| Iron (Fe)-Dissolved | | | <0.010 | | mg/L | | 0.01 | 05-OCT-13 |
| Magnesium (Mg)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 05-OCT-13 |
| Phosphorus (P)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 05-OCT-13 |
| Potassium (K)-Dissolved | | | <0.10 | | mg/L | | 0.1 | 05-OCT-13 |
| Silicon (Si)-Dissolved | | | <0.050 | | mg/L | | 0.05 | 05-OCT-13 |
| **Batch** | **R2710860** | | | | | | | |
| **WG1761728-2** | **CRM** | **VA-HIGH-WATRM** | | | | | | |
| Calcium (Ca)-Dissolved | | | 98.0 | | % | | 80-120 | 07-OCT-13 |
| Iron (Fe)-Dissolved | | | 95.4 | | % | | 80-120 | 07-OCT-13 |
| Magnesium (Mg)-Dissolved | | | 96.6 | | % | | 80-120 | 07-OCT-13 |
| Phosphorus (P)-Dissolved | | | 96.6 | | % | | 80-120 | 07-OCT-13 |
| Potassium (K)-Dissolved | | | 96.3 | | % | | 80-120 | 07-OCT-13 |
| Silicon (Si)-Dissolved | | | 98.0 | | % | | 80-120 | 07-OCT-13 |
| **Batch** | **R2714246** | | | | | | | |
| **WG1761728-18** | **MS** | **L1373256-11** | | | | | | |
| Calcium (Ca)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Iron (Fe)-Dissolved | | | 91.6 | | % | | 70-130 | 10-OCT-13 |
| Magnesium (Mg)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Potassium (K)-Dissolved | | | 102.6 | | % | | 70-130 | 10-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **MET-DIS-LOW-ICP-VA** | **Water** | | | | | | | |
| **Batch R2714756** | | | | | | | | |
| **WG1760900-7 MS** | | **L1372681-42** | | | | | | |
| Calcium (Ca)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Iron (Fe)-Dissolved | | | 94.9 | | % | | 70-130 | 10-OCT-13 |
| Magnesium (Mg)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Potassium (K)-Dissolved | | | 105.0 | | % | | 70-130 | 10-OCT-13 |
| **Batch R2714768** | | | | | | | | |
| **WG1760900-5 MS** | | **L1372681-17** | | | | | | |
| Calcium (Ca)-Dissolved | | | N/A | MS-B | % | | - | 10-OCT-13 |
| Iron (Fe)-Dissolved | | | 94.9 | | % | | 70-130 | 10-OCT-13 |
| Magnesium (Mg)-Dissolved | | | 95.6 | | % | | 70-130 | 10-OCT-13 |
| Potassium (K)-Dissolved | | | 105.9 | | % | | 70-130 | 10-OCT-13 |
| **NH3-F-VA** | **Water** | | | | | | | |
| **Batch R2711728** | | | | | | | | |
| **WG1762880-2 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 102.8 | | % | | 85-115 | 08-OCT-13 |
| **WG1762880-4 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 102.1 | | % | | 85-115 | 08-OCT-13 |
| **WG1762880-6 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 102.8 | | % | | 85-115 | 08-OCT-13 |
| **WG1762880-1 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1762880-3 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1762880-5 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1762880-10 MS** | | **L1371260-1** | | | | | | |
| Ammonia, Total (as N) | | | 103.5 | | % | | 75-125 | 08-OCT-13 |
| **WG1762880-12 MS** | | **L1371308-2** | | | | | | |
| Ammonia, Total (as N) | | | 97.4 | | % | | 75-125 | 08-OCT-13 |
| **WG1762880-8 MS** | | **L1367988-1** | | | | | | |
| Ammonia, Total (as N) | | | 100.3 | | % | | 75-125 | 08-OCT-13 |
| **Batch R2711773** | | | | | | | | |
| **WG1762975-10 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 101.6 | | % | | 85-115 | 08-OCT-13 |
| **WG1762975-2 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 100.3 | | % | | 85-115 | 08-OCT-13 |
| **WG1762975-4 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 93.4 | | % | | 85-115 | 08-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **NH3-F-VA** | **Water** | | | | | | | |
| **Batch R2711773** | | | | | | | | |
| **WG1762975-6 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 101.2 | | % | | 85-115 | 08-OCT-13 |
| **WG1762975-8 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 103.3 | | % | | 85-115 | 08-OCT-13 |
| **WG1762975-1 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1762975-3 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1762975-5 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1762975-7 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1762975-9 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1762975-12 MS** | | **L1372870-1** | | | | | | |
| Ammonia, Total (as N) | | | 97.7 | | % | | 75-125 | 08-OCT-13 |
| **Batch R2711960** | | | | | | | | |
| **WG1763110-10 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 100.3 | | % | | 85-115 | 08-OCT-13 |
| **WG1763110-2 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 100.3 | | % | | 85-115 | 08-OCT-13 |
| **WG1763110-4 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 99.0 | | % | | 85-115 | 08-OCT-13 |
| **WG1763110-6 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 103.1 | | % | | 85-115 | 08-OCT-13 |
| **WG1763110-8 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 102.1 | | % | | 85-115 | 08-OCT-13 |
| **WG1763110-1 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763110-3 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763110-5 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763110-7 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763110-9 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1763110-12 MS** | | **L1371471-2** | | | | | | |
| Ammonia, Total (as N) | | | 96.7 | | % | | 75-125 | 08-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **NH3-F-VA** | **Water** | | | | | | | |
| **Batch R2711960** | | | | | | | | |
| **WG1763110-14 MS** | | **L1372574-2** | | | | | | |
| Ammonia, Total (as N) | | | 100.3 | | % | | 75-125 | 08-OCT-13 |
| **WG1763110-16 MS** | | **L1372663-2** | | | | | | |
| Ammonia, Total (as N) | | | 101.6 | | % | | 75-125 | 08-OCT-13 |
| **Batch R2712270** | | | | | | | | |
| **WG1764010-2 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 104.2 | | % | | 85-115 | 08-OCT-13 |
| **WG1764010-4 CRM** | | **VA-NH3-F** | | | | | | |
| Ammonia, Total (as N) | | | 96.9 | | % | | 85-115 | 08-OCT-13 |
| **WG1764010-5 DUP** | | **L1371904-11** | | | | | | |
| Ammonia, Total (as N) | | 0.0146 | 0.0140 | | mg/L | 4.3 | 20 | 08-OCT-13 |
| **WG1764010-1 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1764010-3 MB** | | | | | | | | |
| Ammonia, Total (as N) | | | <0.0050 | | mg/L | | 0.005 | 08-OCT-13 |
| **WG1764010-6 MS** | | **L1371904-11** | | | | | | |
| Ammonia, Total (as N) | | | 95.1 | | % | | 75-125 | 08-OCT-13 |
| **PH-MAN-WR** | **Water** | | | | | | | |
| **Batch R2712725** | | | | | | | | |
| **WG1763445-2 DUP** | | **L1371904-1** | | | | | | |
| pH | | 7.79 | 7.79 | J | pH | 0.00 | 0.2 | 07-OCT-13 |
| **WG1763445-1 LCS** | | | | | | | | |
| pH | | | 7.01 | | pH | | 6.9-7.1 | 07-OCT-13 |
| **WG1763445-3 LCS** | | | | | | | | |
| pH | | | 7.04 | | pH | | 6.9-7.1 | 07-OCT-13 |
| **PH-PCT-VA** | **Water** | | | | | | | |
| **Batch R2711674** | | | | | | | | |
| **WG1762373-25 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.01 | | pH | | 6.9-7.1 | 07-OCT-13 |
| **WG1762373-26 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.02 | | pH | | 6.9-7.1 | 07-OCT-13 |
| **WG1762373-27 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.01 | | pH | | 6.9-7.1 | 07-OCT-13 |
| **WG1762373-28 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.04 | | pH | | 6.9-7.1 | 07-OCT-13 |
| **WG1762373-29 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.00 | | pH | | 6.9-7.1 | 07-OCT-13 |
| **WG1762373-30 CRM** | | **VA-PH7-BUF** | | | | | | |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **PH-PCT-VA** | **Water** | | | | | | | |
| **Batch R2711674** | | | | | | | | |
| **WG1762373-30 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.04 | | pH | | 6.9-7.1 | 07-OCT-13 |
| **WG1762373-31 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.01 | | pH | | 6.9-7.1 | 07-OCT-13 |
| **WG1762373-32 CRM** | | **VA-PH7-BUF** | | | | | | |
| pH | | | 7.01 | | pH | | 6.9-7.1 | 07-OCT-13 |
| **S-DIS-ICP-VA** | **Water** | | | | | | | |
| **Batch R2709087** | | | | | | | | |
| **WG1760900-2 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Sulfur (S)-Dissolved | | | 99.2 | | % | | 80-120 | 04-OCT-13 |
| **WG1760900-1 MB** | | | | | | | | |
| Sulfur (S)-Dissolved | | | <0.50 | | mg/L | | 0.5 | 04-OCT-13 |
| **Batch R2710539** | | | | | | | | |
| **WG1761728-1 MB** | | | | | | | | |
| Sulfur (S)-Dissolved | | | <0.50 | | mg/L | | 0.5 | 05-OCT-13 |
| **Batch R2710860** | | | | | | | | |
| **WG1761728-2 CRM** | | **VA-HIGH-WATRM** | | | | | | |
| Sulfur (S)-Dissolved | | | 101.3 | | % | | 80-120 | 07-OCT-13 |
| **TKN-F-VA** | **Water** | | | | | | | |
| **Batch R2710516** | | | | | | | | |
| **WG1761569-10 LCS** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | 108.1 | | % | | 75-125 | 05-OCT-13 |
| **WG1761569-2 LCS** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | 104.2 | | % | | 75-125 | 05-OCT-13 |
| **WG1761569-6 LCS** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | 95.0 | | % | | 75-125 | 05-OCT-13 |
| **WG1761569-1 MB** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | <0.050 | | mg/L | | 0.05 | 05-OCT-13 |
| **WG1761569-5 MB** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | <0.050 | | mg/L | | 0.05 | 05-OCT-13 |
| **WG1761569-9 MB** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | <0.050 | | mg/L | | 0.05 | 05-OCT-13 |
| **WG1761569-4 MS** | | **L1371904-6** | | | | | | |
| Total Kjeldahl Nitrogen | | | 99.8 | | % | | 70-130 | 05-OCT-13 |
| **WG1761569-8 MS** | | **L1371421-1** | | | | | | |
| Total Kjeldahl Nitrogen | | | N/A | MS-B | % | | - | 05-OCT-13 |

# Quality Control Report



| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|---|---|---|---|---|---|---|---|---|
| **TKN-F-VA** | **Water** | | | | | | | |
| **Batch R2710516** | | | | | | | | |
| **WG1761569-8 MS** | | **L1371421-1** | | | | | | |
| Total Kjeldahl Nitrogen | | | N/A | MS-B | % | | - | 05-OCT-13 |
| **Batch R2710891** | | | | | | | | |
| **WG1761951-2 LCS** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | 92.5 | | % | | 75-125 | 07-OCT-13 |
| **WG1761951-6 LCS** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | 103.7 | | % | | 75-125 | 07-OCT-13 |
| **WG1761951-1 MB** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | <0.050 | | mg/L | | 0.05 | 07-OCT-13 |
| **WG1761951-5 MB** | | | | | | | | |
| Total Kjeldahl Nitrogen | | | <0.050 | | mg/L | | 0.05 | 07-OCT-13 |
| **WG1761951-4 MS** | | **L1373181-2** | | | | | | |
| Total Kjeldahl Nitrogen | | | 96.9 | | % | | 70-130 | 07-OCT-13 |
| **WG1761951-8 MS** | | **L1373183-2** | | | | | | |
| Total Kjeldahl Nitrogen | | | 99.9 | | % | | 70-130 | 07-OCT-13 |

**Legend:**

| | |
|---|---|
| Limit | ALS Control Limit (Data Quality Objectives) |
| DUP | Duplicate |
| RPD | Relative Percent Difference |
| N/A | Not Available |
| LCS | Laboratory Control Sample |
| SRM | Standard Reference Material |
| MS | Matrix Spike |
| MSD | Matrix Spike Duplicate |
| ADE | Average Desorption Efficiency |
| MB | Method Blank |
| IRM | Internal Reference Material |
| CRM | Certified Reference Material |
| CCV | Continuing Calibration Verification |
| CVS | Calibration Verification Standard |
| LCSD | Laboratory Control Sample Duplicate |

**Sample Parameter Qualifier Definitions:**

| Qualifier | Description |
|---|---|
| J | Duplicate results and limits are expressed in terms of absolute difference. |
| MS-B | Matrix Spike recovery could not be accurately calculated due to high analyte background in sample. |
| RPD-NA | Relative Percent Difference Not Available due to result(s) being less than detection limit. |

**Hold Time Exceedances:**

| ALS Product Description | Sample ID | Sampling Date | Date Processed | Rec. HT | Actual HT | Units | Qualifier |
|---|---|---|---|---|---|---|---|
| **Physical Tests** | | | | | | | |
| pH by Meter | | | | | | | |
| | 1 | 28-SEP-13 | 07-OCT-13 09:37 | 24 | 214 | hours | EHTR |
| | 2 | 27-SEP-13 | 07-OCT-13 09:37 | 24 | 238 | hours | EHTR |
| | 3 | 30-SEP-13 | 07-OCT-13 09:37 | 24 | 166 | hours | EHTR |
| | 4 | 30-SEP-13 | 07-OCT-13 09:37 | 24 | 166 | hours | EHTR |
| | 5 | 28-SEP-13 | 07-OCT-13 09:37 | 24 | 214 | hours | EHTR |
| | 6 | 28-SEP-13 | 07-OCT-13 09:37 | 24 | 214 | hours | EHTR |
| | 7 | 28-SEP-13 | 07-OCT-13 09:37 | 24 | 214 | hours | EHTR |
| | 8 | 29-SEP-13 | 07-OCT-13 09:37 | 24 | 190 | hours | EHTR |
| | 9 | 30-SEP-13 | 07-OCT-13 09:37 | 24 | 166 | hours | EHTR |
| | 11 | 30-SEP-13 | 07-OCT-13 09:37 | 24 | 166 | hours | EHTR |
| | 12 | 29-SEP-13 | 07-OCT-13 09:37 | 24 | 190 | hours | EHTR |
| | 13 | 29-SEP-13 | 07-OCT-13 09:37 | 24 | 190 | hours | EHTR |
| | 14 | 29-SEP-13 | 07-OCT-13 09:37 | 24 | 190 | hours | EHTR |
| | 15 | 29-SEP-13 | 07-OCT-13 09:37 | 24 | 190 | hours | EHTR |
| | 16 | 29-SEP-13 | 07-OCT-13 09:37 | 24 | 190 | hours | EHTR |
| | 17 | 30-SEP-13 | 07-OCT-13 09:37 | 24 | 166 | hours | EHTR |
| | 18 | 30-SEP-13 | 07-OCT-13 09:37 | 24 | 166 | hours | EHTR |
| | 19 | 30-SEP-13 | 07-OCT-13 09:37 | 24 | 166 | hours | EHTR |
| | 20 | 28-SEP-13 | 07-OCT-13 09:37 | 24 | 214 | hours | EHTR |
| | 21 | 29-SEP-13 | 07-OCT-13 09:37 | 24 | 190 | hours | EHTR |
| pH by Meter (Automated) | | | | | | | |
| | 10 | 27-SEP-13 | 07-OCT-13 23:00 | 0.25 | 251 | hours | EHTR-FM |
| **Anions and Nutrients** | | | | | | | |
| Nitrate Nitrogen by Ion Chromatography | | | | | | | |
| | 1 | 28-SEP-13 | 02-OCT-13 19:00 | 3 | 4 | days | EHTR |
| | 2 | 27-SEP-13 | 02-OCT-13 19:00 | 3 | 5 | days | EHTR |
| | 5 | 28-SEP-13 | 02-OCT-13 19:00 | 3 | 4 | days | EHTR |
| | 6 | 28-SEP-13 | 02-OCT-13 19:00 | 3 | 4 | days | EHTR |
| | 7 | 28-SEP-13 | 02-OCT-13 19:00 | 3 | 4 | days | EHTR |
| | 10 | 27-SEP-13 | 02-OCT-13 19:00 | 3 | 5 | days | EHTR |
| | 20 | 28-SEP-13 | 02-OCT-13 19:00 | 3 | 4 | days | EHTR |
| Nitrite Nitrogen by Ion Chromatography | | | | | | | |
| | 1 | 28-SEP-13 | 02-OCT-13 19:00 | 3 | 4 | days | EHTR |
| | 2 | 27-SEP-13 | 02-OCT-13 19:00 | 3 | 5 | days | EHTR |
| | 5 | 28-SEP-13 | 02-OCT-13 19:00 | 3 | 4 | days | EHTR |
| | 6 | 28-SEP-13 | 02-OCT-13 19:00 | 3 | 4 | days | EHTR |
| | 7 | 28-SEP-13 | 02-OCT-13 19:00 | 3 | 4 | days | EHTR |
| | 10 | 27-SEP-13 | 02-OCT-13 19:00 | 3 | 5 | days | EHTR |
| | 20 | 28-SEP-13 | 02-OCT-13 19:00 | 3 | 4 | days | EHTR |

**Legend & Qualifier Definitions:**

| | |
|---|---|
| EHTR-FM: | Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended. |
| EHTR: | Exceeded ALS recommended hold time prior to sample receipt. |
| EHTL: | Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry. |
| EHT: | Exceeded ALS recommended hold time prior to analysis. |
| Rec. HT: | ALS recommended hold time (see units). |

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1371904 were received on 01-OCT-13 16:30.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

# Quality Control Report



The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

# Chain of Custody / Analytical Request Form

**Canada Toll Free: 1 800 668 9878**

www.alsglobal.com

COC # _____

Page 1 of 1

| Report To | | Report Format / Distribution | Service Requested (Rush for routine analysis subject to availability) |
|---|---|---|---|
| Company: | AMEC | ☑ Standard ☐ Other | ◉ Regular (Standard Turnaround Times - Business Days) |
| Contact: | Leslie Hardy | ☑ PDF ☑ Excel ☐ Digital ☐ Fax | ○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT |
| Address: | 5681-70 St | Email 1: leslie.hardy@amec.com | ○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT |
| | Edmonton, AB, T6B 3P6 | Email 2: | ○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT |
| Phone: | 780-436-2152 Fax: | Email 3: | **Analysis Request** |
| **Invoice To** | Same as Report ? ☑ Yes ☐ No | **Client / Project Information** | Please indicate below Filtered, Preserved or both (F, P, F/P) |
| Hardcopy of Invoice with Report? | ☑ Yes ☐ No | Job #: VM00605E.2380 | |
| Company: | | PO / AFE: | |
| Contact: | | LSD: | |
| Address: | | | |
| Phone: | Fax: | Quote #: | |
| Lab Work Order # (lab use only) | L1371904 | ALS Contact: Dean Watt | Sampler: SG + NF |

| Sample # | Sample Identification (This description will appear on the report) | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | Routine Chemistry | Dissolved Metals* | Dissolved Metals | Cyanide | Thiocyanate | Total Inorganic Carbon | TOC, TKN, Ammonia | | | | | | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | F | F/P | P | P | | P | | | | | | |
| 1 | DC-01 | 28-Sep-13 | | Groundwater | x | | | | | | | | | | | | 1 |
| 2 | DC-02 | 27&28-Sep-13 | | Groundwater | X | X | X | X | X | X | X | | | | | | 7 |
| 3 | DC-03 | 30-Sep-13 | | Groundwater | X | X | X | X | X | X | X | | | | | | 7 |
| 4 | DC-05 | 30-Sep-13 | | Groundwater | X | X | X | X | X | | X | | | | | | 6 |
| 5 | DC-06 | 28-Sep-13 | | Groundwater | X | X | X | X | X | X | X | | | | | | 7 |
| 6 | DC-07 | 28-Sep-13 | | Groundwater | X | X | X | X | X | X | X | | | | | | 7 |
| 7 | DC-09 | 28-Sep-13 | | Groundwater | X | X | X | X | X | X | X | | | | | | 7 |
| 8 | DC-10 | 29&30-Sep-13 | | Groundwater | X | X | X | X | X | X | X | | | | | | 7 |
| 9 | PC-01 | 30-Sep-13 | | Groundwater | X | X | X | X | | | | | | | | | 4 |
| 10 | PC-02 | 27&29-Sep-13 | | Groundwater | X | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ | | | | | | 1~~7~~ |
| 11 | PC-05 | 30-Sep-13 | | Groundwater | X | X | X | X | X | X | X | | | | | | 7 |
| 12 | HA-01 | 29-Sep-13 | | Groundwater | X | X | X | X | X | X | X | | | | | | 7 |
| 13 | HA-02 | 29-Sep-13 | | Groundwater | X | X | X | X | X | X | X | | | | | | 7 |
| 14 | HA-03 | 29-Sep-13 | | Groundwater | X | X | X | X | X | X | X | | | | | | 7 |
| 15 | HA-04 | 29-Sep-13 | | Groundwater | X | X | X | X | X | X | X | | | | | | 7 |
| 16 | HA-05 | 29-Sep-13 | | Groundwater | X | X | X | X | X | X | X | | | | | | 7 |
| 17 | CH-13-03 | 30-Sep-13 | | Groundwater | X | X | X | X | X | X | X | | | | | | 7 |
| 18 | CH-13-04 | 30-Sep-13 | | Groundwater | X | X | X | X | X | X | X | | | | | | 7 |
| 19 | CH-13-05 | 30-Sep-13 | | Groundwater | X | X | X | X | X | X | X | | | | | | 7 |
| 20 | Dup_01 | 28-Sep-13 | | Groundwater | X | X | X | X | X | X | X | | | | | | 7 |

L1371904-COFC

Short Holding Time

Rush Processing

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [redacted] | Dup_02 | 29-Sep-13 | | Groundwater | X | X | X | X | X | X | X | | | | | | 7 |

**Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details**

*DO NOT ADD ACID TO UNPRESERVED METALS. Some samples have limited sample volumes.

**Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

**Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.**

| [redacted] SHIPMENT RELEASE (client use) [redacted] | | | [redacted] SHIPMENT RECEPTION (lab use only) [redacted] | | | | [redacted] SHIPMENT VERIFICATION (lab use only) [redacted] | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Released by: | Date (dd-mmm-yy) | Time (hh-mm) | Received by: | Date: | Time: | Temperature: | Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
| | | | | 1-Oct-13 | 4:30 | °C | | | | |

GENF 18.01 Front

3.7, 4.1, 4.0 °C

Paige - Oct. 3 - 13:45 - 3°, 1°C

L1371904-COFC

# Final Analytical Report

Attention: Leslie Hardy

AMEC Environment & Infrastructure
5681-70 Street
Edmonton, AB T6B 3P6

Results for File: EC-66575

Project Number: VM00605E.5.2380
Project Name: Mount Nansen

Date Received: 2013/11/20
Date of Report: 2013/11/27

Report reviewed by:

Jesse Dang, B.Sc.
Manager
Laboratory Services

Kristine Connor
Client Services Representative
Laboratory Services

** All samples will be disposed of after 30 days following analysis. Please contact the lab if you require additional sample storage time. (Samples deemed hazardous will be returned to the client at their own expense or disposal will be arranged.) **

# Water Analysis - Volatile Organic Compounds

Project No. VM00605E.5.2380

Final
File No. EC-66575

| Analyst | Date of Analysis (yyyy/m/d) | Analytical Parameter | Units | Reference Method | Lab #: / Client ID: / Sample Date: / MDL | 13-16884 MW09-02 2013/11/16 0:00 | 13-16885 MW09-03 2013/11/16 0:00 | 13-16886 MW09-04 2013/11/16 0:00 | 13-16887 MW09-22 2013/11/16 0:00 |
|---|---|---|---|---|---|---|---|---|---|
| AD | 2013/11/25 | Carbon Disulphide | mg/L (ppm) | EPA 5030B/8260B | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| AD | 2013/11/25 | Chloromethane | mg/L (ppm) | EPA 5030B/8260B | 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| AD | 2013/11/25 | Vinyl Chloride | mg/L (ppm) | EPA 5030B/8260B | 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 |
| AD | 2013/11/25 | Bromomethane | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| AD | 2013/11/25 | Chloroethane | mg/L (ppm) | EPA 5030B/8260B | 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| AD | 2013/11/25 | Trichlorofluoromethane | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| AD | 2013/11/25 | 1,1-Dichloroethene | mg/L (ppm) | EPA 5030B/8260B | 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 |
| AD | 2013/11/25 | Dichloromethane | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| AD | 2013/11/25 | Tr-1,2-dichoroethene | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| AD | 2013/11/25 | 1,1-Dichloroethane | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| AD | 2013/11/25 | Cis-1,2-dichloroethene | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| AD | 2013/11/25 | Chloroform | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| AD | 2013/11/25 | 1,1,1-Trichloroethane | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| AD | 2013/11/25 | Carbon tetrachloride | mg/L (ppm) | EPA 5030B/8260B | 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 |
| AD | 2013/11/25 | Benzene | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| AD | 2013/11/25 | 1,2-Dichloroethane | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| AD | 2013/11/25 | Trichloroethene | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| AD | 2013/11/25 | 1,2-Dichloropropane | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| AD | 2013/11/25 | Bromodichloromethane | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| AD | 2013/11/25 | Cis-1,3-dichloropropene | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| AD | 2013/11/25 | Toluene | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| AD | 2013/11/25 | Tr-1,3-dichloropropene | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| AD | 2013/11/25 | 1,1,2-Trichloroethane | mg/L (ppm) | EPA 5030B/8260B | 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| AD | 2013/11/25 | Tetrachloroethene (Perc) | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| AD | 2013/11/25 | Dibromochloromethane | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| AD | 2013/11/25 | Chlorobenzene | mg/L (ppm) | EPA 5030B/8260B | 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 |
| AD | 2013/11/25 | Ethylbenzene | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| AD | 2013/11/25 | m+p-xylene | mg/L (ppm) | EPA 5030B/8260B | 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| AD | 2013/11/25 | o-Xylene | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| AD | 2013/11/25 | Styrene | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| AD | 2013/11/25 | Bromoform | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| AD | 2013/11/25 | 1,1,2,2 Tetrachloroethane | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| AD | 2013/11/25 | 1,3-Dichlorobenzene | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 |
| AD | 2013/11/25 | 1,4-Dichlorobenzene | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| AD | 2013/11/25 | 1,2-Dichlorobenzene | mg/L (ppm) | EPA 5030B/8260B | 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 |
| AD | 2013/11/25 | Surrogate Recovery | % | EPA 5030B/8260B | 0.1 | 99.8 | 99.8 | 99.8 | 100 |

# Water Analysis - Volatile Organic Compounds

Project No. VM00605E.5.2380

Final
File No. EC-66575

| Analyst | Date of Analysis (yyyy/m/d) | Analytical Parameter | Units | Reference Method | Lab #: Client ID: Sample Date: MDL | 13-16888 MW09-23 2013/11/16 0:00 |
|---|---|---|---|---|---|---|
| AD | 2013/11/25 | Carbon Disulphide | mg/L (ppm) | EPA 5030B/8260B | 0.05 | < 0.05 |
| AD | 2013/11/25 | Chloromethane | mg/L (ppm) | EPA 5030B/8260B | 0.005 | < 0.005 |
| AD | 2013/11/25 | Vinyl Chloride | mg/L (ppm) | EPA 5030B/8260B | 0.0005 | < 0.0005 |
| AD | 2013/11/25 | Bromomethane | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 |
| AD | 2013/11/25 | Chloroethane | mg/L (ppm) | EPA 5030B/8260B | 0.005 | < 0.005 |
| AD | 2013/11/25 | Trichlorofluoromethane | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 |
| AD | 2013/11/25 | 1,1-Dichloroethene | mg/L (ppm) | EPA 5030B/8260B | 0.0005 | < 0.0005 |
| AD | 2013/11/25 | Dichloromethane | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 |
| AD | 2013/11/25 | Tr-1,2-dichoroethene | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 |
| AD | 2013/11/25 | 1,1-Dichloroethane | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 |
| AD | 2013/11/25 | Cis-1,2-dichloroethene | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 |
| AD | 2013/11/25 | Chloroform | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 |
| AD | 2013/11/25 | 1,1,1-Trichloroethane | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 |
| AD | 2013/11/25 | Carbon tetrachloride | mg/L (ppm) | EPA 5030B/8260B | 0.0001 | < 0.0001 |
| AD | 2013/11/25 | Benzene | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 |
| AD | 2013/11/25 | 1,2-Dichloroethane | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 |
| AD | 2013/11/25 | Trichloroethene | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 |
| AD | 2013/11/25 | 1,2-Dichloropropane | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 |
| AD | 2013/11/25 | Bromodichloromethane | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 |
| AD | 2013/11/25 | Cis-1,3-dichloropropene | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 |
| AD | 2013/11/25 | Toluene | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 |
| AD | 2013/11/25 | Tr-1,3-dichloropropene | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 |
| AD | 2013/11/25 | 1,1,2-Trichloroethane | mg/L (ppm) | EPA 5030B/8260B | 0.005 | < 0.005 |
| AD | 2013/11/25 | Tetrachloroethene (Perc) | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 |
| AD | 2013/11/25 | Dibromochloromethane | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 |
| AD | 2013/11/25 | Chlorobenzene | mg/L (ppm) | EPA 5030B/8260B | 0.0005 | < 0.0005 |
| AD | 2013/11/25 | Ethylbenzene | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 |
| AD | 2013/11/25 | m+p-xylene | mg/L (ppm) | EPA 5030B/8260B | 0.005 | < 0.005 |
| AD | 2013/11/25 | o-Xylene | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 |
| AD | 2013/11/25 | Styrene | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 |
| AD | 2013/11/25 | Bromoform | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 |
| AD | 2013/11/25 | 1,1,2,2 Tetrachloroethane | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 |
| AD | 2013/11/25 | 1,3-Dichlorobenzene | mg/L (ppm) | EPA 5030B/8260B | 0.002 | < 0.002 |
| AD | 2013/11/25 | 1,4-Dichlorobenzene | mg/L (ppm) | EPA 5030B/8260B | 0.001 | < 0.001 |
| AD | 2013/11/25 | 1,2-Dichlorobenzene | mg/L (ppm) | EPA 5030B/8260B | 0.0005 | < 0.0005 |
| AD | 2013/11/25 | Surrogate Recovery | % | EPA 5030B/8260B | 0.1 | 99.8 |

# Quality Control Standard

Project No. VM00605E.5.2380 File No. EC-66575

## Water Analysis - Volatile Organic Compounds

| Analyst | Date of Analysis (yyyy/m/d) | Analytical Parameter | Units | Reference Method | MDL | Analyzed Value | Advisory Range | Target Value | Reference No. |
|---|---|---|---|---|---|---|---|---|---|
| AD | 2013/11/25 | Carbon Disulphide | % | EPA 5030/8260B | 0.10 | 87 | 85-115 | 100.00 | Spike Recovery |
| AD | 2013/11/25 | Chloromethane | % | EPA 8260B | 0.005 | 92 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | Vinyl Chloride | % | EPA 8260B | 0.0005 | 87 | 85-115 | 100.0000 | Spike Recovery |
| AD | 2013/11/25 | Bromomethane | % | EPA 8260B | 0.002 | 91 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | Chloroethane | % | EPA 8260B | 0.005 | 98 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | Trichlorofluoromethane | % | EPA 8260B | 0.001 | 100 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | 1,1-Dichloroethene | % | EPA 8260B | 0.0005 | 97 | 85-115 | 100.0000 | Spike Recovery |
| AD | 2013/11/25 | Dichloromethane | % | EPA 8260B | 0.002 | 96 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | Tr-1,2-dichoroethene | % | EPA 8260B | 0.002 | 97 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | 1,1-Dichloroethane | % | EPA 8260B | 0.002 | 98 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | Cis-1,2-dichloroethene | % | EPA 8260B | 0.002 | 95 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | Chloroform | % | EPA 8260B | 0.001 | 96 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | 1,1,1-Trichloroethane | % | EPA 8260B | 0.010 | 97 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | Carbon tetrachloride | % | EPA 8260B | 0.0001 | 98 | 85-115 | 100.0000 | Spike Recovery |
| AD | 2013/11/25 | Benzene | % | EPA 8260B | 0.001 | 96.1 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | 1,2-Dichloroethane | % | EPA 8260B | 0.002 | 96 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | Trichloroethene | % | EPA 8260B | 0.002 | 95 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | 1,2-Dichloropropane | % | EPA 8260B | 0.002 | 97 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | Bromodichloromethane | % | EPA 8260B | 0.002 | 96 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | Cis-1,3-dichloropropene | % | EPA 8260B | 0.001 | 99 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | Toluene | % | EPA 8260B | 0.001 | 95.7 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | Tr-1,3-dichloropropene | % | EPA 8260B | 0.001 | 110 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | 1,1,2-Trichloroethane | % | EPA 8260B | 0.005 | 96 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | Tetrachloroethene (Perc) | % | EPA 8260B | 0.001 | 99 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | Dibromochloromethane | % | EPA 8260B | 0.002 | 95 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | Chlorobenzene | % | EPA 8260B | 0.0005 | 92 | 85-115 | 100.0000 | Spike Recovery |
| AD | 2013/11/25 | Ethylbenzene | % | EPA 8260B | 0.001 | 96.2 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | m+p-xylene | % | EPA 8260B | 0.005 | 95 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | o-Xylene | % | EPA 8260B | 0.002 | 94 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | Styrene | % | EPA 8260B | 0.010 | 97 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | Bromoform | % | EPA 8260B | 0.002 | 96 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | 1,1,2,2 Tetrachloroethane | % | EPA 8260B | 0.001 | 97 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | 1,3-Dichlorobenzene | % | EPA 8260B | 0.002 | 93 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | 1,4-Dichlorobenzene | % | EPA 8260B | 0.001 | 96 | 85-115 | 100.000 | Spike Recovery |
| AD | 2013/11/25 | 1,2-Dichlorobenzene | % | EPA 8260B | 0.0005 | 92 | 85-115 | 100.0000 | Spike Recovery |

# Analytical Comments

Project No. VM00605E.5.2380 File No. EC-66575

All Analytical results pertain to samples analyzed as received.

EPA: U.S. Environmental Protection Agency. 1997. Test Methods of Evaluation of Solid Waste 3rd Ed through Update III. Office Solid Waste Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

MDL - Method Detection Limit

# EDMONTON CHEMISTRY LAB

5667-70 St, Edmonton AB T6B 3P6

## Chain of Custody Record/Analysis Request

**Tracking #:**

| | | | |
|---|---|---|---|
| **ISSUING OFFICE:** | Edmonton | | |
| **Project Name:** | Mount Nansen | **Sampler:** | |
| **Project Manager:** | Leslie Hardy | **Phone No.:** | |
| **Project Number:** | VM00605E.5.2380 | | |

**ANALYSIS REQUIRED (Note preferred method)**

**QUOTE NUMBER**

**REQUIREMENTS**

AB Tier 1
AB Tier 2
CCME
BCME
Other

| Client Sample ID | AMEC E & E Lab Sample ID (FOR LAB USE ONLY) | Date Collected (dd-mm-yy) | Time Collected (hh:mm) | Matrix | # of Containers | VOC including CS2 | 50% RUSH (Please Notify Lab!) | 100% RUSH (Please Notify Lab!) |
|---|---|---|---|---|---|---|---|---|
| MW09-02 | | 16-11-13 | | Water | | x | | |
| MW09-03 | | 16-11-13 | | Water | | x | | |
| MW09-04 | | 16-11-13 | | Water | | x | | |
| MW09-22 | | 16-11-13 | | Water | | x | | |
| MW09-23 | | 16-11-13 | | Water | | x | | |

**RECEIVER COMMENTS**

| RELINQUISHED BY: | RECEIVED BY: | REPORT FORMAT | CLIENT COMMENTS / SPECIAL INSTRUCTIONS |
|---|---|---|---|
| Signature: | Signature: | Digital pdf ____ Excel ____ Hardcopy ____ | VOC analysis to include quantification of carbon disulfide ($CS_2$). |
| Printed Name: | Printed Name: | **INVOICING** | |
| Firm: | Date/Time: | Digital pdf ____ Hardcopy ____ | |
| Date/Time: | Temperature °C | | |

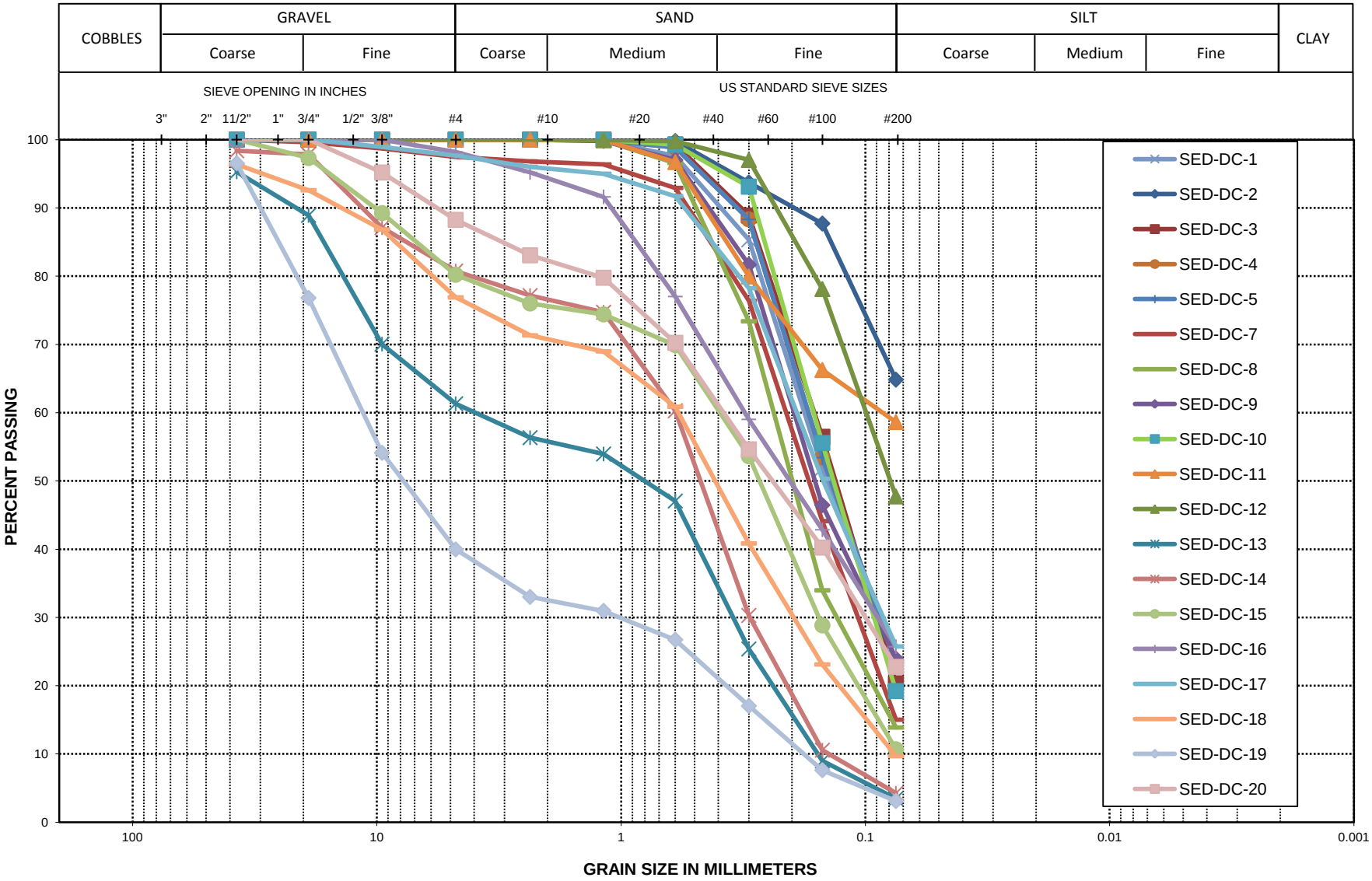
# Appendix D4

# Hydrotechnical Lab Results

Dome Creek Sediment Samples
Mount Nansen 2013 Site Investigation

| Sediment Sample | % Passing | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 37.5 | 19.05 | 9.525 | 4.76 | 2.36 | 1.18 | 0.6 | 0.300 | 0.150 | 0.075 |
| SED-DC-1 | 100 | 100 | 100 | 100 | 100 | 100 | 98 | 85 | 52 | 23 |
| SED-DC-2 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 94 | 88 | 65 |
| SED-DC-3 | 100 | 100 | 100 | 100 | 100 | 100 | 99 | 89 | 56 | 20 |
| SED-DC-4 | 100 | 100 | 100 | 100 | 100 | 100 | 99 | 88 | 53 | 24 |
| SED-DC-5 | 100 | 100 | 100 | 100 | 100 | 100 | 98 | 83 | 41 | 17 |
| SED-DC-6 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 97 | 60 | 24 |
| SED-DC-7 | 100 | 100 | 99 | 97 | 97 | 96 | 93 | 76 | 44 | 15 |
| SED-DC-8 | 100 | 100 | 100 | 100 | 100 | 100 | 97 | 73 | 34 | 14 |
| SED-DC-9 | 100 | 100 | 100 | 100 | 100 | 100 | 97 | 82 | 46 | 24 |
| SED-DC-10 | 100 | 100 | 100 | 100 | 100 | 100 | 99 | 93 | 56 | 19 |
| SED-DC-11 | 100 | 100 | 100 | 100 | 100 | 100 | 97 | 80 | 66 | 59 |
| SED-DC-12 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 97 | 78 | 48 |
| SED-DC-13 | 95 | 89 | 70 | 61 | 56 | 54 | 47 | 25 | 9 | 3 |
| SED-DC-14 | 98 | 98 | 87 | 81 | 77 | 75 | 60 | 30 | 11 | 4 |
| SED-DC-15 | 100 | 97 | 89 | 80 | 76 | 74 | 70 | 54 | 29 | 11 |
| SED-DC-16 | 100 | 100 | 100 | 98 | 95 | 92 | 77 | 59 | 43 | 26 |
| SED-DC-17 | 100 | 100 | 99 | 98 | 96 | 95 | 92 | 78 | 50 | 26 |
| SED-DC-18 | 96 | 93 | 87 | 77 | 71 | 69 | 61 | 41 | 23 | 10 |
| SED-DC-19 | 97 | 77 | 54 | 40 | 33 | 31 | 27 | 17 | 8 | 3 |
| SED-DC-20 | 100 | 100 | 95 | 88 | 83 | 80 | 70 | 55 | 40 | 23 |

# Dome Creek Sediment Sieve Results

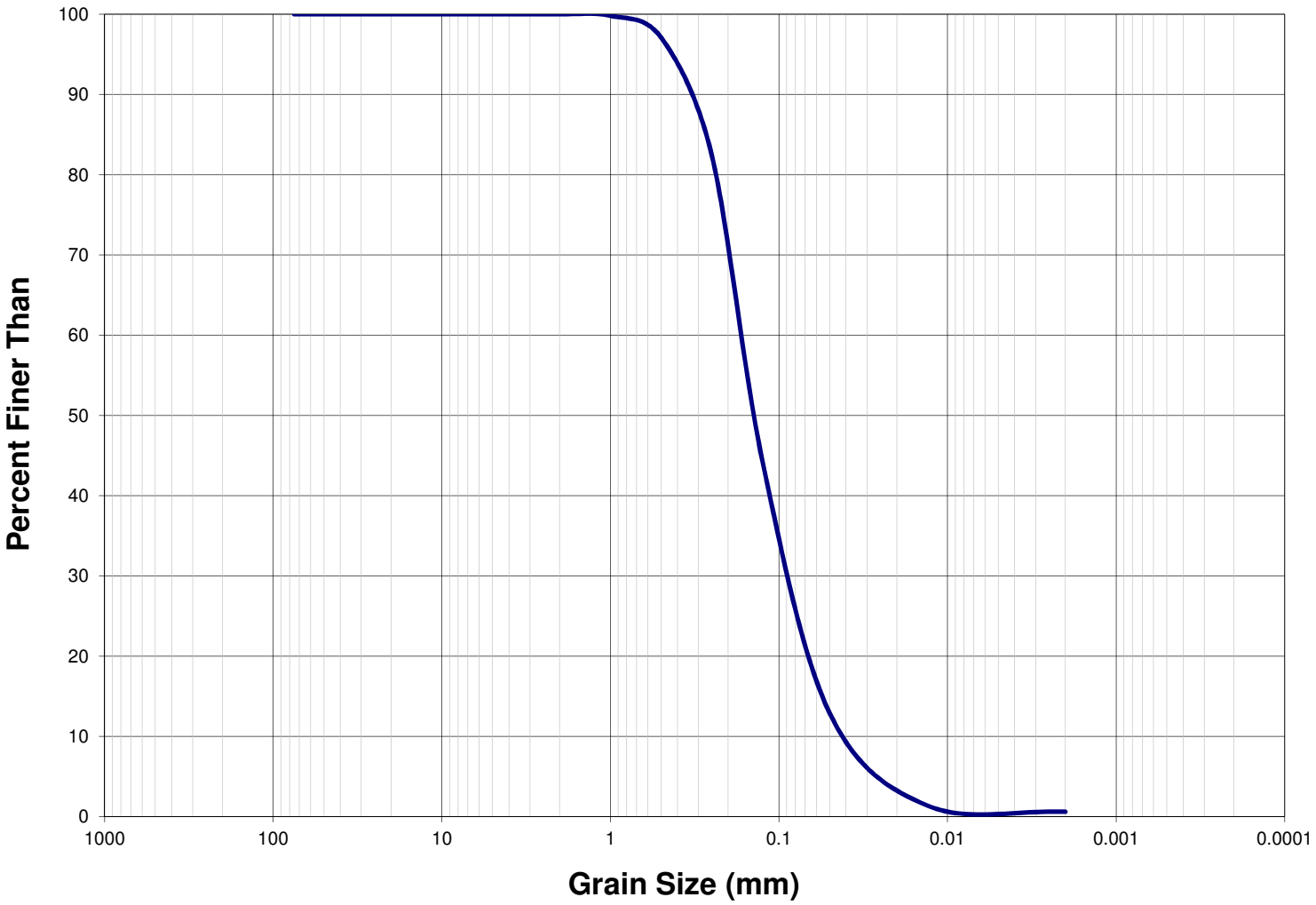


ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-1
**Lab ID:** L1384673-1

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 0.00 |
| 19 - 9.5 | 0.00 |
| 9.5 - 4.75 | 0.00 |
| 4.75 - 2.36 | 0.00 |
| 2.36 - 1.18 | 0.16 |
| 1.18 - 0.6 | 2.21 |
| 0.6 - 0.3 | 12.31 |
| 0.3 - 0.15 | 33.47 |
| 0.15 - 0.075 | 28.51 |
| <0.075 | 23.34 |
| | |

| Range (mm) | Wt. (%) |
|---|---|
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Texture: Sand

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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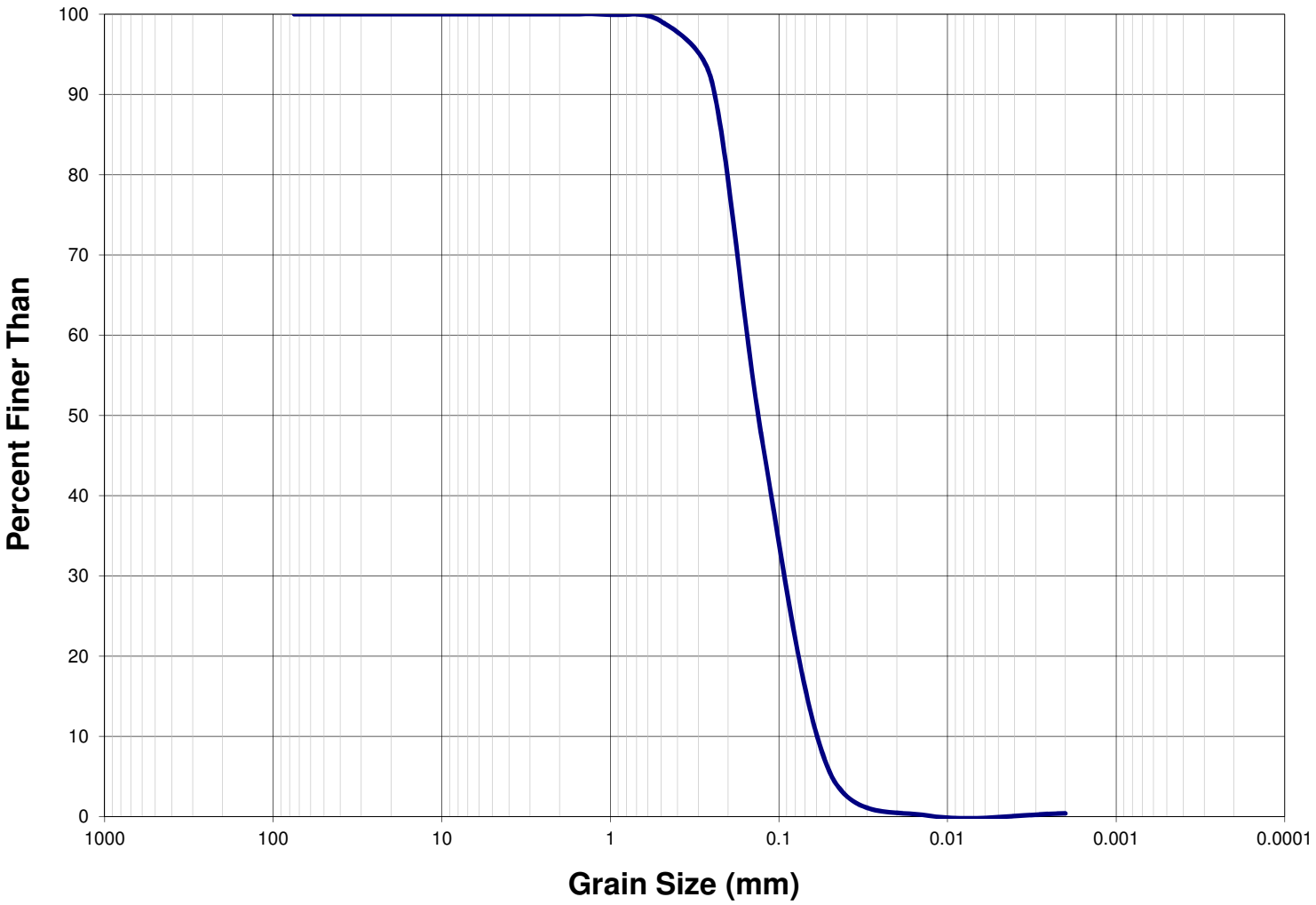
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-10
**Lab ID:** L1384673-10

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 0.00 |
| 19 - 9.5 | 0.00 |
| 9.5 - 4.75 | 0.00 |
| 4.75 - 2.36 | 0.00 |
| 2.36 - 1.18 | 0.05 |
| 1.18 - 0.6 | 0.68 |
| 0.6 - 0.3 | 6.16 |
| 0.3 - 0.15 | 37.55 |
| 0.15 - 0.075 | 36.34 |
| <0.075 | 19.22 |
| | |

| Range (mm) | Wt. (%) |
|---|---|
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Texture: Sand

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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Environmental Division

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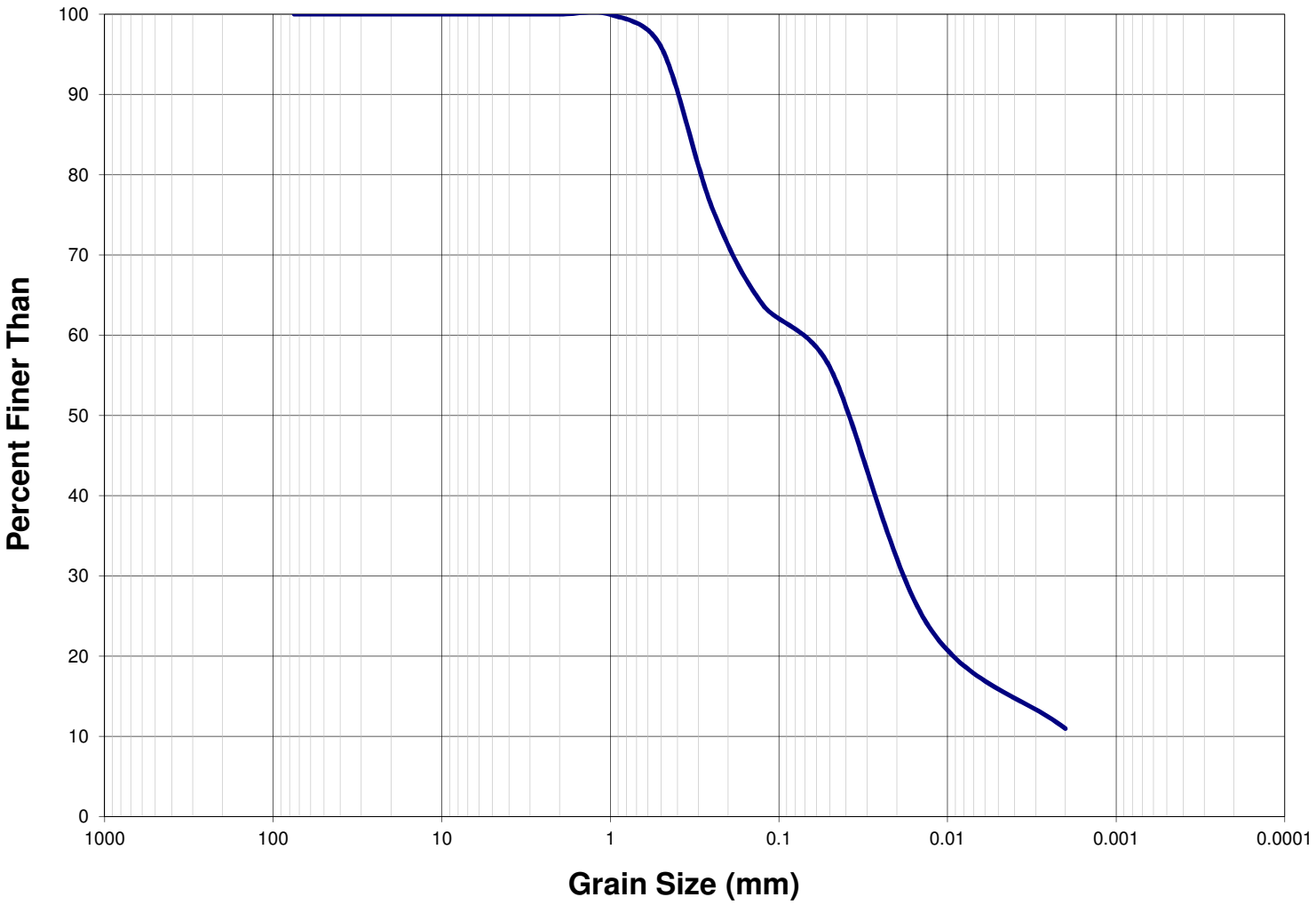
**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-11
**Lab ID:** L1384673-11

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 0.00 |
| 19 - 9.5 | 0.00 |
| 9.5 - 4.75 | 0.00 |
| 4.75 - 2.36 | 0.00 |
| 2.36 - 1.18 | 0.04 |
| 1.18 - 0.6 | 3.23 |
| 0.6 - 0.3 | 16.76 |
| 0.3 - 0.15 | 13.70 |
| 0.15 - 0.075 | 7.63 |
| <0.075 | 58.63 |
| | |

| Range (mm) | Wt. (%) |
|---|---|
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Texture: Loam

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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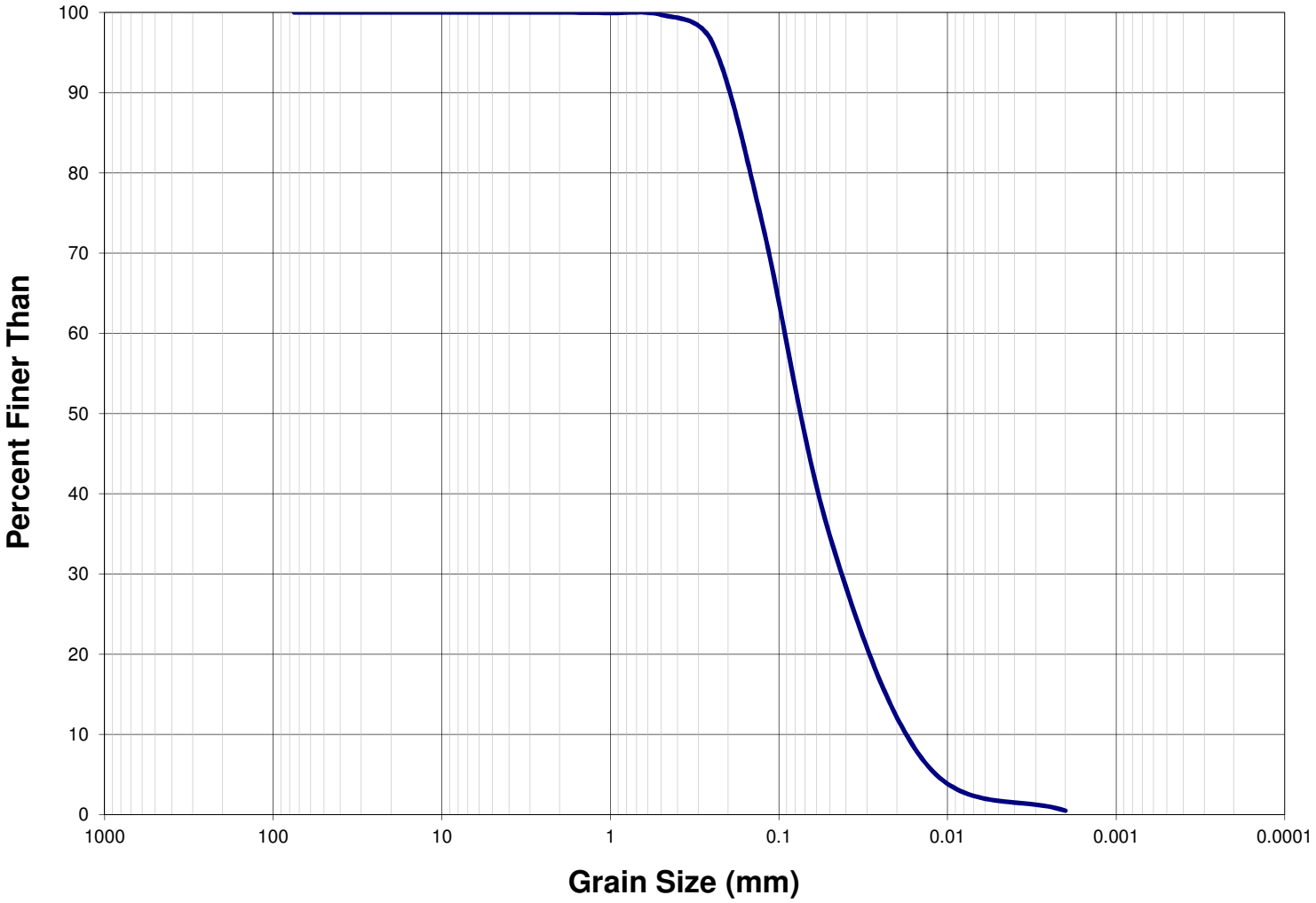
819-58th Street, Saskatoon, SK S7K 6X5

**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-12
**Lab ID:** L1384673-12

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 0.00 |
| 19 - 9.5 | 0.00 |
| 9.5 - 4.75 | 0.00 |
| 4.75 - 2.36 | 0.00 |
| 2.36 - 1.18 | 0.06 |
| 1.18 - 0.6 | 0.19 |
| 0.6 - 0.3 | 2.73 |
| 0.3 - 0.15 | 18.91 |
| 0.15 - 0.075 | 30.39 |
| <0.075 | 47.73 |
| | |

| Range (mm) | Wt. (%) |
|---|---|
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Texture: Sandy loam

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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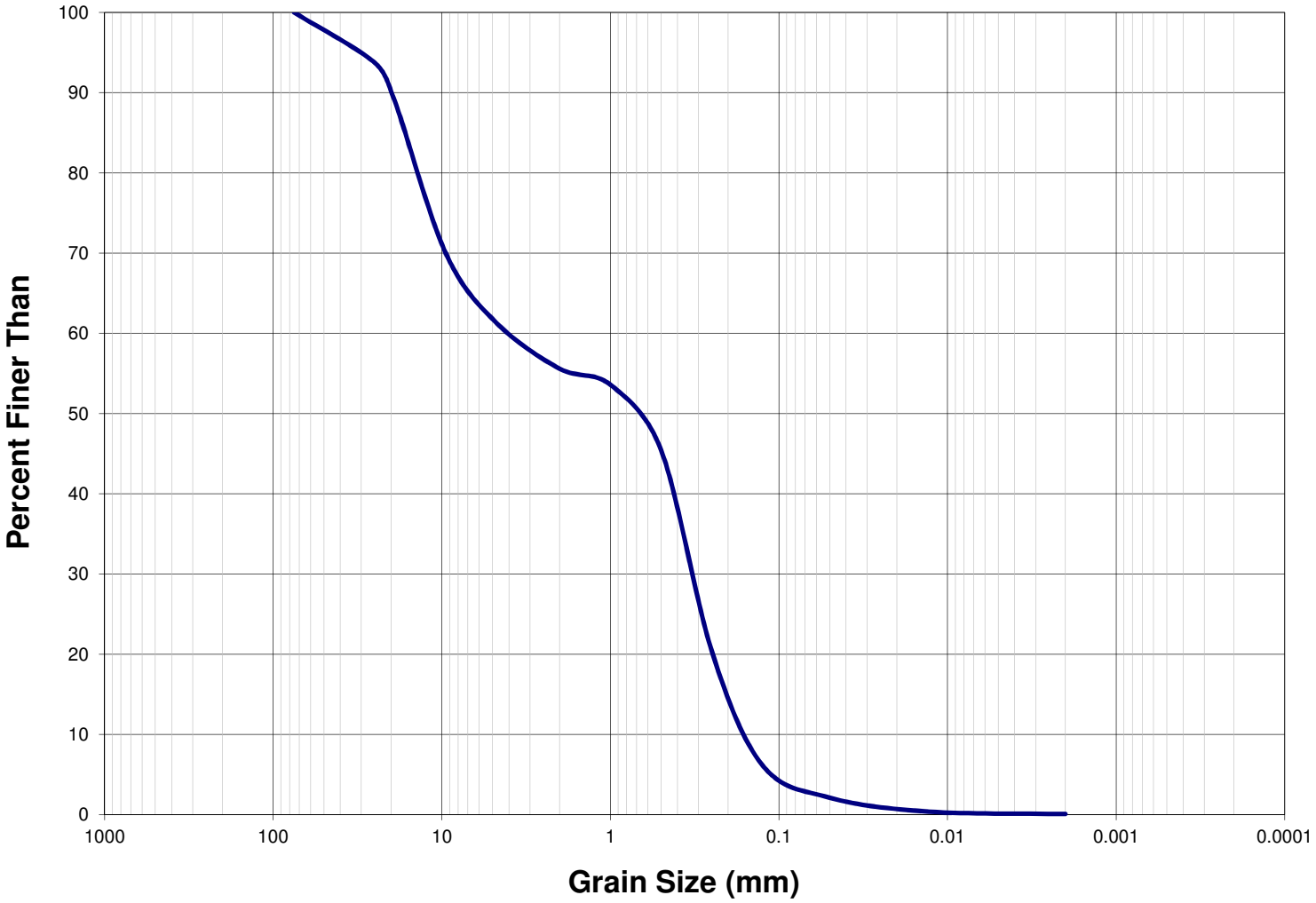
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-13
**Lab ID:** L1384673-13

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 6.37 |
| 19 - 9.5 | 18.87 |
| 9.5 - 4.75 | 8.73 |
| 4.75 - 2.36 | 4.97 |
| 2.36 - 1.18 | 2.39 |
| 1.18 - 0.6 | 6.89 |
| 0.6 - 0.3 | 21.68 |
| 0.3 - 0.15 | 16.40 |
| 0.15 - 0.075 | 5.53 |
| <0.075 | 3.45 |
| | |

| Range (mm) | Wt. (%) |
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Texture: Sand

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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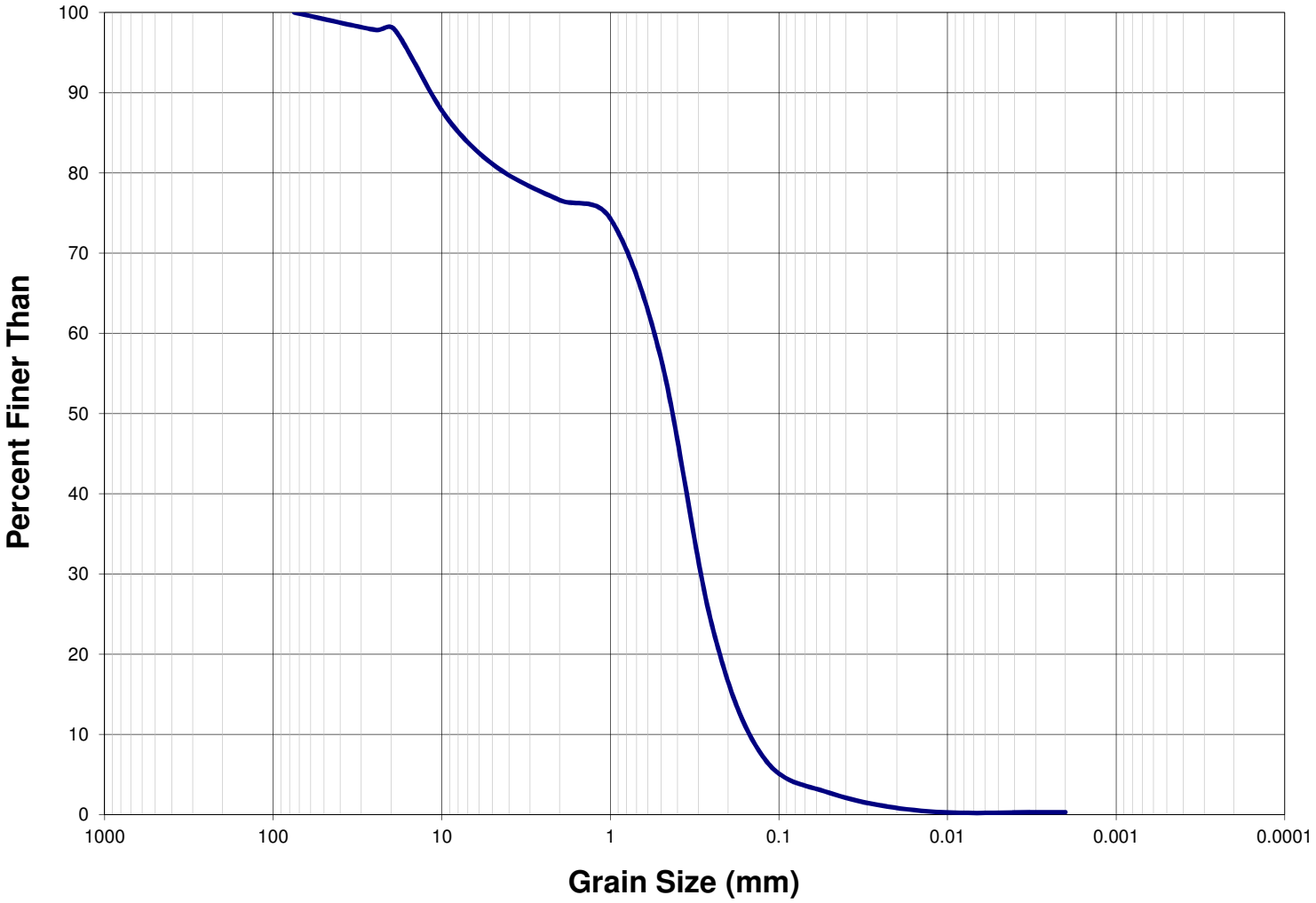
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-14
**Lab ID:** L1384673-14

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 0.54 |
| 19 - 9.5 | 10.73 |
| 9.5 - 4.75 | 6.36 |
| 4.75 - 2.36 | 3.59 |
| 2.36 - 1.18 | 2.45 |
| 1.18 - 0.6 | 14.43 |
| 0.6 - 0.3 | 29.99 |
| 0.3 - 0.15 | 19.73 |
| 0.15 - 0.075 | 6.32 |
| <0.075 | 4.24 |
| | |

| Range (mm) | Wt. (%) |
|---|---|
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Texture: Sand

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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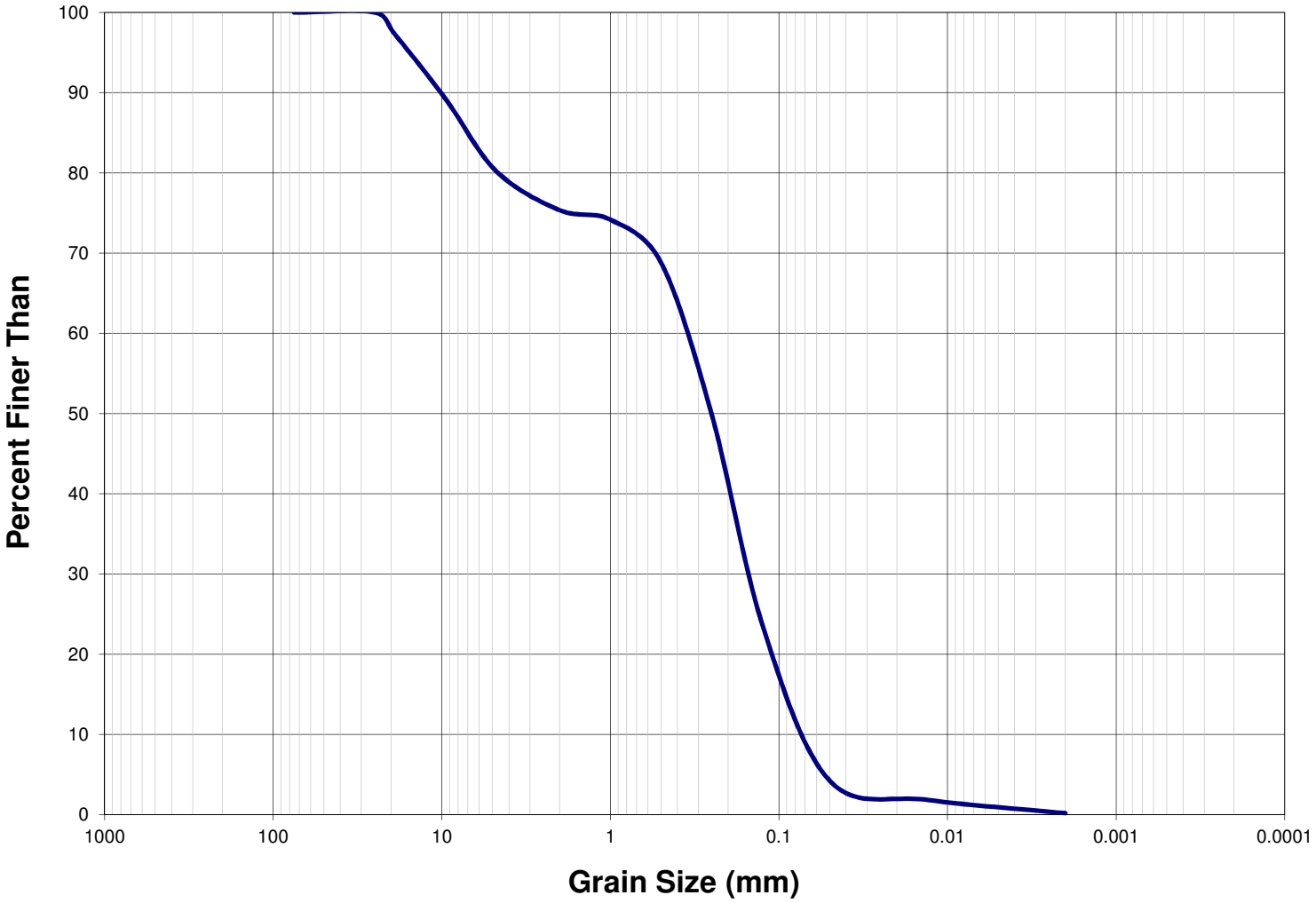
**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-15
**Lab ID:** L1384673-15

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 2.71 |
| 19 - 9.5 | 8.07 |
| 9.5 - 4.75 | 9.03 |
| 4.75 - 2.36 | 4.21 |
| 2.36 - 1.18 | 1.60 |
| 1.18 - 0.6 | 4.51 |
| 0.6 - 0.3 | 16.27 |
| 0.3 - 0.15 | 24.78 |
| 0.15 - 0.075 | 18.16 |
| <0.075 | 10.68 |
| | |

| Range (mm) | Wt. (%) |
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Texture: Sand

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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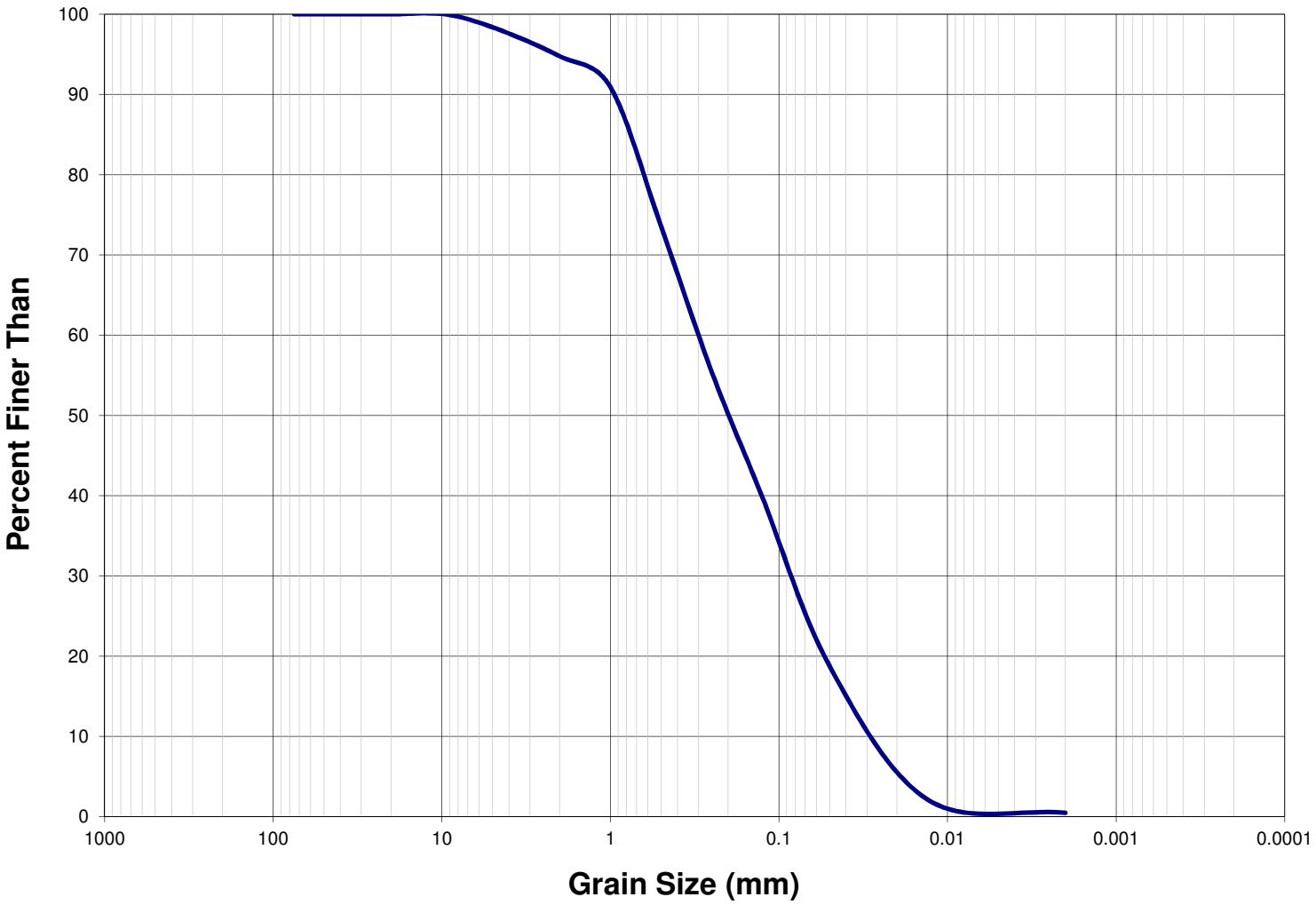
**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-16
**Lab ID:** L1384673-16

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 0.00 |
| 19 - 9.5 | 0.00 |
| 9.5 - 4.75 | 1.80 |
| 4.75 - 2.36 | 2.98 |
| 2.36 - 1.18 | 3.59 |
| 1.18 - 0.6 | 14.60 |
| 0.6 - 0.3 | 18.00 |
| 0.3 - 0.15 | 16.17 |
| 0.15 - 0.075 | 17.13 |
| <0.075 | 25.72 |
| | |

| Range (mm) | Wt. (%) |
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Texture: Loamy sand

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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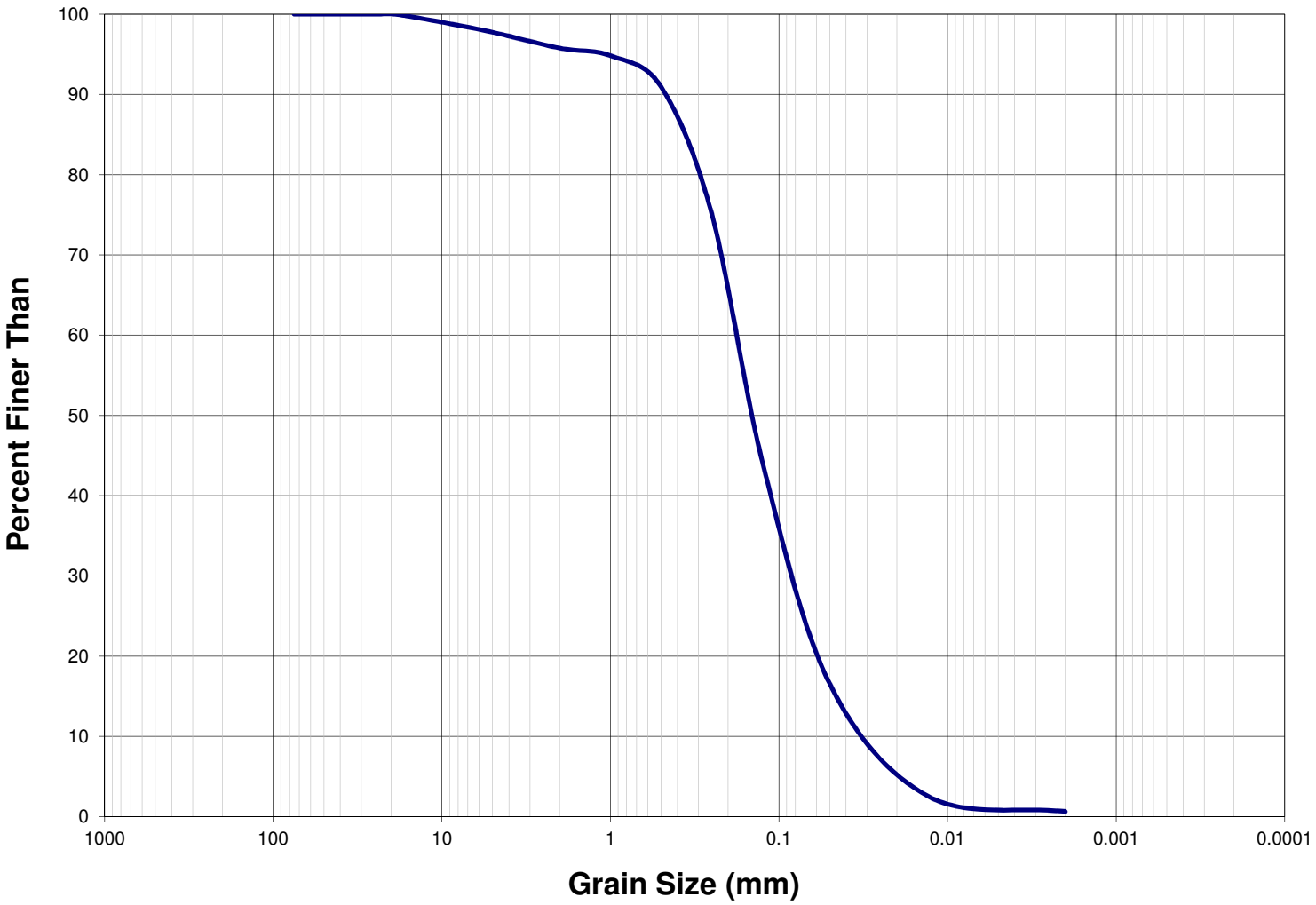
**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-17
**Lab ID:** L1384673-17

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 0.00 |
| 19 - 9.5 | 1.08 |
| 9.5 - 4.75 | 1.28 |
| 4.75 - 2.36 | 1.62 |
| 2.36 - 1.18 | 1.02 |
| 1.18 - 0.6 | 3.29 |
| 0.6 - 0.3 | 13.48 |
| 0.3 - 0.15 | 27.93 |
| 0.15 - 0.075 | 24.56 |
| <0.075 | 25.75 |
| | |

| Range (mm) | Wt. (%) |
|---|---|
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Texture: Loamy sand

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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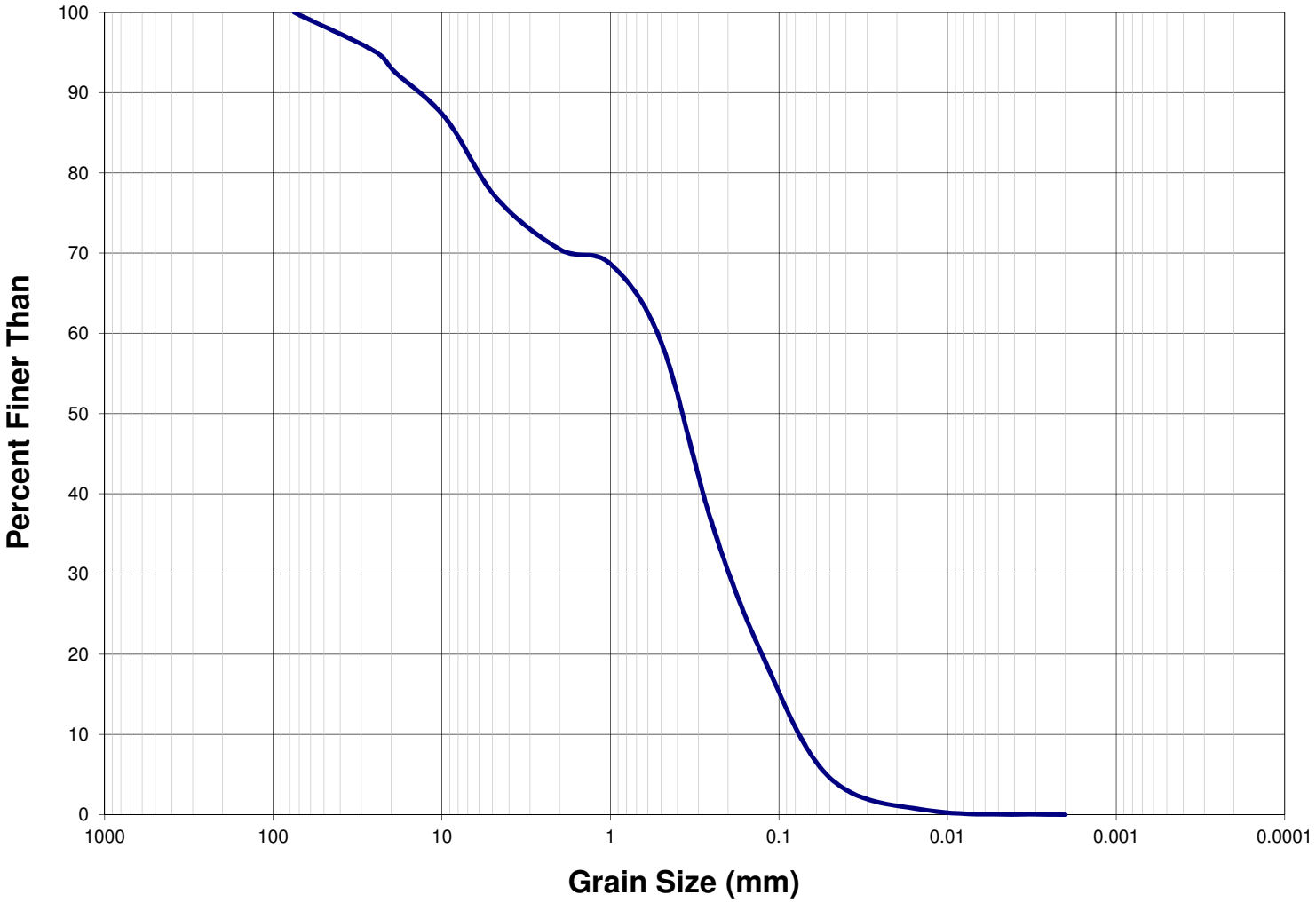
**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-18
**Lab ID:** L1384673-18

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 3.79 |
| 19 - 9.5 | 5.75 |
| 9.5 - 4.75 | 9.94 |
| 4.75 - 2.36 | 5.57 |
| 2.36 - 1.18 | 2.35 |
| 1.18 - 0.6 | 8.11 |
| 0.6 - 0.3 | 20.03 |
| 0.3 - 0.15 | 17.72 |
| 0.15 - 0.075 | 13.44 |
| <0.075 | 9.68 |
| | |

| Range (mm) | Wt. (%) |
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Texture: #N/A

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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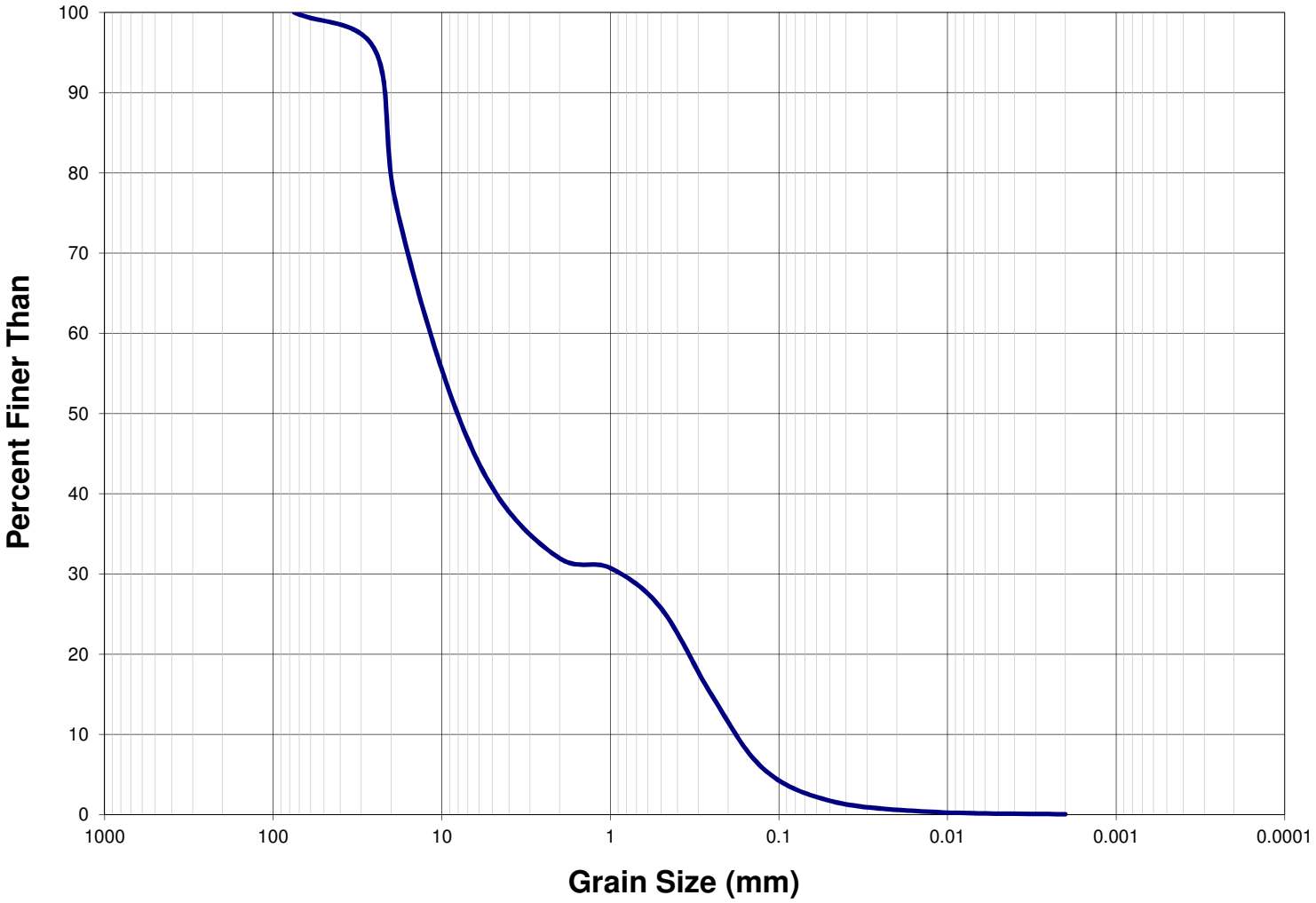
**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-19
**Lab ID:** L1384673-19

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 19.73 |
| 19 - 9.5 | 22.70 |
| 9.5 - 4.75 | 14.15 |
| 4.75 - 2.36 | 6.96 |
| 2.36 - 1.18 | 2.05 |
| 1.18 - 0.6 | 4.23 |
| 0.6 - 0.3 | 9.69 |
| 0.3 - 0.15 | 9.42 |
| 0.15 - 0.075 | 4.52 |
| <0.075 | 3.10 |
| | |

| Range (mm) | Wt. (%) |
|---|---|
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Texture: Sand

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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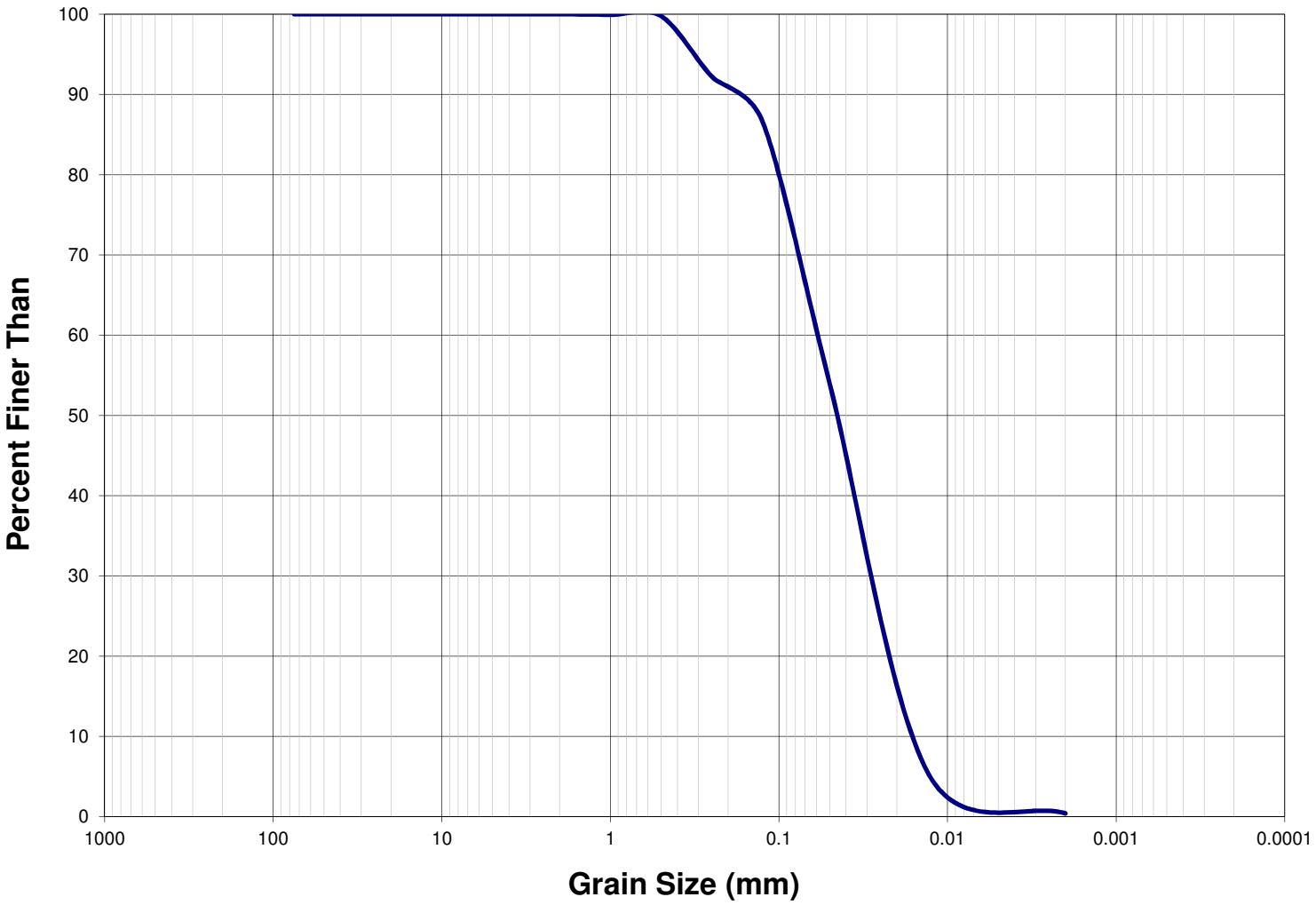
**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-2
**Lab ID:** L1384673-2

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 0.00 |
| 19 - 9.5 | 0.00 |
| 9.5 - 4.75 | 0.00 |
| 4.75 - 2.36 | 0.00 |
| 2.36 - 1.18 | 0.06 |
| 1.18 - 0.6 | 0.13 |
| 0.6 - 0.3 | 6.08 |
| 0.3 - 0.15 | 6.01 |
| 0.15 - 0.075 | 22.87 |
| <0.075 | 64.84 |
| | |

| Range (mm) | Wt. (%) |
|---|---|
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Texture: Silt loam

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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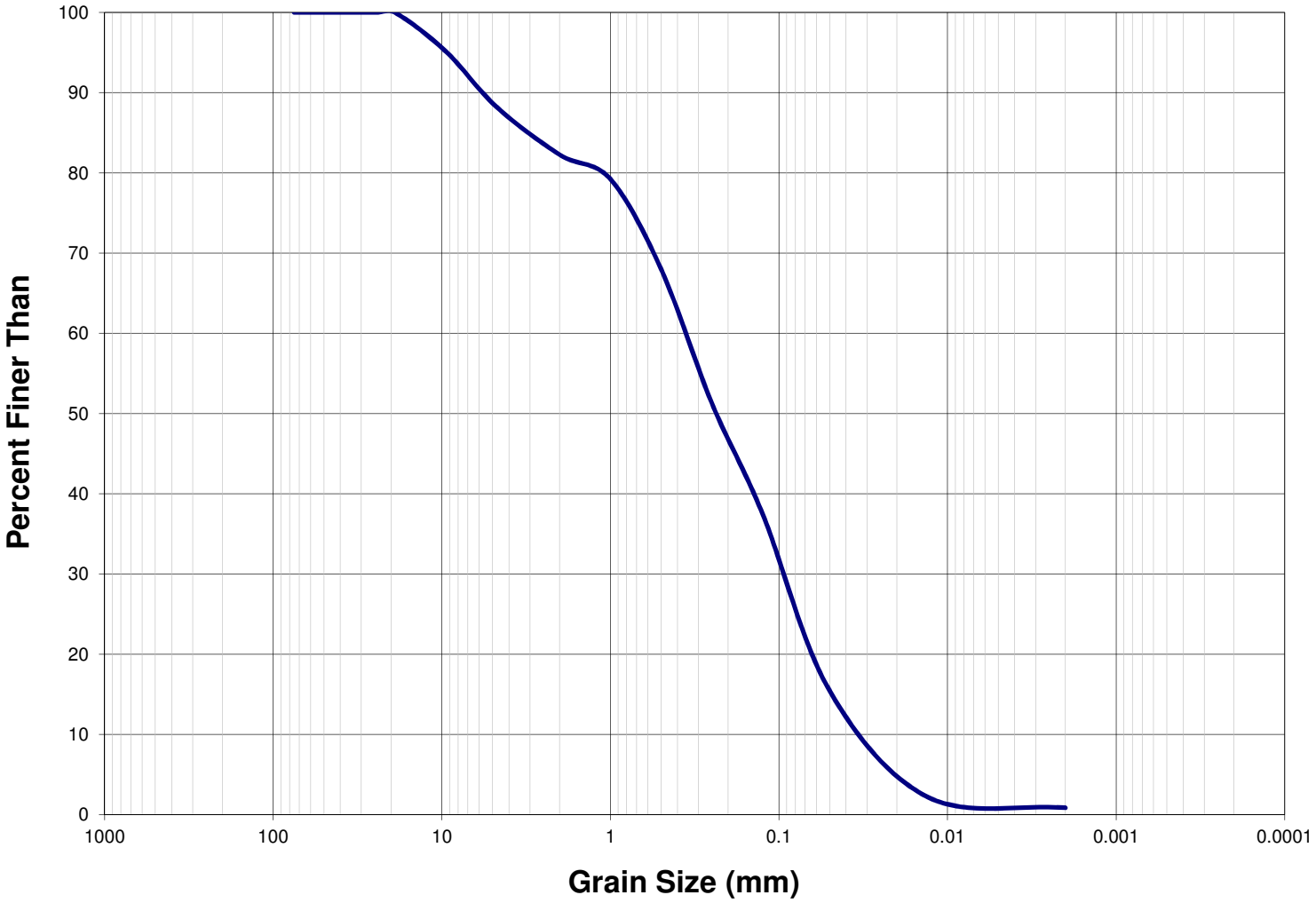
**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-20
**Lab ID:** L1384673-20

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 0.00 |
| 19 - 9.5 | 4.82 |
| 9.5 - 4.75 | 6.94 |
| 4.75 - 2.36 | 5.19 |
| 2.36 - 1.18 | 3.29 |
| 1.18 - 0.6 | 9.53 |
| 0.6 - 0.3 | 15.61 |
| 0.3 - 0.15 | 14.39 |
| 0.15 - 0.075 | 17.47 |
| <0.075 | 22.77 |
| | |

| Range (mm) | Wt. (%) |
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Texture: Loamy sand

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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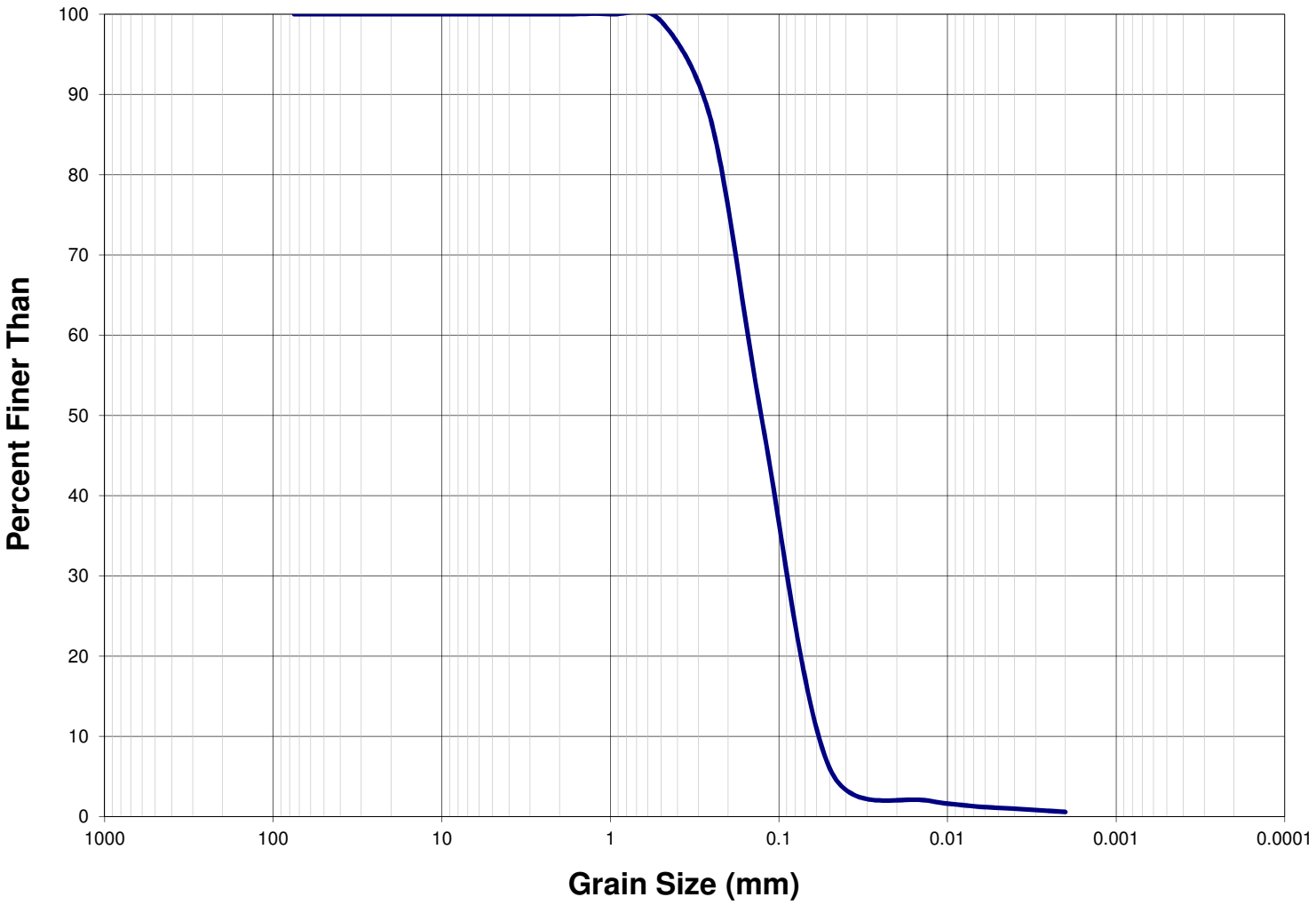
**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-3
**Lab ID:** L1384673-3

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 0.00 |
| 19 - 9.5 | 0.00 |
| 9.5 - 4.75 | 0.00 |
| 4.75 - 2.36 | 0.00 |
| 2.36 - 1.18 | 0.00 |
| 1.18 - 0.6 | 0.70 |
| 0.6 - 0.3 | 10.41 |
| 0.3 - 0.15 | 32.42 |
| 0.15 - 0.075 | 36.12 |
| <0.075 | 20.35 |
| | |

| Range (mm) | Wt. (%) |
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Texture: Sand

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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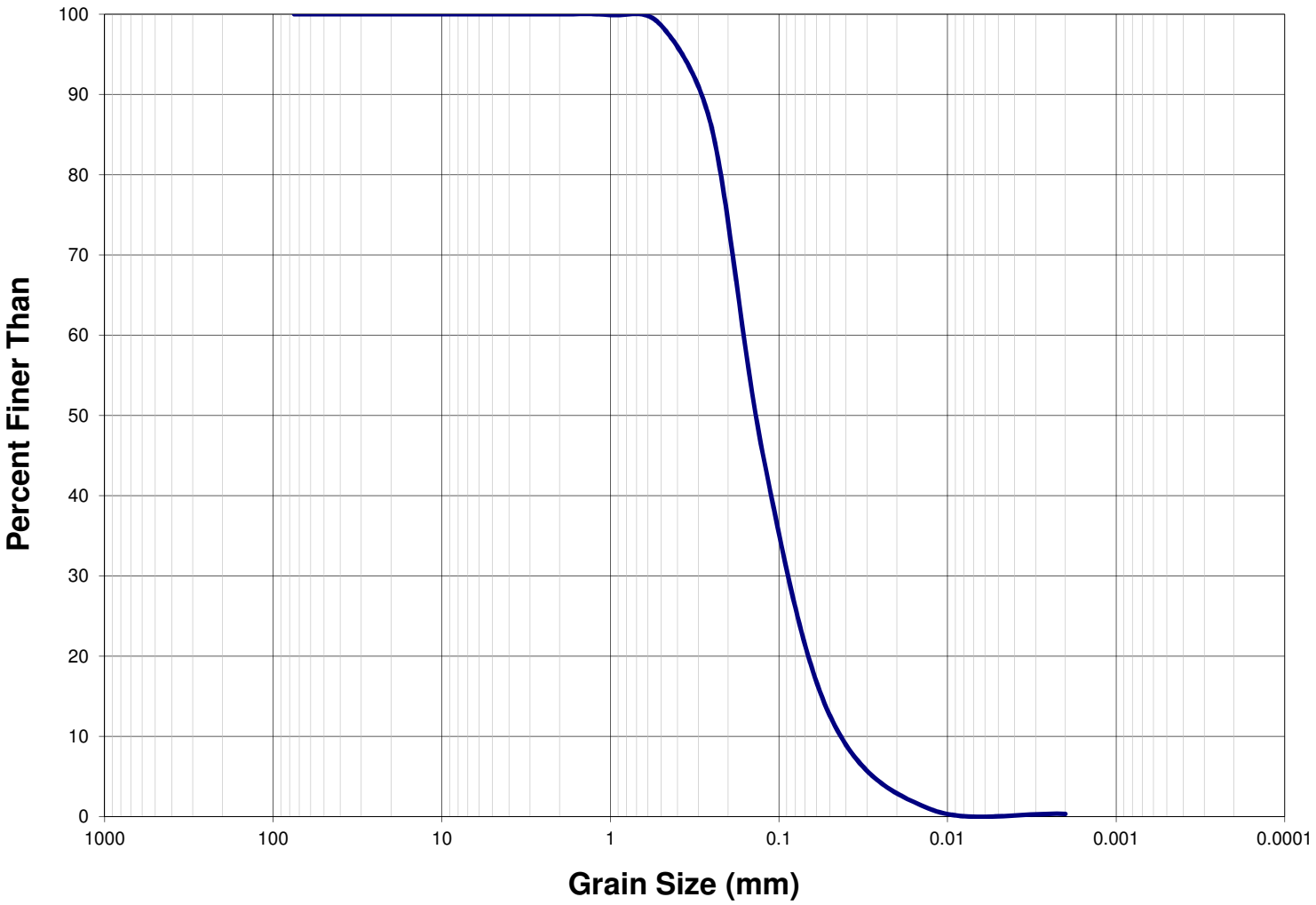
**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-4
**Lab ID:** L1384673-4

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 0.00 |
| 19 - 9.5 | 0.00 |
| 9.5 - 4.75 | 0.00 |
| 4.75 - 2.36 | 0.00 |
| 2.36 - 1.18 | 0.08 |
| 1.18 - 0.6 | 1.06 |
| 0.6 - 0.3 | 10.54 |
| 0.3 - 0.15 | 34.89 |
| 0.15 - 0.075 | 29.89 |
| <0.075 | 23.54 |
| | |

| Range (mm) | Wt. (%) |
|---|---|
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Texture: Sand

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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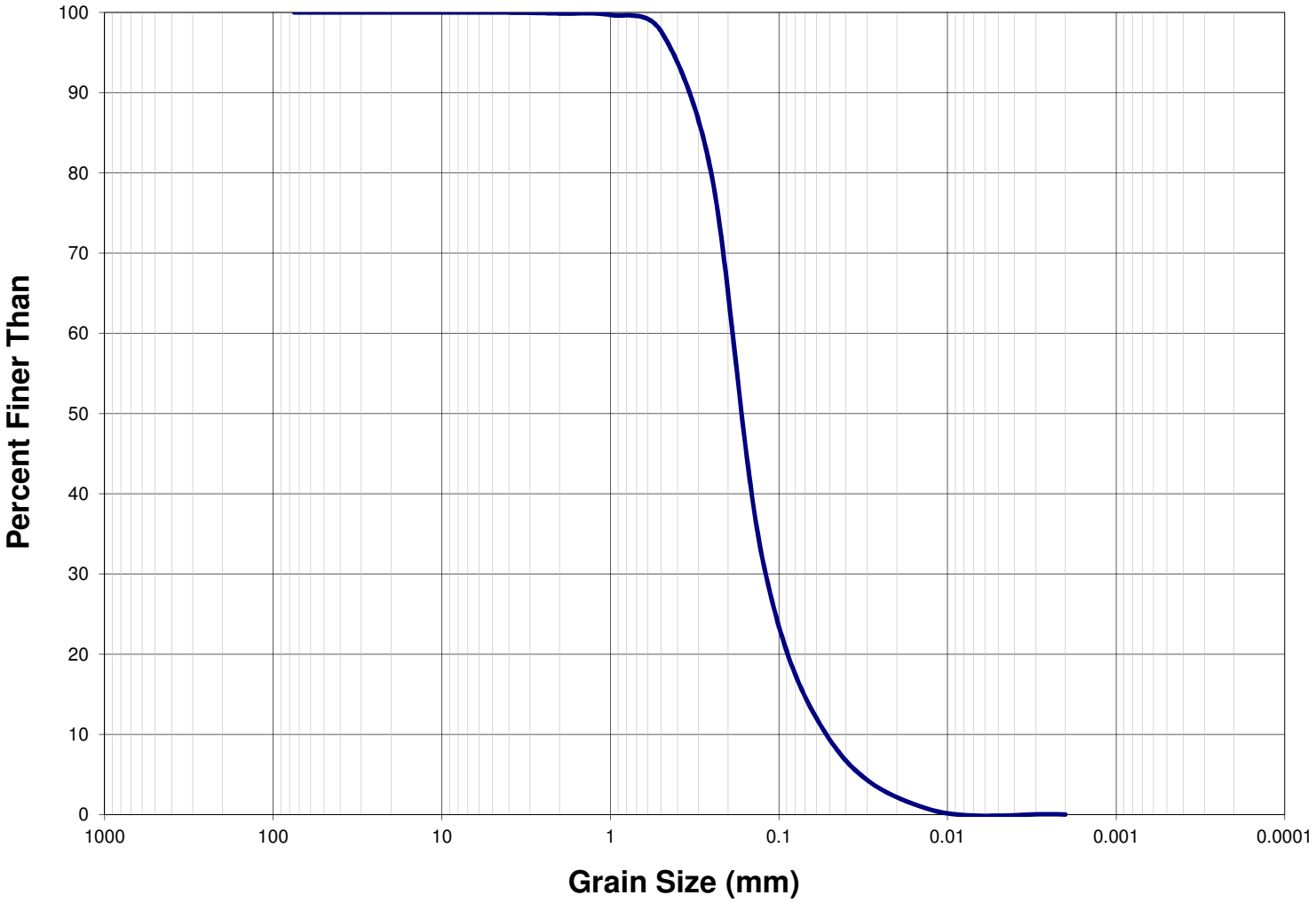
**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-5
**Lab ID:** L1384673-5

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 0.00 |
| 19 - 9.5 | 0.00 |
| 9.5 - 4.75 | 0.00 |
| 4.75 - 2.36 | 0.11 |
| 2.36 - 1.18 | 0.18 |
| 1.18 - 0.6 | 1.67 |
| 0.6 - 0.3 | 14.85 |
| 0.3 - 0.15 | 41.83 |
| 0.15 - 0.075 | 24.53 |
| <0.075 | 16.84 |
| | |

| Range (mm) | Wt. (%) |
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Texture: Sand

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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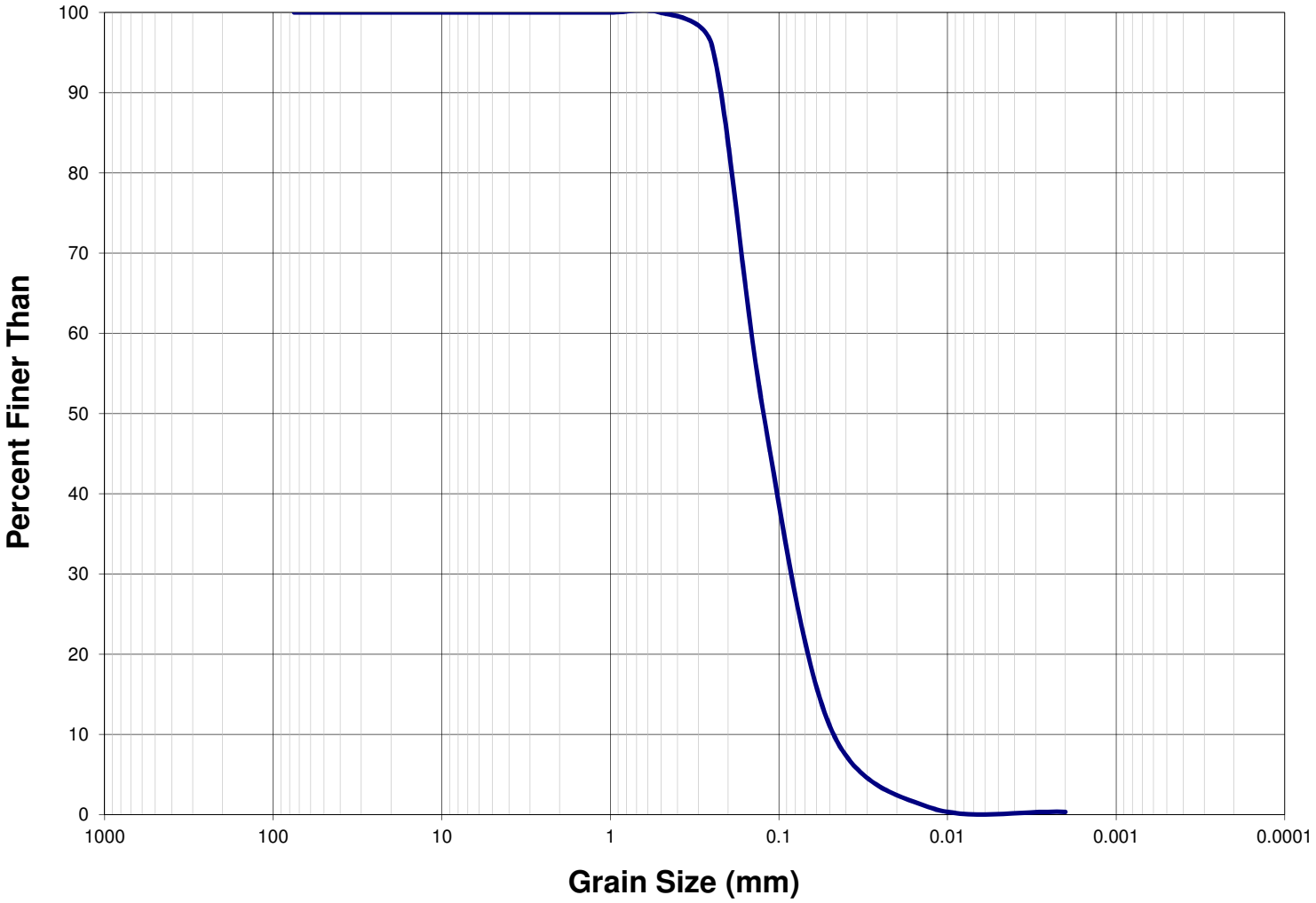
**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-6
**Lab ID:** L1384673-6

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 0.00 |
| 19 - 9.5 | 0.00 |
| 9.5 - 4.75 | 0.00 |
| 4.75 - 2.36 | 0.00 |
| 2.36 - 1.18 | 0.00 |
| 1.18 - 0.6 | 0.03 |
| 0.6 - 0.3 | 3.27 |
| 0.3 - 0.15 | 36.97 |
| 0.15 - 0.075 | 35.45 |
| <0.075 | 24.28 |
| | |

| Range (mm) | Wt. (%) |
|---|---|
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Texture: Sand

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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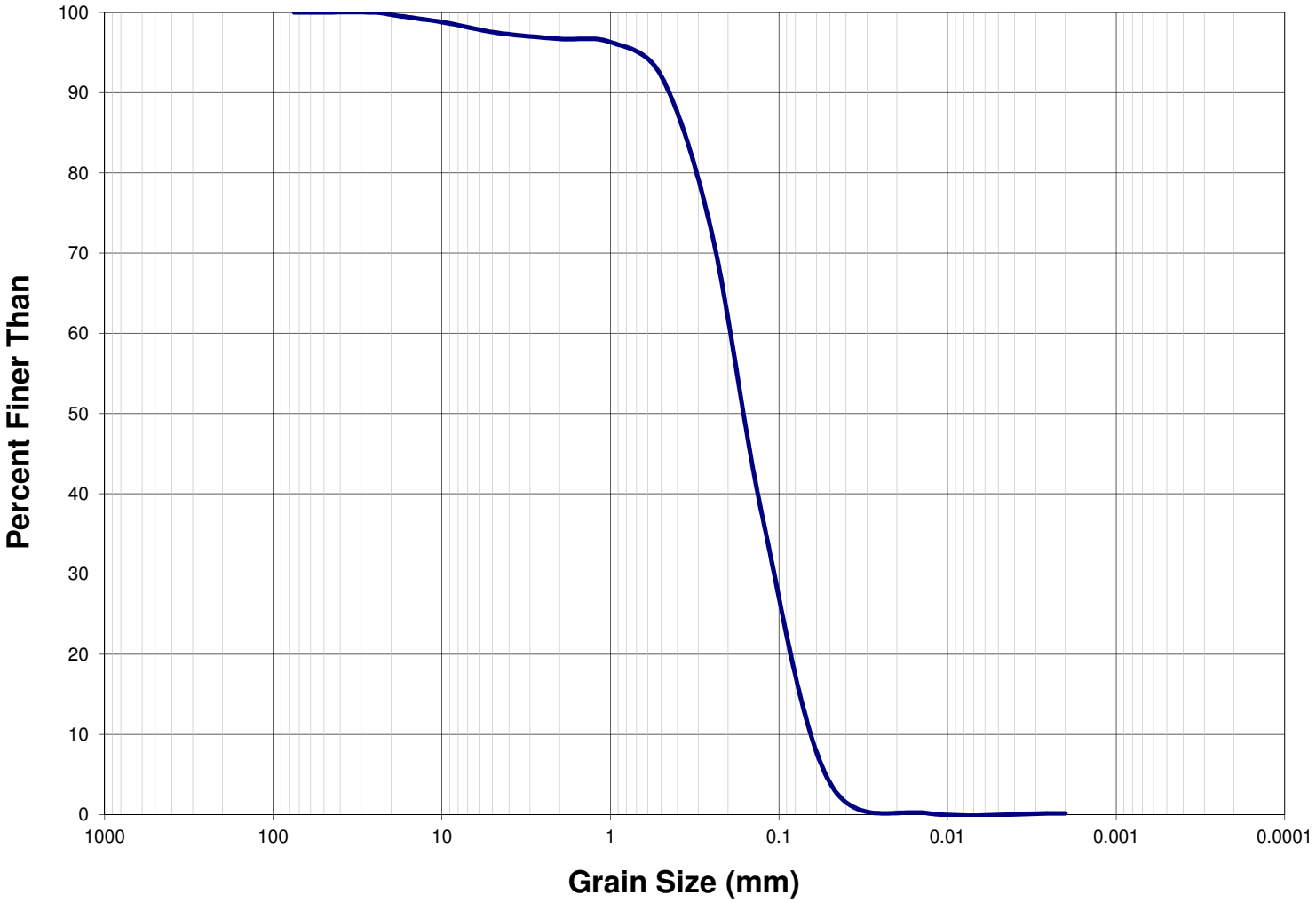
**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-7
**Lab ID:** L1384673-7

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 0.36 |
| 19 - 9.5 | 0.91 |
| 9.5 - 4.75 | 1.25 |
| 4.75 - 2.36 | 0.67 |
| 2.36 - 1.18 | 0.44 |
| 1.18 - 0.6 | 3.44 |
| 0.6 - 0.3 | 16.54 |
| 0.3 - 0.15 | 32.27 |
| 0.15 - 0.075 | 29.10 |
| <0.075 | 15.02 |
| | |

| Range (mm) | Wt. (%) |
|---|---|
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Texture: Sand

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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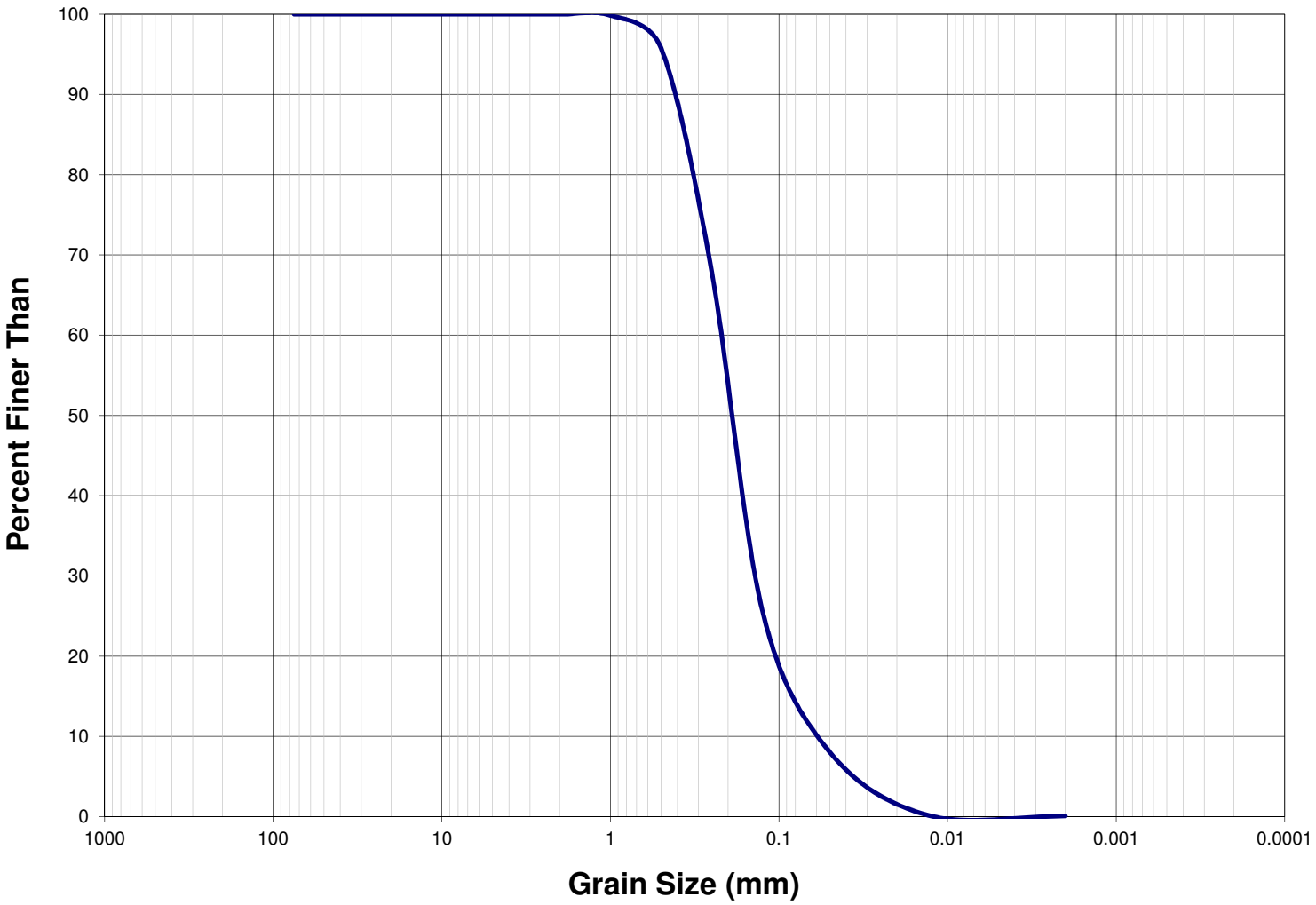
**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-8
**Lab ID:** L1384673-8

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 0.00 |
| 19 - 9.5 | 0.00 |
| 9.5 - 4.75 | 0.00 |
| 4.75 - 2.36 | 0.00 |
| 2.36 - 1.18 | 0.12 |
| 1.18 - 0.6 | 3.29 |
| 0.6 - 0.3 | 23.19 |
| 0.3 - 0.15 | 39.41 |
| 0.15 - 0.075 | 20.10 |
| <0.075 | 13.88 |
| | |

| Range (mm) | Wt. (%) |
|---|---|
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Texture: Sand

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

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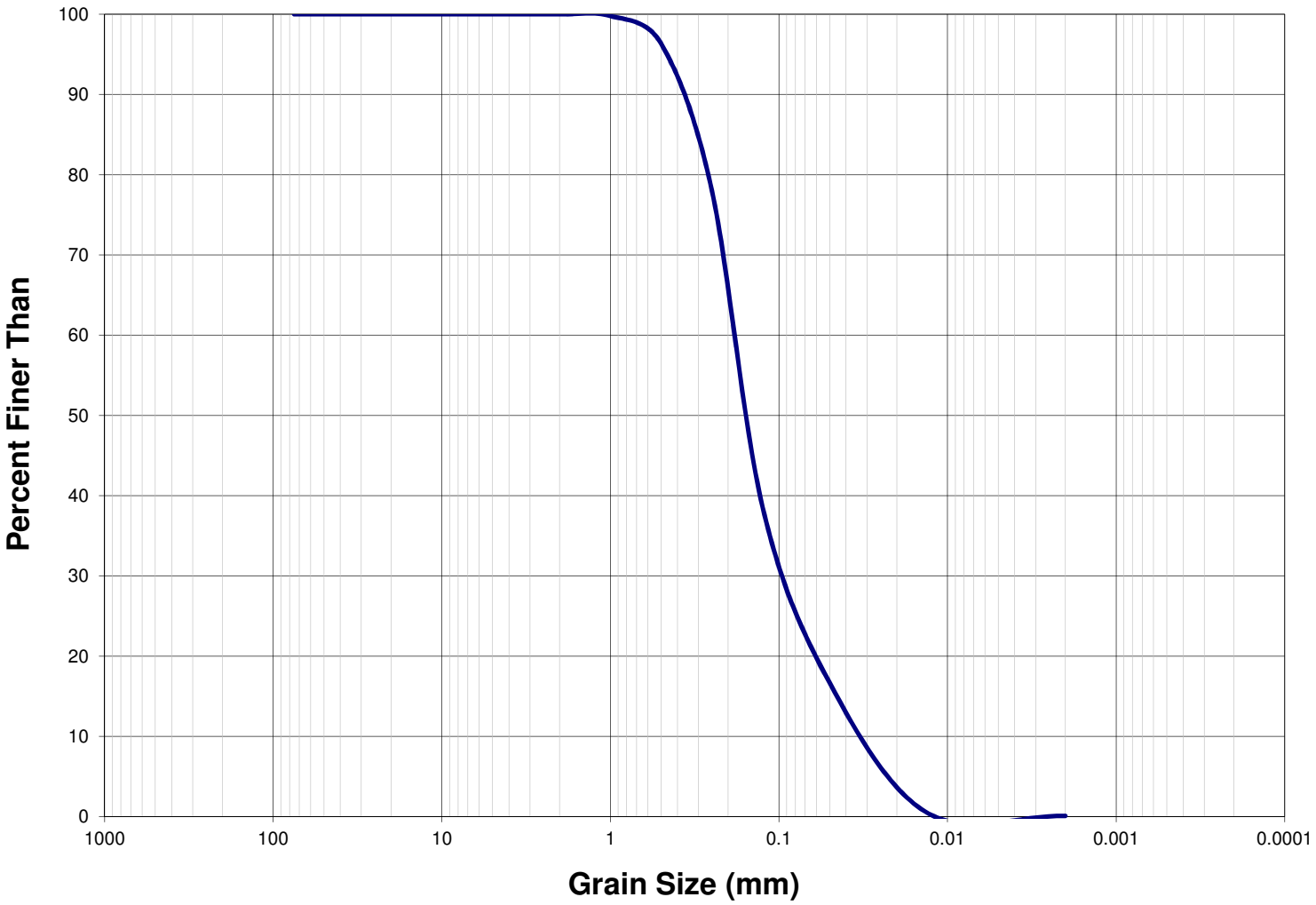
**Client Name:** AMEC EARTH & ENVIRONMENTAL
**Project:**
**Sample ID:** SED-DC-9
**Lab ID:** L1384673-9

# Particle Size Distribution Curve




## Particle Size Distribution

| Range (mm) | Wt. (%) |
|---|---|
| > 37.5 | 0 |
| 37.5 - 19 | 0.00 |
| 19 - 9.5 | 0.00 |
| 9.5 - 4.75 | 0.00 |
| 4.75 - 2.36 | 0.00 |
| 2.36 - 1.18 | 0.18 |
| 1.18 - 0.6 | 2.80 |
| 0.6 - 0.3 | 15.33 |
| 0.3 - 0.15 | 35.23 |
| 0.15 - 0.075 | 22.50 |
| <0.075 | 23.96 |
| | |

| Range (mm) | Wt. (%) |
|---|---|
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Texture: Loamy sand

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

# Appendix D5

# Site Characterization Lab Results

Mount Nansen Remediation Project
2013 Site Investigation Data Report
Appendix D5

## Site Characteristic Lab Test Summary

| Geographic Area | Laboratory Test | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Physical | Metals | Leachable Metals | Volatile Organic Compounds | Extractable Petroleum Hydro-carbons | Volatile Organic Compounds | Polycyclic Aromatic Hydro-carbons | Cyanide | Miscellaneous | Ion Balance | Carbon | PCBs | Nitrogen | Glycols | Chlorinated Hydro-carbons | Phenols |
| Total of All Areas | 38 | 35 | 23 | 16 | 14 | 12 | 12 | 10 | 6 | 6 | 6 | 3 | 4 | 2 | 2 | 2 |
| Ketza | 6 | 7 | 4 | 3 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mill | 25 | 24 | 11 | 13 | 14 | 12 | 12 | 6 | 3 | 3 | 2 | 3 | 0 | 2 | 2 | 2 |
| Mill-Hazardous Materials | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Road | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Expolosive | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 4 | 0 | 0 | 0 |

Note: Miscellaneous Laboratory Tests include:Volume Nanopure Water, Sample Weight, Redox, Conductivity, Total Acidity (to pH 8.3), Alkalinity, Sulphate

## Table D5-1: 2013 Soil Hydrocarbon Analytical Results Compared to Standards, Mt. Nansen, YT

| | | | Sample ID | BH-M-13-01 | BH-M-13-01 | BH-M-13-01 | BH-M-13-02 | BH-M-13-05 | BH-M-13-04 | BH-M-13-04 | BH-M-13-05 | BH-M-13-07 | BH-M-13-07 | BH-M-13-07 | BH-M-13-08 | BH-M-13-08 | BH-M-13-08 | BH-M-13-08 | TP-M-13-04 | BH-KZ-13-02 | BH-KZ-13-02 | BH-KZ-13-01 | BH-KZ-13-01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Depth (mbgs) | 1.1-1.5 | 1.6-2.0 | 2.1-2.5 | 3.1-3.5 | 0.0-0.5 | 0.0-0.5 | 1.1-1.5 | 1.1-1.5 | 0.0-0.5 | 0.6-1.0 | 1.1-1.5 | 0.0-0.5 | 2.6-3.0 | 3.1-3.5 | 3.6-4.0 | 2.1-2.5 | 0.0-0.5 | 1.1-1.5 | 0.0-0.5 | 0.6-1.0 |
| | | | Date Sampled | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/09/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 9/13/2013 | 09/10/2013 | 09/10/2013 | 09/09/2013 | 09/09/2013 |
| **Group** | **Analyte** | **Units** | **CSR-PL** | | | | | | | | | | | | | | | | | | | | |
| Physical | Moisture | % | - | 13.2 | 11.2 | 11.8 | 13.5 | 7.73 | 7.1 | 13.9 | 4.53 | 11.9 | 15.2 | 15.8 | 20 | 14.9 | 8.05 | 15 | 17.7 | 7.23 | 5.28 | 4.16 | 12.3 |
| | pH (1:2 soil:water) | pH | - | 7.61 | 7.95 | 7.83 | 8.61 | 7.44 | 7.74 | 7.61 | 7.82 | 7.91 | 8.29 | 8.34 | 7.71 | 7.74 | 7.66 | 7.64 | 7.05 | 7.22 | 6.1 | 7.08 | 5.71 |
| Volatile Organic Compounds | Volatile Hydrocarbons (VH6-10) | mg/kg | - | <100 | - | - | <100 | <100 | <100 | <100 | <100 | 320 | 660 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | - | 1610 | <100 |
| | VPH (C6-C10) | mg/kg | 200 | <100 | - | - | <100 | <100 | <100 | <100 | <100 | 320 | 660 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | - | 1210 | <100 |
| | Benzene | mg/kg | 10 | <0.040 | - | - | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | - | <0.40 | <0.040 |
| | Ethylbenzene | mg/kg | 1 | <0.050 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 1.36 | 0.131 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | - | 7.19 | <0.050 |
| | Methyl t-butyl ether (MTBE) | mg/kg | - | <0.20 | - | - | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | - | <0.20 | <0.20 |
| | Styrene | mg/kg | 5 | <0.050 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | - | 0.12 | <0.050 |
| | Toluene | mg/kg | 1.5 | <0.050 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | - | 31.6 | <0.050 |
| | ortho-Xylene | mg/kg | - | 0.061 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | - | 144 | <0.050 |
| | meta- & para-Xylene | mg/kg | - | 0.124 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.060 * | 1.47 | 0.139 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | - | 215 | <0.050 |
| | Xylenes | mg/kg | 5 | 0.185 | - | - | <0.075 | <0.075 | <0.075 | <0.075 | <0.075 | <0.078 | 1.47 | 0.139 | <0.075 | <0.075 | <0.075 | <0.075 | <0.075 | <0.075 | - | 359 | <0.075 |
| Extractable Petroleum Hydrocarbons | EPH10-19 | mg/kg | - | 970 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | 4600 | 7330 | 470 | <200 | <200 | 210 | <200 | 210 | 630 | <200 | 2120 | <200 |
| | EPH10-19 (sg) | mg/kg | - | - | - | - | - | - | - | <200 | - | - | - | - | - | - | - | - | <200 | - | - | - | - |
| | EPH19-32 | mg/kg | - | 1630 | <200 | <200 | <200 | <200 | <200 | 260 | <200 | 1030 | 940 | <200 | <200 | <200 | <200 | <200 | <200 | 17700 | 230 | 21200 | 460 |
| | EPH19-32 (sg) | mg/kg | - | - | - | - | - | - | - | 210 | - | - | - | - | - | - | - | - | <200 | - | - | - | - |
| | LEPH | mg/kg | 1000 | 970 | - | - | <200 | <200 | <200 | <200 | <200 | 4600 | 7330 | 470 | <200 | <200 | 210 | <200 | 210 | 630 | <200 | 2110 | <200 |
| | HEPH | mg/kg | 1000 | 1630 | - | - | <200 | <200 | <200 | 260 | <200 | 1030 | 940 | <200 | <200 | <200 | <200 | <200 | <200 | 17700 | 230 | 21200 | 460 |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene | mg/kg | - | <0.050 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.090 * | <0.60 * | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 * | <0.050 | <0.20 * | <0.050 |
| | Acenaphthylene | mg/kg | - | <0.050 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.060 * | <0.30 * | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 * | <0.050 | <0.050 | <0.050 |
| | Anthracene | mg/kg | - | <0.050 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.060 * | <0.15 * | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 * | <0.050 | <0.080 * | <0.050 |
| | Benz(a)anthracene | mg/kg | 1 | <0.050 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 * | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 * | <0.050 | <0.050 | <0.050 |
| | Benzo(a)pyrene | mg/kg | 1 | <0.050 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 * | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 * | <0.050 | <0.050 | <0.050 |
| | Benzo(b)fluoranthene | mg/kg | 1 | <0.050 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 * | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.20 * | <0.050 | <0.20 * | <0.050 |
| | Benzo(g,h,i)perylene | mg/kg | - | <0.050 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 * | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.35 * | <0.050 | 0.226 | <0.050 |
| | Benzo(k)fluoranthene | mg/kg | 1 | <0.050 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 * | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.20 * | <0.050 | <0.060 * | <0.050 |
| | Chrysene | mg/kg | - | <0.050 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 * | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.070 * | <0.050 | <0.060 * | <0.050 |
| | Dibenz(a,h)anthracene | mg/kg | 1 | <0.050 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 * | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.070 * | <0.050 | <0.050 | <0.050 |
| | Fluoranthene | mg/kg | - | <0.050 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.060 * | <0.050 * | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 * | <0.050 | <0.070 * | <0.050 |
| | Fluorene | mg/kg | - | <0.050 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.188 | 0.902 | 0.071 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 * | <0.050 | <0.20 * | <0.050 |
| | Indeno(1,2,3-c,d)pyrene | mg/kg | 1 | <0.050 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 * | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.080 * | <0.050 | <0.050 | <0.050 |
| | 2-Methylnaphthalene | mg/kg | - | 0.076 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.61 | 14.3 | 0.847 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 * | <0.050 | 4.94 | <0.050 |
| | Naphthalene | mg/kg | 5 | <0.080 * | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.30 * | 3.05 | <0.20 * | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 * | <0.050 | 6.51 | <0.050 |
| | Phenanthrene | mg/kg | 5 | <0.050 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.20 * | 1.15 | 0.077 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 * | <0.050 | 0.269 | <0.050 |
| | Pyrene | mg/kg | 10 | 0.215 | - | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.949 | 1.35 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.483 | <0.050 | 0.563 | <0.050 |

* indicates that the result is qualified
- indicates no data
CSR - PL = Yukon Government (YG). 2002. Contaminated Sites Regulation – *Yukon Environment Act* Schedules 1 and 2 for Park Land Use [O.I.C. 2002/171]
CSR-PL exeedances are highlighted and underlined

## Table D5-2: 2013 Soil Hydrocarbon Analytical Results Compared to Standards, Mt. Nansen, YT

| | | | | Sample ID | BH-M-13-01 | BH-M-13-01 | BH-M-13-01 | BH-M-13-02 | BH-M-13-02 | BH-M-13-04 | BH-M-13-04 | BH-M-13-04 | BH-M-13-05 | BH-M-13-05 | BH-M-13-05 | BH-M-13-05 | BH-M-13-05 | BH-M-13-05 | BH-M-13-07 | BH-M-13-07 | BH-M-13-07 | BH-M-13-07 | BH-M-13-08 | BH-M-13-08 | BH-M-13-08 | BH-M-13-08 | TP-M-13-04 | TP-M-13-04 | TP-M-13-04 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Depth (mbgs) | 1.1-1.5 | 1.6-2.0 | 2.1-2.5 | 1.6-2.0 | 3.1-3.5 | 0.0-0.5 | 0.0-0.5 | 1.1-1.5 | 0.0-0.5 | 0.6-1.0 | 1.1-1.5 | 1.6-2.0 | 2.1-2.5 | 3.1-3.5 | 0.0-0.5 | 0.6-1.0 | 1.1-1.5 | 2.6-3.0 | 0.0-0.5 | 2.6-3.0 | 3.1-3.5 | 3.6-4.0 | 0.0-0.5 | 2.1-2.5 | 3.1-3.5 |
| | | | | Date Sampled | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/09/2013 | 09/09/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 9/13/2013 | 9/13/2013 | 9/13/2013 |
| **Group** | **Analyte** | **Units** | **CSR-PL** | **HWHRM** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Physical | Moisture | % | - | - | 13.2 | 11.2 | 11.8 | - | 13.5 | - | 7.1 | 13.9 | 7.73 | 6 | 4.53 | 6.48 | - | - | 11.9 | 15.2 | 15.8 | - | 20 | 14.9 | 8.05 | 15 | - | 17.7 | - |
| | pH (1:2 soil:water) | pH | - | - | 7.61 | 7.95 | 7.83 | - | 8.61 | 7.67 | 7.74 | 7.61 | 7.44 | 7.82 | 7.82 | 7.89 | 7.94 | 5.81 | 7.91 | 8.29 | 8.34 | 8.09 | 7.71 | 7.74 | 7.66 | 7.64 | 7.82 | 7.05 | 6.2 |
| Total Metals | Antimony (Sb) | mg/kg | 20 | - | 36.8 | 30.9 | 67 | - | 4.22 | - | 558 | 125 | 135 | 146 | 94 | 28.3 | 21.1 | 6.76 | 107 | 3.35 | 0.71 | 12.8 | 128 | 1730 | 165 | 131 | - | 20.9 | 40.6 |
| | Arsenic (As) | mg/kg | 20 | - | 502 | 355 | 1190 | 20.1 | 56.2 | - | 9350 | 2570 | 1450 | 1730 | 1480 | 423 | 443 | 93.3 | 1050 | 71.7 | 27.2 | 187 | 1840 | 80700 | 16400 | 8770 | - | 380 | 454 |
| | Barium (Ba) | mg/kg | 500 | - | 166 | 194 | 234 | - | 98.5 | - | 106 | 141 | 169 | 135 | 131 | 120 | 136 | 150 | 154 | 60.6 | 47.3 | 53.1 | 218 | 116 | 80.5 | 141 | - | 144 | 125 |
| | Beryllium (Be) | mg/kg | 4 | - | 0.33 | 0.36 | 0.41 | - | 0.39 | - | 0.43 | 0.49 | 0.53 | 0.43 | 0.49 | 0.39 | 0.39 | 0.3 | 0.38 | <0.20 | <0.20 | 0.26 | 0.52 | 0.34 | <0.20 | 0.41 | - | 0.46 | 0.43 |
| | Cadmium (Cd) | mg/kg | 2a | - | 2.03 | 1.84 | 4.04 | - | 0.269 | - | 41.7 | 26.2 | 10.5 | 11.4 | 10.1 | 3.55 | 5.1 | 0.266 | 11.8 | 0.176 | 0.082 | 0.755 | 9.54 | 24.3 | 2.49 | 4.04 | - | 1.95 | 4.75 |
| | Chromium (Cr) | mg/kg | - | - | 16.4 | 14.6 | 21.3 | - | 16.3 | - | 13.2 | 19 | 11.1 | 10.5 | 11.9 | 10.3 | 15.8 | 16.9 | 31.2 | 10.3 | 9.9 | 13.3 | 17 | 2.64 | 1.7 | 2.4 | - | 18.4 | 14.6 |
| | Chromium, Trivalent | mg/kg | 65 | - | 16.4 | - | - | - | 16.2 | - | 13.2 | 18.7 | 10.9 | 10.3 | 11.8 | 10.2 | - | - | 30.8 | 10.3 | 9.9 | - | 17 | 2.64 | 1.67 | 2.4 | - | 18.4 | - |
| | Hexavalent Chromium | mg/kg | 60 | - | <0.10 | - | - | - | <0.10 | - | <0.10 | 0.23 | 0.1 | 0.18 | 0.13 | <0.10 | - | - | 0.33 | <0.10 | <0.10 | - | <0.10 | <0.10 | <0.10 | <0.10 | - | <0.10 | - |
| | Cobalt (Co) | mg/kg | 50 | - | 10.9 | 12 | 15.9 | - | 10.1 | - | 11.4 | 16.5 | 17.3 | 11 | 13.1 | 11.1 | 11.5 | 7.91 | 8.28 | 3.86 | 3.17 | 6.62 | 10.2 | 0.99 | 0.66 | 1.05 | - | 11 | 8.69 |
| | Copper (Cu) | mg/kg | 150a | - | 74.6 | 80.3 | 108 | - | 30 | - | 326 | 159 | 52.4 | 72.4 | 80 | 36.1 | 38.4 | 21.3 | 94.4 | 8.8 | 5.31 | 21.4 | 499 | 383 | 38.6 | 32.7 | - | 33.9 | 31.7 |
| | Lead (Pb) | mg/kg | 250a | - | 203 | 132 | 407 | - | 11.8 | - | 4250 | 524 | 1980 | 1310 | 585 | 139 | 210 | 9.79 | 658 | 10.6 | 4.2 | 35.4 | 791 | 9340 | 1550 | 2050 | - | 103 | 208 |
| | Mercury (Hg) | mg/kg | 15 | - | <0.050 | <0.050 | 0.074 | - | 0.058 | - | 0.177 | 0.083 | 0.136 | 0.082 | 0.062 | <0.050 | <0.050 | <0.050 | 0.083 | <0.050 | <0.050 | <0.050 | 0.164 | 0.876 | 0.199 | 0.144 | - | 0.08 | 0.074 |
| | Molybdenum (Mo) | mg/kg | 10 | - | 1.03 | <0.50 | <0.50 | - | 0.65 | - | 1.11 | 1.1 | 0.94 | 1.62 | 1.14 | 0.82 | 1.07 | 0.53 | 2.22 | <0.50 | <0.50 | <0.50 | 1.67 | 0.97 | 1.3 | 0.72 | - | 0.7 | 0.71 |
| | Nickel (Ni) | mg/kg | 100 | - | 9.6 | 8.67 | 11.7 | - | 8.1 | - | 10.9 | 12.1 | 21 | 8.16 | 8.73 | 7.35 | 11.9 | 9.01 | 16.9 | 6.93 | 6.03 | 8.58 | 13.2 | 1.01 | 0.73 | 0.94 | - | 11.1 | 9.63 |
| | Selenium (Se) | mg/kg | 3 | - | 0.32 | 0.32 | 0.42 | - | 0.27 | - | 1.15 | 0.61 | 0.57 | 0.39 | 0.36 | 0.27 | 0.48 | 0.33 | 0.61 | <0.20 | <0.20 | 0.29 | 0.55 | 2.25 | 0.9 | 0.91 | - | 0.56 | 0.47 |
| | Silver (Ag) | mg/kg | 20 | - | 3.8 | 2.17 | 6.41 | - | 0.39 | - | 64 | 5.11 | 9.84 | 11.9 | 9.37 | 6.53 | 7.65 | 0.44 | 17.3 | 0.13 | <0.10 | 0.59 | 14.2 | 53.4 | 10.9 | 9.52 | - | 1.12 | 2.07 |
| | Thallium (Tl) | mg/kg | - | - | 0.375 | 0.326 | 0.401 | - | 0.362 | - | 0.942 | 0.64 | 0.539 | 0.366 | 0.345 | 0.279 | 0.303 | 0.24 | 0.524 | 0.075 | 0.052 | 0.253 | 0.688 | 7.39 | 1.74 | 5.21 | - | 0.45 | 0.387 |
| | Tin (Sn) | mg/kg | 50 | - | <2.0 | <2.0 | <2.0 | - | <2.0 | - | 4.7 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | - | <2.0 | <2.0 |
| | Uranium (U) | mg/kg | - | - | 0.398 | 0.391 | 0.448 | - | 0.862 | - | 0.773 | 1.24 | 0.538 | 0.86 | 0.541 | 0.443 | 0.525 | 0.617 | 0.711 | 0.685 | 0.384 | 0.586 | 0.944 | 3.33 | 0.457 | 0.437 | - | 0.804 | 0.743 |
| | Vanadium (V) | mg/kg | 200 | - | 73.8 | 85.8 | 110 | - | 85.4 | - | 48.7 | 63.1 | 45.2 | 45.7 | 43.3 | 49.8 | 57 | 57.9 | 52.8 | 25.6 | 22.2 | 52.1 | 56.9 | 20.1 | 12.1 | 15.2 | - | 64.7 | 55.8 |
| | Zinc (Zn) | mg/kg | 300a | - | 222 | 180 | 326 | - | 95.7 | - | 2440 | 1180 | 843 | 818 | 731 | 324 | 234 | 61.6 | 853 | 40.4 | 23.6 | 92.7 | 781 | 677 | 131 | 236 | - | 159 | 301 |
| Leachable Metals | 1st Preliminary PH | pH | - | - | 8.65 | - | - | - | - | - | 8.94 | - | - | - | 9.3 | - | - | - | 9.37 | 9.18 | - | - | - | 8.26 | 8.22 | - | - | - | - |
| | 2nd Preliminary PH | pH | - | - | 1.61 | - | - | - | - | - | 1.69 | - | - | - | 1.67 | - | - | - | 1.61 | 1.61 | - | - | - | 1.61 | 1.61 | - | - | - | - |
| | Final pH | pH | - | - | 5.08 | - | - | - | - | - | 5.22 | - | - | - | 5.42 | - | - | - | 5.26 | 4.98 | - | - | - | 5.03 | 4.94 | - | - | - | - |
| | Extraction Solution Initial pH | pH | - | - | 4.94 | - | - | - | - | - | 4.94 | - | - | - | 4.92 | - | - | - | 4.94 | 4.92 | - | - | - | 4.93 | 4.92 | - | - | - | - |
| | Aluminum (Al) | mg/L | - | - | - | - | - | - | - | *0.0181* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | *0.0343* | - | - |
| | Antimony (Sb) | mg/L | - | - | <1.0 | - | - | - | - | *0.905* | <1.0 | - | - | - | <1.0 | - | - | - | <1.0 | <1.0 | - | - | - | <1.0 | <1.0 | - | *0.110* | - | - |
| | Arsenic (As) | mg/L | - | 2.5 | <1.0 | - | - | - | - | *0.375* | <1.0 | - | - | - | <1.0 | - | - | - | <1.0 | <1.0 | - | - | - | **6.1** | **5** | - | *0.131* | - | - |
| | Barium (Ba) | mg/L | - | 100 | <2.5 | - | - | - | - | *0.0328* | <2.5 | - | - | - | <2.5 | - | - | - | <2.5 | <2.5 | - | - | - | <2.5 | <2.5 | - | *0.0150* | - | - |
| | Beryllium (Be) | mg/L | - | - | <0.025 | - | - | - | - | *< 0.00002* | <0.025 | - | - | - | <0.025 | - | - | - | <0.025 | <0.025 | - | - | - | <0.025 | <0.025 | - | *< 0.00002* | - | - |
| | Bismuth (Bi) | mg/L | - | - | - | - | - | - | - | *< 0.00001* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | *< 0.00001* | - | - |
| | Boron (B) | mg/L | - | 500 | <0.50 | - | - | - | - | *0.0168* | <0.50 | - | - | - | <0.50 | - | - | - | <0.50 | <0.50 | - | - | - | <0.50 | <0.50 | - | *0.0172* | - | - |
| | Cadmium (Cd) | mg/L | - | 0.5 | <0.050 | - | - | - | - | *0.00144* | 0.341 | - | - | - | 0.084 | - | - | - | 0.173 | <0.050 | - | - | - | <0.050 | <0.050 | - | *0.000294* | - | - |
| | Calcium (Ca) | mg/L | - | - | 77.6 | - | - | - | - | *52.2* | 174 | - | - | - | 404 | - | - | - | 265 | 52.6 | - | - | - | 81.8 | 42.1 | - | *29.8* | - | - |
| | Chromium (Cr) | mg/L | - | 5 | <0.25 | - | - | - | - | *< 0.0005* | <0.25 | - | - | - | <0.25 | - | - | - | <0.25 | <0.25 | - | - | - | <0.25 | <0.25 | - | *< 0.0005* | - | - |
| | Cobalt (Co) | mg/L | - | - | <0.050 | - | - | - | - | *0.000113* | <0.050 | - | - | - | 0.209 | - | - | - | <0.050 | <0.050 | - | - | - | <0.050 | <0.050 | - | *0.000070* | - | - |
| | Copper (Cu) | mg/L | - | - | 0.168 | - | - | - | - | *0.0065* | 1.23 | - | - | - | <0.050 | - | - | - | 0.084 | <0.050 | - | - | - | 0.278 | <0.050 | - | *0.0016* | - | - |
| | Iron (Fe) | mg/L | - | - | 1 | - | - | - | - | *0.021* | 0.34 | - | - | - | <0.15 | - | - | - | 2.91 | 23.4 | - | - | - | 0.58 | 0.64 | - | *0.020* | - | - |
| | Lead (Pb) | mg/L | - | 5 | <0.25 | - | - | - | - | *0.00516* | **6.22** | - | - | - | 0.27 | - | - | - | 2.67 | <0.25 | - | - | - | <0.25 | <0.25 | - | *0.00105* | - | - |
| | Lithium (Li) | mg/L | - | - | - | - | - | - | - | *0.004* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | *< 0.001* | - | - |
| | Magnesium (Mg) | mg/L | - | - | 14 | - | - | - | - | *14.7* | 19.5 | - | - | - | 13.8 | - | - | - | 7.41 | 4.03 | - | - | - | 18.5 | 12.4 | - | *5.90* | - | - |
| | Manganese(Mn) | mg/L | - | - | - | - | - | - | - | *0.0189* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | *0.0024* | - | - |
| | Mercury (Hg) | mg/L | - | 0.1 | <0.0010 | - | - | - | - | *0.02* | <0.0010 | - | - | - | <0.0010 | - | - | - | <0.0010 | <0.0010 | - | - | - | <0.0010 | <0.0010 | - | *< 0.01* | - | - |
| | Molybdenum (Mo) | mg/L | - | - | - | - | - | - | - | *0.00266* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | *0.00120* | - | - |
| | Nickel (Ni) | mg/L | - | - | <0.25 | - | - | - | - | *0.0004* | <0.25 | - | - | - | <0.25 | - | - | - | <0.25 | <0.25 | - | - | - | <0.25 | <0.25 | - | *0.0003* | - | - |
| | Phosphorus (P) | mg/L | - | - | - | - | - | - | - | *0.014* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | *0.014* | - | - |
| | Potassium (K) | mg/L | - | - | - | - | - | - | - | *4.21* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | *3.29* | - | - |
| | Selenium (Se) | mg/L | - | 1 | <1.0 | - | - | - | - | *0.00041* | <1.0 | - | - | - | <1.0 | - | - | - | <1.0 | <1.0 | - | - | - | <1.0 | <1.0 | - | *0.00041* | - | - |
| | Silicon (Si) | mg/L | - | - | - | - | - | - | - | *2.56* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | *2.16* | - | - |
| | Silver (Ag) | mg/L | - | 5 | <0.050 | - | - | - | - | *0.00036* | <0.050 | - | - | - | <0.050 | - | - | - | <0.050 | <0.050 | - | - | - | <0.050 | <0.050 | - | *< 0.00001* | - | - |
| | Sodium (Na) | mg/L | - | - | - | - | - | - | - | *1.32* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | *0.64* | - | - |
| | Strontium (Sr) | mg/L | - | - | - | - | - | - | - | *0.150* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | *0.0669* | - | - |
| | Sulphur (S) | mg/L | - | - | - | - | - | - | - | *47.8* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | *21.1* | - | - |
| | Thallium (Tl) | mg/L | - | - | <1.0 | - | - | - | - | *0.00021* | <1.0 | - | - | - | <1.0 | - | - | - | <1.0 | <1.0 | - | - | - | <1.0 | <1.0 | - | *0.00004* | - | - |
| | Tin (Sn) | mg/L | - | - | - | - | - | - | - | *0.00087* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | *< 0.00001* | - | - |
| | Titanium (Ti) | mg/L | - | - | - | - | - | - | - | *0.0003* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | *0.0004* | - | - |
| | Uranium (U) | mg/L | - | - | - | - | - | - | - | *0.000411* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | *0.000156* | - | - |
| | Vanadium (V) | mg/L | - | - | <0.15 | - | - | - | - | *0.00029* | <0.15 | - | - | - | <0.15 | - | - | - | <0.15 | <0.15 | - | - | - | <0.15 | <0.15 | - | *0.00032* | - | - |
| | Zinc (Zn) | mg/L | - | - | 1.05 | - | - | - | - | *0.038* | 19.8 | - | - | - | 3.21 | - | - | - | 4.69 | <0.50 | - | - | - | 1.75 | 0.8 | - | *0.006* | - | - |
| | Zirconium (Zr) | mg/L | - | - | - | - | - | - | - | *0.00014* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | *0.00005* | - | - |

* indicates that the result is qualified

\- indicates no data

CSR - PL = Yukon Government (YG). 2002. Contaminated Sites Regulation – *Yukon Environment Act* Schedules 1 and 2 for Park Land Use [O.I.C. 2002/171]

CSR-PL exeedances are highlighted and underlined

HWHRM = Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149)

**HWHRM exceedances are highlighted and underlined**

Leachable metals through TCLP Extraction Procedure or, *if italicized, through the SFE Method*

a. Standard is pH dependent. Lowest applicable standard is presented but results are compared to sample specific pH

| | | | | Sample ID | TP-M-13-04 | TP-M-13-05 | BH-KZ-13-02 | BH-KZ-13-02 | BH-KZ-13-02 | BH-KZ-13-01 | BH-KZ-13-01 | BH-KZ-13-01 | BH-KZ-13-01 | BH-KZ-13-01 | TP-SP-13-03 | TP-SP-13-04 | TP-SP-13-05 | TP-SP-13-06 | TP-R-13-01 | TP-R-13-02 | TP-R-13-03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Depth (mbgs) | 4.6-5.0 | 0.6-1.0 | 0.0-0.5 | 1.1-1.5 | 2.1-2.5 | 0.0-0.5 | 0.6-1.0 | 1.1-1.5 | 2.1-2.5 | 3.1-3.5 | 0.1-0.2 | 0.1-0.2 | 0.1-0.2 | 0.1-0.2 | 0.6-1.0 | 0.0-0.5 | 0.6-1.0 |
| | | | | Date Sampled | 9/13/2013 | 9/13/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/09/2013 | 09/09/2013 | 09/09/2013 | 09/09/2013 | 09/09/2013 | 09/11/2013 | 09/11/2013 | 09/11/2013 | 09/11/2013 | 09/12/2013 | 09/12/2013 | 09/12/2013 |
| **Group** | **Analyte** | **Units** | **CSR-PL** | **HWHRM** | | | | | | | | | | | | | | | | | |
| Physical | Moisture | % | - | - | - | - | 7.23 | 5.28 | - | 4.16 | 12.3 | - | - | - | - | - | - | - | - | - | - |
| | pH (1:2 soil:water) | pH | - | - | 6.05 | 7.86 | 7.22 | 6.1 | 7.86 | 7.08 | 5.71 | 6.6 | - | - | 8.26 | 7.72 | 8.58 | 5.86 | 7.43 | 7.83 | 7.82 |
| Total Metals | Antimony (Sb) | mg/kg | 20 | - | 19.7 | - | 33.9 | 5.45 | 2.75 | 25.9 | 2.61 | 4.58 | - | - | 9.17 | 1.69 | 3.91 | 0.29 | - | - | - |
| | Arsenic (As) | mg/kg | 20 | - | 203 | - | 525 | 83.9 | 13.2 | 276 | 98.7 | 98.2 | 139 | 147 | 104 | 9.89 | 31.7 | 3.56 | - | - | - |
| | Barium (Ba) | mg/kg | 500 | - | 110 | - | 86.3 | 200 | 105 | 166 | 385 | 202 | - | - | 366 | 306 | 460 | 43 | - | - | - |
| | Beryllium (Be) | mg/kg | 4 | - | 0.27 | - | 0.27 | 0.41 | 0.35 | 0.38 | 0.66 | 0.41 | - | - | 0.44 | 0.47 | 0.8 | <0.20 | - | - | - |
| | Cadmium (Cd) | mg/kg | 2a | - | 1.23 | - | 0.857 | 0.25 | 0.094 | 4.17 | 0.137 | 0.264 | - | - | 0.306 | 0.108 | 0.358 | <0.050 | - | - | - |
| | Chromium (Cr) | mg/kg | - | - | 16 | - | 8.77 | 8.28 | 4.94 | 28.8 | 29 | 8.98 | - | - | 24.5 | 8.48 | 82 | 8.71 | - | - | - |
| | Chromium, Trivalent | mg/kg | 65 | - | - | - | 8.58 | - | - | 28.7 | 28.8 | - | - | - | - | - | - | - | - | - | - |
| | Hexavalent Chromium | mg/kg | 60 | - | - | - | 0.19 | - | - | 0.13 | 0.23 | - | - | - | - | - | - | - | - | - | - |
| | Cobalt (Co) | mg/kg | 50 | - | 7.02 | - | 4.26 | 5.37 | 7.33 | 6.47 | 7.55 | 7.08 | - | - | 19.5 | 14.7 | 26.9 | 3.52 | - | - | - |
| | Copper (Cu) | mg/kg | 150a | - | 22.6 | - | 18.9 | 9.81 | 8.2 | 70.9 | 21.4 | 36.6 | - | - | 49.1 | 49 | 25.8 | 8.54 | - | - | - |
| | Lead (Pb) | mg/kg | 250a | - | 137 | - | 270 | 27.2 | 5.64 | 231 | 15.6 | 16.5 | - | - | 56.1 | 2.89 | 16.7 | 1.46 | - | - | - |
| | Mercury (Hg) | mg/kg | 15 | - | 0.054 | - | <0.050 | <0.050 | <0.050 | 0.071 | <0.050 | <0.050 | - | - | <0.050 | 0.064 | <0.050 | <0.050 | - | - | - |
| | Molybdenum (Mo) | mg/kg | 10 | - | <0.50 | - | 0.57 | <0.50 | <0.50 | 5.13 | 0.65 | 2.62 | - | - | <0.50 | <0.50 | <0.50 | <0.50 | - | - | - |
| | Nickel (Ni) | mg/kg | 100 | - | 9.69 | - | 6.7 | 5.6 | 4.2 | 11.2 | 16.4 | 6.53 | - | - | 10.7 | 4.9 | 40.6 | 3.31 | - | - | - |
| | Selenium (Se) | mg/kg | 3 | - | 0.49 | - | <0.20 | <0.20 | <0.20 | <0.20 | 0.25 | <0.20 | - | - | 0.35 | <0.20 | <0.20 | <0.20 | - | - | - |
| | Silver (Ag) | mg/kg | 20 | - | 1.05 | - | 2.31 | 0.2 | <0.10 | 2.35 | 0.16 | 0.12 | - | - | 1.49 | 0.1 | 0.36 | 0.11 | - | - | - |
| | Thallium (Tl) | mg/kg | - | - | 0.262 | - | 0.144 | 0.098 | 0.053 | 0.235 | 0.172 | 0.155 | - | - | 0.425 | 0.295 | 0.32 | <0.050 | - | - | - |
| | Tin (Sn) | mg/kg | 50 | - | <2.0 | - | <2.0 | <2.0 | <2.0 | 5.2 | <2.0 | <2.0 | - | - | <2.0 | <2.0 | <2.0 | <2.0 | - | - | - |
| | Uranium (U) | mg/kg | - | - | 1.45 | - | 0.405 | 0.32 | 0.18 | 0.579 | 0.808 | 0.4 | - | - | 0.321 | 0.457 | 0.272 | 0.156 | - | - | - |
| | Vanadium (V) | mg/kg | 200 | - | 39.5 | - | 25.2 | 26.7 | 25.1 | 39.9 | 57.8 | 28 | - | - | 131 | 97.1 | 127 | 36 | - | - | - |
| | Zinc (Zn) | mg/kg | 300a | - | 117 | - | 170 | 29.1 | 23.9 | 307 | 59.7 | 46.8 | - | - | 117 | 97.1 | 110 | 16.7 | - | - | - |
| Leachable Metals | 1st Preliminary PH | pH | - | - | - | - | 8.08 | - | - | 7.28 | - | - | - | - | - | - | - | - | - | - | - |
| | 2nd Preliminary PH | pH | - | - | - | - | 1.58 | - | - | 1.58 | - | - | - | - | - | - | - | - | - | - | - |
| | Final pH | pH | - | - | - | - | 5.03 | - | - | 4.95 | - | - | - | - | - | - | - | - | - | - | - |
| | Extraction Solution Initial pH | pH | - | - | - | - | 4.94 | - | - | 4.92 | - | - | - | - | - | - | - | - | - | - | - |
| | Aluminum (Al) | mg/L | - | - | - | *0.105* | - | - | - | - | - | - | - | - | - | - | - | - | *0.0440* | *0.0340* | *0.0362* |
| | Antimony (Sb) | mg/L | - | - | - | *0.0013* | <1.0 | - | - | <1.0 | - | - | - | - | - | - | - | - | *0.0065* | *0.0107* | *0.0026* |
| | Arsenic (As) | mg/L | - | 2.5 | - | *0.0021* | <1.0 | - | - | <1.0 | - | - | - | - | - | - | - | - | *0.0092* | *0.0215* | *0.0031* |
| | Barium (Ba) | mg/L | - | 100 | - | *0.0401* | <2.5 | - | - | <2.5 | - | - | - | - | - | - | - | - | *0.0586* | *0.0188* | *0.0152* |
| | Beryllium (Be) | mg/L | - | - | - | *< 0.00002* | <0.025 | - | - | <0.025 | - | - | - | - | - | - | - | - | *< 0.00002* | *< 0.00002* | *< 0.00002* |
| | Bismuth (Bi) | mg/L | - | - | - | *< 0.00001* | - | - | - | - | - | - | - | - | - | - | - | - | *0.00002* | *< 0.00001* | *< 0.00001* |
| | Boron (B) | mg/L | - | 500 | - | *0.0073* | <0.50 | - | - | <0.50 | - | - | - | - | - | - | - | - | *0.0048* | *0.0154* | *0.0063* |
| | Cadmium (Cd) | mg/L | - | 0.5 | - | *0.000003* | <0.050 | - | - | <0.050 | - | - | - | - | - | - | - | - | *0.000147* | *0.000098* | *0.000286* |
| | Calcium (Ca) | mg/L | - | - | - | *8.73* | 30.6 | - | - | 41.2 | - | - | - | - | - | - | - | - | *25.6* | *39.4* | *42.7* |
| | Chromium (Cr) | mg/L | - | 5 | - | *< 0.0005* | <0.25 | - | - | <0.25 | - | - | - | - | - | - | - | - | *< 0.0005* | *< 0.0005* | *< 0.0005* |
| | Cobalt (Co) | mg/L | - | - | - | *0.000078* | <0.050 | - | - | <0.050 | - | - | - | - | - | - | - | - | *0.000084* | *0.000135* | *0.000087* |
| | Copper (Cu) | mg/L | - | - | - | *0.0014* | <0.050 | - | - | <0.050 | - | - | - | - | - | - | - | - | *0.0033* | *0.0010* | *0.0008* |
| | Iron (Fe) | mg/L | - | - | - | *0.095* | 0.41 | - | - | 4.01 | - | - | - | - | - | - | - | - | *0.101* | *0.022* | *0.016* |
| | Lead (Pb) | mg/L | - | 5 | - | *0.00013* | <0.25 | - | - | <0.25 | - | - | - | - | - | - | - | - | *0.00202* | *0.00045* | *0.00032* |
| | Lithium (Li) | mg/L | - | - | - | *< 0.001* | - | - | - | - | - | - | - | - | - | - | - | - | *0.001* | *< 0.001* | *0.002* |
| | Magnesium (Mg) | mg/L | - | - | - | *1.68* | 4.72 | - | - | 5.07 | - | - | - | - | - | - | - | - | *5.25* | *6.25* | *6.10* |
| | Manganese(Mn) | mg/L | - | - | - | *0.0105* | - | - | - | - | - | - | - | - | - | - | - | - | *0.0262* | *0.0030* | *0.0054* |
| | Mercury (Hg) | mg/L | - | 0.1 | - | *< 0.01* | <0.0010 | - | - | <0.0010 | - | - | - | - | - | - | - | - | *< 0.01* | *< 0.01* | *< 0.01* |
| | Molybdenum (Mo) | mg/L | - | - | - | *0.00035* | - | - | - | - | - | - | - | - | - | - | - | - | *0.00008* | *0.00023* | *0.00044* |
| | Nickel (Ni) | mg/L | - | - | - | *0.0004* | <0.25 | - | - | <0.25 | - | - | - | - | - | - | - | - | *0.0007* | *0.0002* | *0.0002* |
| | Phosphorus (P) | mg/L | - | - | - | *< 0.009* | - | - | - | - | - | - | - | - | - | - | - | - | *0.011* | *0.026* | *< 0.009* |
| | Potassium (K) | mg/L | - | - | - | *1.09* | - | - | - | - | - | - | - | - | - | - | - | - | *4.32* | *3.67* | *3.14* |
| | Selenium (Se) | mg/L | - | 1 | - | *0.00020* | <1.0 | - | - | <1.0 | - | - | - | - | - | - | - | - | *0.00014* | *0.00009* | *0.00009* |
| | Silicon (Si) | mg/L | - | - | - | *2.01* | - | - | - | - | - | - | - | - | - | - | - | - | *3.58* | *2.46* | *2.38* |
| | Silver (Ag) | mg/L | - | 5 | - | *< 0.00001* | <0.050 | - | - | <0.050 | - | - | - | - | - | - | - | - | *0.00001* | *< 0.00001* | *< 0.00001* |
| | Sodium (Na) | mg/L | - | - | - | *0.80* | - | - | - | - | - | - | - | - | - | - | - | - | *1.77* | *1.09* | *2.21* |
| | Strontium (Sr) | mg/L | - | - | - | *0.0308* | - | - | - | - | - | - | - | - | - | - | - | - | *0.0721* | *0.0865* | *0.150* |
| | Sulphur (S) | mg/L | - | - | - | *3.57* | - | - | - | - | - | - | - | - | - | - | - | - | *28.6* | *28.8* | *32.5* |
| | Thallium (Tl) | mg/L | - | - | - | *< 0.00002* | <1.0 | - | - | <1.0 | - | - | - | - | - | - | - | - | *0.00004* | *< 0.00002* | *< 0.00002* |
| | Tin (Sn) | mg/L | - | - | - | *< 0.00001* | - | - | - | - | - | - | - | - | - | - | - | - | *< 0.00001* | *< 0.00001* | *< 0.00001* |
| | Titanium (Ti) | mg/L | - | - | - | *0.0025* | - | - | - | - | - | - | - | - | - | - | - | - | *0.0013* | *0.0004* | *0.0002* |
| | Uranium (U) | mg/L | - | - | - | *0.000022* | - | - | - | - | - | - | - | - | - | - | - | - | *0.000008* | *0.000142* | *0.000159* |
| | Vanadium (V) | mg/L | - | - | - | *0.00062* | <0.15 | - | - | <0.15 | - | - | - | - | - | - | - | - | *0.00027* | *0.00017* | *0.00012* |
| | Zinc (Zn) | mg/L | - | - | - | *0.001* | 1.62 | - | - | 1.15 | - | - | - | - | - | - | - | - | *0.006* | *0.003* | *0.004* |
| | Zirconium (Zr) | mg/L | - | - | - | *0.00003* | - | - | - | - | - | - | - | - | - | - | - | - | *0.00007* | *0.00003* | *0.00002* |

* indicates that the result is qualified

- indicates no data

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**HWHRM exceedances are highlighted and underlined**

Leachable metals through TCLP Extraction Procedure or, *if italicized, through the SFE Method*

a. Standard is pH dependent. Lowest applicable standard is presented but results are compared to sample specific pH

**Table D5-3: 2013 Soil Hydrocarbon Analytical Results Compared to Standards, Mt. Nansen, YT**

| | | | Sample ID | BH-M-13-01 | BH-M-13-02 | BH-M-13-05 | BH-M-13-04 | BH-M-13-04 | BH-M-13-04 | BH-M-13-05 | BH-M-13-07 | BH-M-13-07 | BH-M-13-07 | BH-M-13-08 | BH-M-13-08 | BH-M-13-08 | BH-M-13-08 | TP-M-13-04 | TP-M-13-04 | TP-M-13-05 | BH-KZ-13-02 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Depth (mbgs) | 1.1-1.5 | 3.1-3.5 | 0.0-0.5 | 0.0-0.5 | 0.0-0.5 | 1.1-1.5 | 1.1-1.5 | 0.0-0.5 | 0.6-1.0 | 1.1-1.5 | 0.0-0.5 | 2.6-3.0 | 3.1-3.5 | 3.6-4.0 | 0.0-0.5 | 2.1-2.5 | 0.6-1.0 | 0.0-0.5 |
| | | | Date Sampled | 09/10/2013 | 09/09/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 9/13/2013 | 9/13/2013 | 09/12/2013 | 09/10/2013 |
| **Group** | **Analyte** | **Units** | **CSR SOIL PL** | | | | | | | | | | | | | | | | | | |
| Physical | Moisture | % | - | 13.2 | 13.5 | 7.73 | - | 7.1 | 13.9 | 4.53 | 11.9 | 15.2 | 15.8 | 20 | 14.9 | 8.05 | 15 | - | 17.7 | - | 7.23 |
| | pH (1:2 soil:water) | pH | - | 7.61 | 8.61 | 7.44 | 7.67 | 7.74 | 7.61 | 7.82 | 7.91 | 8.29 | 8.34 | 7.71 | 7.74 | 7.66 | 7.64 | 7.82 | 7.05 | 7.86 | 7.22 |
| Cyanide | Cyanide, Weak Acid Diss | mg/kg | 50 | - | - | - | - | <0.050 | <0.050 | - | - | <0.050 | - | - | - | <0.050 | - | - | <0.050 | - | <0.050 |
| | Cyanide, Total | mg/kg | - | - | - | - | - | 29.6 | <0.050 | - | - | <0.050 | - | - | - | <0.050 | - | - | <0.050 | - | <0.050 |
| Carbon | Total Organic Carbon | % | - | 0.97 | <0.10 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Nitrogen | Available Ammonium-N | mg/kg | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total Kjeldahl Nitrogen | % | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Nitrate+Nitrite-N | mg/kg | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Nitrate-N | mg/kg | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Nitrite-N | mg/kg | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Volatile Organic Compounds | Volatile Hydrocarbons (VH6-10) | mg/kg | - | <100 | <100 | <100 | - | <100 | <100 | <100 | 320 | 660 | <100 | <100 | <100 | <100 | <100 | - | <100 | - | <100 |
| | VPH (C6-C10) | mg/kg | 200 | <100 | <100 | <100 | - | <100 | <100 | <100 | 320 | 660 | <100 | <100 | <100 | <100 | <100 | - | <100 | - | <100 |
| | Benzene | mg/kg | 0.04 | <0.040 | <0.040 | <0.040 | - | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | <0.040 | - | <0.040 | - | <0.040 |
| | Bromodichloromethane | mg/kg | - | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Bromoform | mg/kg | - | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Carbon Tetrachloride | mg/kg | 5 | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Chlorobenzene | mg/kg | 1 | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Dibromochloromethane | mg/kg | - | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Chloroethane | mg/kg | - | <0.10 | <0.10 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Chloroform | mg/kg | 5 | <0.10 | <0.10 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Chloromethane | mg/kg | - | <0.10 | <0.10 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2-Dichlorobenzene | mg/kg | 1 | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,3-Dichlorobenzene | mg/kg | 1 | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,4-Dichlorobenzene | mg/kg | 1 | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,1-Dichloroethane | mg/kg | 5 | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2-Dichloroethane | mg/kg | 5 | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,1-Dichloroethylene | mg/kg | 5 | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | cis-1,2-Dichloroethylene | mg/kg | 5 | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | trans-1,2-Dichloroethylene | mg/kg | 5 | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Dichloromethane | mg/kg | 5 | <0.30 | <0.30 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2-Dichloropropane | mg/kg | 5 | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | cis-1,3-Dichloropropylene | mg/kg | 5 | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | trans-1,3-Dichloropropylene | mg/kg | 5 | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Ethylbenzene | mg/kg | 1 | <0.050 | <0.050 | <0.050 | - | <0.050 | <0.050 | <0.050 | <0.050 | 1.36 | 0.131 | <0.050 | <0.050 | <0.050 | <0.050 | - | <0.050 | - | <0.050 |
| | Methyl t-butyl ether (MTBE) | mg/kg | - | <0.20 | <0.20 | <0.20 | - | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | - | <0.20 | - | <0.20 |
| | Styrene | mg/kg | 5 | <0.050 | <0.050 | <0.050 | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | - | <0.050 | - | <0.050 |
| | 1,1,1,2-Tetrachloroethane | mg/kg | - | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,1,2,2-Tetrachloroethane | mg/kg | - | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Tetrachloroethylene | mg/kg | 5 | 0.153 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Toluene | mg/kg | 1.5 | <0.050 | <0.050 | <0.050 | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | - | <0.050 | - | <0.050 |
| | 1,1,1-Trichloroethane | mg/kg | 5 | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,1,2-Trichloroethane | mg/kg | 5 | <0.050 | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Trichloroethylene | mg/kg | 0.15 | 0.015 | <0.010 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Trichlorofluoromethane | mg/kg | - | <0.10 | <0.10 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Vinyl Chloride | mg/kg | - | <0.10 | <0.10 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | ortho-Xylene | mg/kg | - | 0.061 | <0.050 | <0.050 | - | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | - | <0.050 | - | <0.050 |
| | meta- & para-Xylene | mg/kg | - | 0.124 | <0.050 | <0.050 | - | <0.050 | <0.050 | <0.050 | <0.060 * | 1.47 | 0.139 | <0.050 | <0.050 | <0.050 | <0.050 | - | <0.050 | - | <0.050 |
| | Xylenes | mg/kg | 5 | 0.185 | <0.075 | <0.075 | - | <0.075 | <0.075 | <0.075 | <0.078 | 1.47 | 0.139 | <0.075 | <0.075 | <0.075 | <0.075 | - | <0.075 | - | <0.075 |
| Glycols | Diethylene Glycol | mg/kg | - | <10 | <10 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Ethylene Glycol | mg/kg | 1500 | <10 | <10 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2-Propylene Glycol | mg/kg | - | <10 | <10 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Chlorinated Hydrocarbons | 1,2-Dichlorobenzene | mg/kg | 1 | <0.010 | <0.010 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,3-Dichlorobenzene | mg/kg | 1 | <0.010 | <0.010 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,4-Dichlorobenzene | mg/kg | 1 | <0.010 | <0.010 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Hexachlorobenzene | mg/kg | 2 | <0.010 | <0.010 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Hexachlorobutadiene | mg/kg | - | <0.010 | <0.010 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Hexachlorocyclohexane (Total) | mg/kg | - | <0.30 * | <0.050 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Hexachloroethane | mg/kg | - | <0.010 | <0.010 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Pentachlorobenzene | mg/kg | 2 | <0.010 | <0.010 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,4-Tetrachlorobenzene | mg/kg | 2 | <0.010 | <0.010 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,5-Tetrachlorobenzene | mg/kg | 2 | <0.010 | <0.010 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2,4,5-Tetrachlorobenzene | mg/kg | 2 | <0.010 | <0.010 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3-Trichlorobenzene | mg/kg | 2 | <0.020 * | <0.010 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2,4-Trichlorobenzene | mg/kg | 2 | <0.010 | <0.010 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,3,5-Trichlorobenzene | mg/kg | 2 | <0.010 | <0.010 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2,4,5-Trichlorotoluene | mg/kg | - | <0.20 * | <0.010 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

| | | | Sample ID | BH-M-13-01 | BH-M-13-02 | BH-M-13-05 | BH-M-13-04 | BH-M-13-04 | BH-M-13-04 | BH-M-13-05 | BH-M-13-07 | BH-M-13-07 | BH-M-13-07 | BH-M-13-08 | BH-M-13-08 | BH-M-13-08 | BH-M-13-08 | TP-M-13-04 | TP-M-13-04 | TP-M-13-05 | BH-KZ-13-02 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Depth (mbgs) | 1.1-1.5 | 3.1-3.5 | 0.0-0.5 | 0.0-0.5 | 0.0-0.5 | 1.1-1.5 | 1.1-1.5 | 0.0-0.5 | 0.6-1.0 | 1.1-1.5 | 0.0-0.5 | 2.6-3.0 | 3.1-3.5 | 3.6-4.0 | 0.0-0.5 | 2.1-2.5 | 0.6-1.0 | 0.0-0.5 |
| | | | Date Sampled | 09/10/2013 | 09/09/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 9/13/2013 | 9/13/2013 | 09/12/2013 | 09/10/2013 |
| **Group** | **Analyte** | **Units** | **CSR SOIL PL** | | | | | | | | | | | | | | | | | | |
| Phenols | 4-Chloro-3-methylphenol | mg/kg | - | <0.020 | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2-Chlorophenol | mg/kg | 0.5 | <0.030 * | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 3-Chlorophenol | mg/kg | 0.5 | <0.020 | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 4-Chlorophenol | mg/kg | 0.5 | <0.020 | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2,3-Dichlorophenol | mg/kg | 0.5 | <0.020 | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2,4 & 2,5-Dichlorophenol | mg/kg | - | <0.050 * | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2,6-Dichlorophenol | mg/kg | 0.5 | <0.020 | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 3,4-Dichlorophenol | mg/kg | 0.5 | <0.020 | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 3,5-Dichlorophenol | mg/kg | 0.5 | <0.060 * | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2,4-Dimethylphenol | mg/kg | 1 | <0.020 | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | o-Cresol | mg/kg | 1 | <0.030 * | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | m-Cresol | mg/kg | 1 | <0.030 * | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | p-Cresol | mg/kg | 1 | <0.020 | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Pentachlorophenol | mg/kg | 0.15 | <0.020 | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Phenol | mg/kg | 1 | <0.020 | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2,3,4,5-Tetrachlorophenol | mg/kg | 0.5 | <0.030 * | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2,3,4,6-Tetrachlorophenol | mg/kg | 0.5 | <0.030 * | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2,3,5,6-Tetrachlorophenol | mg/kg | 0.5 | <0.030 * | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2,3,4-Trichlorophenol | mg/kg | 0.5 | <0.020 | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2,3,5-Trichlorophenol | mg/kg | 0.5 | <0.020 | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2,3,6-Trichlorophenol | mg/kg | 0.5 | <0.020 | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2,4,5-Trichlorophenol | mg/kg | 0.5 | <0.020 | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2,4,6-Trichlorophenol | mg/kg | 0.5 | <0.020 | <0.020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| PCBs | PCB-1016 | mg/kg | - | <0.020 | <0.020 | - | - | - | - | <0.020 | - | - | - | - | - | - | - | - | - | - | - |
| | PCB-1221 | mg/kg | - | <0.020 | <0.020 | - | - | - | - | <0.020 | - | - | - | - | - | - | - | - | - | - | - |
| | PCB-1232 | mg/kg | - | <0.020 | <0.020 | - | - | - | - | <0.020 | - | - | - | - | - | - | - | - | - | - | - |
| | PCB-1242 | mg/kg | - | <0.020 | <0.020 | - | - | - | - | <0.020 | - | - | - | - | - | - | - | - | - | - | - |
| | PCB-1248 | mg/kg | - | <0.020 | <0.020 | - | - | - | - | <0.020 | - | - | - | - | - | - | - | - | - | - | - |
| | PCB-1254 | mg/kg | - | <0.020 | <0.020 | - | - | - | - | <0.020 | - | - | - | - | - | - | - | - | - | - | - |
| | PCB-1260 | mg/kg | - | <0.020 | <0.020 | - | - | - | - | <0.020 | - | - | - | - | - | - | - | - | - | - | - |
| | PCB-1262 | mg/kg | - | <0.020 | <0.020 | - | - | - | - | <0.020 | - | - | - | - | - | - | - | - | - | - | - |
| | PCB-1268 | mg/kg | - | <0.020 | <0.020 | - | - | - | - | <0.020 | - | - | - | - | - | - | - | - | - | - | - |
| | Total Polychlorinated Biphenyls | mg/kg | 5 | <0.020 | <0.020 | - | - | - | - | <0.020 | - | - | - | - | - | - | - | - | - | - | - |
| | 2,3,7,8-TCDD | pg/g | - | 0.97 * | <0.27 * | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,7,8-PeCDD | pg/g | - | 3.21 * | <0.19 * | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,4,7,8-HxCDD | pg/g | - | 2.40 * | <0.11 * | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,6,7,8-HxCDD | pg/g | - | 4.44 * | <0.12 * | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,7,8,9-HxCDD | pg/g | - | 4.00 * | <0.11 * | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,4,6,7,8-HpCDD | pg/g | - | 26 | <0.18 * | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | OCDD | pg/g | - | 36.9 | <0.16 * | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total-TCDD | pg/g | - | 82.3 | <0.27 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total TCDD # Homologues | | - | 13 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total-PeCDD | pg/g | - | 84.1 | <0.19 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total PeCDD # Homologues | | - | 7 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total-HxCDD | pg/g | - | 75.9 | <0.12 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total HxCDD # Homologues | | - | 4 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total-HpCDD | pg/g | - | 60.7 | <0.18 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total HpCDD # Homologues | | - | 2 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2,3,7,8-TCDF | pg/g | - | 9.5 | <0.21 * | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,7,8-PeCDF | pg/g | - | 11.3 | <0.12 * | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2,3,4,7,8-PeCDF | pg/g | - | 21 | <0.11 * | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,4,7,8-HxCDF | pg/g | - | 17.7 | <0.10 * | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,6,7,8-HxCDF | pg/g | - | 16.2 | <0.095 * | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,7,8,9-HxCDF | pg/g | - | 2.70 * | <0.13 * | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2,3,4,6,7,8-HxCDF | pg/g | - | 20.7 | <0.094 * | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,4,6,7,8-HpCDF | pg/g | - | 69.7 | <0.11 * | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,4,7,8,9-HpCDF | pg/g | - | 3.4 * | <0.17 * | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | OCDF | pg/g | - | 15.0 * | <0.24 * | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total-TCDF | pg/g | - | 370 | <0.21 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total TCDF # Homologues | | - | 19 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total-PeCDF | pg/g | - | 314 | <0.12 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total PeCDF # Homologues | | - | 12 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total-HxCDF | pg/g | - | 179 | <0.13 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total HxCDF # Homologues | | - | 9 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total-HpCDF | pg/g | - | 92.2 | <0.17 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total HpCDF # Homologues | | - | 4 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 13C12-2,3,7,8-TCDD | % | - | 88 | 56 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,7,8-PeCDD | % | - | 82 | 49 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,4,7,8-HxCDD | % | - | 100 | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,6,7,8-HxCDD | % | - | 92 | 70 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,4,6,7,8-HpCDD | % | - | 84 | 64 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

| | | | Sample ID | BH-M-13-01 | BH-M-13-02 | BH-M-13-05 | BH-M-13-04 | BH-M-13-04 | BH-M-13-04 | BH-M-13-05 | BH-M-13-07 | BH-M-13-07 | BH-M-13-07 | BH-M-13-08 | BH-M-13-08 | BH-M-13-08 | BH-M-13-08 | TP-M-13-04 | TP-M-13-04 | TP-M-13-05 | BH-KZ-13-02 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Depth (mbgs) | 1.1-1.5 | 3.1-3.5 | 0.0-0.5 | 0.0-0.5 | 0.0-0.5 | 1.1-1.5 | 1.1-1.5 | 0.0-0.5 | 0.6-1.0 | 1.1-1.5 | 0.0-0.5 | 2.6-3.0 | 3.1-3.5 | 3.6-4.0 | 0.0-0.5 | 2.1-2.5 | 0.6-1.0 | 0.0-0.5 |
| | | | Date Sampled | 09/10/2013 | 09/09/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 09/10/2013 | 9/13/2013 | 9/13/2013 | 09/12/2013 | 09/10/2013 |
| **Group** | **Analyte** | **Units** | **CSR SOIL PL** | | | | | | | | | | | | | | | | | | |
| | 13C12-OCDD | % | - | 81 | 53 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 13C12-2,3,7,8-TCDF | % | - | 88 | 59 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,7,8-PeCDF | % | - | 82 | 52 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 13C12-2,3,4,7,8-PeCDF | % | - | 78 | 51 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,4,7,8-HxCDF | % | - | 92 | 63 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,6,7,8-HxCDF | % | - | 84 | 68 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 13C12-2,3,4,6,7,8-HxCDF | % | - | 85 | 72 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,7,8,9-HxCDF | % | - | 95 | 66 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,4,6,7,8-HpCDF | % | - | 81 | 66 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,4,7,8,9-HpCDF | % | - | 87 | 60 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 37Cl4-2,3,7,8-TCDD (Cleanup) | % | - | 96 | 78 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Lower Bound PCDD/F TEQ | pg/g | - | 17.7 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Mid Point PCDD/F TEQ | pg/g | - | 19.6 | 0.299 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Higher Bound PCDD/F TEQ | pg/g | - | 19.6 | 0.598 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Volume Nanopure Water | mL | - | - | - | - | 750 | - | - | - | - | - | - | - | - | - | - | 750 | - | 750 | - |
| | Sample Weight | g | - | - | - | - | 250 | - | - | - | - | - | - | - | - | - | - | 250 | - | 250 | - |
| Miscellaneous Parameters | Redox | mV | - | - | - | - | 317 | - | - | - | - | - | - | - | - | - | - | 351 | - | 345 | - |
| | Conductivity | uS/cm | - | - | - | - | 389 | - | - | - | - | - | - | - | - | - | - | 209 | - | 61 | - |
| | Total Acidity (to pH 8.3) | mg CaCO3/L | - | - | - | - | 3.7 | - | - | - | - | - | - | - | - | - | - | 3.6 | - | 3.0 | - |
| | Alkalinity | mg CaCO3/L | - | - | - | - | 50.1 | - | - | - | - | - | - | - | - | - | - | 38.8 | - | 24.3 | - |
| | Sulphate | mg/L | - | - | - | - | 109 | - | - | - | - | - | - | - | - | - | - | 58 | - | 10 | - |
| | Major Anions | meq/L | - | - | - | - | 1.12 | - | - | - | - | - | - | - | - | - | - | 0.88 | - | 0.57 | - |
| | Major Cations | meq/L | - | - | - | - | 0.00 | - | - | - | - | - | - | - | - | - | - | 0.00 | - | 0.00 | - |
| Ion Balance | Difference | meq/L | - | - | - | - | 1.12 | - | - | - | - | - | - | - | - | - | - | 0.88 | - | 0.57 | - |
| | Balance (%) | % | - | - | - | - | 100.0% | - | - | - | - | - | - | - | - | - | - | 100.0% | - | 100.0% | - |

* indicates that the result is qualified
\- indicates no data

CSR - PL = Yukon Government (YG). 2002. Contaminated Sites Regulation – *Yukon Environment Act* Schedules 1 and 2 for Park Land Use [O.I.C. 2002/171]

CSR-PL exeedances are highlighted and underlined

| | | | Sample ID | BH-KZ-13-01 | BH-KZ-13-01 | TP-SP-13-03 | TP-SP-13-04 | TP-SP-13-05 | TP-SP-13-06 | TP-R-13-01 | TP-R-13-02 | TP-R-13-03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Depth (mbgs) | 0.0-0.5 | 0.6-1.0 | 0.1-0.2 | 0.1-0.2 | 0.1-0.2 | 0.1-0.2 | 0.6-1.0 | 0.0-0.5 | 0.6-1.0 |
| | | | Date Sampled | 09/09/2013 | 09/09/2013 | 09/11/2013 | 09/11/2013 | 09/11/2013 | 09/11/2013 | 09/12/2013 | 09/12/2013 | 09/12/2013 |
| **Group** | **Analyte** | **Units** | **CSR SOIL PL** | | | | | | | | | |
| Physical | Moisture | % | - | 4.16 | 12.3 | - | - | - | - | - | - | - |
| | pH (1:2 soil:water) | pH | - | 7.08 | 5.71 | 8.26 | 7.72 | 8.58 | 5.86 | 7.43 | 7.83 | 7.82 |
| Cyanide | Cyanide, Weak Acid Diss | mg/kg | 50 | <0.10 * | <0.050 | - | - | - | - | - | - | - |
| | Cyanide, Total | mg/kg | - | - | - | - | - | - | - | - | - | - |
| Carbon | Total Organic Carbon | % | - | - | - | 0.15 | <0.10 | <0.10 | 2.5 | - | - | - |
| Nitrogen | Available Ammonium-N | mg/kg | - | - | - | 1.8 | 1.1 | 3.3 | 1.8 | - | - | - |
| | Total Kjeldahl Nitrogen | % | - | - | - | <0.020 | <0.020 | <0.020 | 0.142 | - | - | - |
| | Nitrate+Nitrite-N | mg/kg | - | - | - | <2.0 | <2.0 | <2.0 | <4.0 * | - | - | - |
| | Nitrate-N | mg/kg | - | - | - | <2.0 | <2.0 | <2.0 | <4.0 * | - | - | - |
| | Nitrite-N | mg/kg | - | - | - | <0.40 | <0.40 | <0.40 | <0.80 * | - | - | - |
| Volatile Organic Compounds | Volatile Hydrocarbons (VH6-10) | mg/kg | - | 1610 | <100 | - | - | - | - | - | - | - |
| | VPH (C6-C10) | mg/kg | 200 | 1210 | <100 | - | - | - | - | - | - | - |
| | Benzene | mg/kg | 0.04 | <0.40 | <0.040 | - | - | - | - | - | - | - |
| | Bromodichloromethane | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | Bromoform | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | Carbon Tetrachloride | mg/kg | 5 | - | - | - | - | - | - | - | - | - |
| | Chlorobenzene | mg/kg | 1 | - | - | - | - | - | - | - | - | - |
| | Dibromochloromethane | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | Chloroethane | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | Chloroform | mg/kg | 5 | - | - | - | - | - | - | - | - | - |
| | Chloromethane | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | 1,2-Dichlorobenzene | mg/kg | 1 | - | - | - | - | - | - | - | - | - |
| | 1,3-Dichlorobenzene | mg/kg | 1 | - | - | - | - | - | - | - | - | - |
| | 1,4-Dichlorobenzene | mg/kg | 1 | - | - | - | - | - | - | - | - | - |
| | 1,1-Dichloroethane | mg/kg | 5 | - | - | - | - | - | - | - | - | - |
| | 1,2-Dichloroethane | mg/kg | 5 | - | - | - | - | - | - | - | - | - |
| | 1,1-Dichloroethylene | mg/kg | 5 | - | - | - | - | - | - | - | - | - |
| | cis-1,2-Dichloroethylene | mg/kg | 5 | - | - | - | - | - | - | - | - | - |
| | trans-1,2-Dichloroethylene | mg/kg | 5 | - | - | - | - | - | - | - | - | - |
| | Dichloromethane | mg/kg | 5 | - | - | - | - | - | - | - | - | - |
| | 1,2-Dichloropropane | mg/kg | 5 | - | - | - | - | - | - | - | - | - |
| | cis-1,3-Dichloropropylene | mg/kg | 5 | - | - | - | - | - | - | - | - | - |
| | trans-1,3-Dichloropropylene | mg/kg | 5 | - | - | - | - | - | - | - | - | - |
| | Ethylbenzene | mg/kg | 1 | 7.19 | <0.050 | - | - | - | - | - | - | - |
| | Methyl t-butyl ether (MTBE) | mg/kg | - | <0.20 | <0.20 | - | - | - | - | - | - | - |
| | Styrene | mg/kg | 5 | 0.12 | <0.050 | - | - | - | - | - | - | - |
| | 1,1,1,2-Tetrachloroethane | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | 1,1,2,2-Tetrachloroethane | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | Tetrachloroethylene | mg/kg | 5 | - | - | - | - | - | - | - | - | - |
| | Toluene | mg/kg | 1.5 | 31.6 | <0.050 | - | - | - | - | - | - | - |
| | 1,1,1-Trichloroethane | mg/kg | 5 | - | - | - | - | - | - | - | - | - |
| | 1,1,2-Trichloroethane | mg/kg | 5 | - | - | - | - | - | - | - | - | - |
| | Trichloroethylene | mg/kg | 0.15 | - | - | - | - | - | - | - | - | - |
| | Trichlorofluoromethane | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | Vinyl Chloride | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | ortho-Xylene | mg/kg | - | 144 | <0.050 | - | - | - | - | - | - | - |
| | meta- & para-Xylene | mg/kg | - | 215 | <0.050 | - | - | - | - | - | - | - |
| | Xylenes | mg/kg | 5 | 359 | <0.075 | - | - | - | - | - | - | - |
| Glycols | Diethylene Glycol | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | Ethylene Glycol | mg/kg | 1500 | - | - | - | - | - | - | - | - | - |
| | 1,2-Propylene Glycol | mg/kg | - | - | - | - | - | - | - | - | - | - |
| Chlorinated Hydrocarbons | 1,2-Dichlorobenzene | mg/kg | 1 | - | - | - | - | - | - | - | - | - |
| | 1,3-Dichlorobenzene | mg/kg | 1 | - | - | - | - | - | - | - | - | - |
| | 1,4-Dichlorobenzene | mg/kg | 1 | - | - | - | - | - | - | - | - | - |
| | Hexachlorobenzene | mg/kg | 2 | - | - | - | - | - | - | - | - | - |
| | Hexachlorobutadiene | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | Hexachlorocyclohexane (Total) | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | Hexachloroethane | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | Pentachlorobenzene | mg/kg | 2 | - | - | - | - | - | - | - | - | - |
| | 1,2,3,4-Tetrachlorobenzene | mg/kg | 2 | - | - | - | - | - | - | - | - | - |
| | 1,2,3,5-Tetrachlorobenzene | mg/kg | 2 | - | - | - | - | - | - | - | - | - |
| | 1,2,4,5-Tetrachlorobenzene | mg/kg | 2 | - | - | - | - | - | - | - | - | - |
| | 1,2,3-Trichlorobenzene | mg/kg | 2 | - | - | - | - | - | - | - | - | - |
| | 1,2,4-Trichlorobenzene | mg/kg | 2 | - | - | - | - | - | - | - | - | - |
| | 1,3,5-Trichlorobenzene | mg/kg | 2 | - | - | - | - | - | - | - | - | - |
| | 2,4,5-Trichlorotoluene | mg/kg | - | - | - | - | - | - | - | - | - | - |

| | | | Sample ID | BH-KZ-13-01 | BH-KZ-13-01 | TP-SP-13-03 | TP-SP-13-04 | TP-SP-13-05 | TP-SP-13-06 | TP-R-13-01 | TP-R-13-02 | TP-R-13-03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Depth (mbgs) | 0.0-0.5 | 0.6-1.0 | 0.1-0.2 | 0.1-0.2 | 0.1-0.2 | 0.1-0.2 | 0.6-1.0 | 0.0-0.5 | 0.6-1.0 |
| | | | Date Sampled | 09/09/2013 | 09/09/2013 | 09/11/2013 | 09/11/2013 | 09/11/2013 | 09/11/2013 | 09/12/2013 | 09/12/2013 | 09/12/2013 |
| Group | Analyte | Units | CSR SOIL PL | | | | | | | | | |
| Phenols | 4-Chloro-3-methylphenol | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | 2-Chlorophenol | mg/kg | 0.5 | - | - | - | - | - | - | - | - | - |
| | 3-Chlorophenol | mg/kg | 0.5 | - | - | - | - | - | - | - | - | - |
| | 4-Chlorophenol | mg/kg | 0.5 | - | - | - | - | - | - | - | - | - |
| | 2,3-Dichlorophenol | mg/kg | 0.5 | - | - | - | - | - | - | - | - | - |
| | 2,4 & 2,5-Dichlorophenol | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | 2,6-Dichlorophenol | mg/kg | 0.5 | - | - | - | - | - | - | - | - | - |
| | 3,4-Dichlorophenol | mg/kg | 0.5 | - | - | - | - | - | - | - | - | - |
| | 3,5-Dichlorophenol | mg/kg | 0.5 | - | - | - | - | - | - | - | - | - |
| | 2,4-Dimethylphenol | mg/kg | 1 | - | - | - | - | - | - | - | - | - |
| | o-Cresol | mg/kg | 1 | - | - | - | - | - | - | - | - | - |
| | m-Cresol | mg/kg | 1 | - | - | - | - | - | - | - | - | - |
| | p-Cresol | mg/kg | 1 | - | - | - | - | - | - | - | - | - |
| | Pentachlorophenol | mg/kg | 0.15 | - | - | - | - | - | - | - | - | - |
| | Phenol | mg/kg | 1 | - | - | - | - | - | - | - | - | - |
| | 2,3,4,5-Tetrachlorophenol | mg/kg | 0.5 | - | - | - | - | - | - | - | - | - |
| | 2,3,4,6-Tetrachlorophenol | mg/kg | 0.5 | - | - | - | - | - | - | - | - | - |
| | 2,3,5,6-Tetrachlorophenol | mg/kg | 0.5 | - | - | - | - | - | - | - | - | - |
| | 2,3,4-Trichlorophenol | mg/kg | 0.5 | - | - | - | - | - | - | - | - | - |
| | 2,3,5-Trichlorophenol | mg/kg | 0.5 | - | - | - | - | - | - | - | - | - |
| | 2,3,6-Trichlorophenol | mg/kg | 0.5 | - | - | - | - | - | - | - | - | - |
| | 2,4,5-Trichlorophenol | mg/kg | 0.5 | - | - | - | - | - | - | - | - | - |
| | 2,4,6-Trichlorophenol | mg/kg | 0.5 | - | - | - | - | - | - | - | - | - |
| PCBs | PCB-1016 | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | PCB-1221 | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | PCB-1232 | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | PCB-1242 | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | PCB-1248 | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | PCB-1254 | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | PCB-1260 | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | PCB-1262 | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | PCB-1268 | mg/kg | - | - | - | - | - | - | - | - | - | - |
| | Total Polychlorinated Biphenyls | mg/kg | 5 | - | - | - | - | - | - | - | - | - |
| | 2,3,7,8-TCDD | pg/g | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,7,8-PeCDD | pg/g | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,4,7,8-HxCDD | pg/g | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,6,7,8-HxCDD | pg/g | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,7,8,9-HxCDD | pg/g | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,4,6,7,8-HpCDD | pg/g | - | - | - | - | - | - | - | - | - | - |
| | OCDD | pg/g | - | - | - | - | - | - | - | - | - | - |
| | Total-TCDD | pg/g | - | - | - | - | - | - | - | - | - | - |
| | Total TCDD # Homologues | | - | - | - | - | - | - | - | - | - | - |
| | Total-PeCDD | pg/g | - | - | - | - | - | - | - | - | - | - |
| | Total PeCDD # Homologues | | - | - | - | - | - | - | - | - | - | - |
| | Total-HxCDD | pg/g | - | - | - | - | - | - | - | - | - | - |
| | Total HxCDD # Homologues | | - | - | - | - | - | - | - | - | - | - |
| | Total-HpCDD | pg/g | - | - | - | - | - | - | - | - | - | - |
| | Total HpCDD # Homologues | | - | - | - | - | - | - | - | - | - | - |
| | 2,3,7,8-TCDF | pg/g | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,7,8-PeCDF | pg/g | - | - | - | - | - | - | - | - | - | - |
| | 2,3,4,7,8-PeCDF | pg/g | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,4,7,8-HxCDF | pg/g | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,6,7,8-HxCDF | pg/g | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,7,8,9-HxCDF | pg/g | - | - | - | - | - | - | - | - | - | - |
| | 2,3,4,6,7,8-HxCDF | pg/g | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,4,6,7,8-HpCDF | pg/g | - | - | - | - | - | - | - | - | - | - |
| | 1,2,3,4,7,8,9-HpCDF | pg/g | - | - | - | - | - | - | - | - | - | - |
| | OCDF | pg/g | - | - | - | - | - | - | - | - | - | - |
| | Total-TCDF | pg/g | - | - | - | - | - | - | - | - | - | - |
| | Total TCDF # Homologues | | - | - | - | - | - | - | - | - | - | - |
| | Total-PeCDF | pg/g | - | - | - | - | - | - | - | - | - | - |
| | Total PeCDF # Homologues | | - | - | - | - | - | - | - | - | - | - |
| | Total-HxCDF | pg/g | - | - | - | - | - | - | - | - | - | - |
| | Total HxCDF # Homologues | | - | - | - | - | - | - | - | - | - | - |
| | Total-HpCDF | pg/g | - | - | - | - | - | - | - | - | - | - |
| | Total HpCDF # Homologues | | - | - | - | - | - | - | - | - | - | - |
| | 13C12-2,3,7,8-TCDD | % | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,7,8-PeCDD | % | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,4,7,8-HxCDD | % | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,6,7,8-HxCDD | % | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,4,6,7,8-HpCDD | % | - | - | - | - | - | - | - | - | - | - |

| | | | Sample ID | BH-KZ-13-01 | BH-KZ-13-01 | TP-SP-13-03 | TP-SP-13-04 | TP-SP-13-05 | TP-SP-13-06 | TP-R-13-01 | TP-R-13-02 | TP-R-13-03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Depth (mbgs) | 0.0-0.5 | 0.6-1.0 | 0.1-0.2 | 0.1-0.2 | 0.1-0.2 | 0.1-0.2 | 0.6-1.0 | 0.0-0.5 | 0.6-1.0 |
| | | | Date Sampled | 09/09/2013 | 09/09/2013 | 09/11/2013 | 09/11/2013 | 09/11/2013 | 09/11/2013 | 09/12/2013 | 09/12/2013 | 09/12/2013 |
| **Group** | **Analyte** | **Units** | **CSR SOIL PL** | | | | | | | | | |
| | 13C12-OCDD | % | - | - | - | - | - | - | - | - | - | - |
| | 13C12-2,3,7,8-TCDF | % | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,7,8-PeCDF | % | - | - | - | - | - | - | - | - | - | - |
| | 13C12-2,3,4,7,8-PeCDF | % | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,4,7,8-HxCDF | % | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,6,7,8-HxCDF | % | - | - | - | - | - | - | - | - | - | - |
| | 13C12-2,3,4,6,7,8-HxCDF | % | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,7,8,9-HxCDF | % | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,4,6,7,8-HpCDF | % | - | - | - | - | - | - | - | - | - | - |
| | 13C12-1,2,3,4,7,8,9-HpCDF | % | - | - | - | - | - | - | - | - | - | - |
| | 37Cl4-2,3,7,8-TCDD (Cleanup) | % | - | - | - | - | - | - | - | - | - | - |
| | Lower Bound PCDD/F TEQ | pg/g | - | - | - | - | - | - | - | - | - | - |
| | Mid Point PCDD/F TEQ | pg/g | - | - | - | - | - | - | - | - | - | - |
| | Higher Bound PCDD/F TEQ | pg/g | - | - | - | - | - | - | - | - | - | - |
| Miscellaneous Parameters | Volume Nanopure Water | mL | - | - | - | - | - | - | - | 750 | 750 | 750 |
| | Sample Weight | g | - | - | - | - | - | - | - | 250 | 250 | 250 |
| | Redox | mV | - | - | - | - | - | - | - | 366 | 361 | 357 |
| | Conductivity | uS/cm | - | - | - | - | - | - | - | 203 | 260 | 287 |
| | Total Acidity (to pH 8.3) | mg CaCO3/L | - | - | - | - | - | - | - | 3.8 | 3.4 | 3.8 |
| | Alkalinity | mg CaCO3/L | - | - | - | - | - | - | - | 4.0 | 42.1 | 36.6 |
| | Sulphate | mg/L | - | - | - | - | - | - | - | 82 | 77 | 96 |
| Ion Balance | Major Anions | meq/L | - | - | - | - | - | - | - | 0.16 | 0.95 | 0.84 |
| | Major Cations | meq/L | - | - | - | - | - | - | - | 0.00 | 0.00 | 0.00 |
| | Difference | meq/L | - | - | - | - | - | - | - | 0.16 | 0.95 | 0.84 |
| | Balance (%) | % | - | - | - | - | - | - | - | 100.0% | 100.0% | 100.0% |

* indicates that the result is qualified
\- indicates no data

CSR - PL = Yukon Government (YG). 2002. Contaminated Sites Regulation – *Yukon Environment Act* Schedules 1 and 2 for Park Land Use [O.I.C. 2002/171]

CSR-PL exeedances are highlighted and underlined

# SITE CHARACTERISTIC LABORATORY CERTIFICATE RESULTS

SUMMIT ENVIRONMENTAL CONSULTANTS INC.
ATTN: Nicole Jacques
# 301 - 4109 4th Avenue
Whitehorse YT Y1A 1H6

Date Received: 13-SEP-13
Report Date: 04-OCT-13 17:30 (MT)
Version: FINAL

Client Phone: 867-456-2711

# Certificate of Analysis

**Lab Work Order #: L1362807**

Project P.O. #: NOT SUBMITTED
Job Reference: 2012-2333.523.550
C of C Numbers:
Legal Site Desc:

Dean Watt
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | | | | | | |
|---|---|---|---|---|---|---|
| | **Sample ID** | L1362807-1 | L1362807-2 | | | |
| | **Description** | SOIL | SOIL | | | |
| | **Sampled Date** | 10-SEP-13 | 10-SEP-13 | | | |
| | **Sampled Time** | | | | | |
| | **Client ID** | BH-M-13-01 @ 1.1 TO 1.5 MBGS | BH-M-13-01 @ 1.6 TO 2.0 MBGS | | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Physical Tests** | Moisture (%) | 13.2 | 11.2 | | | |
| | pH (1:2 soil:water) (pH) | 7.61 | 7.95 | | | |
| **Organic / Inorganic Carbon** | Total Organic Carbon (%) | 0.97 | | | | |
| **Metals** | Antimony (Sb) (mg/kg) | 36.8 | 30.9 | | | |
| | Arsenic (As) (mg/kg) | 502 | 355 | | | |
| | Barium (Ba) (mg/kg) | 166 | 194 | | | |
| | Beryllium (Be) (mg/kg) | 0.33 | 0.36 | | | |
| | Cadmium (Cd) (mg/kg) | 2.03 | 1.84 | | | |
| | Chromium (Cr) (mg/kg) | 16.4 | 14.6 | | | |
| | Cobalt (Co) (mg/kg) | 10.9 | 12.0 | | | |
| | Copper (Cu) (mg/kg) | 74.6 | 80.3 | | | |
| | Lead (Pb) (mg/kg) | 203 | 132 | | | |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | | | |
| | Molybdenum (Mo) (mg/kg) | 1.03 | <0.50 | | | |
| | Nickel (Ni) (mg/kg) | 9.60 | 8.67 | | | |
| | Selenium (Se) (mg/kg) | 0.32 | 0.32 | | | |
| | Silver (Ag) (mg/kg) | 3.80 | 2.17 | | | |
| | Thallium (Tl) (mg/kg) | 0.375 | 0.326 | | | |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | | | |
| | Uranium (U) (mg/kg) | 0.398 | 0.391 | | | |
| | Vanadium (V) (mg/kg) | 73.8 | 85.8 | | | |
| | Zinc (Zn) (mg/kg) | 222 | 180 | | | |
| **Speciated Metals** | Chromium, Trivalent (mg/kg) | 16.4 | | | | |
| | Hexavalent Chromium (mg/kg) | <0.10 | | | | |
| **Volatile Organic Compounds** | Benzene (mg/kg) | <0.040 | | | | |
| | Bromodichloromethane (mg/kg) | <0.050 | | | | |
| | Bromoform (mg/kg) | <0.050 | | | | |
| | Carbon Tetrachloride (mg/kg) | <0.050 | | | | |
| | Chlorobenzene (mg/kg) | <0.050 | | | | |
| | Dibromochloromethane (mg/kg) | <0.050 | | | | |
| | Chloroethane (mg/kg) | <0.10 | | | | |
| | Chloroform (mg/kg) | <0.10 | | | | |
| | Chloromethane (mg/kg) | <0.10 | | | | |
| | 1,2-Dichlorobenzene (mg/kg) | <0.050 | | | | |
| | 1,3-Dichlorobenzene (mg/kg) | <0.050 | | | | |
| | 1,4-Dichlorobenzene (mg/kg) | <0.050 | | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1362807-1 | L1362807-2 | | | |
|---|---|---|---|---|---|---|
| | Description | SOIL | SOIL | | | |
| | Sampled Date | 10-SEP-13 | 10-SEP-13 | | | |
| | Sampled Time | | | | | |
| | Client ID | BH-M-13-01 @ 1.1 TO 1.5 MBGS | BH-M-13-01 @ 1.6 TO 2.0 MBGS | | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Volatile Organic Compounds** | 1,1-Dichloroethane (mg/kg) | <0.050 | | | | |
| | 1,2-Dichloroethane (mg/kg) | <0.050 | | | | |
| | 1,1-Dichloroethylene (mg/kg) | <0.050 | | | | |
| | cis-1,2-Dichloroethylene (mg/kg) | <0.050 | | | | |
| | trans-1,2-Dichloroethylene (mg/kg) | <0.050 | | | | |
| | Dichloromethane (mg/kg) | <0.30 | | | | |
| | 1,2-Dichloropropane (mg/kg) | <0.050 | | | | |
| | cis-1,3-Dichloropropylene (mg/kg) | <0.050 | | | | |
| | trans-1,3-Dichloropropylene (mg/kg) | <0.050 | | | | |
| | Ethylbenzene (mg/kg) | <0.050 | | | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | | | | |
| | Styrene (mg/kg) | <0.050 | | | | |
| | 1,1,1,2-Tetrachloroethane (mg/kg) | <0.050 | | | | |
| | 1,1,2,2-Tetrachloroethane (mg/kg) | <0.050 | | | | |
| | Tetrachloroethylene (mg/kg) | 0.153 | | | | |
| | Toluene (mg/kg) | <0.050 | | | | |
| | 1,1,1-Trichloroethane (mg/kg) | <0.050 | | | | |
| | 1,1,2-Trichloroethane (mg/kg) | <0.050 | | | | |
| | Trichloroethylene (mg/kg) | 0.015 | | | | |
| | Trichlorofluoromethane (mg/kg) | <0.10 | | | | |
| | Vinyl Chloride (mg/kg) | <0.10 | | | | |
| | ortho-Xylene (mg/kg) | 0.061 | | | | |
| | meta- & para-Xylene (mg/kg) | 0.124 | | | | |
| | Xylenes (mg/kg) | 0.185 | | | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 97.7 | | | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 92.3 | | | | |
| **Hydrocarbons** | EPH10-19 (mg/kg) | 970 | <200 | | | |
| | EPH19-32 (mg/kg) | 1630 | <200 | | | |
| | LEPH (mg/kg) | 970 | | | | |
| | HEPH (mg/kg) | 1630 | | | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | | | | |
| | VPH (C6-C10) (mg/kg) | <100 | | | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | Not Reportable SMI | | | | |
| **Polycyclic Aromatic Hydrocarbons** | Acenaphthene (mg/kg) | <0.050 | | | | |
| | Acenaphthylene (mg/kg) | <0.050 | | | | |
| | Anthracene (mg/kg) | <0.050 | | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1362807-1 | L1362807-2 | | | |
|---|---|---|---|---|---|---|
| | Description | SOIL | SOIL | | | |
| | Sampled Date | 10-SEP-13 | 10-SEP-13 | | | |
| | Sampled Time | | | | | |
| | Client ID | BH-M-13-01 @ 1.1 TO 1.5 MBGS | BH-M-13-01 @ 1.6 TO 2.0 MBGS | | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Polycyclic Aromatic Hydrocarbons** | Benz(a)anthracene (mg/kg) | <0.050 | | | | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | | | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | | | | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | | | | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | | | | |
| | Chrysene (mg/kg) | <0.050 | | | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | | | | |
| | Fluoranthene (mg/kg) | <0.050 | | | | |
| | Fluorene (mg/kg) | <0.050 | | | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | | | | |
| | 2-Methylnaphthalene (mg/kg) | 0.076 | | | | |
| | Naphthalene (mg/kg) | <0.080 DLM | | | | |
| | Phenanthrene (mg/kg) | <0.050 | | | | |
| | Pyrene (mg/kg) | 0.215 | | | | |
| | Surrogate: Acenaphthene d10 (%) | 103.2 | | | | |
| | Surrogate: Chrysene d12 (%) | 80.6 | | | | |
| | Surrogate: Naphthalene d8 (%) | 79.8 | | | | |
| | Surrogate: Phenanthrene d10 (%) | 98.8 | | | | |
| **Glycols** | Diethylene Glycol (mg/kg) | <10 | | | | |
| | Ethylene Glycol (mg/kg) | <10 | | | | |
| | 1,2-Propylene Glycol (mg/kg) | <10 | | | | |
| **Chlorinated Hydrocarbons** | 1,2-Dichlorobenzene (mg/kg) | <0.010 | | | | |
| | 1,3-Dichlorobenzene (mg/kg) | <0.010 | | | | |
| | 1,4-Dichlorobenzene (mg/kg) | <0.010 | | | | |
| | Hexachlorobenzene (mg/kg) | <0.010 | | | | |
| | Hexachlorobutadiene (mg/kg) | <0.010 | | | | |
| | Hexachlorocyclohexane (Total) (mg/kg) | <0.30 DLM | | | | |
| | Hexachloroethane (mg/kg) | <0.010 | | | | |
| | Pentachlorobenzene (mg/kg) | <0.010 | | | | |
| | 1,2,3,4-Tetrachlorobenzene (mg/kg) | <0.010 | | | | |
| | 1,2,3,5-Tetrachlorobenzene (mg/kg) | <0.010 | | | | |
| | 1,2,4,5-Tetrachlorobenzene (mg/kg) | <0.010 | | | | |
| | 1,2,3-Trichlorobenzene (mg/kg) | <0.020 DLM | | | | |
| | 1,2,4-Trichlorobenzene (mg/kg) | <0.010 | | | | |
| | 1,3,5-Trichlorobenzene (mg/kg) | <0.010 | | | | |
| | 2,4,5-Trichlorotoluene (mg/kg) | <0.20 DLM | | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | | | | | | |
|---|---|---|---|---|---|---|
| | **Sample ID** | L1362807-1 | L1362807-2 | | | |
| | **Description** | SOIL | SOIL | | | |
| | **Sampled Date** | 10-SEP-13 | 10-SEP-13 | | | |
| | **Sampled Time** | | | | | |
| | **Client ID** | BH-M-13-01 @ 1.1 TO 1.5 MBGS | BH-M-13-01 @ 1.6 TO 2.0 MBGS | | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Phenolics** | 4-Chloro-3-methylphenol (mg/kg) | <0.020 | | | | |
| | 2-Chlorophenol (mg/kg) | <0.030 DLM | | | | |
| | 3-Chlorophenol (mg/kg) | <0.020 | | | | |
| | 4-Chlorophenol (mg/kg) | <0.020 | | | | |
| | 2,3-Dichlorophenol (mg/kg) | <0.020 | | | | |
| | 2,4 & 2,5-Dichlorophenol (mg/kg) | <0.050 DLM | | | | |
| | 2,6-Dichlorophenol (mg/kg) | <0.020 | | | | |
| | 3,4-Dichlorophenol (mg/kg) | <0.020 | | | | |
| | 3,5-Dichlorophenol (mg/kg) | <0.060 DLM | | | | |
| | 2,4-Dimethylphenol (mg/kg) | <0.020 | | | | |
| | o-Cresol (mg/kg) | <0.030 DLM | | | | |
| | m-Cresol (mg/kg) | <0.030 DLM | | | | |
| | p-Cresol (mg/kg) | <0.020 | | | | |
| | Pentachlorophenol (mg/kg) | <0.020 | | | | |
| | Phenol (mg/kg) | <0.020 | | | | |
| | 2,3,4,5-Tetrachlorophenol (mg/kg) | <0.030 DLM | | | | |
| | 2,3,4,6-Tetrachlorophenol (mg/kg) | <0.030 DLM | | | | |
| | 2,3,5,6-Tetrachlorophenol (mg/kg) | <0.030 DLM | | | | |
| | 2,3,4-Trichlorophenol (mg/kg) | <0.020 | | | | |
| | 2,3,5-Trichlorophenol (mg/kg) | <0.020 | | | | |
| | 2,3,6-Trichlorophenol (mg/kg) | <0.020 | | | | |
| | 2,4,5-Trichlorophenol (mg/kg) | <0.020 | | | | |
| | 2,4,6-Trichlorophenol (mg/kg) | <0.020 | | | | |
| **Polychlorinated Biphenyls** | PCB-1016 (mg/kg) | <0.020 | | | | |
| | PCB-1221 (mg/kg) | <0.020 | | | | |
| | PCB-1232 (mg/kg) | <0.020 | | | | |
| | PCB-1242 (mg/kg) | <0.020 | | | | |
| | PCB-1248 (mg/kg) | <0.020 | | | | |
| | PCB-1254 (mg/kg) | <0.020 | | | | |
| | PCB-1260 (mg/kg) | <0.020 | | | | |
| | PCB-1262 (mg/kg) | <0.020 | | | | |
| | PCB-1268 (mg/kg) | <0.020 | | | | |
| | Total Polychlorinated Biphenyls (mg/kg) | <0.020 | | | | |
| **Dioxins and Furans** | 2,3,7,8-TCDD (pg/g) | 0.97 R | | | | |
| | 1,2,3,7,8-PeCDD (pg/g) | 3.21 [J] | | | | |
| | 1,2,3,4,7,8-HxCDD (pg/g) | 2.40 J,R | | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1362807-1 | L1362807-2 | | | |
|---|---|---|---|---|---|---|
| | Description | SOIL | SOIL | | | |
| | Sampled Date | 10-SEP-13 | 10-SEP-13 | | | |
| | Sampled Time | | | | | |
| | Client ID | BH-M-13-01 @ 1.1 TO 1.5 MBGS | BH-M-13-01 @ 1.6 TO 2.0 MBGS | | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Dioxins and Furans** | 1,2,3,6,7,8-HxCDD (pg/g) | 4.44 [J] | | | | |
| | 1,2,3,7,8,9-HxCDD (pg/g) | 4.00 J,R | | | | |
| | 1,2,3,4,6,7,8-HpCDD (pg/g) | 26.0 | | | | |
| | OCDD (pg/g) | 36.9 | | | | |
| | Total-TCDD (pg/g) | 82.3 | | | | |
| | Total TCDD # Homologues | 13 | | | | |
| | Total-PeCDD (pg/g) | 84.1 | | | | |
| | Total PeCDD # Homologues | 7 | | | | |
| | Total-HxCDD (pg/g) | 75.9 | | | | |
| | Total HxCDD # Homologues | 4 | | | | |
| | Total-HpCDD (pg/g) | 60.7 | | | | |
| | Total HpCDD # Homologues | 2 | | | | |
| | 2,3,7,8-TCDF (pg/g) | 9.50 | | | | |
| | 1,2,3,7,8-PeCDF (pg/g) | 11.3 | | | | |
| | 2,3,4,7,8-PeCDF (pg/g) | 21.0 | | | | |
| | 1,2,3,4,7,8-HxCDF (pg/g) | 17.7 | | | | |
| | 1,2,3,6,7,8-HxCDF (pg/g) | 16.2 | | | | |
| | 1,2,3,7,8,9-HxCDF (pg/g) | 2.70 J,R | | | | |
| | 2,3,4,6,7,8-HxCDF (pg/g) | 20.7 | | | | |
| | 1,2,3,4,6,7,8-HpCDF (pg/g) | 69.7 | | | | |
| | 1,2,3,4,7,8,9-HpCDF (pg/g) | 3.4 [J] | | | | |
| | OCDF (pg/g) | 15.0 R | | | | |
| | Total-TCDF (pg/g) | 370 | | | | |
| | Total TCDF # Homologues | 19 | | | | |
| | Total-PeCDF (pg/g) | 314 | | | | |
| | Total PeCDF # Homologues | 12 | | | | |
| | Total-HxCDF (pg/g) | 179 | | | | |
| | Total HxCDF # Homologues | 9 | | | | |
| | Total-HpCDF (pg/g) | 92.2 | | | | |
| | Total HpCDF # Homologues | 4 | | | | |
| | Surrogate: 13C12-2,3,7,8-TCDD (%) | 88.0 | | | | |
| | Surrogate: 13C12-1,2,3,7,8-PeCDD (%) | 82.0 | | | | |
| | Surrogate: 13C12-1,2,3,4,7,8-HxCDD (%) | 100.0 | | | | |
| | Surrogate: 13C12-1,2,3,6,7,8-HxCDD (%) | 92.0 | | | | |
| | Surrogate: 13C12-1,2,3,4,6,7,8-HpCDD (%) | 84.0 | | | | |
| | Surrogate: 13C12-OCDD (%) | 81.0 | | | | |
| | Surrogate: 13C12-2,3,7,8-TCDF (%) | 88.0 | | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | | | | | | |
|---|---|---|---|---|---|---|
| | **Sample ID** | L1362807-1 | L1362807-2 | | | |
| | **Description** | SOIL | SOIL | | | |
| | **Sampled Date** | 10-SEP-13 | 10-SEP-13 | | | |
| | **Sampled Time** | | | | | |
| | **Client ID** | BH-M-13-01 @ 1.1 TO 1.5 MBGS | BH-M-13-01 @ 1.6 TO 2.0 MBGS | | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Dioxins and Furans** | Surrogate: 13C12-1,2,3,7,8-PeCDF (%) | 82.0 | | | | |
| | Surrogate: 13C12-2,3,4,7,8-PeCDF (%) | 78.0 | | | | |
| | Surrogate: 13C12-1,2,3,4,7,8-HxCDF (%) | 92.0 | | | | |
| | Surrogate: 13C12-1,2,3,6,7,8-HxCDF (%) | 84.0 | | | | |
| | Surrogate: 13C12-2,3,4,6,7,8-HxCDF (%) | 85.0 | | | | |
| | Surrogate: 13C12-1,2,3,7,8,9-HxCDF (%) | 95.0 | | | | |
| | Surrogate: 13C12-1,2,3,4,6,7,8-HpCDF (%) | 81.0 | | | | |
| | Surrogate: 13C12-1,2,3,4,7,8,9-HpCDF (%) | 87.0 | | | | |
| | Surrogate: 37Cl4-2,3,7,8-TCDD (Cleanup) (%) | 96.0 | | | | |
| **Toxic Equivalency** | Lower Bound PCDD/F TEQ (WHO 2005) (pg/g) | 17.7 | | | | |
| | Mid Point PCDD/F TEQ (WHO 2005) (pg/g) | 19.6 | | | | |
| | Upper Bound PCDD/F TEQ (WHO 2005) (pg/g) | 19.6 | | | | |

* 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 | Cobalt (Co) | DUP-H | L1362807-1 |
| Duplicate | Molybdenum (Mo) | DUP-H | L1362807-1 |
| Duplicate | Mercury (Hg) | DUP-H | L1362807-2 |
| Duplicate | Arsenic (As) | DUP-H | L1362807-2 |
| Duplicate | Nickel (Ni) | DUP-H | L1362807-2 |
| Duplicate | Silver (Ag) | DUP-H | L1362807-2 |
| Duplicate | Chromium (Cr) | DUP-H | L1362807-2 |
| Duplicate | Lead (Pb) | DUP-H | L1362807-2 |
| Duplicate | Molybdenum (Mo) | DUP-H | L1362807-2 |
| Duplicate | Nickel (Ni) | DUP-H | L1362807-2 |
| Duplicate | Tin (Sn) | DUP-H | L1362807-2 |
| Laboratory Control Sample | 1,2-Propylene Glycol | LCS-ND | L1362807-1 |
| Method Blank | 1,2,3,4,6,7,8-HpCDF | [J] | L1362807-1 |
| Method Blank | 1,2,3,4,6,7,8-HpCDD | [U] | L1362807-1 |
| Method Blank | 1,2,3,4,7,8,9-HpCDF | [U] | L1362807-1 |
| Method Blank | 1,2,3,4,7,8-HxCDD | [U] | L1362807-1 |
| Method Blank | 1,2,3,4,7,8-HxCDF | [U] | L1362807-1 |
| Method Blank | 1,2,3,6,7,8-HxCDD | [U] | L1362807-1 |
| Method Blank | 1,2,3,6,7,8-HxCDF | [U] | L1362807-1 |
| Method Blank | 1,2,3,7,8,9-HxCDD | [U] | L1362807-1 |
| Method Blank | 1,2,3,7,8,9-HxCDF | [U] | L1362807-1 |
| Method Blank | 1,2,3,7,8-PeCDD | [U] | L1362807-1 |
| Method Blank | 1,2,3,7,8-PeCDF | [U] | L1362807-1 |
| Method Blank | 2,3,4,6,7,8-HxCDF | [U] | L1362807-1 |
| Method Blank | 2,3,4,7,8-PeCDF | [U] | L1362807-1 |
| Method Blank | 2,3,7,8-TCDD | [U] | L1362807-1 |
| Method Blank | 2,3,7,8-TCDF | [U] | L1362807-1 |
| Method Blank | OCDD | [U] | L1362807-1 |
| Method Blank | OCDF | [U] | L1362807-1 |

**Qualifiers for Individual Parameters Listed:**

| Qualifier | Description |
|---|---|
| DLM | Detection Limit Adjusted For Sample Matrix Effects |
| DUP-H | Duplicate results outside ALS DQO, due to sample heterogeneity. |
| J,R | The analyte was detected below the calibrated range but above the EDL, and the ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum. |
| LCS-ND | Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected. |
| R | The ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum. |
| SMI | Surrogate recovery could not be measured due to sample matrix interference. |
| [J] | The analyte was detected below the calibrated range but above the EDL. |
| [U] | The analyte was not detected above the EDL. |

**Test Method References:**

| ALS Test Code | Matrix | Test Description | Method Reference** |
|---|---|---|---|
| **C-TOT-ORG-LECO-SK** | Soil | Organic Carbon by combustion method | SSSA (1996) p. 973 |

Total Organic Carbon (C-TOT-ORG-LECO-SK, C-TOT-ORG-SK)

Total C and inorganic C are determined on separate samples. The total C is determined by combustion and thermal conductivity detection, while inorganic C is determined by weight lass after addition of hydrochloric acid. Organic C is calculated by the difference between these two determinations.

Reference for Total C:
Nelson, D.W. and Sommers, L.E. 1996. Total Carbon, organic carbon and organic matter. P. 961-1010 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

# Reference Information

Reference for Inorganic C:
Loeppert, R.H. and Suarez, D.L. 1996. Gravimetric Method for Loss of Carbon Dioxide. P. 455-456 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

| | | | |
|---|---|---|---|
| **CLH-SOX-MS-VA** | Soil | Chlorinated Hydrocarbons in Soil by GCMS | 3510, 3610, 8121 SW-846 AND 8270 EPA |

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3540, 3610, 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a Soxhlet system to extract a subsample of the sediment/soilwith dichloromethane. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Hexachlorocyclohexanes includes the alpha, beta, gamma, and delta isomers

| | | | |
|---|---|---|---|
| **CLPHEN-TMB-MS-VA** | Soil | Chlorinated Phenols by Tumbler/GCMS | EPA 3570, 8270, Knapp(1979) |

A subsample of the soil/sediment is rotary extracted by solvent, derivitized, and analysed by GC/MS.

| | | | |
|---|---|---|---|
| **CR-CR3-ED** | Soil | Chromium, Trivalent (Cr +3) | Total Cr - Cr(+6) |
| **CR-CR6-3060-ED** | Soil | Chromium, Hexavalent (Cr +6) | APHA 3500-CR C, EPA 3060A ALKALINE |
| **DX-1613B-HRMS-BU** | Soil | Dioxins and Furans HR 1613B | USEPA 1613B |
| **EPH-TUMB-FID-VA** | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to gas chromatography with flame ionization detection (GC-FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

| | | | |
|---|---|---|---|
| **GLY-EXT-FID-VA** | Soil | Glycols in Soil by Wrist Shaker GCFID | SW-846, METHOD 8015B, EPA |

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8015B, published by the United States Environmental Protection Agency (EPA). The procedure involves extraction of a subsample of the sediment/soil with deionized water, followed by treatment of the extract with a strong base (NaOH) and benzoyl chloride to form the corresponding benzoate esters. The benzoate esters are then extracted with iso-octane and the extract is analyzed by capillary column gas chromatography with flame ionization detection (FID).

| | | | |
|---|---|---|---|
| **HG-200.2-CVAF-VA** | Soil | Mercury in Soil by CVAFS | EPA 200.2/245.7 |

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry(EPA Method 245.7).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

| | | | |
|---|---|---|---|
| **LEPH/HEPH-CALC-VA** | Soil | LEPHs and HEPHs | BC MOE LABORATORY MANUAL (2005) |

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated
by subtracting selected Polycyclic Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene, and Pyrene
are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

| | | | |
|---|---|---|---|
| **MET-200.2-CCMS-VA** | Soil | Metals in Soil by CRC ICPMS | EPA 200.2/6020A |

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

| | | | |
|---|---|---|---|
| **MOISTURE-VA** | Soil | Moisture content | ASTM D2974-00 Method A |

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

| | | | |
|---|---|---|---|
| **PAH-TMB-H/A-MS-VA** | Soil | PAH - Rotary Extraction (Hexane/Acetone) | EPA 3570/8270 |

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3545 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the

# Reference Information

sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation. Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

**PCB-SE-ECD-VA** Soil PCB by Extraction with GCECD EPA8082, 3630

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3500, 3620, 3630, 3660, 3665 & 8082, published by the United States Environmental Protection Agency (EPA). The procedure involves a solid-liquid extraction of a subsample of the sediment/soil using a mixture of hexane and acetone. Water is added to the extract and the resulting hexane extract undergoes one or more of the following clean-up procedures (if required): florisil clean-up, silica gel clean-up, sulphur clean-up and/or sulphuric acid clean-up. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).

**PCB-SUM-CALC-VA** Soil Total PCBs in soil CALCULATION

Calculation of Total PCB. Total PCB is the sum of the concentrations of PCB aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268. Results below detection limit (DL) are treated as zero. The Total PCB detection limit is equal to the highest of the aroclor detection limits used in the sum.

**PH-1:2-VA** Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

**PHEN-TMB-MS-VA** Soil Phenolics by Tumbler/GC-MS EPA 3570 & 8270, Knapp (1979)

A subsample of the soil/sediment is rotary extracted by solvent, derivitized, and analysed by GC/MS.

**VH-HSFID-VA** Soil VH in soil by Headspace GCFID EPA8260B, 5021, 5035, BC MOE

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

**VH-SURR-FID-VA** Soil VH Surrogates for Soils BCMELP CSR ANALYTICAL METHOD 2

**VOC-HSMS-VA** Soil VOCs in soil by Headspace GCMS EPA8260B, 5021, 5035, BC MOE

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

**VOC7-L-HSMS-VA** Soil VOCs in soil by Headspace GCMS EPA8260B, 5021, 5035, BC MOE

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

**VOC7/VOC-SURR-MS-VA** Soil VOC7 and/or VOC Surrogates for Soils EPA METHODS 8260B & 524.2

**VPH-CALC-VA** Soil VPH is VH minus select aromatics BC MOE LABORATORY MANUAL (2005)

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water" (Version 2.1, July 20, 1999). According to this method, the concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, Xylenes and Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10). Analysis of Volatile Hydrocarbons adheres to all prescribed elements of BCMELP method "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

**VPH-CALC-VA** Soil VPHv is VHv minus BTEX/nC6/nC10 BC MOE LABORATORY MANUAL (2005)

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water" (Version 2.1, July 20, 1999). According to this method, the concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, Xylenes and Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10). Analysis of Volatile Hydrocarbons adheres to all prescribed elements of BCMELP method "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

**XYLENES-CALC-VA** Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** 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 |
|---|---|
| ED | ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA |
| | ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA |

# Reference Information

| | | |
|---|---|---|
| SK | BU | |
| | | ALS ENVIRONMENTAL - BURLINGTON, ONTARIO, CANADA |
| VA | | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |

**Chain of Custody Numbers:**

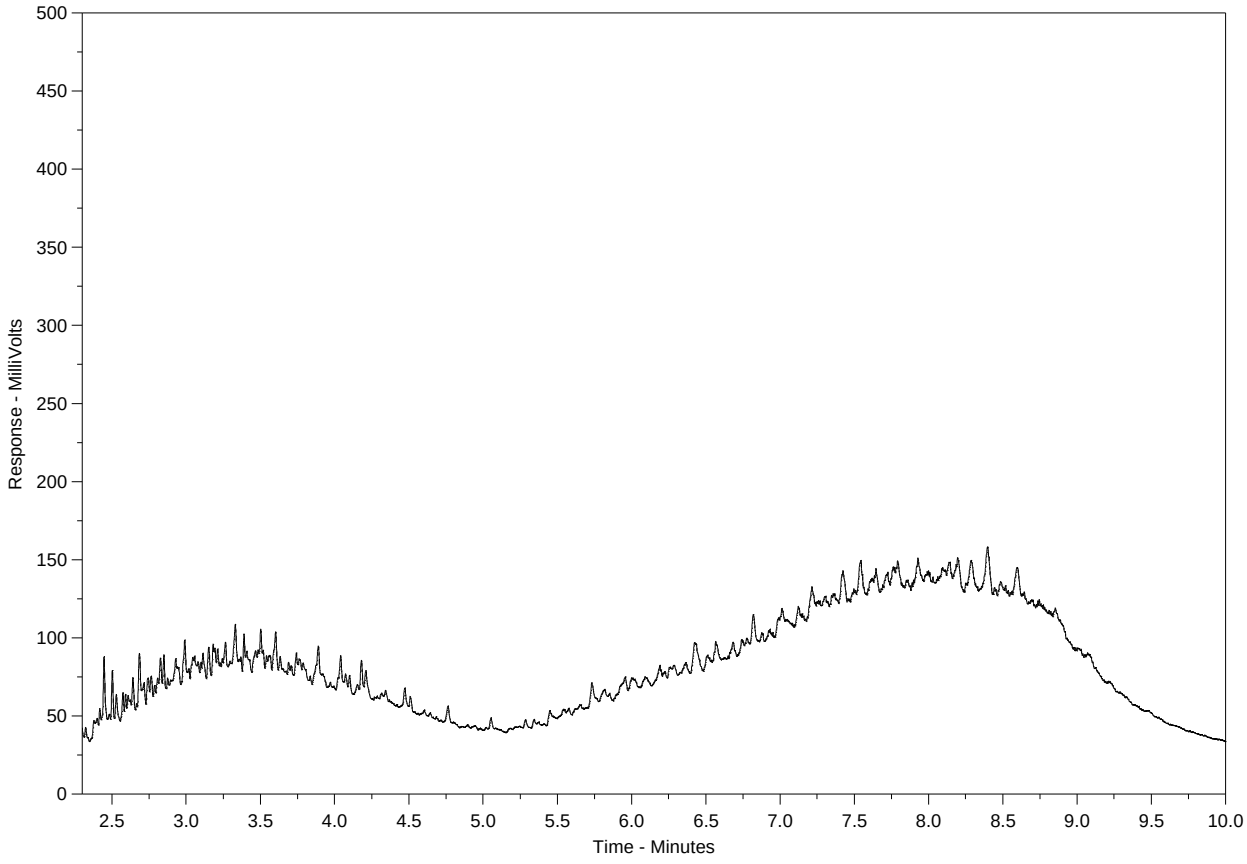
**GLOSSARY OF REPORT TERMS**

*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 wwt - 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.*

# Hydrocarbon Distribution Report

ALS Sample ID: L1362807-1
Client Sample ID: BH-M-13-01 @ 1.1 TO 1.5 MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

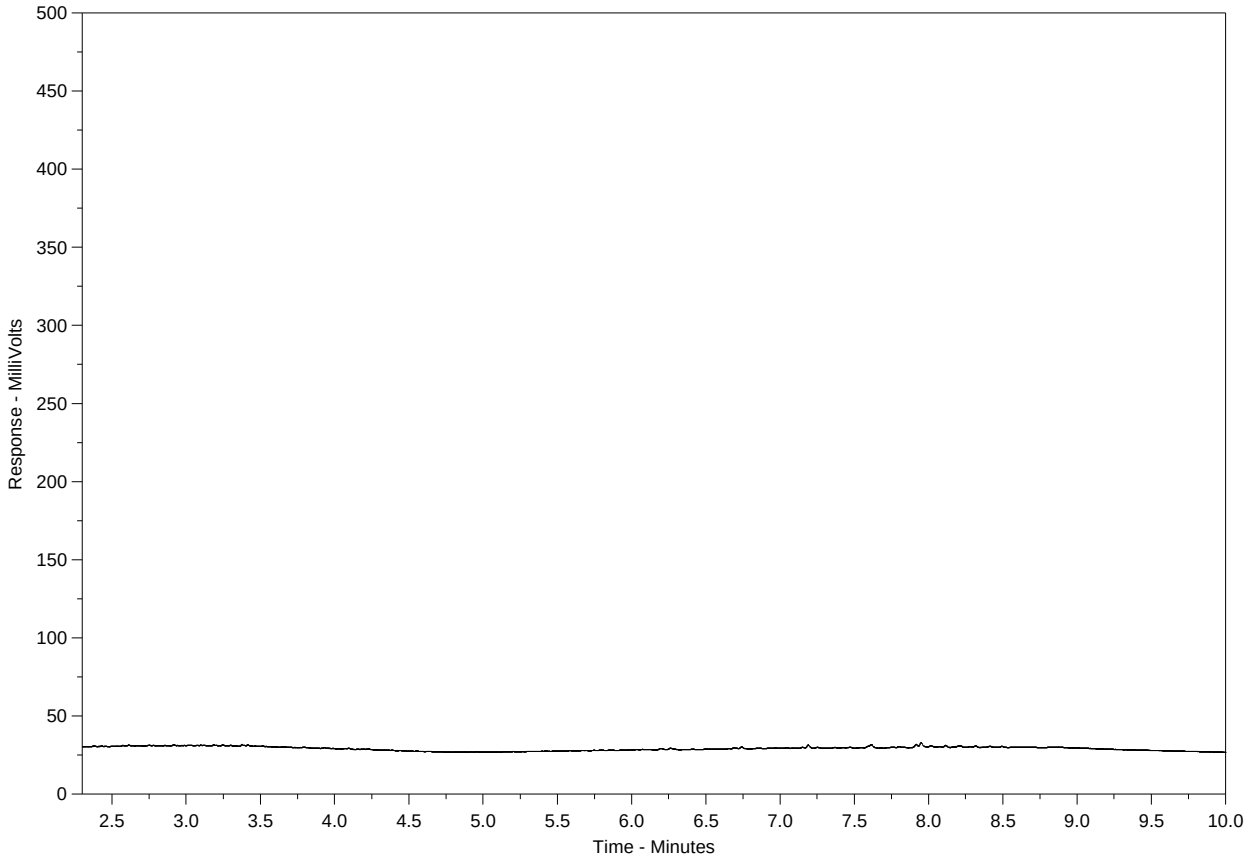
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report

ALS Sample ID: L1362807-2
Client Sample ID: BH-M-13-01 @ 1.6 TO 2.0 MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

L1362807-COFC

# Chain of Custody / Analytical Request Form

**Canada Toll Free: 1 800 668 9878**

**www.alsglobal.com**

COC # _____

Page ___ of ___

ALS Environmental

| Report To | | Report Format / Distribution | | Service Requeste |
|---|---|---|---|---|
| Company: | Summit Environmental Consultants Inc. | ☑ Standard ☐ Other | | Regular (Standard Turnaround Times- Business Days |
| Contact: | Nicole Jacques | ☑ PDF ☑ Excel ☐ Digital | | |
| Address: | 301-4109 4th Ave | Email 1: | nrj@summit-environmental.com | |
| | Whitehorse, Yukon, Y1A 1H6 | Email 2: | | |
| Phone: | 867-456-2711 | Email 3: | | |
| **Invoice To** | Same as Report ? Y | **Client / Project Information** | | |
| Hardcopy of Invoice with Report? | | Job #: | 2012-2333.523.550 | |
| Company: | | PO / AFE: | | |
| Contact: | | LSD: | | |
| Address: | | | | |
| Phone: | Fax: | Quote #: | | |

Lab Work Order # (lab use only): L1362807

**ALS Contact:** Dean Watt **Sampler:** SVB

| Sample | Sample Identification | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | Extract for LEPH/HEPH, PAH | Extract for BTEX / VPH | Hold | MET-TOT-CSR-VA (includes | CR-CR3-ED | BTEX+VPH+MTBE-CSR-VA | LEPH/HEPH-CSR-VA | VOC+MTBE-ROUT-VA | CLH-SOX-MS-VA | CLH-SOX-MS-VA | PHEN-CL-FULL-VA | PHEN-NONCL-VA | GLYCOLS-SED-VA | PCB-SE-ECD-VA | DX-1613B-HRMS-BU | C-TOT-ORG-LECO-SK | | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **Analysis Request** | | | | | | | | | | | | | | | | | |
| | BH-M-13-01 @ 1.1 to 1.5 mbgs | 10-Sep-13 | | Soil | | | | X | X | X | X | X | X | X | X | X | X | X | X | X | | 5 |
| | BH-M-13-01 @ 1.6 to 2.0 mbgs | 10-Sep-13 | | Soil | X | X | X | | | | | | | | | | | | | | | 11 |
| | BH-M-13-01 @ 2.1 to 2.5 mbgs | 10-Sep-13 | | Soil | X | X | X | | | | | | | | | | | | | | | 5 |
| | BH-M-13-01 @ 2.6 to 3.0 mbgs | 10-Sep-13 | | Soil | X | X | X | | | | | | | | | | | | | | | 5 |

**Regulations with water or land use**

site specific

rm may delay analysis. Please fill in this form

es with the Terms and Conditions | Date (dd-mm

NT RELEASE (client use)

Released by:

SHIPMENT RECEPTION (lab use only)

| Received by: | Date: | Time: | Temperatu |
|---|---|---|---|
| PR | 13 SEPT | 13:50 | °C |

SHIPMENT VERIFICATION (lab use only)

| Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
|---|---|---|---|
| | | | |

GENF 18.01 Front

8.1 °C, 4.4 °C, 7.9 °C, 3.3 °C, 6.1 °C.

SUMMIT ENVIRONMENTAL CONSULTANTS INC.
ATTN: Nicole Jacques
# 301 - 4109 4th Avenue
Whitehorse YT Y1A 1H6

Date Received: 13-SEP-13
Report Date: 11-OCT-13 15:23 (MT)
Version: FINAL REV. 2

Client Phone: 867-456-2711

# Certificate of Analysis

**Lab Work Order #: L1362844**

Project P.O. #: NOT SUBMITTED
Job Reference: 2012-2333.523.550
C of C Numbers:
Legal Site Desc:

**Comments:**

Dean Watt
Account Manager

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# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1362844-1 | L1362844-2 | L1362844-3 | L1362844-4 | |
|---|---|---|---|---|---|---|
| | Description | SOIL | SOIL | SOIL | SOIL | |
| | Sampled Date | 10-SEP-13 | 10-SEP-13 | 10-SEP-13 | 10-SEP-13 | |
| | Sampled Time | | | | | |
| | Client ID | BH-M-13-05 @ 0.0 TO 0.5 MBGS | BH-M-13-05 @ 0.6 TO 1.0 MBGS | BH-M-13-05 @ 1.1 TO 1.5 MBGS | BH-M-13-05 @ 1.6 TO 2.0 MBGS | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Physical Tests** | Moisture (%) | 7.73 | 6.00 | 4.53 | 6.48 | |
| | pH (1:2 soil:water) (pH) | 7.44 | 7.82 | 7.82 | 7.89 | |
| **Metals** | Antimony (Sb) (mg/kg) | 135 | 146 | 94.0 | 28.3 | |
| | Arsenic (As) (mg/kg) | 1450 | 1730 | 1480 | 423 | |
| | Barium (Ba) (mg/kg) | 169 | 135 | 131 | 120 | |
| | Beryllium (Be) (mg/kg) | 0.53 | 0.43 | 0.49 | 0.39 | |
| | Cadmium (Cd) (mg/kg) | 10.5 | 11.4 | 10.1 | 3.55 | |
| | Chromium (Cr) (mg/kg) | 11.1 | 10.5 | 11.9 | 10.3 | |
| | Cobalt (Co) (mg/kg) | 17.3 | 11.0 | 13.1 | 11.1 | |
| | Copper (Cu) (mg/kg) | 52.4 | 72.4 | 80.0 | 36.1 | |
| | Lead (Pb) (mg/kg) | 1980 | 1310 | 585 | 139 | |
| | Mercury (Hg) (mg/kg) | 0.136 | 0.082 | 0.062 | <0.050 | |
| | Molybdenum (Mo) (mg/kg) | 0.94 | 1.62 | 1.14 | 0.82 | |
| | Nickel (Ni) (mg/kg) | 21.0 | 8.16 | 8.73 | 7.35 | |
| | Selenium (Se) (mg/kg) | 0.57 | 0.39 | 0.36 | 0.27 | |
| | Silver (Ag) (mg/kg) | 9.84 | 11.9 | 9.37 | 6.53 | |
| | Thallium (Tl) (mg/kg) | 0.539 | 0.366 | 0.345 | 0.279 | |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | <2.0 | |
| | Uranium (U) (mg/kg) | 0.538 | 0.860 | 0.541 | 0.443 | |
| | Vanadium (V) (mg/kg) | 45.2 | 45.7 | 43.3 | 49.8 | |
| | Zinc (Zn) (mg/kg) | 843 | 818 | 731 | 324 | |
| **Speciated Metals** | Chromium, Trivalent (mg/kg) | 10.9 | 10.3 | 11.8 | 10.2 | |
| | Hexavalent Chromium (mg/kg) | 0.10 | 0.18 | 0.13 | <0.10 | |
| **TCLP Metals** | 1st Preliminary PH (pH) | | | 9.30 | | |
| | 2nd Preliminary PH (pH) | | | 1.67 | | |
| | Final pH (pH) | | | 5.42 | | |
| | Extraction Solution Initial pH (pH) | | | 4.92 | | |
| | Antimony (Sb)-Leachable (mg/L) | | | <1.0 | | |
| | Arsenic (As)-Leachable (mg/L) | | | <1.0 | | |
| | Barium (Ba)-Leachable (mg/L) | | | <2.5 | | |
| | Beryllium (Be)-Leachable (mg/L) | | | <0.025 | | |
| | Boron (B)-Leachable (mg/L) | | | <0.50 | | |
| | Cadmium (Cd)-Leachable (mg/L) | | | 0.084 | | |
| | Calcium (Ca)-Leachable (mg/L) | | | 404 | | |
| | Chromium (Cr)-Leachable (mg/L) | | | <0.25 | | |
| | Cobalt (Co)-Leachable (mg/L) | | | 0.209 | | |
| | Copper (Cu)-Leachable (mg/L) | | | <0.050 | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1362844-1 | L1362844-2 | L1362844-3 | L1362844-4 | |
|---|---|---|---|---|---|---|
| | Description | SOIL | SOIL | SOIL | SOIL | |
| | Sampled Date | 10-SEP-13 | 10-SEP-13 | 10-SEP-13 | 10-SEP-13 | |
| | Sampled Time | | | | | |
| | Client ID | BH-M-13-05 @ 0.0 TO 0.5 MBGS | BH-M-13-05 @ 0.6 TO 1.0 MBGS | BH-M-13-05 @ 1.1 TO 1.5 MBGS | BH-M-13-05 @ 1.6 TO 2.0 MBGS | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **TCLP Metals** | Iron (Fe)-Leachable (mg/L) | | | <0.15 | | |
| | Lead (Pb)-Leachable (mg/L) | | | 0.27 | | |
| | Magnesium (Mg)-Leachable (mg/L) | | | 13.8 | | |
| | Mercury (Hg)-Leachable (mg/L) | | | <0.0010 | | |
| | Nickel (Ni)-Leachable (mg/L) | | | <0.25 | | |
| | Selenium (Se)-Leachable (mg/L) | | | <1.0 | | |
| | Silver (Ag)-Leachable (mg/L) | | | <0.050 | | |
| | Thallium (Tl)-Leachable (mg/L) | | | <1.0 | | |
| | Vanadium (V)-Leachable (mg/L) | | | <0.15 | | |
| | Zinc (Zn)-Leachable (mg/L) | | | 3.21 | | |
| **Volatile Organic Compounds** | Benzene (mg/kg) | <0.040 | | <0.040 | | |
| | Ethylbenzene (mg/kg) | <0.050 | | <0.050 | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | | <0.20 | | |
| | Styrene (mg/kg) | <0.050 | | <0.050 | | |
| | Toluene (mg/kg) | <0.050 | | <0.050 | | |
| | ortho-Xylene (mg/kg) | <0.050 | | <0.050 | | |
| | meta- & para-Xylene (mg/kg) | <0.050 | | <0.050 | | |
| | Xylenes (mg/kg) | <0.075 | | <0.075 | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 100.0 | | 89.9 | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 96.8 | | 94.5 | | |
| **Hydrocarbons** | EPH10-19 (mg/kg) | <200 | | <200 | | |
| | EPH19-32 (mg/kg) | <200 | | <200 | | |
| | LEPH (mg/kg) | <200 | | <200 | | |
| | HEPH (mg/kg) | <200 | | <200 | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | | <100 | | |
| | VPH (C6-C10) (mg/kg) | <100 | | <100 | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 101.4 | | 79.5 | | |
| **Polycyclic Aromatic Hydrocarbons** | Acenaphthene (mg/kg) | <0.050 | | <0.050 | | |
| | Acenaphthylene (mg/kg) | <0.050 | | <0.050 | | |
| | Anthracene (mg/kg) | <0.050 | | <0.050 | | |
| | Benz(a)anthracene (mg/kg) | <0.050 | | <0.050 | | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | | <0.050 | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | | <0.050 | | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | | <0.050 | | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | | <0.050 | | |
| | Chrysene (mg/kg) | <0.050 | | <0.050 | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1362844-1 | L1362844-2 | L1362844-3 | L1362844-4 | |
|---|---|---|---|---|---|---|
| | Description | SOIL | SOIL | SOIL | SOIL | |
| | Sampled Date | 10-SEP-13 | 10-SEP-13 | 10-SEP-13 | 10-SEP-13 | |
| | Sampled Time | | | | | |
| | Client ID | BH-M-13-05 @ 0.0 TO 0.5 MBGS | BH-M-13-05 @ 0.6 TO 1.0 MBGS | BH-M-13-05 @ 1.1 TO 1.5 MBGS | BH-M-13-05 @ 1.6 TO 2.0 MBGS | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Polycyclic Aromatic Hydrocarbons** | Dibenz(a,h)anthracene (mg/kg) | <0.050 | | <0.050 | | |
| | Fluoranthene (mg/kg) | <0.050 | | <0.050 | | |
| | Fluorene (mg/kg) | <0.050 | | <0.050 | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | | <0.050 | | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | | <0.050 | | |
| | Naphthalene (mg/kg) | <0.050 | | <0.050 | | |
| | Phenanthrene (mg/kg) | <0.050 | | <0.050 | | |
| | Pyrene (mg/kg) | <0.050 | | <0.050 | | |
| | Surrogate: Acenaphthene d10 (%) | 88.8 | | 83.8 | | |
| | Surrogate: Chrysene d12 (%) | 90.4 | | 106.2 | | |
| | Surrogate: Naphthalene d8 (%) | 85.9 | | 75.8 | | |
| | Surrogate: Phenanthrene d10 (%) | 98.1 | | 98.2 | | |
| **Polychlorinated Biphenyls** | PCB-1016 (mg/kg) | | | <0.020 | | |
| | PCB-1221 (mg/kg) | | | <0.020 | | |
| | PCB-1232 (mg/kg) | | | <0.020 | | |
| | PCB-1242 (mg/kg) | | | <0.020 | | |
| | PCB-1248 (mg/kg) | | | <0.020 | | |
| | PCB-1254 (mg/kg) | | | <0.020 | | |
| | PCB-1260 (mg/kg) | | | <0.020 | | |
| | PCB-1262 (mg/kg) | | | <0.020 | | |
| | PCB-1268 (mg/kg) | | | <0.020 | | |
| | Total Polychlorinated Biphenyls (mg/kg) | | | <0.020 | | |

* 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 | Anthracene | DLM | L1362844-1, -3 |
| Duplicate | Fluoranthene | DLM | L1362844-1, -3 |
| Duplicate | Benzo(b)fluoranthene | DUP-H | L1362844-1, -3 |
| Duplicate | Antimony (Sb) | DUP-H | L1362844-2, -4 |
| Duplicate | Arsenic (As) | DUP-H | L1362844-2, -4 |
| Duplicate | Lead (Pb) | DUP-H | L1362844-2, -4 |
| Duplicate | Uranium (U) | DUP-H | L1362844-2, -4 |
| Matrix Spike | Calcium (Ca)-Leachable | MS-B | L1362844-3 |
| Matrix Spike | Magnesium (Mg)-Leachable | MS-B | L1362844-3 |

**Qualifiers for Individual Parameters Listed:**

| Qualifier | Description |
|---|---|
| DLM | Detection Limit Adjusted due to sample matrix effects. |
| DUP-H | Duplicate results outside ALS DQO, due to sample heterogeneity. |
| MS-B | Matrix Spike recovery could not be accurately calculated due to high analyte background in sample. |

## Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** |
|---|---|---|---|
| **CR-CR3-ED** | Soil | Chromium, Trivalent (Cr +3) | Total Cr - Cr(+6) |
| **CR-CR6-3060-ED** | Soil | Chromium, Hexavalent (Cr +6) | APHA 3500-CR C, EPA 3060A ALKALINE |
| **EPH-TUMB-FID-VA** | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to gas chromatography with flame ionization detection (GC-FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

**HG-200.2-CVAF-VA** Soil Mercury in Soil by CVAFS EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry(EPA Method 245.7).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

**HG-TCLP-CVAFS-VA** Soil Mercury by CVAFS (TCLP) EPA 1311/245.7

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter and analysed using atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA 245.7).

**LEPH/HEPH-CALC-VA** Soil LEPHs and HEPHs BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated
by subtracting selected Polycyclic Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene, and Pyrene
are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

**MET-200.2-CCMS-VA** Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually

# Reference Information

mobile in the environment.

**MET-TCLP-ICP-VA** Soil Metals by ICPOES (TCLP) EPA 1311/6010B

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter and analysed using inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

**MOISTURE-VA** Soil Moisture content ASTM D2974-00 Method A

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

**PAH-TMB-H/A-MS-VA** Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3545 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation. Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

**PCB-SE-ECD-VA** Soil PCB by Extraction with GCECD EPA8082, 3630

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3500, 3620, 3630, 3660, 3665 & 8082, published by the United States Environmental Protection Agency (EPA). The procedure involves a solid-liquid extraction of a subsample of the sediment/soil using a mixture of hexane and acetone. Water is added to the extract and the resulting hexane extract undergoes one or more of the following clean-up procedures (if required): florisil clean-up, silica gel clean-up, sulphur clean-up and/or sulphuric acid clean-up. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).

**PCB-SUM-CALC-VA** Soil Total PCBs in soil CALCULATION

Calculation of Total PCB. Total PCB is the sum of the concentrations of PCB aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268. Results below detection limit (DL) are treated as zero. The Total PCB detection limit is equal to the highest of the aroclor detection limits used in the sum.

**PH-1:2-VA** Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

**VH-HSFID-VA** Soil VH in soil by Headspace GCFID EPA8260B, 5021, 5035, BC MOE

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

**VH-SURR-FID-VA** Soil VH Surrogates for Soils BCMELP CSR ANALYTICAL METHOD 2

**VOC7-L-HSMS-VA** Soil VOCs in soil by Headspace GCMS EPA8260B, 5021, 5035, BC MOE

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

**VOC7/VOC-SURR-MS-VA** Soil VOC7 and/or VOC Surrogates for Soils EPA METHODS 8260B & 524.2

**VPH-CALC-VA** Soil VPH is VH minus select aromatics BC MOE LABORATORY MANUAL (2005)

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water" (Version 2.1, July 20, 1999). According to this method, the concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, Xylenes and Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10). Analysis of Volatile Hydrocarbons adheres to all prescribed elements of BCMELP method "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

**XYLENES-CALC-VA** Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** 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 |
|---|---|

# Reference Information

| | |
|---|---|
| ED | ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA |
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |

**Chain of Custody Numbers:**

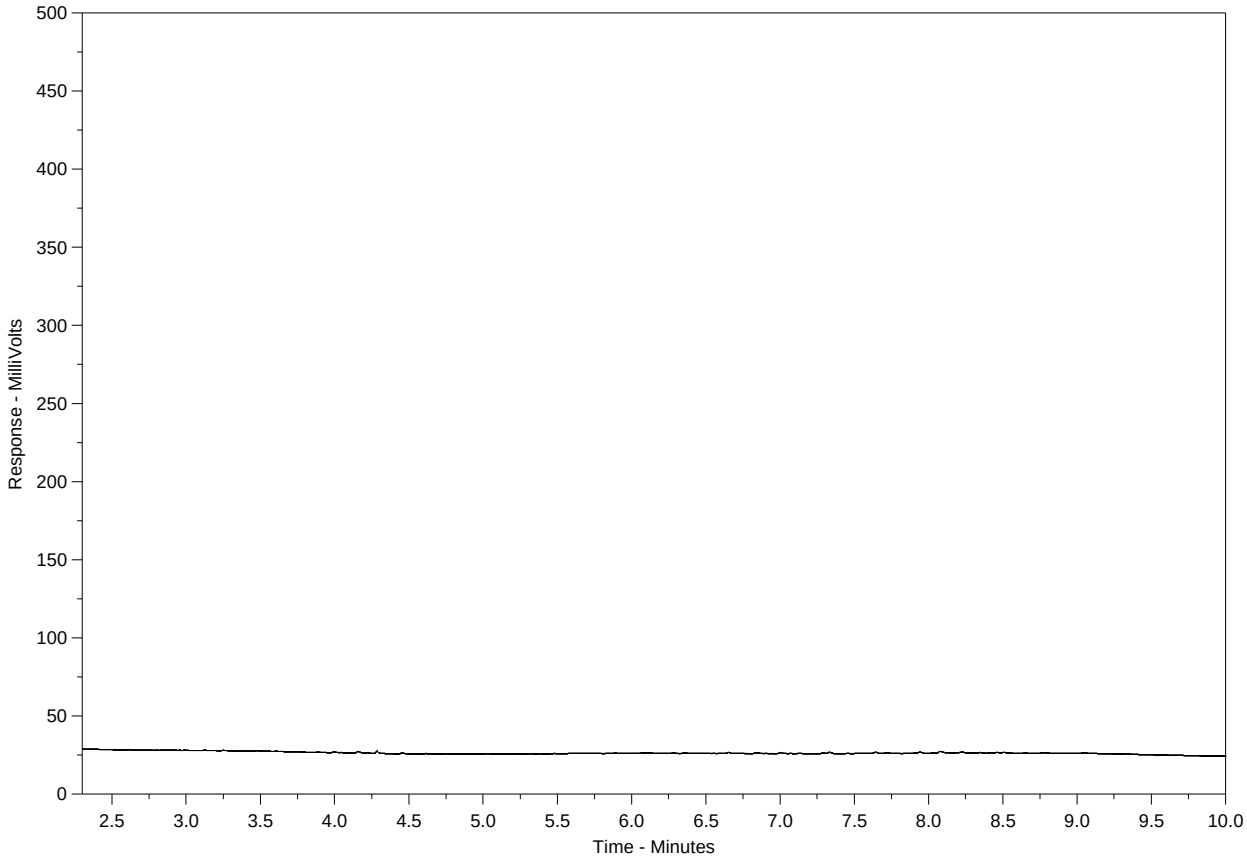
**GLOSSARY OF REPORT TERMS**

*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 wwt - 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.*

# Hydrocarbon Distribution Report

ALS Sample ID: L1362844-1
Client Sample ID: BH-M-13-05 @ 0.0 TO 0.5 MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

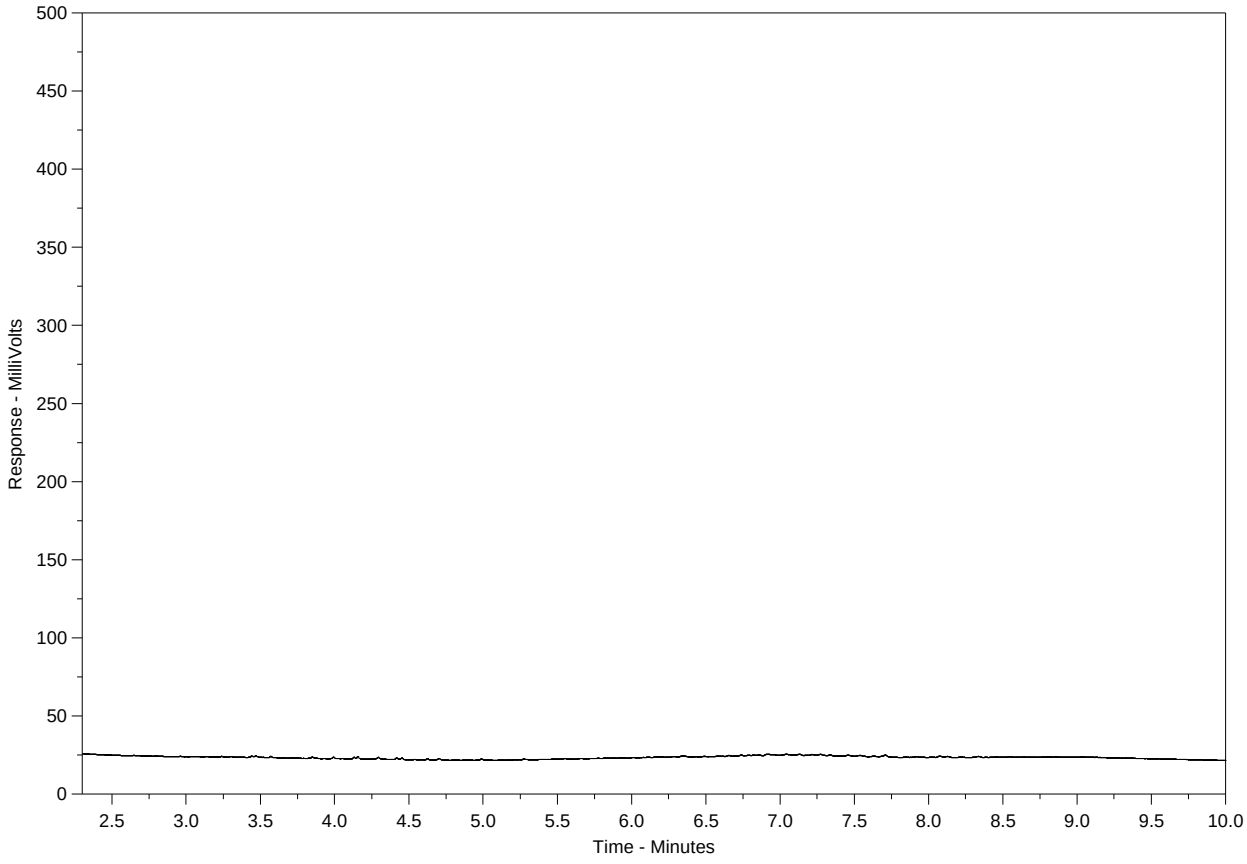
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report

ALS Sample ID: L1362844-3
Client Sample ID: BH-M-13-05 @ 1.1 TO 1.5 MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

L1362844-COFC

ALS Environmental

**of Custody / Analytical Request Form**
**anada Toll Free: 1 800 668 9878**
**www.alsglobal.com**

COC # _____

Page ___ of ___

| **Report To** | | **Report Format / Distribution** | **Service Requeste** |
|---|---|---|---|
| Company: | Summit Environmental Consultants Inc. | ☑ Standard ☐ Other | Regular (Standard Turnaround Times- Business Days |
| Contact: | Nicole Jacques | ☑ PDF ☑ Excel ☐ Digital | |
| Address: | 301-4109 4th Ave | Email 1: nrj@summit-environmental.com | |
| | Whitehorse, Yukon, Y1A 1H6 | Email 2: | |
| Phone: | 867-456-2711 | Email 3: | |
| **Invoice To** | Same as Report ? Y | **Client / Project Information** | **Analysis Request** |
| Hardcopy of Invoice with Report? | | Job #: 2012-2333.523.550 | |
| Company: | | PO / AFE: | |
| Contact: | | LSD: | |
| Address: | | | |
| Phone: | Fax: | Quote #: | |
| [redacted] Lab Work Order # (lab use only) | L1362844 | **ALS Contact:** Dean Watt | **Sampler:** SVB |

| Sample | Sample Identification | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | MET-TOT-CSR-VA (includes | CR-CR3-ED | BTEX+VPH+MTBE-CSR-VA | LEPH/HEPH-CSR-VA | CN-WAD-NAOH-CFA-VA | CN-T-NAOH-CFA-VA | PCB-SE-ECD-VA | Extract for BTEX/VPH | Extract for LEPH/HEPH/PAH | Hold | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [redacted] 1 | BH-M-13-05 @ 0.0 to 0.5 mbgs | 10-Sep-13 | | Soil | | | | | | | | X | X | X | 3 |
| [redacted] 2 | BH-M-13-05 @ 0.6 to 1.0 mbgs | 10-Sep-13 | | Soil | | | | | | | | X | X | X | 3 |
| [redacted] 3 | BH-M-13-05 @ 1.1 to 1.5 mbgs | 10-Sep-13 | | Soil | | X | X | X | X | | | X | | | 4 |
| [redacted] 4 | BH-M-13-05 @ 1.6 to 2.0 mbgs | 10-Sep-13 | | Soil | | | | | | | | X | X | X | 3 |
| [redacted] 5 | BH-M-13-05 @ 2.1 to 2.5 mbgs | 10-Sep-13 | | Soil | | | | | | | | X | X | X | 3 |
| [redacted] 6 | BH-M-13-05 @ 2.6 to 3.0 mbgs | 10-Sep-13 | | Soil | | | | | | | | X | X | X | 3 |
| [redacted] 7 | BH-M-13-05 @ 3.1 to 3.5 mbgs | 10-Sep-13 | | Soil | | | | | | | | X | X | X | 3 |
| [redacted] 8 | BH-M-13-05 @ 3.6 to 4.0 mbgs | 10-Sep-13 | | Soil | | | | | | | | X | X | X | 3 |
| [redacted] 9 | BH-M-13-05 @ 4.1 to 4.5 mbgs | 10-Sep-13 | | Soil | | | | | | | | X | X | X | 3 |
| [redacted] 10 | BH-M-13-05 @ 4.6 to 5.0 mbgs | 10-Sep-13 | | Soil | | | | | | | | X | X | X | 3 |
| [redacted] 11 | BH-M-13-05 @ 5.1 to 5.5 mbgs | 10-Sep-13 | | Soil | | | | | | | | X | X | X | 3 |

**Special Instructions / Regulations with water or land use**

Compare to site specific standards provided to ALS

**Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

**By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.**

| SHIPMENT RELEASE (client use) | | SHIPMENT RECEPTION (lab use only) | | | | SHIPMENT VERIFICATION (lab use only) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Released by: | Date (dd-mm | Received by: | Date: | Time: | Temperatu | Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
| | | PR | 13SEPT | 13:50 | °C | | | | |

GENF 18.01 Front

8.1°C, 4.4°C, 7.9°C, 3.3°C, 6.1°C

SUMMIT ENVIRONMENTAL CONSULTANTS INC.
ATTN: Nicole Jacques
# 301 - 4109 4th Avenue
Whitehorse YT Y1A 1H6

Date Received: 13-SEP-13
Report Date: 04-OCT-13 17:36 (MT)
Version: FINAL

Client Phone: 867-456-2711

# Certificate of Analysis

**Lab Work Order #: L1362817**

Project P.O. #: NOT SUBMITTED
Job Reference: 2012-2333.523.550
C of C Numbers:
Legal Site Desc:

Dean Watt
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1362817-4 | L1362817-7 | | | |
|---|---|---|---|---|---|---|
| | Description | SOIL | SOIL | | | |
| | Sampled Date | 09-SEP-13 | 09-SEP-13 | | | |
| | Sampled Time | | | | | |
| | Client ID | BH-M-13-02 @ 1.6 TO 2.0 MBGS | BH-M-13-02 @ 3.1 TO 3.5 MBGS | | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Physical Tests** | Moisture (%) | | 13.5 | | | |
| | pH (1:2 soil:water) (pH) | | 8.61 | | | |
| **Organic / Inorganic Carbon** | Total Organic Carbon (%) | | <0.10 | | | |
| **Metals** | Antimony (Sb) (mg/kg) | | 4.22 | | | |
| | Arsenic (As) (mg/kg) | 20.1 | 56.2 | | | |
| | Barium (Ba) (mg/kg) | | 98.5 | | | |
| | Beryllium (Be) (mg/kg) | | 0.39 | | | |
| | Cadmium (Cd) (mg/kg) | | 0.269 | | | |
| | Chromium (Cr) (mg/kg) | | 16.3 | | | |
| | Cobalt (Co) (mg/kg) | | 10.1 | | | |
| | Copper (Cu) (mg/kg) | | 30.0 | | | |
| | Lead (Pb) (mg/kg) | | 11.8 | | | |
| | Mercury (Hg) (mg/kg) | | 0.058 | | | |
| | Molybdenum (Mo) (mg/kg) | | 0.65 | | | |
| | Nickel (Ni) (mg/kg) | | 8.10 | | | |
| | Selenium (Se) (mg/kg) | | 0.27 | | | |
| | Silver (Ag) (mg/kg) | | 0.39 | | | |
| | Thallium (Tl) (mg/kg) | | 0.362 | | | |
| | Tin (Sn) (mg/kg) | | <2.0 | | | |
| | Uranium (U) (mg/kg) | | 0.862 | | | |
| | Vanadium (V) (mg/kg) | | 85.4 | | | |
| | Zinc (Zn) (mg/kg) | | 95.7 | | | |
| **Speciated Metals** | Chromium, Trivalent (mg/kg) | | 16.2 | | | |
| | Hexavalent Chromium (mg/kg) | | <0.10 | | | |
| **Volatile Organic Compounds** | Benzene (mg/kg) | | <0.040 | | | |
| | Bromodichloromethane (mg/kg) | | <0.050 | | | |
| | Bromoform (mg/kg) | | <0.050 | | | |
| | Carbon Tetrachloride (mg/kg) | | <0.050 | | | |
| | Chlorobenzene (mg/kg) | | <0.050 | | | |
| | Dibromochloromethane (mg/kg) | | <0.050 | | | |
| | Chloroethane (mg/kg) | | <0.10 | | | |
| | Chloroform (mg/kg) | | <0.10 | | | |
| | Chloromethane (mg/kg) | | <0.10 | | | |
| | 1,2-Dichlorobenzene (mg/kg) | | <0.050 | | | |
| | 1,3-Dichlorobenzene (mg/kg) | | <0.050 | | | |
| | 1,4-Dichlorobenzene (mg/kg) | | <0.050 | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1362817-4 | L1362817-7 | | | |
|---|---|---|---|---|---|---|
| | Description | SOIL | SOIL | | | |
| | Sampled Date | 09-SEP-13 | 09-SEP-13 | | | |
| | Sampled Time | | | | | |
| | Client ID | BH-M-13-02 @ 1.6 TO 2.0 MBGS | BH-M-13-02 @ 3.1 TO 3.5 MBGS | | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Volatile Organic Compounds** | 1,1-Dichloroethane (mg/kg) | | <0.050 | | | |
| | 1,2-Dichloroethane (mg/kg) | | <0.050 | | | |
| | 1,1-Dichloroethylene (mg/kg) | | <0.050 | | | |
| | cis-1,2-Dichloroethylene (mg/kg) | | <0.050 | | | |
| | trans-1,2-Dichloroethylene (mg/kg) | | <0.050 | | | |
| | Dichloromethane (mg/kg) | | <0.30 | | | |
| | 1,2-Dichloropropane (mg/kg) | | <0.050 | | | |
| | cis-1,3-Dichloropropylene (mg/kg) | | <0.050 | | | |
| | trans-1,3-Dichloropropylene (mg/kg) | | <0.050 | | | |
| | Ethylbenzene (mg/kg) | | <0.050 | | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | | <0.20 | | | |
| | Styrene (mg/kg) | | <0.050 | | | |
| | 1,1,1,2-Tetrachloroethane (mg/kg) | | <0.050 | | | |
| | 1,1,2,2-Tetrachloroethane (mg/kg) | | <0.050 | | | |
| | Tetrachloroethylene (mg/kg) | | <0.050 | | | |
| | Toluene (mg/kg) | | <0.050 | | | |
| | 1,1,1-Trichloroethane (mg/kg) | | <0.050 | | | |
| | 1,1,2-Trichloroethane (mg/kg) | | <0.050 | | | |
| | Trichloroethylene (mg/kg) | | <0.010 | | | |
| | Trichlorofluoromethane (mg/kg) | | <0.10 | | | |
| | Vinyl Chloride (mg/kg) | | <0.10 | | | |
| | ortho-Xylene (mg/kg) | | <0.050 | | | |
| | meta- & para-Xylene (mg/kg) | | <0.050 | | | |
| | Xylenes (mg/kg) | | <0.075 | | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | | 92.5 | | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | | 98.1 | | | |
| **Hydrocarbons** | EPH10-19 (mg/kg) | | <200 | | | |
| | EPH19-32 (mg/kg) | | <200 | | | |
| | LEPH (mg/kg) | | <200 | | | |
| | HEPH (mg/kg) | | <200 | | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | | <100 | | | |
| | VPH (C6-C10) (mg/kg) | | <100 | | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | | 118.9 | | | |
| **Polycyclic Aromatic Hydrocarbons** | Acenaphthene (mg/kg) | | <0.050 | | | |
| | Acenaphthylene (mg/kg) | | <0.050 | | | |
| | Anthracene (mg/kg) | | <0.050 | | | |

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# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1362817-4 | L1362817-7 | | | |
|---|---|---|---|---|---|---|
| | Description | SOIL | SOIL | | | |
| | Sampled Date | 09-SEP-13 | 09-SEP-13 | | | |
| | Sampled Time | | | | | |
| | Client ID | BH-M-13-02 @ 1.6 TO 2.0 MBGS | BH-M-13-02 @ 3.1 TO 3.5 MBGS | | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Polycyclic Aromatic Hydrocarbons** | Benz(a)anthracene (mg/kg) | | <0.050 | | | |
| | Benzo(a)pyrene (mg/kg) | | <0.050 | | | |
| | Benzo(b)fluoranthene (mg/kg) | | <0.050 | | | |
| | Benzo(g,h,i)perylene (mg/kg) | | <0.050 | | | |
| | Benzo(k)fluoranthene (mg/kg) | | <0.050 | | | |
| | Chrysene (mg/kg) | | <0.050 | | | |
| | Dibenz(a,h)anthracene (mg/kg) | | <0.050 | | | |
| | Fluoranthene (mg/kg) | | <0.050 | | | |
| | Fluorene (mg/kg) | | <0.050 | | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | | <0.050 | | | |
| | 2-Methylnaphthalene (mg/kg) | | <0.050 | | | |
| | Naphthalene (mg/kg) | | <0.050 | | | |
| | Phenanthrene (mg/kg) | | <0.050 | | | |
| | Pyrene (mg/kg) | | <0.050 | | | |
| | Surrogate: Acenaphthene d10 (%) | | 95.3 | | | |
| | Surrogate: Chrysene d12 (%) | | 115.2 | | | |
| | Surrogate: Naphthalene d8 (%) | | 93.0 | | | |
| | Surrogate: Phenanthrene d10 (%) | | 96.0 | | | |
| **Glycols** | Diethylene Glycol (mg/kg) | | <10 | | | |
| | Ethylene Glycol (mg/kg) | | <10 | | | |
| | 1,2-Propylene Glycol (mg/kg) | | <10 | | | |
| **Chlorinated Hydrocarbons** | 1,2-Dichlorobenzene (mg/kg) | | <0.010 | | | |
| | 1,3-Dichlorobenzene (mg/kg) | | <0.010 | | | |
| | 1,4-Dichlorobenzene (mg/kg) | | <0.010 | | | |
| | Hexachlorobenzene (mg/kg) | | <0.010 | | | |
| | Hexachlorobutadiene (mg/kg) | | <0.010 | | | |
| | Hexachlorocyclohexane (Total) (mg/kg) | | <0.050 | | | |
| | Hexachloroethane (mg/kg) | | <0.010 | | | |
| | Pentachlorobenzene (mg/kg) | | <0.010 | | | |
| | 1,2,3,4-Tetrachlorobenzene (mg/kg) | | <0.010 | | | |
| | 1,2,3,5-Tetrachlorobenzene (mg/kg) | | <0.010 | | | |
| | 1,2,4,5-Tetrachlorobenzene (mg/kg) | | <0.010 | | | |
| | 1,2,3-Trichlorobenzene (mg/kg) | | <0.010 | | | |
| | 1,2,4-Trichlorobenzene (mg/kg) | | <0.010 | | | |
| | 1,3,5-Trichlorobenzene (mg/kg) | | <0.010 | | | |
| | 2,4,5-Trichlorotoluene (mg/kg) | | <0.010 | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1362817-4 | L1362817-7 | | | |
|---|---|---|---|---|---|---|
| | Description | SOIL | SOIL | | | |
| | Sampled Date | 09-SEP-13 | 09-SEP-13 | | | |
| | Sampled Time | | | | | |
| | Client ID | BH-M-13-02 @ 1.6 TO 2.0 MBGS | BH-M-13-02 @ 3.1 TO 3.5 MBGS | | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Phenolics** | 4-Chloro-3-methylphenol (mg/kg) | | <0.020 | | | |
| | 2-Chlorophenol (mg/kg) | | <0.020 | | | |
| | 3-Chlorophenol (mg/kg) | | <0.020 | | | |
| | 4-Chlorophenol (mg/kg) | | <0.020 | | | |
| | 2,3-Dichlorophenol (mg/kg) | | <0.020 | | | |
| | 2,4 & 2,5-Dichlorophenol (mg/kg) | | <0.020 | | | |
| | 2,6-Dichlorophenol (mg/kg) | | <0.020 | | | |
| | 3,4-Dichlorophenol (mg/kg) | | <0.020 | | | |
| | 3,5-Dichlorophenol (mg/kg) | | <0.020 | | | |
| | 2,4-Dimethylphenol (mg/kg) | | <0.020 | | | |
| | o-Cresol (mg/kg) | | <0.020 | | | |
| | m-Cresol (mg/kg) | | <0.020 | | | |
| | p-Cresol (mg/kg) | | <0.020 | | | |
| | Pentachlorophenol (mg/kg) | | <0.020 | | | |
| | Phenol (mg/kg) | | <0.020 | | | |
| | 2,3,4,5-Tetrachlorophenol (mg/kg) | | <0.020 | | | |
| | 2,3,4,6-Tetrachlorophenol (mg/kg) | | <0.020 | | | |
| | 2,3,5,6-Tetrachlorophenol (mg/kg) | | <0.020 | | | |
| | 2,3,4-Trichlorophenol (mg/kg) | | <0.020 | | | |
| | 2,3,5-Trichlorophenol (mg/kg) | | <0.020 | | | |
| | 2,3,6-Trichlorophenol (mg/kg) | | <0.020 | | | |
| | 2,4,5-Trichlorophenol (mg/kg) | | <0.020 | | | |
| | 2,4,6-Trichlorophenol (mg/kg) | | <0.020 | | | |
| **Polychlorinated Biphenyls** | PCB-1016 (mg/kg) | | <0.020 | | | |
| | PCB-1221 (mg/kg) | | <0.020 | | | |
| | PCB-1232 (mg/kg) | | <0.020 | | | |
| | PCB-1242 (mg/kg) | | <0.020 | | | |
| | PCB-1248 (mg/kg) | | <0.020 | | | |
| | PCB-1254 (mg/kg) | | <0.020 | | | |
| | PCB-1260 (mg/kg) | | <0.020 | | | |
| | PCB-1262 (mg/kg) | | <0.020 | | | |
| | PCB-1268 (mg/kg) | | <0.020 | | | |
| | Total Polychlorinated Biphenyls (mg/kg) | | <0.020 | | | |
| **Dioxins and Furans** | 2,3,7,8-TCDD (pg/g) | | <0.27 [U] | | | |
| | 1,2,3,7,8-PeCDD (pg/g) | | <0.19 [U] | | | |
| | 1,2,3,4,7,8-HxCDD (pg/g) | | <0.11 [U] | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1362817-4 | L1362817-7 | | | |
|---|---|---|---|---|---|---|
| | Description | SOIL | SOIL | | | |
| | Sampled Date | 09-SEP-13 | 09-SEP-13 | | | |
| | Sampled Time | | | | | |
| | Client ID | BH-M-13-02 @ 1.6 TO 2.0 MBGS | BH-M-13-02 @ 3.1 TO 3.5 MBGS | | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Dioxins and Furans** | 1,2,3,6,7,8-HxCDD (pg/g) | | <0.12 [U] | | | |
| | 1,2,3,7,8,9-HxCDD (pg/g) | | <0.11 [U] | | | |
| | 1,2,3,4,6,7,8-HpCDD (pg/g) | | <0.18 [U] | | | |
| | OCDD (pg/g) | | <0.16 [U] | | | |
| | Total-TCDD (pg/g) | | <0.27 | | | |
| | Total TCDD # Homologues | | 0 | | | |
| | Total-PeCDD (pg/g) | | <0.19 | | | |
| | Total PeCDD # Homologues | | 0 | | | |
| | Total-HxCDD (pg/g) | | <0.12 | | | |
| | Total HxCDD # Homologues | | 0 | | | |
| | Total-HpCDD (pg/g) | | <0.18 | | | |
| | Total HpCDD # Homologues | | 0 | | | |
| | 2,3,7,8-TCDF (pg/g) | | <0.21 [U] | | | |
| | 1,2,3,7,8-PeCDF (pg/g) | | <0.12 [U] | | | |
| | 2,3,4,7,8-PeCDF (pg/g) | | <0.11 [U] | | | |
| | 1,2,3,4,7,8-HxCDF (pg/g) | | <0.10 [U] | | | |
| | 1,2,3,6,7,8-HxCDF (pg/g) | | <0.095 [U] | | | |
| | 1,2,3,7,8,9-HxCDF (pg/g) | | <0.13 [U] | | | |
| | 2,3,4,6,7,8-HxCDF (pg/g) | | <0.094 [U] | | | |
| | 1,2,3,4,6,7,8-HpCDF (pg/g) | | <0.11 [U] | | | |
| | 1,2,3,4,7,8,9-HpCDF (pg/g) | | <0.17 [U] | | | |
| | OCDF (pg/g) | | <0.24 [U] | | | |
| | Total-TCDF (pg/g) | | <0.21 | | | |
| | Total TCDF # Homologues | | 0 | | | |
| | Total-PeCDF (pg/g) | | <0.12 | | | |
| | Total PeCDF # Homologues | | 0 | | | |
| | Total-HxCDF (pg/g) | | <0.13 | | | |
| | Total HxCDF # Homologues | | 0 | | | |
| | Total-HpCDF (pg/g) | | <0.17 | | | |
| | Total HpCDF # Homologues | | 0 | | | |
| | Surrogate: 13C12-2,3,7,8-TCDD (%) | | 56.0 | | | |
| | Surrogate: 13C12-1,2,3,7,8-PeCDD (%) | | 49.0 | | | |
| | Surrogate: 13C12-1,2,3,4,7,8-HxCDD (%) | | 83.0 | | | |
| | Surrogate: 13C12-1,2,3,6,7,8-HxCDD (%) | | 70.0 | | | |
| | Surrogate: 13C12-1,2,3,4,6,7,8-HpCDD (%) | | 64.0 | | | |
| | Surrogate: 13C12-OCDD (%) | | 53.0 | | | |
| | Surrogate: 13C12-2,3,7,8-TCDF (%) | | 59.0 | | | |

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# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1362817-4 | L1362817-7 | | | |
|---|---|---|---|---|---|---|
| | Description | SOIL | SOIL | | | |
| | Sampled Date | 09-SEP-13 | 09-SEP-13 | | | |
| | Sampled Time | | | | | |
| | Client ID | BH-M-13-02 @ 1.6 TO 2.0 MBGS | BH-M-13-02 @ 3.1 TO 3.5 MBGS | | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Dioxins and Furans** | Surrogate: 13C12-1,2,3,7,8-PeCDF (%) | | 52.0 | | | |
| | Surrogate: 13C12-2,3,4,7,8-PeCDF (%) | | 51.0 | | | |
| | Surrogate: 13C12-1,2,3,4,7,8-HxCDF (%) | | 63.0 | | | |
| | Surrogate: 13C12-1,2,3,6,7,8-HxCDF (%) | | 68.0 | | | |
| | Surrogate: 13C12-2,3,4,6,7,8-HxCDF (%) | | 72.0 | | | |
| | Surrogate: 13C12-1,2,3,7,8,9-HxCDF (%) | | 66.0 | | | |
| | Surrogate: 13C12-1,2,3,4,6,7,8-HpCDF (%) | | 66.0 | | | |
| | Surrogate: 13C12-1,2,3,4,7,8,9-HpCDF (%) | | 60.0 | | | |
| | Surrogate: 37Cl4-2,3,7,8-TCDD (Cleanup) (%) | | 78.0 | | | |
| **Toxic Equivalency** | Lower Bound PCDD/F TEQ (WHO 2005) (pg/g) | | 0.00 | | | |
| | Mid Point PCDD/F TEQ (WHO 2005) (pg/g) | | 0.299 | | | |
| | Upper Bound PCDD/F TEQ (WHO 2005) (pg/g) | | 0.598 | | | |

* 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 | Anthracene | DLM | L1362817-7 |
| Duplicate | Fluoranthene | DLM | L1362817-7 |
| Duplicate | Benzo(b)fluoranthene | DUP-H | L1362817-7 |
| Method Blank | OCDD | J,R | L1362817-7 |
| Laboratory Control Sample | 1,2-Propylene Glycol | LCS-ND | L1362817-7 |
| Method Blank | 1,2,3,4,6,7,8-HpCDD | [U] | L1362817-7 |
| Method Blank | 1,2,3,4,6,7,8-HpCDF | [U] | L1362817-7 |
| Method Blank | 1,2,3,4,7,8,9-HpCDF | [U] | L1362817-7 |
| Method Blank | 1,2,3,4,7,8-HxCDD | [U] | L1362817-7 |
| Method Blank | 1,2,3,4,7,8-HxCDF | [U] | L1362817-7 |
| Method Blank | 1,2,3,6,7,8-HxCDD | [U] | L1362817-7 |
| Method Blank | 1,2,3,6,7,8-HxCDF | [U] | L1362817-7 |
| Method Blank | 1,2,3,7,8,9-HxCDD | [U] | L1362817-7 |
| Method Blank | 1,2,3,7,8,9-HxCDF | [U] | L1362817-7 |
| Method Blank | 1,2,3,7,8-PeCDD | [U] | L1362817-7 |
| Method Blank | 1,2,3,7,8-PeCDF | [U] | L1362817-7 |
| Method Blank | 2,3,4,6,7,8-HxCDF | [U] | L1362817-7 |
| Method Blank | 2,3,4,7,8-PeCDF | [U] | L1362817-7 |
| Method Blank | 2,3,7,8-TCDD | [U] | L1362817-7 |
| Method Blank | 2,3,7,8-TCDF | [U] | L1362817-7 |
| Method Blank | OCDF | [U] | L1362817-7 |

**Qualifiers for Individual Parameters Listed:**

| Qualifier | Description |
|---|---|
| DLM | Detection Limit Adjusted For Sample Matrix Effects |
| DUP-H | Duplicate results outside ALS DQO, due to sample heterogeneity. |
| J,R | The analyte was detected below the calibrated range but above the EDL, and the ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum. |
| LCS-ND | Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected. |
| [U] | The analyte was not detected above the EDL. |

## Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** |
|---|---|---|---|
| **C-TOT-ORG-LECO-SK** | Soil | Organic Carbon by combustion method | SSSA (1996) p. 973 |

Total Organic Carbon (C-TOT-ORG-LECO-SK, C-TOT-ORG-SK)

Total C and inorganic C are determined on separate samples. The total C is determined by combustion and thermal conductivity detection, while inorganic C is determined by weight lass after addition of hydrochloric acid. Organic C is calculated by the difference between these two determinations.

Reference for Total C:
Nelson, D.W. and Sommers, L.E. 1996. Total Carbon, organic carbon and organic matter. P. 961-1010 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

Reference for Inorganic C:
Loeppert, R.H. and Suarez, D.L. 1996. Gravimetric Method for Loss of Carbon Dioxide. P. 455-456 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

| | | | |
|---|---|---|---|
| **CLH-SOX-MS-VA** | Soil | Chlorinated Hydrocarbons in Soil by GCMS | 3510, 3610, 8121 SW-846 AND 8270 EPA |

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3540, 3610, 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a Soxhlet system to extract a subsample of the sediment/soilwith dichloromethane. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Hexachlorocyclohexanes includes the alpha, beta, gamma, and delta isomers

| | | | |
|---|---|---|---|
| **CLPHEN-TMB-MS-VA** | Soil | Chlorinated Phenols by Tumbler/GCMS | EPA 3570, 8270, Knapp(1979) |

A subsample of the soil/sediment is rotary extracted by solvent, derivitized, and analysed by GC/MS.

| | | | |
|---|---|---|---|
| **CR-CR3-ED** | Soil | Chromium, Trivalent (Cr +3) | Total Cr - Cr(+6) |

# Reference Information

| | | | |
|---|---|---|---|
| **CR-CR6-3060-ED** | Soil | Chromium, Hexavalent (Cr +6) | APHA 3500-CR C, EPA 3060A ALKALINE |
| **DX-1613B-HRMS-BU** | Soil | Dioxins and Furans HR 1613B | USEPA 1613B |
| **EPH-TUMB-FID-VA** | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to gas chromatography with flame ionization detection (GC-FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

**GLY-EXT-FID-VA** Soil Glycols in Soil by Wrist Shaker GCFID SW-846, METHOD 8015B, EPA

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8015B, published by the United States Environmental Protection Agency (EPA). The procedure involves extraction of a subsample of the sediment/soil with deionized water, followed by treatment of the extract with a strong base (NaOH) and benzoyl chloride to form the corresponding benzoate esters. The benzoate esters are then extracted with iso-octane and the extract is analyzed by capillary column gas chromatography with flame ionization detection (FID).

**HG-200.2-CVAF-VA** Soil Mercury in Soil by CVAFS EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry(EPA Method 245.7).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

**LEPH/HEPH-CALC-VA** Soil LEPHs and HEPHs BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated
by subtracting selected Polycyclic Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene, and Pyrene
are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

**MET-200.2-CCMS-VA** Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

**MOISTURE-VA** Soil Moisture content ASTM D2974-00 Method A

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

**PAH-TMB-H/A-MS-VA** Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3545 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation. Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

**PCB-SE-ECD-VA** Soil PCB by Extraction with GCECD EPA8082, 3630

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3500, 3620, 3630, 3660, 3665 & 8082, published by the United States Environmental Protection Agency (EPA). The procedure involves a solid-liquid extraction of a subsample of the sediment/soil using a mixture of hexane and acetone. Water is added to the extract and the resulting hexane extract undergoes one or more of the following clean-up procedures (if required): florisil clean-up, silica gel clean-up, sulphur clean-up and/or sulphuric acid clean-up. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).

**PCB-SUM-CALC-VA** Soil Total PCBs in soil CALCULATION

Calculation of Total PCB. Total PCB is the sum of the concentrations of PCB aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268. Results below detection limit (DL) are treated as zero. The Total PCB detection limit is equal to the highest of the aroclor detection limits used in the sum.

# Reference Information

| | | | |
|---|---|---|---|
| **PH-1:2-VA** | Soil | pH in Soil (1:2 Soil:Water Extraction) | BC WLAP METHOD: PH, ELECTROMETRIC, SOIL |

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

| | | | |
|---|---|---|---|
| **PHEN-TMB-MS-VA** | Soil | Phenolics by Tumbler/GC-MS | EPA 3570 & 8270, Knapp (1979) |

A subsample of the soil/sediment is rotary extracted by solvent, derivitized, and analysed by GC/MS.

| | | | |
|---|---|---|---|
| **VH-HSFID-VA** | Soil | VH in soil by Headspace GCFID | EPA8260B, 5021, 5035, BC MOE |

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

| | | | |
|---|---|---|---|
| **VH-SURR-FID-VA** | Soil | VH Surrogates for Soils | BCMELP CSR ANALYTICAL METHOD 2 |
| **VOC-HSMS-VA** | Soil | VOCs in soil by Headspace GCMS | EPA8260B, 5021, 5035, BC MOE |

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

| | | | |
|---|---|---|---|
| **VOC7-L-HSMS-VA** | Soil | VOCs in soil by Headspace GCMS | EPA8260B, 5021, 5035, BC MOE |

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

| | | | |
|---|---|---|---|
| **VOC7/VOC-SURR-MS-VA** | Soil | VOC7 and/or VOC Surrogates for Soils | EPA METHODS 8260B & 524.2 |
| **VPH-CALC-VA** | Soil | VPH is VH minus select aromatics | BC MOE LABORATORY MANUAL (2005) |

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water" (Version 2.1, July 20, 1999). According to this method, the concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, Xylenes and Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10). Analysis of Volatile Hydrocarbons adheres to all prescribed elements of BCMELP method "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

| | | | |
|---|---|---|---|
| **VPH-CALC-VA** | Soil | VPHv is VHv minus BTEX/nC6/nC10 | BC MOE LABORATORY MANUAL (2005) |

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water" (Version 2.1, July 20, 1999). According to this method, the concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, Xylenes and Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10). Analysis of Volatile Hydrocarbons adheres to all prescribed elements of BCMELP method "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

| | | | |
|---|---|---|---|
| **XYLENES-CALC-VA** | Soil | Sum of Xylene Isomer Concentrations | EPA 8260B & 524.2 |

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** 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 |
|---|---|
| ED | ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA |
| SK | ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA |
| BU | ALS ENVIRONMENTAL - BURLINGTON, ONTARIO, CANADA |
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |

**Chain of Custody Numbers:**

# Reference Information

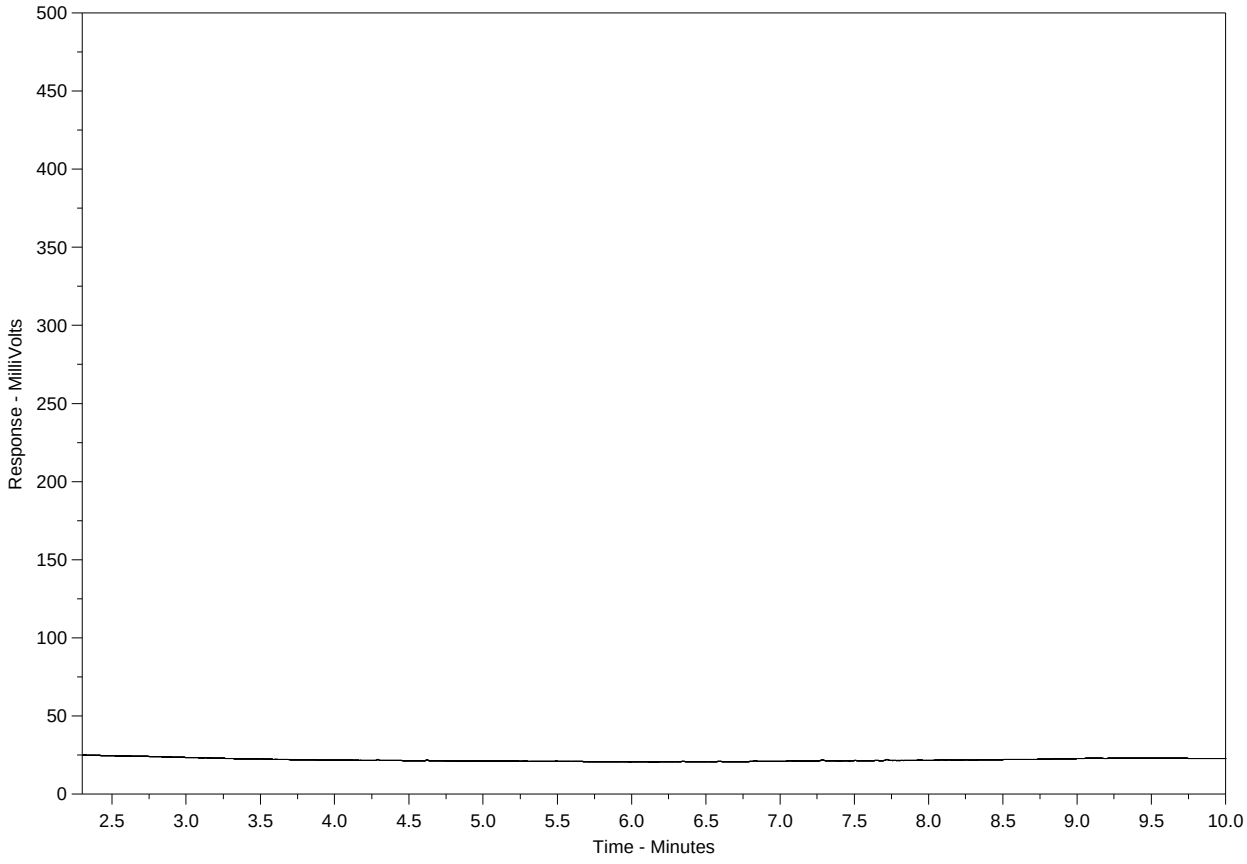
**GLOSSARY OF REPORT TERMS**

*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 wwt - 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.*

# Hydrocarbon Distribution Report

ALS Sample ID: L1362817-7
Client Sample ID: BH-M-13-02 @ 3.1 TO 3.5 MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

L1362817-COFC

ALS Environmental

**n of Custody / Analytical Request Form**
**Canada Toll Free: 1 800 668 9878**
**www.alsglobal.com**

COC # _____

Page ___ of ___

| **Report To** | | **Report Format / Distribution** | | **Service Requeste** |
|---|---|---|---|---|
| Company: | Summit Environmental Consultants Inc. | ☑ Standard | ☐ Other | Regular (Standard Turnaround Times- Business Days |
| Contact: | Nicole Jacques | ☑ PDF | ☑ Excel ☐ Dig tal | |
| Address: | 301-4109 4th Ave | Email 1: | nrj@summit-environmental.com | |
| | Whitehorse, Yukon, Y1A 1H6 | Email 2: | | |
| Phone: | 867-456-2711 | Email 3: | | |
| **Invoice To** | Same as Report ? Y | **Client / Project Information** | | **Analysis Request** |
| Hardcopy of Invoice with Report? | | Job #: | 2012-2333.523.550 | |
| Company: | | PO / AFE: | | |
| Contact: | | LSD: | | |
| Address: | | | | |
| Phone: | Fax: | Quote #: | | |
| [redacted] Lab Work Order # (lab use only): | L1362817 | **ALS Contact:** | Dean Watt | **Sampler:** SVB |

| Sample | Sample Identification | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | Extract for hydrocarbon analyse | Extract for BTEX / VPH | Hold | MET-TOT-CSR-VA (includes | CR-CR3-ED | BTEX+VPH+MTBE-CSR-VA | LEPH/HEPH-CSR-VA | VOC+MTBE-ROUT-VA | CLH-SOX-MS-VA | CLH-SOX-MS-VA | PHEN-CL-FULL-VA | PHEN-NONCL-VA | GLYCOLS-SED-VA | PCB-SE-ECD-VA | DX-1613B-HRMS-BU | C-TOT-ORG-LECO-SK | | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [redacted] 1 | BH-M-13-02 @ 0.0 to 0.5 mbgs | 09-Sep-13 | | Soil | X | X | X | | | | | | | | | | | | | | | 5 |
| [redacted] 2 | BH-M-13-02 @ 0.6 to 1.0 mbgs | 09-Sep-13 | | Soil | X | X | X | | | | | | | | | | | | | | | 5 |
| [redacted] 3 | BH-M-13-02 @ 1.1 to 1.5 mbgs | 09-Sep-13 | | Soil | X | X | X | | | | | | | | | | | | | | | 5 |
| [redacted] 4 | BH-M-13-02 @ 1.6 to 2.0 mbgs | 09-Sep-13 | | Soil | X | X | X | | | | | | | | | | | | | | | 5 |
| [redacted] 5 | BH-M-13-02 @ 2.1 to 2.5 mbgs | 09-Sep-13 | | Soil | X | X | X | | | | | | | | | | | | | | | 5 |
| [redacted] 6 | BH-M-13-02 @ 2.6 to 3.0 mbgs | 09-Sep-13 | | Soil | X | X | X | | | | | | | | | | | | | | | 5 |
| [redacted] 7 | BH-M-13-02 @ 3.1 to 3.5 mbgs | 09-Sep-13 | | Soil | | | | X | X | X | X | X | X | X | X | X | X | X | X | X | | 4 |
| [redacted] | | | | | | | | | | | | | | | | | | | | | | |
| [redacted] | | | | | | | | | | | | | | | | | | | | | | |
| [redacted] | | | | | | | | | | | | | | | | | | | | | | |
| [redacted] | | | | | | | | | | | | | | | | | | | | | | |
| [redacted] | | | | | | | | | | | | | | | | | | | | | | |

**Special Instructions / Regulations with water or land use**

Compare to site specific standards provided to ALS

**Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

**By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.**

| [redacted] SHIPMENT RELEASE (client use) | | [redacted] SHIPMENT RECEPTION (lab use only) | | | | [redacted] SHIPMENT VERIFICATION (lab use only) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Released by: | Date (dd-mm | Received by: | Date: | Time: | Temperatu | Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
| | | PR | 13SEPT | 13:50 | °C | | | | |

GENF 18.01 Front

8.1 °C, 4.4 °C, 7.9 °C, 3.3 °C, 6.1 °C.

SUMMIT ENVIRONMENTAL CONSULTANTS INC.
ATTN: Nicole Jacques
# 301 - 4109 4th Avenue
Whitehorse YT Y1A 1H6

Date Received: 13-SEP-13
Report Date: 11-OCT-13 15:21 (MT)
Version: FINAL REV. 2

Client Phone: 867-456-2711

# Certificate of Analysis

**Lab Work Order #: L1362831**

Project P.O. #: NOT SUBMITTED
Job Reference: 2012-2333.523.550
C of C Numbers:
Legal Site Desc:

**Comments:**

Dean Watt
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | | | | | | |
|---|---|---|---|---|---|---|
| | **Sample ID** | L1362831-1 | L1362831-2 | | | |
| | **Description** | SOIL | SOIL | | | |
| | **Sampled Date** | 09-SEP-13 | 09-SEP-13 | | | |
| | **Sampled Time** | | | | | |
| | **Client ID** | BH-KZ-13-01 @ 0.0 TO 0.5 MBGS | BH-KZ-13-01 @ 0.6 TO 1.0 MBGS | | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Physical Tests** | Moisture (%) | 4.16 | 12.3 | | | |
| | pH (1:2 soil:water) (pH) | 7.08 | 5.71 | | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/kg) | <0.10 DLM | <0.050 | | | |
| **Metals** | Antimony (Sb) (mg/kg) | 25.9 | 2.61 | | | |
| | Arsenic (As) (mg/kg) | 276 | 98.7 | | | |
| | Barium (Ba) (mg/kg) | 166 | 385 | | | |
| | Beryllium (Be) (mg/kg) | 0.38 | 0.66 | | | |
| | Cadmium (Cd) (mg/kg) | 4.17 | 0.137 | | | |
| | Chromium (Cr) (mg/kg) | 28.8 | 29.0 | | | |
| | Cobalt (Co) (mg/kg) | 6.47 | 7.55 | | | |
| | Copper (Cu) (mg/kg) | 70.9 | 21.4 | | | |
| | Lead (Pb) (mg/kg) | 231 | 15.6 | | | |
| | Mercury (Hg) (mg/kg) | 0.071 | <0.050 | | | |
| | Molybdenum (Mo) (mg/kg) | 5.13 | 0.65 | | | |
| | Nickel (Ni) (mg/kg) | 11.2 | 16.4 | | | |
| | Selenium (Se) (mg/kg) | <0.20 | 0.25 | | | |
| | Silver (Ag) (mg/kg) | 2.35 | 0.16 | | | |
| | Thallium (Tl) (mg/kg) | 0.235 | 0.172 | | | |
| | Tin (Sn) (mg/kg) | 5.2 | <2.0 | | | |
| | Uranium (U) (mg/kg) | 0.579 | 0.808 | | | |
| | Vanadium (V) (mg/kg) | 39.9 | 57.8 | | | |
| | Zinc (Zn) (mg/kg) | 307 | 59.7 | | | |
| **Speciated Metals** | Chromium, Trivalent (mg/kg) | 28.7 | 28.8 | | | |
| | Hexavalent Chromium (mg/kg) | 0.13 | 0.23 | | | |
| **TCLP Metals** | 1st Preliminary PH (pH) | 7.28 | | | | |
| | 2nd Preliminary PH (pH) | 1.58 | | | | |
| | Final pH (pH) | 4.95 | | | | |
| | Extraction Solution Initial pH (pH) | 4.92 | | | | |
| | Antimony (Sb)-Leachable (mg/L) | <1.0 | | | | |
| | Arsenic (As)-Leachable (mg/L) | <1.0 | | | | |
| | Barium (Ba)-Leachable (mg/L) | <2.5 | | | | |
| | Beryllium (Be)-Leachable (mg/L) | <0.025 | | | | |
| | Boron (B)-Leachable (mg/L) | <0.50 | | | | |
| | Cadmium (Cd)-Leachable (mg/L) | <0.050 | | | | |
| | Calcium (Ca)-Leachable (mg/L) | 41.2 | | | | |
| | Chromium (Cr)-Leachable (mg/L) | <0.25 | | | | |
| | Cobalt (Co)-Leachable (mg/L) | <0.050 | | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | | | | | | |
|---|---|---|---|---|---|---|
| | **Sample ID** | L1362831-1 | L1362831-2 | | | |
| | **Description** | SOIL | SOIL | | | |
| | **Sampled Date** | 09-SEP-13 | 09-SEP-13 | | | |
| | **Sampled Time** | | | | | |
| | **Client ID** | BH-KZ-13-01 @ 0.0 TO 0.5 MBGS | BH-KZ-13-01 @ 0.6 TO 1.0 MBGS | | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **TCLP Metals** | Copper (Cu)-Leachable (mg/L) | <0.050 | | | | |
| | Iron (Fe)-Leachable (mg/L) | 4.01 | | | | |
| | Lead (Pb)-Leachable (mg/L) | <0.25 | | | | |
| | Magnesium (Mg)-Leachable (mg/L) | 5.07 | | | | |
| | Mercury (Hg)-Leachable (mg/L) | <0.0010 | | | | |
| | Nickel (Ni)-Leachable (mg/L) | <0.25 | | | | |
| | Selenium (Se)-Leachable (mg/L) | <1.0 | | | | |
| | Silver (Ag)-Leachable (mg/L) | <0.050 | | | | |
| | Thallium (Tl)-Leachable (mg/L) | <1.0 | | | | |
| | Vanadium (V)-Leachable (mg/L) | <0.15 | | | | |
| | Zinc (Zn)-Leachable (mg/L) | 1.15 | | | | |
| **Volatile Organic Compounds** | Benzene (mg/kg) | <0.40 | <0.040 | | | |
| | Ethylbenzene (mg/kg) | 7.19 | <0.050 | | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | | | |
| | Styrene (mg/kg) | 0.120 | <0.050 | | | |
| | Toluene (mg/kg) | 31.6 | <0.050 | | | |
| | ortho-Xylene (mg/kg) | 144 | <0.050 | | | |
| | meta- & para-Xylene (mg/kg) | 215 | <0.050 | | | |
| | Xylenes (mg/kg) | 359 | <0.075 | | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 83.9 | 96.3 | | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 108.8 | 92.5 | | | |
| **Hydrocarbons** | EPH10-19 (mg/kg) | 2120 | <200 | | | |
| | EPH19-32 (mg/kg) | 21200 | 460 | | | |
| | LEPH (mg/kg) | 2110 | <200 | | | |
| | HEPH (mg/kg) | 21200 | 460 | | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | 1610 | <100 | | | |
| | VPH (C6-C10) (mg/kg) | 1210 | <100 | | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 100.7 | 96.4 | | | |
| **Polycyclic Aromatic Hydrocarbons** | Acenaphthene (mg/kg) | <0.20 DLM | <0.050 | | | |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | | | |
| | Anthracene (mg/kg) | <0.080 DLM | <0.050 | | | |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | | | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.20 DLM | <0.050 | | | |
| | Benzo(g,h,i)perylene (mg/kg) | 0.226 | <0.050 | | | |
| | Benzo(k)fluoranthene (mg/kg) | <0.060 DLM | <0.050 | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1362831-1 | L1362831-2 | | | |
|---|---|---|---|---|---|---|
| | Description | SOIL | SOIL | | | |
| | Sampled Date | 09-SEP-13 | 09-SEP-13 | | | |
| | Sampled Time | | | | | |
| | Client ID | BH-KZ-13-01 @ 0.0 TO 0.5 MBGS | BH-KZ-13-01 @ 0.6 TO 1.0 MBGS | | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Polycyclic Aromatic Hydrocarbons** | Chrysene (mg/kg) | <0.060 DLM | <0.050 | | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | | | |
| | Fluoranthene (mg/kg) | <0.070 DLM | <0.050 | | | |
| | Fluorene (mg/kg) | <0.20 DLM | <0.050 | | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | | | |
| | 2-Methylnaphthalene (mg/kg) | 4.94 | <0.050 | | | |
| | Naphthalene (mg/kg) | 6.51 | <0.050 | | | |
| | Phenanthrene (mg/kg) | 0.269 | <0.050 | | | |
| | Pyrene (mg/kg) | 0.563 | <0.050 | | | |
| | Surrogate: Acenaphthene d10 (%) | 123.2 | 87.2 | | | |
| | Surrogate: Chrysene d12 (%) | 127.0 | 87.8 | | | |
| | Surrogate: Naphthalene d8 (%) | 115.8 | 79.7 | | | |
| | Surrogate: Phenanthrene d10 (%) | 117.5 | 93.2 | | | |

# Reference Information

**QC Samples with Qualifiers & Comments:**

| QC Type Description | Parameter | Qualifier | Applies to Sample Number(s) |
|---|---|---|---|
| Duplicate | Anthracene | DLM | L1362831-1, -2 |
| Duplicate | Fluoranthene | DLM | L1362831-1, -2 |
| Duplicate | Cyanide, Weak Acid Diss | DLM | L1362831-1, -2 |
| Duplicate | Benzo(b)fluoranthene | DUP-H | L1362831-1, -2 |
| Matrix Spike | Calcium (Ca)-Leachable | MS-B | L1362831-1 |
| Matrix Spike | Magnesium (Mg)-Leachable | MS-B | L1362831-1 |

**Qualifiers for Individual Parameters Listed:**

| Qualifier | Description |
|---|---|
| DLM | Detection Limit Adjusted due to sample matrix effects. |
| DUP-H | Duplicate results outside ALS DQO, due to sample heterogeneity. |
| MS-B | Matrix Spike recovery could not be accurately calculated due to high analyte background in sample. |

**Test Method References:**

| ALS Test Code | Matrix | Test Description | Method Reference** |
|---|---|---|---|
| **CN-WAD-NAOH-CFA-VA** | Soil | Weak Acid Diss. Cyanide in soil by CFA | ONMOE CN-E3015/APHA 4500-CN CYANIDE |

This analysis is carried out using procedures adapted from the Ontario Ministry of Environment CN-E3015 and APHA Method 4500-CN I. "Weak Acid Dissociable Cyanide". Weak Acid Dissociable (WAD) cyanide is determined by rotary extraction of the soil with 0.04M Sodium Hydroxide, followed by in-line sample distillation with final determination by colourimetric analysis.

| | | | |
|---|---|---|---|
| **CR-CR3-ED** | Soil | Chromium, Trivalent (Cr +3) | Total Cr - Cr(+6) |
| **CR-CR6-3060-ED** | Soil | Chromium, Hexavalent (Cr +6) | APHA 3500-CR C, EPA 3060A ALKALINE |
| **EPH-TUMB-FID-VA** | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to gas chromatography with flame ionization detection (GC-FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

| | | | |
|---|---|---|---|
| **HG-200.2-CVAF-VA** | Soil | Mercury in Soil by CVAFS | EPA 200.2/245.7 |

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry(EPA Method 245.7).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

| | | | |
|---|---|---|---|
| **HG-TCLP-CVAFS-VA** | Soil | Mercury by CVAFS (TCLP) | EPA 1311/245.7 |

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter and analysed using atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA 245.7).

| | | | |
|---|---|---|---|
| **LEPH/HEPH-CALC-VA** | Soil | LEPHs and HEPHs | BC MOE LABORATORY MANUAL (2005) |

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated
by subtracting selected Polycyclic Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene, and Pyrene
are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

| | | | |
|---|---|---|---|
| **MET-200.2-CCMS-VA** | Soil | Metals in Soil by CRC ICPMS | EPA 200.2/6020A |

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may

# Reference Information

be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

**MET-TCLP-ICP-VA** Soil Metals by ICPOES (TCLP) EPA 1311/6010B

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter and analysed using inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

**MOISTURE-VA** Soil Moisture content ASTM D2974-00 Method A

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

**PAH-TMB-H/A-MS-VA** Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3545 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation. Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

**PH-1:2-VA** Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

**VH-HSFID-VA** Soil VH in soil by Headspace GCFID EPA8260B, 5021, 5035, BC MOE

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

**VH-SURR-FID-VA** Soil VH Surrogates for Soils BCMELP CSR ANALYTICAL METHOD 2

**VOC7-L-HSMS-VA** Soil VOCs in soil by Headspace GCMS EPA8260B, 5021, 5035, BC MOE

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

**VOC7/VOC-SURR-MS-VA** Soil VOC7 and/or VOC Surrogates for Soils EPA METHODS 8260B & 524.2

**VPH-CALC-VA** Soil VPH is VH minus select aromatics BC MOE LABORATORY MANUAL (2005)

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water" (Version 2.1, July 20, 1999). According to this method, the concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, Xylenes and Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10). Analysis of Volatile Hydrocarbons adheres to all prescribed elements of BCMELP method "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

**XYLENES-CALC-VA** Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** 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 |
|---|---|
| ED | ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA |
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |

**Chain of Custody Numbers:**

# Reference Information

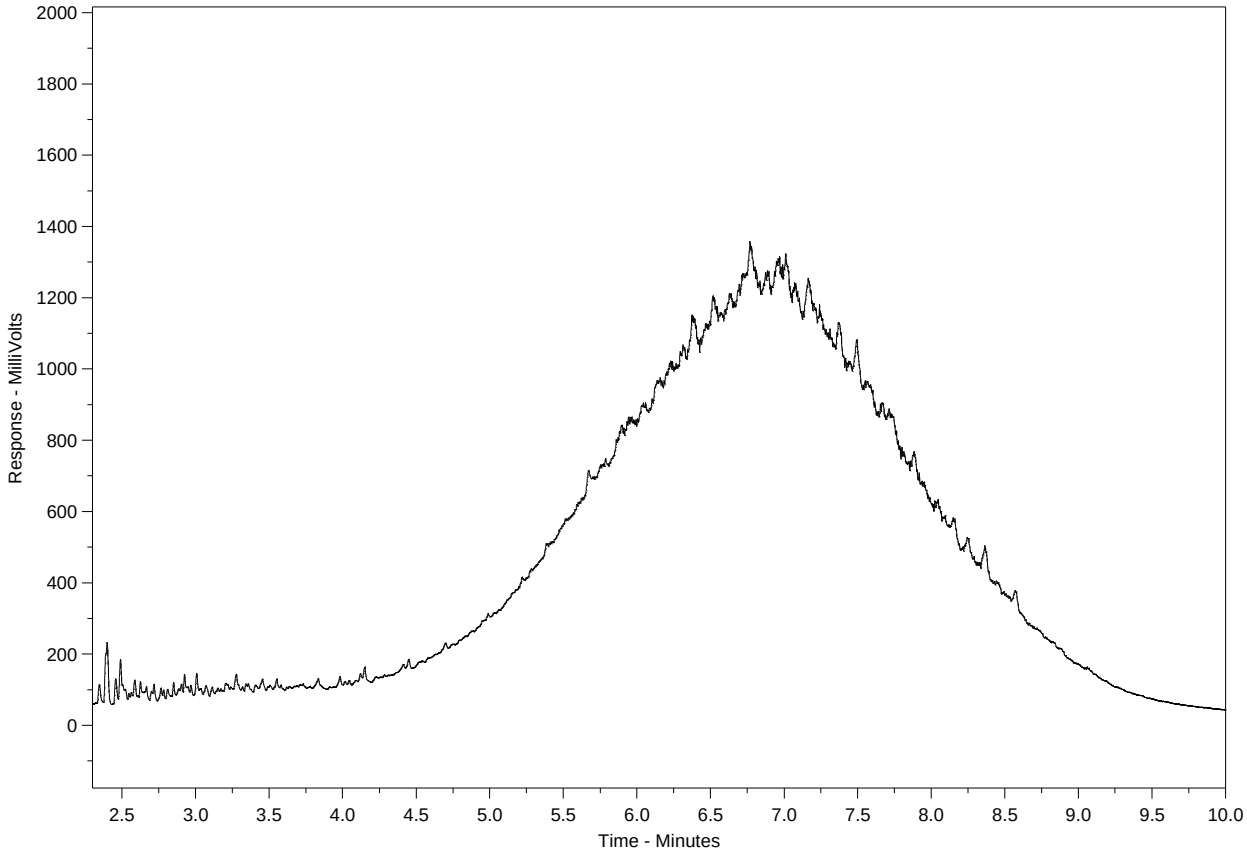
**GLOSSARY OF REPORT TERMS**

*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 wwt - 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.*

# Hydrocarbon Distribution Report

ALS Sample ID: L1362831-1
Client Sample ID: BH-KZ-13-01 @ 0.0 TO 0.5 MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

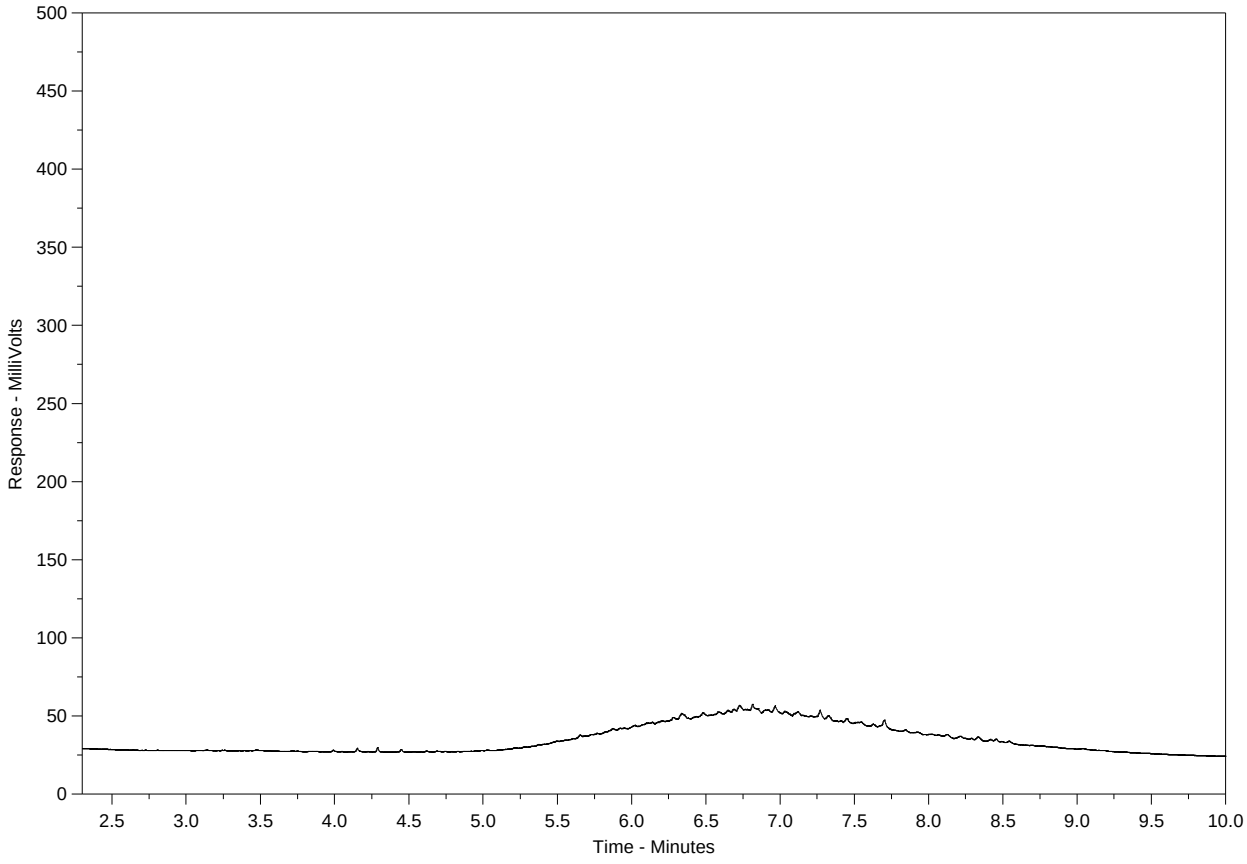
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report

ALS Sample ID: L1362831-2
Client Sample ID: BH-KZ-13-01 @ 0.6 TO 1.0 MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

L1362831-COFC

# ain of Custody / Analytical Request Form

ALS Environmental

**Canada Toll Free: 1 800 668 9878**

**www.alsglobal.com**

COC # _____

Page ___ of ___

| **Report To** | | **Report Format / Distribution** | | **Service Requeste** |
|---|---|---|---|---|
| Company: | Summit Environmental Consultants Inc. | ☑ Standard ☐ Other | | Regular (Standard Turnaround Times- Business Days |
| Contact: | Nicole Jacques | ☑ PDF ☑ Excel ☐ Digital | | |
| Address: | 301-4109 4th Ave | Email 1: | nrj@summit-environmental.com | |
| | Whitehorse, Yukon, Y1A 1H6 | Email 2: | | |
| Phone: | 867-456-2711 | Email 3: | | |
| **Invoice To** | Same as Report ? Y | **Client / Project Information** | | **Analysis Request** |
| Hardcopy of Invoice with Report? | | Job #: | 2012-2333.523.550 | |
| Company: | | PO / AFE: | | |
| Contact: | | LSD: | | |
| Address: | | | | |
| Phone: | Fax: | Quote #: | | |
| [redacted] Lab Work Order # (lab use only) | L1362831 | **ALS Contact:** Dean Watt | **Sampler:** SVB | |

| Sample | Sample Identification | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | MET-TOT-CSR-VA (includes | CR-CR3-ED | BTEX+VPH+MTBE-CSR-VA | LEPH/HEPH-CSR-VA | Extract for VPH/BTEX | Extract for LEPH/HEPH/PAH | Hold | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [redacted] 1 | BH-KZ-13-01 @ 0.0 to 0.5 mbgs | 09-Sep-13 | | Soil | X | X | X | X | | | | 3 |
| [redacted] 2 | BH-KZ-13-01 @ 0.6 to 1.0 mbgs | 09-Sep-13 | | Soil | | | | | X | X | X | 3 |
| [redacted] 3 | BH-KZ-13-01 @ 1.1 to 1.5 mbgs | 09-Sep-13 | | Soil | | | | | X | X | X | 3 |
| [redacted] 4 | BH-KZ-13-01 @ 1.6 to 2.0 mbgs | 09-Sep-13 | | Soil | | | | | X | X | X | 3 |
| [redacted] 5 | BH-KZ-13-01 @ 2.1 to 2.5 mbgs | 09-Sep-13 | | Soil | | | | | X | X | X | 2 |
| [redacted] 6 | BH-KZ-13-01 @ 2.6 to 3.0 mbgs | 09-Sep-13 | | Soil | | | | | X | X | X | 2 |
| [redacted] 7 | BH-KZ-13-01 @ 3.1 to 3.5 mbgs | 09-Sep-13 | | Soil | | | | | X | X | X | 2 |
| [redacted] 8 | BH-KZ-13-01 @ 3.6 to 4.0 mbgs | 09-Sep-13 | | Soil | | | | | X | X | X | 1 |

**Special Instructions / Regulations with water or land use**

Compare to site specific standards provided to ALS

**Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

**By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.**

| SHIPMENT RELEASE (client use) | | SHIPMENT RECEPTION (lab use only) | | | | SHIPMENT VERIFICATION (lab use only) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Released by: | Date (dd-mm | Received by: | Date: | Time: | Temperatu | Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
| | | P R | 13 SEPT | 13:50 | °C | | | | |

GENF 18.01 Front

8.1°C, 4.4°C, 7.9°C, 3.3°C, 6.1°C

SUMMIT ENVIRONMENTAL CONSULTANTS INC.
ATTN: Nicole Jacques
# 301 - 4109 4th Avenue
Whitehorse YT Y1A 1H6

Date Received: 13-SEP-13
Report Date: 25-SEP-13 17:48 (MT)
Version: FINAL

Client Phone: 867-456-2711

# Certificate of Analysis

**Lab Work Order #: L1362869**

Project P.O. #: NOT SUBMITTED
Job Reference: 2012-2333.523.550
C of C Numbers:
Legal Site Desc:

Dean Watt
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1362869-1 | L1362869-2 | L1362869-3 | L1362869-4 | |
|---|---|---|---|---|---|---|
| | Description | SOIL | SOIL | SOIL | SOIL | |
| | Sampled Date | 11-SEP-13 | 11-SEP-13 | 11-SEP-13 | 11-SEP-13 | |
| | Sampled Time | | | | | |
| | Client ID | TP-SP-13-03 | TP-SP-13-04 | TP-SP-13-05 | TP-SP-13-06 | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Leachable Anions & Nutrients** | Total Kjeldahl Nitrogen (%) | <0.020 | <0.020 | <0.020 | 0.142 | |
| **Organic / Inorganic Carbon** | Total Organic Carbon (%) | 0.15 | <0.10 | <0.10 | 2.50 | |
| **Plant Available Nutrients** | Available Ammonium-N (mg/kg) | 1.8 | 1.1 | 3.3 | 1.8 | |
| | Nitrate+Nitrite-N (mg/kg) | <2.0 | <2.0 | <2.0 | <4.0 DLM | |
| | Nitrate-N (mg/kg) | <2.0 | <2.0 | <2.0 | <4.0 DLM | |
| | Nitrite-N (mg/kg) | <0.40 | <0.40 | <0.40 | <0.80 DLM | |

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

# Reference Information

**Qualifiers for Individual Parameters Listed:**

| Qualifier | Description |
|---|---|
| DLM | Detection Limit Adjusted For Sample Matrix Effects |

**Test Method References:**

| ALS Test Code | Matrix | Test Description | Method Reference** |
|---|---|---|---|
| **C-TOT-ORG-LECO-SK** | Soil | Organic Carbon by combustion method | SSSA (1996) p. 973 |

Total Organic Carbon (C-TOT-ORG-LECO-SK, C-TOT-ORG-SK)

Total C and inorganic C are determined on separate samples. The total C is determined by combustion and thermal conductivity detection, while inorganic C is determined by weight lass after addition of hydrochloric acid. Organic C is calculated by the difference between these two determinations.

Reference for Total C:
Nelson, D.W. and Sommers, L.E. 1996. Total Carbon, organic carbon and organic matter. P. 961-1010 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

Reference for Inorganic C:
Loeppert, R.H. and Suarez, D.L. 1996. Gravimetric Method for Loss of Carbon Dioxide. P. 455-456 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

| | | | |
|---|---|---|---|
| **N-TOTKJ-COL-SK** | Soil | Total Kjeldahl Nitrogen | CSSS (1993) 22.2.3 |

The soil is digested with sulfuric acid in the presence of CuSO4 and K2SO4 catalysts. Ammonia in the soil extract is determined colrimetrically at 660 nm.

| | | | |
|---|---|---|---|
| **N2/N3-AVAIL-SK** | Soil | Nitrate, Nitrite and Nitrate+Nitrite-N | APHA 4500 NO3F |

Available Nitrate and Nitrite are extracted from the soil using a dilute calcium chloride solution. Nitrate is quantitatively reduced to nitrite by passage of the sample through a copperized cadmium column. The nitrite (reduced nitrate plus original nitrite) is then determined by diazotizing with sulfanilamide followed by coupling with N-(1-naphthyl) ethylenediamine dihydrochloride. The resulting water soluble dye has a magenta color which is measured at colorimetrically at 520nm.

Reference:
Carter, Martin. Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci.(1993) method 4.3

| | | | |
|---|---|---|---|
| **NH4-AVAIL-SK** | Soil | Available Ammonium-N | CSSS(1993) 4.2/COMM SOIL SCI 19(6) |

Ammonium (NH4-N) is extracted from the soil using 2 N KCl. Ammonium in the extract is mixed with hypochlorite and salicylate to form indophenol blue, which is determined colorimetrically by auto analysis at 660 nm.

** 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 |
|---|---|
| SK | ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, 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 wwt - 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.*

L1362869-COFC

ALS Environmental

**Chain of Custody / Analytical Request Form**
**Canada Toll Free: 1 800 668 9878**
**www.alsglobal.com**

COC # _____

Page ___ of ___

| **Report To** | | **Report Format / Distribution** | | **Service Requeste** |
|---|---|---|---|---|
| Company: | Summit Environmental Consultants Inc. | ☑ Standard | ☐ Other | Regular (Standard Turnaround Times- Business Days |
| Contact: | Nicole Jacques | ☑ PDF | ☑ Excel ☐ Digital | |
| Address: | 301-4109 4th Ave | Email 1: | nrj@summit-environmental.com | |
| | Whitehorse, Yukon, Y1A 1H6 | Email 2: | | |
| Phone: | 867-456-2711 | Email 3: | | |
| **Invoice To** | Same as Report ? Y | **Client / Project Information** | | **Analysis Request** |
| Hardcopy of Invoice with Report? | | Job #: | 2012-2333.523.550 | |
| Company: | | PO / AFE: | | |
| Contact: | | LSD: | | |
| Address: | | | | |
| Phone: | Fax: | Quote #: | | |
| Lab Work Order # (lab use only) | L1362869 | **ALS Contact:** | Dean Watt | **Sampler:** SVB |

| Sample | Sample Identification | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | NH4-AVAIL-SK | N2/N3-AVAIL-SK | N-TOTKJ-COL-SK | C-TOT-ORG-LECO-SK | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|
| [redacted] | TP-SP-13-03 | 11-Sep-13 | | Soil | X | X | X | X | 1 |
| [redacted] | TP-SP-13-04 | 11-Sep-13 | | Soil | X | X | X | X | 1 |
| [redacted] | TP-SP-13-05 | 11-Sep-13 | | Soil | X | X | X | X | 1 |
| [redacted] | TP-SP-13-06 | 11-Sep-13 | | Soil | X | X | X | X | 1 |
| [redacted] | | | | | | | | | |
| [redacted] | | | | | | | | | |
| [redacted] | | | | | | | | | |
| [redacted] | | | | | | | | | |
| [redacted] | | | | | | | | | |
| [redacted] | | | | | | | | | |
| [redacted] | | | | | | | | | |

**Special Instructions / Regulations with water or land use**

Compare to site specific standards provided to ALS

**Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

**By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.**

| SHIPMENT RELEASE (client use) | | SHIPMENT RECEPTION (lab use only) | | | | SHIPMENT VERIFICATION (lab use only) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Released by: | Date (dd-mm | Received by: | Date: | Time: | Temperatu | Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
| | | PR | 13SEPT | 13:50 | °C | | | | |

GENF 18.01 Front

8.1°C, 4.4°C, 7.9°C, 3.3°C, 6.1°C

SUMMIT ENVIRONMENTAL CONSULTANTS INC.
ATTN: Nicole Jacques
# 301 - 4109 4th Avenue
Whitehorse YT Y1A 1H6

Date Received: 13-SEP-13
Report Date: 11-OCT-13 15:26 (MT)
Version: FINAL REV. 2

Client Phone: 867-456-2711

# Certificate of Analysis

**Lab Work Order #: L1362874**

Project P.O. #: NOT SUBMITTED
Job Reference: 2012-2333.523.550
C of C Numbers:
Legal Site Desc:

**Comments:**

11-OCT-13: Additional results have been added to samples 1, 2 and 3.

Dean Watt
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1362874-1 | L1362874-2 | L1362874-3 | | |
|---|---|---|---|---|---|---|
| | Description | SOIL | SOIL | SOIL | | |
| | Sampled Date | 10-SEP-13 | 10-SEP-13 | 10-SEP-13 | | |
| | Sampled Time | | | | | |
| | Client ID | BH-M-13-07 (2) @ 0.0 TO 0.5 MBGS | BH-M-13-07 (2) @ 0.6 TO 1.0 MBGS | BH-M-13-07 (2) @ 1.1 TO 1.5 MBGS | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Physical Tests** | % Moisture (%) | | | 15.8 | | |
| | Moisture (%) | 11.9 | 15.2 | 15.0 | | |
| | pH (1:2 soil:water) (pH) | 7.91 | 8.29 | 8.34 | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/kg) | | <0.050 | | | |
| | Cyanide, Total (mg/kg) | | <0.050 | | | |
| **Metals** | Antimony (Sb) (mg/kg) | 107 | 3.35 | 0.71 | | |
| | Arsenic (As) (mg/kg) | 1050 | 71.7 | 27.2 | | |
| | Barium (Ba) (mg/kg) | 154 | 60.6 | 47.3 | | |
| | Beryllium (Be) (mg/kg) | 0.38 | <0.20 | <0.20 | | |
| | Cadmium (Cd) (mg/kg) | 11.8 | 0.176 | 0.082 | | |
| | Chromium (Cr) (mg/kg) | 31.2 | 10.3 | 9.90 | | |
| | Cobalt (Co) (mg/kg) | 8.28 | 3.86 | 3.17 | | |
| | Copper (Cu) (mg/kg) | 94.4 | 8.80 | 5.31 | | |
| | Lead (Pb) (mg/kg) | 658 | 10.6 | 4.20 | | |
| | Mercury (Hg) (mg/kg) | 0.083 | <0.050 | <0.050 | | |
| | Molybdenum (Mo) (mg/kg) | 2.22 | <0.50 | <0.50 | | |
| | Nickel (Ni) (mg/kg) | 16.9 | 6.93 | 6.03 | | |
| | Selenium (Se) (mg/kg) | 0.61 | <0.20 | <0.20 | | |
| | Silver (Ag) (mg/kg) | 17.3 | 0.13 | <0.10 | | |
| | Thallium (Tl) (mg/kg) | 0.524 | 0.075 | 0.052 | | |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | | |
| | Uranium (U) (mg/kg) | 0.711 | 0.685 | 0.384 | | |
| | Vanadium (V) (mg/kg) | 52.8 | 25.6 | 22.2 | | |
| | Zinc (Zn) (mg/kg) | 853 | 40.4 | 23.6 | | |
| **Speciated Metals** | Chromium, Trivalent (mg/kg) | 30.8 | 10.3 | 9.90 | | |
| | Hexavalent Chromium (mg/kg) | 0.33 | <0.10 | <0.10 | | |
| **TCLP Metals** | 1st Preliminary PH (pH) | | 9.18 | | | |
| | 2nd Preliminary PH (pH) | | 1.61 | | | |
| | Final pH (pH) | | 4.98 | | | |
| | Extraction Solution Initial pH (pH) | | 4.92 | | | |
| | Antimony (Sb)-Leachable (mg/L) | | <1.0 | | | |
| | Arsenic (As)-Leachable (mg/L) | | <1.0 | | | |
| | Barium (Ba)-Leachable (mg/L) | | <2.5 | | | |
| | Beryllium (Be)-Leachable (mg/L) | | <0.025 | | | |
| | Boron (B)-Leachable (mg/L) | | <0.50 | | | |
| | Cadmium (Cd)-Leachable (mg/L) | | <0.050 | | | |
| | Calcium (Ca)-Leachable (mg/L) | | 52.6 | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | | | | | | |
|---|---|---|---|---|---|---|
| | **Sample ID** | L1362874-1 | L1362874-2 | L1362874-3 | | |
| | **Description** | SOIL | SOIL | SOIL | | |
| | **Sampled Date** | 10-SEP-13 | 10-SEP-13 | 10-SEP-13 | | |
| | **Sampled Time** | | | | | |
| | **Client ID** | BH-M-13-07 (2) @ 0.0 TO 0.5 MBGS | BH-M-13-07 (2) @ 0.6 TO 1.0 MBGS | BH-M-13-07 (2) @ 1.1 TO 1.5 MBGS | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **TCLP Metals** | Chromium (Cr)-Leachable (mg/L) | | <0.25 | | | |
| | Cobalt (Co)-Leachable (mg/L) | | <0.050 | | | |
| | Copper (Cu)-Leachable (mg/L) | | <0.050 | | | |
| | Iron (Fe)-Leachable (mg/L) | | 23.4 | | | |
| | Lead (Pb)-Leachable (mg/L) | | <0.25 | | | |
| | Magnesium (Mg)-Leachable (mg/L) | | 4.03 | | | |
| | Mercury (Hg)-Leachable (mg/L) | | <0.0010 | | | |
| | Nickel (Ni)-Leachable (mg/L) | | <0.25 | | | |
| | Selenium (Se)-Leachable (mg/L) | | <1.0 | | | |
| | Silver (Ag)-Leachable (mg/L) | | <0.050 | | | |
| | Thallium (Tl)-Leachable (mg/L) | | <1.0 | | | |
| | Vanadium (V)-Leachable (mg/L) | | <0.15 | | | |
| | Zinc (Zn)-Leachable (mg/L) | | <0.50 | | | |
| **Volatile Organic Compounds** | Benzene (mg/kg) | <0.040 | <0.040 | <0.040 | | |
| | Ethylbenzene (mg/kg) | <0.050 | 1.36 | 0.131 | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | | |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | meta- & para-Xylene (mg/kg) | <0.060 DLM | 1.47 | 0.139 | | |
| | Xylenes (mg/kg) | <0.078 | 1.47 | 0.139 | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 87.2 | 105.7 | 103.7 | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 94.1 | 122.5 | 92.7 | | |
| **Hydrocarbons** | EPH10-19 (mg/kg) | 4600 | 7330 | 470 | | |
| | EPH19-32 (mg/kg) | 1030 | 940 | <200 | | |
| | LEPH (mg/kg) | 4600 | 7330 | 470 | | |
| | HEPH (mg/kg) | 1030 | 940 | <200 | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | 320 | 660 | <100 | | |
| | VPH (C6-C10) (mg/kg) | 320 | 660 | <100 | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | SMI Not Reportable | SMI Not Reportable | SMI Not Reportable | | |
| **Polycyclic Aromatic Hydrocarbons** | Acenaphthene (mg/kg) | <0.090 DLM | <0.60 DLM | <0.050 | | |
| | Acenaphthylene (mg/kg) | <0.060 DLM | <0.30 DLM | <0.050 | | |
| | Anthracene (mg/kg) | <0.060 DLM | <0.15 DLM | <0.050 | | |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 DLM | <0.050 | | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 DLM | <0.050 | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 DLM | <0.050 | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1362874-1 | L1362874-2 | L1362874-3 | | |
|---|---|---|---|---|---|---|
| | Description | SOIL | SOIL | SOIL | | |
| | Sampled Date | 10-SEP-13 | 10-SEP-13 | 10-SEP-13 | | |
| | Sampled Time | | | | | |
| | Client ID | BH-M-13-07 (2) @ 0.0 TO 0.5 MBGS | BH-M-13-07 (2) @ 0.6 TO 1.0 MBGS | BH-M-13-07 (2) @ 1.1 TO 1.5 MBGS | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Polycyclic Aromatic Hydrocarbons** | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 DLM | <0.050 | | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 DLM | <0.050 | | |
| | Chrysene (mg/kg) | <0.050 | <0.050 DLM | <0.050 | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 DLM | <0.050 | | |
| | Fluoranthene (mg/kg) | <0.060 DLM | <0.050 DLM | <0.050 | | |
| | Fluorene (mg/kg) | 0.188 | 0.902 | 0.071 | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 DLM | <0.050 | | |
| | 2-Methylnaphthalene (mg/kg) | 0.610 | 14.3 | 0.847 | | |
| | Naphthalene (mg/kg) | <0.30 DLM | 3.05 | <0.20 DLM | | |
| | Phenanthrene (mg/kg) | <0.20 DLM | 1.15 | 0.077 | | |
| | Pyrene (mg/kg) | 0.949 | 1.35 | <0.050 | | |
| | Surrogate: Acenaphthene d10 (%) | 79.8 | 124.5 | 70.9 | | |
| | Surrogate: Chrysene d12 (%) | 74.2 | 83.2 | 72.9 | | |
| | Surrogate: Naphthalene d8 (%) | 84.1 | 109.0 | 66.9 | | |
| | Surrogate: Phenanthrene d10 (%) | 78.4 | 89.6 | 76.3 | | |

* 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 | Cobalt (Co) | DUP-H | L1362874-2 |
| Duplicate | Molybdenum (Mo) | DUP-H | L1362874-2 |
| Matrix Spike | Calcium (Ca)-Leachable | MS-B | L1362874-2 |
| Matrix Spike | Magnesium (Mg)-Leachable | MS-B | L1362874-2 |

**Qualifiers for Individual Parameters Listed:**

| Qualifier | Description |
|---|---|
| DLM | Detection Limit Adjusted due to sample matrix effects. |
| DUP-H | Duplicate results outside ALS DQO, due to sample heterogeneity. |
| MS-B | Matrix Spike recovery could not be accurately calculated due to high analyte background in sample. |
| SMI | Surrogate recovery could not be measured due to sample matrix interference. |

**Test Method References:**

| ALS Test Code | Matrix | Test Description | Method Reference** |
|---|---|---|---|
| **CN-T-NAOH-CFA-VA** | Soil | Total Cyanide in soil by CFA | ONMOE CN-E3015/ISO 14403:2002 |

This analysis is carried out using procedures adapted from the Ontario Ministry of Environment CN-E3015 and ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by rotary extraction of the soil with 0.04M Sodium Hydroxide, followed by in-line UV digestion along with sample distillation and final determination by colourimetric analysis.

| | | | |
|---|---|---|---|
| **CN-WAD-NAOH-CFA-VA** | Soil | Weak Acid Diss. Cyanide in soil by CFA | ONMOE CN-E3015/APHA 4500-CN CYANIDE |

This analysis is carried out using procedures adapted from the Ontario Ministry of Environment CN-E3015 and APHA Method 4500-CN I. "Weak Acid Dissociable Cyanide". Weak Acid Dissociable (WAD) cyanide is determined by rotary extraction of the soil with 0.04M Sodium Hydroxide, followed by in-line sample distillation with final determination by colourimetric analysis.

| | | | |
|---|---|---|---|
| **CR-CR3-ED** | Soil | Chromium, Trivalent (Cr +3) | Total Cr - Cr(+6) |
| **CR-CR6-3060-ED** | Soil | Chromium, Hexavalent (Cr +6) | APHA 3500-CR C, EPA 3060A ALKALINE |
| **EPH-TUMB-FID-VA** | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to gas chromatography with flame ionization detection (GC-FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

| | | | |
|---|---|---|---|
| **HG-200.2-CVAF-VA** | Soil | Mercury in Soil by CVAFS | EPA 200.2/245.7 |

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry(EPA Method 245.7).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

| | | | |
|---|---|---|---|
| **HG-TCLP-CVAFS-VA** | Soil | Mercury by CVAFS (TCLP) | EPA 1311/245.7 |

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter and analysed using atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA 245.7).

| | | | |
|---|---|---|---|
| **LEPH/HEPH-CALC-VA** | Soil | LEPHs and HEPHs | BC MOE LABORATORY MANUAL (2005) |

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated
by subtracting selected Polycyclic Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene, and Pyrene
are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

| | | | |
|---|---|---|---|
| **MET-200.2-CCMS-VA** | Soil | Metals in Soil by CRC ICPMS | EPA 200.2/6020A |

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids.

# Reference Information

Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

| | | | |
|---|---|---|---|
| **MET-TCLP-ICP-VA** | Soil | Metals by ICPOES (TCLP) | EPA 1311/6010B |

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter and analysed using inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

| | | | |
|---|---|---|---|
| **MOISTURE-VA** | Soil | Moisture content | ASTM D2974-00 Method A |

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

| | | | |
|---|---|---|---|
| **PAH-TMB-H/A-MS-VA** | Soil | PAH - Rotary Extraction (Hexane/Acetone) | EPA 3570/8270 |

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3545 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation. Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

| | | | |
|---|---|---|---|
| **PH-1:2-VA** | Soil | pH in Soil (1:2 Soil:Water Extraction) | BC WLAP METHOD: PH, ELECTROMETRIC, SOIL |

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

| | | | |
|---|---|---|---|
| **PREP-MOISTURE-ED** | Soil | % Moisture | Oven dry 105C-Gravimetric |
| **VH-HSFID-VA** | Soil | VH in soil by Headspace GCFID | EPA8260B, 5021, 5035, BC MOE |

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

| | | | |
|---|---|---|---|
| **VH-SURR-FID-VA** | Soil | VH Surrogates for Soils | BCMELP CSR ANALYTICAL METHOD 2 |
| **VOC7-L-HSMS-VA** | Soil | VOCs in soil by Headspace GCMS | EPA8260B, 5021, 5035, BC MOE |

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

| | | | |
|---|---|---|---|
| **VOC7/VOC-SURR-MS-VA** | Soil | VOC7 and/or VOC Surrogates for Soils | EPA METHODS 8260B & 524.2 |
| **VPH-CALC-VA** | Soil | VPH is VH minus select aromatics | BC MOE LABORATORY MANUAL (2005) |

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water" (Version 2.1, July 20, 1999). According to this method, the concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, Xylenes and Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10). Analysis of Volatile Hydrocarbons adheres to all prescribed elements of BCMELP method "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

| | | | |
|---|---|---|---|
| **XYLENES-CALC-VA** | Soil | Sum of Xylene Isomer Concentrations | EPA 8260B & 524.2 |

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** 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 |
|---|---|
| ED | ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA |
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |

**Chain of Custody Numbers:**

# Reference Information

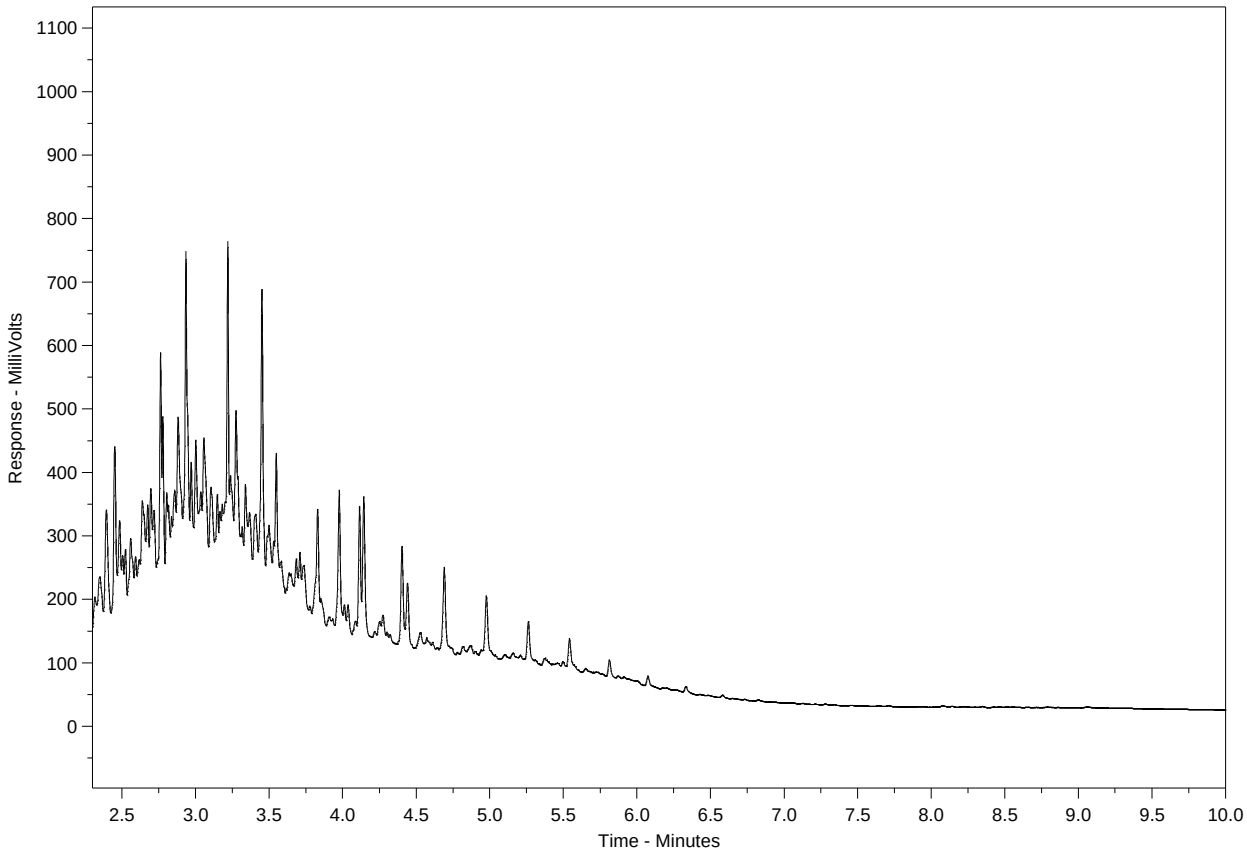
**GLOSSARY OF REPORT TERMS**

*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 wwt - 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.*

# Hydrocarbon Distribution Report

ALS Sample ID: L1362874-1
Client Sample ID: BH-M-13-07 (2) @ 0.0 TO 0.5 MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

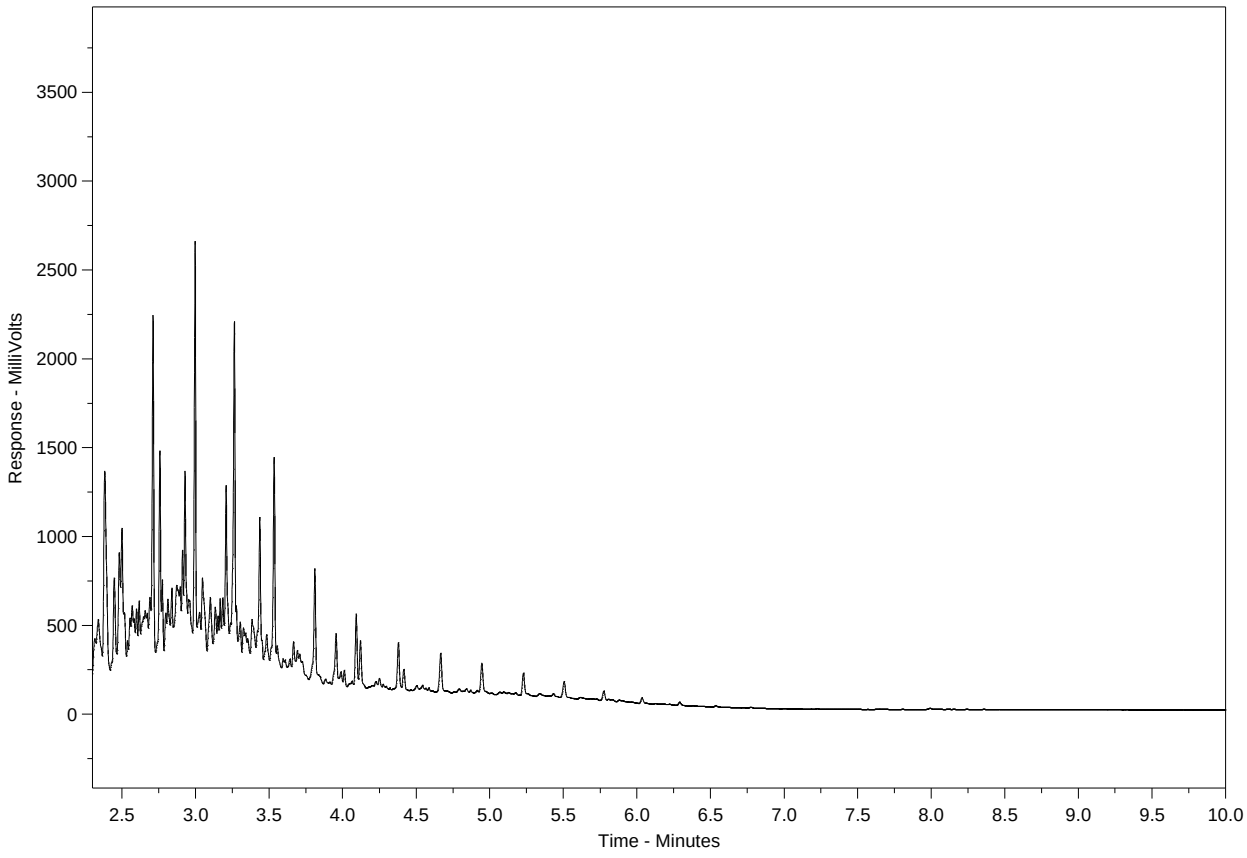
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report

ALS Sample ID: L1362874-2
Client Sample ID: BH-M-13-07 (2) @ 0.6 TO 1.0 MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

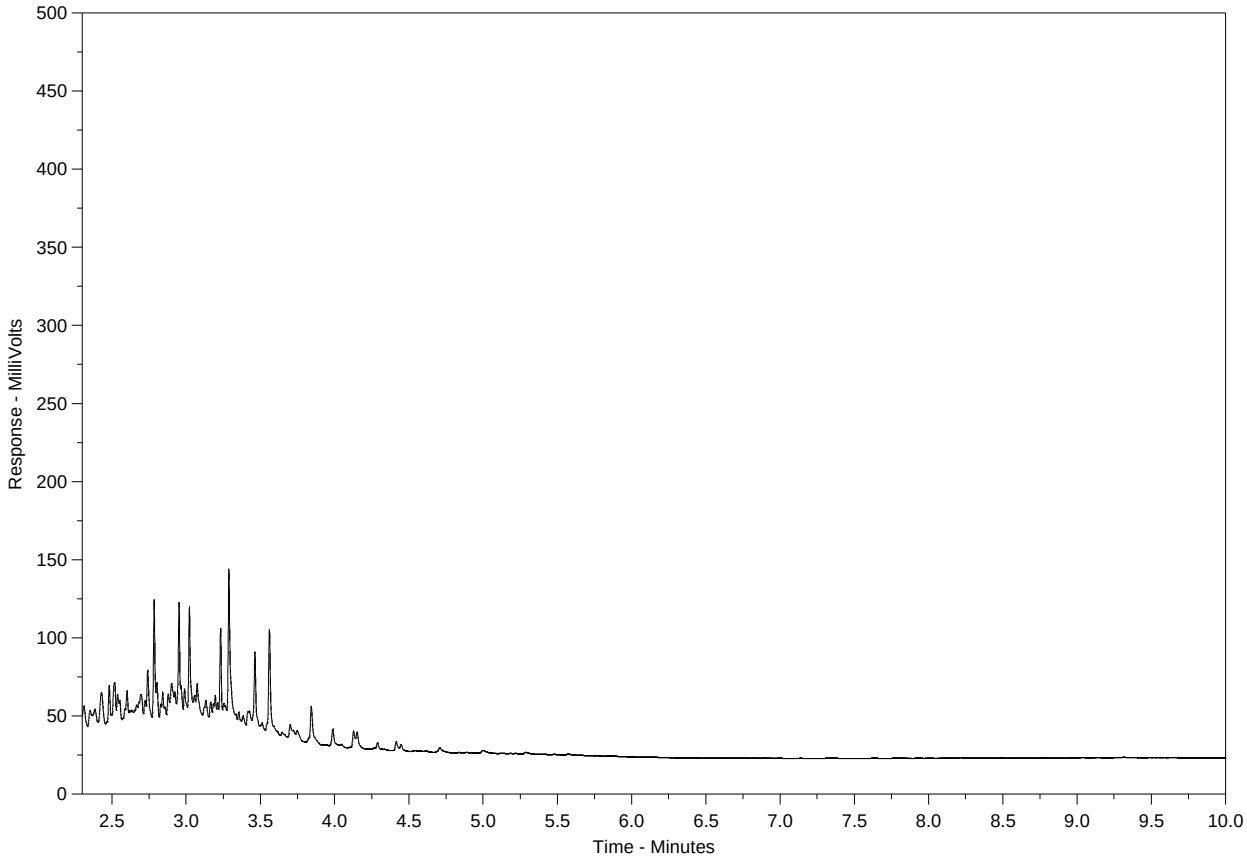
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report

ALS Sample ID: L1362874-3
Client Sample ID: BH-M-13-07 (2) @ 1.1 TO 1.5 MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

L1362874-COFC

ALS Environmental

**ain of Custody / Analytical Request Form**
**Canada Toll Free: 1 800 668 9878**
**www.alsglobal.com**

COC # _____

Page ___ of ___

| **Report To** | | **Report Format / Distribution** | | **Service Requeste** |
|---|---|---|---|---|
| Company: | Summit Environmental Consultants Inc. | ☑ Standard | ☐ Other | Regular (Standard Turnaround Times- Business Days |
| Contact: | Nicole Jacques | ☑ PDF | ☑ Excel ☐ Digital | |
| Address: | 301-4109 4th Ave | Email 1: | nrj@summit-environmental.com | |
| | Whitehorse, Yukon, Y1A 1H6 | Email 2: | | |
| Phone: | 867-456-2711 | Email 3: | | |
| **Invoice To** | Same as Report ? Y | **Client / Project Information** | | **Analysis Request** |
| Hardcopy of Invoice with Report? | | Job #: | 2012-2333.523.550 | |
| Company: | | PO / AFE: | | |
| Contact: | | LSD: | | |
| Address: | | | | |
| Phone: | Fax: | Quote #: | | |
| [redacted] Lab Work Order # (lab use only) | L1362874 | **ALS Contact:** | Dean Watt | **Sampler:** SVB |

| Sample | Sample Identification | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | MET-TOT-CSR-VA (includes | CR-CR3-ED | BTEX+VPH+MTBE-CSR-VA | LEPH/HEPH-CSR-VA | CN-WAD-NAOH-CFA-VA | CN-T-NAOH-CFA-VA | Extract for BTEX/VPH | Extract for HEPH/LEPH/PAH | Hold | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [redacted] | BH-M-13-07 (2) @ 0.0 to 0.5 mbgs | 10-Sep-13 | | Soil | | | | | | | X | X | X | 4 |
| [redacted] | BH-M-13-07 (2) @ 0.6 to 1.0 mbgs | 10-Sep-13 | | Soil | X | X | X | X | X | X | | | | 4 |
| [redacted] | BH-M-13-07 (2) @ 1.1 to 1.5 mbgs | 10-Sep-13 | | Soil | | | | | | | X | X | X | 4 |
| [redacted] | BH-M-13-07 (2) @ 2.6 to 3.0 mbgs | 10-Sep-13 | | Soil | | | | | | | X | X | X | 4 |

**Special Instructions / Regulations with water or land use**

Compare to site specific standards provided to ALS

**Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

**By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.**

| [redacted] SHIPMENT RELEASE (client use) | | [redacted] SHIPMENT RECEPTION (lab use only) | | | | [redacted] SHIPMENT VERIFICATION (lab use only) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Released by: | Date (dd-mm | Received by: | Date: | Time: | Temperatu | Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
| | | PR | 13SEPT | 13:30 | °C | | | | |

GENF 18.01 Front

8.1°C, 4.4°C, 7.9°C, 3.3°C, 6.1°C

SUMMIT ENVIRONMENTAL CONSULTANTS INC.
ATTN: Nicole Jacques
# 301 - 4109 4th Avenue
Whitehorse YT Y1A 1H6

Date Received: 13-SEP-13
Report Date: 10-OCT-13 18:03 (MT)
Version: FINAL

Client Phone: 867-456-2711

# Certificate of Analysis

**Lab Work Order #: L1362933**

Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers:
Legal Site Desc:

Dean Watt
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | | | | | | |
|---|---|---|---|---|---|---|
| | **Sample ID** | L1362933-1 | | | | |
| | **Description** | soil | | | | |
| | **Sampled Date** | | | | | |
| | **Sampled Time** | | | | | |
| | **Client ID** | BH17-13-03 - 0.0 - 0.5 | | | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Physical Tests** | Moisture (%) | 8.09 | | | | |
| | % Moisture(Sieve) (%) | 9.00 | | | | |
| | pH (1:2 soil:water) (pH) | 7.00 | | | | |
| **Metals** | Antimony (Sb) (mg/kg) | 344 | | | | |
| | Arsenic (As) (mg/kg) | 4010 | | | | |
| | Barium (Ba) (mg/kg) | 141 | | | | |
| | Beryllium (Be) (mg/kg) | 0.44 | | | | |
| | Cadmium (Cd) (mg/kg) | 30.3 | | | | |
| | Chromium (Cr) (mg/kg) | 13.2 | | | | |
| | Cobalt (Co) (mg/kg) | 11.1 | | | | |
| | Copper (Cu) (mg/kg) | 179 | | | | |
| | Lead (Pb) (mg/kg) | 2690 | | | | |
| | Mercury (Hg) (mg/kg) | 0.149 | | | | |
| | Molybdenum (Mo) (mg/kg) | 3.29 | | | | |
| | Nickel (Ni) (mg/kg) | 11.9 | | | | |
| | Selenium (Se) (mg/kg) | 0.72 | | | | |
| | Silver (Ag) (mg/kg) | 54.4 | | | | |
| | Thallium (Tl) (mg/kg) | 0.761 | | | | |
| | Tin (Sn) (mg/kg) | 4.5 | | | | |
| | Uranium (U) (mg/kg) | 0.779 | | | | |
| | Vanadium (V) (mg/kg) | 54.9 | | | | |
| | Zinc (Zn) (mg/kg) | 1780 | | | | |
| **Speciated Metals** | Chromium, Trivalent (mg/kg) | 13.2 | | | | |
| | Hexavalent Chromium (mg/kg) | <0.10 | | | | |
| **Volatile Organic Compounds** | Benzene (mg/kg) | <0.040 | | | | |
| | Ethylbenzene (mg/kg) | <0.050 | | | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | | | | |
| | Styrene (mg/kg) | <0.050 | | | | |
| | Toluene (mg/kg) | <0.050 | | | | |
| | ortho-Xylene (mg/kg) | <0.050 | | | | |
| | meta- & para-Xylene (mg/kg) | <0.050 | | | | |
| | Xylenes (mg/kg) | <0.075 | | | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 94.1 | | | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 94.9 | | | | |
| **Hydrocarbons** | EPH10-19 (mg/kg) | <200 | | | | |
| | EPH19-32 (mg/kg) | <200 | | | | |
| | LEPH (mg/kg) | <200 | | | | |

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | | | | | | |
|---|---|---|---|---|---|---|
| | **Sample ID** | L1362933-1 | | | | |
| | **Description** | soil | | | | |
| | **Sampled Date** | | | | | |
| | **Sampled Time** | | | | | |
| | **Client ID** | BH17-13-03 - 0.0 - 0.5 | | | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Hydrocarbons** | HEPH (mg/kg) | <200 | | | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | | | | |
| | VPH (C6-C10) (mg/kg) | <100 | | | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 99.5 | | | | |
| **Polycyclic Aromatic Hydrocarbons** | Acenaphthene (mg/kg) | <0.050 | | | | |
| | Acenaphthylene (mg/kg) | <0.050 | | | | |
| | Anthracene (mg/kg) | <0.050 | | | | |
| | Benz(a)anthracene (mg/kg) | <0.050 | | | | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | | | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | | | | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | | | | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | | | | |
| | Chrysene (mg/kg) | <0.050 | | | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | | | | |
| | Fluoranthene (mg/kg) | <0.050 | | | | |
| | Fluorene (mg/kg) | <0.050 | | | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | | | | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | | | | |
| | Naphthalene (mg/kg) | <0.050 | | | | |
| | Phenanthrene (mg/kg) | <0.050 | | | | |
| | Pyrene (mg/kg) | <0.050 | | | | |
| | Surrogate: Acenaphthene d10 (%) | 100.7 | | | | |
| | Surrogate: Chrysene d12 (%) | 111.7 | | | | |
| | Surrogate: Naphthalene d8 (%) | 94.8 | | | | |
| | Surrogate: Phenanthrene d10 (%) | 109.5 | | | | |

# Reference Information

**Test Method References:**

| ALS Test Code | Matrix | Test Description | Method Reference** |
|---|---|---|---|
| **CR-CR3-ED** | Soil | Chromium, Trivalent (Cr +3) | Total Cr - Cr(+6) |
| **CR-CR6-3060-ED** | Soil | Chromium, Hexavalent (Cr +6) | APHA 3500-CR C, EPA 3060A ALKALINE |
| **EPH-TUMB-FID-VA** | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to gas chromatography with flame ionization detection (GC-FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

| | | | |
|---|---|---|---|
| **HG-WW-200.2-CVAF-VA** | Soil | Hg in Soil by CVAFS | EPA 200.2/245.7 |

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, sieved (wet sample) through a 2 mm (10 mesh) sieve, and a representative subsample of the material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

| | | | |
|---|---|---|---|
| **LEPH/HEPH-CALC-VA** | Soil | LEPHs and HEPHs | BC MOE LABORATORY MANUAL (2005) |

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated
by subtracting selected Polycyclic Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene, and Pyrene
are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

| | | | |
|---|---|---|---|
| **MET-WW-200.2-CCMS-VA** | Soil | Metals in Soil by CRC ICPMS | EPA 200.2/6020A |

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, sieved (wet sample) through a 2 mm (10 mesh) sieve, and a representative subsample of the material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

| | | | |
|---|---|---|---|
| **MOISTURE-SIEVE-VA** | Soil | Moisture for CSR Metals Calculations | ASTM D2974-00 Method A |

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

| | | | |
|---|---|---|---|
| **MOISTURE-VA** | Soil | Moisture content | ASTM D2974-00 Method A |

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

| | | | |
|---|---|---|---|
| **PAH-TMB-H/A-MS-VA** | Soil | PAH - Rotary Extraction (Hexane/Acetone) | EPA 3570/8270 |

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3545 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation. Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

| | | | |
|---|---|---|---|
| **PH-WW-1:2-DI-MAN-VA** | Soil | pH in Soil (1:2 Soil:Water Ext.) (WET) | BC WLAP METHOD: PH, ELECTROMETRIC, SOIL |

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the wet sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water, where the samples moisture is accounted for. The pH of the solution is then measured using a standard pH probe.

| | | | |
|---|---|---|---|
| **VH-HSFID-VA** | Soil | VH in soil by Headspace GCFID | EPA8260B, 5021, 5035, BC MOE |

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

| | | | |
|---|---|---|---|
| **VH-SURR-FID-VA** | Soil | VH Surrogates for Soils | BCMELP CSR ANALYTICAL METHOD 2 |
| **VOC7-L-HSMS-VA** | Soil | VOCs in soil by Headspace GCMS | EPA8260B, 5021, 5035, BC MOE |

# Reference Information

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

| | | | |
|---|---|---|---|
| **VOC7/VOC-SURR-MS-VA** | Soil | VOC7 and/or VOC Surrogates for Soils | EPA METHODS 8260B & 524.2 |
| **VPH-CALC-VA** | Soil | VPH is VH minus select aromatics | BC MOE LABORATORY MANUAL (2005) |

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water" (Version 2.1, July 20, 1999). According to this method, the concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, Xylenes and Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10). Analysis of Volatile Hydrocarbons adheres to all prescribed elements of BCMELP method "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

| | | | |
|---|---|---|---|
| **XYLENES-CALC-VA** | Soil | Sum of Xylene Isomer Concentrations | EPA 8260B & 524.2 |

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** 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 |
|---|---|
| ED | ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA |
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |

**Chain of Custody Numbers:**

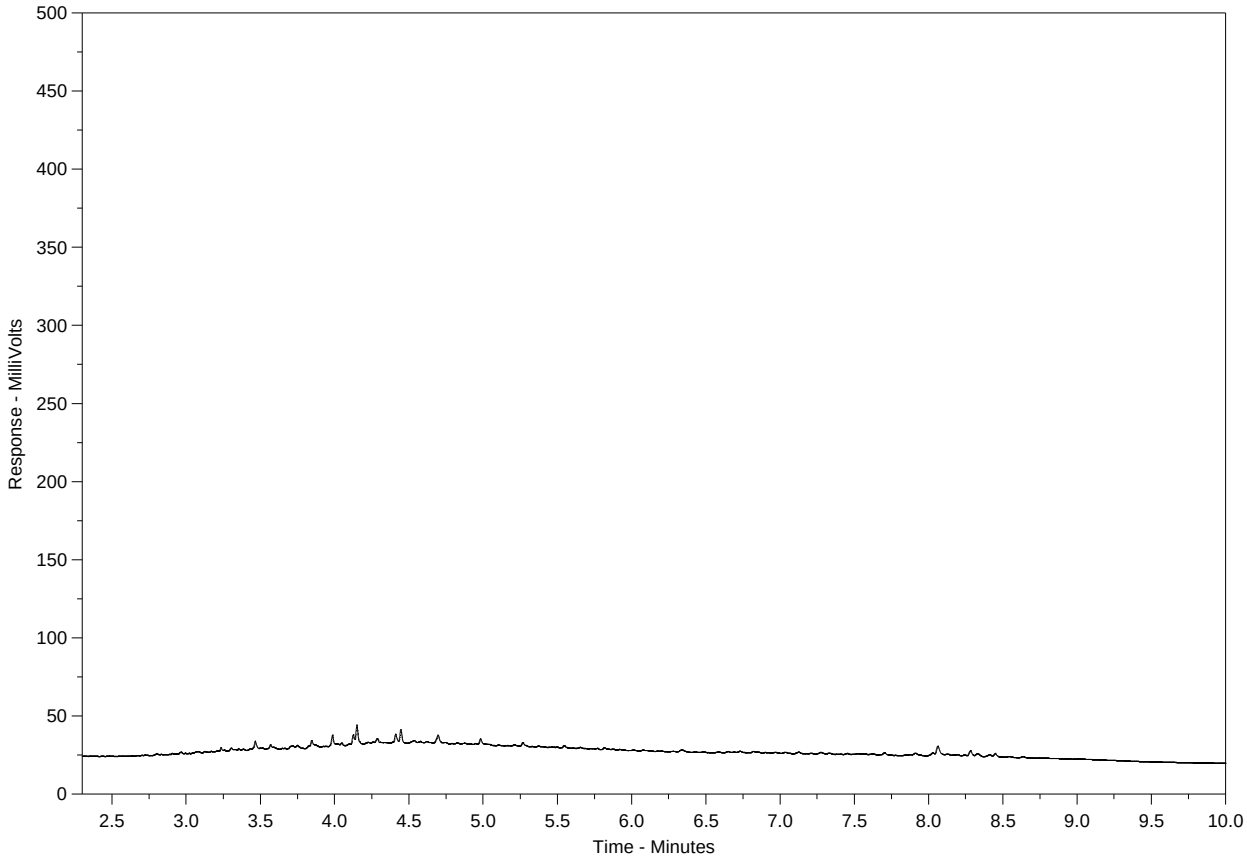
**GLOSSARY OF REPORT TERMS**

*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 wwt - 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.*

# Hydrocarbon Distribution Report

ALS Sample ID: L1362933-1
Client Sample ID: BH17-13-03 - 0.0 - 0.5




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

L1362933-COFC

# Chain of Custody / Analytical Request Form

**Canada Toll Free: 1 800 668 9878**

www.alsglobal.com

[redacted]

Page ____ of ____

| Report To | | Report Format / Distribution | | Service Request: (Rush subject to availability - Contact ALS to confirm TAT) |
|---|---|---|---|---|
| Company: | | Standard: | Other (specify): | Regular (Standard Turnaround Times - Business Days) |
| Contact: | Summit Env | Select: PDF | Excel Digital Fax | Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT |
| Address: | | Email 1: | | Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT |
| | | Email 2: | | Same Day or Weekend Emergency - Contact ALS to confirm TAT |
| Phone: | Fax: | | | Analysis Request |
| Invoice To | Same as Report ? (circle) Yes or No (if No, provide details) | Client / Project Information | | ( Indicate Filtered or Preserved, F/P ) |
| | Copy of Invoice with Report? (circle) Yes or No | Job #: | | |
| Company: | | PO / AFE: | | |
| Contact: | | LSD: | | |
| Address: | | | | |
| Phone: | Fax: | Quote #: | | |
| Lab Work Order # (lab use only) | L1362933 | ALS Contact: | Sampler: | |

| Sample # | Sample Identification (This description will appear on the report) | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | Number of Containers |
|---|---|---|---|---|---|
| | BH17-13-03 - 0.0 - 0.5 | | | | |
| | BH17-13-03 - 0.6 - 1.0 | | | | |
| | BH17-13-03 - 1.1 - 1.15 | | | | |

**Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details**

Samples received without CofC

**Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

**By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.**

| SHIPMENT RELEASE (client use) | | | SHIPMENT RECEPTION (lab use only) | | | | SHIPMENT VERIFICATION (lab use only) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Released by: | Date: | Time: | Received by: | Date: | Time: | Temperature: | Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
| | | | | Sep13 | 13:30 | °C | | | | |

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | WHITE - LABORATORY COPY | YELLOW - CLIENT COPY | GENF 18.01 Front

SUMMIT ENVIRONMENTAL CONSULTANTS INC.
ATTN: Nicole Jacques
# 301 - 4109 4th Avenue
Whitehorse YT Y1A 1H6

Date Received: 13-SEP-13
Report Date: 09-OCT-13 17:14 (MT)
Version: FINAL REV. 2

Client Phone: 867-456-2711

# Certificate of Analysis

**Lab Work Order #: L1362889**

Project P.O. #: NOT SUBMITTED
Job Reference: 2012-2333.523.550
C of C Numbers:
Legal Site Desc:

**Comments:** ADDITIONAL 27-SEP-13 19:22

09-OCT-13: Additional data has been added for samples 1, 6, 7 and 8.

Dean Watt
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | | | | | | |
|---|---|---|---|---|---|---|
| | **Sample ID** | L1362889-1 | L1362889-6 | L1362889-7 | L1362889-8 | |
| | **Description** | SOIL | SOIL | SOIL | SOIL | |
| | **Sampled Date** | 10-SEP-13 | 10-SEP-13 | 10-SEP-13 | 10-SEP-13 | |
| | **Sampled Time** | | | | | |
| | **Client ID** | BH-M-13-08 @ 0.0 TO 0.5 MBGS | BH-M-13-08 @ 2.6 TO 3.0 MBGS | BH-M-13-08 @ 3.1 TO 3.5 MBGS | BH-M-13-08 @ 3.6 TO 4.0 MBGS | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Physical Tests** | Moisture (%) | 20.0 | 14.9 | 8.05 | 15.0 | |
| | pH (1:2 soil:water) (pH) | 7.71 | 7.74 | 7.66 | 7.64 | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/kg) | | | <0.050 | | |
| | Cyanide, Total (mg/kg) | | | <0.050 | | |
| **Metals** | Antimony (Sb) (mg/kg) | 128 | 1730 | 165 | 131 | |
| | Arsenic (As) (mg/kg) | 1840 | 80700 | 16400 | 8770 | |
| | Barium (Ba) (mg/kg) | 218 | 116 | 80.5 | 141 | |
| | Beryllium (Be) (mg/kg) | 0.52 | 0.34 | <0.20 | 0.41 | |
| | Cadmium (Cd) (mg/kg) | 9.54 | 24.3 | 2.49 | 4.04 | |
| | Chromium (Cr) (mg/kg) | 17.0 | 2.64 | 1.70 | 2.40 | |
| | Cobalt (Co) (mg/kg) | 10.2 | 0.99 | 0.66 | 1.05 | |
| | Copper (Cu) (mg/kg) | 499 | 383 | 38.6 | 32.7 | |
| | Lead (Pb) (mg/kg) | 791 | 9340 | 1550 | 2050 | |
| | Mercury (Hg) (mg/kg) | 0.164 | 0.876 | 0.199 | 0.144 | |
| | Molybdenum (Mo) (mg/kg) | 1.67 | 0.97 | 1.30 | 0.72 | |
| | Nickel (Ni) (mg/kg) | 13.2 | 1.01 | 0.73 | 0.94 | |
| | Selenium (Se) (mg/kg) | 0.55 | 2.25 | 0.90 | 0.91 | |
| | Silver (Ag) (mg/kg) | 14.2 | 53.4 | 10.9 | 9.52 | |
| | Thallium (Tl) (mg/kg) | 0.688 | 7.39 | 1.74 | 5.21 | |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | <2.0 | |
| | Uranium (U) (mg/kg) | 0.944 | 3.33 | 0.457 | 0.437 | |
| | Vanadium (V) (mg/kg) | 56.9 | 20.1 | 12.1 | 15.2 | |
| | Zinc (Zn) (mg/kg) | 781 | 677 | 131 | 236 | |
| **Speciated Metals** | Chromium, Trivalent (mg/kg) | 17.0 | 2.64 | 1.67 | 2.40 | |
| | Hexavalent Chromium (mg/kg) | <0.10 | <0.10 | <0.10 | <0.10 | |
| **TCLP Metals** | 1st Preliminary PH (pH) | | | 8.22 | | |
| | 2nd Preliminary PH (pH) | | | 1.61 | | |
| | Final pH (pH) | | | 4.94 | | |
| | Extraction Solution Initial pH (pH) | | | 4.92 | | |
| | Antimony (Sb)-Leachable (mg/L) | | | <1.0 | | |
| | Arsenic (As)-Leachable (mg/L) | | | 5.0 | | |
| | Barium (Ba)-Leachable (mg/L) | | | <2.5 | | |
| | Beryllium (Be)-Leachable (mg/L) | | | <0.025 | | |
| | Boron (B)-Leachable (mg/L) | | | <0.50 | | |
| | Cadmium (Cd)-Leachable (mg/L) | | | <0.050 | | |
| | Calcium (Ca)-Leachable (mg/L) | | | 42.1 | | |
| | Chromium (Cr)-Leachable (mg/L) | | | <0.25 | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1362889-1 SOIL 10-SEP-13 BH-M-13-08 @ 0.0 TO 0.5 MBGS | L1362889-6 SOIL 10-SEP-13 BH-M-13-08 @ 2.6 TO 3.0 MBGS | L1362889-7 SOIL 10-SEP-13 BH-M-13-08 @ 3.1 TO 3.5 MBGS | L1362889-8 SOIL 10-SEP-13 BH-M-13-08 @ 3.6 TO 4.0 MBGS | |
|---|---|---|---|---|---|---|
| **SOIL** | | | | | | |
| **TCLP Metals** | Cobalt (Co)-Leachable (mg/L) | | | <0.050 | | |
| | Copper (Cu)-Leachable (mg/L) | | | <0.050 | | |
| | Iron (Fe)-Leachable (mg/L) | | | 0.64 | | |
| | Lead (Pb)-Leachable (mg/L) | | | <0.25 | | |
| | Magnesium (Mg)-Leachable (mg/L) | | | 12.4 | | |
| | Mercury (Hg)-Leachable (mg/L) | | | <0.0010 | | |
| | Nickel (Ni)-Leachable (mg/L) | | | <0.25 | | |
| | Selenium (Se)-Leachable (mg/L) | | | <1.0 | | |
| | Silver (Ag)-Leachable (mg/L) | | | <0.050 | | |
| | Thallium (Tl)-Leachable (mg/L) | | | <1.0 | | |
| | Vanadium (V)-Leachable (mg/L) | | | <0.15 | | |
| | Zinc (Zn)-Leachable (mg/L) | | | 0.80 | | |
| **Volatile Organic Compounds** | Benzene (mg/kg) | <0.040 | <0.040 | <0.040 | <0.040 | |
| | Ethylbenzene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Xylenes (mg/kg) | <0.075 | <0.075 | <0.075 | <0.075 | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 98.7 | 92.5 | 98.0 | 99.8 | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 93.1 | 91.1 | 96.1 | 95.5 | |
| **Hydrocarbons** | EPH10-19 (mg/kg) | <200 | <200 | 210 | <200 | |
| | EPH19-32 (mg/kg) | <200 | <200 | <200 | <200 | |
| | LEPH (mg/kg) | <200 | <200 | 210 | <200 | |
| | HEPH (mg/kg) | <200 | <200 | <200 | <200 | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | <100 | <100 | |
| | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | <100 | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 94.4 | 90.2 | Not Reportable SMI | 109.8 | |
| **Polycyclic Aromatic Hydrocarbons** | Acenaphthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1362889-1 | L1362889-6 | L1362889-7 | L1362889-8 | |
|---|---|---|---|---|---|---|
| | Description | SOIL | SOIL | SOIL | SOIL | |
| | Sampled Date | 10-SEP-13 | 10-SEP-13 | 10-SEP-13 | 10-SEP-13 | |
| | Sampled Time | | | | | |
| | Client ID | BH-M-13-08 @ 0.0 TO 0.5 MBGS | BH-M-13-08 @ 2.6 TO 3.0 MBGS | BH-M-13-08 @ 3.1 TO 3.5 MBGS | BH-M-13-08 @ 3.6 TO 4.0 MBGS | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Polycyclic Aromatic Hydrocarbons** | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Surrogate: Acenaphthene d10 (%) | 83.6 | 73.0 | 84.7 | 76.8 | |
| | Surrogate: Chrysene d12 (%) | 80.2 | 78.3 | 82.8 | 76.5 | |
| | Surrogate: Naphthalene d8 (%) | 72.9 | 68.6 | 80.5 | 71.9 | |
| | Surrogate: Phenanthrene d10 (%) | 92.2 | 76.5 | 90.0 | 77.6 | |

* 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) |
|---|---|---|---|
| Matrix Spike | Calcium (Ca)-Leachable | MS-B | L1362889-7 |
| Matrix Spike | Magnesium (Mg)-Leachable | MS-B | L1362889-7 |

**Qualifiers for Individual Parameters Listed:**

| Qualifier | Description |
|---|---|
| MS-B | Matrix Spike recovery could not be accurately calculated due to high analyte background in sample. |
| SMI | Surrogate recovery could not be measured due to sample matrix interference. |

**Test Method References:**

| ALS Test Code | Matrix | Test Description | Method Reference** |
|---|---|---|---|
| **CN-T-NAOH-CFA-VA** | Soil | Total Cyanide in soil by CFA | ONMOE CN-E3015/ISO 14403:2002 |

This analysis is carried out using procedures adapted from the Ontario Ministry of Environment CN-E3015 and ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by rotary extraction of the soil with 0.04M Sodium Hydroxide, followed by in-line UV digestion along with sample distillation and final determination by colourimetric analysis.

| | | | |
|---|---|---|---|
| **CN-WAD-NAOH-CFA-VA** | Soil | Weak Acid Diss. Cyanide in soil by CFA | ONMOE CN-E3015/APHA 4500-CN CYANIDE |

This analysis is carried out using procedures adapted from the Ontario Ministry of Environment CN-E3015 and APHA Method 4500-CN I. "Weak Acid Dissociable Cyanide". Weak Acid Dissociable (WAD) cyanide is determined by rotary extraction of the soil with 0.04M Sodium Hydroxide, followed by in-line sample distillation with final determination by colourimetric analysis.

| | | | |
|---|---|---|---|
| **CR-CR3-ED** | Soil | Chromium, Trivalent (Cr +3) | Total Cr - Cr(+6) |
| **CR-CR6-3060-ED** | Soil | Chromium, Hexavalent (Cr +6) | APHA 3500-CR C, EPA 3060A ALKALINE |
| **EPH-TUMB-FID-VA** | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to gas chromatography with flame ionization detection (GC-FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

| | | | |
|---|---|---|---|
| **HG-200.2-CVAF-VA** | Soil | Mercury in Soil by CVAFS | EPA 200.2/245.7 |

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry(EPA Method 245.7).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

| | | | |
|---|---|---|---|
| **HG-TCLP-CVAFS-VA** | Soil | Mercury by CVAFS (TCLP) | EPA 1311/245.7 |

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter and analysed using atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA 245.7).

| | | | |
|---|---|---|---|
| **LEPH/HEPH-CALC-VA** | Soil | LEPHs and HEPHs | BC MOE LABORATORY MANUAL (2005) |

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated
by subtracting selected Polycyclic Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene, and Pyrene
are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

| | | | |
|---|---|---|---|
| **MET-200.2-CCMS-VA** | Soil | Metals in Soil by CRC ICPMS | EPA 200.2/6020A |

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually

# Reference Information

mobile in the environment.

| | | | |
|---|---|---|---|
| **MET-TCLP-ICP-VA** | Soil | Metals by ICPOES (TCLP) | EPA 1311/6010B |

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter and analysed using inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

| | | | |
|---|---|---|---|
| **MOISTURE-VA** | Soil | Moisture content | ASTM D2974-00 Method A |

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

| | | | |
|---|---|---|---|
| **PAH-TMB-H/A-MS-VA** | Soil | PAH - Rotary Extraction (Hexane/Acetone) | EPA 3570/8270 |

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3545 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation. Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

| | | | |
|---|---|---|---|
| **PH-1:2-VA** | Soil | pH in Soil (1:2 Soil:Water Extraction) | BC WLAP METHOD: PH, ELECTROMETRIC, SOIL |

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

| | | | |
|---|---|---|---|
| **VH-HSFID-VA** | Soil | VH in soil by Headspace GCFID | EPA8260B, 5021, 5035, BC MOE |

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

| | | | |
|---|---|---|---|
| **VH-SURR-FID-VA** | Soil | VH Surrogates for Soils | BCMELP CSR ANALYTICAL METHOD 2 |
| **VOC7-L-HSMS-VA** | Soil | VOCs in soil by Headspace GCMS | EPA8260B, 5021, 5035, BC MOE |

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

| | | | |
|---|---|---|---|
| **VOC7/VOC-SURR-MS-VA** | Soil | VOC7 and/or VOC Surrogates for Soils | EPA METHODS 8260B & 524.2 |
| **VPH-CALC-VA** | Soil | VPH is VH minus select aromatics | BC MOE LABORATORY MANUAL (2005) |

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water" (Version 2.1, July 20, 1999). According to this method, the concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, Xylenes and Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10). Analysis of Volatile Hydrocarbons adheres to all prescribed elements of BCMELP method "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

| | | | |
|---|---|---|---|
| **XYLENES-CALC-VA** | Soil | Sum of Xylene Isomer Concentrations | EPA 8260B & 524.2 |

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** 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 |
|---|---|
| ED | ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA |
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |

**Chain of Custody Numbers:**

# Reference Information

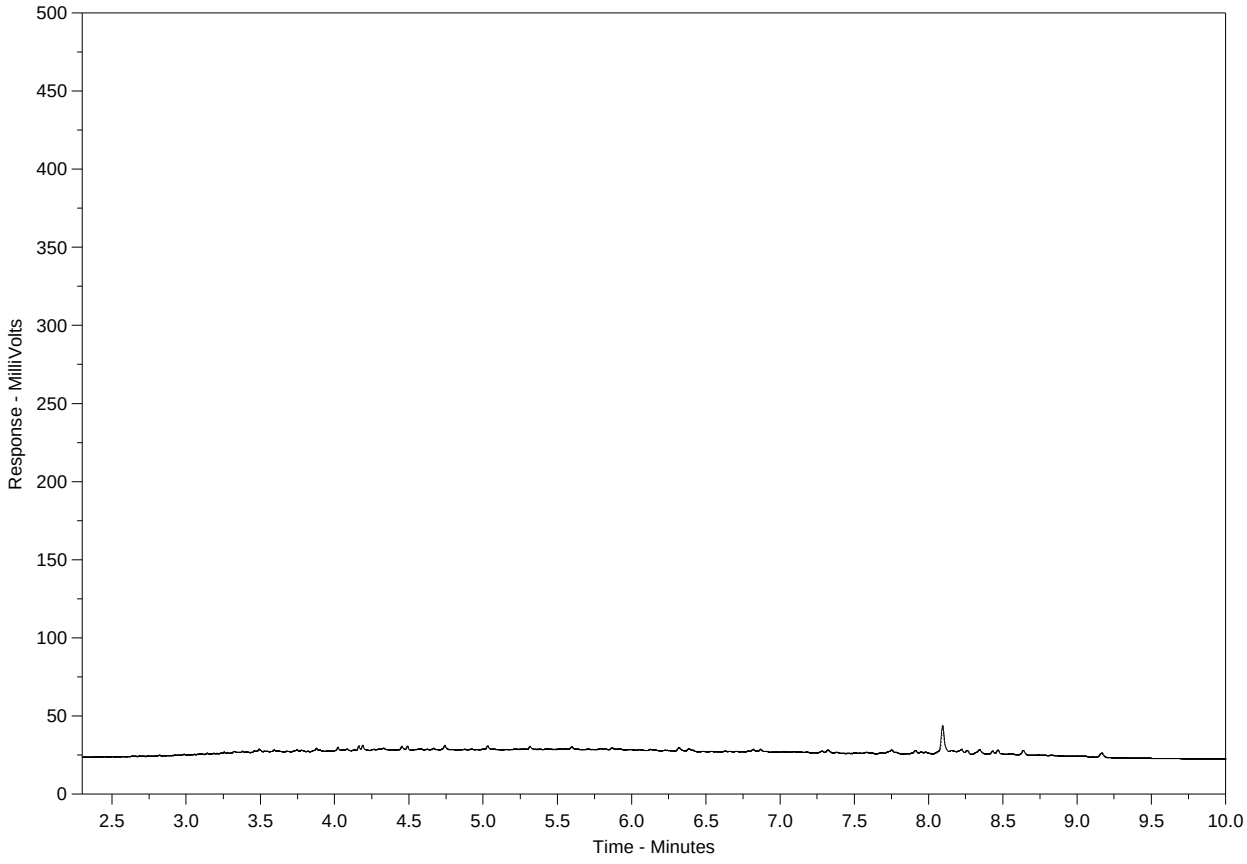
**GLOSSARY OF REPORT TERMS**

*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 wwt - 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.*

# Hydrocarbon Distribution Report

ALS Sample ID: L1362889-1
Client Sample ID: BH-M-13-08 @ 0.0 TO 0.5 MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

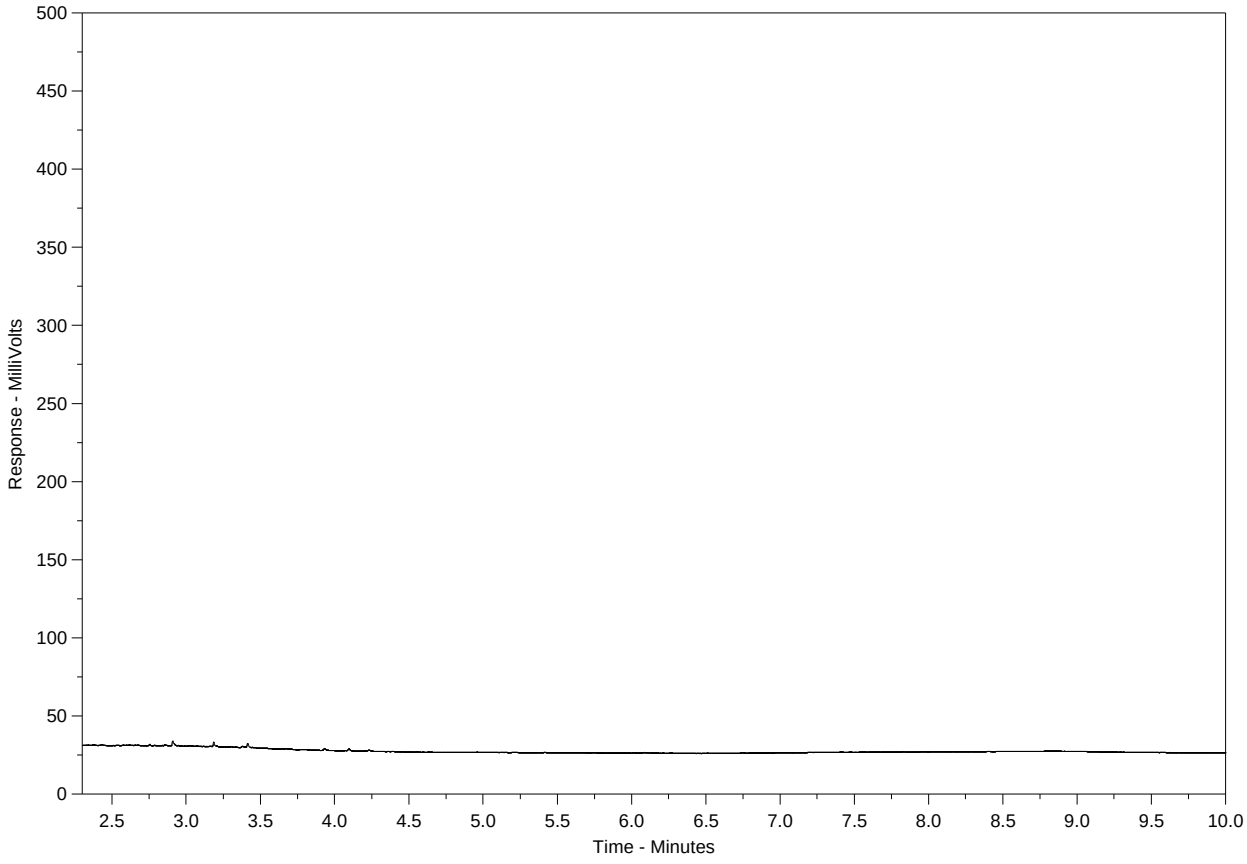
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report

ALS Sample ID: L1362889-6
Client Sample ID: BH-M-13-08 @ 2.6 TO 3.0 MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

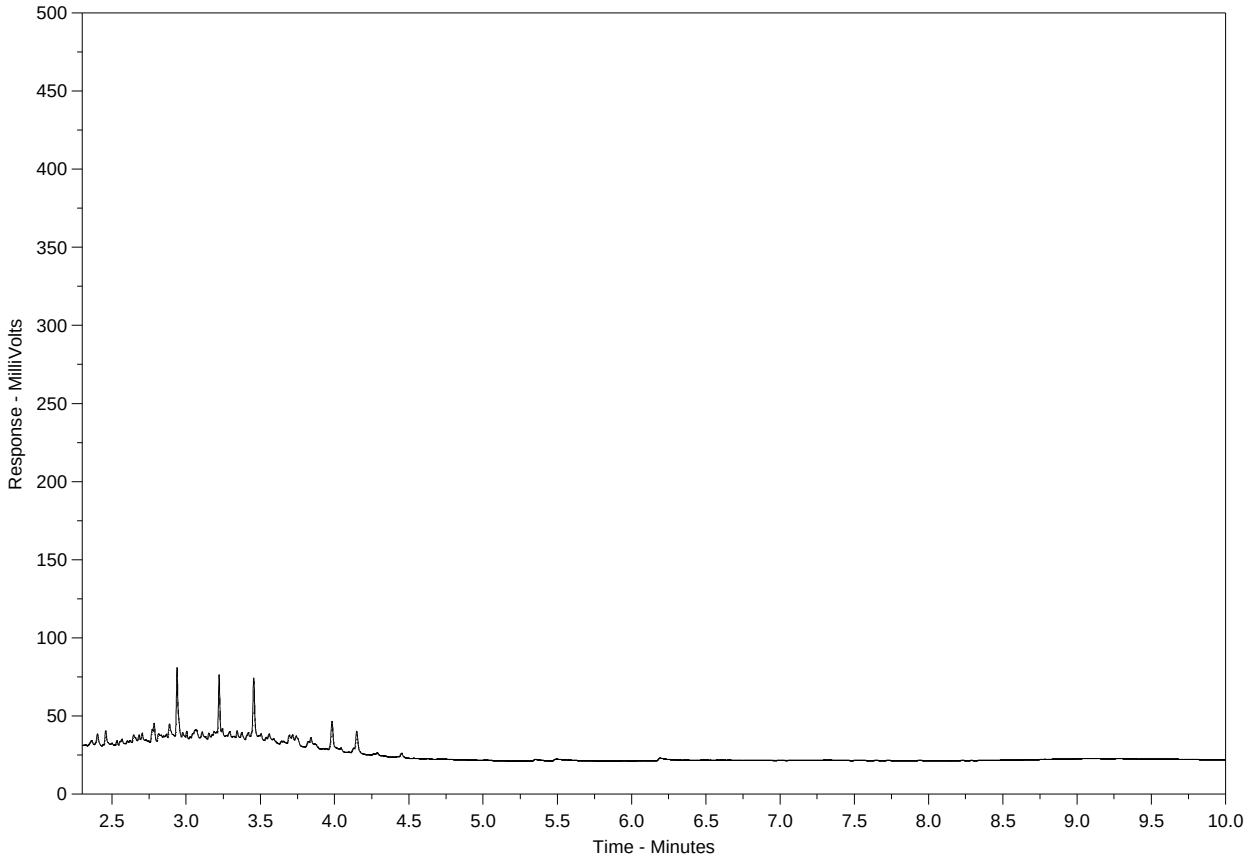
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report

ALS Sample ID: L1362889-7
Client Sample ID: BH-M-13-08 @ 3.1 TO 3.5 MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

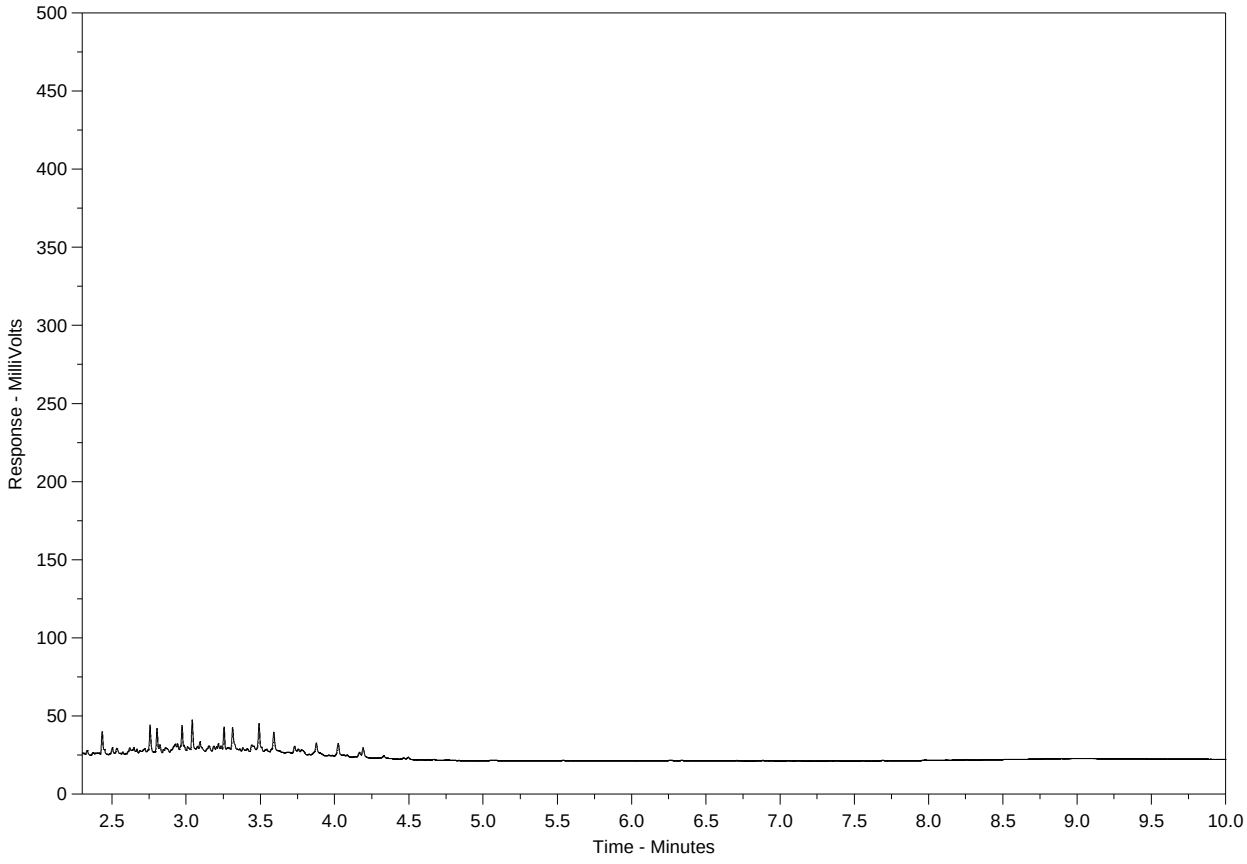
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report

ALS Sample ID: L1362889-8
Client Sample ID: BH-M-13-08 @ 3.6 TO 4.0 MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

L1362889-COFC

ALS Environmental

**Chain of Custody / Analytical Request Form**
**Canada Toll Free: 1 800 668 9878**
**www.alsglobal.com**

COC # _____

Page ___ of ___

| **Report To** | | **Report Format / Distribution** | | **Service Requeste** |
|---|---|---|---|---|
| Company: | Summit Environmental Consultants Inc. | ☑ Standard | ☐ Other | Regular (Standard Turnaround Times- Business Days |
| Contact: | Nicole Jacques | ☑ PDF | ☑ Excel ☐ Dig tak | |
| Address: | 301-4109 4th Ave | Email 1: | nrj@summit-environmental.com | |
| | Whitehorse, Yukon, Y1A 1H6 | Email 2: | | |
| Phone: | 867-456-2711 | Email 3: | | |
| **Invoice To** | Same as Report ? Y | **Client / Project Information** | | **Analysis Request** |
| Hardcopy of Invoice with Report? | | Job #: | 2012-2333.523.550 | |
| Company: | | PO / AFE: | | |
| Contact: | | LSD: | | |
| Address: | | | | |
| Phone: | Fax: | Quote #: | | |
| [redacted] Lab Work Order # (lab use only) | L1362889 | **ALS Contact:** | Dean Watt | **Sampler:** SVB |

| Sample | Sample Identification | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | MET-TOT-CSR-VA (includes | CR-CR3-ED | BTEX+VPH+MTBE-CSR-VA | LEPH/HEPH-CSR-VA | CN-WAD-NAOH-CFA-VA | CN-T-NAOH-CFA-VA | Extract for VPH/BTEX | Extract for LEPH/HEPH/PAH | Hold | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [redacted]1 | BH-M-13-08 @ 0.0 to 0.5 mbgs | 10-Sep-13 | | Soil | | | | | | | X | X | X | 4 |
| [redacted]2 | BH-M-13-08 @ 0.6 to 1.0 mbgs | 10-Sep-13 | | Soil | | | | | | | X | X | X | 4 |
| [redacted]3 | BH-M-13-08 @ 1.1 to 1.5 mbgs | 10-Sep-13 | | Soil | | | | | | | X | X | X | 4 |
| [redacted]4 | BH-M-13-08 @ 1.6 to 2.0 mbgs | 10-Sep-13 | | Soil | | | | | | | X | X | X | 4 |
| [redacted]5 | BH-M-13-08 @ 2.1 to 2.5 mbgs | 10-Sep-13 | | Soil | | | | | | | X | X | X | 4 |
| [redacted]6 | BH-M-13-08 @ 2.6 to 3.0 mbgs | 10-Sep-13 | | Soil | | | | | | | X | X | X | 4 |
| [redacted]7 | BH-M-13-08 @ 3.1 to 3.5 mbgs | 10-Sep-13 | | Soil | X | X | X | X | X | X | X | | | 4 |
| [redacted]8 | BH-M-13-08 @ 3.6 to 4.0 mbgs | 10-Sep-13 | | Soil | | | | | | | X | X | X | 4 |
| [redacted] | | | | | | | | | | | | | | |
| [redacted] | | | | | | | | | | | | | | |
| [redacted] | | | | | | | | | | | | | | |
| [redacted] | | | | | | | | | | | | | | |

**Special Instructions / Regulations with water or land use**

Compare to site specific standards provided to ALS

**Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

**By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.**

| [redacted] SHIPMENT RELEASE (client use) | | [redacted] SHIPMENT RECEPTION (lab use only) | | | | [redacted] SHIPMENT VERIFICATION (lab use only) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Released by: | Date (dd-mm | Received by: | Date: | Time: | Temperatu | Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
| | | P R | 13 SEPT | 13:50 | °C | | | | |

GENF 18.01 Front

8.1°C, 4.4°C, 7.9°C, 3.3°C, 6.1°C

SUMMIT ENVIRONMENTAL CONSULTANTS INC.
ATTN: Nicole Jacques
# 301 - 4109 4th Avenue
Whitehorse YT Y1A 1H6

Date Received: 16-SEP-13
Report Date: 14-NOV-13 16:00 (MT)
Version: FINAL REV. 4

Client Phone: 867-456-2711

# Certificate of Analysis

**Lab Work Order #: L1364070**

Project P.O. #: NOT SUBMITTED
Job Reference: 2012-2333.523.550
C of C Numbers:
Legal Site Desc:

**Comments:** 30-OCT-2013 Additional data has been added.
6-NOV-2013 Metals and pH data has been added to sample 21.
14-NOV-2013 Metals and pH data has been added to sample 16.

Dean Watt
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1364070-1 | L1364070-3 | L1364070-11 | L1364070-13 | L1364070-16 |
|---|---|---|---|---|---|---|
| | Description | soil | soil | soil | soil | soil |
| | Sampled Date | 10-SEP-13 | 10-SEP-13 | 13-SEP-13 | 13-SEP-13 | 13-SEP-13 |
| | Sampled Time | | | | | |
| | Client ID | BH-M-13-04@0.0 TO 0.5 MBGS | BH-M-13-04@1.1 TO 1.5MBGS | TP-M-13-04@2.1 TO 2.5MBGS | TP-M-13-04@3.1 TO 3.5MBGS | TP-M-13-04@4.6 TO 5.0 MBGS |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Physical Tests** | Moisture (%) | 7.10 | 13.9 | 17.7 | | |
| | pH (1:2 soil:water) (pH) | 7.74 | 7.61 | 7.05 | 6.20 | 6.05 |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Cyanide, Total (mg/kg) | 29.6 | <0.050 | <0.050 | | |
| **Metals** | Antimony (Sb) (mg/kg) | 558 | 125 | 20.9 | 40.6 | 19.7 |
| | Arsenic (As) (mg/kg) | 9350 | 2570 | 380 | 454 | 203 |
| | Barium (Ba) (mg/kg) | 106 | 141 | 144 | 125 | 110 |
| | Beryllium (Be) (mg/kg) | 0.43 | 0.49 | 0.46 | 0.43 | 0.27 |
| | Cadmium (Cd) (mg/kg) | 41.7 | 26.2 | 1.95 | 4.75 | 1.23 |
| | Chromium (Cr) (mg/kg) | 13.2 | 19.0 | 18.4 | 14.6 | 16.0 |
| | Cobalt (Co) (mg/kg) | 11.4 | 16.5 | 11.0 | 8.69 | 7.02 |
| | Copper (Cu) (mg/kg) | 326 | 159 | 33.9 | 31.7 | 22.6 |
| | Lead (Pb) (mg/kg) | 4250 | 524 | 103 | 208 | 137 |
| | Mercury (Hg) (mg/kg) | 0.177 | 0.083 | 0.080 | 0.074 | 0.054 |
| | Molybdenum (Mo) (mg/kg) | 1.11 | 1.10 | 0.70 | 0.71 | <0.50 |
| | Nickel (Ni) (mg/kg) | 10.9 | 12.1 | 11.1 | 9.63 | 9.69 |
| | Selenium (Se) (mg/kg) | 1.15 | 0.61 | 0.56 | 0.47 | 0.49 |
| | Silver (Ag) (mg/kg) | 64.0 | 5.11 | 1.12 | 2.07 | 1.05 |
| | Thallium (Tl) (mg/kg) | 0.942 | 0.640 | 0.450 | 0.387 | 0.262 |
| | Tin (Sn) (mg/kg) | 4.7 | <2.0 | <2.0 | <2.0 | <2.0 |
| | Uranium (U) (mg/kg) | 0.773 | 1.24 | 0.804 | 0.743 | 1.45 |
| | Vanadium (V) (mg/kg) | 48.7 | 63.1 | 64.7 | 55.8 | 39.5 |
| | Zinc (Zn) (mg/kg) | 2440 | 1180 | 159 | 301 | 117 |
| **Speciated Metals** | Chromium, Trivalent (mg/kg) | 13.2 | 18.7 | 18.4 | | |
| | Hexavalent Chromium (mg/kg) | <0.10 | 0.23 | <0.10 | | |
| **TCLP Metals** | 1st Preliminary PH (pH) | 8.94 | | | | |
| | 2nd Preliminary PH (pH) | 1.69 | | | | |
| | Final pH (pH) | 5.22 | | | | |
| | Extraction Solution Initial pH (pH) | 4.94 | | | | |
| | Antimony (Sb)-Leachable (mg/L) | <1.0 | | | | |
| | Arsenic (As)-Leachable (mg/L) | <1.0 | | | | |
| | Barium (Ba)-Leachable (mg/L) | <2.5 | | | | |
| | Beryllium (Be)-Leachable (mg/L) | <0.025 | | | | |
| | Boron (B)-Leachable (mg/L) | <0.50 | | | | |
| | Cadmium (Cd)-Leachable (mg/L) | 0.341 | | | | |
| | Calcium (Ca)-Leachable (mg/L) | 174 | | | | |
| | Chromium (Cr)-Leachable (mg/L) | <0.25 | | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1364070-17 | L1364070-19 | L1364070-21 | | |
|---|---|---|---|---|---|---|
| | Description | soil | soil | soil | | |
| | Sampled Date | 10-SEP-13 | 10-SEP-13 | 10-SEP-13 | | |
| | Sampled Time | | | | | |
| | Client ID | BH-KZ-13-02@0.0 TO 0.5 MBGS | BH-KZ-13-02@1.1 TO 1.5 MBGS | BH-KZ-13-02@2.1 TO 2.5 MBGS | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Physical Tests** | Moisture (%) | 7.23 | 5.28 | | | |
| | pH (1:2 soil:water) (pH) | 7.22 | 6.10 | 7.86 | | |
| **Cyanides** | Cyanide, Weak Acid Diss (mg/kg) | <0.050 | | | | |
| | Cyanide, Total (mg/kg) | <0.050 | | | | |
| **Metals** | Antimony (Sb) (mg/kg) | 33.9 | 5.45 | 2.75 | | |
| | Arsenic (As) (mg/kg) | 525 | 83.9 | 13.2 | | |
| | Barium (Ba) (mg/kg) | 86.3 | 200 | 105 | | |
| | Beryllium (Be) (mg/kg) | 0.27 | 0.41 | 0.35 | | |
| | Cadmium (Cd) (mg/kg) | 0.857 | 0.250 | 0.094 | | |
| | Chromium (Cr) (mg/kg) | 8.77 | 8.28 | 4.94 | | |
| | Cobalt (Co) (mg/kg) | 4.26 | 5.37 | 7.33 | | |
| | Copper (Cu) (mg/kg) | 18.9 | 9.81 | 8.20 | | |
| | Lead (Pb) (mg/kg) | 270 | 27.2 | 5.64 | | |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Molybdenum (Mo) (mg/kg) | 0.57 | <0.50 | <0.50 | | |
| | Nickel (Ni) (mg/kg) | 6.70 | 5.60 | 4.20 | | |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | <0.20 | | |
| | Silver (Ag) (mg/kg) | 2.31 | 0.20 | <0.10 | | |
| | Thallium (Tl) (mg/kg) | 0.144 | 0.098 | 0.053 | | |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | | |
| | Uranium (U) (mg/kg) | 0.405 | 0.320 | 0.180 | | |
| | Vanadium (V) (mg/kg) | 25.2 | 26.7 | 25.1 | | |
| | Zinc (Zn) (mg/kg) | 170 | 29.1 | 23.9 | | |
| **Speciated Metals** | Chromium, Trivalent (mg/kg) | 8.58 | | | | |
| | Hexavalent Chromium (mg/kg) | 0.19 | | | | |
| **TCLP Metals** | 1st Preliminary PH (pH) | 8.08 | | | | |
| | 2nd Preliminary PH (pH) | 1.58 | | | | |
| | Final pH (pH) | 5.03 | | | | |
| | Extraction Solution Initial pH (pH) | 4.94 | | | | |
| | Antimony (Sb)-Leachable (mg/L) | <1.0 | | | | |
| | Arsenic (As)-Leachable (mg/L) | <1.0 | | | | |
| | Barium (Ba)-Leachable (mg/L) | <2.5 | | | | |
| | Beryllium (Be)-Leachable (mg/L) | <0.025 | | | | |
| | Boron (B)-Leachable (mg/L) | <0.50 | | | | |
| | Cadmium (Cd)-Leachable (mg/L) | <0.050 | | | | |
| | Calcium (Ca)-Leachable (mg/L) | 30.6 | | | | |
| | Chromium (Cr)-Leachable (mg/L) | <0.25 | | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1364070-1 soil 10-SEP-13 BH-M-13-04@0.0 TO 0.5 MBGS | L1364070-3 soil 10-SEP-13 BH-M-13-04@1.1 TO 1.5MBGS | L1364070-11 soil 13-SEP-13 TP-M-13-04@2.1 TO 2.5MBGS | L1364070-13 soil 13-SEP-13 TP-M-13-04@3.1 TO 3.5MBGS | L1364070-16 soil 13-SEP-13 TP-M-13-04@4.6 TO 5.0 MBGS |
|---|---|---|---|---|---|---|
| **SOIL** | | | | | | |
| **TCLP Metals** | Cobalt (Co)-Leachable (mg/L) | <0.050 | | | | |
| | Copper (Cu)-Leachable (mg/L) | 1.23 | | | | |
| | Iron (Fe)-Leachable (mg/L) | 0.34 | | | | |
| | Lead (Pb)-Leachable (mg/L) | 6.22 | | | | |
| | Magnesium (Mg)-Leachable (mg/L) | 19.5 | | | | |
| | Mercury (Hg)-Leachable (mg/L) | <0.0010 | | | | |
| | Nickel (Ni)-Leachable (mg/L) | <0.25 | | | | |
| | Selenium (Se)-Leachable (mg/L) | <1.0 | | | | |
| | Silver (Ag)-Leachable (mg/L) | <0.050 | | | | |
| | Thallium (Tl)-Leachable (mg/L) | <1.0 | | | | |
| | Vanadium (V)-Leachable (mg/L) | <0.15 | | | | |
| | Zinc (Zn)-Leachable (mg/L) | 19.8 | | | | |
| **Volatile Organic Compounds** | Benzene (mg/kg) | <0.040 | <0.040 | <0.040 | | |
| | Ethylbenzene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | | |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Xylenes (mg/kg) | <0.075 | <0.075 | <0.075 | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 85.9 | 85.1 | 94.4 | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 89.1 | 89.1 | 90.9 | | |
| **Hydrocarbons** | EPH10-19 (mg/kg) | <200 | <200 | 210 | | |
| | EPH10-19 (sg) (mg/kg) | | <200 | <200 | | |
| | EPH19-32 (mg/kg) | <200 | 260 | <200 | | |
| | EPH19-32 (sg) (mg/kg) | | 210 | <200 | | |
| | LEPH (mg/kg) | <200 | <200 | 210 | | |
| | HEPH (mg/kg) | <200 | 260 | <200 | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | <100 | | |
| | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 68.4 SURR-ND | 88.2 | 115.9 | | |
| **Polycyclic Aromatic Hydrocarbons** | Acenaphthene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1364070-17 | L1364070-19 | L1364070-21 | | |
|---|---|---|---|---|---|---|
| | Description | soil | soil | soil | | |
| | Sampled Date | 10-SEP-13 | 10-SEP-13 | 10-SEP-13 | | |
| | Sampled Time | | | | | |
| | Client ID | BH-KZ-13-02@0.0 TO 0.5 MBGS | BH-KZ-13-02@1.1 TO 1.5 MBGS | BH-KZ-13-02@2.1 TO 2.5 MBGS | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **TCLP Metals** | Cobalt (Co)-Leachable (mg/L) | <0.050 | | | | |
| | Copper (Cu)-Leachable (mg/L) | <0.050 | | | | |
| | Iron (Fe)-Leachable (mg/L) | 0.41 | | | | |
| | Lead (Pb)-Leachable (mg/L) | <0.25 | | | | |
| | Magnesium (Mg)-Leachable (mg/L) | 4.72 | | | | |
| | Mercury (Hg)-Leachable (mg/L) | <0.0010 | | | | |
| | Nickel (Ni)-Leachable (mg/L) | <0.25 | | | | |
| | Selenium (Se)-Leachable (mg/L) | <1.0 | | | | |
| | Silver (Ag)-Leachable (mg/L) | <0.050 | | | | |
| | Thallium (Tl)-Leachable (mg/L) | <1.0 | | | | |
| | Vanadium (V)-Leachable (mg/L) | <0.15 | | | | |
| | Zinc (Zn)-Leachable (mg/L) | 1.62 | | | | |
| **Volatile Organic Compounds** | Benzene (mg/kg) | <0.040 | | | | |
| | Ethylbenzene (mg/kg) | <0.050 | | | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | | | | |
| | Styrene (mg/kg) | <0.050 | | | | |
| | Toluene (mg/kg) | <0.050 | | | | |
| | ortho-Xylene (mg/kg) | <0.050 | | | | |
| | meta- & para-Xylene (mg/kg) | <0.050 | | | | |
| | Xylenes (mg/kg) | <0.075 | | | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 82.2 | | | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 87.2 | | | | |
| **Hydrocarbons** | EPH10-19 (mg/kg) | 630 | <200 | | | |
| | EPH10-19 (sg) (mg/kg) | | | | | |
| | EPH19-32 (mg/kg) | 17700 | 230 | | | |
| | EPH19-32 (sg) (mg/kg) | | | | | |
| | LEPH (mg/kg) | 630 | <200 | | | |
| | HEPH (mg/kg) | 17700 | 230 | | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | | | | |
| | VPH (C6-C10) (mg/kg) | <100 | | | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 70.0 | | | | |
| **Polycyclic Aromatic Hydrocarbons** | Acenaphthene (mg/kg) | <0.050 DLM | <0.050 | | | |
| | Acenaphthylene (mg/kg) | <0.050 DLM | <0.050 | | | |
| | Anthracene (mg/kg) | <0.050 DLM | <0.050 | | | |
| | Benz(a)anthracene (mg/kg) | <0.050 DLM | <0.050 | | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Grouping | Analyte | L1364070-1 soil 10-SEP-13 BH-M-13-04@0.0 TO 0.5 MBGS | L1364070-3 soil 10-SEP-13 BH-M-13-04@1.1 TO 1.5MBGS | L1364070-11 soil 13-SEP-13 TP-M-13-04@2.1 TO 2.5MBGS | L1364070-13 soil 13-SEP-13 TP-M-13-04@3.1 TO 3.5MBGS | L1364070-16 soil 13-SEP-13 TP-M-13-04@4.6 TO 5.0 MBGS |
|---|---|---|---|---|---|---|
| **SOIL** | | | | | | |
| **Polycyclic Aromatic Hydrocarbons** | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | 0.211 | | |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | Surrogate: Acenaphthene d10 (%) | 69.0 | 85.1 | 85.3 | | |
| | Surrogate: Chrysene d12 (%) | 61.7 | 84.5 | 97.2 | | |
| | Surrogate: Naphthalene d8 (%) | 68.0 | 76.9 | 86.7 | | |
| | Surrogate: Phenanthrene d10 (%) | 73.7 | 96.5 | 92.8 | | |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID | L1364070-17 | L1364070-19 | L1364070-21 | | |
|---|---|---|---|---|---|---|
| | Description | soil | soil | soil | | |
| | Sampled Date | 10-SEP-13 | 10-SEP-13 | 10-SEP-13 | | |
| | Sampled Time | | | | | |
| | Client ID | BH-KZ-13-02@0.0 TO 0.5 MBGS | BH-KZ-13-02@1.1 TO 1.5 MBGS | BH-KZ-13-02@2.1 TO 2.5 MBGS | | |
| **Grouping** | **Analyte** | | | | | |
| **SOIL** | | | | | | |
| **Polycyclic Aromatic Hydrocarbons** | Benzo(a)pyrene (mg/kg) | <0.050 DLM | <0.050 | | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.20 DLM | <0.050 | | | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.35 DLM | <0.050 | | | |
| | Benzo(k)fluoranthene (mg/kg) | <0.20 DLM | <0.050 | | | |
| | Chrysene (mg/kg) | <0.070 DLM | <0.050 | | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.070 DLM | <0.050 | | | |
| | Fluoranthene (mg/kg) | <0.050 DLM | <0.050 | | | |
| | Fluorene (mg/kg) | <0.050 DLM | <0.050 | | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.080 DLM | <0.050 | | | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 DLM | <0.050 | | | |
| | Naphthalene (mg/kg) | <0.050 DLM | <0.050 | | | |
| | Phenanthrene (mg/kg) | <0.050 DLM | <0.050 | | | |
| | Pyrene (mg/kg) | 0.483 | <0.050 | | | |
| | Surrogate: Acenaphthene d10 (%) | 106.4 | 99.5 | | | |
| | Surrogate: Chrysene d12 (%) | 101.7 | 116.9 | | | |
| | Surrogate: Naphthalene d8 (%) | 95.3 | 101.0 | | | |
| | Surrogate: Phenanthrene d10 (%) | 100.4 | 106.3 | | | |

* 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) |
|---|---|---|---|
| Method Blank | Arsenic (As) | B | L1364070-17 |
| Duplicate | Cyanide, Weak Acid Diss | DLM | L1364070-1 |
| Duplicate | Hexavalent Chromium | DLR | L1364070-11, -17, -3 |
| Duplicate | Cobalt (Co) | DUP-H | L1364070-3 |
| Duplicate | Molybdenum (Mo) | DUP-H | L1364070-3 |
| Duplicate | Antimony (Sb) | DUP-H | L1364070-13, -19 |
| Duplicate | Arsenic (As) | DUP-H | L1364070-13, -19 |
| Duplicate | Cadmium (Cd) | DUP-H | L1364070-13, -19 |
| Matrix Spike | Calcium (Ca)-Leachable | MS-B | L1364070-1, -17 |
| Matrix Spike | Magnesium (Mg)-Leachable | MS-B | L1364070-1, -17 |

**Qualifiers for Individual Parameters Listed:**

| Qualifier | Description |
|---|---|
| B | Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable. |
| DLM | Detection Limit Adjusted due to sample matrix effects. |
| DLR | Detection Limit Raised due to required dilution, limited sample amount, and/or high moisture content (soil samples) |
| DUP-H | Duplicate results outside ALS DQO, due to sample heterogeneity. |
| MS-B | Matrix Spike recovery could not be accurately calculated due to high analyte background in sample. |
| SURR-ND | Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected. |

**Test Method References:**

| ALS Test Code | Matrix | Test Description | Method Reference** |
|---|---|---|---|
| **CN-T-NAOH-CFA-VA** | Soil | Total Cyanide in soil by CFA | ONMOE CN-E3015/ISO 14403:2002 |

This analysis is carried out using procedures adapted from the Ontario Ministry of Environment CN-E3015 and ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by rotary extraction of the soil with 0.04M Sodium Hydroxide, followed by in-line UV digestion along with sample distillation and final determination by colourimetric analysis.

| | | | |
|---|---|---|---|
| **CN-WAD-NAOH-CFA-VA** | Soil | Weak Acid Diss. Cyanide in soil by CFA | ONMOE CN-E3015/APHA 4500-CN CYANIDE |

This analysis is carried out using procedures adapted from the Ontario Ministry of Environment CN-E3015 and APHA Method 4500-CN I. "Weak Acid Dissociable Cyanide". Weak Acid Dissociable (WAD) cyanide is determined by rotary extraction of the soil with 0.04M Sodium Hydroxide, followed by in-line sample distillation with final determination by colourimetric analysis.

| | | | |
|---|---|---|---|
| **CR-CR3-ED** | Soil | Chromium, Trivalent (Cr +3) | Total Cr - Cr(+6) |
| **CR-CR6-3060-ED** | Soil | Chromium, Hexavalent (Cr +6) | APHA 3500-CR C, EPA 3060A ALKALINE |
| **EPH-TUMB-FID-VA** | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to gas chromatography with flame ionization detection (GC-FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

| | | | |
|---|---|---|---|
| **EPH-TUMB-SG-FID-VA** | Soil | EPH with Silica Gel by Tumbler and GCFID | BCMOE EPH GCFID |

EPH in Sediment/Soil with Silica Gel Cleanup - EPH(sg)

This analysis is carried out using British Columbia Ministry of Water, Land and Air Protection (BC WLAP) methods. Sediment/Soil samples are extracted and analzyed in accordance with the BC WLAP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID, Version 2.1 July 1999". The procedure, based on EPA 3570, uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone.

Prior to analysis by capillary gas chromatography with flame ionization detection (GC/FID), a silica gel cleanup procedure is applied. The cleanup, which is intended to selectively remove most naturally occurring organics, follows the BC WLAP method "Silica Gel Cleanup of Extractable Petroleum Hydrocarbons" (Draft, October 23, 2003).

Note that EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH). This analysis is sometimes also referred to as Total Petroleum Hydrocarbons.

Accuracy target values for Reference Materials used in this method are derived from averages of long-term method performance, as certified values do not exist for the reported parameters.

| | | | |
|---|---|---|---|
| **HG-200.2-CVAF-VA** | Soil | Mercury in Soil by CVAFS | EPA 200.2/245.7 |

# Reference Information

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry(EPA Method 245.7).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

**HG-TCLP-CVAFS-VA** Soil Mercury by CVAFS (TCLP) EPA 1311/245.7

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter and analysed using atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA 245.7).

**LEPH/HEPH-CALC-VA** Soil LEPHs and HEPHs BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated
by subtracting selected Polycyclic Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene, and Pyrene
are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

**MET-200.2-CCMS-VA** Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

**MET-TCLP-ICP-VA** Soil Metals by ICPOES (TCLP) EPA 1311/6010B

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter and analysed using inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

**MOISTURE-VA** Soil Moisture content ASTM D2974-00 Method A

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

**PAH-TMB-H/A-MS-VA** Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3545 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation. Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

**PH-1:2-VA** Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

**VH-HSFID-VA** Soil VH in soil by Headspace GCFID EPA8260B, 5021, 5035, BC MOE

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

**VH-SURR-FID-VA** Soil VH Surrogates for Soils BCMELP CSR ANALYTICAL METHOD 2

# Reference Information

| | | | |
|---|---|---|---|
| **VOC7-L-HSMS-VA** | Soil | VOCs in soil by Headspace GCMS | EPA8260B, 5021, 5035, BC MOE |

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

| | | | |
|---|---|---|---|
| **VOC7/VOC-SURR-MS-VA** | Soil | VOC7 and/or VOC Surrogates for Soils | EPA METHODS 8260B & 524.2 |
| **VPH-CALC-VA** | Soil | VPH is VH minus select aromatics | BC MOE LABORATORY MANUAL (2005) |

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water" (Version 2.1, July 20, 1999). According to this method, the concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, Xylenes and Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10). Analysis of Volatile Hydrocarbons adheres to all prescribed elements of BCMELP method "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

| | | | |
|---|---|---|---|
| **XYLENES-CALC-VA** | Soil | Sum of Xylene Isomer Concentrations | EPA 8260B & 524.2 |

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** 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 |
|---|---|
| ED | ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA |
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |

**Chain of Custody Numbers:**

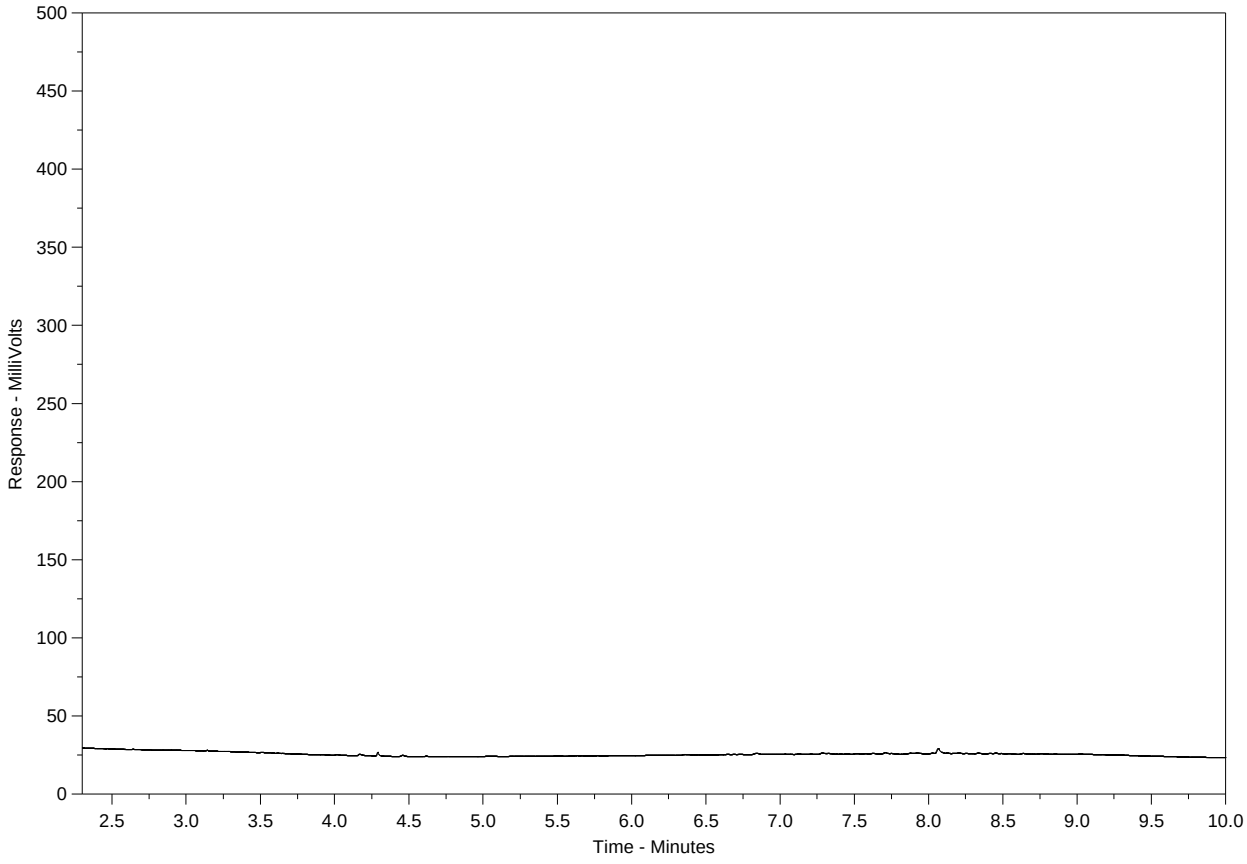
**GLOSSARY OF REPORT TERMS**

*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 wwt - 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.*

# Hydrocarbon Distribution Report

ALS Sample ID: L1364070-1
Client Sample ID: BH-M-13-04@0.0 TO 0.5 MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

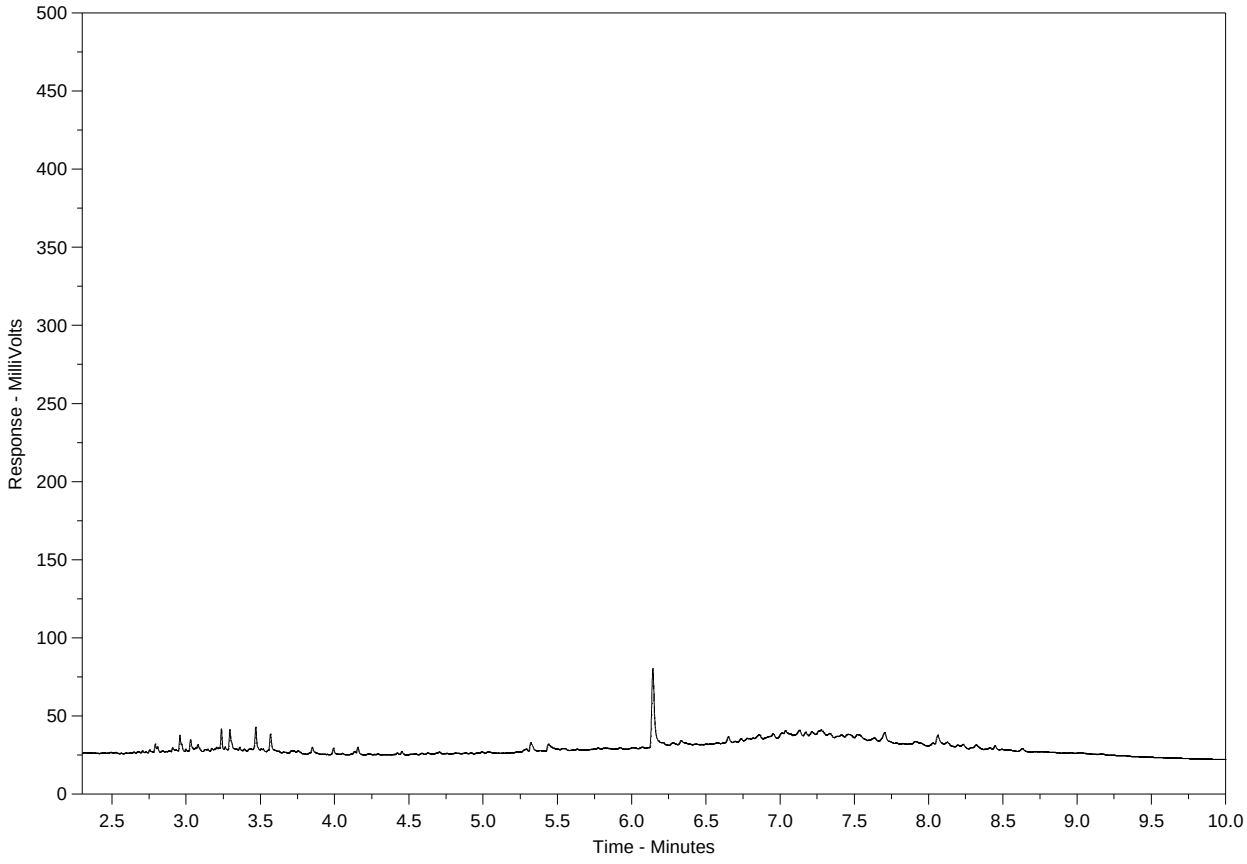
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report

ALS Sample ID: L1364070-3
Client Sample ID: BH-M-13-04@1.1 TO 1.5MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

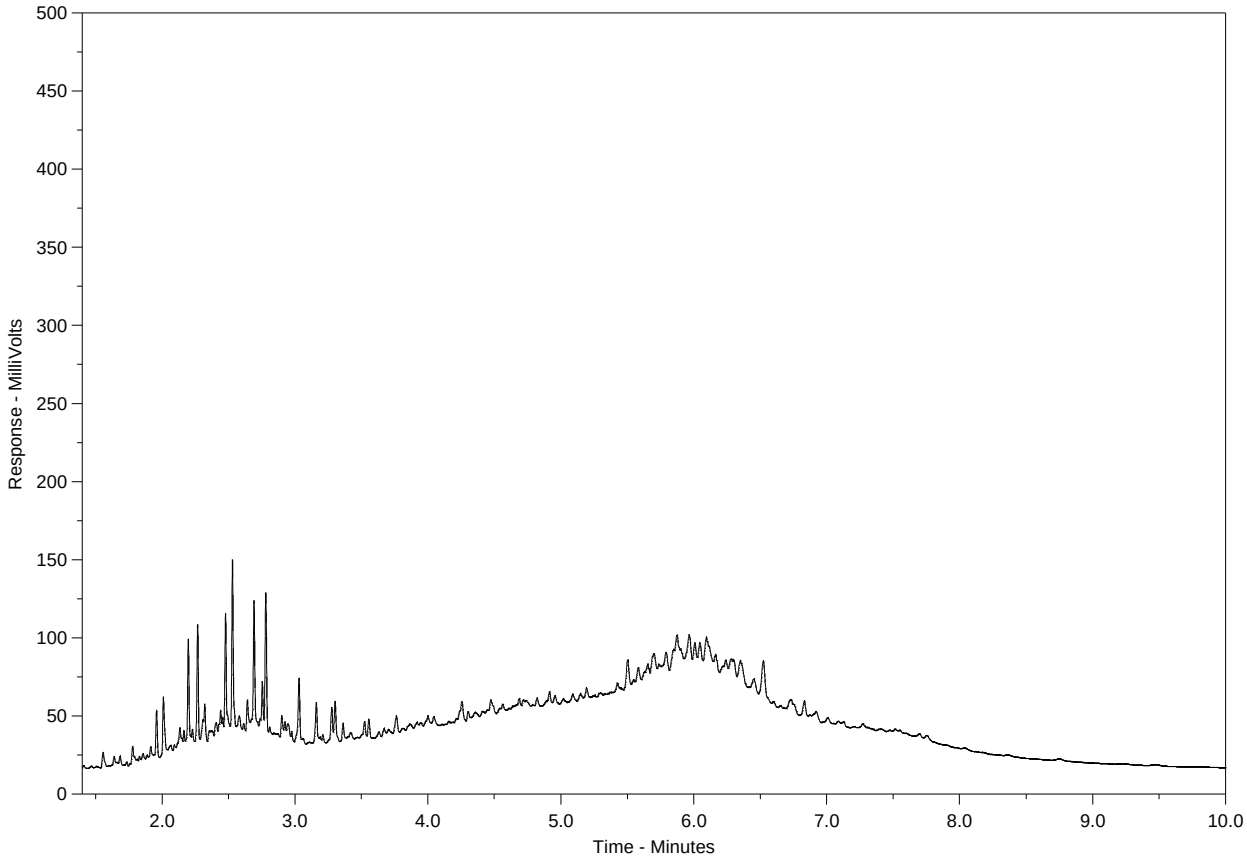
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report

ALS Sample ID: L1364070-S-3
Client Sample ID: BH-M-13-04@1.1 TO 1.5MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

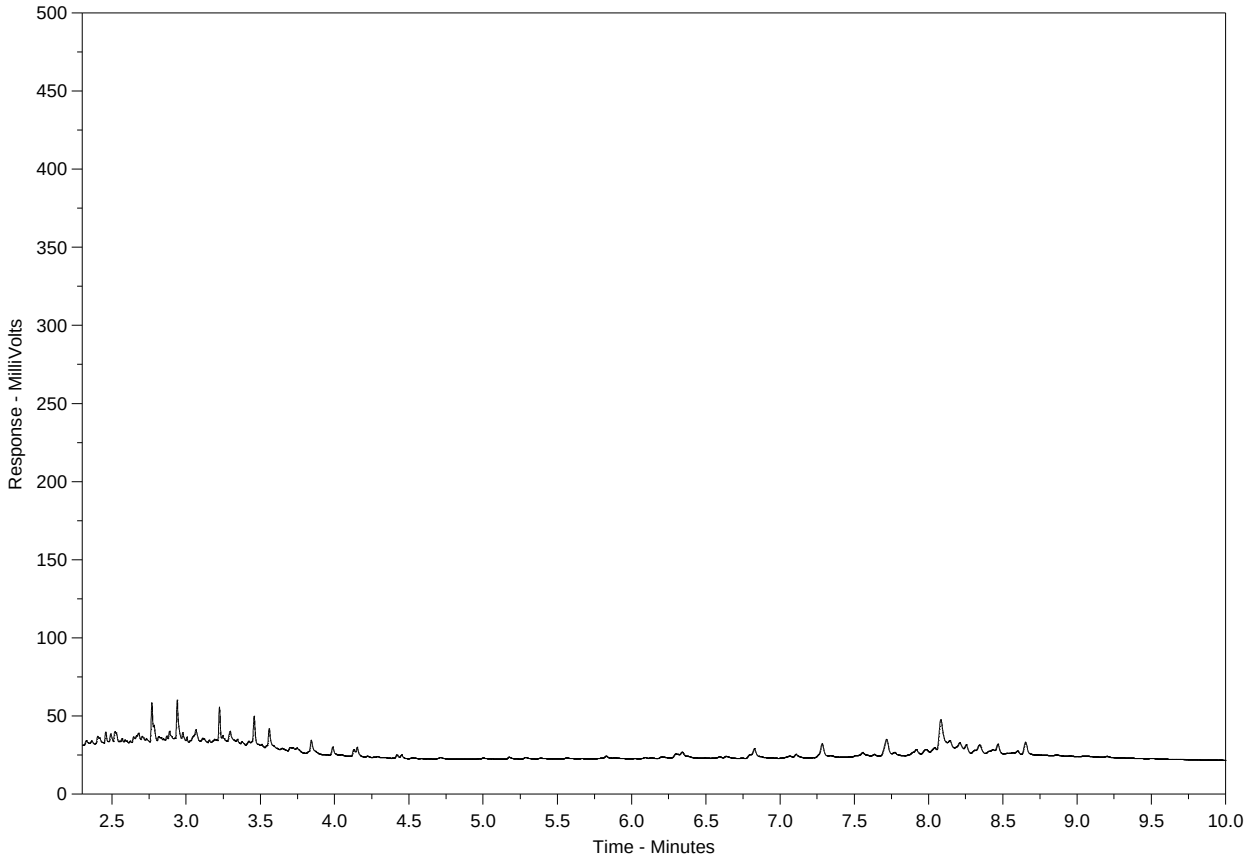
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report

ALS Sample ID: L1364070-11
Client Sample ID: TP-M-13-04@2.1 TO 2.5MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

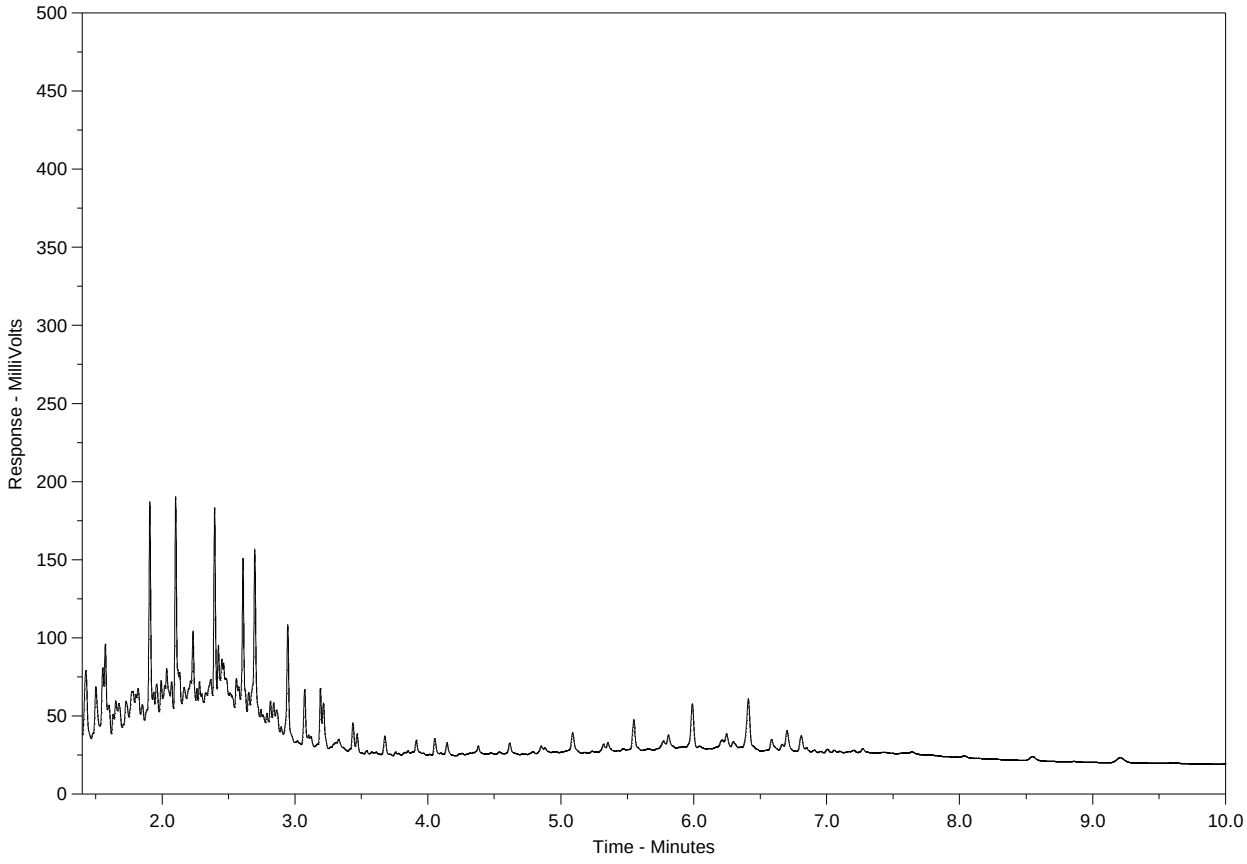
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report

ALS Sample ID: L1364070-S-11
Client Sample ID: TP-M-13-04@2.1 TO 2.5MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

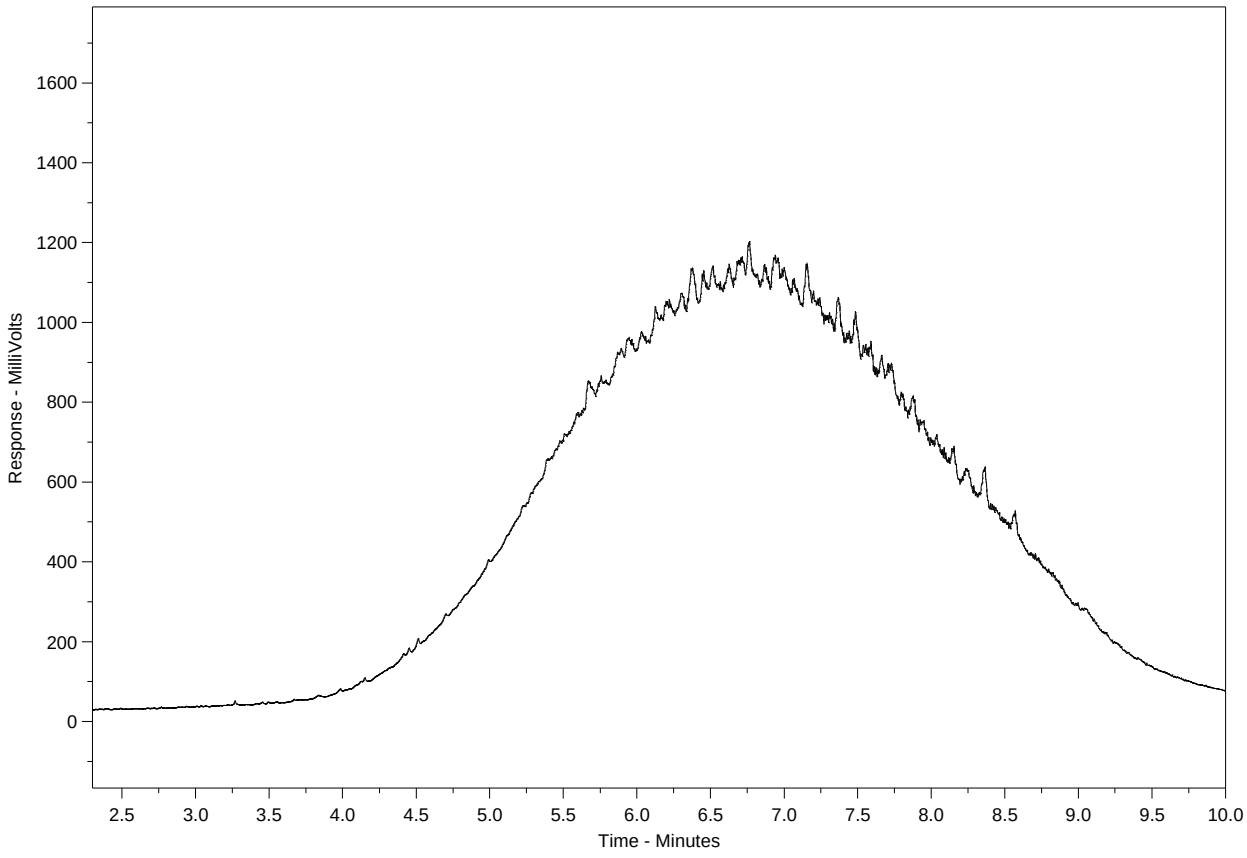
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report

ALS Sample ID: L1364070-17
Client Sample ID: BH-KZ-13-02@0.0 TO 0.5 MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

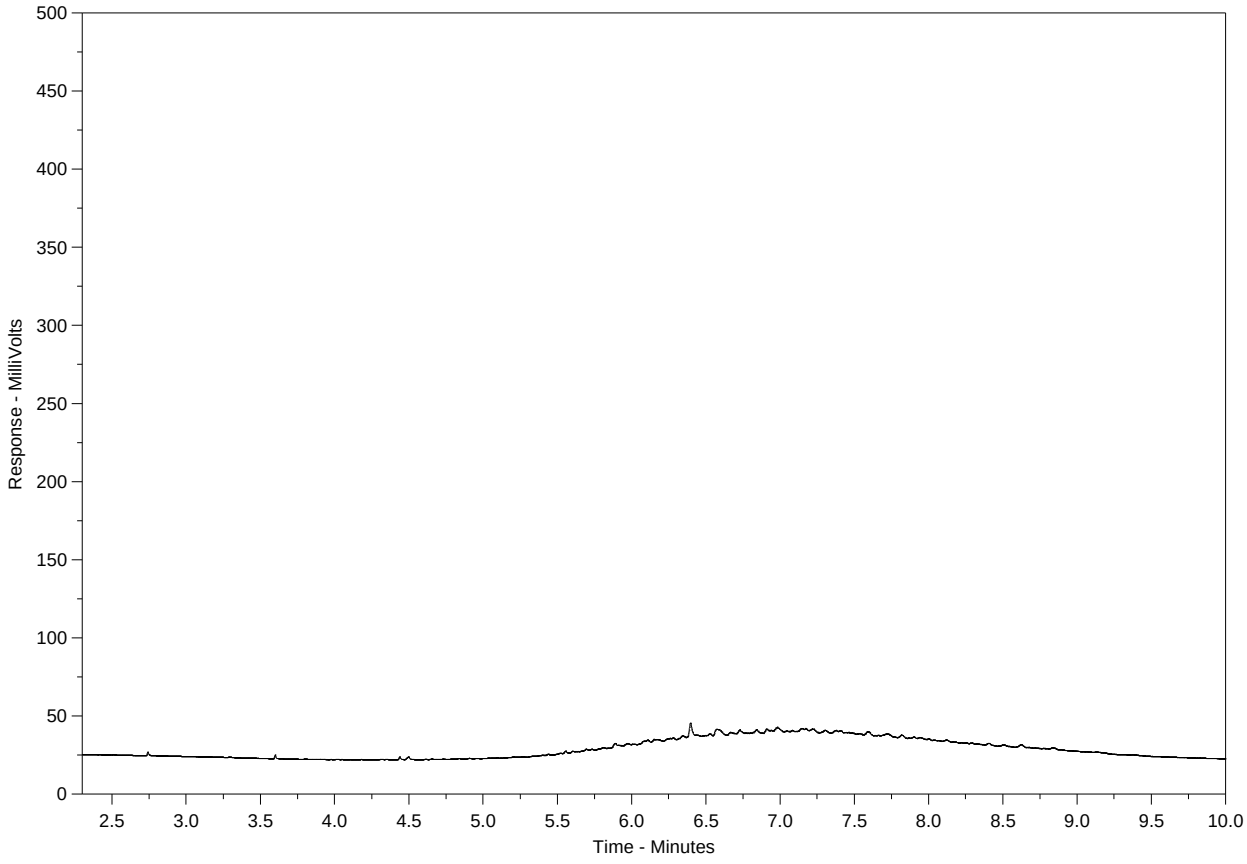
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

# Hydrocarbon Distribution Report

ALS Sample ID: L1364070-19
Client Sample ID: BH-KZ-13-02@1.1 TO 1.5 MBGS




| nC10 | nC19 | nC32 |
|---|---|---|
| 174°C | 330°C | 467°C |
| 346°F | 626°F | 873°F |
| ← Gasoline → | ← Motor Oils / Lube Oils / Grease → | |
| ← Diesel / Jet Fuels → | | |

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

L1364070-COFC

ALS Environmental

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COC # _____

Page 1 of 3

| | | | |
|---|---|---|---|
| Report To | | Report Format / Distribution | Service Requeste |
| Company: | Summit Environmental Consultants Inc | ✓ Standard | Standard Turnaround Times- Business Days |
| Contact: | Nicole Jacques | ☑ PDF ☑ Excel ☐ Digital ☐ Fax | |
| Address: | 301-4109 4th Ave | Email 1: nrj@summit-environmental.com | |
| | Whitehorse, Yukon, Y1A 1H6 | Email 2: | |
| Phone: | 867-456-2711 | Email 3: | |
| Invoice To | Same as Report ? Y | Client / Project Information | |
| Hardcopy of Invoice with Report? | | Job #: 2012-2333.523.550 | |
| Company: | AMEC Environmental | PO / AFE: | |
| Contact: | Renata Wood | LSD: | |
| Address: | Renata.Wood@amec.com | | |
| Phone: | (604) 295-8243 Fax: | Quote #: | |
| Lab Work Order # (lab use only) | | ALS Contact: Dean Watt | Sampler: SVB |

| Sample | Sample Identification | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | Extract for BTEX + VPH | Extract for LEPH,HEPH + PAH | MET-TOT-CSR-VA (includes | CR-CR3-ED | BTEX+VPH+MTBE-CSR-VA | LEPH/HEPH-CSR-VA | CN-WAD-NAOH-CFA-VA | CN-T-NAOH-CFA-VA | PCB-SE-ECD-VA | Hold | Silica Gel Cleanup | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BH-M-13-04 @ 0.0 to 0.5 mbgs | 10-Sep-13 | | Soil | X | X | | | | | | | | X | | 3 |
| | BH-M-13-04 @ 0.6 to 1.0 mbgs | 10-Sep-13 | | Soil | X | X | | | | | | | | X | | 3 |
| | BH-M-13-04 @ 1.1 to 1.5 mbgs | 10-Sep-13 | | Soil | | | X | X | X | X | X | X | X | | X | 3 |
| | BH-M-13-04 @ 3.1 to 3.5 mbgs | 10-Sep-13 | | Soil | X | X | | | | | | | | X | | 3 |
| | BH-M-13-04 @ 3.6 to 4.0 mbgs | 10-Sep-13 | | Soil | X | X | | | | | | | | X | | 3 |
| | BH-M-13-04 @ 4.1 to 4.5 mbgs | 10-Sep-13 | | Soil | X | X | | | | | | | | X | | 3 |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | |

Special Instructions / Regulations with water or land use

Compare to site specific standards provided to ALS

**Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

**By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.**

| SHIPMENT RELEASE (client use) | | SHIPMENT RECEPTION (lab use only) | | | | SHIPMENT VERIFICATION (lab use only) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Released by: | Date (dd-mm | Received by: | Date: | Time: | Temperatu | Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
| | | YC | Sep 16 | 15:25 | 12.5°C | | | | |

9.9

GENF 18.01 Front

L1364070-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____



| | | | |
|---|---|---|---|
| Report Form | | Service Requested | |
| | | Standard Turnaround Times- Business Days | |
| Contact: | Nicole [redacted] | ☑ Excel ☐ Digital ☐ Fax | |
| Address: | 301-4 [redacted] Ave | Email 1: nrj@summit-environmental.com | |
| | Whitehorse, Yukon, Y1A 1H6 | Email 2: | |
| Phone: | 867-456-2711 | Email 3: | |
| **Invoice To** | Same as Report ? Y | **Client / Project Information** | |
| Hardcopy of Invoice with Report? | | Job #: 2012-2333.523.550 | |
| Company: | AMEC Environmental | PO / AFE: | |
| Contact: | Renata Wood | LSD: | |
| Address: | Renata.Wood@amec.com | | |
| Phone: | (604) 295-8243 Fax: | Quote #: | |
| [redacted] Lab Work Order # (lab use only) | | **ALS Contact:** Dean Watt | **Sampler:** SVB |

**Analysis Request**

| Sample | Sample Identification | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | Extract for BTEX + VPH | Extract for LEPH,HEPH + PAH | MET-TOT-CSR-VA (includes | CR-CR3-ED | BTEX+VPH+MTBE-CSR-VA | LEPH/HEPH-CSR-VA | CN-WAD-NAOH-CFA-VA | CN-T-NAOH-CFA-VA | Hold | Silica Gel Cleanup | | | | | | | | | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [redacted] | TP-M-13-04 @ 0.0 to 0.5 mbgs | 13-Sep-13 | | Soil | X | X | | | | | | | X | | | | | | | | | | 2 |
| [redacted] | TP-M-13-04 @ 0.6 to 1.0 mbgs | 13-Sep-13 | | Soil | X | X | | | | | | | X | | | | | | | | | | 2 |
| [redacted] | TP-M-13-04 @ 1.1 to 1.5 mbgs | 13-Sep-13 | | Soil | X | X | | | | | | | X | | | | | | | | | | 2 |
| [redacted] | TP-M-13-04 @ 1.6 to 2.0 mbgs | 13-Sep-13 | | Soil | X | X | | | | | | | X | | | | | | | | | | 2 |
| [redacted] | TP-M-13-04 @ 2.1 to 2.5 mbgs | 13-Sep-13 | | Soil | | | X | X | X | X | X | X | | X | | | | | | | | | | 2 |
| [redacted] | TP-M-13-04 @ 2.6 to 3.0 mbgs | 13-Sep-13 | | Soil | X | X | | | | | | | X | | | | | | | | | | 2 |
| [redacted] | TP-M-13-04 @ 3.1 to 3.5 mbgs | 13-Sep-13 | | Soil | X | X | | | | | | | X | | | | | | | | | | 2 |
| [redacted] | TP-M-13-04 @ 3.6 to 4.0 mbgs | 13-Sep-13 | | Soil | X | X | | | | | | | X | | | | | | | | | | 2 |
| [redacted] | TP-M-13-04 @ 4.1 to 4.5 mbgs | 13-Sep-13 | | Soil | X | X | | | | | | | X | | | | | | | | | | 2 |
| [redacted] | TP-M-13-04 @ 4.6 to 5.0 mbgs | 13-Sep-13 | | Soil | X | X | | | | | | | X | | | | | | | | | | 2 |
| [redacted] | | | | | | | | | | | | | | | | | | | | | | | |
| [redacted] | | | | | | | | | | | | | | | | | | | | | | | |

**Special Instructions / Regulations with water or land use**

Compare to site specific standards provided to ALS

**Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

**By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.**

| [redacted] SHIPMENT RELEASE (client use) [redacted] | | [redacted] SHIPMENT RECEPTION (lab use only) [redacted] | | | | [redacted] SHIPMENT VERIFICATION (lab use only) [redacted] | | | |
|---|---|---|---|---|---|---|---|---|---|
| Released by: | Date (dd-mm | Received by: | Date: | Time: | Temperatu | Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
| | | YC | Sept 16 | 15:25 | 12.5 9.9 °C | | | | |

L1364070-COFC

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____



| | | | |
|---|---|---|---|
| Contact: | Nicol[redacted]s | Excel ☐ Digital ☐ Fax | Service Requested: Regular Turnaround Times- Business Days |
| Address: | 301-4[redacted] Ave | Email 1: [redacted]rj@summit-environmental.com | |
| | Whitehorse, Yukon, Y1A 1H6 | Email 2: | |
| Phone: | 867-456-2711 | Email 3: | |
| Invoice To | Same as Report ? Y | **Client / Project Information** | |
| Hardcopy of Invoice with Report? | | Job #: 2012-2333.523.550 | |
| Company: | AMEC Environmental | PO / AFE: | |
| Contact: | Renata Wood | LSD: | |
| Address: | Renata.Wood@amec.com | | |
| Phone: | (604) 295-8243 Fax: | Quote #: | |
| Lab Work Order # [redacted] (lab use only) | | **ALS Contact:** Dean Watt | **Sampler:** SVB |

**Analysis Request**

| Sample | Sample Identification | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | Extract for BTEX + VPH | Extract for LEPH,HEPH + PAH | MET-TOT-CSR-VA (includes | CR-CR3-ED | BTEX+VPH+MTBE-CSR-VA | LEPH/HEPH-CSR-VA | Hold | CN-WAD-NAOH-CFA-VA | CN-T-NAOH-CFA-VA | Number of Containers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [redacted] | BH-KZ-13-02 @ 0.0 to 0.5 mbgs | 10-Sep-13 | | Soil | | | X | X | X | X | | X | X | 2 |
| [redacted] | BH-KZ-13-02 @ 0.6 to 1.0 mbgs | 10-Sep-13 | | Soil | X | X | | | | | X | | | 2 |
| [redacted] | BH-KZ-13-02 @ 1.1 to 1.5 mbgs | 10-Sep-13 | | Soil | X | X | | | | | X | | | 2 |
| [redacted] | BH-KZ-13-02 @ 1.6 to 2.0 mbgs | 10-Sep-13 | | Soil | X | X | | | | | X | | | 2 |
| [redacted] | BH-KZ-13-02 @ 2.1 to 2.5 mbgs | 10-Sep-13 | | Soil | X | X | | | | | X | | | 2 |
| [redacted] | BH-KZ-13-02 @ 2.6 to 3.0 mbgs | 10-Sep-13 | | Soil | X | X | | | | | X | | | 2 |
| [redacted] | BH-KZ-13-02 @ 3.1 to 3.5 mbgs | 10-Sep-13 | | Soil | X | X | | | | | X | | | 2 |
| [redacted] | BH-KZ-13-02 @ 3.6 to 4.0 mbgs | 10-Sep-13 | | Soil | X | X | | | | | X | | | 2 |
| [redacted] | BH-KZ-13-02 @ 4.1 to 4.5 mbgs | 10-Sep-13 | | Soil | X | X | | | | | X | | | 2 |
| [redacted] | BH-KZ-13-02 @ 4.6 to 5.0 mbgs | 10-Sep-13 | | Soil | X | X | | | | | X | | | 2 |
| [redacted] | | | | | | | | | | | | | | 2 |
| [redacted] | | | | | | | | | | | | | | 2 |

**Special Instructions / Regulations with water or land use**

Compare to site specific standards provided to ALS

**Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.**

**By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.**

| SHIPMENT RELEASE (client use) | | SHIPMENT RECEPTION (lab use only) | | | | SHIPMENT VERIFICATION (lab use only) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Released by: | Date (dd-mm | Received by: | Date: | Time: | Temperatu | Verified by: | Date: | Time: | Observations: Yes / No ? If Yes add SIF |
| | | YC | Sept 16 | 15:25 | 12.5 9.9 °C | | | | |

# APPENDIX E

# FIELD INSTRUMENT AND EQUIPMENT SPECIFICATIONS

# Appendix E1

# CPT Equipment Specifications

# GEOTECH CPT PROBES



## Geotech offers two different CPT systems, the Classic and the newly developed Nova.

The Geotech CPT probes are equipped with individual sensors for point resistance ($q_c$), sleeve friction ($f_s$), pore pressure (u). The data measured by the sensors is digitised, multiplexed and encrypted with an error detecting code in the probe before it is forwarded to the transmitter or cable adapter for transmission to the surface. To back-up the data transmission, the cones can also be delivered with a back-up memory of 8 hours capacity, with 18 bits resolution on all channels.

CPT Classic Probe used in Mount Nansen 2013 Site Investigation

# GEOTECH CPT PROBES

All the three parameters point resistance, sleeve friction and dynamic pore pressure vary with the type of penetrated soil. In addition, the point resistance ($q_c$, in MPa, measured behind the probe) varies with the degree of stiffness. The sleeve friction ($f_s$, in kPa, measured along a sleeve on the probe) is an expression of the horizontal pressure building up during penetration of the probe, and varies with the type of soil and the degree of over consolidation. The boundary between soil types is expressed by a modification in the sleeve friction/point resistance relation.

Clays are primarily identified by the dynamic pore pressure readings (u, in MPa, measured through a sintered pewter filter) which also give an indication of the undrained shear strength. The permeability of soils can be estimated by the dissipation time of the dynamic pore pressure. Extra available channels are temperature, electric conductivity and seismic.

The readings from the channels are corrected for temperature drift by a temperature sensor and a processor in the electronic part of the probe. The probes have therefore very low temperature sensitivity.

The Nova probe is also equipped with a tilt sensor (option for Classic probe). During penetration, the deviation from the vertical of the probe can be monitored and the probe automatically stopped at a pre-set maximum tilt increment or point resistance with the programmable automatic electronic card.

**TECHNICAL SPECIFICATIONS**

| | Nova | Classic |
|---|---|---|
| **Point resistance (qc)** | 20, 50, 100 MPa | 10, 50, 100 MPa |
| -Accuracy | < 0.2% FS | < 0.4% FS |
| -Resolution | < 0.0025% FS | < 0.08% FS |
| -Net area factor, cone | 0,82 | 0,58 |
| **Sleeve friction (fs)** | 0.5 and 1 MPa | 0.5 MPa |
| -Accuracy | < 0.2% FS | < 0.4% FS |
| -Resolution | < 0.0025% FS | < 0.08% FS |
| -Net area factor, sleeve friction | 0.0 | 0.014 |
| **Dynamic por pressure (u)** | 1, 1.5 and 5 MPa | 2.5 MPa |
| -Accuracy | < 0.4% FS | < 0.5% FS |
| -Resolution | < 0.0025% FS | < 0.08% FS |
| **Tilt sensor** | 0-40 deg. | 0-40 deg. |
| **Weigth** | ~ 1.25 kg | ~ 2,1 kg |
| **Length** | 230 mm | 470 mm |

www.geotech.se
INGENJÖRSFIRMAN GEOTECH AB

E-mail: sales@geotech.se
Tel: +46 (0)31 28 99 20
Fax: +46 (0)31 68 16 39

Datavägen 53
436 32 Askim (Göteborg)
SWEDEN

Geotech reserves the right to make any changes in the specifications of its products without prior notice.

# Appendix E2

# Vibrating Wire Piezometer Specifications

innovation in geotechnical instrumentation

RST Instruments Ltd., 11545 Kingston St., Maple Ridge, British Columbia, Canada V2X 0Z5
Tel: 604 540 1100 • Fax: 604 540 1005 • Toll Free: 1 800 665 5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

# Calibration Record

Downhole in CH-P-13-03 Deep @ 50m

## Vibrating Wire Piezometer

| | | | |
|---|---|---|---|
| **Customer:** | AMEC Environment & Infrastructure - Edmonton | | |
| **Model:** | | VW2100-0.7 | |
| **Serial Number:** | | **VW26484** | |
| **Mfg Number:** | | 1317112 | |
| **Range:** | | 700.0 | kPa |
| **Temperature:** | | 23.2 | °C |
| **Barometric Pressure:** | | 1000.6 | millibars |
| **Work Order Number:** | | 202043 | |
| **Cable Length:** | | 53 | meters |
| **Cable Markings:** | | 199963 m - 200014 m | |
| **Cable Colour Code:** | Red / Black (Coil) | Green / White | (Thermistor) |
| **Cable Type:** | | EL380004 | |
| **Thermistor Type:** | | 3 | kΩ |

| Applied Pressure (kPa) | First Reading ( B units ) | Second Reading ( B units ) | Average Reading ( B units ) | Calculated Linear (kPa) | Linearity Error ( % FS ) | Polynomial Error ( % FS ) |
|---|---|---|---|---|---|---|
| 0.0 | 8861 | 8862 | 8862 | 1.4 | 0.20 | 0.01 |
| 140.0 | 8111 | 8111 | 8111 | 139.7 | -0.05 | -0.01 |
| 280.0 | 7356 | 7356 | 7356 | 278.8 | -0.18 | -0.03 |
| 419.9 | 6595 | 6595 | 6595 | 419.0 | -0.14 | 0.02 |
| 559.9 | 5830 | 5831 | 5831 | 559.8 | -0.01 | 0.03 |
| 700.0 | 5063 | 5063 | 5063 | 701.2 | 0.17 | -0.02 |
| | | | **Max. Error (%):** | | 0.20 | 0.03 |

| | | | |
|---|---|---|---|
| **Linear Calibration Factor:** | **C.F.=** | **0.18423** | **kPa/B unit** |
| **Regression Zero:** | **At Calibration =** | **8869.1** | **B unit** |
| **Temperature Correction Factor:** | **Tk =** | **0.01149** | **kPa/°C rise** |

**Polynomial Gage Factors (kPa)** **A:** -6.8518E-07 **B:** -0.17469 **C:** 1601.9

Pressure is calculated with the following equations:

Linear: $P(kPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.10(Bi-Bc)]$

Polynomial: $P(kPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.10(Bc-Bi)]$

| | Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
|---|---|---|---|---|
| **Shipped Zero Readings:** | 16-Sep-13 | 8858 | 22.5 | 1010.2 |

Li, Lc = initial ( at installation) and current readings
Ti, Tc = initial ( at installation) and current temperature, in °C
Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = $Hz^2$ / 1000 ie: 1700Hz = 2890 B units

Technician: S. Kim SK Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia
22724
AL CULLEY
AScT

Document Number.: ELL0130K

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MIG0106B

innovation in geotechnical instrumentation

RST Instruments Ltd., 11545 Kingston St., Maple Ridge, British Columbia, Canada V2X 0Z5
Tel: 604 540 1100 • Fax: 604 540 1005 • Toll Free: 1 800 665 5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

# Calibration Record

Downhole in CH-P-13-04 Deep @ 35m bg.

## Vibrating Wire Piezometer

| | | | |
|---|---|---|---|
| **Customer:** | AMEC Environment & Infrastructure - Burnaby | | |
| **Model:** | VW2100-0.7 | | |
| **Serial Number:** | **VW26289** | | |
| **Mfg Number:** | 1316758 | | |
| **Range:** | 700.0 | kPa | |
| **Temperature:** | 23.2 | °C | |
| **Barometric Pressure:** | 989.4 | millibars | |
| **Work Order Number:** | 202025 | | |
| **Cable Length:** | 40 | meters | |
| **Cable Markings:** | 198978 m - 199017 m | | |
| **Cable Colour Code:** | Red / Black (Coil) | Green / White | (Thermistor) |
| **Cable Type:** | EL380004 | | |
| **Thermistor Type:** | 3 | kΩ | |

| Applied Pressure (kPa) | First Reading ( B units ) | Second Reading ( B units ) | Average Reading ( B units ) | Calculated Linear (kPa) | Linearity Error ( % FS ) | Polynomial Error ( % FS ) |
|---|---|---|---|---|---|---|
| 0.0 | 9098 | 9099 | 9099 | 0.9 | 0.13 | 0.02 |
| 140.0 | 8324 | 8325 | 8325 | 139.7 | -0.04 | -0.02 |
| 280.0 | 7547 | 7547 | 7547 | 279.2 | -0.11 | -0.03 |
| 419.9 | 6765 | 6765 | 6765 | 419.5 | -0.06 | 0.03 |
| 560.0 | 5982 | 5982 | 5982 | 559.9 | -0.01 | 0.01 |
| 700.1 | 5197 | 5197 | 5197 | 700.8 | 0.09 | -0.01 |
| | | | | **Max. Error (%):** | 0.13 | 0.03 |

| | | | |
|---|---|---|---|
| **Linear Calibration Factor:** | **C.F.=** | **0.17939** | **kPa/B unit** |
| **Regression Zero:** | **At Calibration =** | **9103.4** | **B unit** |
| **Temperature Correction Factor:** | **Tk =** | **-0.05913** | **kPa/°C rise** |

**Polynomial Gage Factors (kPa)** **A:** -3.7843E-07 **B:** -0.17398 **C:** 1614.4

Pressure is calculated with the following equations:
Linear: $P(kPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.10(Bi-Bc)]$
Polynomial: $P(kPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.10(Bc-Bi)]$

| | Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
|---|---|---|---|---|
| **Shipped Zero Readings:** | 9-Sep-13 | 9087 | 23.5 | 1018.0 |

Li, Lc = initial ( at installation) and current readings
Ti, Tc = initial ( at installation) and current temperature, in °C
Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = $Hz^2 / 1000$ ie: 1700Hz = 2890 B units

Technician: W. Mok WM Date: 9-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

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# Calibration Record

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## Vibrating Wire Piezometer

| | | | |
|---|---|---|---|
| **Customer:** | AMEC Environment & Infrastructure - Edmonton | | |
| **Model:** | VW2100-0.7 | | |
| **Serial Number:** | **VW26487** | | |
| **Mfg Number:** | 1317115 | | |
| **Range:** | 700.0 kPa | | |
| **Temperature:** | 23.2 °C | | |
| **Barometric Pressure:** | 1000.6 millibars | | |
| **Work Order Number:** | 202043 | | |
| **Cable Length:** | 53 meters | | |
| **Cable Markings:** | 200069 m - 200121 m | | |
| **Cable Colour Code:** | Red / Black (Coil) | Green / White | (Thermistor) |
| **Cable Type:** | EL380004 | | |
| **Thermistor Type:** | 3 kΩ | | |

| Applied Pressure (kPa) | First Reading ( B units ) | Second Reading ( B units ) | Average Reading ( B units ) | Calculated Linear (kPa) | Linearity Error ( % FS ) | Polynomial Error ( % FS ) |
|---|---|---|---|---|---|---|
| 0.0 | 8908 | 8909 | 8909 | 1.5 | 0.22 | 0.02 |
| 140.0 | 8140 | 8141 | 8141 | 139.6 | -0.06 | -0.02 |
| 280.0 | 7367 | 7367 | 7367 | 278.6 | -0.20 | -0.03 |
| 419.9 | 6585 | 6586 | 6586 | 419.1 | -0.12 | 0.05 |
| 559.9 | 5804 | 5804 | 5804 | 559.6 | -0.05 | -0.01 |
| 700.0 | 5015 | 5015 | 5015 | 701.4 | 0.20 | -0.01 |
| | | | | **Max. Error (%):** | 0.22 | 0.05 |

| | | |
|---|---|---|
| **Linear Calibration Factor:** | **C.F.=** | **0.17974 kPa/B unit** |
| **Regression Zero:** | **At Calibration =** | **8917.1 B unit** |
| **Temperature Correction Factor:** | **Tk =** | **0.1168 kPa/°C rise** |

**Polynomial Gage Factors (kPa)** **A:** -7.1003E-07 **B:** -0.16986 **C:** 1569.6

Pressure is calculated with the following equations:

Linear: $P(kPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.10(Bi-Bc)]$

Polynomial: $P(kPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.10(Bc-Bi)]$

| | Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
|---|---|---|---|---|
| **Shipped Zero Readings:** | 16-Sep-13 | 8909 | 22.5 | 1010.2 |

Li, Lc = initial ( at installation) and current readings
Ti, Tc = initial ( at installation) and current temperature, in °C
Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = $Hz^2 / 1000$ ie: 1700Hz = 2890 B units

Technician: S. Kim S K Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

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# Calibration Record

BH ID# = CH-P-13-06
23 m

## Vibrating Wire Piezometer

| | | | |
|---|---|---|---|
| **Customer:** | AMEC Environment & Infrastructure - Edmonton | | |
| **Model:** | VW2100-0.35 | | |
| **Serial Number:** | **VW26479** | | |
| **Mfg Number:** | 1322237 | | |
| **Range:** | 350.0 | kPa | |
| **Temperature:** | 23.0 | °C | |
| **Barometric Pressure:** | 1000.0 | millibars | |
| **Work Order Number:** | 202043 | | |
| **Cable Length:** | 23 | meters | |
| **Cable Markings:** | 200351 m - 200373 m | | |
| **Cable Colour Code:** | Red / Black (Coil) | Green / White | (Thermistor) |
| **Cable Type:** | EL380004 | | |
| **Thermistor Type:** | 3 | kΩ | |

| Applied Pressure (kPa) | First Reading ( B units ) | Second Reading ( B units ) | Average Reading ( B units ) | Calculated Linear (kPa) | Linearity Error ( % FS ) | Polynomial Error ( % FS ) |
|---|---|---|---|---|---|---|
| 0.0 | 8822 | 8822 | 8822 | 0.5 | 0.14 | 0.04 |
| 70.0 | 8243 | 8243 | 8243 | 69.7 | -0.07 | -0.05 |
| 140.0 | 7659 | 7659 | 7659 | 139.6 | -0.12 | -0.03 |
| 210.0 | 7071 | 7071 | 7071 | 209.9 | -0.03 | 0.06 |
| 280.0 | 6485 | 6485 | 6485 | 280.0 | -0.01 | 0.02 |
| 350.0 | 5897 | 5897 | 5897 | 350.3 | 0.08 | -0.02 |
| | | | **Max. Error (%):** | | 0.14 | 0.06 |

| | | |
|---|---|---|
| **Linear Calibration Factor:** | **C.F.=** | **0.11959 kPa/B unit** |
| **Regression Zero:** | **At Calibration =** | **8826.2 B unit** |
| **Temperature Correction Factor:** | **Tk =** | **-0.04268 kPa/°C rise** |

**Polynomial Gage Factors (kPa)** **A:** -3.3021E-07 **B:** -0.11473 **C:** 1037.9

Pressure is calculated with the following equations:
Linear: $P(kPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.10(Bi-Bc)]$
Polynomial: $P(kPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.10(Bc-Bi)]$

| | Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
|---|---|---|---|---|
| **Shipped Zero Readings:** | 16-Sep-13 | 8820 | 22.2 | 1010.2 |

Li, Lc = initial ( at installation) and current readings
Ti, Tc = initial ( at installation) and current temperature, in °C
Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = $Hz^2$ / 1000 ie: 1700Hz = 2890 B units

Technician: S. Kim SK Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

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# Calibration Record

CH-P-13-06

33m

## Vibrating Wire Piezometer

| | | | |
|---|---|---|---|
| **Customer:** | AMEC Environment & Infrastructure - Edmonton | | |
| **Model:** | VW2100-0.35 | | |
| **Serial Number:** | **VW26481** ✓ | | |
| **Mfg Number:** | 1322239 | | |
| **Range:** | 350.0 | kPa | |
| **Temperature:** | 23.0 | °C | |
| **Barometric Pressure:** | 1000.0 | millibars | |
| **Work Order Number:** | 202043 | | |
| **Cable Length:** | 33 | meters | |
| **Cable Markings:** | 200261 m - 200293 m | | |
| **Cable Colour Code:** | Red / Black (Coil) | Green / White | (Thermistor) |
| **Cable Type:** | EL380004 | | |
| **Thermistor Type:** | 3 | kΩ | |

| Applied Pressure (kPa) | First Reading ( B units ) | Second Reading ( B units ) | Average Reading ( B units ) | Calculated Linear (kPa) | Linearity Error ( % FS ) | Polynomial Error ( % FS ) |
|---|---|---|---|---|---|---|
| 0.0 | 8809 | 8809 | 8809 | 0.3 | 0.07 | 0.01 |
| 70.0 | 8203 | 8203 | 8203 | 69.8 | -0.05 | -0.04 |
| 140.0 | 7592 | 7592 | 7592 | 140.0 | -0.01 | 0.04 |
| 210.0 | 6983 | 6984 | 6984 | 209.8 | -0.05 | 0.00 |
| 280.0 | 6373 | 6373 | 6373 | 279.9 | -0.03 | -0.01 |
| 350.0 | 5760 | 5761 | 5761 | 350.2 | 0.06 | 0.01 |
| | | | **Max. Error (%):** | | 0.07 | 0.04 |

| | | |
|---|---|---|
| **Linear Calibration Factor:** | **C.F.=** | **0.11480 kPa/B unit** |
| **Regression Zero:** | **At Calibration =** | **8811.2 B unit** |
| **Temperature Correction Factor:** | **Tk =** | **-0.01181 kPa/°C rise** |

**Polynomial Gage Factors (kPa)** **A:** -1.6810E-07 **B:** -0.11235 **C:** 1002.8

Pressure is calculated with the following equations:

Linear: $P(kPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.10(Bi-Bc)]$

Polynomial: $P(kPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.10(Bc-Bi)]$

| | Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
|---|---|---|---|---|
| **Shipped Zero Readings:** | 16-Sep-13 | 8806 | 22.5 | 1010.2 |

Li, Lc = initial ( at installation) and current readings
Ti, Tc = initial ( at installation) and current temperature, in °C
Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = $Hz^2$ / 1000 ie: 1700Hz = 2890 B units

Technician: S. Kim SK Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

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# Calibration Record

CH-P-13-06
43m

## Vibrating Wire Piezometer

| | | | |
|---|---|---|---|
| **Customer:** | AMEC Environment & Infrastructure - Edmonton | | |
| **Model:** | VW2100-0.7 | | |
| **Serial Number:** | **VW26483** | | |
| **Mfg Number:** | 1316774 | | |
| **Range:** | 700.0 | kPa | |
| **Temperature:** | 23.2 | °C | |
| **Barometric Pressure:** | 989.4 | millibars | |
| **Work Order Number:** | 202043 | | |
| **Cable Length:** | 43 | meters | |
| **Cable Markings:** | 200175 m - 200217 m | | |
| **Cable Colour Code:** | Red / Black (Coil) | Green / White | (Thermistor) |
| **Cable Type:** | EL380004 | | |
| **Thermistor Type:** | 3 | kΩ | |

| Applied Pressure (kPa) | First Reading ( B units ) | Second Reading ( B units ) | Average Reading ( B units ) | Calculated Linear (kPa) | Linearity Error ( % FS ) | Polynomial Error ( % FS ) |
|---|---|---|---|---|---|---|
| 0.0 | 8981 | 8982 | 8982 | -0.1 | -0.01 | 0.02 |
| 140.0 | 8215 | 8216 | 8216 | 139.9 | -0.01 | -0.02 |
| 280.0 | 7449 | 7449 | 7449 | 280.0 | 0.00 | -0.02 |
| 419.9 | 6682 | 6682 | 6682 | 420.2 | 0.04 | 0.02 |
| 560.0 | 5915 | 5916 | 5916 | 560.2 | 0.03 | 0.03 |
| 700.1 | 5152 | 5152 | 5152 | 699.8 | -0.05 | -0.02 |
| | | | **Max. Error (%):** | | 0.05 | 0.03 |

| | | | |
|---|---|---|---|
| **Linear Calibration Factor:** | **C.F.=** | **0.18275** | **kPa/B unit** |
| **Regression Zero:** | **At Calibration =** | **8981.1** | **B unit** |
| **Temperature Correction Factor:** | **Tk =** | **-0.04979** | **kPa/°C rise** |

**Polynomial Gage Factors (kPa)** **A:** 9.6856E-08 **B:** -0.18412 **C:** 1646.0

Pressure is calculated with the following equations:
Linear: $P(kPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.10(Bi-Bc)]$
Polynomial: $P(kPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.10(Bc-Bi)]$

| | Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
|---|---|---|---|---|
| **Shipped Zero Readings:** | 16-Sep-13 | 8978 | 22.7 | 1010.2 |

Li, Lc = initial ( at installation) and current readings
Ti, Tc = initial ( at installation) and current temperature, in °C
Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = $Hz^2 / 1000$ ie: 1700Hz = 2890 B units

Technician: S. Kim SK Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

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## Vibrating Wire Piezometer

CH-P-13-06

53m

| | | | |
|---|---|---|---|
| **Customer:** | AMEC Environment & Infrastructure - Edmonton | | |
| **Model:** | VW2100-0.7 | | |
| **Serial Number:** | **VW26485** | | |
| **Mfg Number:** | 1317113 | | |
| **Range:** | 700.0 kPa | | |
| **Temperature:** | 23.2 °C | | |
| **Barometric Pressure:** | 1000.6 millibars | | |
| **Work Order Number:** | 202043 | | |
| **Cable Length:** | 53 meters | | |
| **Cable Markings:** | 199910 m - 199961 m | | |
| **Cable Colour Code:** | Red / Black (Coil) | Green / White | (Thermistor) |
| **Cable Type:** | EL380004 | | |
| **Thermistor Type:** | 3 kΩ | | |

| Applied Pressure (kPa) | First Reading ( B units ) | Second Reading ( B units ) | Average Reading ( B units ) | Calculated Linear (kPa) | Linearity Error ( % FS ) | Polynomial Error ( % FS ) |
|---|---|---|---|---|---|---|
| 0.0 | 8723 | 8724 | 8724 | 1.2 | 0.18 | 0.00 |
| 140.0 | 7992 | 7992 | 7992 | 139.8 | -0.03 | 0.00 |
| 280.0 | 7257 | 7257 | 7257 | 279.0 | -0.15 | 0.00 |
| 419.9 | 6518 | 6518 | 6518 | 418.9 | -0.14 | 0.00 |
| 559.9 | 5775 | 5775 | 5775 | 559.6 | -0.04 | 0.00 |
| 700.0 | 5027 | 5027 | 5027 | 701.3 | 0.18 | 0.00 |
| | | | **Max. Error (%):** | | 0.18 | 0.00 |

| | | |
|---|---|---|
| **Linear Calibration Factor:** | **C.F.=** | **0.18937 kPa/B unit** |
| **Regression Zero:** | **At Calibration =** | **8730.1 B unit** |
| **Temperature Correction Factor:** | **Tk =** | **0.01399 kPa/°C rise** |

**Polynomial Gage Factors (kPa)** **A:** -6.9206E-07 **B:** -0.17986 **C:** 1621.6

Pressure is calculated with the following equations:
Linear: $P(kPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.10(Bi-Bc)]$
Polynomial: $P(kPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.10(Bc-Bi)]$

| | Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
|---|---|---|---|---|
| **Shipped Zero Readings:** | 16-Sep-13 | 8722 | 22.5 | 1010.2 |

Li, Lc = initial ( at installation) and current readings
Ti, Tc = initial ( at installation) and current temperature, in °C
Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = $Hz^2$ / 1000 ie: 1700Hz = 2890 B units

Technician: S. Kim SK Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

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# Calibration Record

CH-P-13-06
63m

## Vibrating Wire Piezometer

| | | | |
|---|---|---|---|
| **Customer:** | AMEC Environment & Infrastructure - Edmonton | | |
| **Model:** | VW2100-0.7 | | |
| **Serial Number:** | **VW26489** ✓ | | |
| **Mfg Number:** | 1317117 | | |
| **Range:** | 700.0 kPa | | |
| **Temperature:** | 23.2 °C | | |
| **Barometric Pressure:** | 1000.6 millibars | | |
| **Work Order Number:** | 202043 | | |
| **Cable Length:** | 63 meters | | |
| **Cable Markings:** | 199846 m - 199908 m | | |
| **Cable Colour Code:** | Red / Black (Coil) | Green / White | (Thermistor) |
| **Cable Type:** | EL380004 | | |
| **Thermistor Type:** | 3 kΩ | | |

| Applied Pressure (kPa) | First Reading ( B units ) | Second Reading ( B units ) | Average Reading ( B units ) | Calculated Linear (kPa) | Linearity Error ( % FS ) | Polynomial Error ( % FS ) |
|---|---|---|---|---|---|---|
| 0.0 | 8866 | 8867 | 8867 | 1.5 | 0.21 | 0.02 |
| 140.0 | 8102 | 8103 | 8103 | 139.6 | -0.06 | -0.02 |
| 280.0 | 7333 | 7333 | 7333 | 278.7 | -0.18 | -0.02 |
| 419.9 | 6557 | 6558 | 6558 | 418.9 | -0.14 | 0.02 |
| 559.9 | 5778 | 5779 | 5779 | 559.8 | -0.02 | 0.02 |
| 700.0 | 4996 | 4996 | 4996 | 701.2 | 0.18 | -0.02 |
| | | | **Max. Error (%):** | | 0.21 | 0.02 |

| | | |
|---|---|---|
| **Linear Calibration Factor:** | **C.F.=** | **0.18079 kPa/B unit** |
| **Regression Zero:** | **At Calibration =** | **8874.7 B unit** |
| **Temperature Correction Factor:** | **Tk =** | **0.006013 kPa/°C rise** |

**Polynomial Gage Factors (kPa)** **A:** -6.8767E-07 **B:** -0.17126 **C:** 1572.7

Pressure is calculated with the following equations:
Linear: $P(kPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.10(Bi-Bc)]$
Polynomial: $P(kPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.10(Bc-Bi)]$

| | Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
|---|---|---|---|---|
| **Shipped Zero Readings:** | 16-Sep-13 | 8866 | 22.6 | 1010.2 |

Li, Lc = initial ( at installation) and current readings
Ti, Tc = initial ( at installation) and current temperature, in °C
Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = $Hz^2$ / 1000 ie: 1700Hz = 2890 B units

Technician: S. Kim SK Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

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# Calibration Record

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## Vibrating Wire Piezometer

CH-P-13-02

13m

| | | |
|---|---|---|
| **Customer:** | AMEC Environment & Infrastructure - Edmonton | |
| **Model:** | VW2100-0.35 | |
| **Serial Number:** | **VW26477** ✓ | |
| **Mfg Number:** | 1322235 | |
| **Range:** | 350.0 | kPa |
| **Temperature:** | 23.0 | °C |
| **Barometric Pressure:** | 1000.0 | millibars |
| **Work Order Number:** | 202043 | |
| **Cable Length:** | 13 | meters |
| **Cable Markings:** | 200374 m - 200386 m | |
| **Cable Colour Code:** | Red / Black (Coil) | Green / White (Thermistor) |
| **Cable Type:** | EL380004 | |
| **Thermistor Type:** | 3 | kΩ |

| Applied Pressure (kPa) | First Reading ( B units ) | Second Reading ( B units ) | Average Reading ( B units ) | Calculated Linear (kPa) | Linearity Error ( % FS ) | Polynomial Error ( % FS ) |
|---|---|---|---|---|---|---|
| 0.0 | 8838 | 8839 | 8839 | 0.2 | 0.05 | 0.00 |
| 70.0 | 8245 | 8245 | 8245 | 70.0 | -0.01 | 0.00 |
| 140.0 | 7650 | 7651 | 7651 | 139.9 | -0.03 | 0.01 |
| 210.0 | 7056 | 7056 | 7056 | 209.8 | -0.06 | -0.01 |
| 280.0 | 6459 | 6460 | 6460 | 279.9 | -0.02 | 0.00 |
| 350.0 | 5862 | 5862 | 5862 | 350.2 | 0.06 | 0.00 |
| | | | | **Max. Error (%):** | 0.06 | 0.01 |

| | | |
|---|---|---|
| **Linear Calibration Factor:** | **C.F.=** | **0.11760 kPa/B unit** |
| **Regression Zero:** | **At Calibration =** | **8840.0 B unit** |
| **Temperature Correction Factor:** | **Tk =** | **-0.07083 kPa/°C rise** |

**Polynomial Gage Factors (kPa)** **A:** -1.6595E-07 **B:** -0.11516 **C:** 1030.8

Pressure is calculated with the following equations:

Linear: $P(kPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.10(Bi-Bc)]$

Polynomial: $P(kPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.10(Bc-Bi)]$

| | Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
|---|---|---|---|---|
| **Shipped Zero Readings:** | 16-Sep-13 | 8837 | 22.9 | 1010.2 |

Li, Lc = initial ( at installation) and current readings
Ti, Tc = initial ( at installation) and current temperature, in °C
Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = $Hz^2$ / 1000 ie: 1700Hz = 2890 B units

Technician: S. Kim SK Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

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# Calibration Record

## Vibrating Wire Piezometer

CH-P-13-02

23m

| | | |
|---|---|---|
| **Customer:** | AMEC Environment & Infrastructure - Edmonton | |
| **Model:** | VW2100-0.35 | |
| **Serial Number:** | **VW26478** | ✓ |
| **Mfg Number:** | 1322236 | |
| **Range:** | 350.0 | kPa |
| **Temperature:** | 23.0 | °C |
| **Barometric Pressure:** | 1000.0 | millibars |
| **Work Order Number:** | 202043 | |
| **Cable Length:** | 23 | meters |
| **Cable Markings:** | 200328 m - 200349 m | |
| **Cable Colour Code:** | Red / Black (Coil) | Green / White (Thermistor) |
| **Cable Type:** | EL380004 | |
| **Thermistor Type:** | 3 | kΩ |

| Applied Pressure (kPa) | First Reading ( B units ) | Second Reading ( B units ) | Average Reading ( B units ) | Calculated Linear (kPa) | Linearity Error ( % FS ) | Polynomial Error ( % FS ) |
|---|---|---|---|---|---|---|
| 0.0 | 8863 | 8864 | 8864 | 0.2 | 0.05 | 0.03 |
| 70.0 | 8315 | 8315 | 8315 | 69.7 | -0.09 | -0.09 |
| 140.0 | 7758 | 7758 | 7758 | 140.2 | 0.07 | 0.09 |
| 210.0 | 7208 | 7208 | 7208 | 209.9 | -0.03 | -0.01 |
| 280.0 | 6655 | 6656 | 6656 | 279.9 | -0.03 | -0.03 |
| 350.0 | 6101 | 6101 | 6101 | 350.1 | 0.04 | 0.01 |
| | | | **Max. Error (%):** | | 0.09 | 0.09 |

| | | |
|---|---|---|
| **Linear Calibration Factor:** | **C.F.=** | **0.12667 kPa/B unit** |
| **Regression Zero:** | **At Calibration =** | **8865.0 B unit** |
| **Temperature Correction Factor:** | **Tk =** | **-0.05049 kPa/°C rise** |

**Polynomial Gage Factors (kPa)** **A:** -8.8394E-08 **B:** -0.12535 **C:** 1118.1

Pressure is calculated with the following equations:

Linear: $P(kPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.10(Bi-Bc)]$

Polynomial: $P(kPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.10(Bc-Bi)]$

| | Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
|---|---|---|---|---|
| **Shipped Zero Readings:** | 16-Sep-13 | 8859 | 22.3 | 1010.2 |

Li, Lc = initial ( at installation) and current readings
Ti, Tc = initial ( at installation) and current temperature, in °C
Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = $Hz^2$ / 1000 ie: 1700Hz = 2890 B units

Technician: S. Kim S K

Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

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# Calibration Record

## Vibrating Wire Piezometer

CH-P-13-02

33m

| | | | |
|---|---|---|---|
| **Customer:** | AMEC Environment & Infrastructure - Edmonton | | |
| **Model:** | VW2100-0.35 | | |
| **Serial Number:** | **VW26480** ✓ | | |
| **Mfg Number:** | 1322238 | | |
| **Range:** | 350.0 kPa | | |
| **Temperature:** | 23.0 °C | | |
| **Barometric Pressure:** | 1000.0 millibars | | |
| **Work Order Number:** | 202043 | | |
| **Cable Length:** | 33 meters | | |
| **Cable Markings:** | 200295 m - 200326 m | | |
| **Cable Colour Code:** | Red / Black (Coil) | Green / White (Thermistor) | |
| **Cable Type:** | EL380004 | | |
| **Thermistor Type:** | 3 kΩ | | |

| Applied Pressure (kPa) | First Reading ( B units ) | Second Reading ( B units ) | Average Reading ( B units ) | Calculated Linear (kPa) | Linearity Error ( % FS ) | Polynomial Error ( % FS ) |
|---|---|---|---|---|---|---|
| 0.0 | 8945 | 8945 | 8945 | 0.1 | 0.03 | 0.00 |
| 70.0 | 8357 | 8357 | 8357 | 70.0 | -0.01 | 0.00 |
| 140.0 | 7767 | 7768 | 7768 | 140.0 | 0.00 | 0.03 |
| 210.0 | 7179 | 7180 | 7180 | 209.8 | -0.04 | -0.02 |
| 280.0 | 6589 | 6590 | 6590 | 279.9 | -0.02 | -0.01 |
| 350.0 | 5998 | 5999 | 5999 | 350.1 | 0.04 | 0.01 |
| | | | **Max. Error (%):** | | 0.04 | 0.03 |

| | | |
|---|---|---|
| **Linear Calibration Factor:** | **C.F.=** | **0.11880 kPa/B unit** |
| **Regression Zero:** | **At Calibration =** | **8945.9 B unit** |
| **Temperature Correction Factor:** | **Tk =** | **0.01720 kPa/°C rise** |

**Polynomial Gage Factors (kPa)** **A:** -1.0388E-07 **B:** -0.11725 **C:** 1057.1

Pressure is calculated with the following equations:

Linear: $P(kPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.10(Bi-Bc)]$

Polynomial: $P(kPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.10(Bc-Bi)]$

| | Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
|---|---|---|---|---|
| **Shipped Zero Readings:** | 16-Sep-13 | 8944 | 22.5 | 1010.2 |

Li, Lc = initial ( at installation) and current readings
Ti, Tc = initial ( at installation) and current temperature, in °C
Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = $Hz^2$ / 1000 ie: 1700Hz = 2890 B units

Technician: S. Kim SK Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

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# Calibration Record

## Vibrating Wire Piezometer

CH-P-13-02
43m

| | | | |
|---|---|---|---|
| **Customer:** | AMEC Environment & Infrastructure - Edmonton | | |
| **Model:** | | VW2100-0.7 | |
| **Serial Number:** | | **VW26482** ✓ | |
| **Mfg Number:** | | 1316773 | |
| **Range:** | | 700.0 | kPa |
| **Temperature:** | | 23.2 | °C |
| **Barometric Pressure:** | | 989.4 | millibars |
| **Work Order Number:** | | 202043 | |
| **Cable Length:** | | 43 | meters |
| **Cable Markings:** | | 200218 m - 200260 m | |
| **Cable Colour Code:** | Red / Black (Coil) | Green / White | (Thermistor) |
| **Cable Type:** | | EL380004 | |
| **Thermistor Type:** | | 3 | kΩ |

| Applied Pressure (kPa) | First Reading ( B units ) | Second Reading ( B units ) | Average Reading ( B units ) | Calculated Linear (kPa) | Linearity Error ( % FS ) | Polynomial Error ( % FS ) |
|---|---|---|---|---|---|---|
| 0.0 | 8952 | 8953 | 8953 | 1.2 | 0.18 | 0.00 |
| 140.0 | 8166 | 8166 | 8166 | 139.7 | -0.04 | -0.01 |
| 280.0 | 7374 | 7375 | 7375 | 279.1 | -0.13 | 0.01 |
| 419.9 | 6580 | 6580 | 6580 | 418.9 | -0.14 | 0.00 |
| 560.0 | 5780 | 5781 | 5781 | 559.7 | -0.04 | -0.01 |
| 700.1 | 4976 | 4976 | 4976 | 701.3 | 0.18 | 0.00 |
| | | | **Max. Error (%):** | | 0.18 | 0.01 |

| | | |
|---|---|---|
| **Linear Calibration Factor:** | **C.F.=** | **0.17606 kPa/B unit** |
| **Regression Zero:** | **At Calibration =** | **8959.5 B unit** |
| **Temperature Correction Factor:** | **Tk =** | **-0.07356 kPa/°C rise** |

**Polynomial Gage Factors (kPa)** **A:** -5.8096E-07 **B:** -0.16797 **C:** 1550.3

Pressure is calculated with the following equations:
Linear: $P(kPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.10(Bi-Bc)]$
Polynomial: $P(kPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.10(Bc-Bi)]$

| | Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
|---|---|---|---|---|
| **Shipped Zero Readings:** | 16-Sep-13 | 8947 | 22.5 | 1010.2 |

Li, Lc = initial ( at installation) and current readings
Ti, Tc = initial ( at installation) and current temperature, in °C
Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = $Hz^2 / 1000$ ie: 1700Hz = 2890 B units

Technician: S. Kim SK Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

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# Calibration Record

CH-P-13-02
53m.

## Vibrating Wire Piezometer

| | | |
|---|---|---|
| **Customer:** | AMEC Environment & Infrastructure - Edmonton | |
| **Model:** | VW2100-0.7 | |
| **Serial Number:** | **VW26486** | |
| **Mfg Number:** | 1317114 | |
| **Range:** | 700.0 | kPa |
| **Temperature:** | 23.2 | °C |
| **Barometric Pressure:** | 1000.6 | millibars |
| **Work Order Number:** | 202043 | |
| **Cable Length:** | 53 | meters |
| **Cable Markings:** | 200122 m - 200174 m | |
| **Cable Colour Code:** | Red / Black (Coil) | Green / White (Thermistor) |
| **Cable Type:** | EL380004 | |
| **Thermistor Type:** | 3 | kΩ |

| Applied Pressure (kPa) | First Reading ( B units ) | Second Reading ( B units ) | Average Reading ( B units ) | Calculated Linear (kPa) | Linearity Error ( % FS ) | Polynomial Error ( % FS ) |
|---|---|---|---|---|---|---|
| 0.0 | 8932 | 8933 | 8933 | 1.4 | 0.20 | 0.01 |
| 140.0 | 8176 | 8176 | 8176 | 139.7 | -0.05 | -0.01 |
| 280.0 | 7415 | 7415 | 7415 | 278.7 | -0.18 | -0.02 |
| 419.9 | 6647 | 6648 | 6648 | 419.0 | -0.13 | 0.03 |
| 559.9 | 5878 | 5878 | 5878 | 559.6 | -0.04 | 0.00 |
| 700.0 | 5102 | 5103 | 5103 | 701.3 | 0.19 | -0.01 |
| | | | **Max. Error (%):** | | 0.20 | 0.03 |

| | | |
|---|---|---|
| **Linear Calibration Factor:** | **C.F.=** | **0.18274 kPa/B unit** |
| **Regression Zero:** | **At Calibration =** | **8940.3 B unit** |
| **Temperature Correction Factor:** | **Tk =** | **-0.02849 kPa/°C rise** |

**Polynomial Gage Factors (kPa)** **A:** -7.0193E-07 **B:** -0.17289 **C:** 1600.4

Pressure is calculated with the following equations:
Linear: $P(kPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.10(Bi-Bc)]$
Polynomial: $P(kPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.10(Bc-Bi)]$

| | Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
|---|---|---|---|---|
| **Shipped Zero Readings:** | 16-Sep-13 | 8932 | 22.5 | 1010.2 |

Li, Lc = initial ( at installation) and current readings
Ti, Tc = initial ( at installation) and current temperature, in °C
Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = $Hz^2$ / 1000 ie: 1700Hz = 2890 B units

Technician: S. Kim SK Date: 16-Sep-13

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# Vibrating Wire Piezometers

The RST Vibrating Wire Piezometer provides excellent long-term accuracy, stability of readings and reliability under demanding geotechnical conditions. Vibrating Wire Piezometers are the electrical piezometers of choice as the frequency output of VW devices is immune to external electrical noise, and able to tolerate wet wiring common in geotechnical applications.

## operating principle

Vibrating Wire Piezometers contain a high tensile steel wire with a fixed anchor at one end and are attached to a diaphragm in contact with water pressure at the other end. The wire is electrically plucked, with the resonant frequency of vibration proportional to the tension in the wire. This frequency induces an alternating current in a coil which is detected by the readout unit, such as the VW2106 Vibrating Wire Readout, and can then be converted to a pressure. The frequency output is immune to external electrical noise, and able to tolerate wet wiring common in geotechnical applications. Highly reliable lightning protection is incorporated in the vibrating wire transducer.

The frequency signal is exceptionally immune from cable effects, including length (to several kilometers), splicing, resistance, noise pickup, and moisture. The vibrating wire coil circuit contains no semiconductor devices and has built-in ionized gas discharge device protection against transient damage. As a result, the vibrating wire piezometer provides excellent reliability in typical geotechnical situations – i.e. long outdoor cables buried in saturated soil.

The piezometer is equipped with a standard sintered stainless steel porous filter to prevent soil particles from contacting the diaphragm. A thermistor is built into the piezometer body to permit temperature measurement and temperature compensation of the piezometer. Standard construction is all stainless steel. RST vibrating wire piezometers are shipped with extremely tough polyurethane-jacketed foil-shielded cable for maximum endurance in field conditions.

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## applications

- Assessing performance and investigating stability of earth fill dams and embankments.
- Slope stability investigations.
- Monitoring water levels in wells and standpipes.
- Monitoring pressures behind retaining walls and diaphragm walls.
- Monitoring pore pressures during fill or excavation.
- Monitoring pore pressure in land reclamation applications.

## features

- Field proven reliability and accuracy.
- Will tolerate wet wiring common in geotechncial applications.
- Immune from external electrical noise.
- Signal transmission of several kilometers.
- Cable lengths may be changed without affecting the calibration.
- High accuracy, IE a low pressure vented model will measure water level changes as small as 0.5 mm (0.02 in.).
- Thermistor for temperature measurement is standard.
- Negligible displacement of pore water during the measurement process.
- Hermetically sealed, stainless steel construction.
- Heavy case to minimize reading errors caused by overburden pressure.
- Data logger compatible.
- Integral lightning protection.

specifications + ordering info

# Vibrating Wire Piezometers

## vibrating wire piezometer specs

| DESCRIPTION | SPECIFICATION |
|---|---|
| Over range | 2 X F.S. |
| Resolution | 0.025% F.S. minimum |
| Accuracy | 0.1% F.S. |
| Operating Temperature | -20 to 80°C (-4 to 176°F) |
| Diaphragm Displacement | <0.001 cc at F.S. |
| Thermal Zero Shift | <0.05% F.S./°C |
| Materials | Hermetically sealed stainless steel housing |
| Thermistor Type | NTC 3K Ohms @ 25°C |
| Thermistor Interchangeability | ±0.2°C |
| Thermistor Resolution | 0.1°C |
| Filter | 50 micron sintered filter.<br>(High air entry alumina filter 1, 3, 5 Bar available) |

## vibrating wire piezometer options

- Heavy-duty bodies for embankment use.
- Push-in drive points for soft soils
- High air entry ceramic filters to exclude air
- Low range and vented piezometers
- Titanium construction for use with corrosive fluids
- Multi-point/mixed type sensor strings
- Kevlar® reinforced cable

## optional equipment

- VW2106 Vibrating Wire Readout
- Dataloggers
- Terminal stations
- Electrical cable
- Cable splice kits
- Installation geotextile and socks
- Increased lightning protection

## electrical cable specs

| PART # | DESCRIPTION |
|---|---|
| EL380004 | Two twisted pairs cable with polyurethane jacket. |

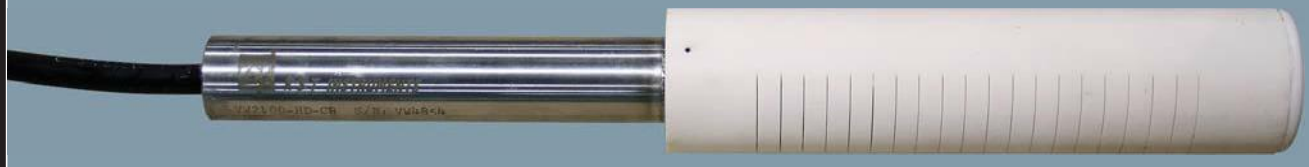
Other types of cables, depending on site conditions and atmospheric reference requirements, are available upon request. These include vented, FEP, PVC, polyurethane, and armored varieties.

Model VW2100 used in project. Refer to calibration records for the pressure range of each piezometer

## ordering info

| PART # | DESCRIPTION | PRESSURE RANGE | DIMENSION |
|---|---|---|---|
| VW2100 | Standard model for general applications. | 0.35, 0.7, 1.0, 2.0, 3.0 MPa | 19 mm Ø X 130 mm |
| VW2100-HD | Heavy duty piezometer for direct burial in fills and large dam embankments. | 0.35, 0.7, 1.0, 2.0 3.0, 5.0, 7.5, 10 MPa | 25.4 mm Ø X 146 mm |
| VW2100-XHD | Heavy duty piezometer for direct burial in fills and large dam embankments. | 1.0, 2.0 3.0, 5.0, 7.5, 10 MPa | 38.1 mm Ø X 146 mm |
| VW2100-HHP | High pressure transducer with NPT port. | 5.0, 7.5, 10, 25, 50, 75, 100 MPa | 25.4 x 143 mm |
| VW2100-DP | Drive point model with CPT adapter. | 0.07, 0.175, 0.35, 0.7, 1.0, 2.0, 3.0, 5.0, 7.5 MPa | 33 mm Ø X 432 mm |
| VW2100-L | Low Pressure, unvented. | 70, 175 kPa | 25 mm Ø X 133 mm |
| VW2100-LV | Low Pressure vented. | 70, 175 kPa | 25 mm Ø X 133 mm |
| VW2100-M | Miniature version – 17.5 mm diameter. | 0.35, 0.7, 1.0, 2.0, 3.0 MPa | 17.5 mm Ø X 133 mm |
| VW2100-MM | Micro-miniature version – 11.1 mm diameter. | 0.35, 0.7 MPa | 11.1 mm Ø X 165 mm |
| PPA0094 | Heavy duty piezometer with bladder. | 0.35, 0.7, 1.0, 2.0 3.0, 5.0, 7.5, 10 MPa | 25.4 mm Ø X 146 mm<br>Bladder O.D.: 1.66 in |

High temperature models and metallic cable are available by special order. High temperature ranges include: 0 to 100°C; 0 to 150°C; and 0 to 200°C.



PPA0094 - Heavy Duty Piezometer with Bladder

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# DT2011-B Single Channel Vibrating Wire Data Logger

The Single Channel Vibrating Wire Data Logger is a low cost, battery powered data logger, designed for reliable, unattended monitoring of a single vibrating wire sensor and thermistor.

It is a purpose built logger ideal for remote locations or instruments that require frequent reliable data recording. It connects to all vibrating wire sensors including piezometers, crack meters, and strain gauges. However, the Single Channel Vibrating Wire Data Logger will not connect to vibrating wire sensors with auto resonant circuitry.

Vibrating wire sensors have unique advantages in geotechnical applications, as the frequency output of the gauge is immune to external electrical noise, able to tolerate wet wiring without signal degradation, and able to transmit the signal upto 1.6 kilometers without loss.

Data logger setup and data collection is done using the Ultra-Rugged Field PC or a laptop. Multi-Channel Host Software is also included.

The DT2011-B is also equipped with an option to add on a radio antenna and incorporate it into an rstar wireless system. RST's rstar system uses wireless technology to provide continuous data acquisition.

Antennas can be ordered at a later date, or at time of initial ordering. An L900 rstar decal is also supplied for identification.

At right, a DT2011-B is shown with an attached antenna and an applied rstar L900 decal.

The radio antenna can be easily screwed into the connector which is at the top of the DT2011-B case.

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## applications

Ideal for applications that require reliable, unattended monitoring of a single vibrating wire sensor.

## features

HARDWARE

- Robust construction.
- 4MB memory.
- Weather resistant NEMA 4X (IP65) enclosure.
- Battery powered (lithium "D" cell) for remote sites.
- 100 year memory backup.
- Compatible with all VW sensors - excluding those with auto resonant circuitry.
- -40°C to 60°C (-40°F to 140°F) operating range.
- 0.01µs vibrating wire resolution.
- 16 bit analog/digital converter.

SOFTWARE

- User friendly Windows® host software included at no additional cost.
- Compatible with most spreadsheet software.
- Data stores in CSV format, and opens in Microsoft® Excel.

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ELB0016N
Certified System
ISO 9001

specifications + ordering info

# DT2011-B Single Channel Vibrating Wire Data Logger

## general specifications

| DESCRIPTION | SPECIFICATION |
|---|---|
| Frequency Accuracy | 0.01% Full Scale |
| Resolution | 1 part in 65,000 |
| Memory | Over 600,000 records including: time, frequency$^2$, temperature |
| Power Source | Lithium 'D' cell battery |
| Battery Life | Over 7 years / 4 memory fills depending on temperature and use |
| Communication | USB Type B connector (radio optional) |
| Dimensions | 185 x 75 x 55 mm (7.28 x. 2.95 x 2.17 in.) |
| Temperature Range | -40°C to 60°C (-40° to 140°F) |
| Enclosure | NEMA 4X (IP65) |

## data storage specifications

| DESCRIPTION | SPECIFICATION |
|---|---|
| Memory | 4MB |
| Data Transfer | 500 data points per second |
| Interval Mode | 2 seconds to 1 day |
| Variable Rate Mode | 16 user programmable sampling rates |
| Time Format | Month / day / year<br>Hour / minute / second |
| Memory Full Behaviour | "Wrap around" or "fill & stop" option |

## optional equipment

| |
|---|
| Communications cable |
| L900 radio option |

## ordering info

| PART # | DESCRIPTION |
|---|---|
| DT2011-B | Single Channel Vibrating Wire Data Logger |
| IC32000-14803 | Ultra-Rugged Field PC |

Setup the data logger and collect data using the Ultra-Rugged Field PC.

Screenshot of the Multi-Channel Mobile software as shown on the Ultra-Rugged Field PC.

Single channel logger used in: CH-P-13-03/50, CH-P-13-04/35 and CH-P-13-05/50. Refer to company website for wiring diagrams and detailed instructions.

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# DT2055B Ten Channel Data Logger

The DT2055B Ten Channel Data Logger is a low cost, battery powered data logger, designed for reliable, unattended monitoring of up to 10 sensors which may be any mix of vibrating wire sensors and thermistors, typically 5 vibrating wire sensors with their associated thermistors.

It is a purpose built logger ideal for remote locations or instruments that require frequent reliable data recording. It connects to all vibrating wire sensors including piezometers, crack meters, and strain gauges. However, the DT2055B Ten Channel Data Logger will not connect to vibrating wire sensors with auto resonant circuitry.

Vibrating wire sensors have unique advantages in geotechnical applications, as the frequency output of the gauge is immune to external electrical noise, able to tolerate wet wiring without signal degradation, and able to transmit the signal up to 1.6 kilometers without loss.

Data logger setup and data collection is done using the Ultra-Rugged Field PC or a laptop. Multi-Channel Host Software is also included.

A single gland option (DT2055B-T) is also available for Multi-point Vibrating Wire Piezometer Strings or Thermistor Strings.

As shown here, the DT2055B can also be equipped with an optional radio antenna (L900) to incorporate it into an rstar wireless system. RST's rstar system uses wireless technology to provide continuous data acquisition.

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## applications

Ideal for applications that require reliable, unattended monitoring of up to five vibrating wire sensors.

## features

HARDWARE

- Option for radio antenna for incorporation into an RST rstar wireless system for acquiring data.
- Robust construction.
- 4MB memory.
- Weather resistant NEMA 4X (IP65) enclosure.
- Battery powered for remote sites.
- 100 year memory backup.
- Compatible with all VW sensors - excluding those with auto resonant circuitry.
- -40°C to 60°C (-40°F to 140°F) operating range.
- 0.01µs vibrating wire resolution.
- 16 bit analog/digital converter.

SOFTWARE

- User friendly Windows® host software included at no additional cost.
- Compatible with most spreadsheet software.
- Data stores in CSV format, and opens in Microsoft® Excel.

GEOTECHNICAL . MINING . ENVIRONMENTAL . STRUCTURAL

ELB0046A

Certified System ISO 9001

specifications + ordering info

# DT2055-B Ten Channel Data Logger

## general specifications

| DESCRIPTION | SPECIFICATION |
|---|---|
| Frequency Accuracy | 0.01% Full Scale |
| Resolution | 1 part in 65,000 |
| Memory | Over 120,000 records including: time, 5 channels frequency, frequency$^2$, 5 channels temperature |
| Power Source | 1 'D' lithium primary battery |
| Battery Life | Over 5 years / 2 memory fills depending on temperature and use |
| Communication | USB type B connector |
| Dimensions | 120 x 122 x 91 mm (4.7 x. 4.8 x 3.6 in.) |
| Temperature Range | -40°C to 60°C (-40° to 140°F) |
| Enclosure | NEMA 4X (IP65) |

## data storage specifications

| DESCRIPTION | SPECIFICATION |
|---|---|
| Memory | 4 MB |
| Data Transfer | 5,000 data points per second |
| Interval Mode | 10 seconds to 1 day |
| Variable Rate Mode | 16 user programmable sampling rates |
| Time Format | Month / day / year<br>Hour / minute / second |
| Memory Full Behaviour | "Wrap around" or "fill & stop" option |

## optional equipment

| |
|---|
| Communications cable |
| L900 radio option |

## ordering info

| PART # | DESCRIPTION |
|---|---|
| DT2055B | Ten Channel Data Logger |
| DT2055B-T | Ten Channel Data Logger - Single Gland |
| Ultra-Rugged Field PC (readout) | IC32000-14803 |

Setup the data logger and collect data using the Ultra-Rugged Field PC.

Screenshot of DT2055B Mobile software as shown on the Ultra-Rugged Field PC.

Ten Channel Data Logger with Single Gland; optional connector available, contact RST for complete details.

Ten channel logger used in:
CH-P-13-02/VWP and
CH-P-13-06/VWP
Refer to company website for wiring diagrams and detailed instructions.

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# Appendix E3

# Drive Point Piezometer Specifications

Model 615 N used in Mount Nansen 2013 Site Investigation

## Stainless Steel Drive-Point Piezometers

Model 615

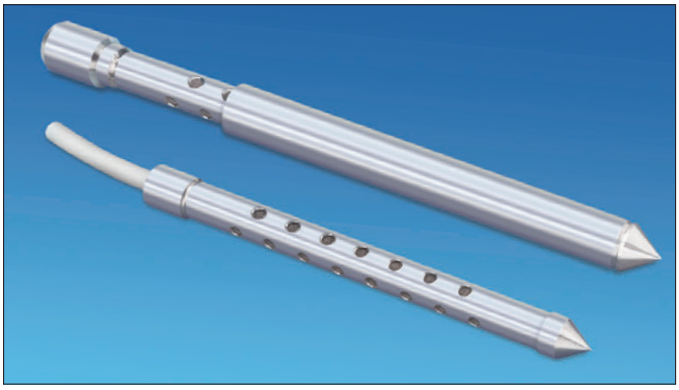
The Model 615 Drive-Point Piezometer is designed as an affordable method to monitor shallow groundwater and soil vapor in suitable conditions.

The Drive-Points attach to inexpensive 3/4" (20 mm) NPT steel drive pipe, which is widely available through local plumbing and hardware stores.

The Drive-Points are designed for single use installations, and not for removal and reuse. Solinst Drive-Point Piezometers are most often installed as permanent well points. They can also be used for temporary, short term monitoring applications.

High quality samples can be obtained if polyethylene or Teflon® lined tubing is attached to the stainless steel drive-point. Groundwater sampling and hydraulic head measurements can be taken within the tubing using small diameter equipment, as described overleaf.

Solinst Drive-Point Piezometers can be driven into the ground with any direct push or drilling technology, including the Manual Slide Hammer shown at right. To avoid clogging or smearing of the screen during installation, a shielded version is also available.



*Model 615 Drive-Point and Shielded Drive-Point Piezometer*

## Applications

- Groundwater sampling, including VOCs
- Water level monitoring
- Base flow monitoring in stream beds
- Contaminant plume delineations
- Soil gas sampling
- UST monitoring
- Low cost and minimal disturbance site assessment
- Sparge points

*Installing Piezometers with a Manual Slide Hammer*

Get Quote | More Info

## High Quality Samples

Model 615 Drive-Point Piezometers have a stainless steel, 50 mesh cylindrical filter-screen, within a 3/4" (20 mm) stainless steel drive-point body, screen support and an optional fitting for attachment of sample tubing.

The 615 N or 615 SN, designed without a tubing barb, is to be used for water level measurements. This saves money and provides better access for Water Level Meters.

*615 N*

The 615 or 615 S has an inner barbed fitting for 5/8" OD x 1/2" ID (16 mm x 12 mm) LDPE or Teflon lined sample tubing. This prevents sample water from contacting the extension rods, and maintains high sample integrity, even when inexpensive galvanized steel extensions are used.

*615*

The 615 C is ideal for soil vapor sampling. Where an air-tight connection is most desirable, the compression fitting option allows users to attach 1/4" (6 mm) sample tubing directly to the top of the screened portion of the drive-point.

*615 C*

The 615 S and 615 SN shielded drive-points have a single use, 1-1/2" (38 mm) dia. shield to avoid smearing and plugging of the screen during installation. The strengthened connector at the top of the drive-point acts as an annular seal, which avoids contamination from higher levels in the hole.

® Solinst is a registered trademark of Solinst Canada Ltd.

® Teflon is a registered trademark of DuPont Corp.

# Drive-Point Piezometers

Model 615 N used in Mount Nansen 2013 Site Investigation

## Sampling Within Narrow Diameters

Direct push sampling has quickly become a popular way to obtain groundwater samples. However, sampling within drive-points requires a narrow diameter sampler. Solinst offers several options for this specific sampling application.

## Peristaltic Pump, Model 410

The Peristaltic Pump uses the suction lift principle. Suitable for 1/4" (6 mm) ID or larger diameters. The Peristaltic Pump provides a regulated and steady flow. It will lift water up to 32 ft. (10 m) at sea level.

## Inertial Pump, Model 404

The Inertial Pump consists of a check valve and tubing that is rapidly raised and lowered to lift a sample. The SS10 foot valve suits wells as narrow as 1/2" (12 mm) ID and works to depths of 74 ft. (25 m).

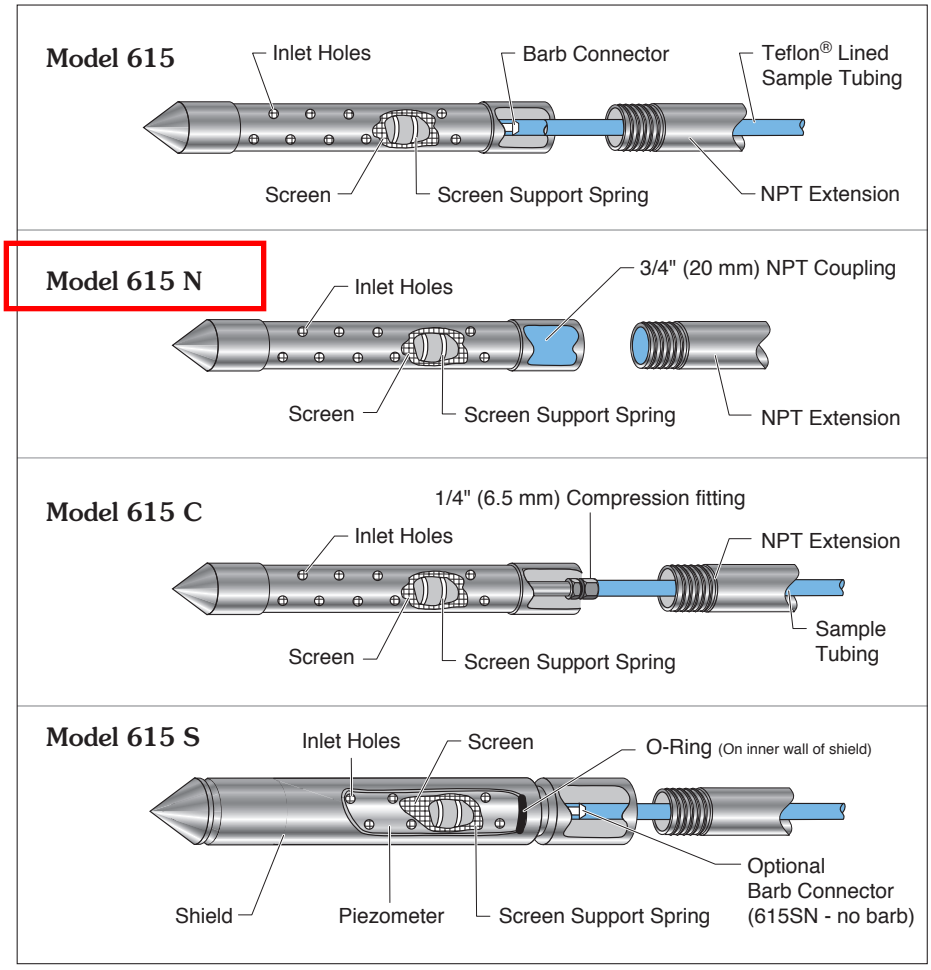
## Miniature Point Source Bailer, Model 429

The 1/2" (12 mm) dia. stainless steel bailer works very well in the 615 N or 615 SN. The bottom emptying device permits a regulated, steady flow.

## Hydraulic Head

Water levels can be measured in any of the Drive-Points described, using a Solinst Model 101 Water Level Meter, or Model 102 or 102M Mini Laser Marked Coaxial Cable Water Meter.

## Stainless Steel Drive-Point Piezometers




*Solinst Drive-Point Piezometers are available in five different configurations; the 615 with a barbed fitting, the 615 N with no barbed fitting, the 615 C with a compression fitting, the 615 S with a barbed fitting and shield, and the 615 SN with a shield and no barbed fitting.*

## Manual Slide Hammer

To install Solinst Drive-Point Piezometers inexpensively, the Manual Slide Hammer can be used. The 25lb (11Kg) slide hammer and all other equipment can easily be transported in a car or truck to most sites.

A heavy duty drive head is used, on which the slide hammer impacts, and a tubing by-pass ensures that the tubing does not get damaged during installation.

## Accessories

Solinst supplies 3/4" (20 mm) NPT Delrin caps, and stainless steel couplings and extensions. These accessories can also be locally sourced at plumbing and hardware stores.

## Depth Limitations

Drive-point Piezometers are not suitable for all sites. The depth limitations vary with soil conditions and the drive method used.

Printed in Canada
June 25, 2013

***For further information contact: Solinst Canada Ltd.***
*Fax: +1 (905) 873-1992; (800) 516-9081 Tel: +1 (905) 873-2255; (800) 661-2023*
*35 Todd Road, Georgetown, Ontario Canada L7G 4R8*
*Web Site: www.solinst.com E-mail: instruments@solinst.com*

# Appendix E4

# GeoProbe Sampler Specifications

Geoprobe Systems®

ENVIRONMENTAL · GEOTECHNICAL · GEOTHERMAL · EXPLORATION

# Product Sheet

## DT22 Soil Sampling System

- Uses 2.25 in. probe rods as outer casing.
- Uses 1.25 in. Light Weight Center Rods for core extraction.
- Collect continuous soil cores through a cased probe hole confirming the security of the sample from cross contamination.
- Optional expendable cutting shoe for use when setting prepack monitoring wells.
- Optional SP22 Groundwater Sampler used in conjunction with DT22

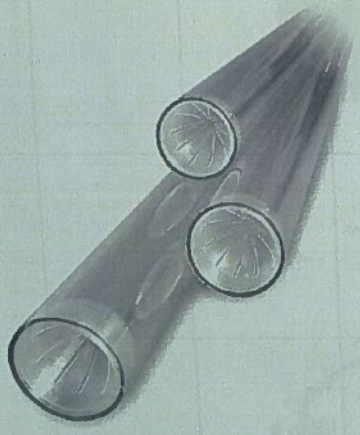
When sampling with the DT22 system, the smaller OD probe rods are placed inside the outer casing and hold a sample liner in place as the outer casing is driven one sampling interval.

Use with 1.25 in. Light-Weight Center Rods. 68% less weight than regular 1.25 in. probe rods.

### Improved dual tube sampling in non-cohesive soils

**No more empty liners! No more nasty surprises!** Geoprobe® Systems has permanently fused a core catcher to the Dual Tube 22 liners. The integrated core catcher prevents soil cores from falling out of the DT22 liner during sample retrieval. It's great for sampling in areas of loose soils, especially saturated sands. By fusing the core catchers directly on to the liner it will save field time for operators and make sampling in problem soils less of a hassle.

DT22 Expendable Cutting Shoe & Holder (Left) can be used when installing prepack monitoring wells after sampling of soils is complete. (Above) The Expendable cutting shoe comes off while installing the prepack monitoring well.



DT22 Liners with Core Catchers

DT22 Drive Cushion and Handle

The Drive Cushion (42236) stands up to those tough field conditions. The DT22 Drive Cushion will minimize the use of rubber bumpers and provides a cost effective alternative. The steel and composite construction design provides lasting field durability.

DT22 Drive Cushion (42236)

DT22 Liner Cutter

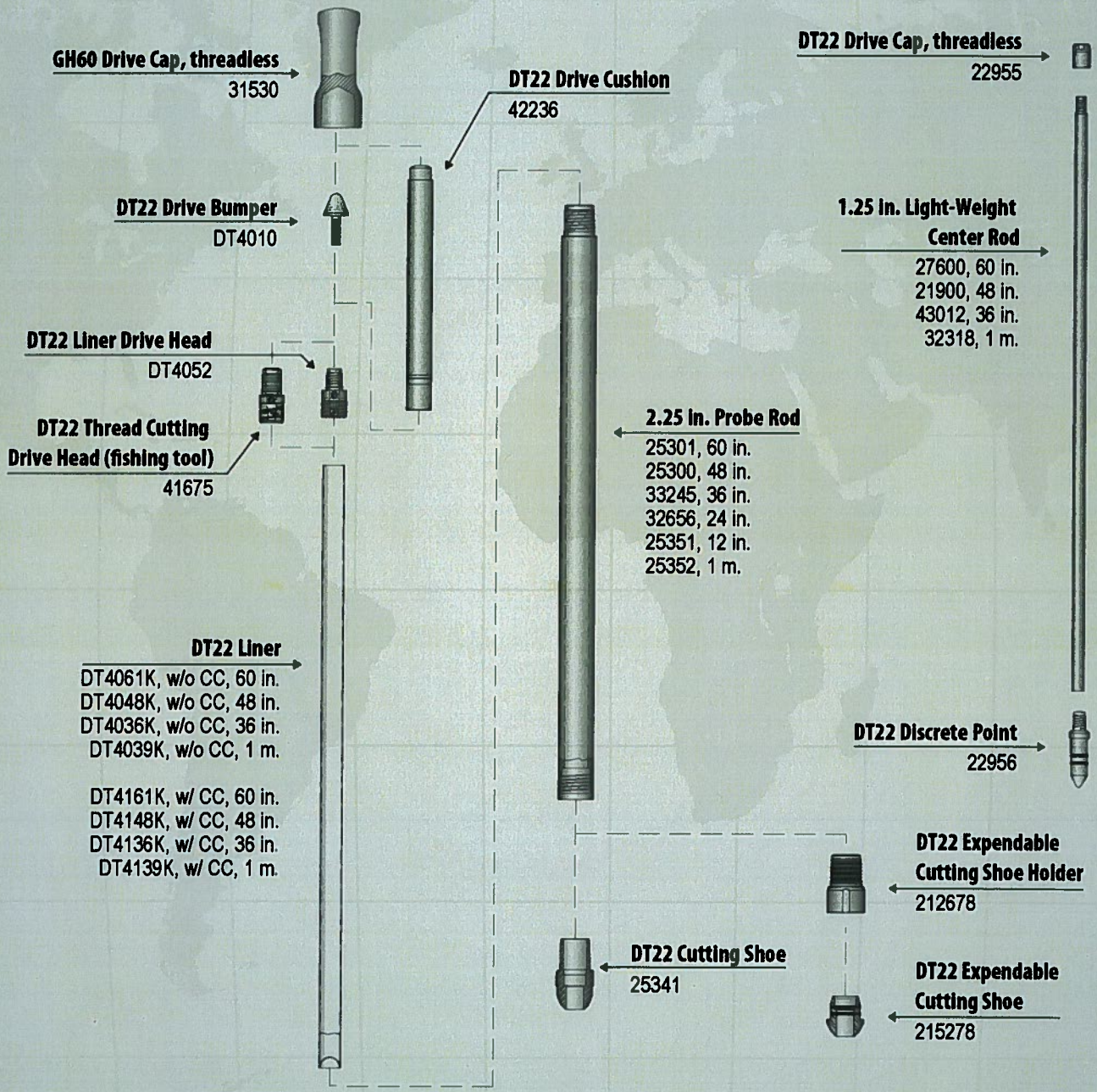
Manufactured under Patent #6029355

DT22 Soil Samples 60 in. Length

1835 Wall Street • Salina, KS 67401 | 1-800-436-7762 | geoprobe.com

This document is not a final purchasing quotation. Tooling specifications are subject to change without notice.

# DT22 Soil Sampling System





This document is not a final purchasing quotation. Tooling specifications are subject to change without notice.

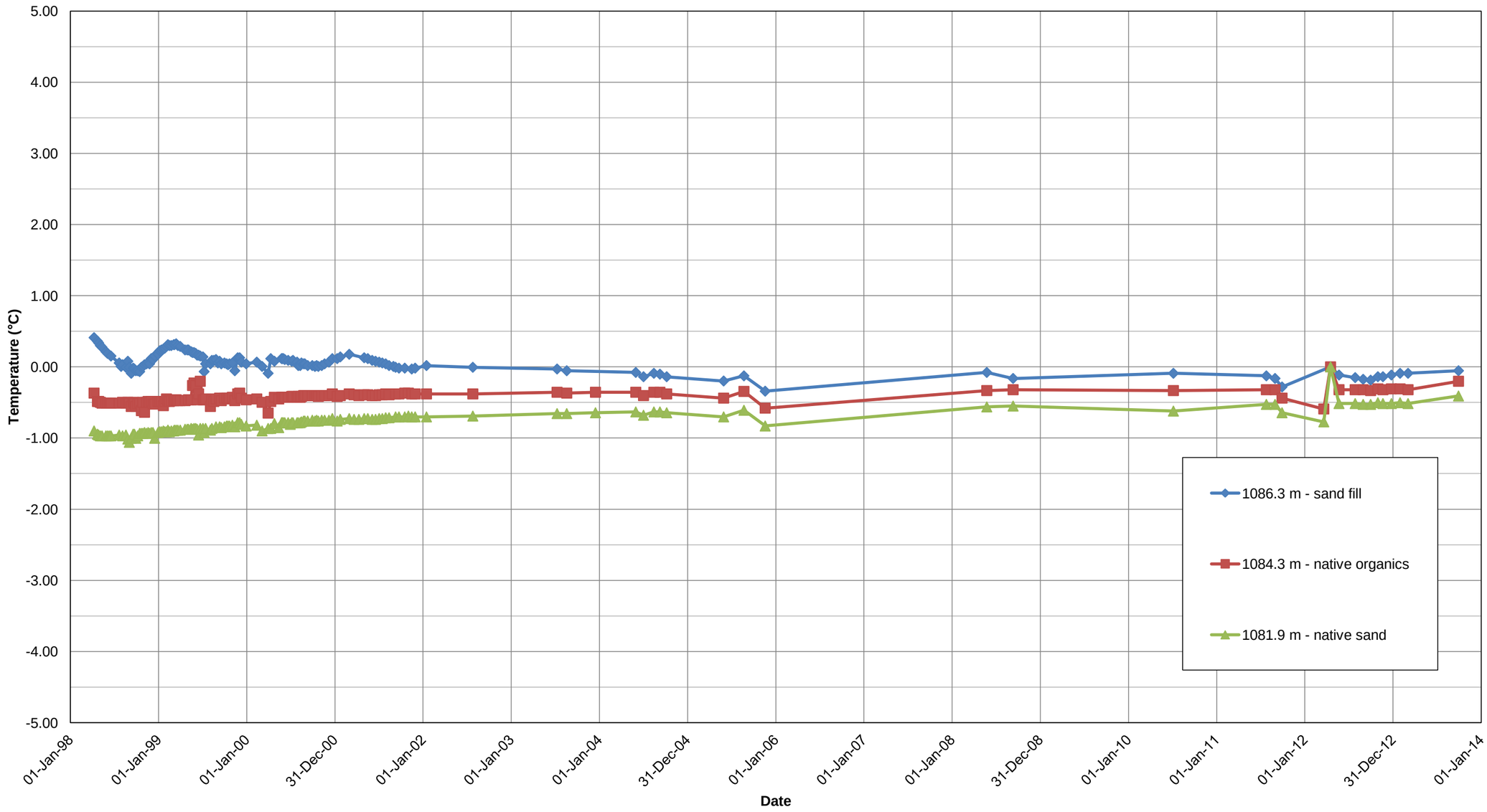
# APPENDIX F

# FIELD INSTRUMENT READINGS

# Appendix F1

# TSF Thermistor Readings

Last Updated: 29-Sep-13

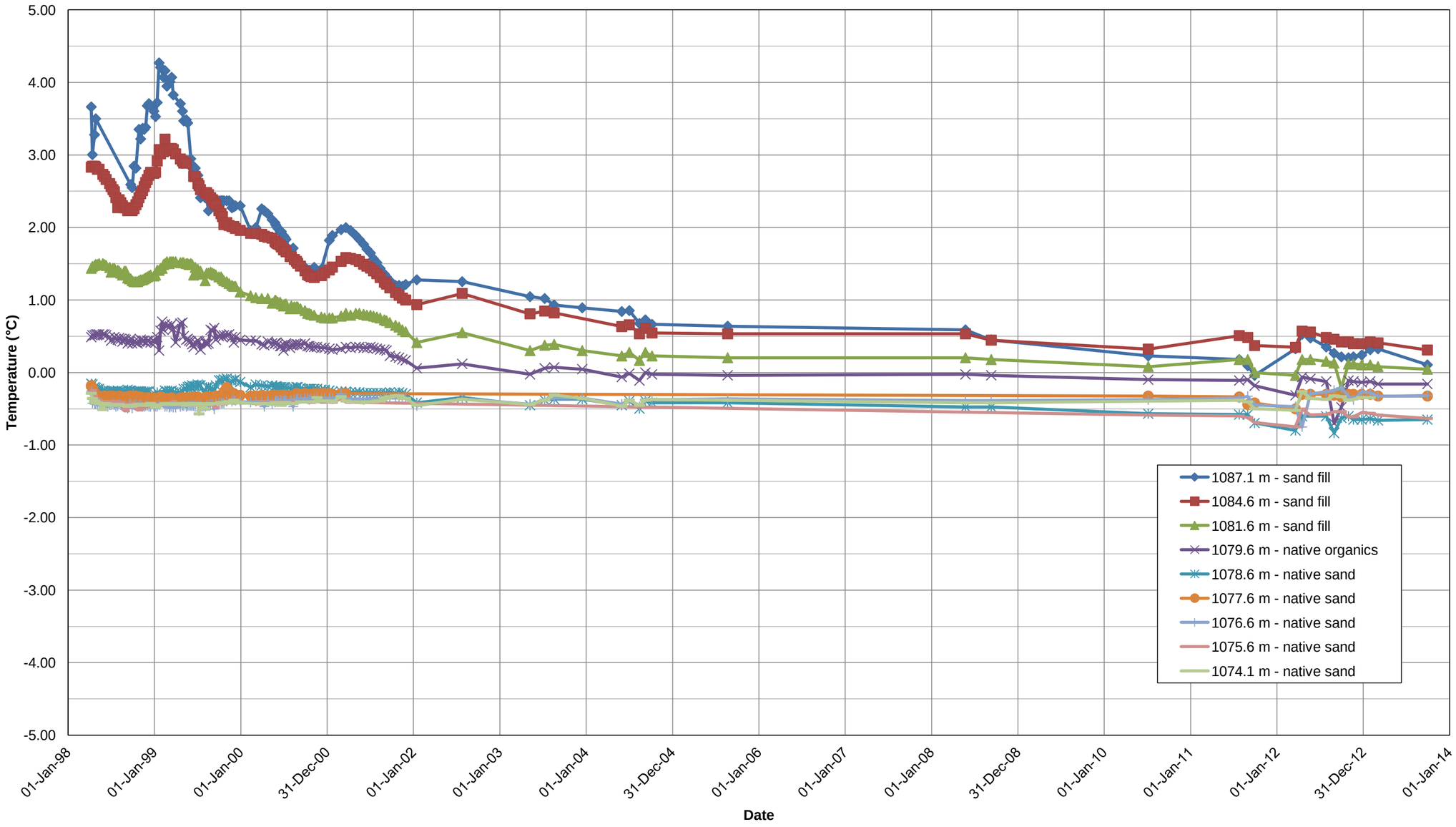



NOTE: 1) BH Location: Crest of Tailings Dam, S End
2) Ground surface: 1099.3 m.
3) Fill and native ground interface: 1085.8 m.
4) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. 1178
Date Installed: 98-03-24

Ground Temperature Profiles
BH 12861-01

Last Updated: 29-Sep-13

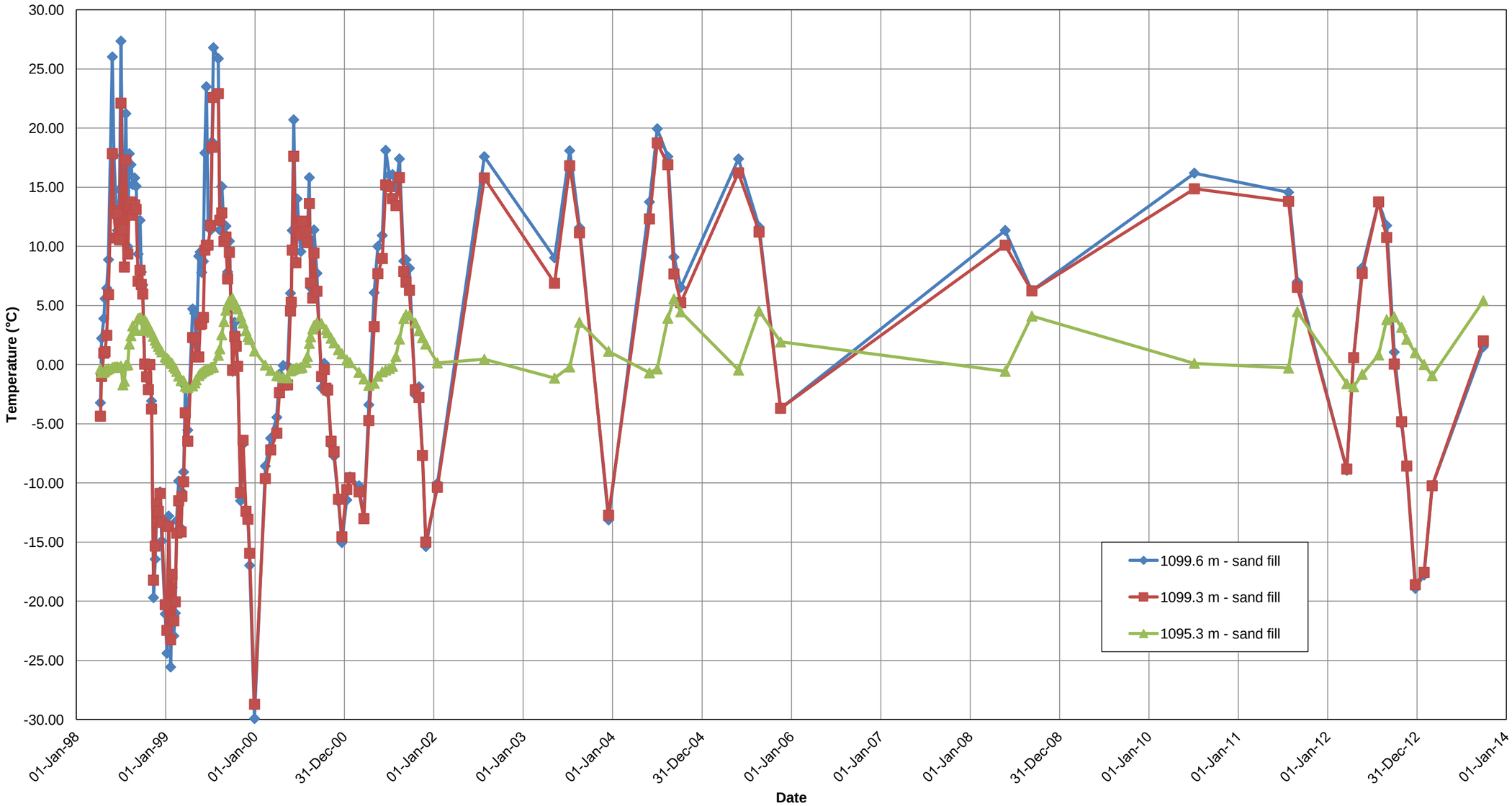



NOTE: 1) BH Location: Crest of Tailings Dam, South Centre
2) Ground surface: 1099.4 m.
3) Fill and native ground interface: 1080.3 m.
4) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. 1179
Date Installed: 98-03-25

Ground Temperature Profiles
BH 12861-02

Last Updated: 29-Sep-13

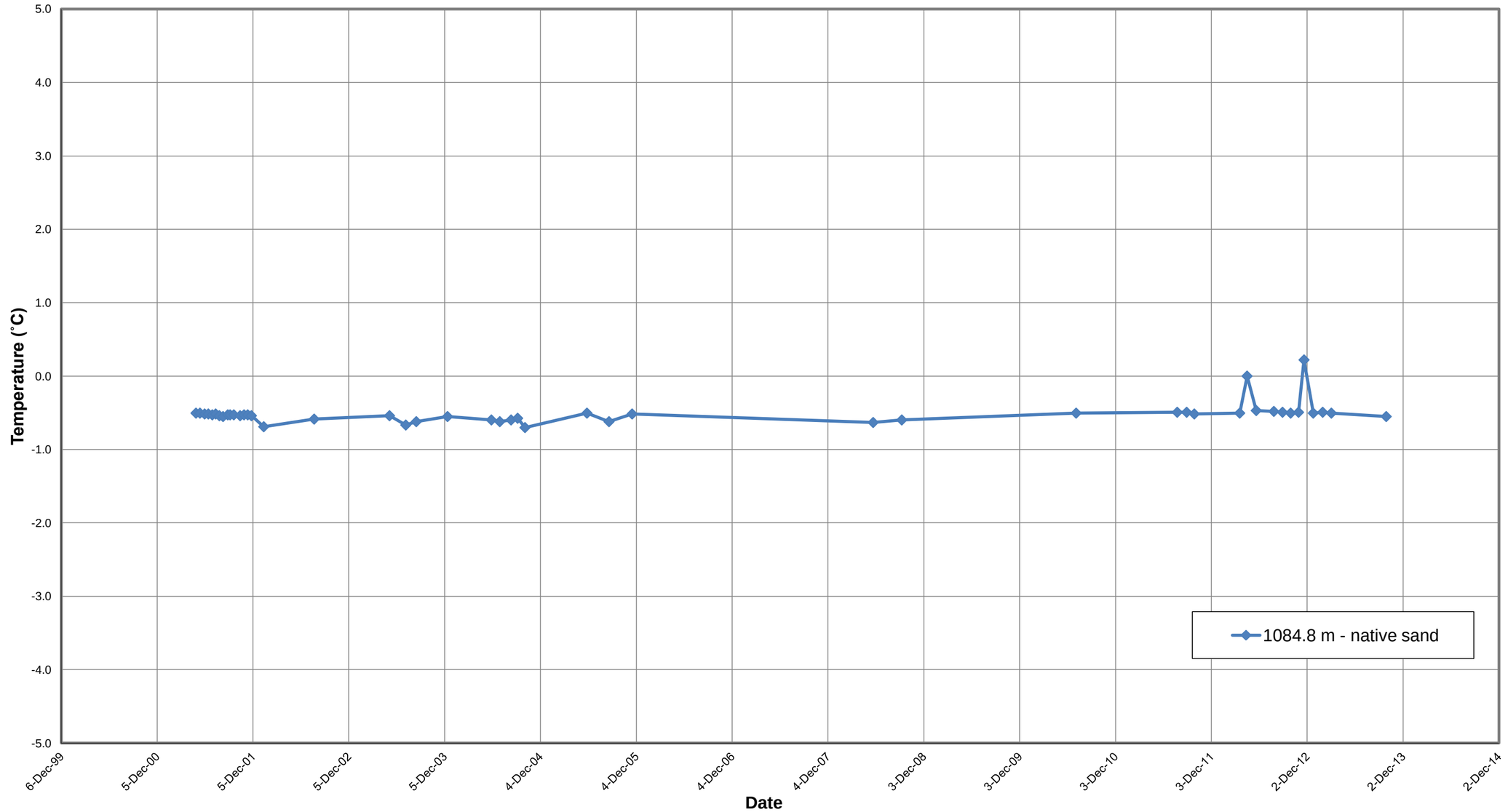



NOTE: 1) BH Location: Crest of Tailings Dam, North Centre
2) Ground surface: 1099.6 m.
3) Fill and native ground interface: unknown.
4) Top two readings removed due to seasonal frost effects.
5) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. 1180
Date Installed: 98-03-31

Ground Temperature Profiles
BH 12861-03

Last Updated: 29-Sep-13

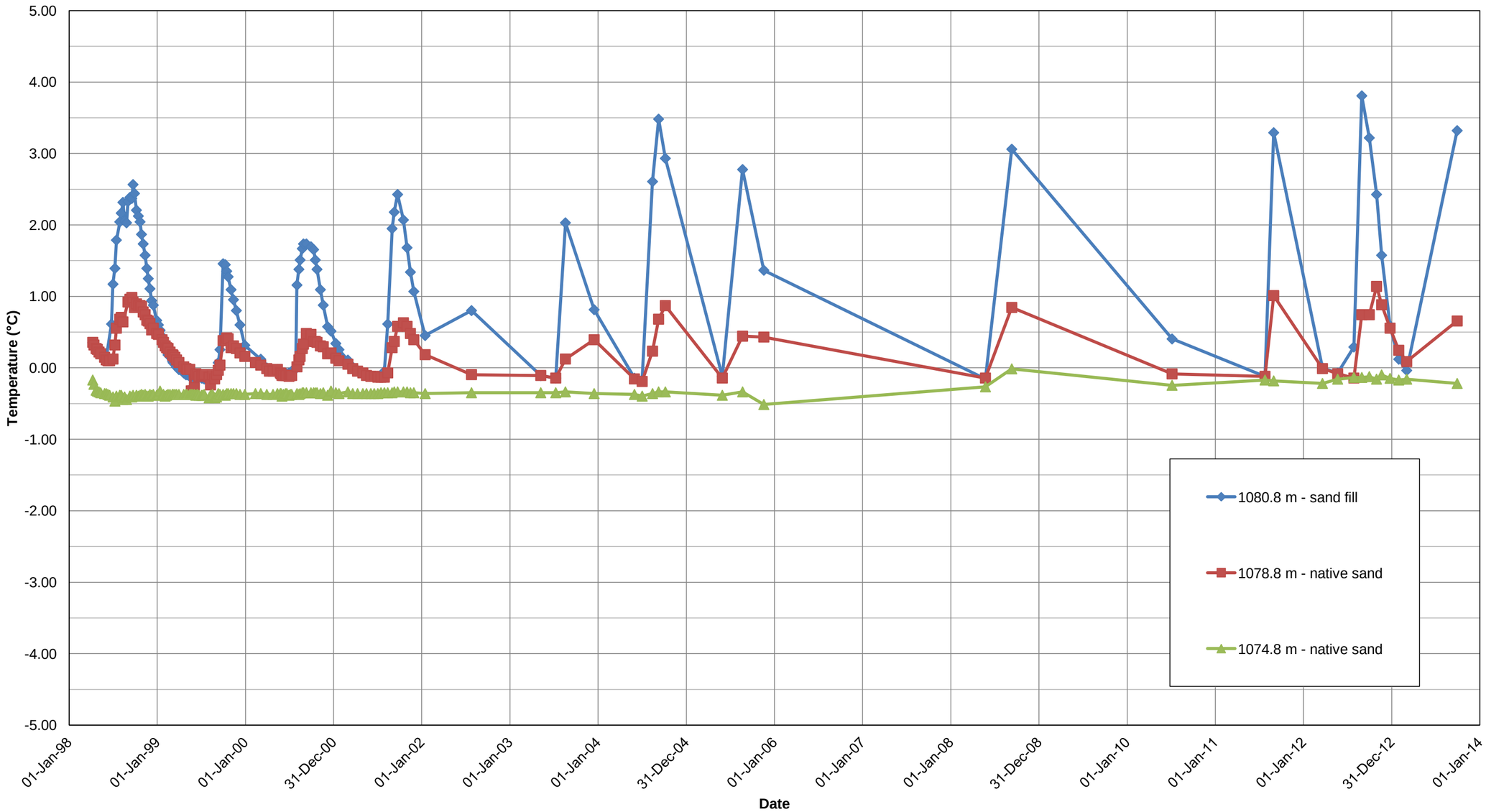



NOTE: 1) BH Location: North Abutment Above Seepage Collection Pond
2) Ground surface: 1095.5 m
3) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. 1
Date Installed: 98-03-30

Ground Temperature Profiles
BH 12861-04

Last Updated: 29-Sep-13

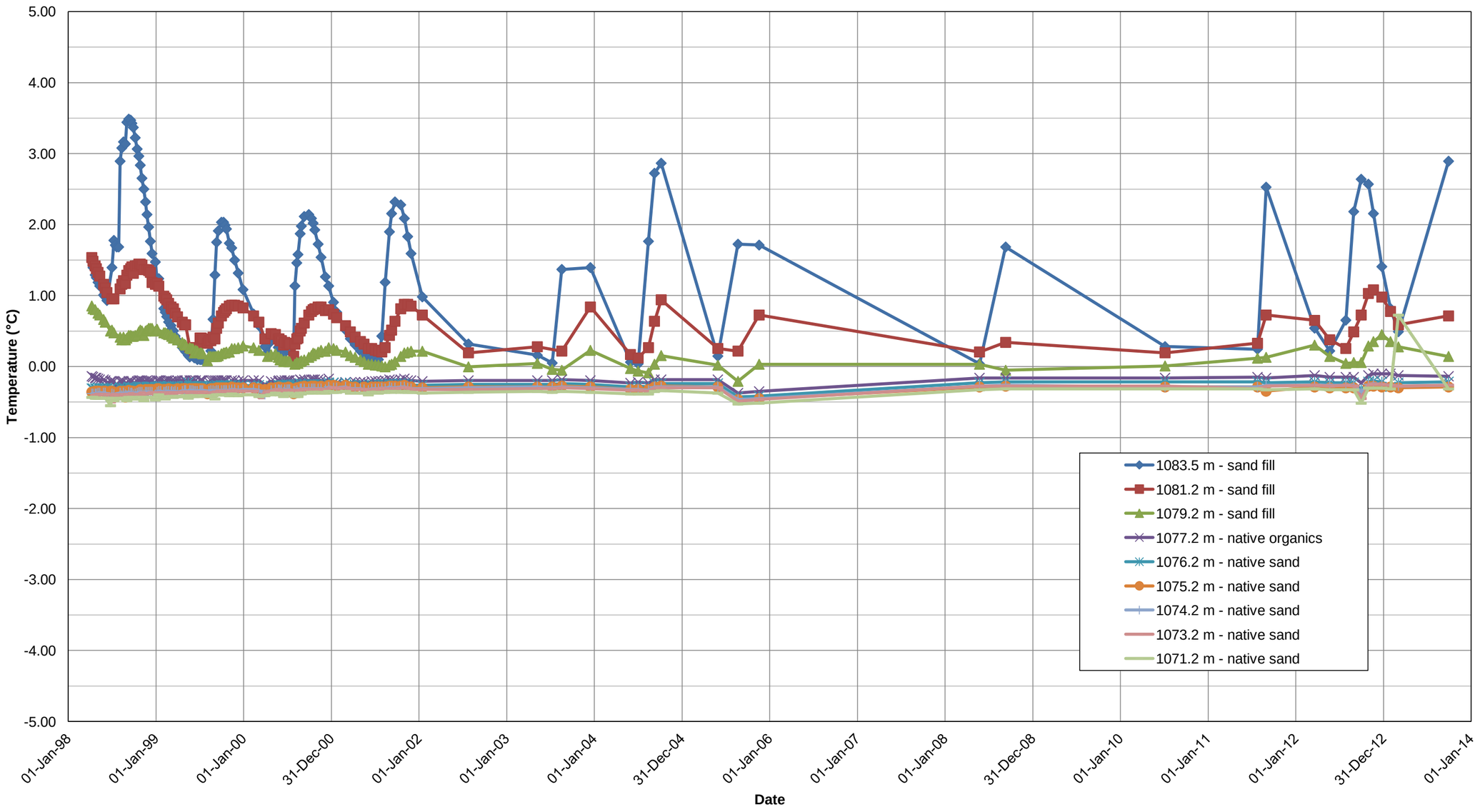



NOTE: 1) BH Location: Crest of Toe Berm, South Centre
2) Ground surface: 1087.8 m.
3) Fill and native ground interface: 1080.5 m.
4) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. 1181
Date Installed: 98-03-28

Ground Temperature Profiles
BH 12861-05

Last Updated: 29-Sep-13

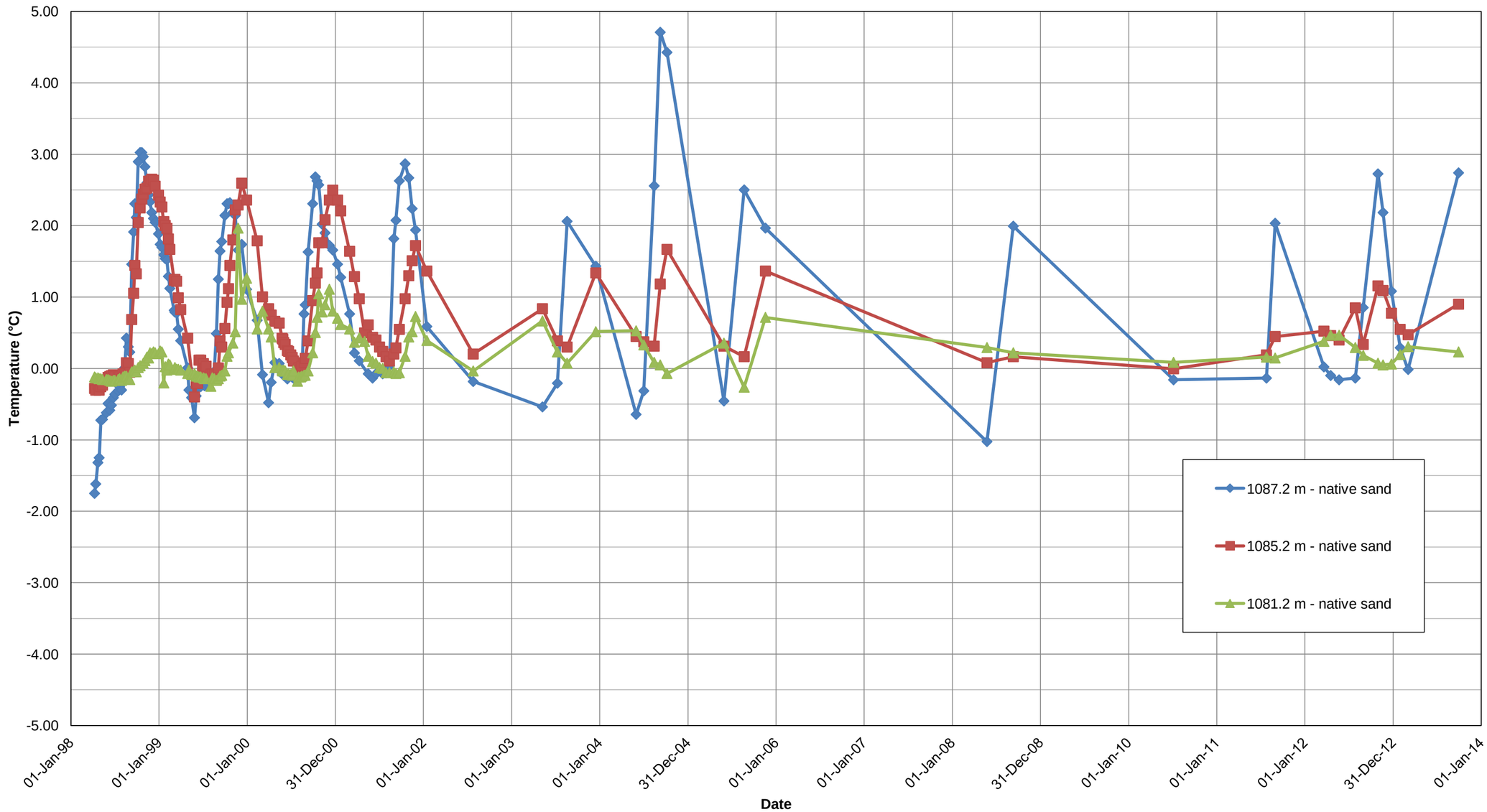



NOTE: 1) BH Location: Crest of Toe Berm, North Centre
2) Ground surface: 1088.0 m.
3) Fill and native ground interface: 1078.0 m.
4) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. 1182
Date Installed: 98-03-30

Ground Temperature Profiles
BH 12861-06

Last Updated: 29-Sep-13

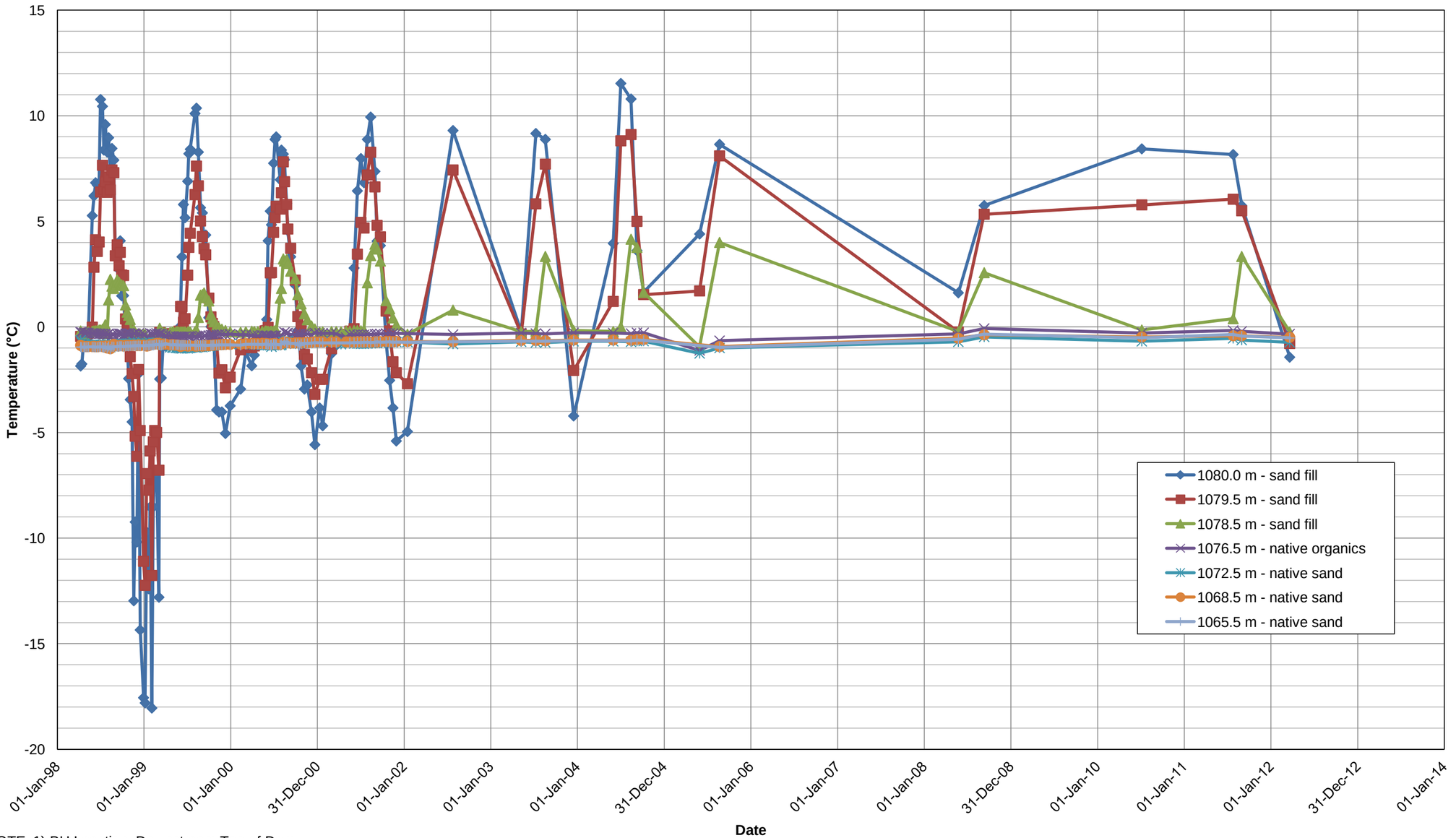



NOTE: 1) BH Location: North End of Toe Berm
2) Ground surface: 1091.4 m.
3) Fill and native ground interface: 1090.8 m.
4) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. 1183
Date Installed: 98-03-31

Ground Temperature Profiles
BH 12861-07

Last Updated: 29-Sep-13

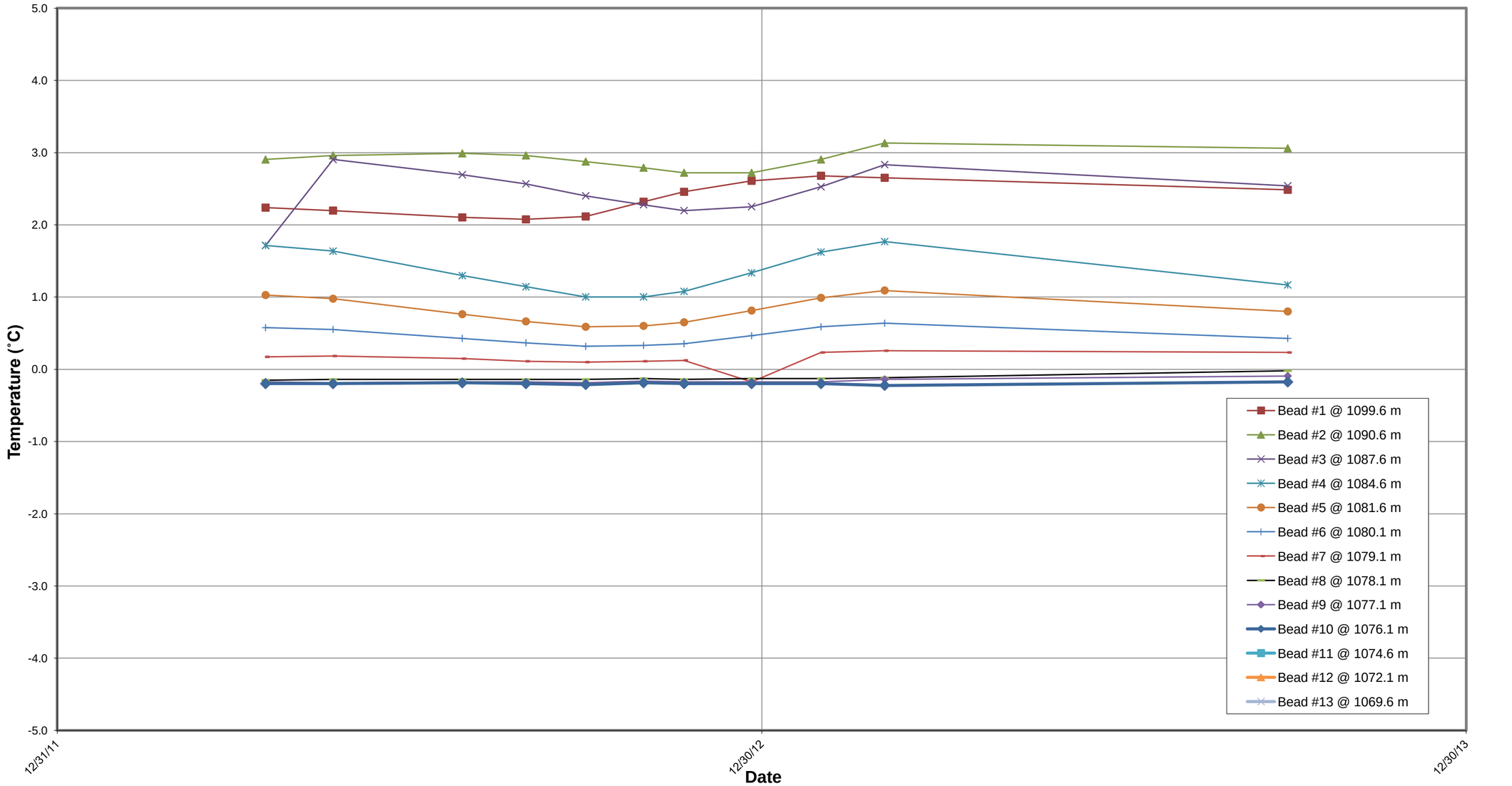



NOTE: 1) BH Location: Downstream Toe of Dam
2) Ground surface: 1080.7 m.
3) Fill and native ground interface: 1077.4 m.
4) Top two thermistor beads not shown due to seasonal frost effects.
5) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. 1143
Date Installed: 98-03-30

Ground Temperature Profiles
BH 12861-08

Last Updated: 29-Sep-13

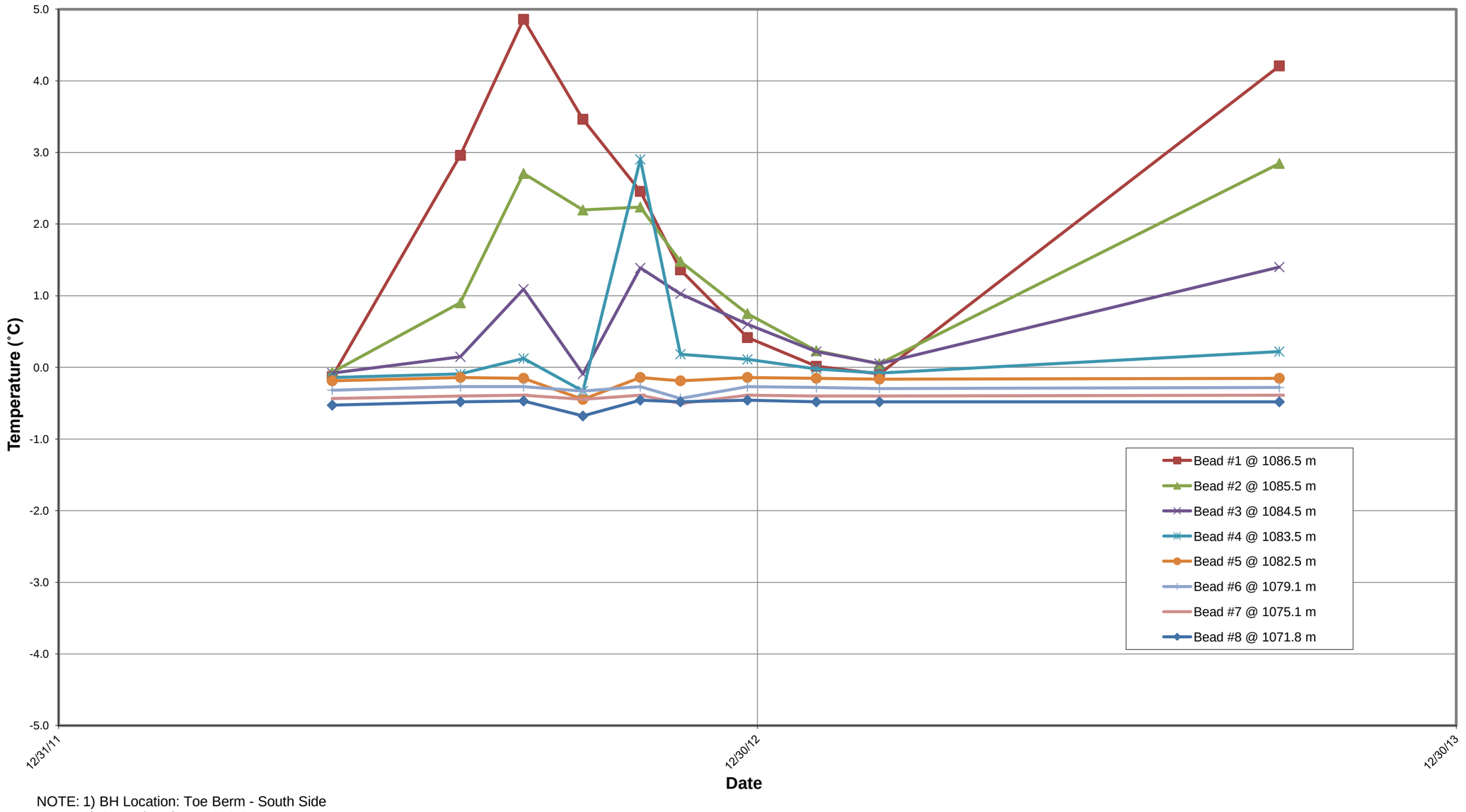



NOTE: 1) BH Location: Crest of Tailings Dam, Centre
2) Ground surface: 1099.6 m
3) Top reading removed due to seasonal frost effects.
4) No data collected from bottom three beads of the thermistor cable to March 2013.
5) Only data from 2012-2013 received.
6) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. Cable 1
Date Installed: 09-07-19

Ground Temperature Profiles
GT09-01 Cable #1

Last Updated: 29-Sep-13

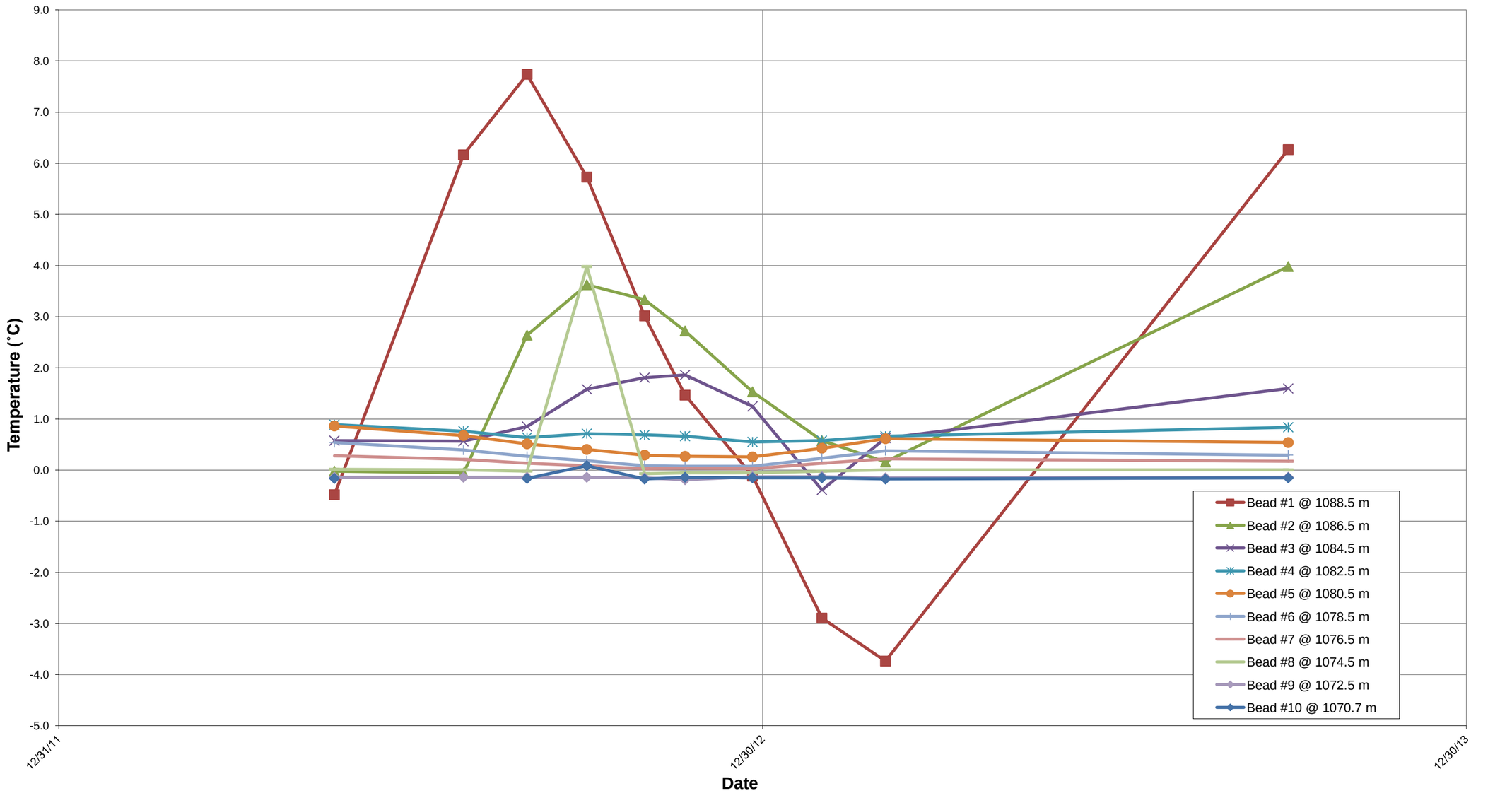



NOTE: 1) BH Location: Toe Berm - South Side
2) Ground surface: 1088.6 m
3) Top one reading removed due to seasonal frost effects.
4) Only data from 2012-2013 received.
5) Editted data for September 30, 2012.
6) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. Cable 5
Date Installed: 09-07-17

Ground Temperature Profiles
GT09-02 Cable #5

Last Updated: 29-Sep-13

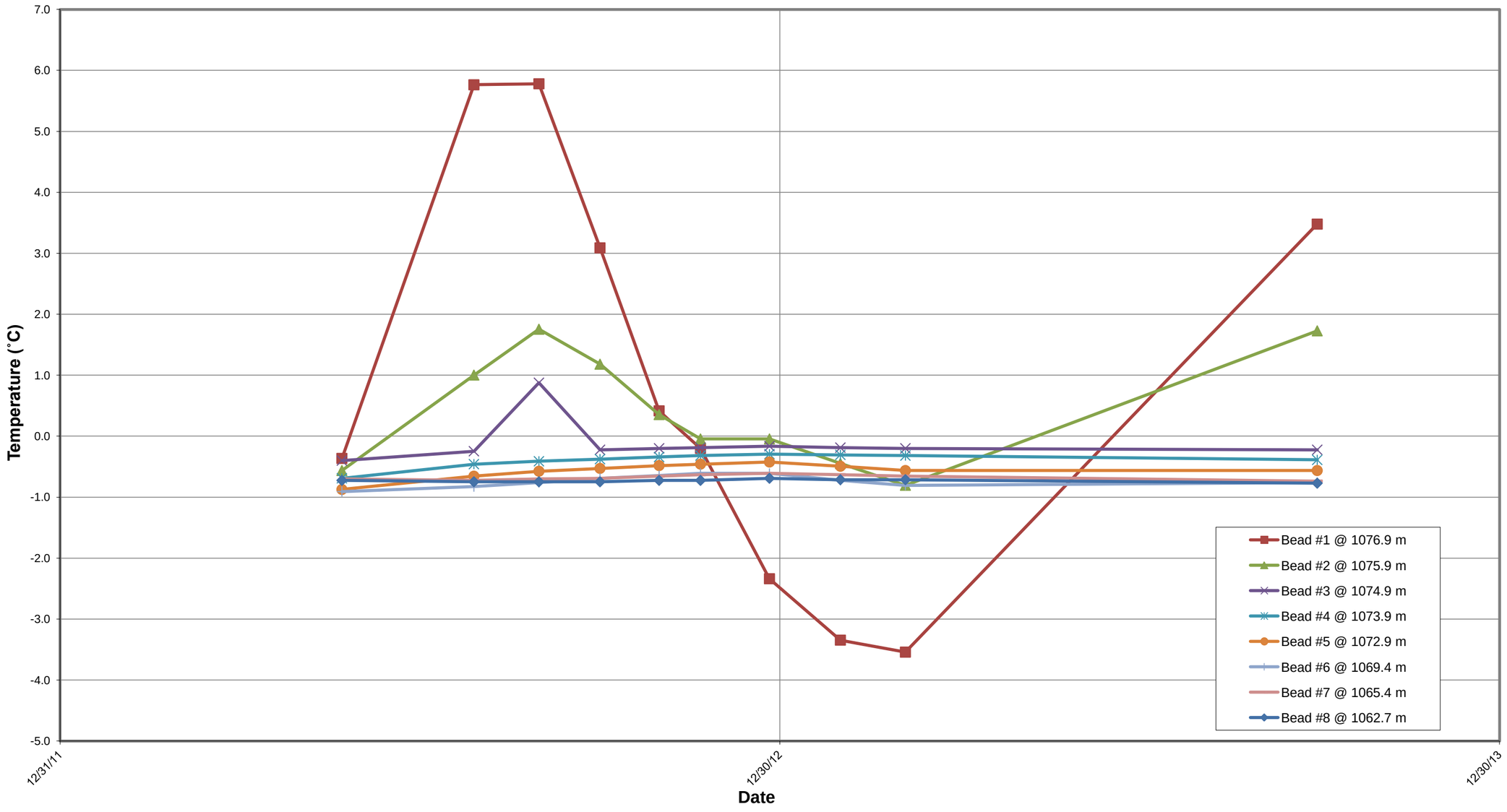



NOTE: 1) BH Location: Toe Berm - North Side
2) Ground surface: 1090.6 m
3) Top one reading removed due to seasonal frost effects.
4) Only data from 2012-2013 received.
5) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. Cable 4
Date Installed: 09-07-19

Ground Temperature Profiles
GT09-03 Cable #4

Last Updated: 29-Sep-13

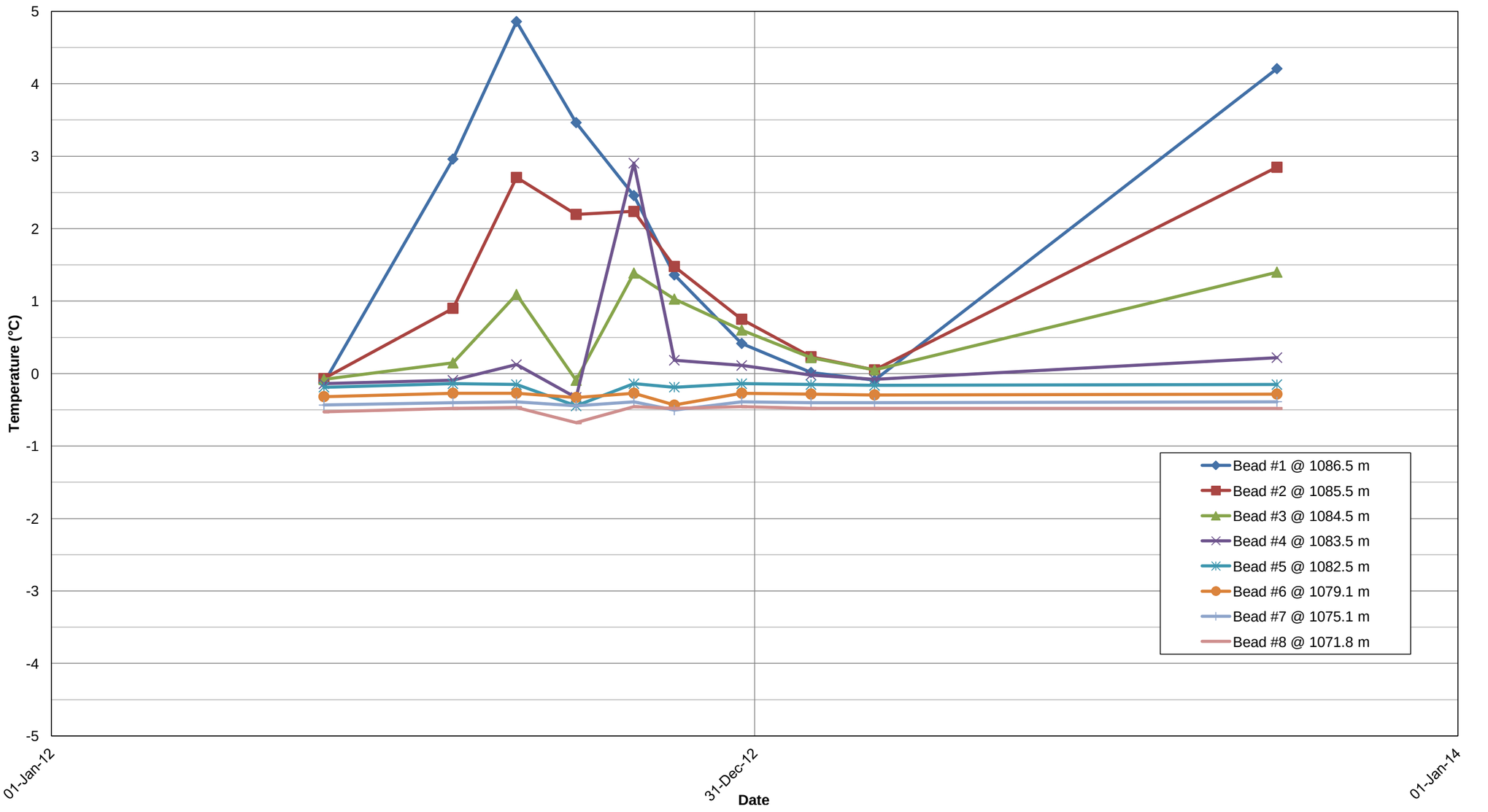



NOTE: 1) BH Location: Crest of Seepage Collection Dam
2) Ground surface: 1078.9 m
3) Only data from 2012-2013 received.
4) Top one reading removed due to seasonal frost effects.
5) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. Cable 3
Date Installed: 09-07-16

Ground Temperature Profiles
GT09-04 Cable #3

Last Updated: 29-Sep-13

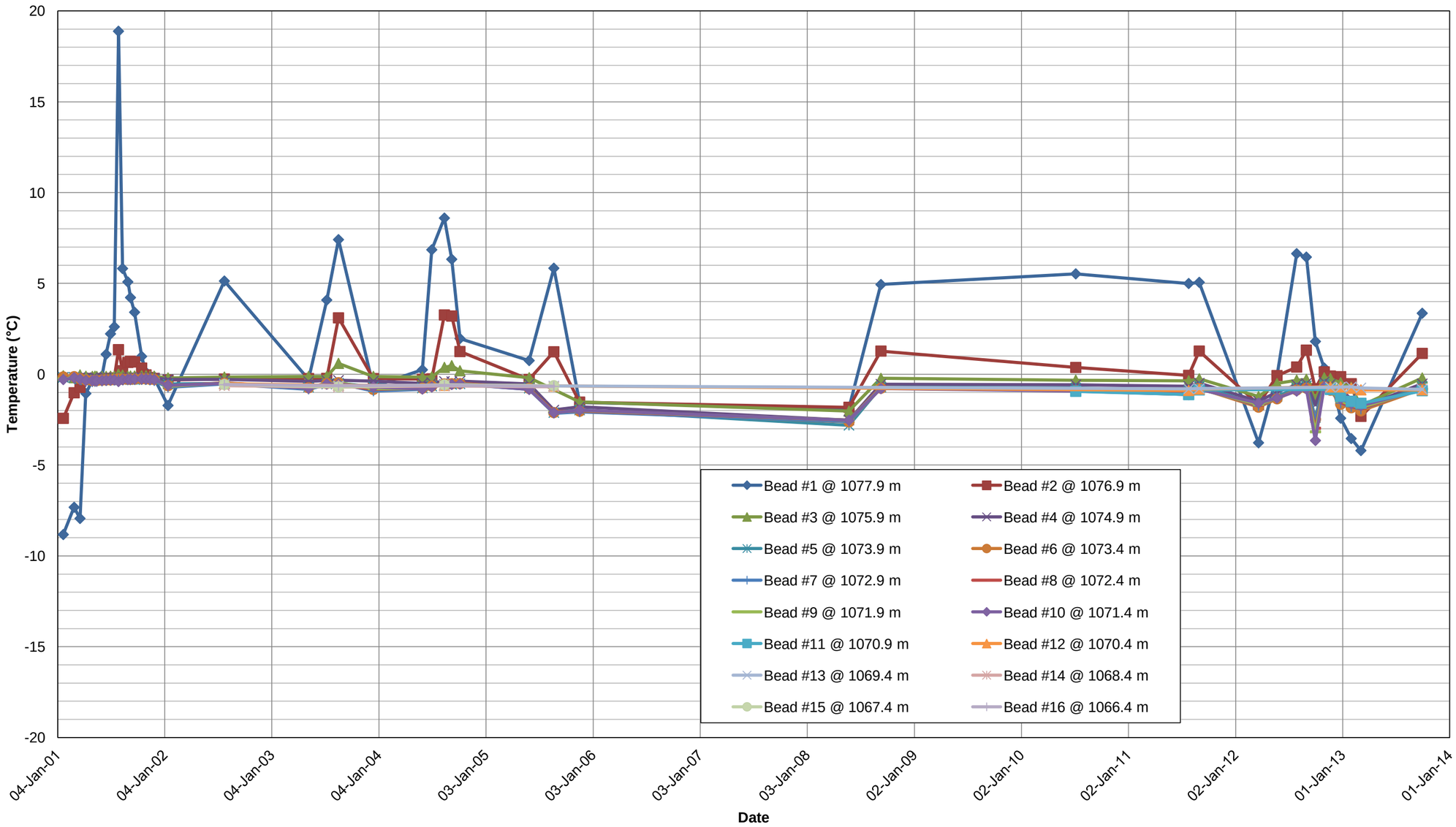



NOTE: 1) BH Location: North Abutment Above Seepage Collection Pond
2) Ground surface: 1087.8 m
3) Top one reading removed due to seasonal frost effects.
4) Only data from 2012-2013 received.
5) Editted data for September 30, 2012.
6) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. Cable 2
Date Installed: 09-07-17

Ground Temperature Profiles
GT09-05 Cable #2

Last Updated: 29-Sep-13

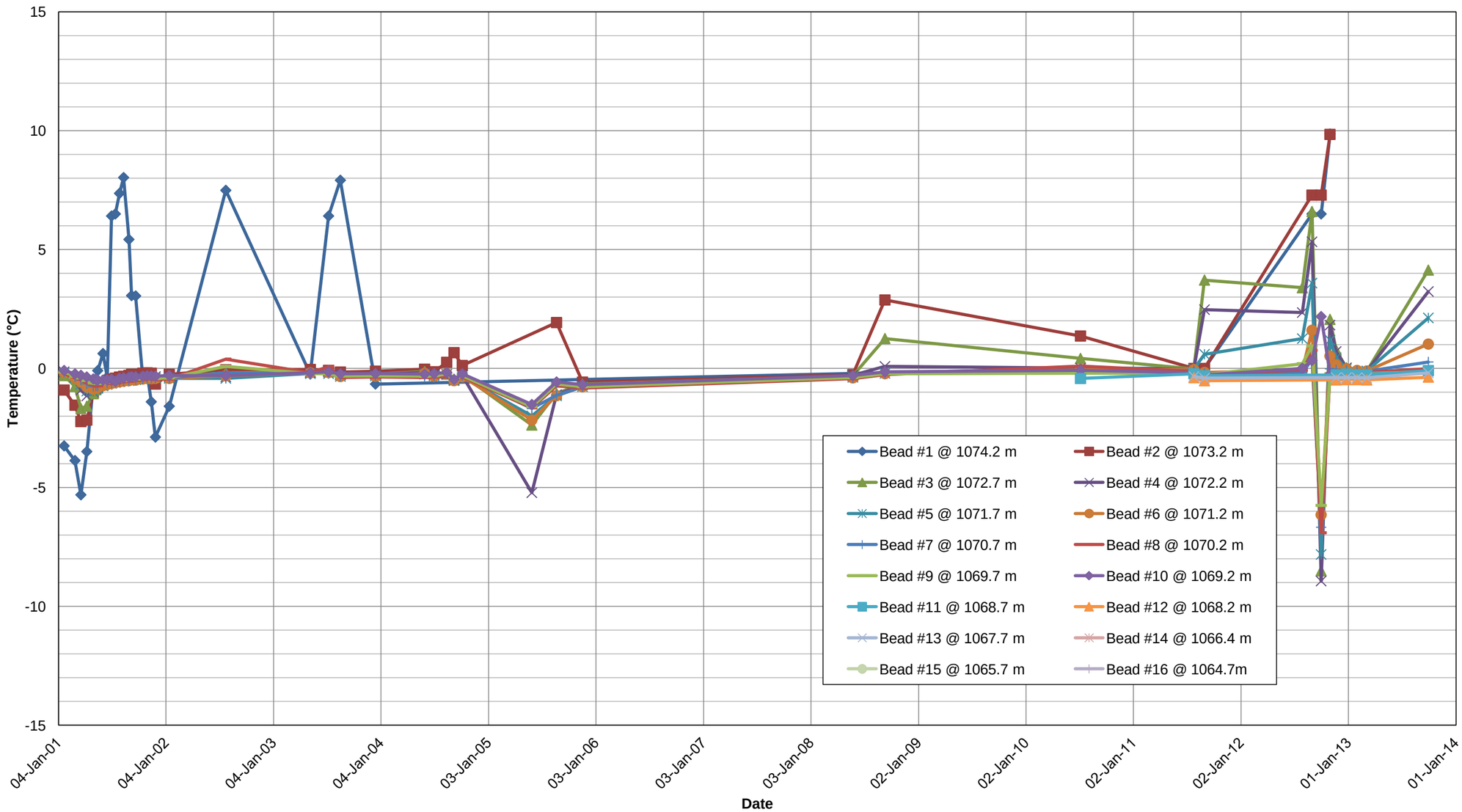



NOTE: 1) BH Location: Crest of Seepage Dam, N End
2) Ground surface: 1078.4 m.
3) Top two readings removed due to seasonal frost effects.
4) No data recorded for bottom three readings.
5) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. 1385
Date Installed: 01-01-18

Ground Temperature Profiles
14618-BH01

Last Updated: 29-Sep-13

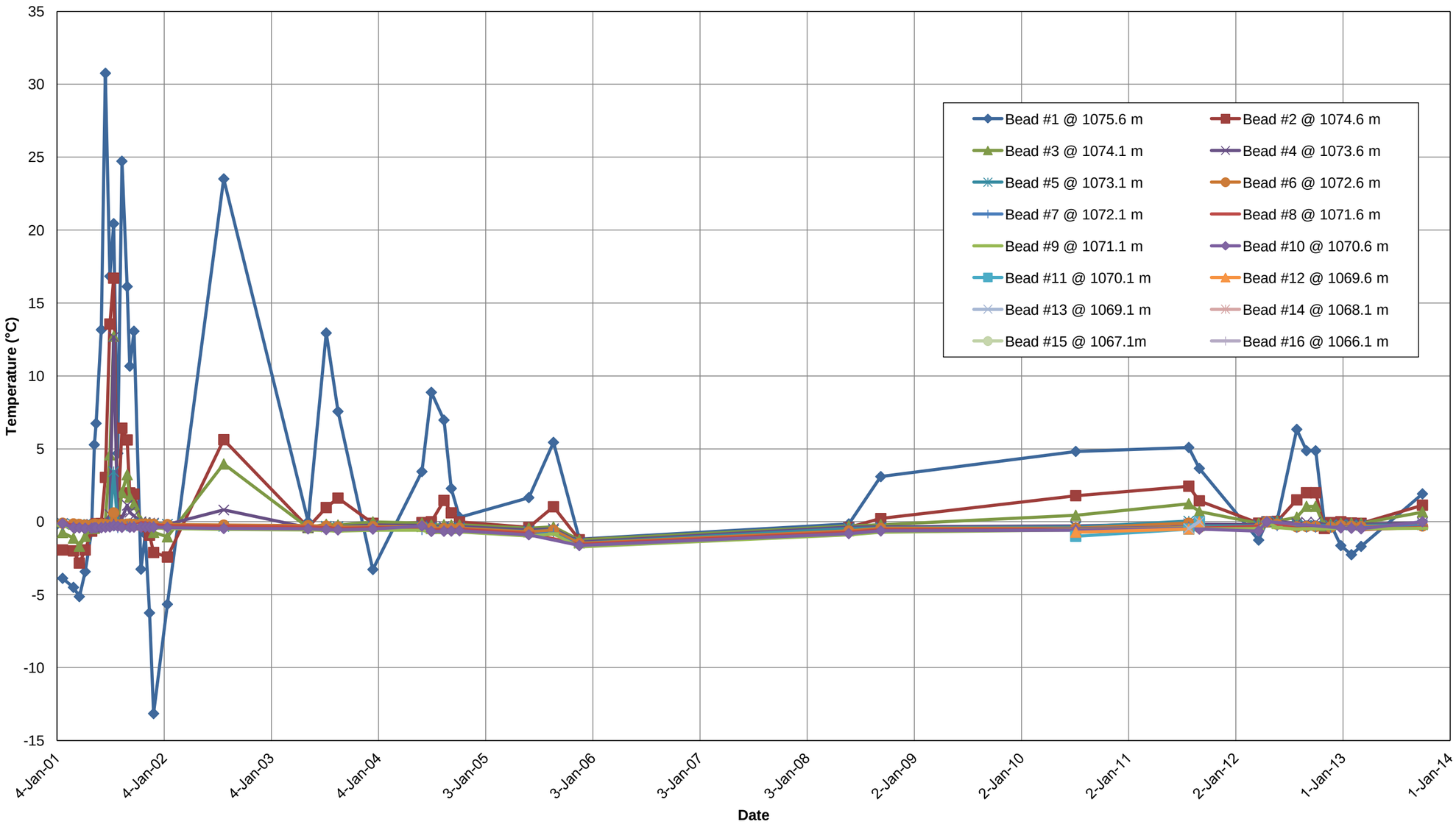



NOTE: 1) BH Location: Toe of Seepage Dam, North Centre
2) Ground surface: 1074.7 m.
3) Top two beads not functioning.
4) No data recorded for bottom three readings.
5) Only recent data collected for Beads #11, 12, and 13.
6) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. 1383
Date Installed: 01-01-20

Ground Temperature Profiles
14618-BH03

Last Updated: 29-Sep-13

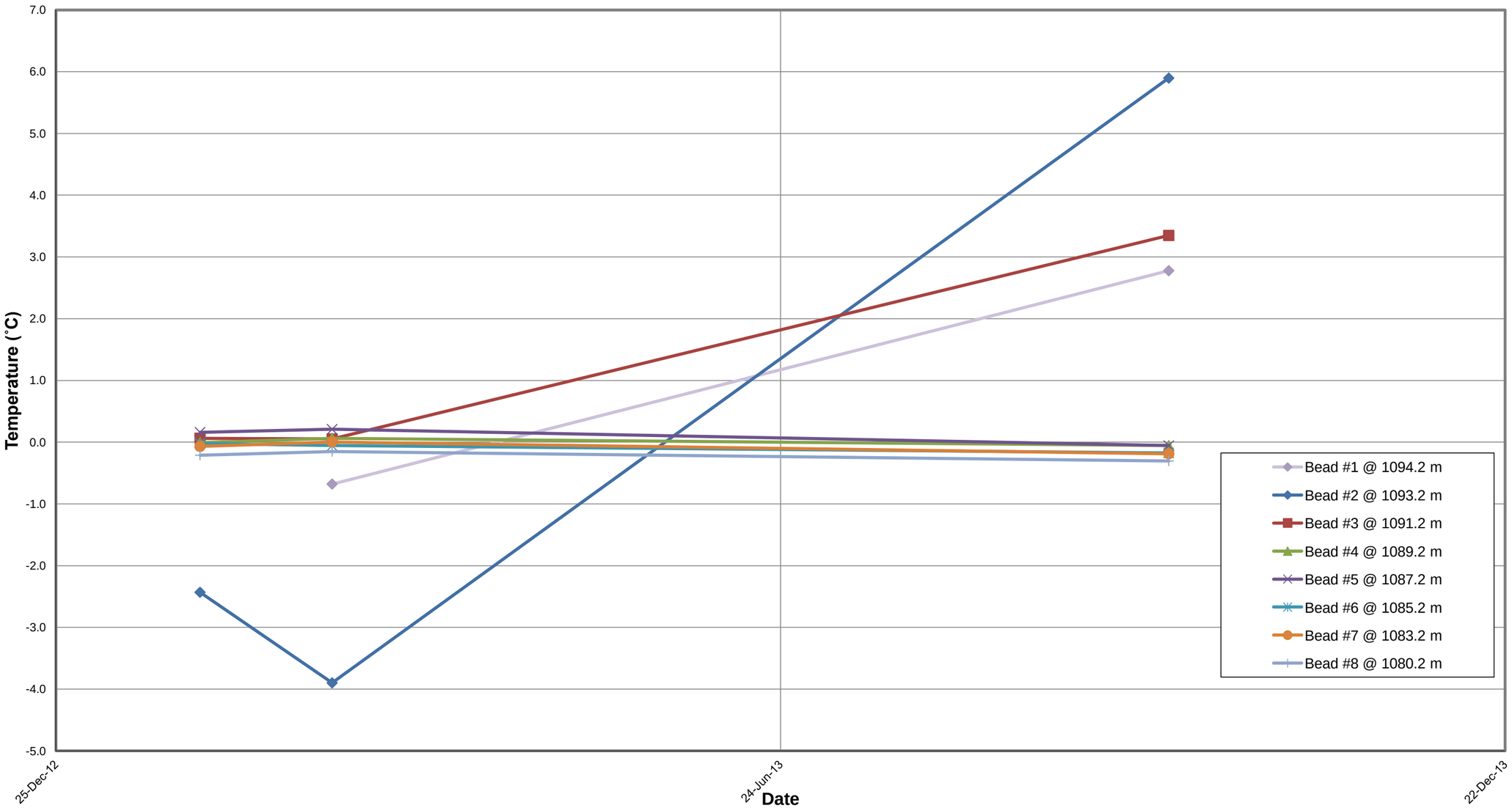



NOTE: 1) BH Location: Toe of Seepage Dam, South Centre
2) Ground surface: 1076.1 m.
3) Top two readings removed due to seasonal frost effects.
4) No readings taken on bottom six beads.
5) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. 1384
Date Installed: 01-01-20

Ground Temperature Profiles
14618-BH04

Last Updated: 29-Sep-13

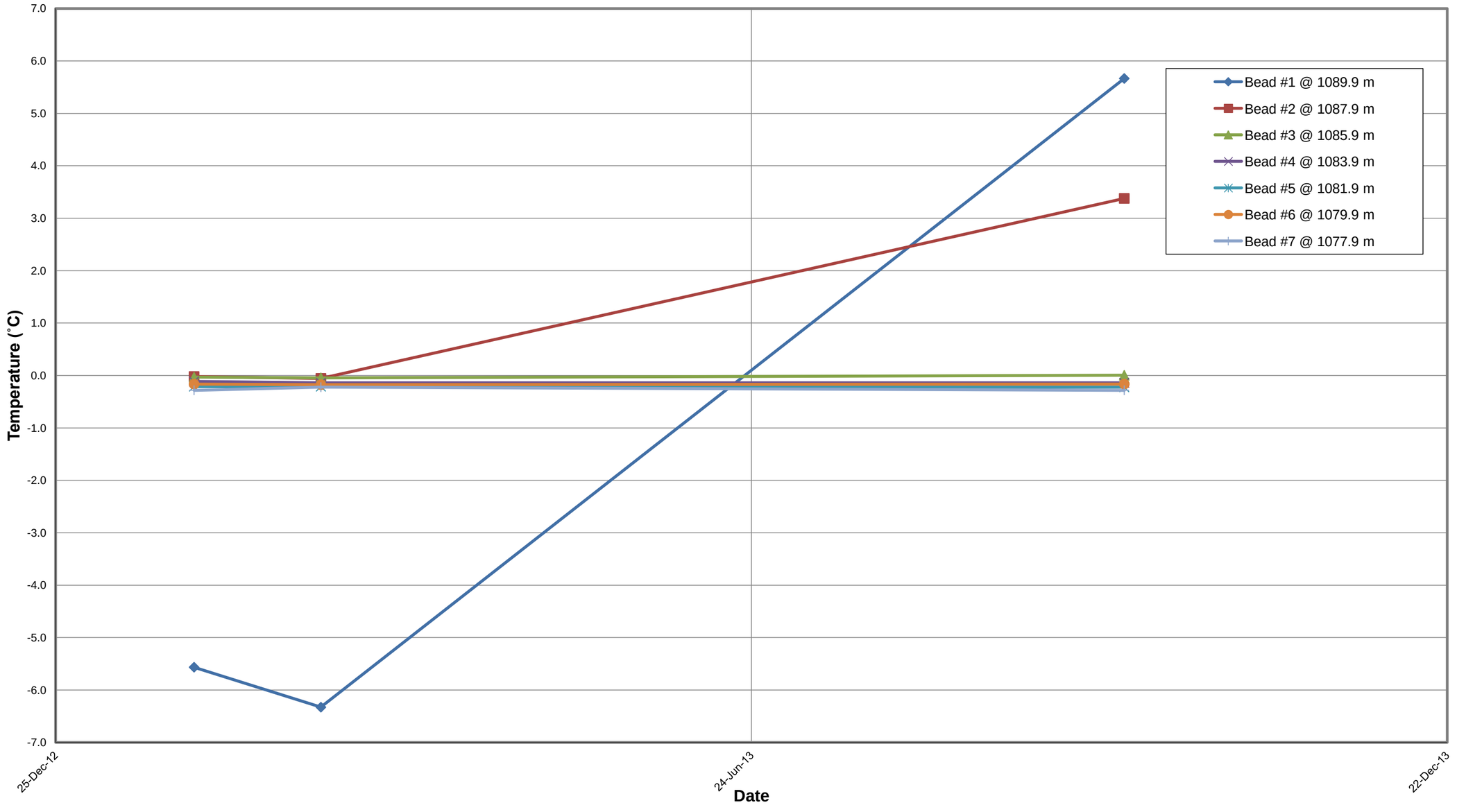



NOTE: 1) BH Location: North Abutment Above Seepage Collection Pond
2) Ground surface: 1094.8 m
3) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. 2364
Date Installed: 10-01-2012

Ground Temperature Profiles
W14103083-01 BH01

Last Updated: 29-Sep-13

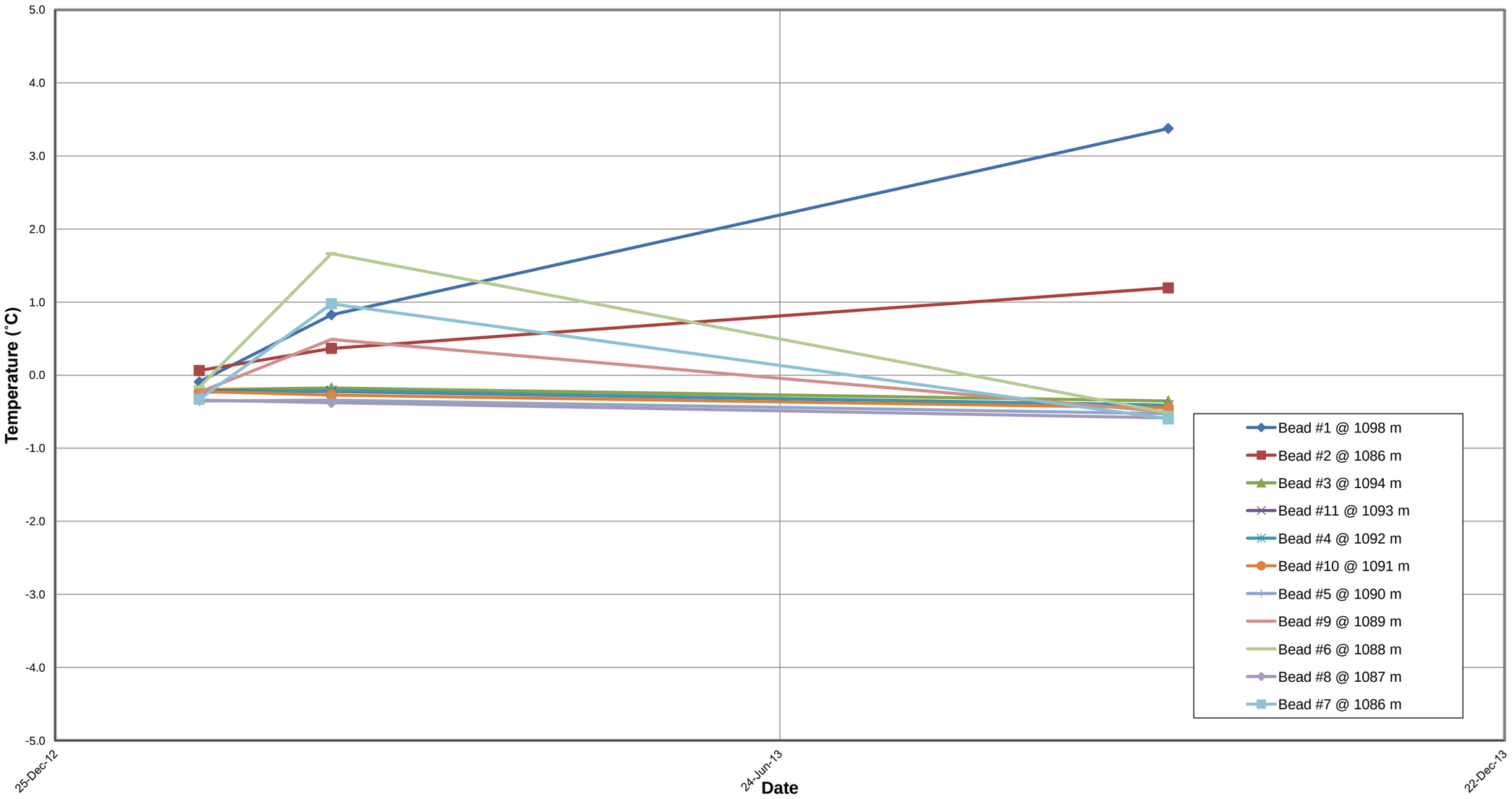



NOTE: 1) BH Location: North Abutment Above Seepage Collection Pond
2) Ground surface: 1091.6 m
3) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. 2365
Date Installed: 10-02-2012

Ground Temperature Profiles
W14103083-01 BH02

Last Updated: 29-Sep-13

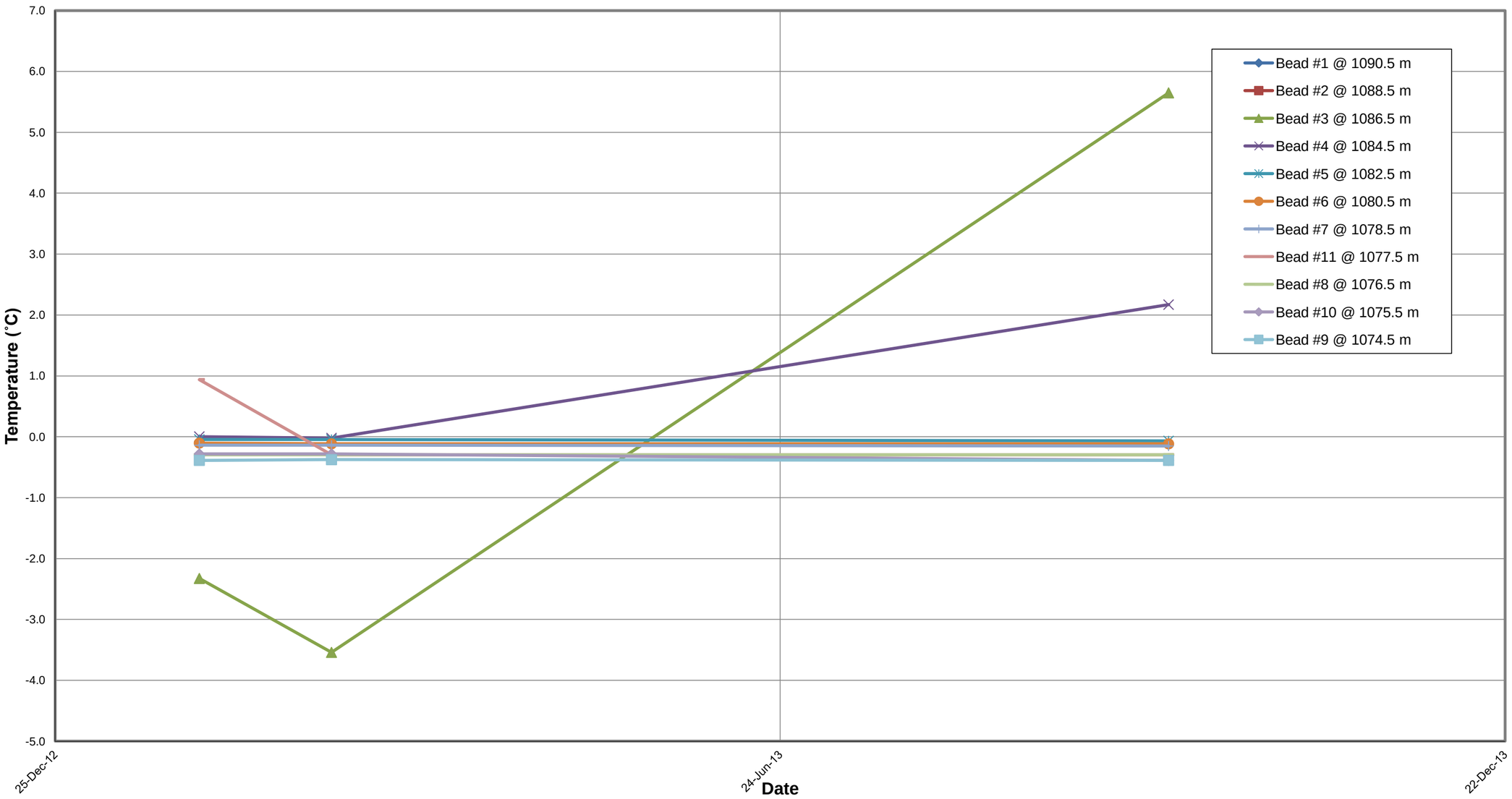



NOTE: 1) BH Location: Upper Tailings Pond, East Side
2) Ground surface: 1099.0 m
3) No data recorded for bottom 2 readings.
4) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

Serial No. 2362
Date Installed: 10-02-2012

Ground Temperature Profiles
W14103083-01 BH03

Last Updated: 29-Sep-13

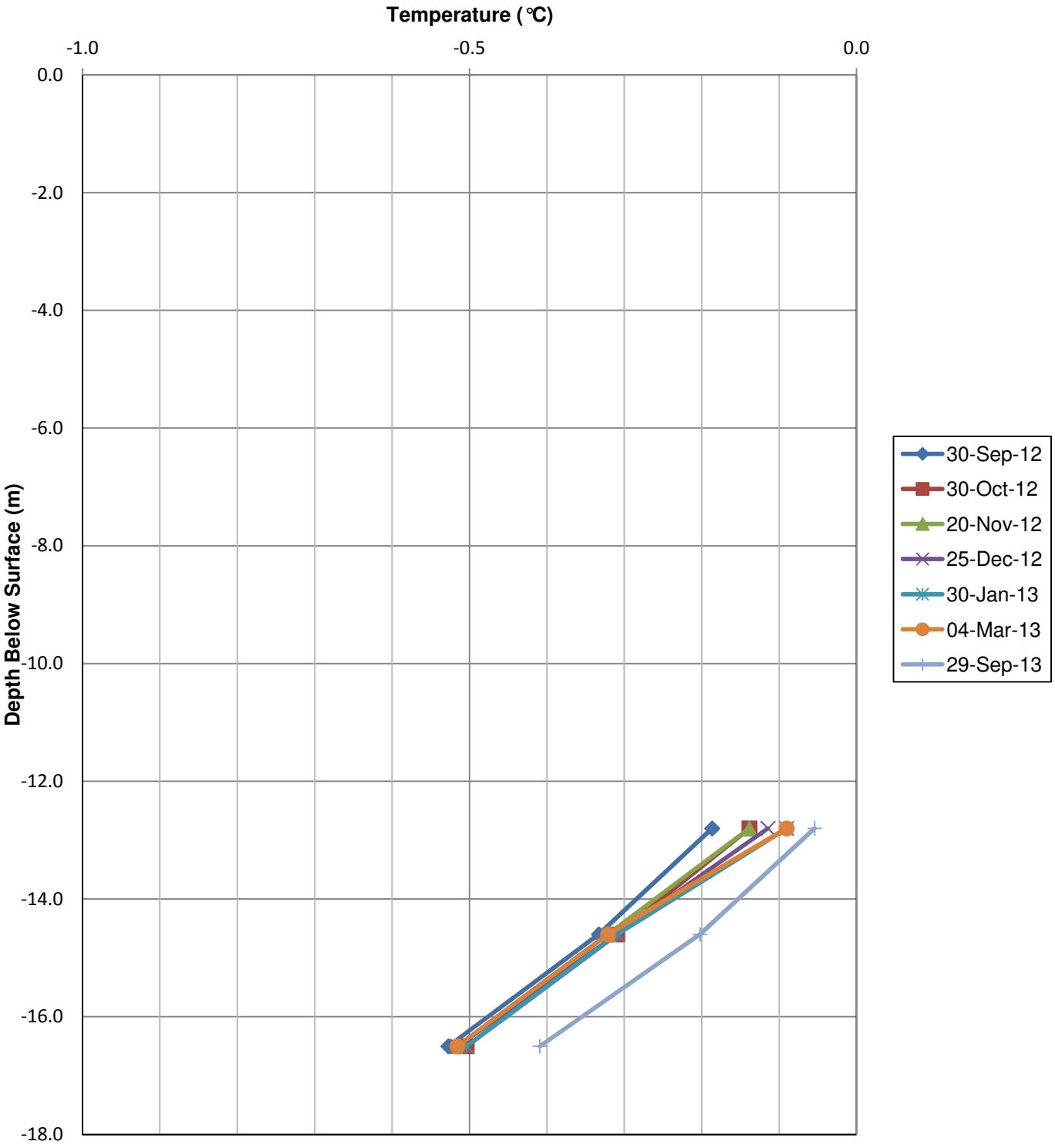



NOTE: 1) BH Location: North Abutment Above Seepage Collection Pond
2) Ground surface: 1092.8 m
3) All readings up to and including March 4,2013 were performed by EBA Engineering Consultants Ltd.

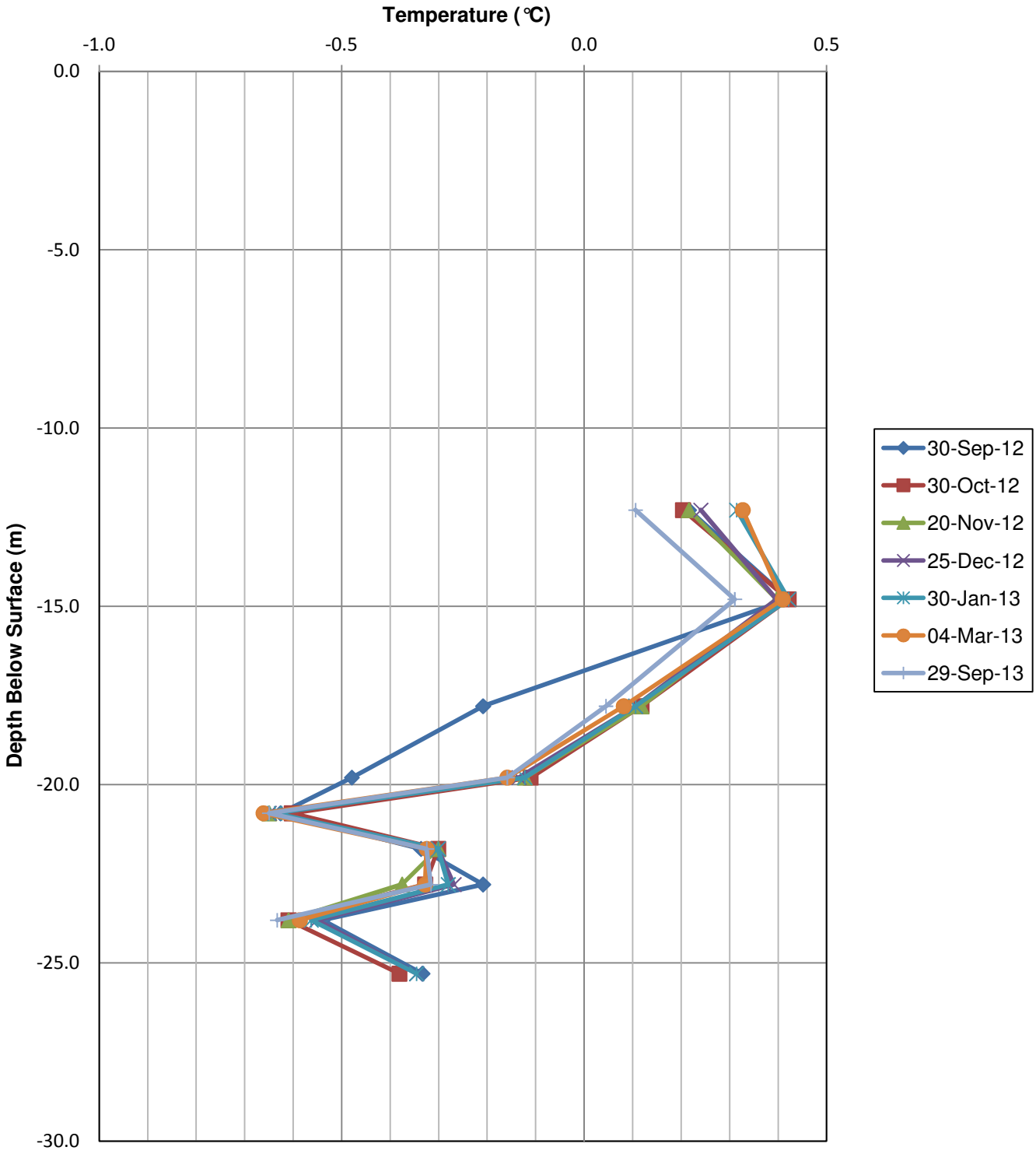
Serial No. 2363
Date Installed: 10-02-2012

Ground Temperature Profiles
W14103083-01 BH04

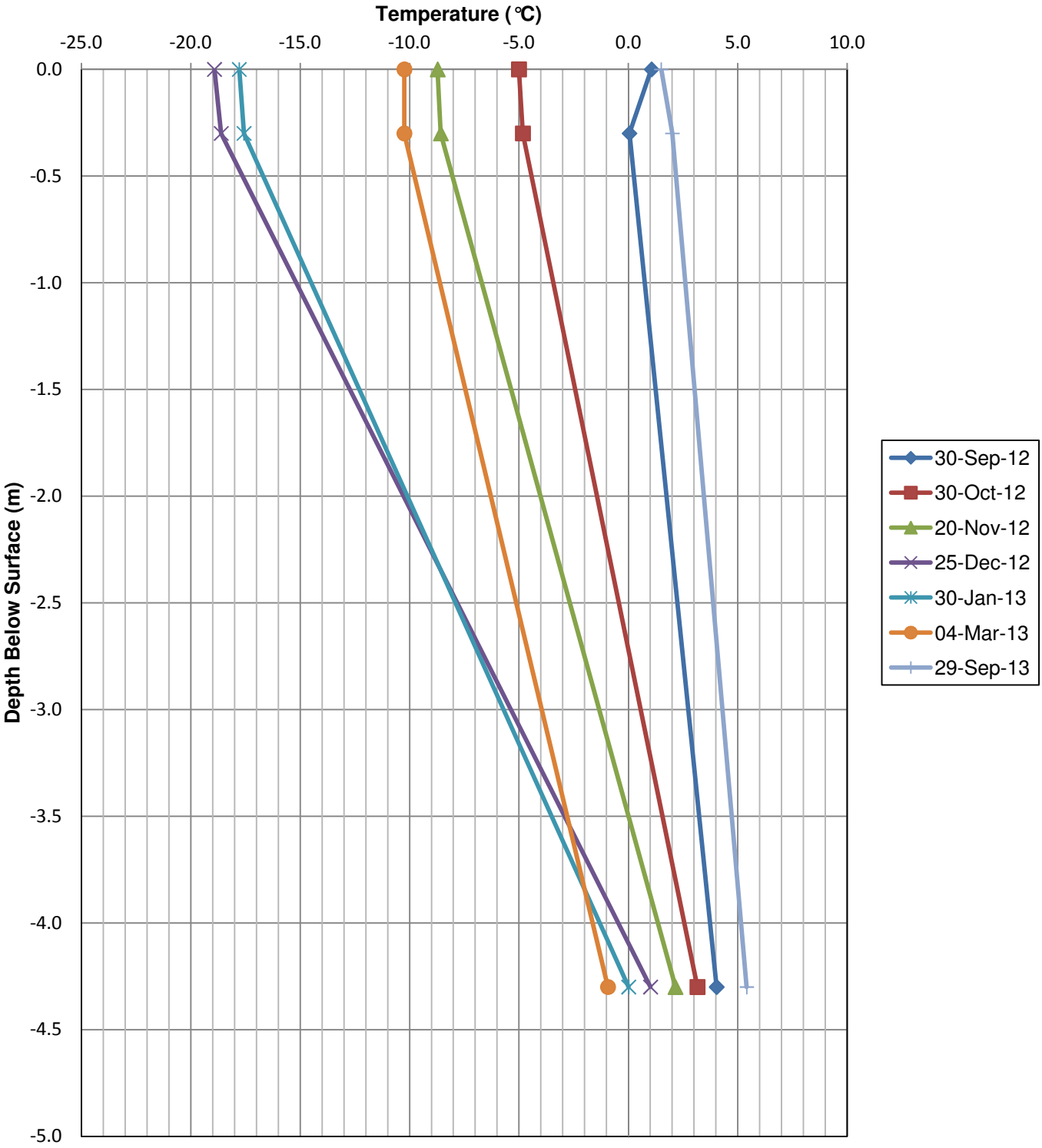
# BH 12861-01: Cable # 1178



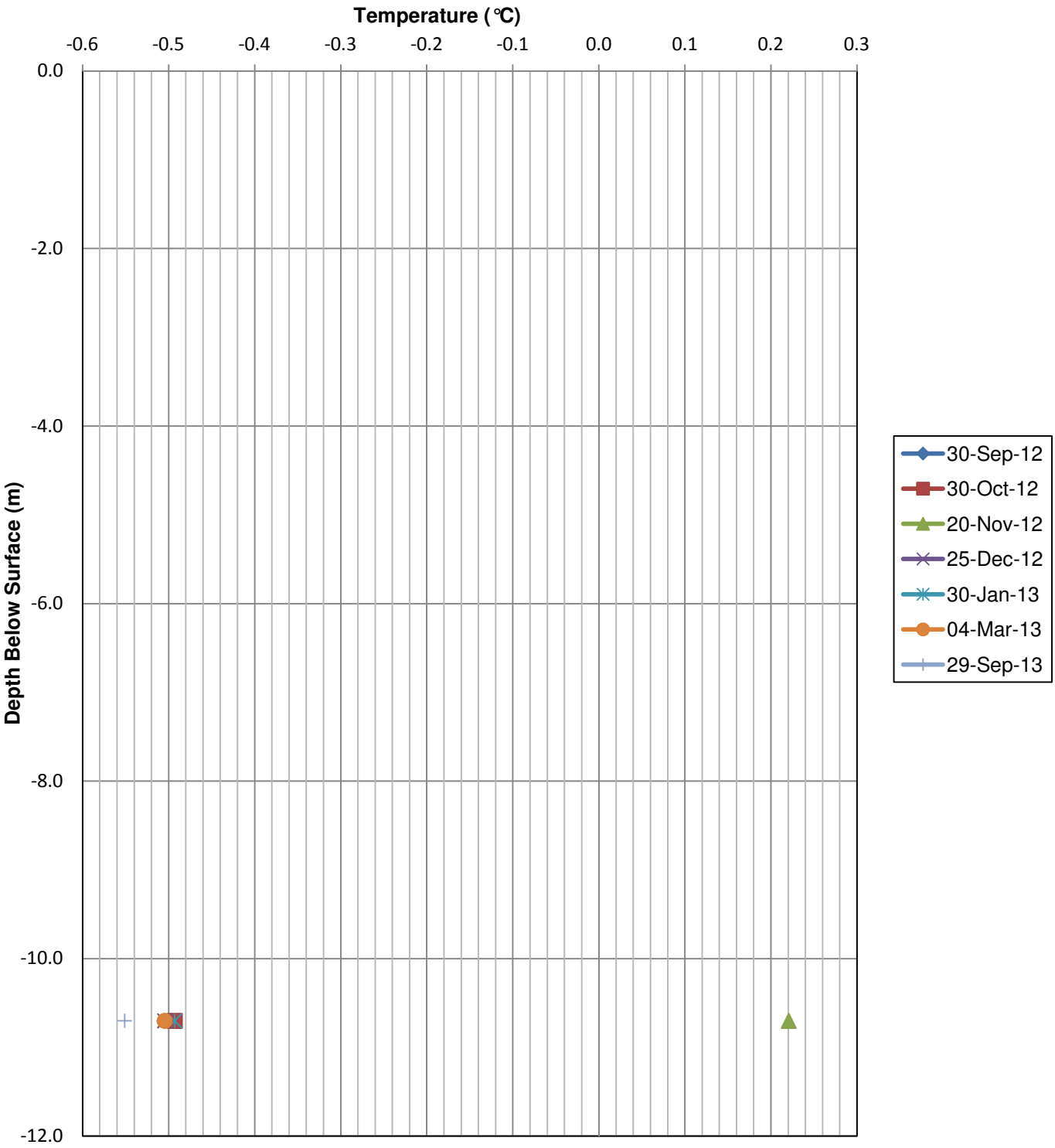
# BH 12861-02: Cable #1179



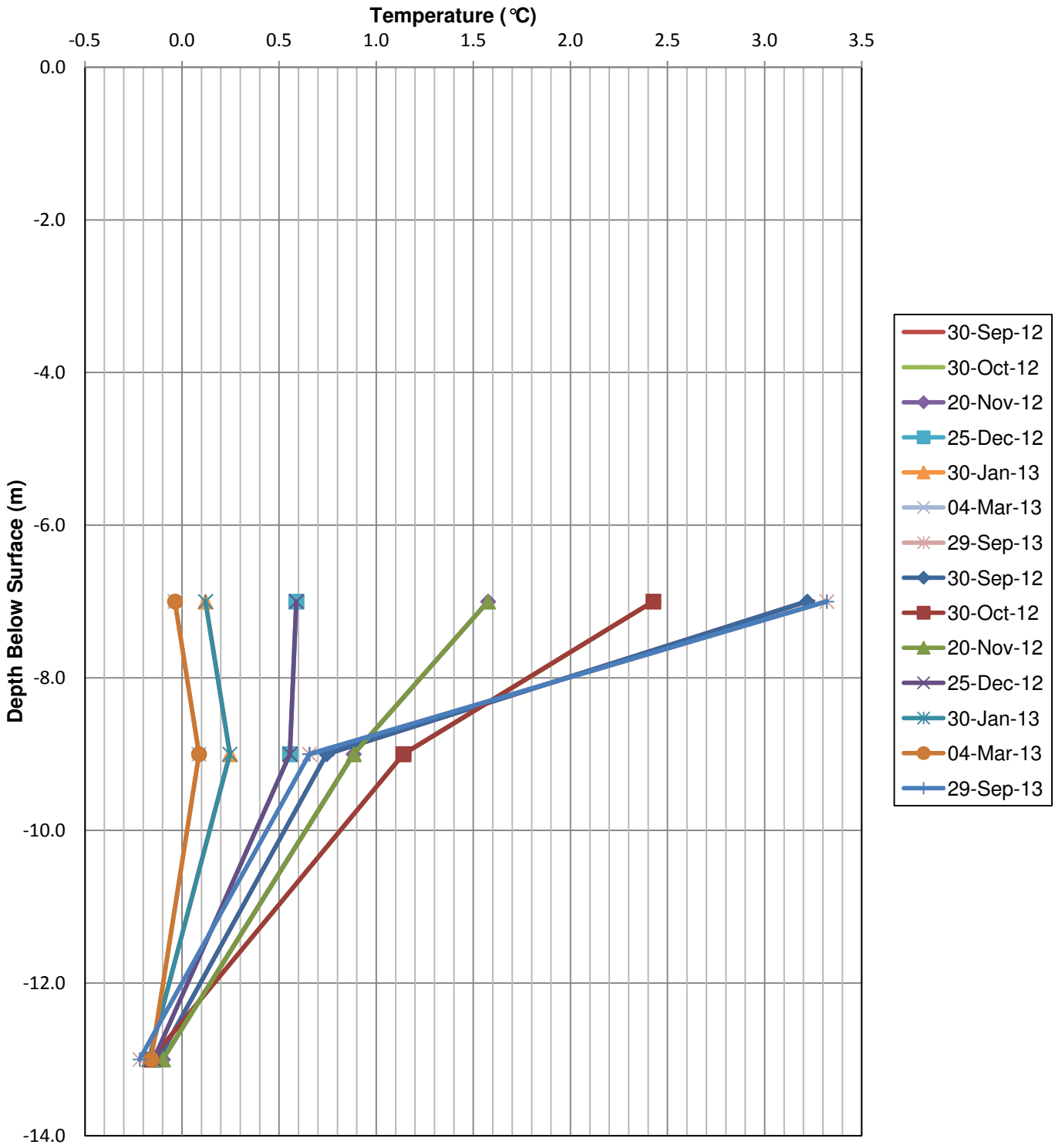
# BH 12861-03: Cable #1180



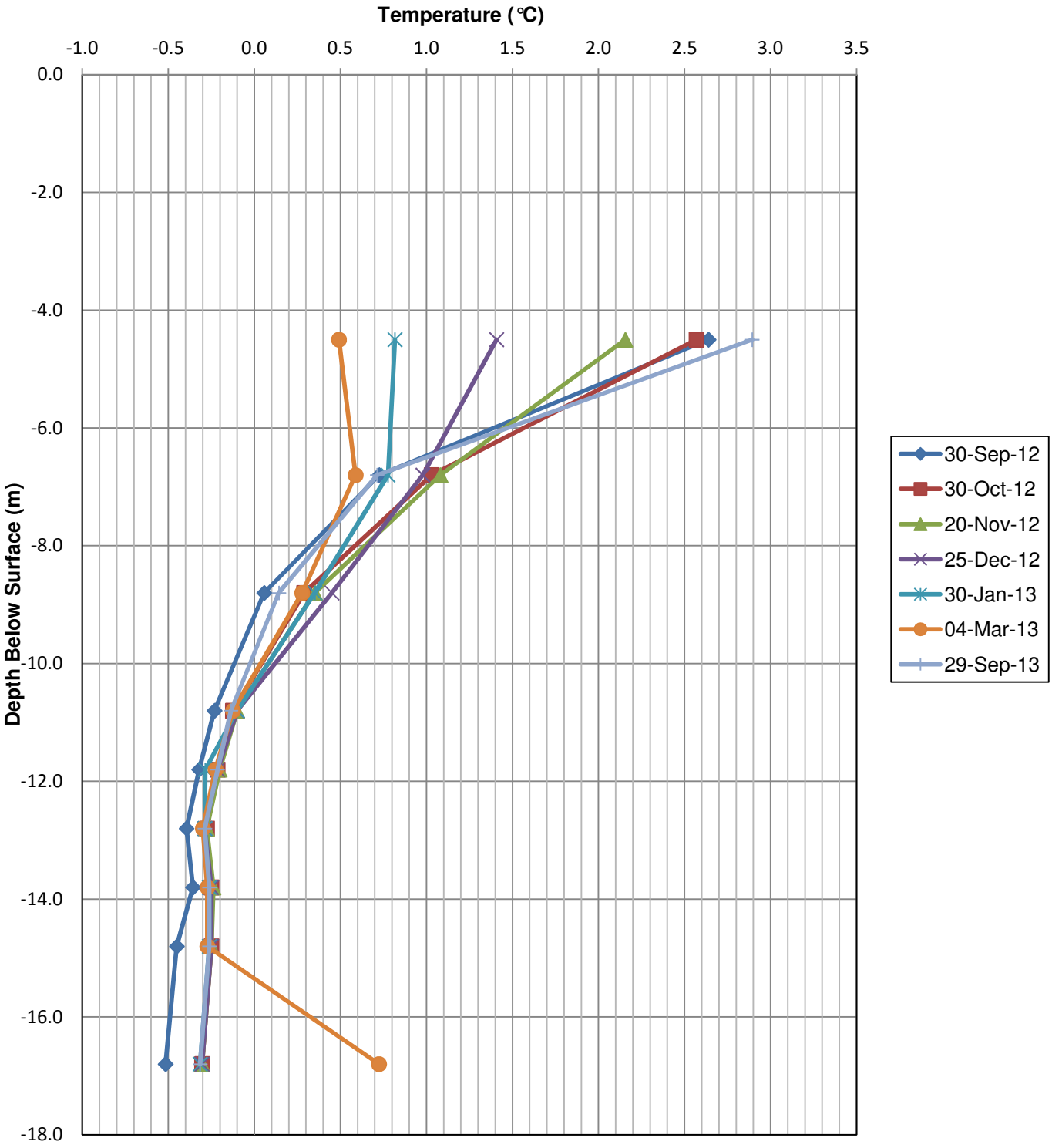
# BH 12861-04: Single Bead



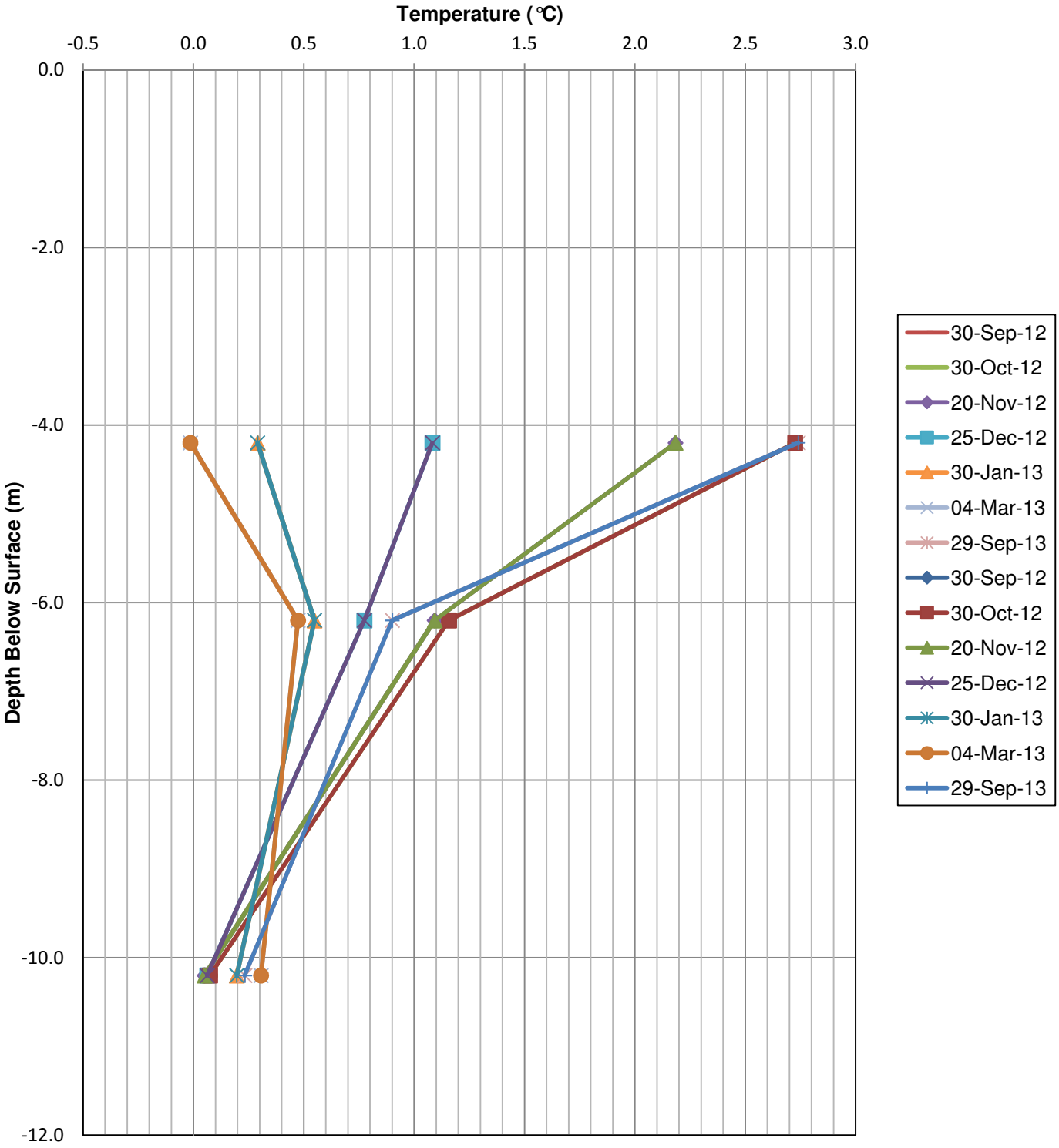
# BH 12861-05: Cable #1181



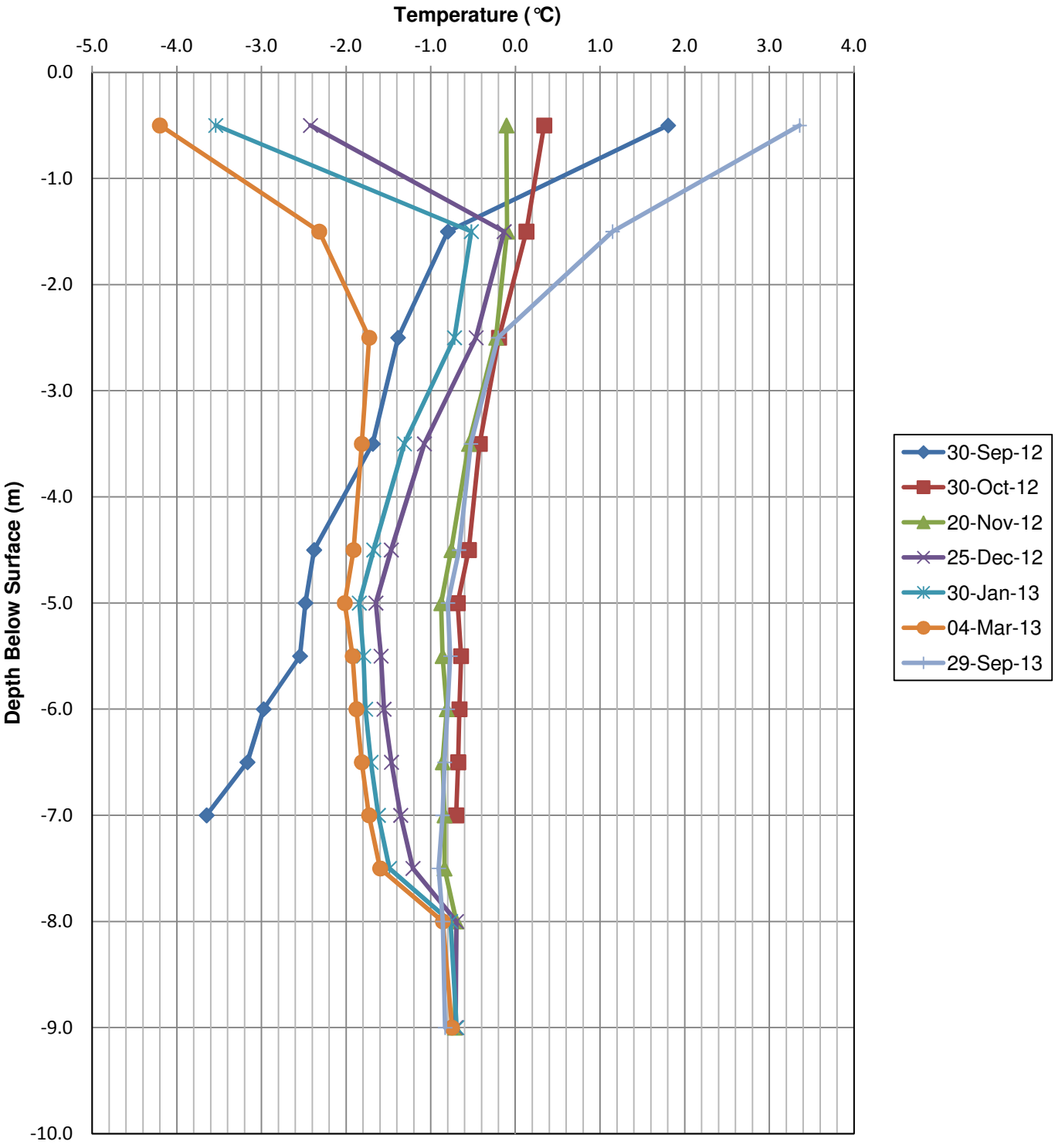
# BH 12861-06: Cable #1182



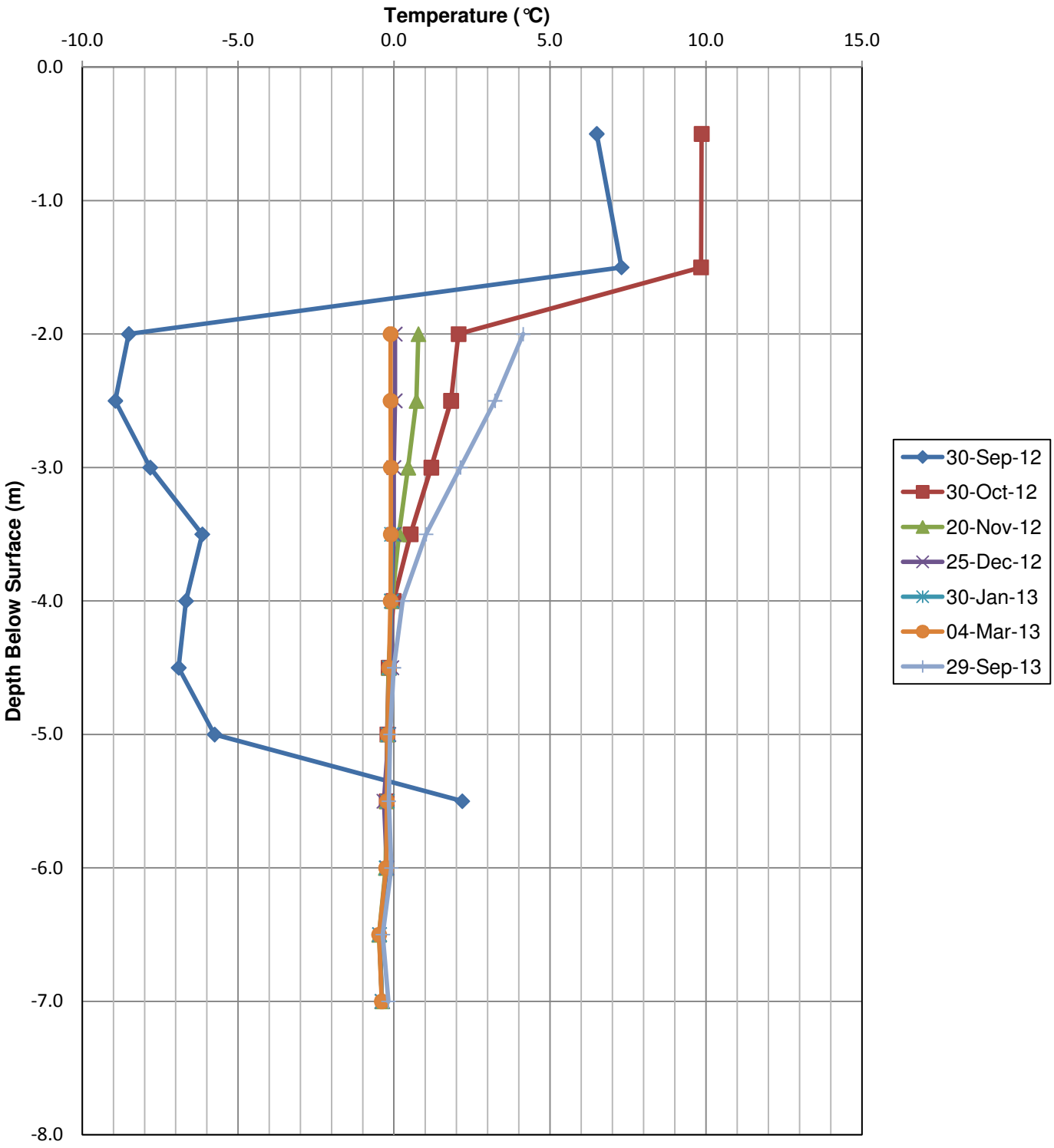
# BH 12861-07: Cable #1183



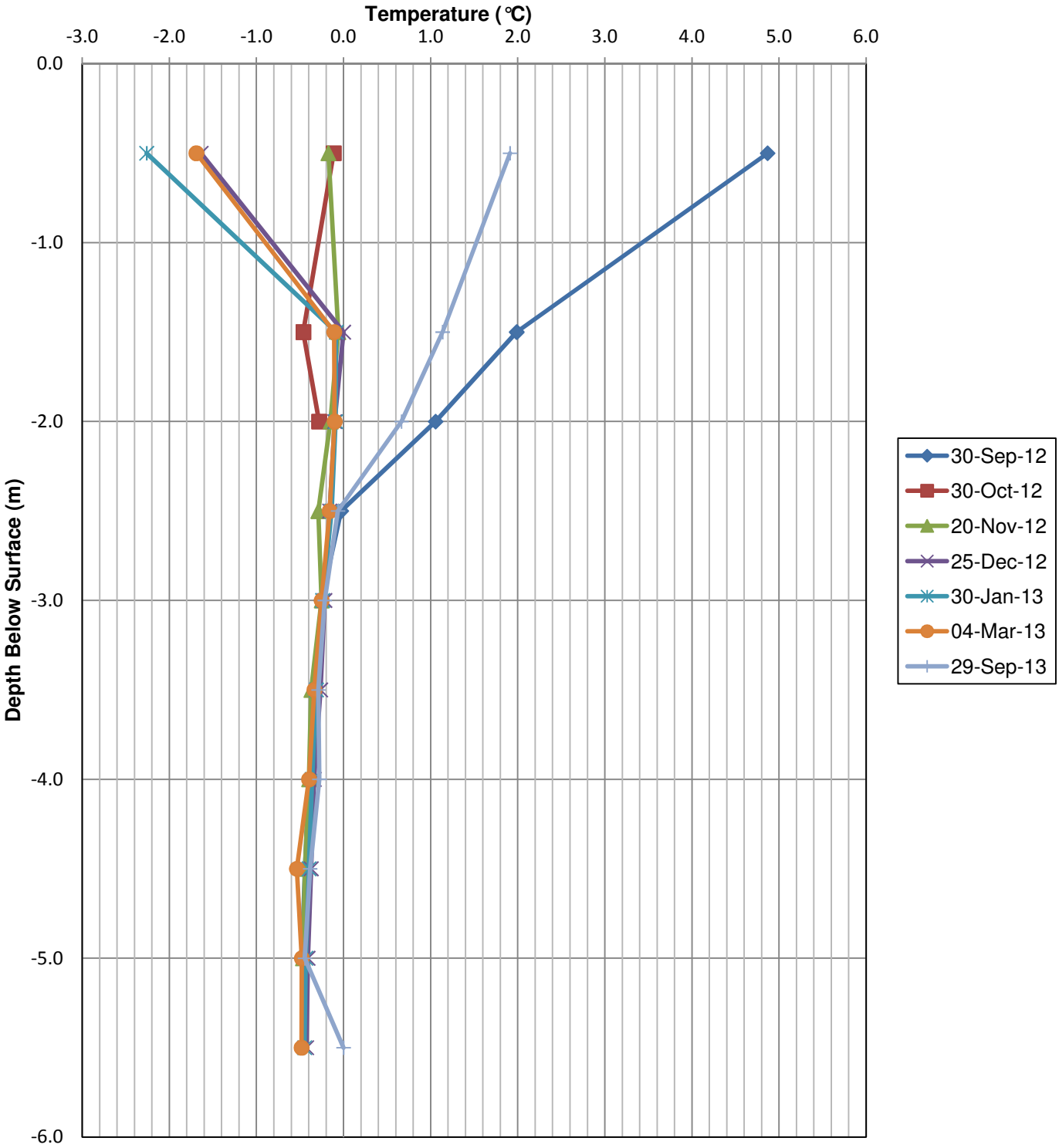
# 14618-BH01


Temperature (°C)
-5.0
-4.0
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
Depth Below Surface (m)
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
-6.0
-7.0
-8.0
-9.0
-10.0
30-Sep-12
30-Oct-12
20-Nov-12
25-Dec-12
30-Jan-13
04-Mar-13
29-Sep-13

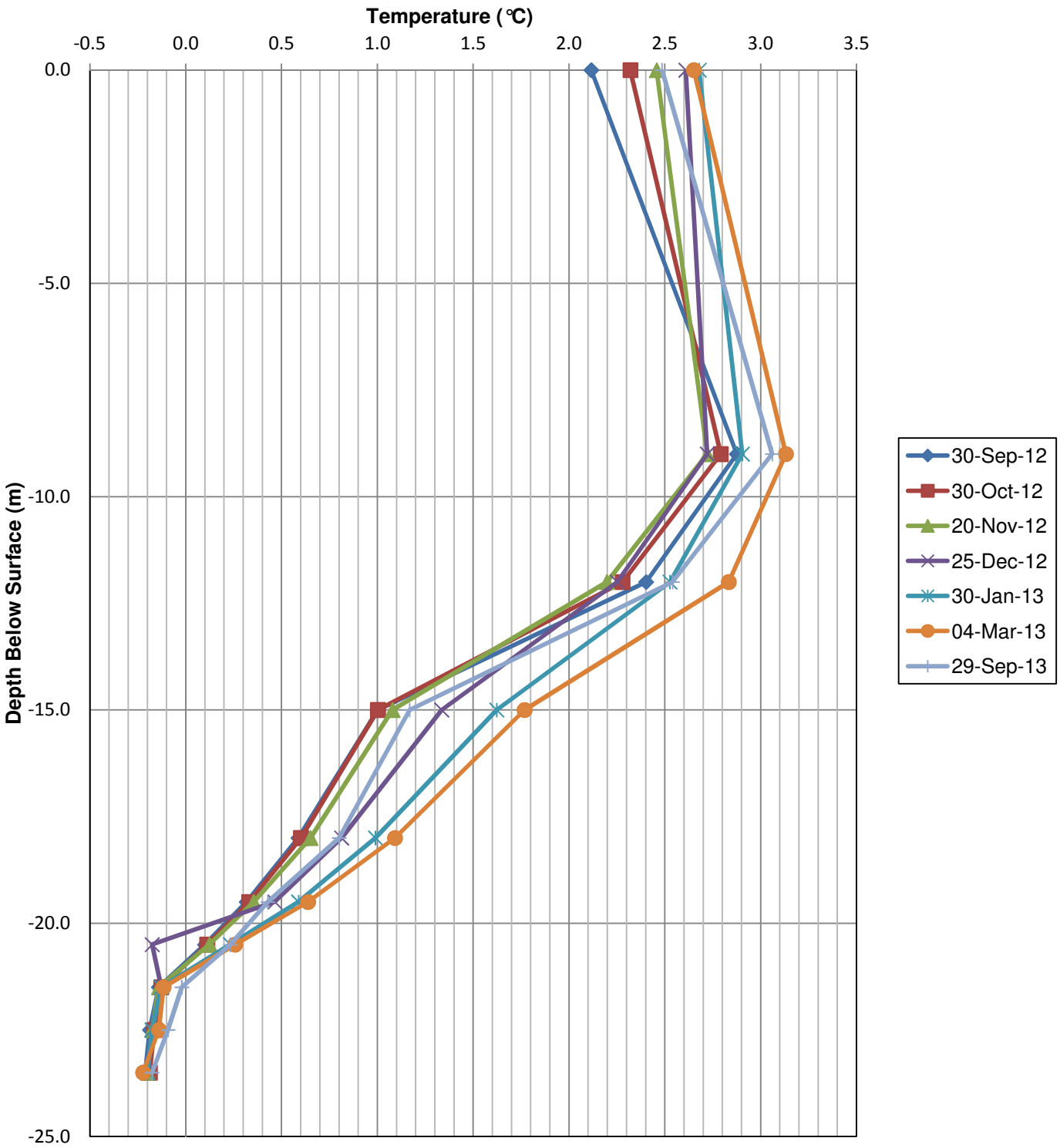
# 14618-BH03


Temperature (°C)
-10.0
-5.0
0.0
5.0
10.0
15.0
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
-6.0
-7.0
-8.0
Depth Below Surface (m)
30-Sep-12
30-Oct-12
20-Nov-12
25-Dec-12
30-Jan-13
04-Mar-13
29-Sep-13

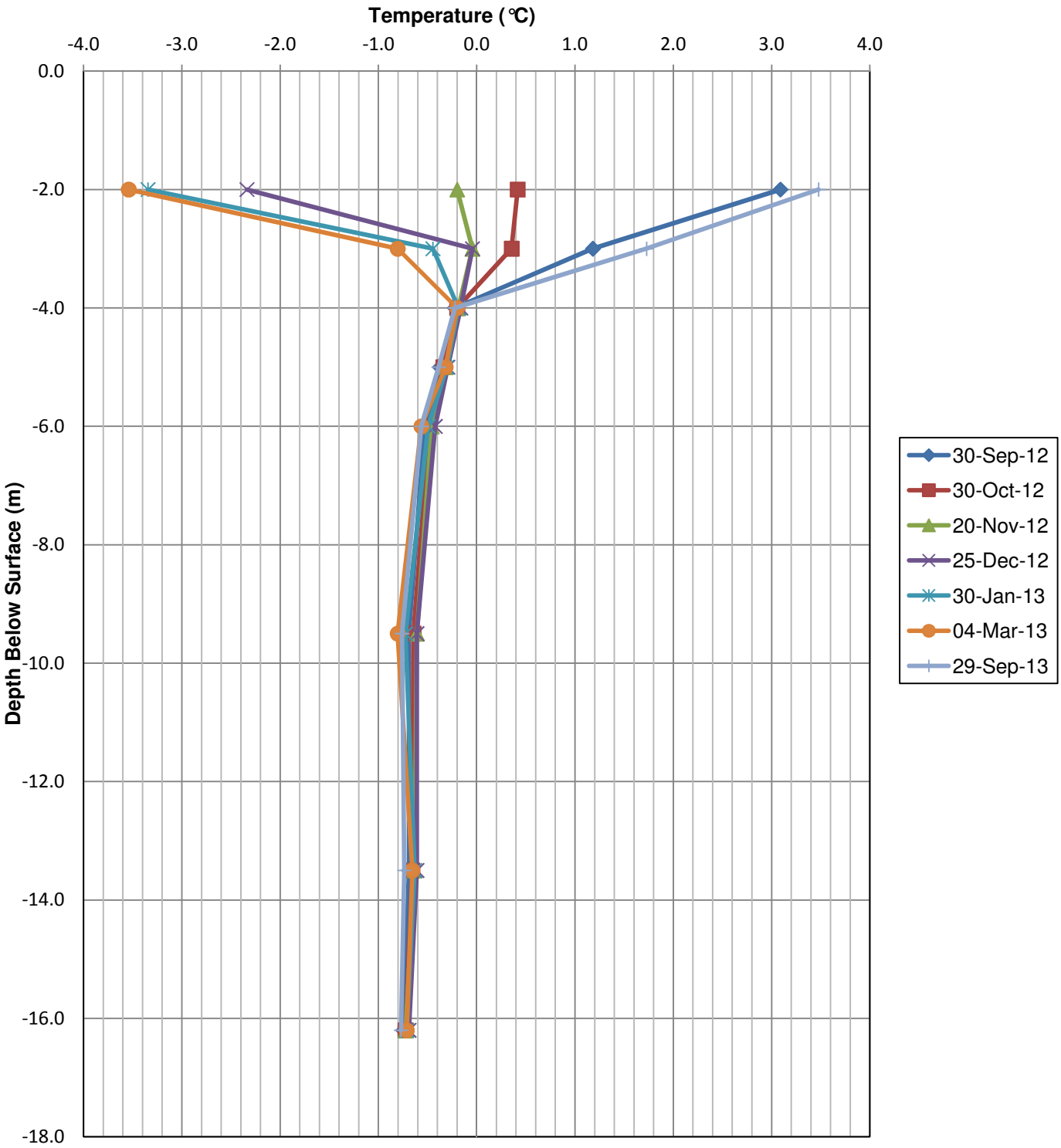
# 14618-BH04


Temperature (°C)
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
-6.0
Depth Below Surface (m)
30-Sep-12
30-Oct-12
20-Nov-12
25-Dec-12
30-Jan-13
04-Mar-13
29-Sep-13

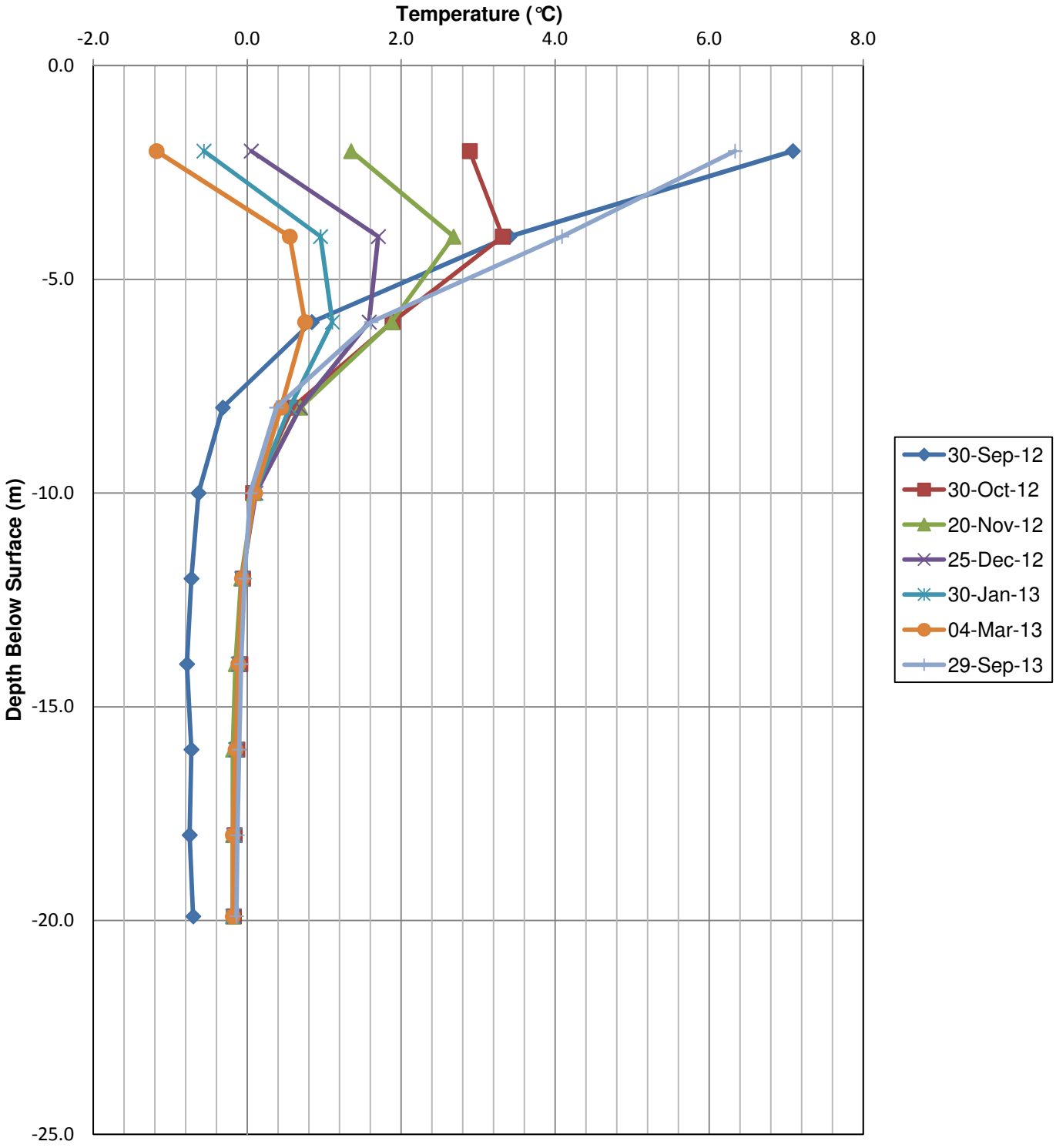
# GT09-01 Cable #1



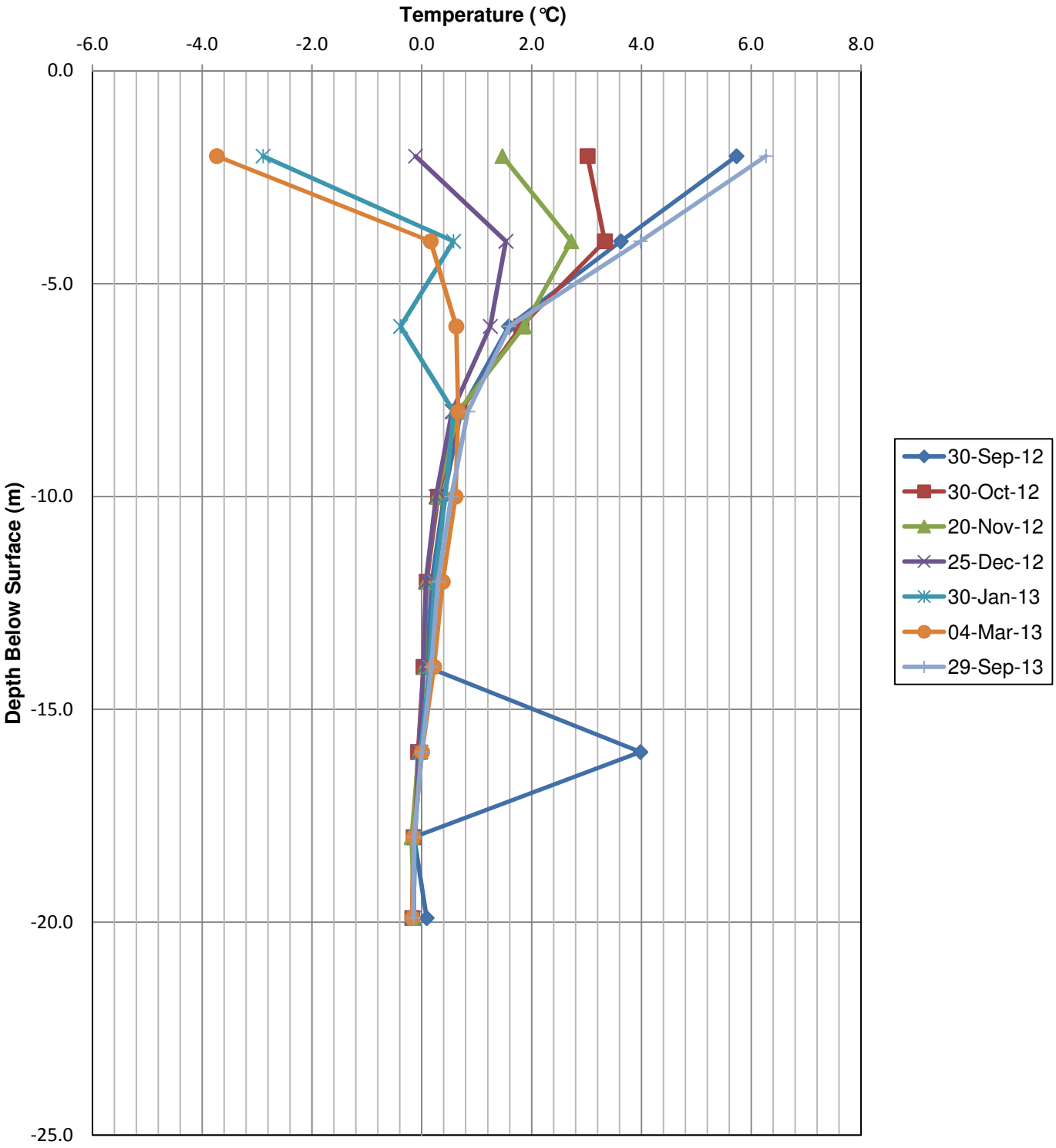
# GT09-05 Cable #2



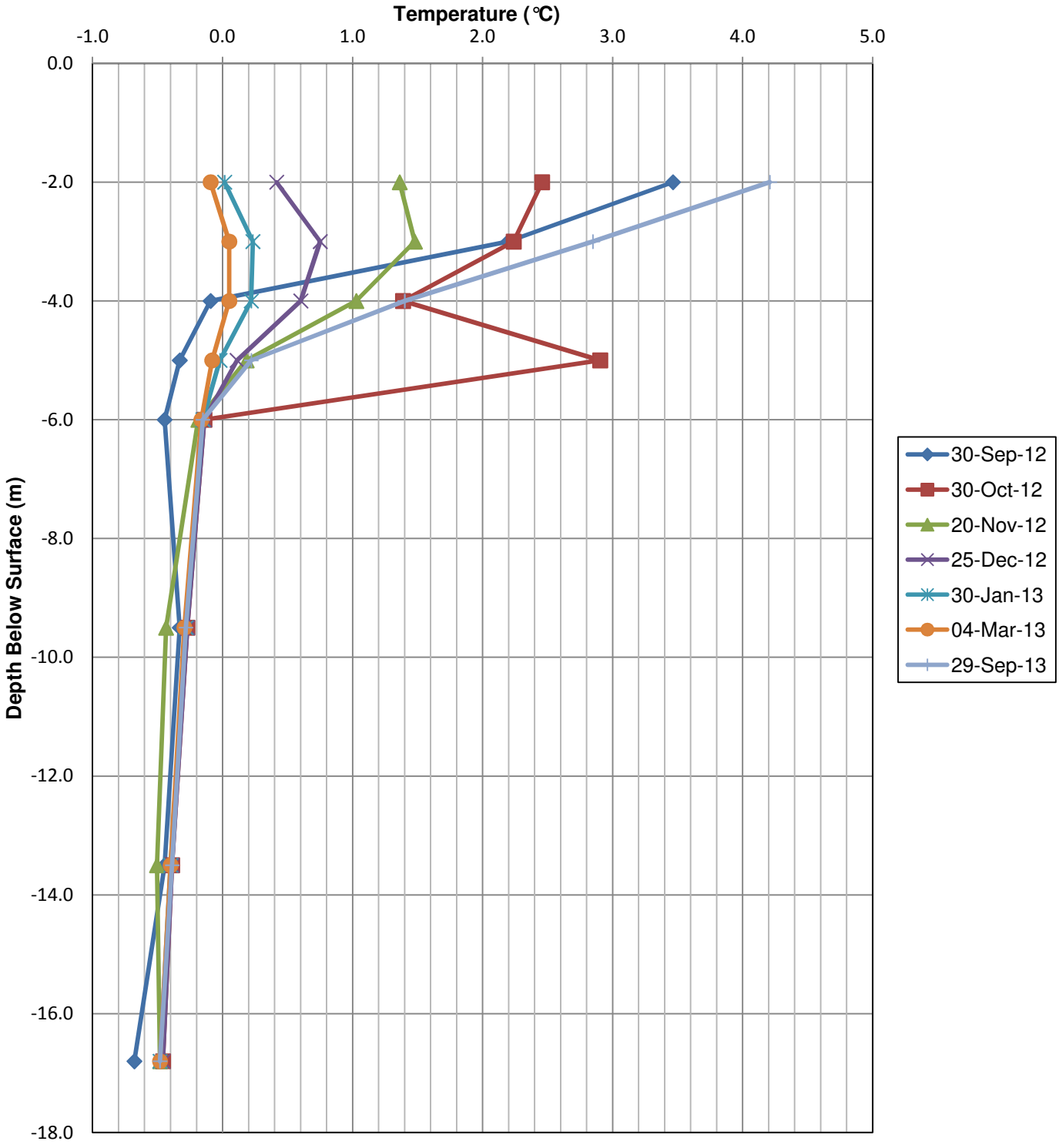
# GT09-04 Cable #3



# GT09-03 Cable #4



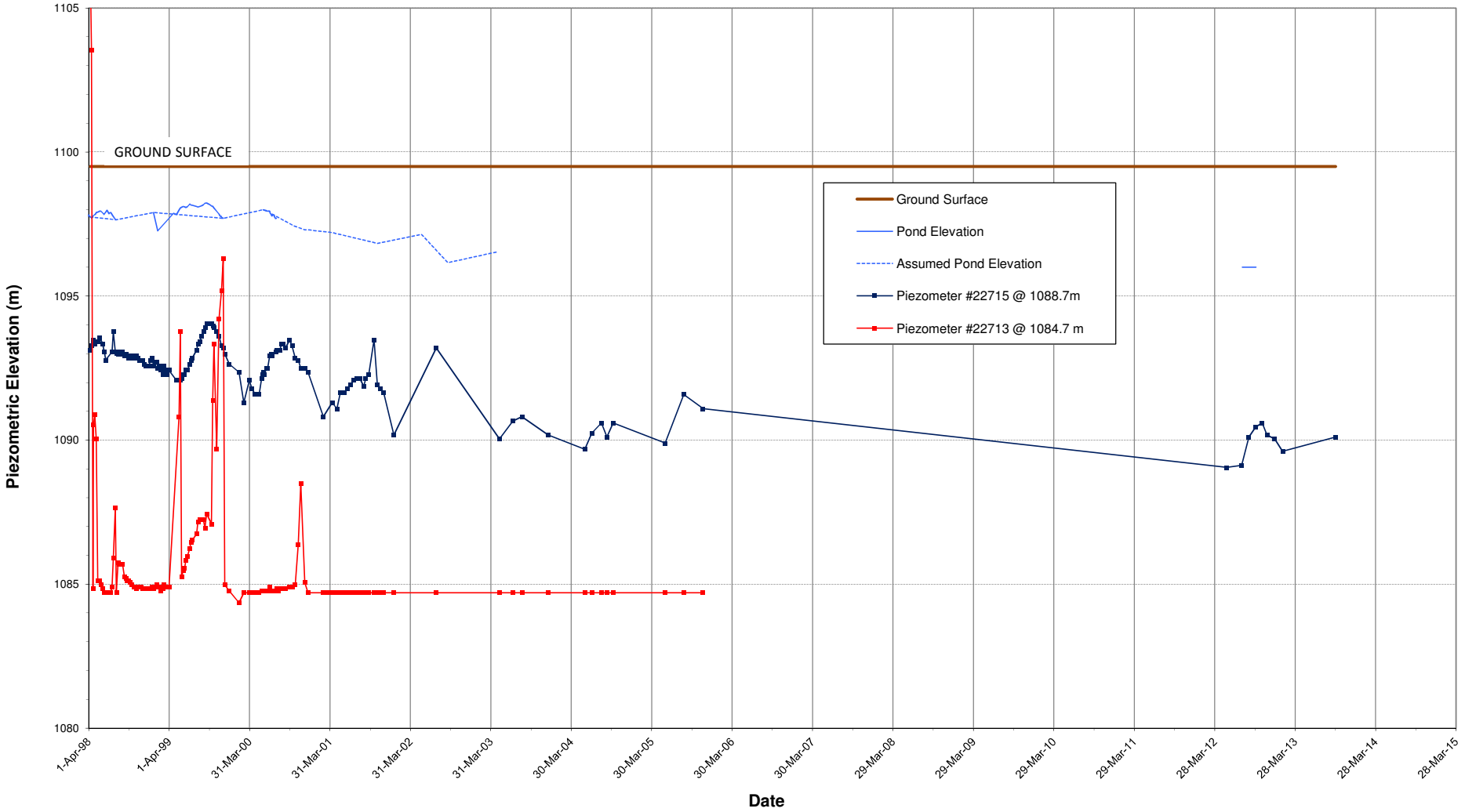
# GT09-02 Cable #5



# Appendix F2

# TSF Standpipe and Pneumatic Piezometer Readings

Last Updated: 28-Sep-13

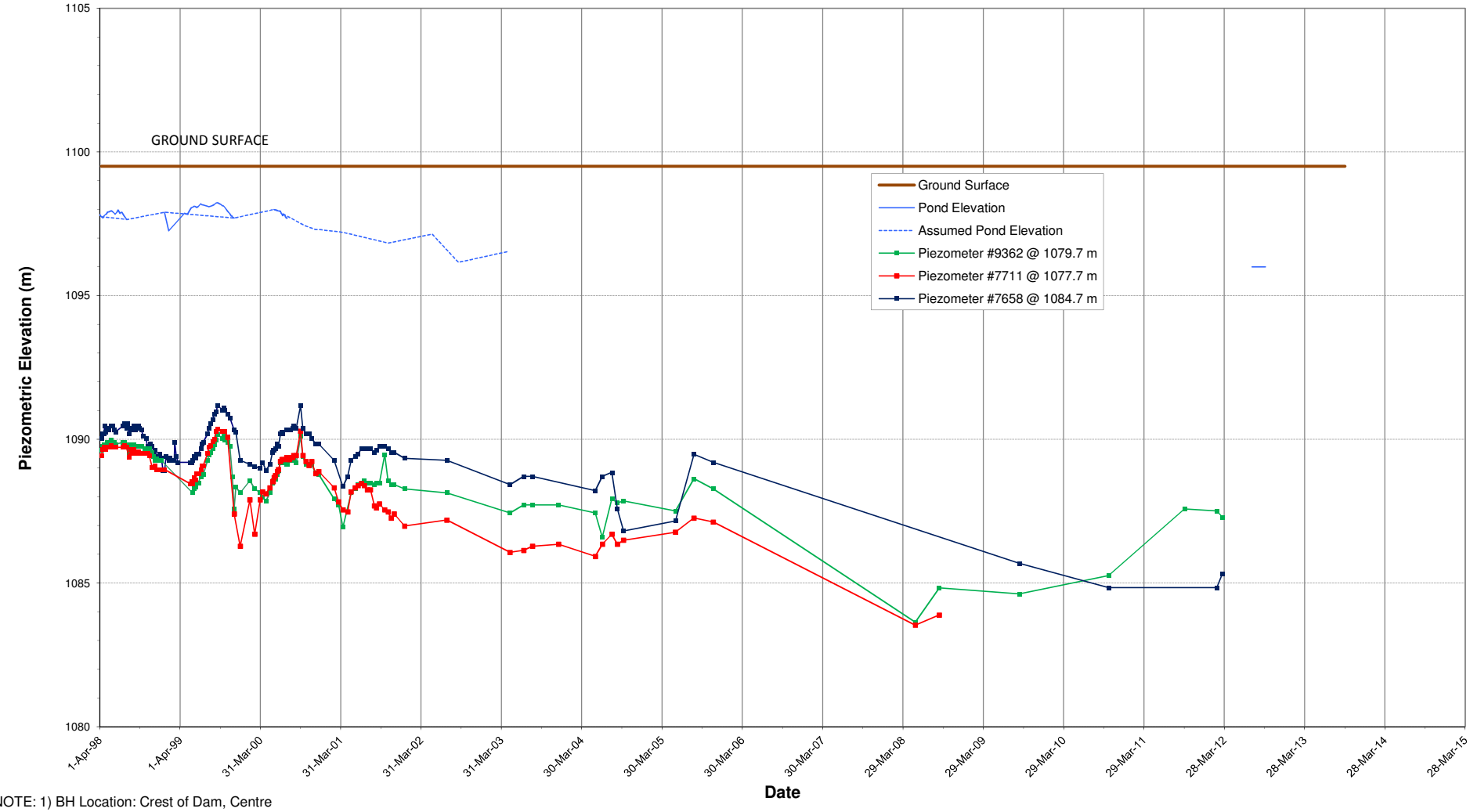



NOTE: 1) BH Location: Crest of Dam, S End
2) Ground surface: 1099.3 m.
3) Fill and native ground interface: 1137.7 m.
4) All readings up to and including January 30,2013 were performed by EBA Engineering Consultants Ltd.

Date Installed: 98-03-24

Piezometric Elevation Profile
BH 12861-01

Last Updated: 28-Sep-13

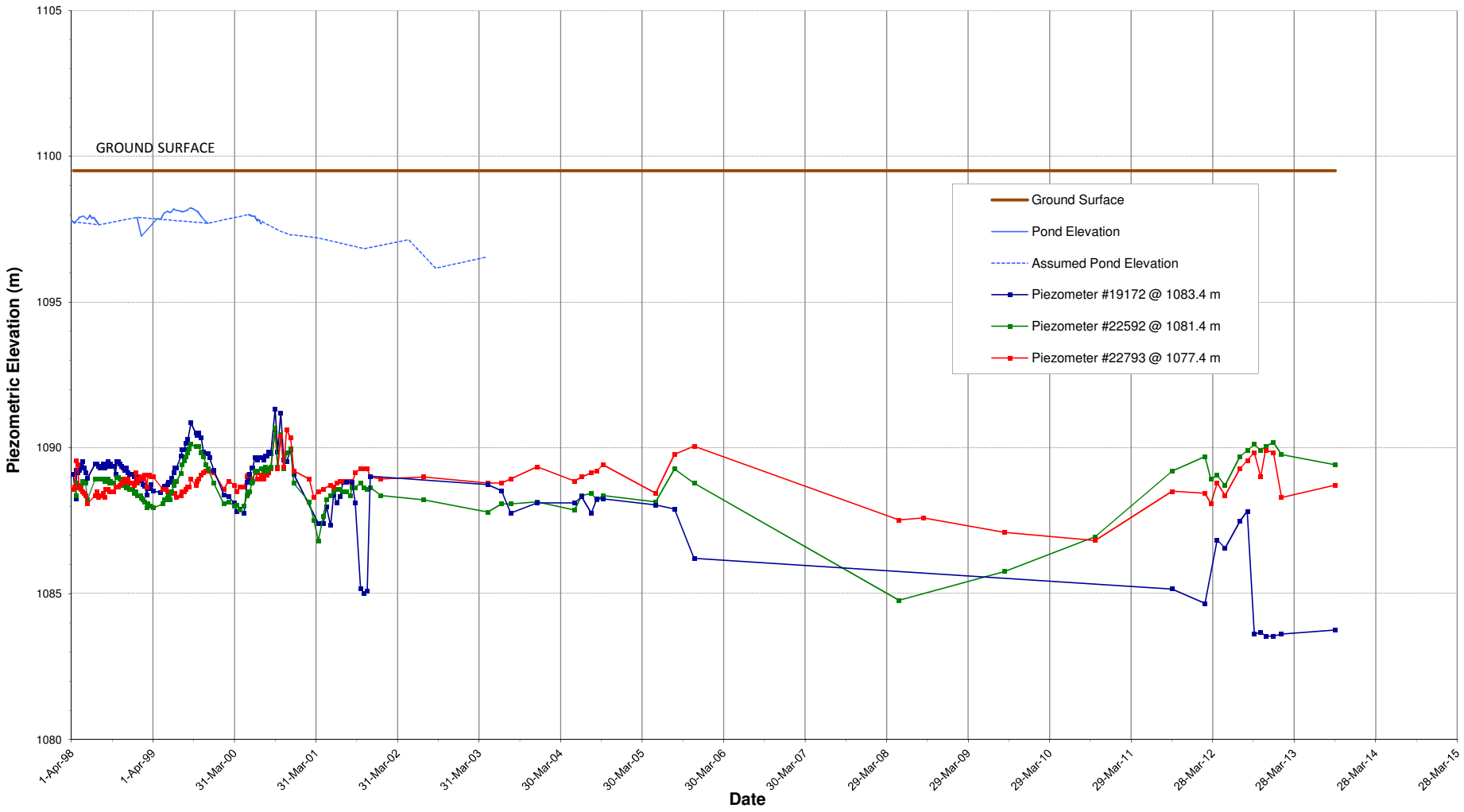



NOTE: 1) BH Location: Crest of Dam, Centre
2) Ground surface: 1099.5 m.
3) Fill and native ground interface: 1080.3 m.
4) Piezometer not functioning/abandoned July 2012.
5) All readings up to and including January 30,2013 were performed by EBA Engineering Consultants Ltd.

Date Installed: 98-03-25

Piezometric Elevation Profiles
BH 12861-02

Last Updated: 28-Sep-13

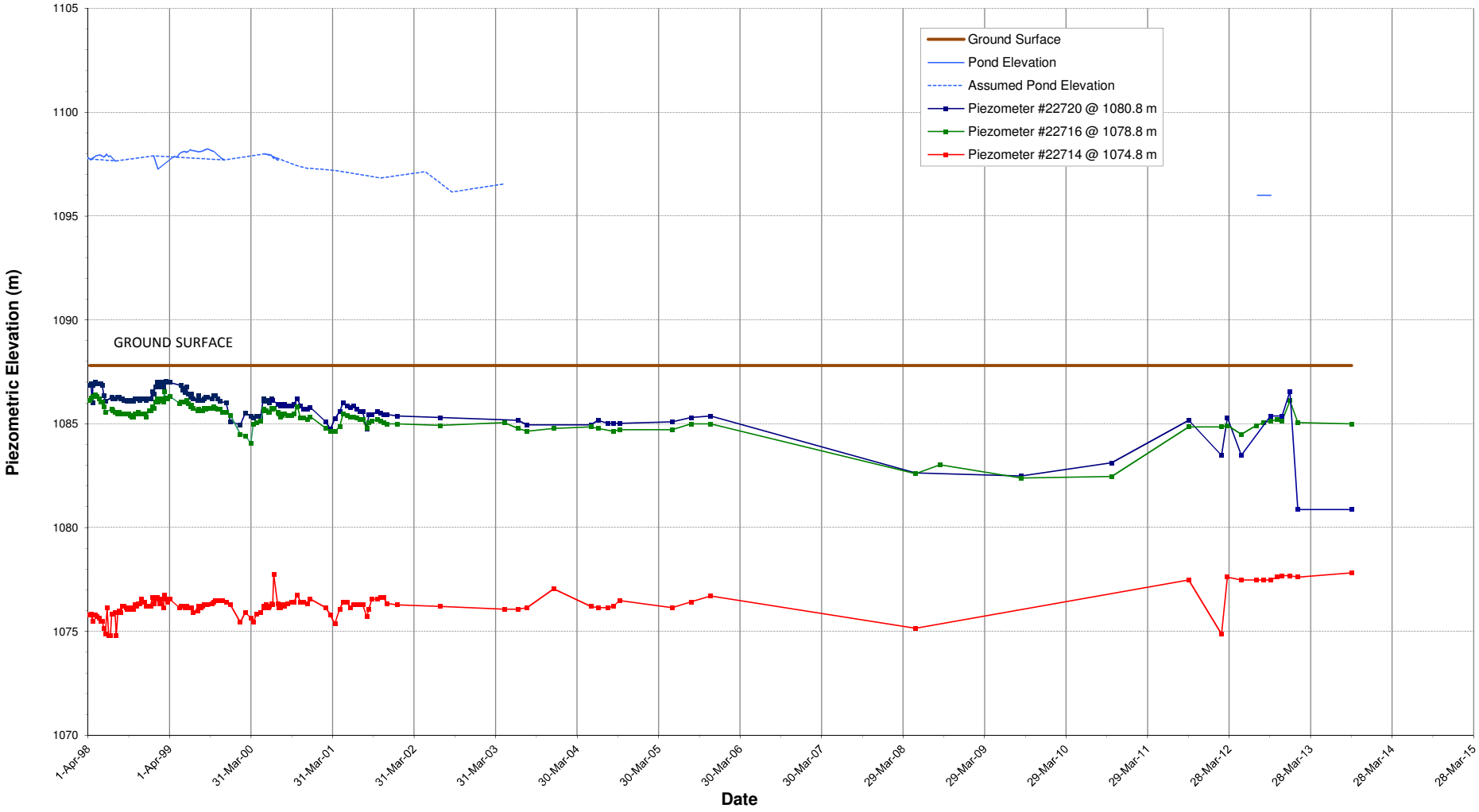



NOTE: 1) BH Location: Crest of Dam, N End
2) Ground surface: 1099.6 m.
3) Fill and native ground interface: unknown.
4) All readings up to and including January 30,2013 were performed by EBA Engineering Consultants Ltd.

Piezometric Elevation Profiles
BH 12861-03

Date Installed: 98-03-31

Last Updated: 28-Sep-13

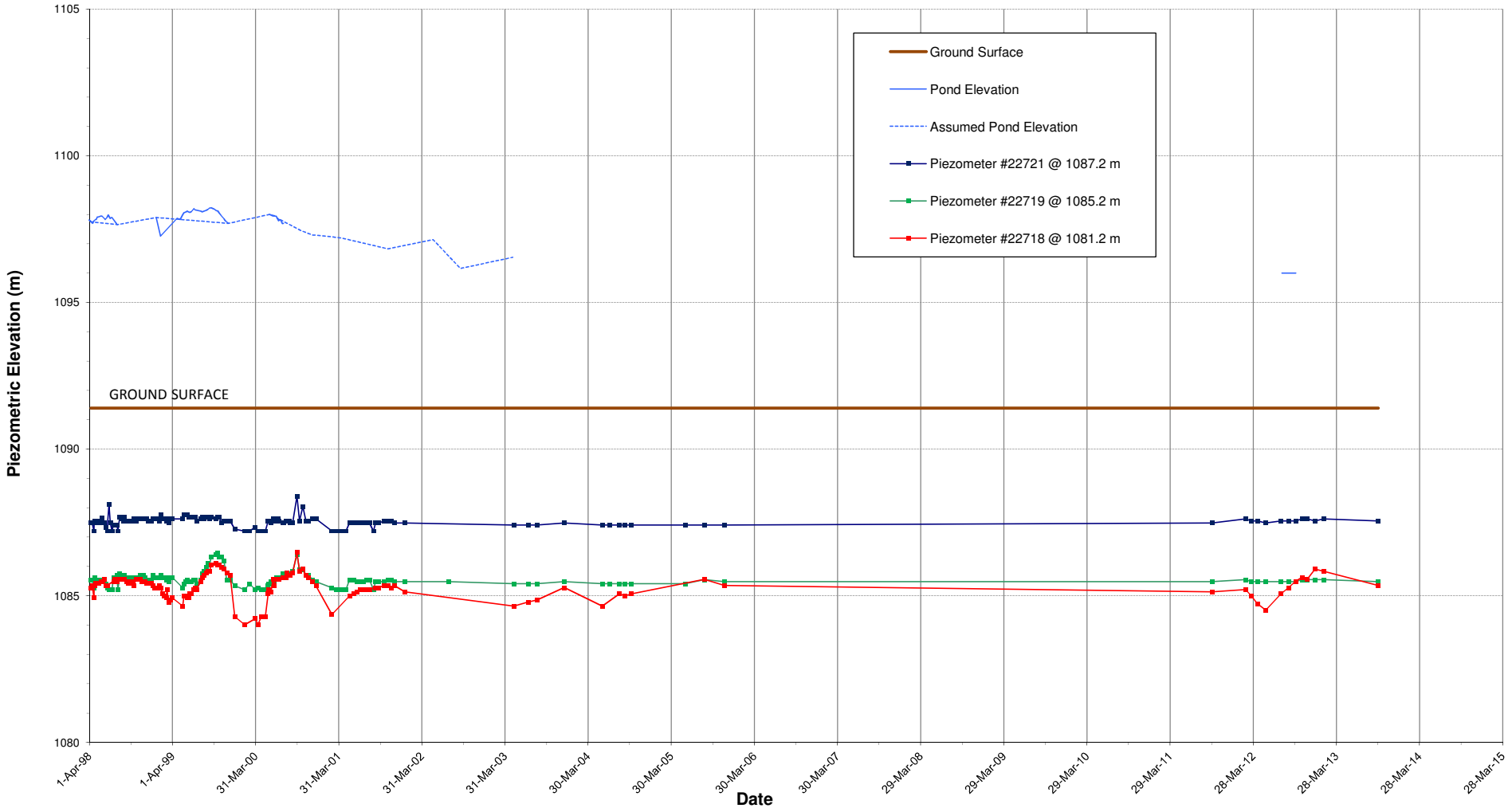



NOTE: 1) BH Location: Crest of Toe Berm, Centre
2) Ground surface: 1087.8 m.
3) Fill and native ground interface: 1080.5 m.
4) All readings up to and including January 30,2013 were performed by EBA Engineering Consultants Ltd.

Date Installed: 98-03-28

Piezometric Elevation Profiles
BH 12861-05

Last Updated: 28-Sep-13




NOTE: 1) BH Location: North Abutment off of Toe Berm
2) Ground surface: 1091.4 m.
3) Fill and native ground interface: 1090.8 m.
4) All readings up to and including January 30,2013 were performed by EBA Engineering Consultants Ltd.

Date Installed: 98-03-31

Piezometric Elevation Profiles
BH 12861-07

# Appendix F3

## Corehole Water Level and Temperature Readings

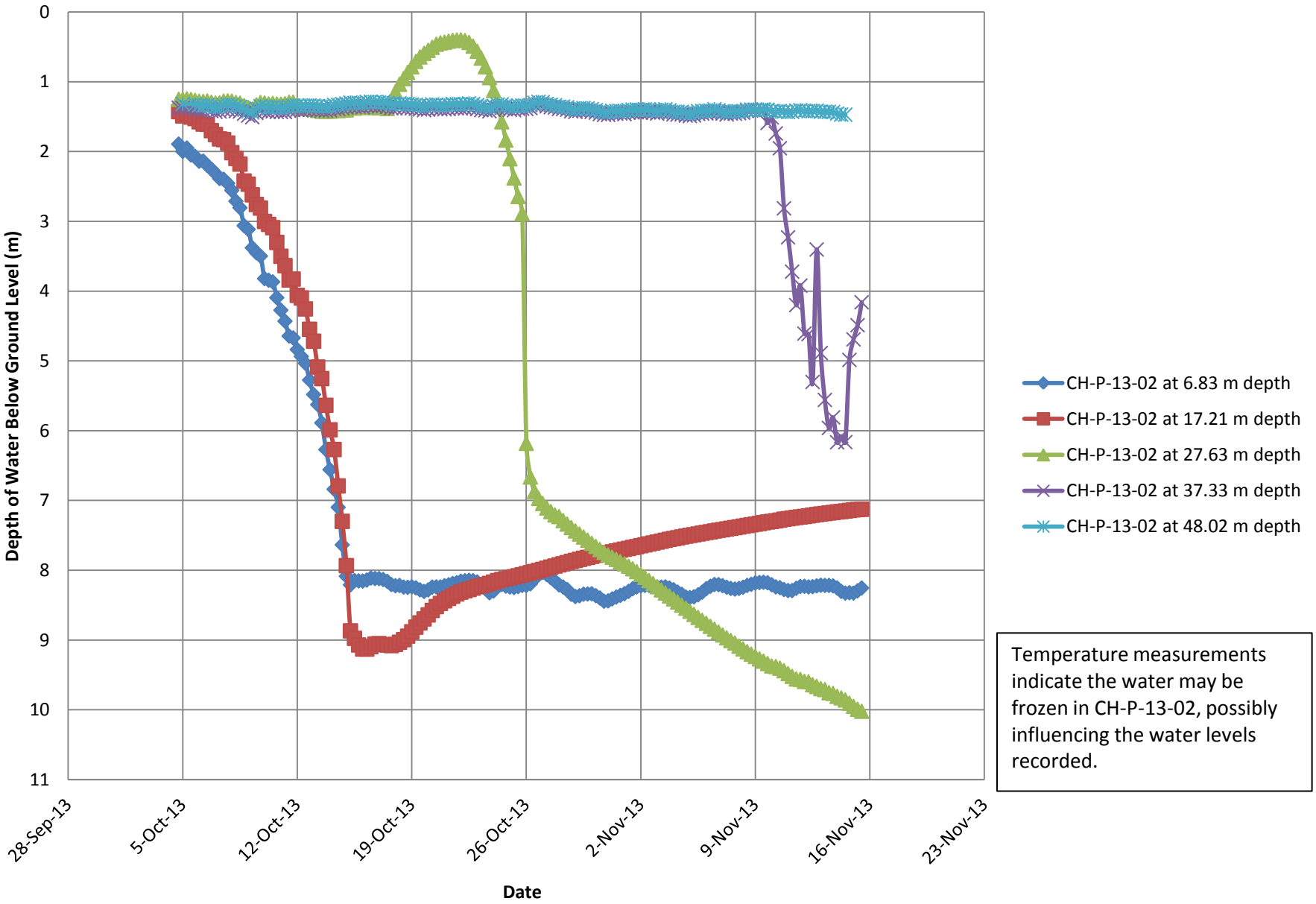
Mount Nansen Remediation Project
2013 Site Investigation Data Report

| | | | Date: | 05-Oct-13 | | | 15-Nov-13 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Core Hole | VW # | Install Depth (mbg) | Elevation Collar (m) | Manul DTW (mbg) | DTW (mbg) | Temperature (°C) | Manul DTW (mbg) | DTW (mbg) | Temperature (°C) | Comments |
| CH-P-13-01/50 | - | - | - | - | - | - | - | - | - | Plugged and Abandoned |
| CH-P-13-01/10 | MW | 10 | 1140.94 | 1.86 | - | - | No Data | - | - | Shallow Well / no VWP installed |
| CH-P-13-02/VWP | 26477 | 6.83 | 1139.07 | - | 2 | 1.5 | - | 8.3 | 0.6 | |
| CH-P-13-02/VWP | 26487 | 17.21 | 1128.69 | - | 1.5 | -0.5 | - | 7.1 | -0.63 | |
| CH-P-13-02/VWP | 26480 | 27.63 | 1118.27 | - | 1.3 | -0.4 | - | 10 | -0.52 | No Well / VWP only |
| CH-P-13-02/VWP | 26482 | 37.33 | 1108.57 | - | 1.4 | -0.4 | - | 4.2 | -0.5 | |
| CH-P-13-02/VWP | 26486 | 48.02 | 1097.88 | - | 1.3 | -0.3 | - | 1.5 | -0.27 | |
| CH-P-13-02/10 | MW | 10 | 1135.89 | 7.8 | - | - | | - | - | Shallow Well / no VWP installed |
| CH-P-13-03/50 | 26484 | 49.58 | 1134.29 | 42.17 | 43 | -0.2 | No Data | 43.9 | -0.14 | Deep Well and VWP installed |
| CH-P-13-03/10 | MW | 10 | 1173.83 | DRY | - | - | No Data | - | - | Shallow Well / no VWP installed |
| CH-P-13-04/35 | 26289 | 35 | 1190.57 | FROZEN | - | -1 | No Data | - | - | Deep Well and VWP installed / slough due to Fault Zone at 35 m |
| CH-P-13-04/10 | MW | 10 | 1215.63 | 2.49 | - | - | No Data | - | - | Shallow Well / no VWP installed |
| CH-P-13-05/50 | 26487 | 49.4 | 1135.60 | 19.76 | 19.7 | 0.3 | No Data | - | 0.41 | Deep Well and VWP installed |
| CH-P-13-06/VWP | 26479 | 14.30 | 1170.70 | - | 9 | 0.1 | - | 12.1 | -0.08 | |
| CH-P-13-06/VWP | 26481 | 20.72 | 1164.29 | - | 11.5 | 0.3 | - | 14.6 | 0.11 | |
| CH-P-13-06/VWP | 26483 | 28.40 | 1156.60 | - | 15 | 0.4 | - | 18.4 | 0.22 | No Well / VWP only - Inclined Hole 45 degrees - Azimuth 80 degree |
| CH-P-13-06/VWP | 26485 | 34.87 | 1150.13 | - | 17.9 | 0 | - | 24.6 | -0.08 | |
| CH-P-13-06/VWP | 26489 | 41.63 | 1143.37 | - | 32.7 | 0 | - | 38 | 0.01 | |

Notes

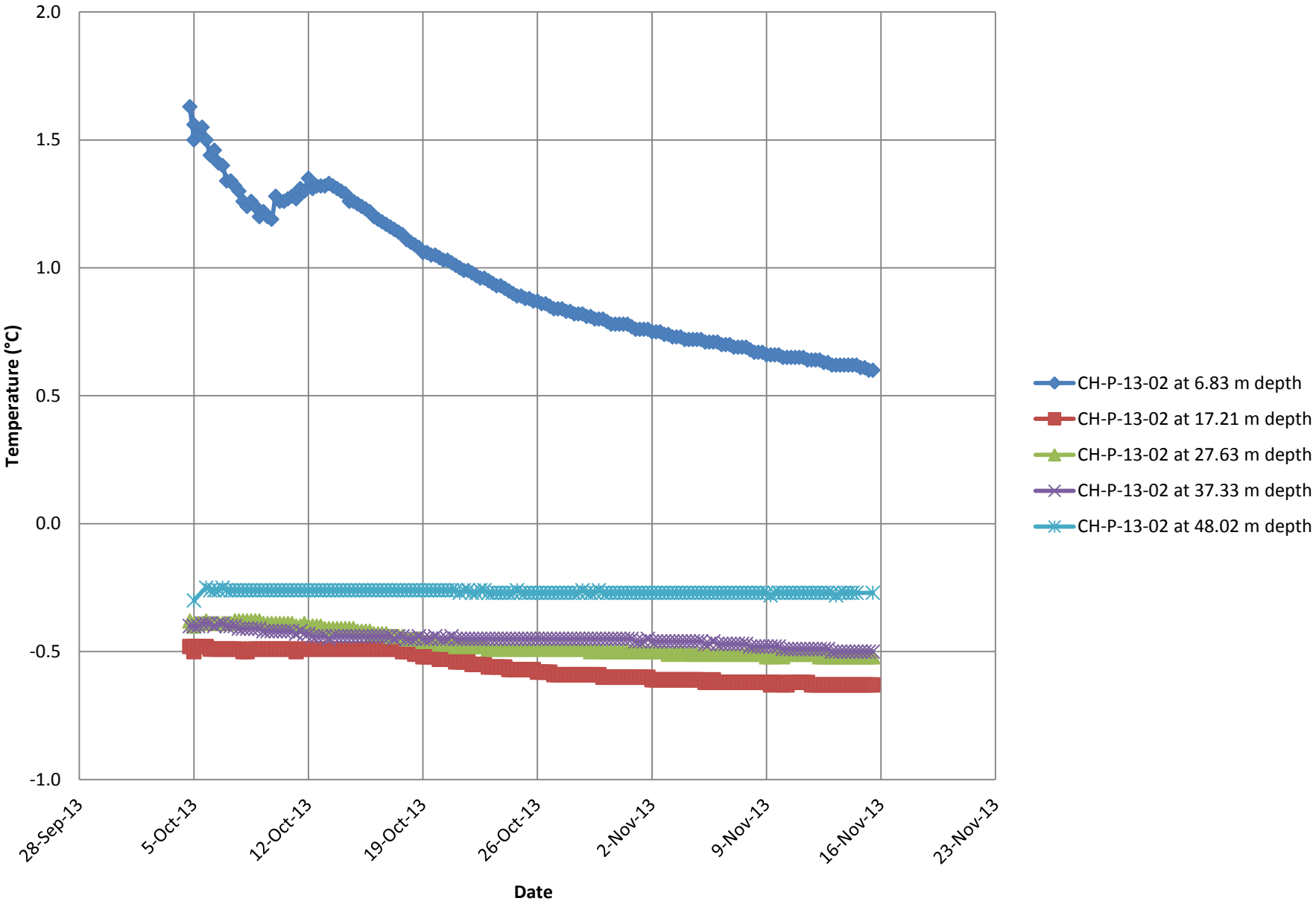
1 Refer to proceeding water level and temperature plots for CH-P-13-02/VWP and CH-P-13-06/VWP where data loggers were attached in October 2013
2 Data from loggers for CH-P-13-03/50, CH-P-13/35 and CH-P-13-50/50 were not available at the time of report
3 DTW = Depth to water, mbg = meters below ground
4 CH-P-13-06/VWP was drilled at a 45° dip. Vertical depths are presented above.

# CH-P-13-02 Vibrating Wire Piezometers - Water Level

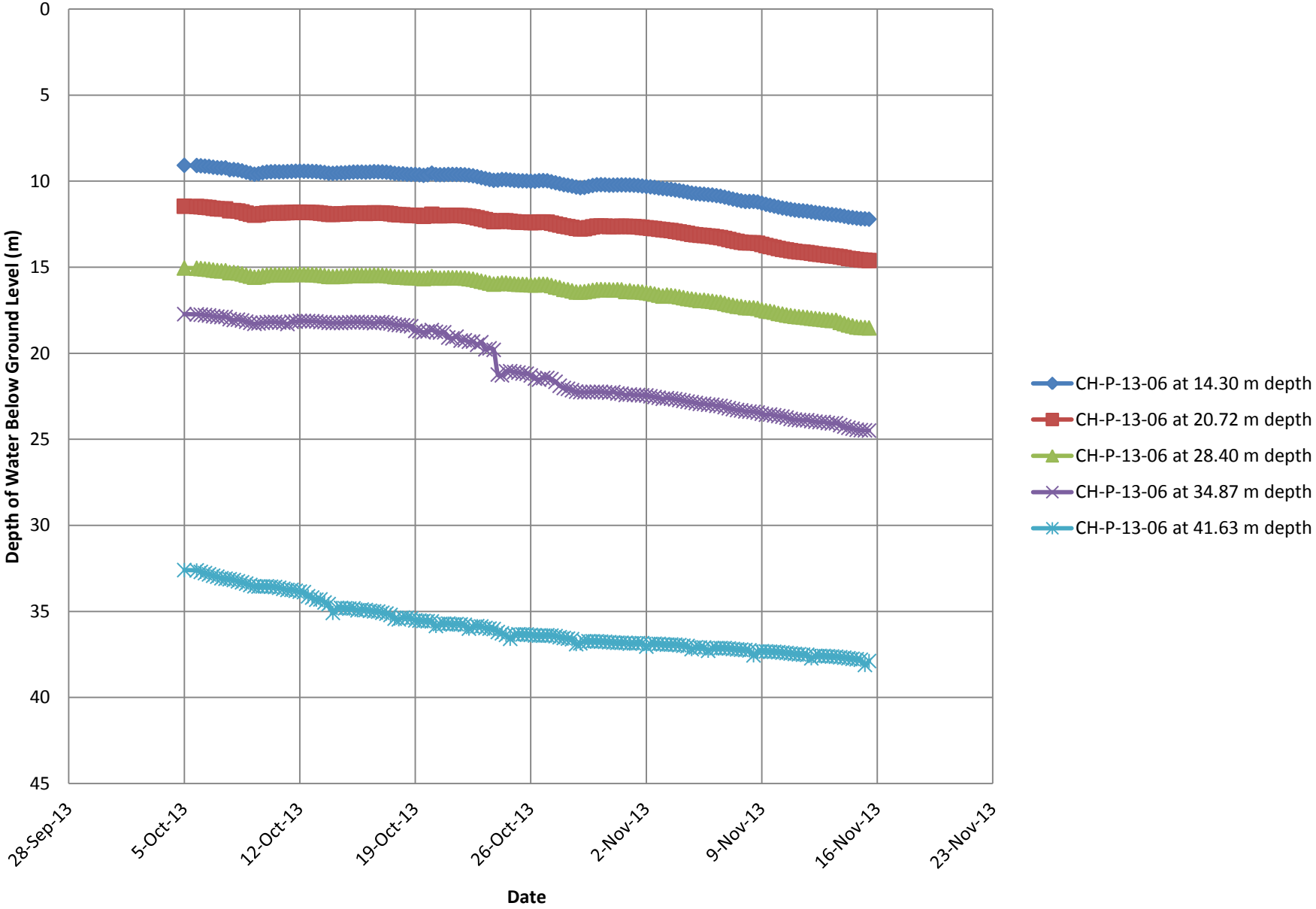



Temperature measurements indicate the water may be frozen in CH-P-13-02, possibly influencing the water levels recorded.

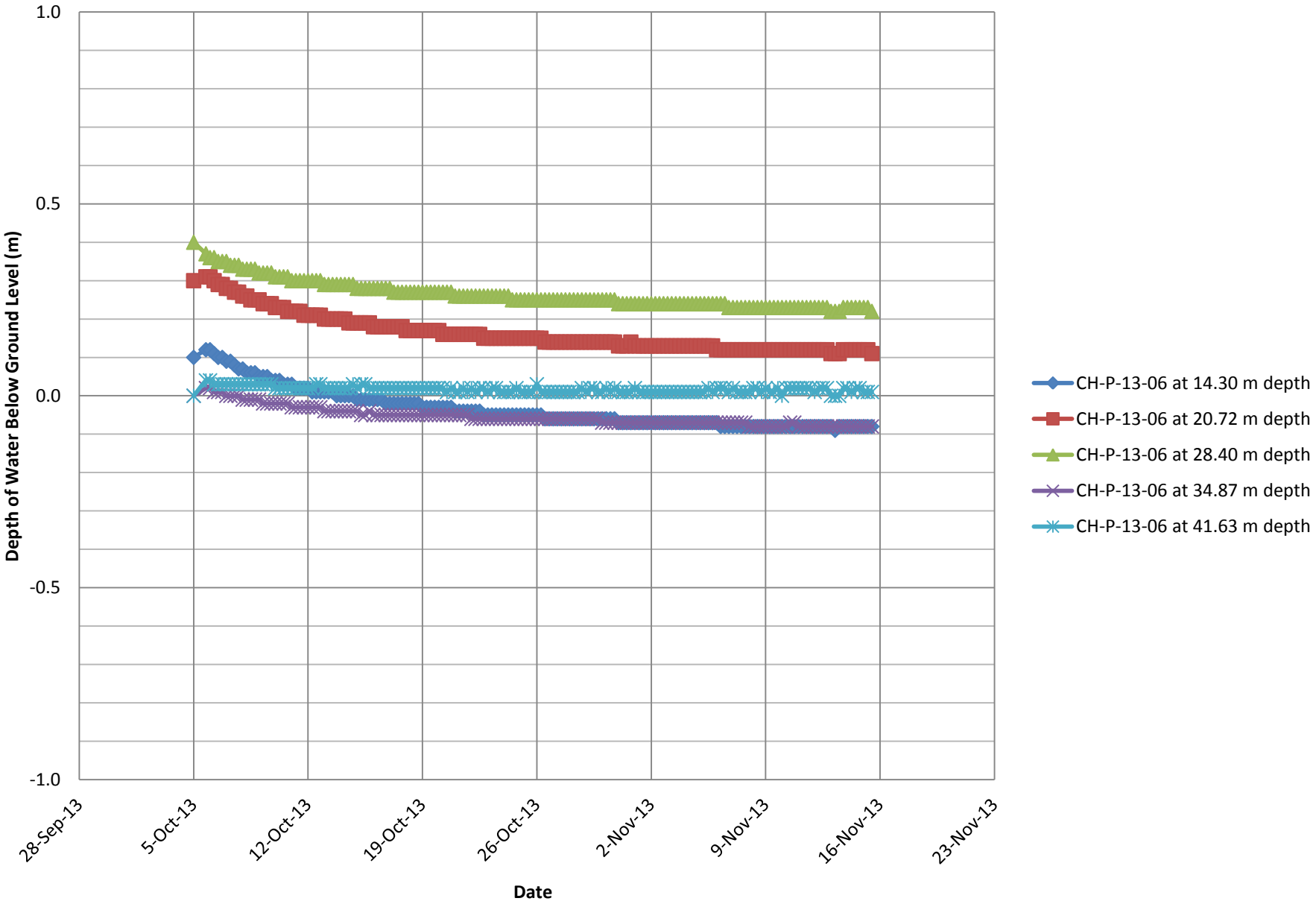
# CH-P-13-02 Vibrating Wire Piezometers - Temperature



# CH-P-13-06 Vibrating Wire Piezometers - Water Level



# CH-P-13-06 Vibrating Wire Piezometers - Temperature



# Appendix F4

# Drive Point Piezometer Readings

**GSI Drive Point Piezometer Installation Summary Table**

| Drive Point ID | Installation Depth (m) | Stick up (m) | Easting | Northing | Ground Elevation | Seepage Test | Temp and EC Readings |
|---|---|---|---|---|---|---|---|
| GSI-DC-01-A | 1.08 | 0.91 | 387,676 | 6,881,123 | 1,218.74 | Yes | Yes |
| GSI-DC-01-B | 2.82 | 0.92 | 387,676 | 6,881,123 | 1,218.75 | Yes | Yes |
| GSI-DC-02-A | 1.09 | 0.90 | 387,840 | 6,881,128 | 1,196.60 | Yes | Yes |
| GSI-DC-02-B | 2.95 | 0.89 | 387,840 | 6,881,129 | 1,196.61 | Yes | Yes |
| GSI-DC-03-A | 1.07 | 0.92 | 388,107 | 6,881,078 | 1,169.99 | Yes | Yes |
| GSI-DC-03-B | 2.91 | 0.90 | 388,107 | 6,881,078 | 1,169.98 | Yes | Yes |
| GSI-DC-04-A | GSI Not Installed | | 388,407 | 6,880,968 | 1,143.10 | Yes | No |
| GSI-DC-05-A | 1.04 | 0.91 | 388,723 | 6,880,836 | 1,119.20 | Yes | Yes |
| GSI-DC-05-B | 2.26 | 0.56 | 388,724 | 6,880,835 | 1,119.25 | Yes | Yes |
| GSI-DC-06-A | 1.08 | 0.90 | 389,791 | 6,880,568 | 1,066.56 | Yes | Yes |
| GSI-DC-06-B | 2.37 | 0.52 | 389,791 | 6,880,568 | 1,066.54 | Yes | Yes |
| GSI-DC-07-A | 1.07 | 0.91 | 390,066 | 6,880,639 | 1,056.68 | Yes | Yes |
| GSI-DC-07-B | 2.91 | 0.89 | 390,066 | 6,880,639 | 1,056.69 | Yes | Yes |
| GSI-DC-08-A | 1.10 | 0.88 | 390,311 | 6,880,584 | 1,048.49 | Yes | Yes |
| GSI-DC-08-B | 2.52 | 0.35 | 390,312 | 6,880,584 | 1,048.48 | Yes | Yes |
| GSI-DC-09-A | 1.08 | 0.90 | 390,615 | 6,880,493 | 1,037.02 | Yes | Yes |
| GSI-DC-09-B | 2.93 | 0.90 | 390,616 | 6,880,493 | 1,036.97 | Yes | Yes |
| GSI-DC-10-A | 1.08 | 0.90 | 390,863 | 6,880,449 | 1,030.60 | Yes | Yes |
| GSI-DC-10-B | 2.83 | 0.90 | 390,862 | 6,880,449 | 1,030.60 | Yes | Yes |
| GSI-PC-01-A | 1.08 | 0.91 | 388,720 | 6,881,918 | 1,224.12 | Yes | Yes |
| GSI-PC-01-B | 2.94 | 0.90 | 388,720 | 6,881,918 | 1,224.09 | Yes | Yes |
| GSI-PC-02-A | 1.09 | 0.90 | 388,909 | 6,881,785 | 1,202.50 | Yes | Yes |
| GSI-PC-02-B | 2.88 | 0.90 | 388,908 | 6,881,786 | 1,202.55 | Yes | Yes |
| GSI-PC-03-A | 1.09 | 0.90 | 389,260 | 6,881,707 | 1,159.77 | Yes | Yes |
| GSI-PC-03-B | 1.99 | 0.90 | 389,260 | 6,881,707 | 1,159.68 | Yes | Yes |
| GSI-PC-04-A | 0.98 | 0.91 | 389,585 | 6,881,658 | 1,129.24 | Yes | Yes |
| GSI-PC-04-B | 2.93 | 0.91 | 389,586 | 6,881,658 | 1,129.17 | Yes | Yes |
| GSI-PC-05-A | 1.08 | 0.90 | 389,713 | 6,881,660 | 1,116.51 | No | Yes |
| GSI-PC-05-B | 2.80 | 0.91 | 389,713 | 6,881,661 | 1,116.43 | No | Yes |
| GSI-HA-01-A | 1.90 | 1.20 | 387,844 | 6,881,132 | 1,196.69 | No | No |
| GSI-HA-02-A | 1.70 | 1.41 | 387,863 | 6,881,130 | 1,195.91 | No | No |
| GSI-HA-03-A | 1.34 | 0.83 | 387,881 | 6,881,130 | 1,194.04 | No | No |
| GSI-HA-04-A | 1.61 | 0.57 | 387,918 | 6,881,130 | 1,189.98 | No | No |
| GSI-HA-05-A | 1.27 | 0.90 | 387,898 | 6,881,124 | 1,192.44 | No | No |
| BH-M-13-04 | 1.10 | 0.90 | 387,984 | 6,881,067 | 1,184.39 | No | No |

Notes

1 Coordinates in UTM Zone 8, NAD83
2 Temperature and EC readings refer to readings completed at the GSI locations.
3 Refer to DCT/PCT locations and table for additional temperature and EC measurements carried out at additional locations

Mount Nansen Remediation Project
2013 Site Investigation Report
Appendix F4

**Summary of Drive Point Piezometer Water Levels and Vertical Gradient**

| Location | Install Date | Install Time | Shallow Drive Point (A) | | | Deep Drive Point (B) | | | Vertical Gradient (Note 1) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Water Level (mm) | Stick Up (mm) | Total Length (mm) | Water Level (mm) | Stick Up (mm) | Total Length (mm) | |
| GSI-DC-01 | 21-Sep-13 | 17:55 | 1945 | 905 | 1982 | 1282 | 921 | 3738 | 0.378 |
| GSI-DC-02 | 17-Sep-13 | 8:34 | 1739 | 897 | 1991 | 2487 | 893 | 3844 | -0.404 |
| GSI-DC-03 | 17-Sep-13 | 8:59 | 1155 | 916 | 1981 | 1629 | 899 | 3811 | -0.259 |
| GSI-DC-04 | 17-Sep-13 | 16:36 | Abandoned - not installed | | | | | | |
| GSI-DC-05 | 22-Sep-13 | 16:30 | 1012 | 910 | 1950 | 620 | 560 | 2816 | 0.453 |
| GSI-DC-06 | 19-Sep-13 | 17:15 | 965 | 901 | 1981 | 590 | 519 | 2886 | 0.414 |
| GSI-DC-07 | 19-Sep-13 | 17:35 | 1196 | 909 | 1980 | 1209 | 894 | 3800 | -0.007 |
| GSI-DC-08 | 18-Sep-13 | 15:40 | 1185 | 883 | 1984 | 2324 | 353 | 2874 | -1.280 |
| GSI-DC-09 | 23-Sep-13 | 11:20 | 1078 | 899 | 1981 | 1023 | 901 | 3832 | 0.030 |
| GSI-DC-10 | 20-Sep-13 | 16:15 | 839 | 904 | 1981 | 1217 | 904 | 3738 | -0.215 |
| GSI-PC-01 | 20-Sep-13 | 10:15 | 1888 | 905 | 1984 | 3487 | 900 | 3839 | -0.862 |
| GSI-PC-02 | 19-Sep-13 | 17:00 | 1029 | 899 | 1985 | 3554 | 897 | 3776 | -1.410 |
| GSI-PC-03 | 20-Sep-13 | 11:19 | 1204 | 897 | 1983 | 2802 | 900 | 2890 | -1.762 |
| GSI-PC-04 | 19-Sep-13 | 14:15 | 993 | 905 | 1880 | 3744 | 912 | 3841 | -1.403 |
| GSI-PC-05 | 23-Sep-13 | 15:16 | 1436 | 903 | 1983 | 3061 | 912 | 3715 | -0.938 |

Note

1 Convention: +ve = upwards, -ve = downwards.

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Appendix F4

**Seepage Meter Summary Table**

| Location | Date installed | Date Complete | Time Start | Time End | Water wt start (kg) (kg) | Water wt end (kg) (kg) | Seepage Flux L/min/m² |
|---|---|---|---|---|---|---|---|
| GSI-DC-01-A/B | Sep-21 | Sep-21 | 17:55 | 19:34 | 0.47 | 1.89 | 0.14 |
| GSI-DC-02-A/B | Sep-20 | Sep-20 | 16:00 | 16:37 | 3.25 | 0.25 | -0.82 |
| | 24-Sep | 24-Sep | 11:44 | 12:10 | 2.339 | 0.477 | -0.72 |
| GSI-DC-03-A/B | 24-Sep | 25-Sep | 15:15 | 9:09 | 2.657 | 2.643 | 0.00 |
| GSI-DC-04-A | 24-Sep | 24-Sep | 9:45 | 17:40 | 1.495 | 1.4 | 0.00 |
| GSI-DC-05-A/B | 22-Sep | 22-Sep | 11:21 | 15:07 | 0.69 | 3.69 | 0.13 |
| GSI-DC-06-A/B | 22-Sep | 22-Sep | 10:04 | 14:44 | 0.39 | 2.57 | 0.08 |
| | 25-Sep | 25-Sep | 10:54 | 16:35 | 1.246 | 2.926 | 0.05 |
| GSI-DC-07-A/B | 25-Sep | 25-Sep | 11:35 | 16:52 | 1.956 | 4.802 | 0.09 |
| GSI-DC-08-A/B | Sep-21 | Sep-21 | 9:50 | 17:04 | 0.21 | 2.16 | 0.05 |
| | Sep-25 | Sep-25 | 10:54 | 16:35 | 1.246 | 2.926 | 0.05 |
| GSI-DC-09-A/B | 23-Sep | 23-Sep | 16:33 | 17:00 | 1.771 | 1.881 | 0.04 |
| | 23-Sep | 24-Sep | 17:05 | 8:54 | 0.339 | 2.238 | 0.02 |
| GSI-DC-10-A/B | Sep-21 | Sep-21 | 11:15 | 16:30 | 3.44 | 2.58 | -0.03 |
| | Sep-21 | Sep-22 | 16:37 | 8:59 | 3.44 | 3.706 | 0.00 |
| | Sep-22 | Sep-22 | 9:08 | 16:50 | 2.37 | 0.87 | -0.03 |
| GSI-PC-01-A/B | 23-Sep | 23-Sep | 10:35 | 13:10 | 2.95 | 3.357 | 0.03 |
| | 26-Sep | 26-Sep | 11:23 | 17:00 | 2.02 | 3.626 | 0.05 |
| GSI-PC-02-A/B | 22-Sep | 22-Sep | 15:59 | 16:18 | 0.53 | 2.62 | 1.11 |
| | 23-Sep | 23-Sep | 9:35 | 11:35 | 2.3 | 3.139 | 0.07 |
| | 23-Sep | 23-Sep | 11:42 | 17:34 | 0.434 | 3.432 | 0.09 |
| GSI-PC-03-A/B | 24-Sep | 24-Sep | 10:35 | 17:13 | 2.553 | 2.689 | 0.00 |
| | 24-Sep | 25-Sep | 8:38 | 17:21 | 1.464 | 1.618 | 0.00 |
| GSI-PC-04-A/B | 23-Sep | 23-Sep | 14:13 | 15:30 | 1.774 | 3.231 | 0.19 |
| | 26-Sep | 26-Sep | 9:43 | 10:21 | 1.687 | 2.423 | 0.20 |

Notes:
1 0.099 seepage meter surface area (m²)
2 Positive seepage flux means upward flow. Negative flux means downward

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**Summary of Temperature and EC Measurements**

| Site ID | Easting | Northing | Measurement Date | Measurement Time | Creek Bank | | Main Channel | | Weather Conditions |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Conductivity (ms/cm) | Temperature (°C) | Conductivity (ms/cm) | Temperature (°C) | |
| DCT-01-0 | 387,676 | 6,881,123 | 21-Sep-13 | 15:00 | 1.18 | 7.9 | 1.02 | 8.1 | 4C, sun and cloud |
| DCT-01-1 | 387,750 | 6,881,131 | 24-Sep-13 | 11:57 | 2.07 | 13.3 | 2.25 | 13.7 | -2C, clouds |
| DCT-02-0 | 387,840 | 6,881,128 | 24-Sep-13 | 11:22 | 2.49 | 12.1 | 2.76 | 13.6 | -2C, clouds |
| DCT-02-1 | 387,937 | 6,881,131 | 24-Sep-13 | 15:34 | 2.34 | 14.8 | 2.70 | 15.0 | -2C, clouds |
| DCT-03-0 | 388,097 | 6,881,051 | 24-Sep-13 | 15:18 | 2.44 | 14.1 | 2.71 | 14.7 | -2C, clouds |
| DCT-05-0 | 388,725 | 6,880,831 | 22-Sep-13 | 15:11 | 0.96 | 13.8 | 1.45 | 14.3 | 2C, clouds |
| DCT-05-1 | 388,817 | 6,880,791 | 22-Sep-13 | 15:20 | 1.41 | 14.4 | 1.01 | 14.0 | 2C, clouds |
| DCT-06-0 | 389,791 | 6,880,567 | 22-Sep-13 | 14:10 | 0.71 | 13.7 | 1.20 | 13.7 | 2C, clouds |
| DCT-06-1 | 389,885 | 6,880,627 | 22-Sep-13 | 14:22 | 0.60 | 12.6 | 1.28 | 13.5 | 2C, clouds |
| DCT-06-2 | 389,985 | 6,880,653 | 22-Sep-13 | 14:33 | 1.53 | 15.3 | 1.27 | 15.3 | 2C, clouds |
| DCT-07-0 | 390,064 | 6,880,634 | 21-Sep-13 | 10:06 | 0.62 | 7.1 | 1.32 | 5.3 | 2C, cloudy |
| DCT-07-1 | 390,174 | 6,880,629 | 21-Sep-13 | 10:16 | 0.67 | 5.5 | 1.48 | 5.5 | 2C, cloudy |
| DCT-07-2 | 390,256 | 6,880,595 | 21-Sep-13 | 10:24 | 1.03 | 8.5 | 1.37 | 7.5 | 2C, cloudy |
| DCT-08-0 | 390,310 | 6,880,584 | 21-Sep-13 | 9:53 | 0.75 | 6.2 | 1.32 | 4.5 | 2C, cloudy |
| DCT-08-1 | 390,464 | 6,880,613 | 21-Sep-13 | 16:55 | 0.80 | 11.7 | 1.29 | 14.1 | 2C, cloudy |
| DCT-08-2 | 390,566 | 6,880,504 | 21-Sep-13 | 16:48 | 0.75 | 11.3 | 1.28 | 13.3 | 2C, cloudy |
| DCT-09-0 | 390,615 | 6,880,493 | 20-Sep-13 | 17:00 | 0.35 | 2.8 | 0.95 | 3.2 | 2C, cloudy |
| DCT-09-1 | 390,699 | 6,880,476 | 20-Sep-13 | 17:15 | 0.62 | 1.6 | 0.97 | 3.1 | 2C, cloudy |
| DCT-09-2 | 390,787 | 6,880,491 | 20-Sep-13 | 17:22 | 0.38 | 2.7 | 0.97 | 3.2 | 2C, cloudy |
| DCT-10-0 | 390,861 | 6,880,449 | 20-Sep-13 | 17:30 | 0.92 | 2.6 | 1.26 | 3.2 | 2C, cloudy |
| DCT-10-1 | 390,957 | 6,880,448 | 20-Sep-13 | 17:35 | 0.92 | 3.6 | 1.44 | 3.2 | 2C, cloudy |
| DCT-10-2 | 391,058 | 6,880,461 | 20-Sep-13 | 17:40 | 0.99 | 3.8 | 1.50 | 3.2 | 2C, cloudy |
| PCT-01-1 | 388,835 | 6,881,809 | 24-Sep-13 | 11:02 | 2.22 | 11.0 | 2.20 | 12.3 | -2C, clouds |
| PCT-02-0 | 388,910 | 6,881,782 | 22-Sep-13 | 16:00 | 0.89 | 13.8 | 0.86 | 17.6 | 2C, clouds |
| PCT-02-1 | 389,188 | 6,881,718 | 24-Sep-13 | 10:49 | 2.18 | 11.8 | 2.20 | 12.3 | -2C, clouds |
| PCT-03-0 | 389,257 | 6,881,705 | 21-Sep-13 | 16:03 | 0.67 | 9.7 | 0.91 | 10.3 | 4C, sun and cloud |
| PCT-03-1 | 389,437 | 6,881,669 | 21-Sep-13 | 15:55 | 0.63 | 9.8 | 0.89 | 11.1 | 4C, sun and cloud |
| PCT-04-0 | 389,582 | 6,881,659 | 21-Sep-13 | 15:48 | 0.86 | 10.4 | 0.94 | 11.5 | 4C, sun and cloud |
| PCT-04-1 | 389,600 | 6,881,641 | 21-Sep-13 | 15:40 | 1.00 | 9.5 | 0.94 | 9.3 | 4C, sun and cloud |
| PCT-05-0 | 389,714 | 6,881,657 | 21-Sep-13 | 15:28 | 0.76 | 8.2 | 0.92 | 8.9 | 4C, sun and cloud |

Notes:

1 Refer to Figures 1-6 for locations in plan view.
2 Creek bank refers to measurement on creek bank
3 Main channel refers to measurement in centre of creek channel
4 Equipment used was a FieldScout Direct Soil EC meter with a 24” probe

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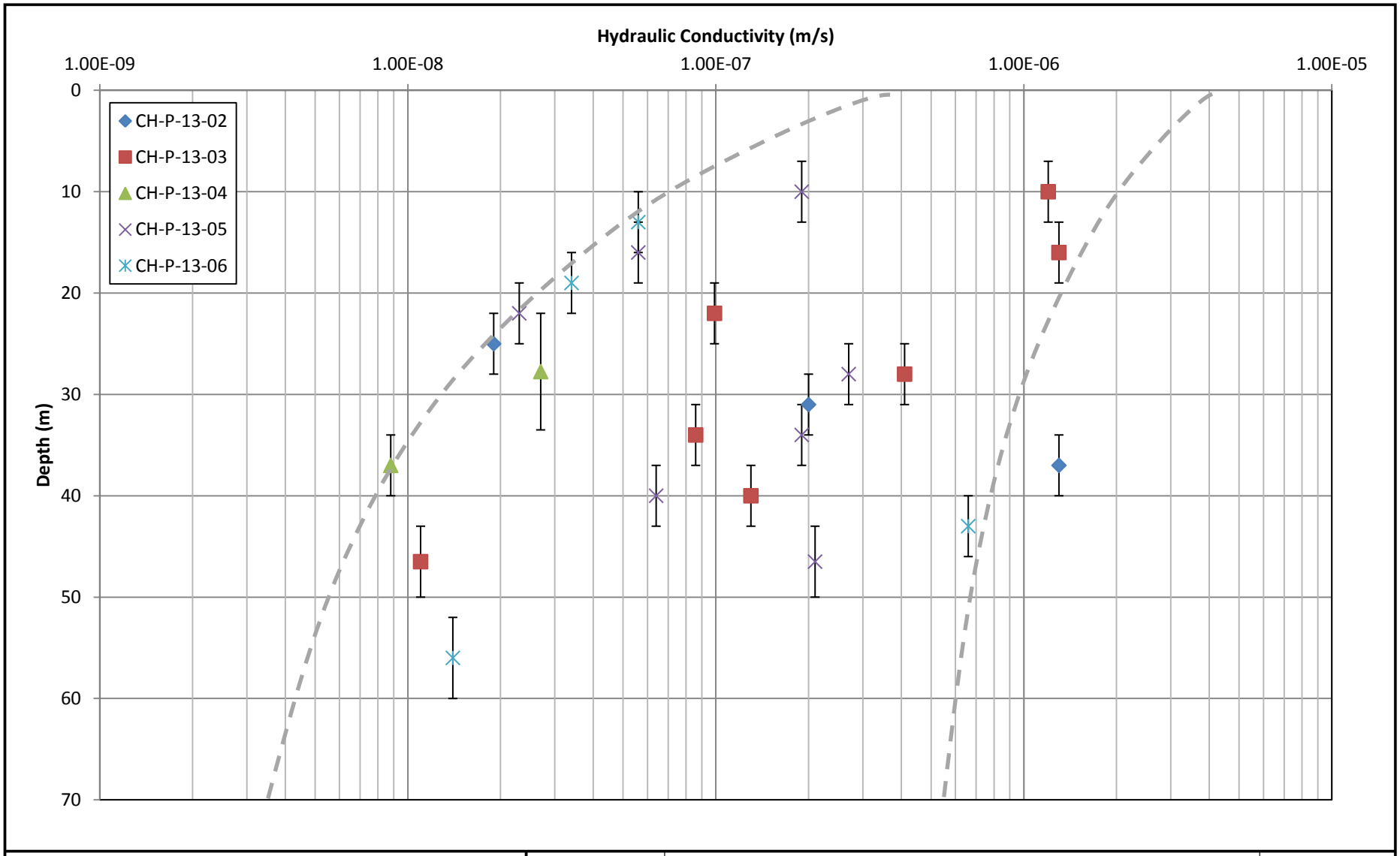
**GSI Drive Point Piezometer Water Levels and Field Readings**

| Location ID | Description | Location | Date and Time | Depth to Water (m BTOP) | Depth to Bottom (m BTOP) | Temperature (°C) | pH | EC (mS/cm) | Comments |
|---|---|---|---|---|---|---|---|---|---|
| GSI-DC-01-B | Drive point, 3 m | Dome Creek, head waters, near Camp | 28-Sep | 0.898 | 1.559 | 1.80 | 8.06 | 4.870 | Well is frozen above screen. Sample was taken from water above screen. |
| GSI-DC-02-B | Drive point, 3 m | Dome Creek, north-west of mill | 28-Sep | 2.358 | 3.842 | 3.90 | 7.57 | 10.450 | Slow recharge rate, will have to come back next day to sample further |
| GSI-DC-03-B | Drive point, 3 m | Dome Creek, main valley, above TSF | 28-Sep | 1.242 | 3.809 | 4.00 | 7.59 | 1.054 | Slow recharge rate, will have to come back next day to sample further |
| GSI-DC-04-B | Drive point, 3 m | Dome Creek, main valley, above TSF | - | - | - | - | - | - | Drive point was never installed |
| GSI-DC-05-B | Drive point, 3 m | Dome Creek, main valley, above TSF | 28-Sep | 0.611 | 2.816 | 3.2 | 7.5 | 1.118 | Limited recharge. |
| GSI-DC-06-B | Drive point, 3 m | Dome Creek, main valley, below TSF | 28-Sep | 0.571 | 2.886 | 2.4/1.9 | 7.57 | 1.230 | Good recharage. Collected Dup_01 from this station |
| GSI-DC-07-B | Drive point, 3 m | Dome Creek, main valley, below TSF | 28-Sep | 1.137 | 3.789 | 2.8/2.2 | 7.4 | 0.548 | Good recharge. |
| GSI-DC-08-B | Drive point, 3 m | Dome Creek, main valley, below TSF | 28-Sep | 2.179 | 2.565 | 3.3 | 6.71 | 1.461 | Well is frozen, ice crystals present on water tape. |
| GSI-DC-09-B | Drive point, 3 m | Dome Creek, main valley, below TSF | 28-Sep | 1.002 | 3.840 | 2.7 | 7.08 | 0.642 | Sulphur-like odour coming from groundwater |
| GSI-DC-10-B | Drive point, 3 m | Dome Creek, main valley, below TSF | 28-Sep | 0.862 | 3.740 | 2.7/1.3 | 6.75 | 1.000 | Slower recharge |
| GSI-PC-01-B | Drive point, 3 m | Pony Creek, above Open Pit | 29-Sep | 2.179 | 2.681 | 3.9 | 6.75 | 0.621 | Slow recharge, may only be able to collect all bottles |
| GSI-PC-02-B | Drive point, 3 m | Pony Creek, close to Open Pit | 29-Sep | 1.223 | 2.029 | 5.3 | 7.42 | 0.343 | Feels frozen. No dedicated sampling equipment left in piezometer. |
| GSI-PC-03-B | Drive point, 3 m | Pony Creek, main valley | 29-Sep | - | 3.804 | - | - | - | Dry |
| GSI-PC-04-B | Drive point, 3 m | Pony Creek, main valley | 30-Sep | - | 2.562 | - | - | - | Well is frozen, unable to sample. |
| GSI-PC-05-B | Drive point, 3 m | Pony Creek, main valley | 30-Sep | 2.817 | 3.714 | 2.2/1/6 | 7.9 | 0.280 | Good recharge. |
| GSI-HA-01-A | Drive point, 1.5 m | Huestis Adit, north-west of mill | 29-Sep | 2.218 | 3.102 | 3.3 | 7.41 | 1.040 | Sulphur-like or decomposing organics-like odour present |
| GSI-HA-02-A | Drive point, 1.5 m | Huestis Adit, north-west of mill | 29-Sep | 2.034 | 3.100 | 1.9 | 7.05 | 1.118 | Sulphur-like or decomposing organics-like odour present |
| GSI-HA-03-A | Drive point, 1.5 m | Huestis Adit, north-west of mill | 29-Sep | 1.052 | 2.173 | 2.5 | 6.98 | 1.000 | Sulphur-like or decomposing organics-like odour present |
| GSI-HA-04-A | Drive point, 1.5 m | Huestis Adit, north-west of mill | 29-Sep | 1.018 | 2.173 | 1.6 | 6.3 | 0.433 | Sulphur-like or decomposing organics-like odour present |
| GSI-HA-05-A | Drive point, 1.5 m | Huestis Adit, north-west of mill | 29-Sep | 1.037 | 2.172 | 1.9 | 7.3 | 0.940 | Dup_02. Sulphur-like or decomposing organics-like odour present |
| BH-M-13-04 | Drive point, 1.5 m | Mill area where seepage had been intersected during drilling | 29-Sep | 1.050 | 1.100 | - | - | - | Insufficient water to sample |

# Appendix F5

# Corehole Packer Test Results

| Mt Nansen Permeability Results | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CH-P-13-02 | | | CH-P-13-03 | | | CH-P-13-04 | | | CH-P-13-05 | | | CH-P-13-06 | | |
| Depth (mbg) | Permeability (m/s) | Test Type (FH/CH) | Depth (mbg) | Permeability (m/s) | Test Type (FH/CH) | Depth (mbg) | Permeability (m/s) | Test Type (FH/CH) | Depth (mbg) | Permeability (m/s) | Test Type (FH/CH) | Depth (mbg) | Permeability (m/s) | Test Type (FH/CH) |
| | | | | | | | | | | | | | | |
| | | | 7 - 13 | 1.20E-06 | CH | 10 - 16 | - | - | 7 - 13 | 1.90E-07 | CH | 10 - 16 | 5.60E-08 | FH |
| | | | 13 - 19 | 1.30E-06 | CH | 16 - 22 | - | - | 13 - 19 | 5.60E-08 | FH | 16 - 22 | 3.40E-08 | FH |
| 22 - 28 | 1.90E-08 | FH | 19 - 25 | 9.90E-08 | FH | 22 - 28 | - | - | 19 - 25 | 2.30E-08 | FH | 22 - 28 | - | - |
| 28 - 34 | 2.00E-07 | FH | 25 - 31 | 4.10E-07 | CH | 22 - 33.5 | 2.70E-08 | FH | 25 - 31 | 2.70E-07 | CH | 28 - 34 | - | - |
| 34 - 40 | 1.30E-06 | CH | 31 - 37 | 8.60E-08 | FH | 34 - 40 | 8.80E-09 | FH | 31 - 37 | 1.90E-07 | CH | 34 - 40 | - | - |
| 40 - 50 | - | - | 37 - 43 | 1.30E-07 | FH | 40 - 50 | - | - | 37 - 43 | 6.40E-08 | FH | 40 - 46 | 6.60E-07 | CH |
| | | | 43 - 50 | 1.10E-08 | FH | | | | 43 - 50 | 2.10E-07 | CH | 46 - 52 | - | - |
| | | | | | | | | | | | | 52 - 60 | 1.40E-08 | FH |




| | | | |
|---|---|---|---|
| CLIENT: Yukon Government | DWN BY: KR | PROJECT: MOUNT NANSEN REMEDIATION | DATE: DEC 2013 |
| | CHK'D BY: PM | | PROJECT No.: VM00605F |
| | DATUM: - | TITLE: SUMMARY OF PACKER TEST RESULTS | REV. No.: A |
| | PROJECTION: - | | FIGURE No.: - |
| | SCALE: NTS | | |

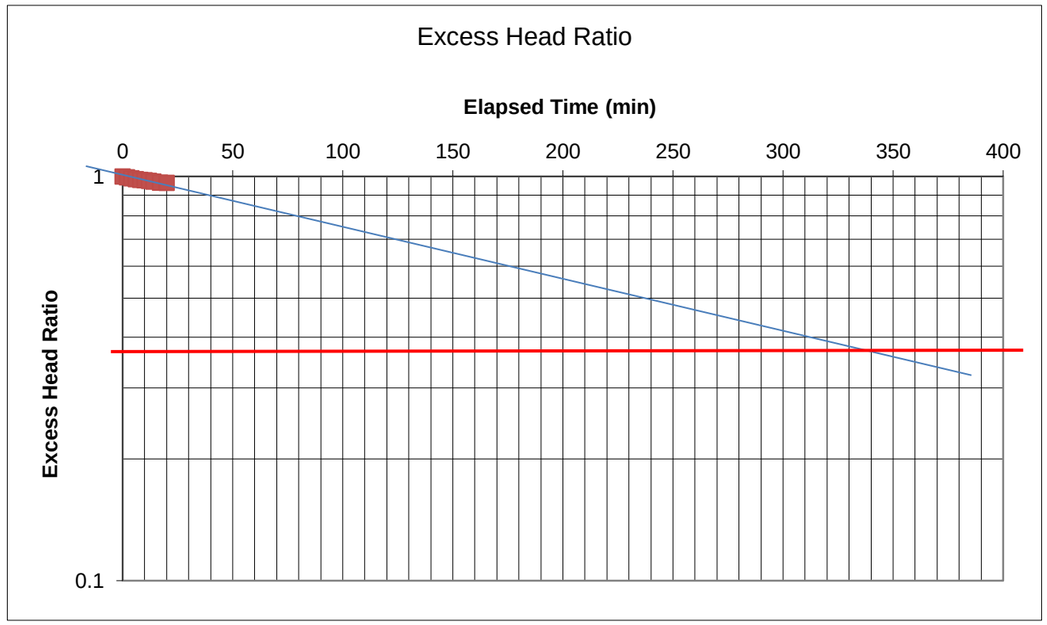
AMEC Environment & Infrastructure
5681-70 STREET, EDMONTON, ALBERTA, T6B 3P6
PHONE 780-436-2152, FAX 780-435-8425

Mount Nansen

**CH-P-13-02** | **Test 1 22-28 m depth** | **Date: 29-Sep-13**

**Falling Head data**

| | Elapsed Time (min) | Depth to Water (m) | Excess Head Ratio | = | 1-[(h-H)/(Ho-H)] |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 1 | | |
| 0.009 | 2 | 0.009 | 0.9955 | | |
| 0.02 | 4 | 0.02 | 0.99 | | |
| 0.03 | 6 | 0.03 | 0.985 | | |
| 0.038 | 8 | 0.038 | 0.981 | | |
| 0.042 | 10 | 0.042 | 0.979 | | |
| 0.049 | 12 | 0.049 | 0.9755 | | |
| 0.057 | 14 | 0.057 | 0.9715 | | |
| 0.069 | 17 | 0.069 | 0.9655 | | |
| 0.071 | 20 | 0.071 | 0.9645 | | |




| | | |
|---|---|---|
| Date | | |
| Packer Inflation Pres | 250 | psi |
| Standpipe | 1.5 | m |
| Static water level | 2 | m |
| h = | measured water level | |
| H = | Initial water level | |
| Ho = | Static water level | |
| Top of interval | 22 | m |
| Bottom of interval | 28 | m |
| **NQ** | | |
| R(borehole) = | 0.0379 | m |
| r (drill rod) = | 0.0302 | m |
| L = | 6 | |
| To = 37% head ratio in sec | 330 | min |
| | 19800 | sec |

**K =** **1.94406E-08** m/s

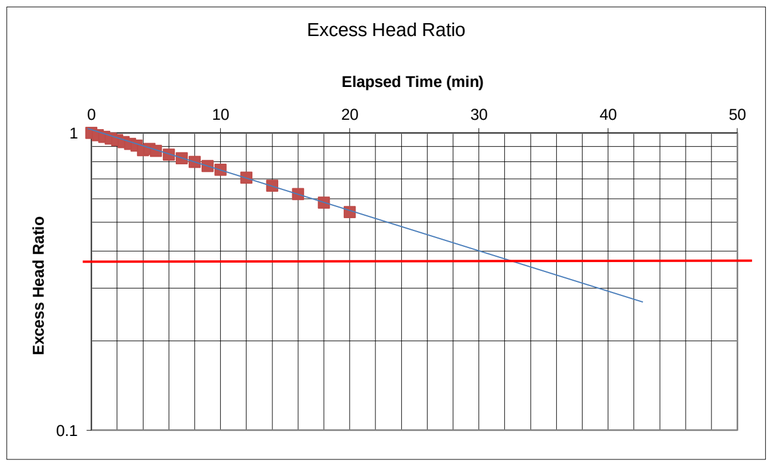
$$K = \frac{r^2 \ln \frac{L}{R}}{2LT_0}$$

Mount Nansen

**CH-P-13-02** | **Test 2 28-34 m depth** | **Date: 30-Sep-13**

**Falling Head data**

| | Elapsed Time (min) | Depth to Water (m) | Excess Head Ratio | = | 1-[(h-H)/(Ho-H)] |
|---|---|---|---|---|---|
| 0.2 | 0 | 0 | 1 | | |
| 0.253 | 0.5 | 0.053 | 0.982333333 | | |
| 0.291 | 1 | 0.091 | 0.969666667 | | |
| 0.329 | 1.5 | 0.129 | 0.957 | | |
| 0.364 | 2 | 0.164 | 0.945333333 | | |
| 0.407 | 2.5 | 0.207 | 0.931 | | |
| 0.445 | 3 | 0.245 | 0.918333333 | | |
| 0.481 | 3.5 | 0.281 | 0.906333333 | | |
| 0.576 | 4 | 0.376 | 0.874666667 | | |
| 0.551 | 4.5 | 0.351 | 0.883 | | |
| 0.59 | 5 | 0.39 | 0.87 | | |
| 0.665 | 6 | 0.465 | 0.845 | | |
| 0.735 | 7 | 0.535 | 0.821666667 | | |
| 0.804 | 8 | 0.604 | 0.798666667 | | |
| 0.879 | 9 | 0.679 | 0.773666667 | | |
| 0.945 | 10 | 0.745 | 0.751666667 | | |
| 1.079 | 12 | 0.879 | 0.707 | | |
| 1.207 | 14 | 1.007 | 0.664333333 | | |
| 1.332 | 16 | 1.132 | 0.622666667 | | |
| 1.452 | 18 | 1.252 | 0.582666667 | | |
| 1.575 | 20 | 1.375 | 0.541666667 | | |




$$K = \frac{r^2 \ln \frac{L}{R}}{2LT_0}$$

| | | |
|---|---|---|
| Date | | |
| Packer Inflation Pres | 260 | psi |
| Standpipe | 1.5 | m |
| Static water level | 3 | m |
| h = | measured water level | |
| H = | Initial water level | |
| Ho = | Static water level | |
| Top of interval | 28 | m |
| Bottom of interval | 34 | m |
| **NQ** | | |
| R(borehole) = | 0.0379 | m |
| r (drill rod) = | 0.0302 | m |
| L = | 6 | |
| To = 37% head ratio in sec | 32 | min |
| | 1920 | sec |

**K = 2.00481E-07** m/s

SHEET 1 OF 1

# CONSTANT HEAD TEST FIELD DATA SHEET

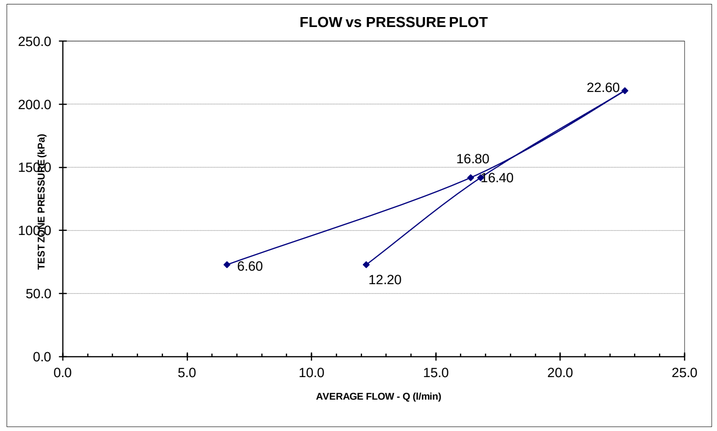
**PROJECT:** Mount Nansen | **PROJECT NO:** VM00605 | **DRILLHOLE:** CH-P-13-02

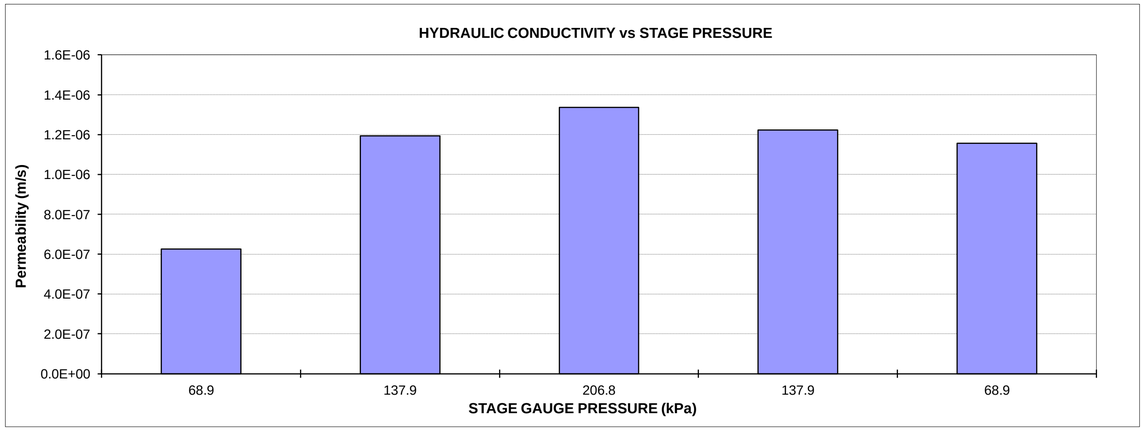
**AREA:** Powerline road - south of pit in DC Valley | **TEST DATE:** 30-Sep-13 | **TEST NO:** 3

**DIP:** 90 ° (FROM HORIZONTAL) | **STATIC WATER DEPTH:** 15.0 m (Corrected Vertical) | **TOP OF TEST INTERVAL:** 34.00 m (DOWN HOLE)

**HOLE DIA.** 75.3 mm | **GAUGE HEIGHT** (Above Ground): 1.5 m | **BOTTOM OF TEST INTERVAL:** 40.00 m (DOWN HOLE)

| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.585 | 2.594 | 2.604 | 2.608 | 2.612 | 2.618 | | | | | | |
| | | | Flow Meter | (litres) | 2585.0 | 2594.0 | 2604.0 | 2608.0 | 2612.0 | 2618.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 9.0 | 10.0 | 4.0 | 4.0 | 6.0 | | | | | | |
| 10 | 68.9 | 72.8 | Average Take | (litres / min) | | 9.00 | 10.00 | 4.00 | 4.00 | 6.00 | | | | | | 6.60 | 6.26E-07 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.639 | 2.654 | 2.667 | 2.686 | 2.705 | 2.721 | | | | | | |
| | | | Flow Meter | (litres) | 2639.0 | 2654.0 | 2667.0 | 2686.0 | 2705.0 | 2721.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 15.0 | 13.0 | 19.0 | 19.0 | 16.0 | | | | | | |
| 20 | 137.9 | 141.7 | Average Take | (litres / min) | | 15.00 | 13.00 | 19.00 | 19.00 | 16.00 | | | | | | 16.40 | 1.19E-06 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.734 | 2.756 | 2.780 | 2.801 | 2.824 | 2.847 | | | | | | |
| | | | Flow Meter | (litres) | 2734.0 | 2756.0 | 2780.0 | 2801.0 | 2824.0 | 2847.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 22.0 | 24.0 | 21.0 | 23.0 | 23.0 | | | | | | |
| 30 | 206.8 | 210.7 | Average Take | (litres / min) | | 22.00 | 24.00 | 21.00 | 23.00 | 23.00 | | | | | | 22.60 | 1.34E-06 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.862 | 2.887 | 2.902 | 2.917 | 2.931 | 2.946 | | | | | | |
| | | | Flow Meter | (litres) | 2862.0 | 2887.0 | 2902.0 | 2917.0 | 2931.0 | 2946.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 25.0 | 15.0 | 15.0 | 14.0 | 15.0 | | | | | | |
| 20 | 137.9 | 141.7 | Average Take | (litres / min) | | 25.00 | 15.00 | 15.00 | 14.00 | 15.00 | | | | | | 16.80 | 1.22E-06 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.950 | 2.964 | 2.976 | 2.987 | 2.999 | 3.011 | | | | | | |
| | | | Flow Meter | (litres) | 2950.0 | 2964.0 | 2976.0 | 2987.0 | 2999.0 | 3011.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 14.0 | 12.0 | 11.0 | 12.0 | 12.0 | | | | | | |
| 10 | 68.9 | 72.8 | Average Take | (litres / min) | | 14.00 | 12.00 | 11.00 | 12.00 | 12.00 | | | | | | 12.20 | 1.16E-06 |




**STATIC WTR LEVEL DETERMINATION:**

**INTERPRETATION REFERENCE:** "Field Permeability Test Methods and Applications to Solution Mining" - USB of Mines, 1977

**INTERPRETATION TYPE OF FLOW:**

| | |
|---|---|
| LAMINAR | NO |
| TURBULENT | NO |
| DILATION | NO |
| WASH-OUT | YES |
| VOID FILLING | NO |

| Hydraulic Conductivity | m/s |
|---|---|
| MAX k= | 1.34E-06 |
| MIN k= | 6.26E-07 |
| AVG k= | 1.11E-06 |
| **Interpreted k =** | 1.34E-06 |

SHEET 1 OF 1

# CONSTANT HEAD TEST FIELD DATA SHEET

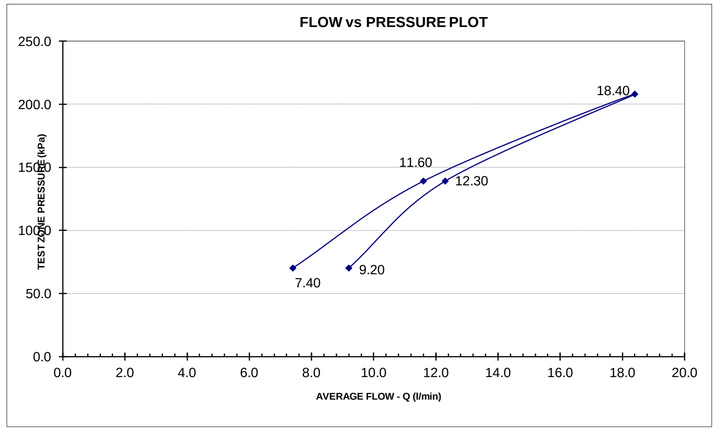
**PROJECT:** Mount Nansen | **PROJECT NO:** VM00605 | **DRILLHOLE:** CH-P-13-03

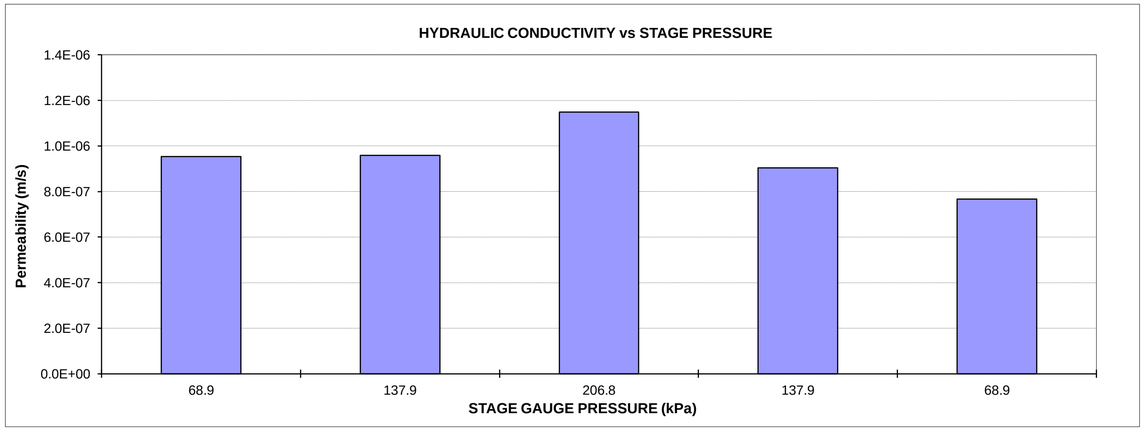
**AREA:** on pit access road | **TEST DATE:** 11-Sep-13 | **TEST NO:** 1

**DIP:** 90 ° (FROM HORIZONTAL) | **STATIC WATER DEPTH:** 13.0 m (Corrected Vertical) | **TOP OF TEST INTERVAL:** 7.00 m (DOWN HOLE)

**HOLE DIA.** 75.3 mm | **GAUGE HEIGHT** (Above Ground): 1.5 m | **BOTTOM OF TEST INTERVAL:** 13.00 m (DOWN HOLE)

| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 0.165 | 0.176 | 0.185 | 0.195 | 0.203 | 0.211 | | | | | | |
| | | | Flow Meter | (litres) | 165.0 | 175.5 | 185.0 | 195.0 | 203.0 | 211.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 10.5 | 9.5 | 10.0 | 8.0 | 8.0 | | | | | | |
| 10 | 68.9 | 70.1 | Average Take | (litres / min) | | 10.50 | 9.50 | 10.00 | 8.00 | 8.00 | | | | | | 9.20 | 9.53E-07 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 0.225 | 0.238 | 0.251 | 0.263 | 0.275 | 0.287 | | | | | | |
| | | | Flow Meter | (litres) | 225.0 | 238.0 | 251.0 | 263.0 | 275.0 | 286.5 | | | | | | |
| | | | Take | (litres) | 0.0 | 13.0 | 13.0 | 12.0 | 12.0 | 11.5 | | | | | | |
| 20 | 137.9 | 139.0 | Average Take | (litres / min) | | 13.00 | 13.00 | 12.00 | 12.00 | 11.50 | | | | | | 12.30 | 9.58E-07 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 0.300 | 0.320 | 0.339 | 0.357 | 0.374 | 0.392 | | | | | | |
| | | | Flow Meter | (litres) | 300.0 | 320.0 | 339.0 | 357.0 | 374.0 | 392.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 20.0 | 19.0 | 18.0 | 17.0 | 18.0 | | | | | | |
| 30 | 206.8 | 208.0 | Average Take | (litres / min) | | 20.00 | 19.00 | 18.00 | 17.00 | 18.00 | | | | | | 18.40 | 1.15E-06 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 0.400 | 0.412 | 0.424 | 0.435 | 0.446 | 0.458 | | | | | | |
| | | | Flow Meter | (litres) | 400.0 | 412.0 | 424.0 | 435.0 | 446.0 | 458.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 12.0 | 12.0 | 11.0 | 11.0 | 12.0 | | | | | | |
| 20 | 137.9 | 139.0 | Average Take | (litres / min) | | 12.00 | 12.00 | 11.00 | 11.00 | 12.00 | | | | | | 11.60 | 9.04E-07 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 0.465 | 0.472 | 0.480 | 0.488 | 0.495 | 0.502 | | | | | | |
| | | | Flow Meter | (litres) | 465.0 | 472.0 | 480.0 | 488.0 | 495.0 | 502.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 7.0 | 8.0 | 8.0 | 7.0 | 7.0 | | | | | | |
| 10 | 68.9 | 70.1 | Average Take | (litres / min) | | 7.00 | 8.00 | 8.00 | 7.00 | 7.00 | | | | | | 7.40 | 7.67E-07 |




**STATIC WTR LEVEL DETERMINATION:**

**INTERPRETATION REFERENCE:** "Field Permeability Test Methods and Applications to Solution Mining" - USB of Mines, 1977

**INTERPRETATION TYPE OF FLOW:**

| | |
|---|---|
| LAMINAR | NO |
| TURBULENT | NO |
| DILATION | NO |
| WASH-OUT | YES |
| VOID FILLING | NO |

| Hydraulic Conductivity | m/s |
|---|---|
| MAX k= | 1.15E-06 |
| MIN k= | 7.67E-07 |
| AVG k= | 9.46E-07 |
| **Interpreted k =** | 1.15E-06 |

SHEET 1 OF 1

# CONSTANT HEAD TEST FIELD DATA SHEET

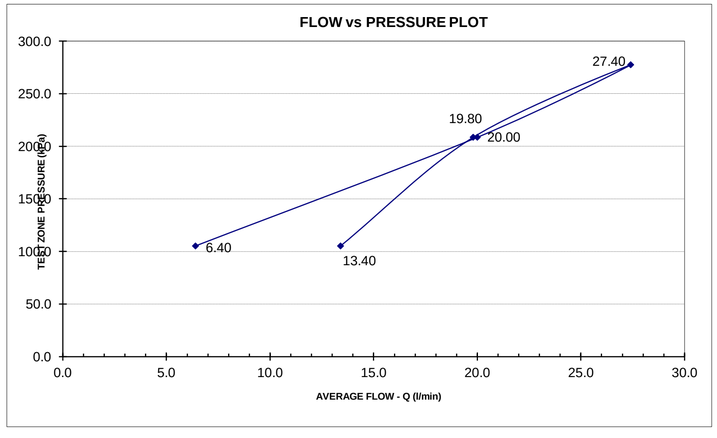
**PROJECT:** Mount Nansen | **PROJECT NO:** VM00605 | **DRILLHOLE:** CH-P-13-03

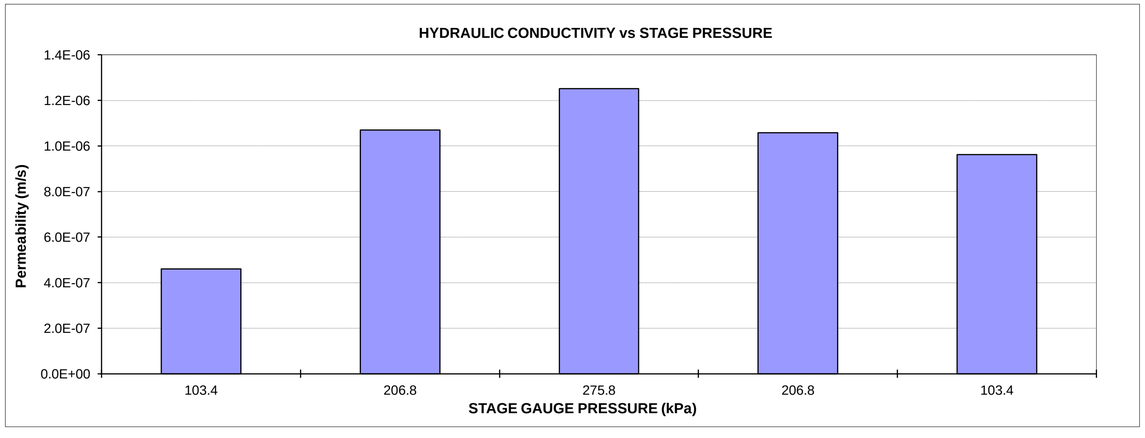
**AREA:** on pit access road | **TEST DATE:** 12-Sep-13 | **TEST NO:** 1

**DIP:** 90 ° (FROM HORIZONTAL) | **STATIC WATER DEPTH:** 19.0 m (Corrected Vertical) | **TOP OF TEST INTERVAL:** 13.00 m (DOWN HOLE)

**HOLE DIA.** 75.3 mm | **GAUGE HEIGHT** (Above Ground): 1.5 m | **BOTTOM OF TEST INTERVAL:** 19.00 m (DOWN HOLE)

| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 0.550 | 0.557 | 0.563 | 0.570 | 0.576 | 0.582 | | | | | | |
| | | | Flow Meter | (litres) | 550.0 | 557.0 | 563.0 | 570.0 | 576.0 | 582.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 7.0 | 6.0 | 7.0 | 6.0 | 6.0 | | | | | | |
| 15 | 103.4 | 105.2 | Average Take | (litres / min) | | 7.00 | 6.00 | 7.00 | 6.00 | 6.00 | | | | | | 6.40 | 4.60E-07 |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 0.600 | 0.621 | 0.641 | 0.660 | 0.681 | 0.700 | | | | | | |
| | | | Flow Meter | (litres) | 600.0 | 621.0 | 641.0 | 660.0 | 681.0 | 700.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 21.0 | 20.0 | 19.0 | 21.0 | 19.0 | | | | | | |
| 30 | 206.8 | 208.6 | Average Take | (litres / min) | | 21.00 | 20.00 | 19.00 | 21.00 | 19.00 | | | | | | 20.00 | 1.07E-06 |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 0.710 | 0.737 | 0.765 | 0.793 | 0.820 | 0.847 | | | | | | |
| | | | Flow Meter | (litres) | 710.0 | 737.0 | 765.0 | 793.0 | 820.0 | 847.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 27.0 | 28.0 | 28.0 | 27.0 | 27.0 | | | | | | |
| 40 | 275.8 | 277.5 | Average Take | (litres / min) | | 27.00 | 28.00 | 28.00 | 27.00 | 27.00 | | | | | | 27.40 | 1.25E-06 |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 0.865 | 0.886 | 0.906 | 0.926 | 0.945 | 0.964 | | | | | | |
| | | | Flow Meter | (litres) | 865.0 | 886.0 | 906.0 | 926.0 | 945.0 | 964.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 21.0 | 20.0 | 20.0 | 19.0 | 19.0 | | | | | | |
| 30 | 206.8 | 208.6 | Average Take | (litres / min) | | 21.00 | 20.00 | 20.00 | 19.00 | 19.00 | | | | | | 19.80 | 1.06E-06 |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 0.975 | 0.989 | 1.002 | 1.016 | 1.029 | 1.042 | | | | | | |
| | | | Flow Meter | (litres) | 975.0 | 989.0 | 1002.0 | 1016.0 | 1029.0 | 1042.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 14.0 | 13.0 | 14.0 | 13.0 | 13.0 | | | | | | |
| 15 | 103.4 | 105.2 | Average Take | (litres / min) | | 14.00 | 13.00 | 14.00 | 13.00 | 13.00 | | | | | | 13.40 | 9.63E-07 |




**STATIC WTR LEVEL DETERMINATION:**

**INTERPRETATION REFERENCE:** "Field Permeability Test Methods and Applications to Solution Mining" - USB of Mines, 1977

**INTERPRETATION TYPE OF FLOW:**

| | |
|---|---|
| LAMINAR | NO |
| TURBULENT | NO |
| DILATION | NO |
| WASH-OUT | YES |
| VOID FILLING | NO |

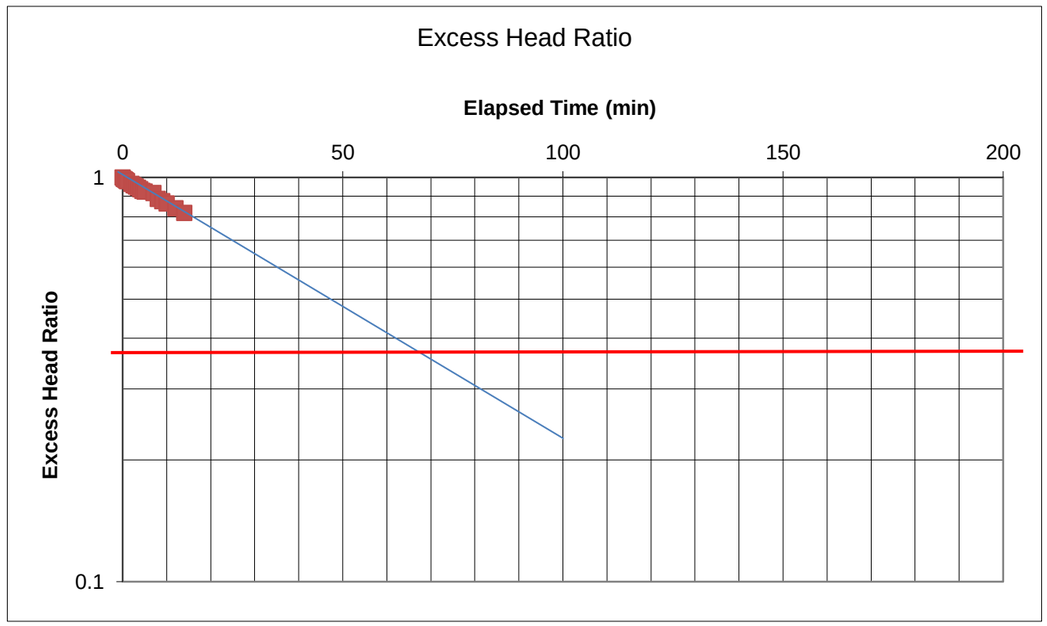
| Hydraulic Conductivity | m/s |
|---|---|
| MAX k= | 1.25E-06 |
| MIN k= | 4.60E-07 |
| AVG k= | 9.61E-07 |
| **Interpreted k =** | 1.25E-06 |

Mount Nansen

**CH-P-13-03** | **Test 3 19-25 m depth** | **Date: 12-Sep-13**

**Falling Head data**

| | Elapsed Time (min) | Depth to Water (m) | Excess Head Ratio | = | 1-[(h-H)/(Ho-H)] |
|---|---|---|---|---|---|
| 0.16 | 0 | 0 | 1 | | |
| 0.36 | 0.25 | 0.2 | 0.99245283 | | |
| 0.45 | 0.5 | 0.29 | 0.989056604 | | |
| 0.57 | 0.75 | 0.41 | 0.984528302 | | |
| 0.7 | 1 | 0.54 | 0.979622642 | | |
| 1.1 | 2 | 0.94 | 0.964528302 | | |
| 1.3 | 2.5 | 1.14 | 0.956981132 | | |
| 1.49 | 3 | 1.33 | 0.949811321 | | |
| 1.66 | 3.5 | 1.5 | 0.943396226 | | |
| 1.87 | 4 | 1.71 | 0.935471698 | | |
| 2.1 | 4.5 | 1.94 | 0.926792453 | | |
| 2.2 | 5 | 2.04 | 0.923018868 | | |
| 2.4 | 7 | 2.24 | 0.915471698 | | |
| 3.2 | 8 | 3.04 | 0.885283019 | | |
| 3.5 | 9 | 3.34 | 0.873962264 | | |
| 3.8 | 10 | 3.64 | 0.862641509 | | |
| 4.42 | 12 | 4.26 | 0.839245283 | | |
| 5 | 14 | 4.84 | 0.817358491 | | |




| | | |
|---|---|---|
| Date | | |
| Packer Inflation Pres | 250 | psi |
| Standpipe | 1.5 | m |
| Static water level | 26.5 | m |
| h = | measured water level | |
| H = | Initial water level | |
| Ho = | Static water level | |
| Top of interval | 19 | m |
| Bottom of interval | 25 | m |
| **NQ** | | |
| R(borehole) = | 0.0379 | m |
| r (drill rod) = | 0.0302 | m |
| L = | 6 | |
| To = 37% head ratio in sec | 65 | min |
| | 3900 | sec |

**K =** **9.86984E-08** m/s

$$K = \frac{r^2 \ln \frac{L}{R}}{2LT_0}$$

SHEET 1 OF 1

# CONSTANT HEAD TEST FIELD DATA SHEET

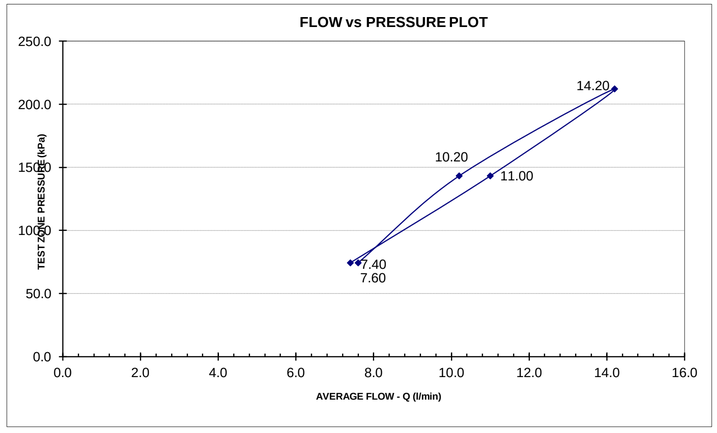
**PROJECT:** Mount Nansen | **PROJECT NO:** VM00605 | **DRILLHOLE:** CH-P-13-03

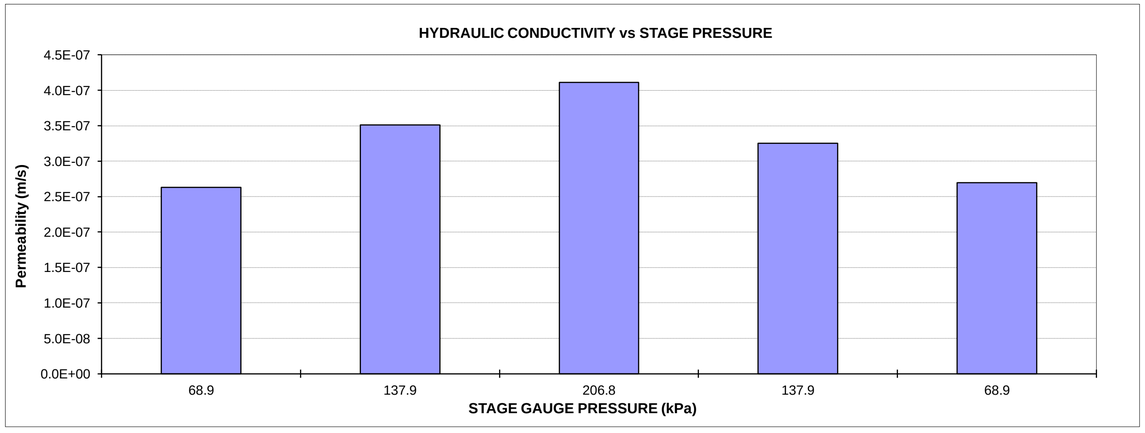
**AREA:** on pit access road | **TEST DATE:** 12-Sep-13 | **TEST NO:** 1

**DIP:** 90 ° (FROM HORIZONTAL) | **STATIC WATER DEPTH:** 31.0 m (Corrected Vertical) | **TOP OF TEST INTERVAL:** 25.00 m (DOWN HOLE)

**HOLE DIA.** 75.3 mm | **GAUGE HEIGHT** (Above Ground): 25.0 m | **BOTTOM OF TEST INTERVAL:** 31.00 m (DOWN HOLE)

| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 1.125 | 1.132 | 1.140 | 1.147 | 1.155 | 1.162 | | | | | | |
| | | | Flow Meter | (litres) | 1125.0 | 1132.0 | 1140.0 | 1147.0 | 1154.5 | 1162.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 7.0 | 8.0 | 7.0 | 7.5 | 7.5 | | | | | | |
| 10 | 68.9 | 74.2 | Average Take | (litres / min) | | 7.00 | 8.00 | 7.00 | 7.50 | 7.50 | | | | | | 7.40 | 2.63E-07 |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 1.180 | 1.192 | 1.203 | 1.214 | 1.224 | 1.235 | | | | | | |
| | | | Flow Meter | (litres) | 1180.0 | 1192.0 | 1203.0 | 1214.0 | 1224.0 | 1235.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 12.0 | 11.0 | 11.0 | 10.0 | 11.0 | | | | | | |
| 20 | 137.9 | 143.2 | Average Take | (litres / min) | | 12.00 | 11.00 | 11.00 | 10.00 | 11.00 | | | | | | 11.00 | 3.51E-07 |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 1.250 | 1.265 | 1.279 | 1.293 | 1.307 | 1.321 | | | | | | |
| | | | Flow Meter | (litres) | 1250.0 | 1265.0 | 1279.0 | 1293.0 | 1307.0 | 1321.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 15.0 | 14.0 | 14.0 | 14.0 | 14.0 | | | | | | |
| 30 | 206.8 | 212.1 | Average Take | (litres / min) | | 15.00 | 14.00 | 14.00 | 14.00 | 14.00 | | | | | | 14.20 | 4.11E-07 |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 1.330 | 1.341 | 1.351 | 1.361 | 1.371 | 1.381 | | | | | | |
| | | | Flow Meter | (litres) | 1330.0 | 1340.5 | 1351.0 | 1361.0 | 1371.0 | 1381.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 10.5 | 10.5 | 10.0 | 10.0 | 10.0 | | | | | | |
| 20 | 137.9 | 143.2 | Average Take | (litres / min) | | 10.50 | 10.50 | 10.00 | 10.00 | 10.00 | | | | | | 10.20 | 3.25E-07 |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 1.385 | 1.393 | 1.400 | 1.408 | 1.416 | 1.423 | | | | | | |
| | | | Flow Meter | (litres) | 1385.0 | 1393.0 | 1400.0 | 1408.0 | 1416.0 | 1423.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 8.0 | 7.0 | 8.0 | 8.0 | 7.0 | | | | | | |
| 10 | 68.9 | 74.2 | Average Take | (litres / min) | | 8.00 | 7.00 | 8.00 | 8.00 | 7.00 | | | | | | 7.60 | 2.70E-07 |




**STATIC WTR LEVEL DETERMINATION:**

**INTERPRETATION REFERENCE:** "Field Permeability Test Methods and Applications to Solution Mining" - USB of Mines, 1977

**INTERPRETATION TYPE OF FLOW:**

| | |
|---|---|
| LAMINAR | YES |
| TURBULENT | NO |
| DILATION | NO |
| WASH-OUT | NO |
| VOID FILLING | NO |

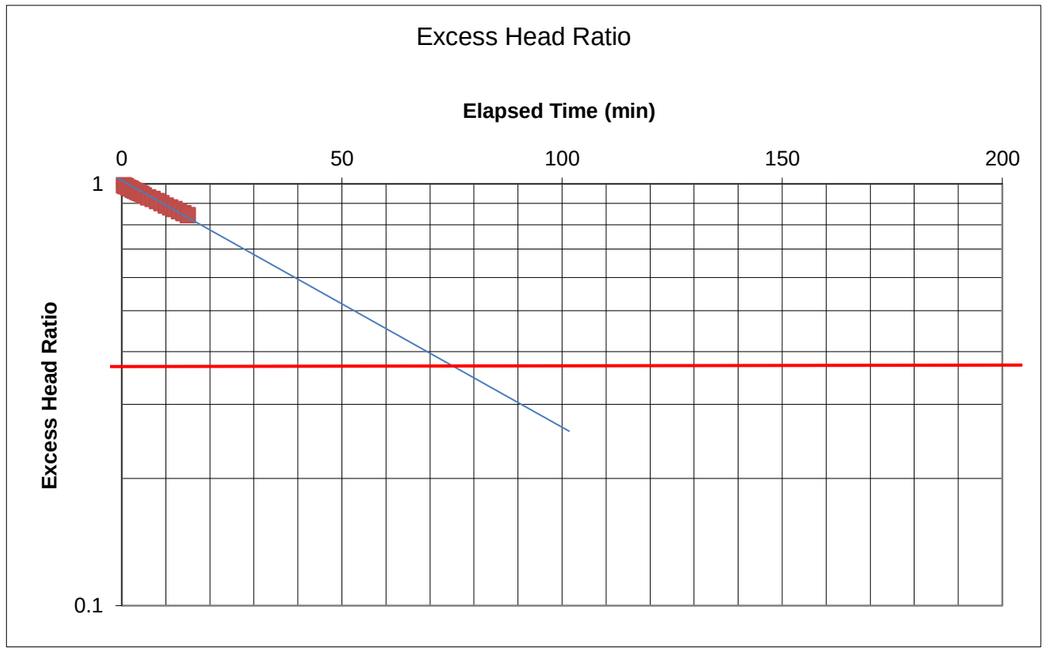
| Hydraulic Conductivity | m/s |
|---|---|
| MAX k= | 4.11E-07 |
| MIN k= | 2.63E-07 |
| AVG k= | 3.24E-07 |
| **Interpreted k =** | 3.24E-07 |

Mount Nansen

**CH-P-13-03** | **Test 5 31-37 m depth** | **Date: 12-Sep-13**

**Falling Head data**

| | Elapsed Time (min) | Depth to Water (m) | Excess Head Ratio | = | 1-[(h-H)/(Ho-H)] |
|---|---|---|---|---|---|
| 0.16 | 0 | 0 | 1 | | |
| 0.44 | 0.5 | 0.28 | 0.992727273 | | |
| 0.6 | 0.75 | 0.44 | 0.988571429 | | |
| 0.64 | 1 | 0.48 | 0.987532468 | | |
| 0.96 | 1.5 | 0.8 | 0.979220779 | | |
| 1.1 | 2 | 0.94 | 0.975584416 | | |
| 1.4 | 2.5 | 1.24 | 0.967792208 | | |
| 1.6 | 3 | 1.44 | 0.962597403 | | |
| 1.8 | 3.5 | 1.64 | 0.957402597 | | |
| 2 | 4 | 1.84 | 0.952207792 | | |
| 2.2 | 4.5 | 2.04 | 0.947012987 | | |
| 2.5 | 5 | 2.34 | 0.939220779 | | |
| 2.9 | 6 | 2.74 | 0.928831169 | | |
| 3.2 | 7 | 3.04 | 0.921038961 | | |
| 3.6 | 8 | 3.44 | 0.910649351 | | |
| 4 | 9 | 3.84 | 0.90025974 | | |
| 4.45 | 10 | 4.29 | 0.888571429 | | |
| 4.8 | 11 | 4.64 | 0.879480519 | | |
| 5.1 | 12 | 4.94 | 0.871688312 | | |
| 5.5 | 13 | 5.34 | 0.861298701 | | |
| 5.85 | 14 | 5.69 | 0.852207792 | | |
| 6.2 | 15 | 6.04 | 0.843116883 | | |




$$K = \frac{r^2 \ln \frac{L}{R}}{2LT_0}$$

| | | |
|---|---|---|
| Date | | |
| Packer Inflation Pres | 250 | psi |
| Standpipe | 1.5 | m |
| Static water level | 38.5 | m |
| h = | measured water level | |
| H = | Initial water level | |
| Ho = | Static water level | |
| Top of interval | 31 | m |
| Bottom of interval | 37 | m |
| **NQ** | | |
| R(borehole) = | 0.0379 | m |
| r (drill rod) = | 0.0302 | m |
| L = | 6 | |
| To = 37% head ratio in sec | 75 | min |
| | 4500 | sec |

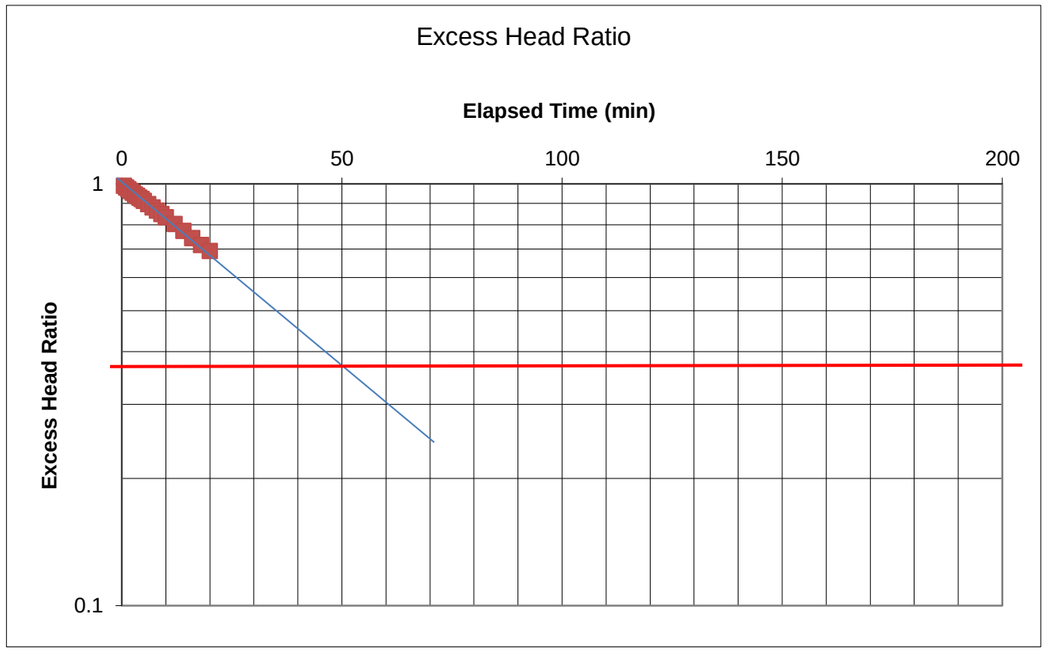
**K =** **8.55386E-08** m/s

Mount Nansen

**CH-P-13-03** | **Test 6 37-43 m depth** | **Date: 13-Sep-13**

**Falling Head data**

| | Elapsed Time (min) | Depth to Water (m) | Excess Head Ratio | = | 1-[(h-H)/(Ho-H)] |
|---|---|---|---|---|---|
| 0.16 | 0 | 0 | 1 | | |
| 0.6 | 0.5 | 0.44 | 0.989885057 | | |
| 1 | 1 | 0.84 | 0.980689655 | | |
| 1.4 | 1.5 | 1.24 | 0.971494253 | | |
| 1.8 | 2 | 1.64 | 0.962298851 | | |
| 2.2 | 2.5 | 2.04 | 0.953103448 | | |
| 2.6 | 3 | 2.44 | 0.943908046 | | |
| 2.9 | 3.5 | 2.74 | 0.937011494 | | |
| 3.3 | 4 | 3.14 | 0.927816092 | | |
| 3.6 | 4.5 | 3.44 | 0.92091954 | | |
| 4 | 5 | 3.84 | 0.911724138 | | |
| 4.7 | 6 | 4.54 | 0.895632184 | | |
| 5.4 | 7 | 5.24 | 0.87954023 | | |
| 6.06 | 8 | 5.9 | 0.864367816 | | |
| 6.76 | 9 | 6.6 | 0.848275862 | | |
| 7.4 | 10 | 7.24 | 0.833563218 | | |
| 8.71 | 12 | 8.55 | 0.803448276 | | |
| 10 | 14 | 9.84 | 0.773793103 | | |
| 11.3 | 16 | 11.14 | 0.743908046 | | |
| 12.5 | 18 | 12.34 | 0.716321839 | | |
| 13.5 | 20 | 13.34 | 0.693333333 | | |




| | | |
|---|---|---|
| Date | | |
| Packer Inflation Pres | 250 | psi |
| Standpipe | 1.5 | m |
| Static water level | 43.5 | m |
| h = | measured water level | |
| H = | Initial water level | |
| Ho = | Static water level | |
| Top of interval | 37 | m |
| Bottom of interval | 43 | m |
| **NQ** | | |
| R(borehole) = | 0.0379 | m |
| r (drill rod) = | 0.0302 | m |
| L = | 6 | |
| To = 37% head ratio in sec | 50 | min |
| | 3000 | sec |

**K =** **1.28308E-07** m/s

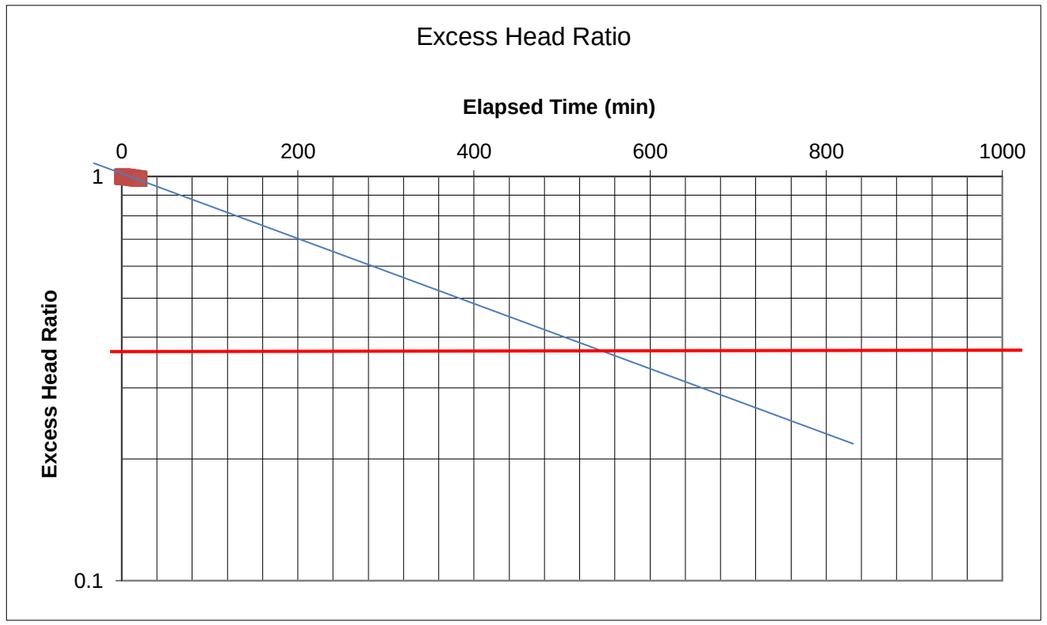
$$K = \frac{r^2 \ln \frac{L}{R}}{2LT_0}$$

Mount Nansen

**CH-P-13-03** | **Test 7 40-43 m depth** | **Date: 13-Sep-13**

**Falling Head data**

| | Elapsed Time (min) | Depth to Water (m) | Excess Head Ratio | = | 1-[(h-H)/(Ho-H)] |
|---|---|---|---|---|---|
| 0.04 | 0 | 0 | 1 | | |
| 0.05 | 0.5 | 0.01 | 0.999767442 | | |
| 0.057 | 1 | 0.017 | 0.999604651 | | |
| 0.07 | 1.5 | 0.03 | 0.999302326 | | |
| 0.08 | 2 | 0.04 | 0.999069767 | | |
| 0.095 | 3 | 0.055 | 0.99872093 | | |
| 0.12 | 4 | 0.08 | 0.998139535 | | |
| 0.15 | 5 | 0.11 | 0.99744186 | | |
| 0.165 | 6 | 0.125 | 0.997093023 | | |
| 0.18 | 7 | 0.14 | 0.996744186 | | |
| 0.215 | 8 | 0.175 | 0.995930233 | | |
| 0.285 | 10 | 0.245 | 0.994302326 | | |
| 0.34 | 12 | 0.3 | 0.993023256 | | |
| 0.4 | 14 | 0.36 | 0.991627907 | | |
| 0.46 | 16 | 0.42 | 0.990232558 | | |
| 0.52 | 18 | 0.48 | 0.988837209 | | |
| 0.58 | 20 | 0.54 | 0.98744186 | | |




| | | |
|---|---|---|
| Date | | |
| Packer Inflation Pres | 250 | psi |
| Standpipe | 1.5 | m |
| Static water level | 43 | m |
| h = | measured water level | |
| H = | Initial water level | |
| Ho = | Static water level | |
| Top of interval | 43 | m |
| Bottom of interval | 50 | m |
| **NQ** | | |
| R(borehole) = | 0.0379 | m |
| r (drill rod) = | 0.0302 | m |
| L = | 7 | |
| To = 37% head ratio in sec | 500 | min |
| | 30000 | sec |

**K =** **1.13326E-08** m/s

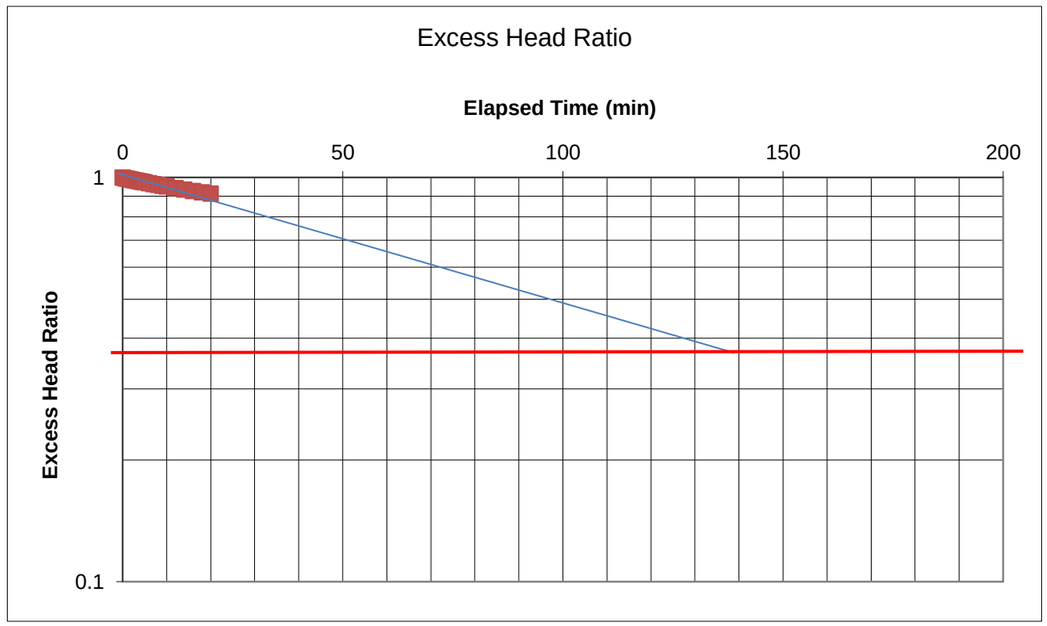
$$K = \frac{r^2 \ln \frac{L}{R}}{2LT_0}$$

Mount Nansen

**CH-P-13-04** | **Test 4 22-33.5 m depth** | **Date: 16-Sep-13**

**Falling Head data**

| | Elapsed Time (min) | Depth to Water (m) | Excess Head Ratio | = | 1-[(h-H)/(Ho-H)] |
|---|---|---|---|---|---|
| 0.16 | 0 | 0 | 1 | | |
| 0.26 | 0.5 | 0.1 | 0.995744681 | | |
| 0.31 | 1 | 0.15 | 0.993617021 | | |
| 0.38 | 1.5 | 0.22 | 0.990638298 | | |
| 0.44 | 2 | 0.28 | 0.988085106 | | |
| 0.52 | 2.5 | 0.36 | 0.984680851 | | |
| 0.56 | 3 | 0.4 | 0.982978723 | | |
| 0.62 | 3.5 | 0.46 | 0.980425532 | | |
| 0.68 | 4 | 0.52 | 0.97787234 | | |
| 0.74 | 4.5 | 0.58 | 0.975319149 | | |
| 0.79 | 5 | 0.63 | 0.973191489 | | |
| 0.91 | 6 | 0.75 | 0.968085106 | | |
| 1.03 | 7 | 0.87 | 0.962978723 | | |
| 1.12 | 8 | 0.96 | 0.959148936 | | |
| 1.23 | 9 | 1.07 | 0.954468085 | | |
| 1.33 | 10 | 1.17 | 0.950212766 | | |
| 1.53 | 12 | 1.37 | 0.941702128 | | |
| 1.72 | 14 | 1.56 | 0.933617021 | | |
| 1.9 | 16 | 1.74 | 0.925957447 | | |
| 2.06 | 18 | 1.9 | 0.919148936 | | |
| 2.22 | 20 | 2.06 | 0.912340426 | | |




| | | |
|---|---|---|
| Date | | |
| Packer Inflation Pres | 250 | psi |
| Standpipe | 1.5 | m |
| Static water level | 23.5 | m |
| h = | measured water level | |
| H = | Initial water level | |
| Ho = | Static water level | |
| Top of interval | 22 | m |
| Bottom of interval | 33.5 | m |
| **NQ** | | |
| R(borehole) = | 0.0379 | m |
| r (drill rod) = | 0.0302 | m |
| L = | 11.5 | |
| To = 37% head ratio in sec | 140 | min |
| | 8400 | sec |

**K =** **2.69795E-08** m/s

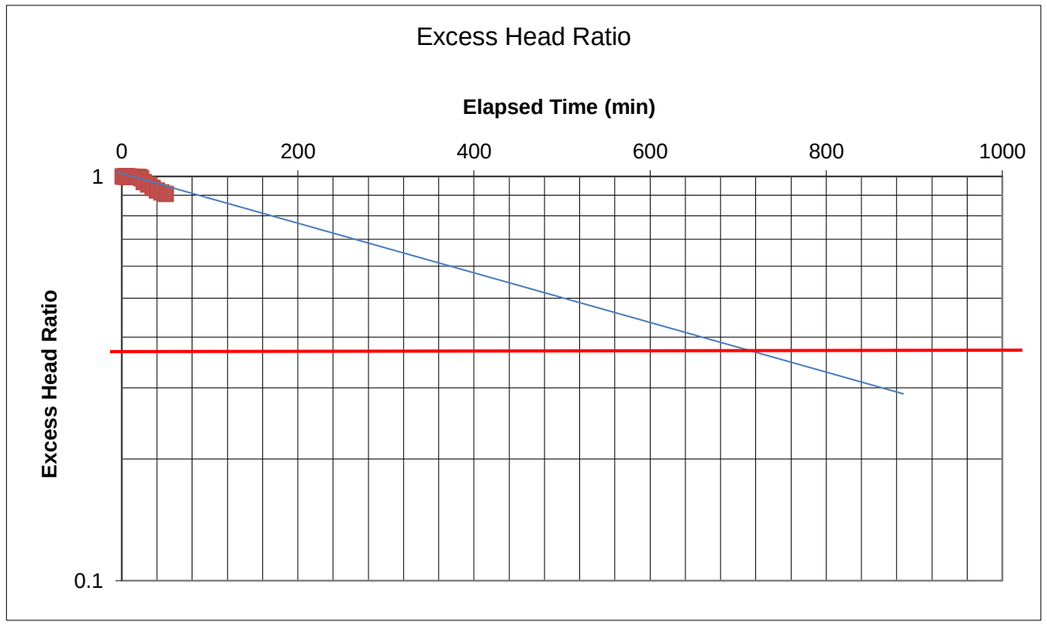
$$K = \frac{r^2 \ln \frac{L}{R}}{2LT_0}$$

Mount Nansen

**CH-P-13-04** | **Test 5** | **34-40 m depth** | **Date:** | **16-Sep-13**

**Falling Head data**

| | Elapsed Time (min) | Depth to Water (m) | Excess Head Ratio | = | 1-[(h-H)/(Ho-H)] |
|---|---|---|---|---|---|
| 0.19 | 1 | 0 | 1 | | |
| 0.19 | 2 | 0 | 1 | | |
| 0.19 | 3 | 0 | 1 | | |
| 0.195 | 4 | 0.005 | 0.999859155 | | |
| 0.2 | 5 | 0.01 | 0.99971831 | | |
| 0.2 | 6 | 0.01 | 0.99971831 | | |
| 0.2 | 7 | 0.01 | 0.99971831 | | |
| 0.21 | 8 | 0.02 | 0.99943662 | | |
| 0.22 | 10 | 0.03 | 0.99915493 | | |
| 0.23 | 12 | 0.04 | 0.998873239 | | |
| 0.245 | 14 | 0.055 | 0.998450704 | | |
| 0.255 | 16 | 0.065 | 0.998169014 | | |
| 0.265 | 18 | 0.075 | 0.997887324 | | |
| 0.295 | 20 | 0.105 | 0.997042254 | | |
| 0.51 | 22 | 0.32 | 0.990985915 | | |
| 1.3 | 25 | 1.11 | 0.968732394 | | |
| 1.77 | 30 | 1.58 | 0.955492958 | | |
| 2.43 | 35 | 2.24 | 0.936901408 | | |
| 2.9 | 40 | 2.71 | 0.923661972 | | |
| 3.27 | 45 | 3.08 | 0.913239437 | | |
| 3.54 | 50 | 3.35 | 0.905633803 | | |




| | | |
|---|---|---|
| Date | | |
| Packer Inflation Pres | 250 | psi |
| Standpipe | 1.5 | m |
| Static water level | 35.5 | m |
| h = | measured water level | |
| H = | Initial water level | |
| Ho = | Static water level | |
| Top of interval | 34 | m |
| Bottom of interval | 40 | m |
| **NQ** | | |
| R(borehole) = | 0.0379 | m |
| r (drill rod) = | 0.0302 | m |
| L = | 6 | |
| To = 37% head ratio in sec | 725 | min |
| | 43500 | sec |

**K =** **8.84882E-09** m/s

$$K = \frac{r^2 \ln \frac{L}{R}}{2LT_0}$$

SHEET 1 OF 1

# CONSTANT HEAD TEST FIELD DATA SHEET

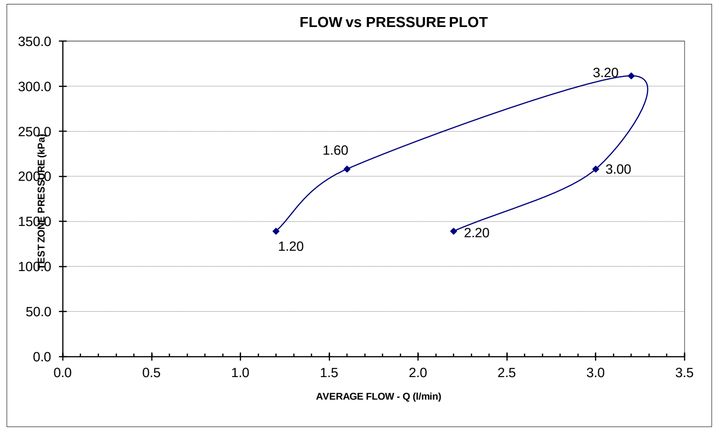
**PROJECT:** Mt Nansen | **PROJECT NO:** VM00605 | **DRILLHOLE:** CH-P-13-05

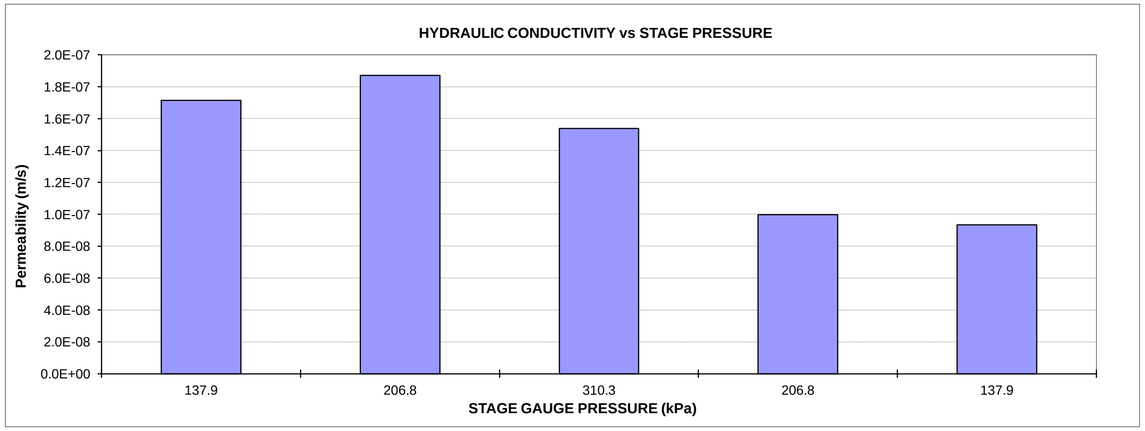
**AREA:** Pit | **TEST DATE:** 21-Sep-13 | **TEST NO:** 1

**DIP:** 90 ° (FROM HORIZONTAL) | **STATIC WATER DEPTH:** 13.0 m (Corrected Vertical) | **TOP OF TEST INTERVAL:** 7.00 m (DOWN HOLE)

**HOLE DIA.** 75.3 mm | **GAUGE HEIGHT** (Above Ground): 1.5 m | **BOTTOM OF TEST INTERVAL:** 13.00 m (DOWN HOLE)

| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | | |
| | | | Flow Meter | ($m^3$) | 1.905 | 1.907 | 1.910 | 1.912 | 1.914 | 1.916 | | | | | | | |
| | | | Flow Meter | (litres) | 1905.0 | 1907.0 | 1910.0 | 1912.0 | 1914.0 | 1916.0 | | | | | | | |
| | | | Take | (litres) | 0.0 | 2.0 | 3.0 | 2.0 | 2.0 | 2.0 | | | | | | | |
| 20 | 137.9 | 139.0 | Average Take | (litres / min) | | 2.00 | 3.00 | 2.00 | 2.00 | 2.00 | | | | | | 2.20 | 1.71E-07 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | | |
| | | | Flow Meter | ($m^3$) | 1.919 | 1.922 | 1.926 | 1.928 | 1.931 | 1.934 | | | | | | | |
| | | | Flow Meter | (litres) | 1919.0 | 1922.0 | 1925.5 | 1928.0 | 1931.0 | 1934.0 | | | | | | | |
| | | | Take | (litres) | 0.0 | 3.0 | 3.5 | 2.5 | 3.0 | 3.0 | | | | | | | |
| 30 | 206.8 | 208.0 | Average Take | (litres / min) | | 3.00 | 3.50 | 2.50 | 3.00 | 3.00 | | | | | | 3.00 | 1.87E-07 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | | |
| | | | Flow Meter | ($m^3$) | 1.936 | 1.940 | 1.943 | 1.946 | 1.949 | 1.952 | | | | | | | |
| | | | Flow Meter | (litres) | 1936.0 | 1940.0 | 1943.0 | 1946.0 | 1949.0 | 1952.0 | | | | | | | |
| | | | Take | (litres) | 0.0 | 4.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | | | | | |
| 45 | 310.3 | 311.4 | Average Take | (litres / min) | | 4.00 | 3.00 | 3.00 | 3.00 | 3.00 | | | | | | 3.20 | 1.54E-07 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | | |
| | | | Flow Meter | ($m^3$) | 1.953 | 1.955 | 1.956 | 1.958 | 1.960 | 1.961 | | | | | | | |
| | | | Flow Meter | (litres) | 1953.0 | 1955.0 | 1956.0 | 1958.0 | 1959.5 | 1961.0 | | | | | | | |
| | | | Take | (litres) | 0.0 | 2.0 | 1.0 | 2.0 | 1.5 | 1.5 | | | | | | | |
| 30 | 206.8 | 208.0 | Average Take | (litres / min) | | 2.00 | 1.00 | 2.00 | 1.50 | 1.50 | | | | | | 1.60 | 9.99E-08 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | | |
| | | | Flow Meter | ($m^3$) | 1.961 | 1.962 | 1.964 | 1.965 | 1.966 | 1.967 | | | | | | | |
| | | | Flow Meter | (litres) | 1961.0 | 1962.0 | 1963.5 | 1965.0 | 1966.0 | 1967.0 | | | | | | | |
| | | | Take | (litres) | 0.0 | 1.0 | 1.5 | 1.5 | 1.0 | 1.0 | | | | | | | |
| 20 | 137.9 | 139.0 | Average Take | (litres / min) | | 1.00 | 1.50 | 1.50 | 1.00 | 1.00 | | | | | | 1.20 | 9.35E-08 |




**STATIC WTR LEVEL DETERMINATION:**

**INTERPRETATION REFERENCE:** "Field Permeability Test Methods and Applications to Solution Mining" - USB of Mines, 1977

**INTERPRETATION TYPE OF FLOW:**

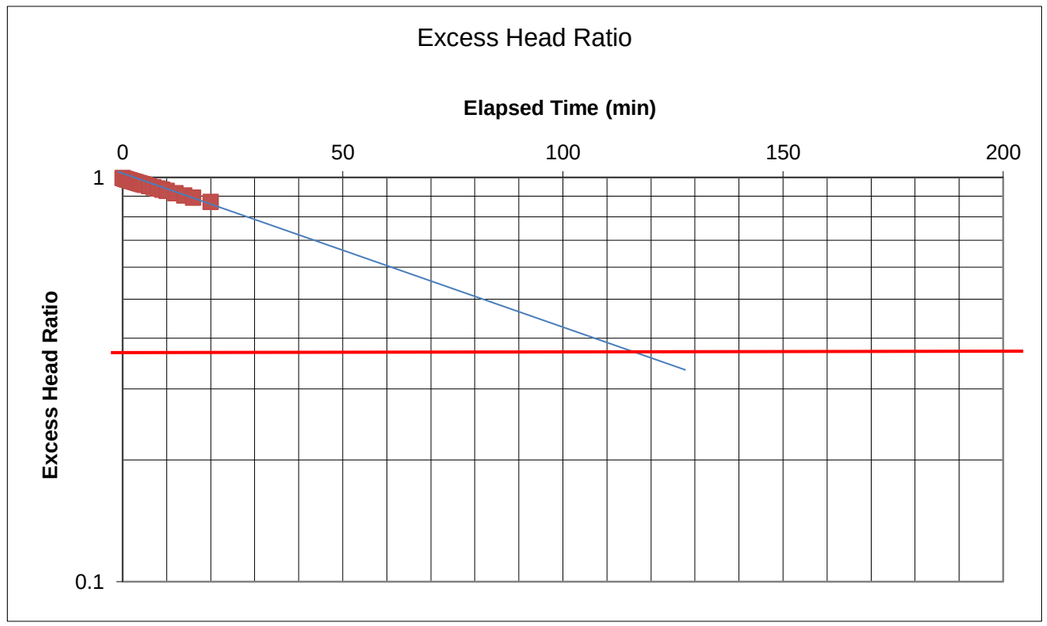
| | |
|---|---|
| LAMINAR | NO |
| TURBULENT | NO |
| DILATION | NO |
| WASH-OUT | NO |
| VOID FILLING | YES |

| Hydraulic Conductivity | m/s |
|---|---|
| MAX k= | 1.87E-07 |
| MIN k= | 9.35E-08 |
| AVG k= | 1.41E-07 |
| **Interpreted k =** | 9.35E-08 |

**CH-P-13-05** | **Test 2** | **Date: 22-Sep-13**

**Falling Head data**

| | Elapsed Time (min) | Depth to Water (m) | Excess Head Ratio | = | 1-[(h-H)/(Ho-H)] |
|---|---|---|---|---|---|
| 0.2 | 0 | 0.04 | 0.997241379 | | |
| 0.27 | 0.5 | 0.11 | 0.992413793 | | |
| 0.33 | 1 | 0.17 | 0.988275862 | | |
| 0.38 | 1.5 | 0.22 | 0.984827586 | | |
| 0.44 | 2 | 0.28 | 0.980689655 | | |
| 0.49 | 2.5 | 0.33 | 0.977241379 | | |
| 0.54 | 3 | 0.38 | 0.973793103 | | |
| 0.6 | 3.5 | 0.44 | 0.969655172 | | |
| 0.65 | 4 | 0.49 | 0.966206897 | | |
| 0.7 | 4.5 | 0.54 | 0.962758621 | | |
| 0.75 | 5 | 0.59 | 0.959310345 | | |
| 0.85 | 6 | 0.69 | 0.952413793 | | |
| 0.94 | 7 | 0.78 | 0.946206897 | | |
| 1.04 | 8 | 0.88 | 0.939310345 | | |
| 1.13 | 9 | 0.97 | 0.933103448 | | |
| 1.22 | 10 | 1.06 | 0.926896552 | | |
| 1.4 | 12 | 1.24 | 0.914482759 | | |
| 1.57 | 14 | 1.41 | 0.902758621 | | |
| 1.73 | 16 | 1.57 | 0.891724138 | | |
| 2.04 | 20 | 1.88 | 0.870344828 | | |




$$K = \frac{r^2 \ln \frac{L}{R}}{2LT_0}$$

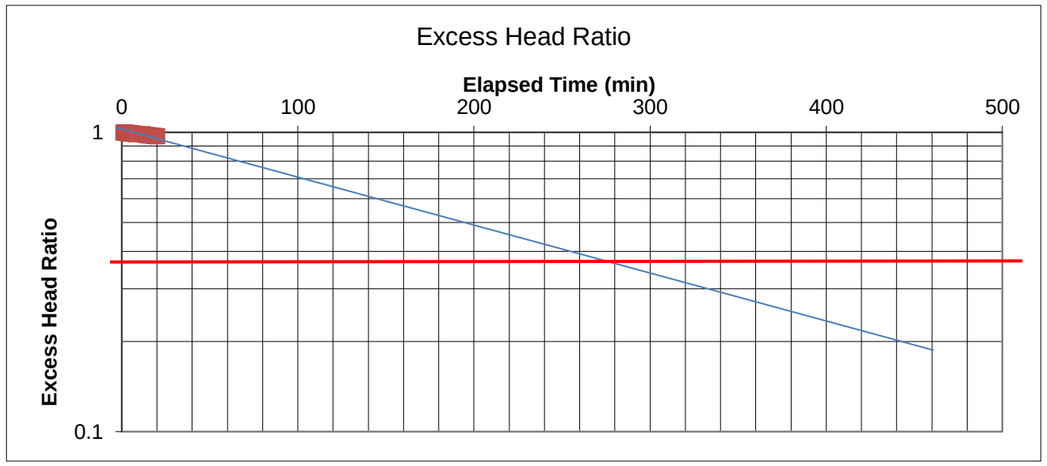
| | | |
|---|---|---|
| Date | | |
| Packer Inflation Pres | 250 | psi |
| Standpipe | 1.5 | m |
| Static water level | 14.5 | m |
| h = | measured water level | |
| H = | Initial water level | |
| Ho = | Static water level | |
| Top of interval | 13 | m |
| Bottom of interval | 19 | m |
| **NQ** | | |
| R(borehole) = | 0.0379 | m |
| r (drill rod) = | 0.0302 | m |
| L = | 6 | |
| To = 37% head ratio in sec | 115 | min |
| | 6900 | sec |

**K =** **5.5786E-08** m/s

**CH-P-13-05** | **Test 3** | **Date: 22-Sep-13**

**Falling Head data**

| | Elapsed Time (min) | Depth to Water (m) | Excess Head Ratio | = | 1-[(h-H)/(Ho-H)] |
|---|---|---|---|---|---|
| 0.2 | 0 | | | | |
| 0.24 | 1 | 0.04 | 0.99804878 | | |
| 0.27 | 2 | 0.08 | 0.996097561 | | |
| 0.31 | 3 | 0.11 | 0.994634146 | | |
| 0.34 | 4 | 0.15 | 0.992682927 | | |
| 0.37 | 5 | 0.18 | 0.991219512 | | |
| 0.41 | 6 | 0.21 | 0.989756098 | | |
| 0.44 | 7 | 0.25 | 0.987804878 | | |
| 0.47 | 8 | 0.28 | 0.986341463 | | |
| 0.6 | 12 | 0.31 | 0.984878049 | | |
| 0.66 | 14 | 0.44 | 0.978536585 | | |
| 0.73 | 16 | 0.5 | 0.975609756 | | |
| 0.79 | 18 | 0.57 | 0.972195122 | | |
| 0.85 | 20 | 0.63 | 0.969268293 | | |




$$K = \frac{r^2 \ln \frac{L}{R}}{2LT_0}$$

| | | |
|---|---|---|
| Date | | |
| Packer Inflation Pres | 250 | psi |
| Standpipe | 1.5 | m |
| Static water level | 20.5 | m |
| h = | measured water level | |
| H = | Initial water level | |
| Ho = | Static water level | |
| Top of interval | 19 | m |
| Bottom of interval | 25 | m |
| **NQ** | | |
| R(borehole) = | 0.0379 | m |
| r (drill rod) = | 0.0302 | m |
| L = | 6 | |
| To = 37% head ratio in sec | 280 | min |
| | 16800 | sec |

**K = 2.29121E-08** m/s

SHEET 1 OF 1

# CONSTANT HEAD TEST FIELD DATA SHEET

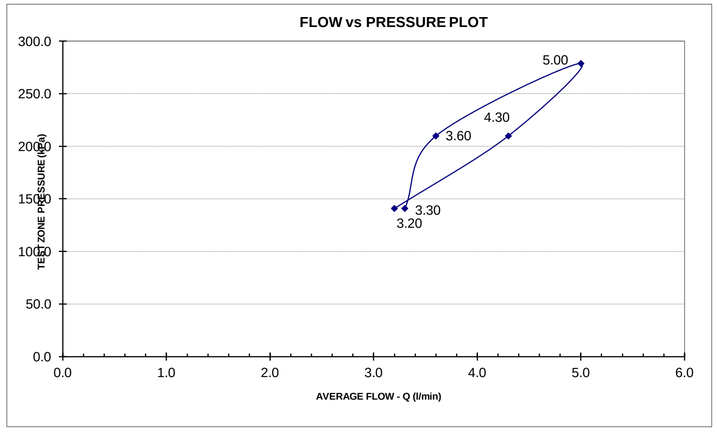
**PROJECT:** Mount Nansen | **PROJECT NO:** VM00605 | **DRILLHOLE:** CH-P-13-05

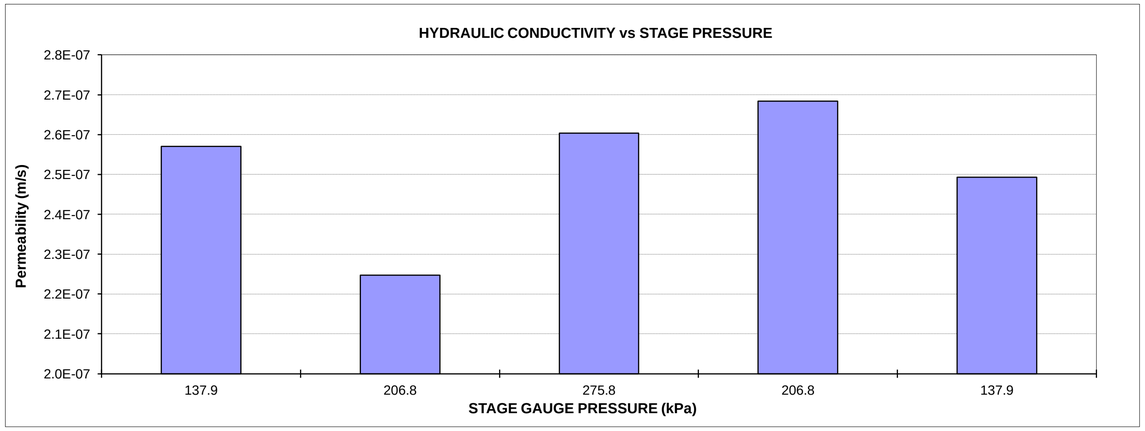
**AREA:** Pit | **TEST DATE:** 22-Sep-03 | **TEST NO:** 4

**DIP:** 90 ° (FROM HORIZONTAL) | **STATIC WATER DEPTH:** 13.0 m (Corrected Vertical) | **TOP OF TEST INTERVAL:** 25.00 m (DOWN HOLE)

**HOLE DIA.** 75.3 mm | **GAUGE HEIGHT** (Above Ground): 1.5 m | **BOTTOM OF TEST INTERVAL:** 31.00 m (DOWN HOLE)

| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 1.980 | 1.984 | 1.987 | 1.990 | 1.993 | 1.997 | | | | | | |
| | | | Flow Meter | (litres) | 1980.0 | 1983.5 | 1987.0 | 1990.0 | 1993.0 | 1996.5 | | | | | | |
| | | | Take | (litres) | 0.0 | 3.5 | 3.5 | 3.0 | 3.0 | 3.5 | | | | | | |
| 20 | 137.9 | 140.8 | Average Take | (litres / min) | | 3.50 | 3.50 | 3.00 | 3.00 | 3.50 | | | | | | 3.30 | 2.57E-07 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.002 | 2.006 | 2.009 | 2.013 | 2.017 | 2.020 | | | | | | |
| | | | Flow Meter | (litres) | 2002.0 | 2005.5 | 2009.0 | 2013.0 | 2016.5 | 2020.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 3.5 | 3.5 | 4.0 | 3.5 | 3.5 | | | | | | |
| 30 | 206.8 | 209.8 | Average Take | (litres / min) | | 3.50 | 3.50 | 4.00 | 3.50 | 3.50 | | | | | | 3.60 | 2.25E-07 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.028 | 2.033 | 2.038 | 2.044 | 2.048 | 2.053 | | | | | | |
| | | | Flow Meter | (litres) | 2028.0 | 2033.0 | 2038.0 | 2044.0 | 2048.0 | 2053.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 5.0 | 5.0 | 6.0 | 4.0 | 5.0 | | | | | | |
| 40 | 275.8 | 278.7 | Average Take | (litres / min) | | 5.00 | 5.00 | 6.00 | 4.00 | 5.00 | | | | | | 5.00 | 2.60E-07 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.055 | 2.060 | 2.064 | 2.068 | 2.072 | 2.077 | | | | | | |
| | | | Flow Meter | (litres) | 2055.0 | 2059.5 | 2064.0 | 2068.0 | 2072.0 | 2076.5 | | | | | | |
| | | | Take | (litres) | 0.0 | 4.5 | 4.5 | 4.0 | 4.0 | 4.5 | | | | | | |
| 30 | 206.8 | 209.8 | Average Take | (litres / min) | | 4.50 | 4.50 | 4.00 | 4.00 | 4.50 | | | | | | 4.30 | 2.68E-07 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.079 | 2.082 | 2.085 | 2.089 | 2.092 | 2.095 | | | | | | |
| | | | Flow Meter | (litres) | 2079.0 | 2082.0 | 2085.0 | 2089.0 | 2092.0 | 2095.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 3.0 | 3.0 | 4.0 | 3.0 | 3.0 | | | | | | |
| 20 | 137.9 | 140.8 | Average Take | (litres / min) | | 3.00 | 3.00 | 4.00 | 3.00 | 3.00 | | | | | | 3.20 | 2.49E-07 |




**STATIC WTR LEVEL DETERMINATION:**

**INTERPRETATION REFERENCE:** "Field Permeability Test Methods and Applications to Solution Mining" - USB of Mines, 1977

**INTERPRETATION TYPE OF FLOW:**

| | |
|---|---|
| LAMINAR | YES |
| TURBULENT | NO |
| DILATION | NO |
| WASH-OUT | NO |
| VOID FILLING | NO |

| Hydraulic Conductivity | m/s |
|---|---|
| MAX k= | 2.68E-07 |
| MIN k= | 2.25E-07 |
| AVG k= | 2.52E-07 |
| **Interpreted k =** | **2.52E-07** |

SHEET 1 OF 1

# CONSTANT HEAD TEST FIELD DATA SHEET

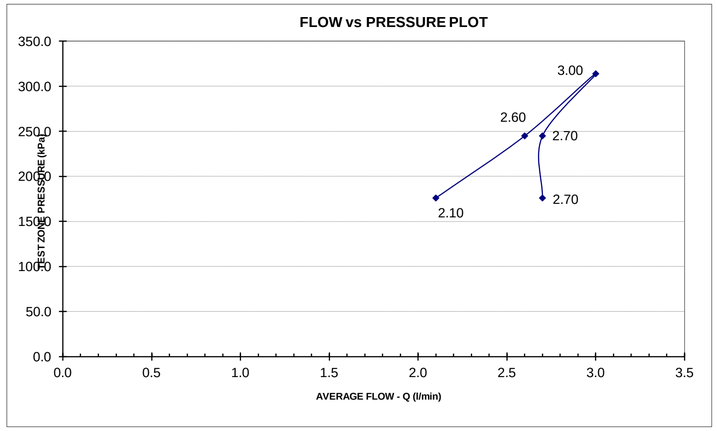
**PROJECT:** Mount Nansen | **PROJECT NO:** VM00605 | **DRILLHOLE:** CH-P-13-05

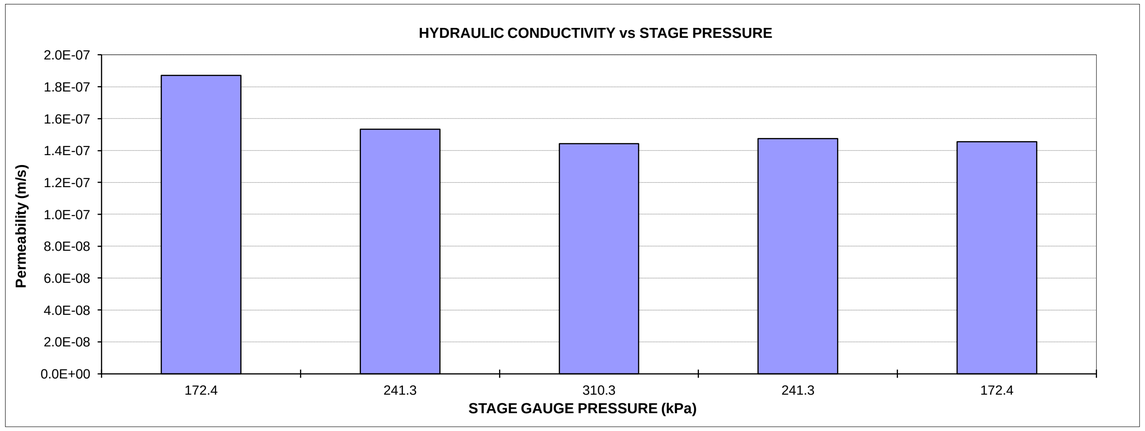
**AREA:** Pit | **TEST DATE:** 22-Sep-03 | **TEST NO:** 5

**DIP:** 90 ° (FROM HORIZONTAL) | **STATIC WATER DEPTH:** 13.0 m (Corrected Vertical) | **TOP OF TEST INTERVAL:** 31.00 m (DOWN HOLE)

**HOLE DIA.** 75.3 mm | **GAUGE HEIGHT** (Above Ground): 1.5 m | **BOTTOM OF TEST INTERVAL:** 37.00 m (DOWN HOLE)

| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.105 | 2.108 | 2.111 | 2.114 | 2.116 | 2.119 | | | | | | | |
| | | | Flow Meter | (litres) | 2105.0 | 2108.0 | 2111.0 | 2113.5 | 2116.0 | 2118.5 | | | | | | | |
| | | | Take | (litres) | 0.0 | 3.0 | 3.0 | 2.5 | 2.5 | 2.5 | | | | | | | |
| 25 | 172.4 | 175.9 | Average Take | (litres / min) | | 3.00 | 3.00 | 2.50 | 2.50 | 2.50 | | | | | | 2.70 | 1.87E-07 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.122 | 2.125 | 2.128 | 2.130 | 2.133 | 2.136 | | | | | | | |
| | | | Flow Meter | (litres) | 2122.0 | 2125.0 | 2128.0 | 2130.0 | 2133.0 | 2135.5 | | | | | | | |
| | | | Take | (litres) | 0.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.5 | | | | | | | |
| 35 | 241.3 | 244.9 | Average Take | (litres / min) | | 3.00 | 3.00 | 2.00 | 3.00 | 2.50 | | | | | | 2.70 | 1.53E-07 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.138 | 2.141 | 2.144 | 2.147 | 2.150 | 2.153 | | | | | | | |
| | | | Flow Meter | (litres) | 2138.0 | 2141.0 | 2144.0 | 2147.0 | 2150.0 | 2153.0 | | | | | | | |
| | | | Take | (litres) | 0.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | | | | | |
| 45 | 310.3 | 313.8 | Average Take | (litres / min) | | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | | | | | | 3.00 | 1.44E-07 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.155 | 2.158 | 2.160 | 2.163 | 2.165 | 2.168 | | | | | | | |
| | | | Flow Meter | (litres) | 2155.0 | 2158.0 | 2160.0 | 2163.0 | 2165.0 | 2168.0 | | | | | | | |
| | | | Take | (litres) | 0.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | | | | | | | |
| 35 | 241.3 | 244.9 | Average Take | (litres / min) | | 3.00 | 2.00 | 3.00 | 2.00 | 3.00 | | | | | | 2.60 | 1.48E-07 |
| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.169 | 2.171 | 2.174 | 2.175 | 2.178 | 2.180 | | | | | | | |
| | | | Flow Meter | (litres) | 2169.0 | 2171.0 | 2173.5 | 2175.0 | 2177.5 | 2179.5 | | | | | | | |
| | | | Take | (litres) | 0.0 | 2.0 | 2.5 | 1.5 | 2.5 | 2.0 | | | | | | | |
| 25 | 172.4 | 175.9 | Average Take | (litres / min) | | 2.00 | 2.50 | 1.50 | 2.50 | 2.00 | | | | | | 2.10 | 1.46E-07 |




**STATIC WTR LEVEL DETERMINATION:**

**INTERPRETATION REFERENCE:** "Field Permeability Test Methods and Applications to Solution Mining" - USB of Mines, 1977

**INTERPRETATION TYPE OF FLOW:**

| | |
|---|---|
| LAMINAR | NO |
| TURBULENT | YES |
| DILATION | NO |
| WASH-OUT | NO |
| VOID FILLING | NO |

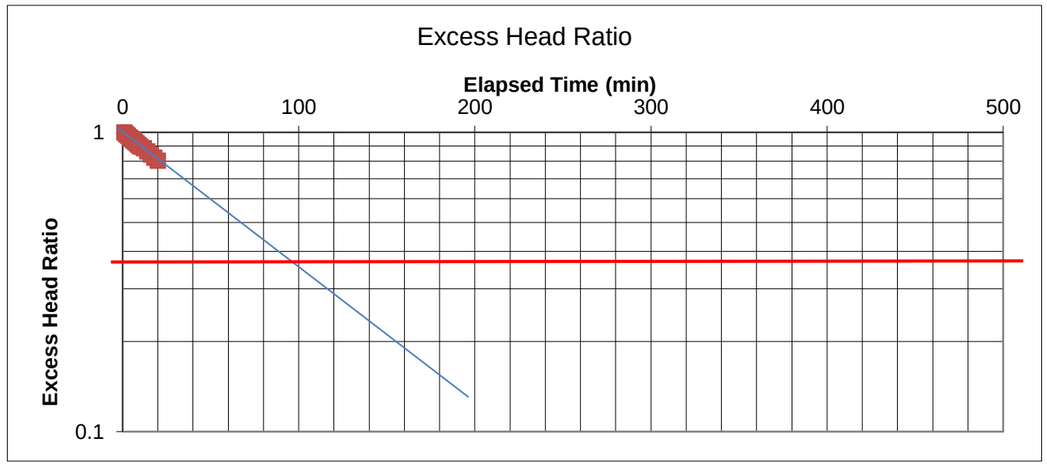
| Hydraulic Conductivity | m/s |
|---|---|
| MAX k= | 1.87E-07 |
| MIN k= | 1.44E-07 |
| AVG k= | 1.56E-07 |
| **Interpreted k =** | 1.44E-07 |

Mount Nansen

**CH-P-13-05** | **Test 6** | **Date:**
**37-43 m depth** | **22-Sep-13**

**Falling Head data**

| | Elapsed Time (min) | Depth to Water (m) | Excess Head Ratio | = | 1-[(h-H)/(Ho-H)] |
|---|---|---|---|---|---|
| 0.2 | 0 | | | | |
| 0.46 | 1 | 0.04 | 0.99804878 | | |
| 0.7 | 2 | 0.3 | 0.985365854 | | |
| 0.95 | 3 | 0.54 | 0.973658537 | | |
| 1.17 | 4 | 0.79 | 0.961463415 | | |
| 1.4 | 5 | 1.01 | 0.950731707 | | |
| 1.63 | 6 | 1.24 | 0.939512195 | | |
| 1.85 | 7 | 1.47 | 0.928292683 | | |
| 2.08 | 8 | 1.69 | 0.917560976 | | |
| 2.3 | 9 | 1.92 | 0.906341463 | | |
| 2.53 | 10 | 2.14 | 0.895609756 | | |
| 2.97 | 12 | 2.37 | 0.884390244 | | |
| 3.38 | 14 | 2.81 | 0.862926829 | | |
| 3.8 | 16 | 3.22 | 0.842926829 | | |
| 4.19 | 18 | 3.64 | 0.822439024 | | |
| 4.58 | 20 | 4.03 | 0.803414634 | | |




$$K = \frac{r^2 \ln \frac{L}{R}}{2LT_0}$$

| | | |
|---|---|---|
| Date | | |
| Packer Inflation Pres | 250 | psi |
| Standpipe | 1.5 | m |
| Static water level | 20.5 | m |
| h = | measured water level | |
| H = | Initial water level | |
| Ho = | Static water level | |
| Top of interval | 37 | m |
| Bottom of interval | 43 | m |
| **NQ** | | |
| R(borehole) = | 0.0379 | m |
| r (drill rod) = | 0.0302 | m |
| L = | 6 | |
| To = 37% head ratio in sec | 100 | min |
| | 6000 | sec |

**K =** **6.4154E-08** m/s

SHEET 1 OF 1

# CONSTANT HEAD TEST FIELD DATA SHEET

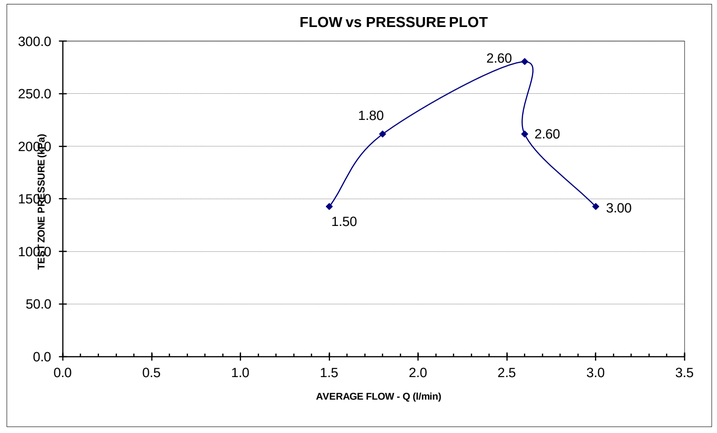
**PROJECT:** Mount Nansen | **PROJECT NO:** VM00605 | **DRILLHOLE:** CH-P-13-05

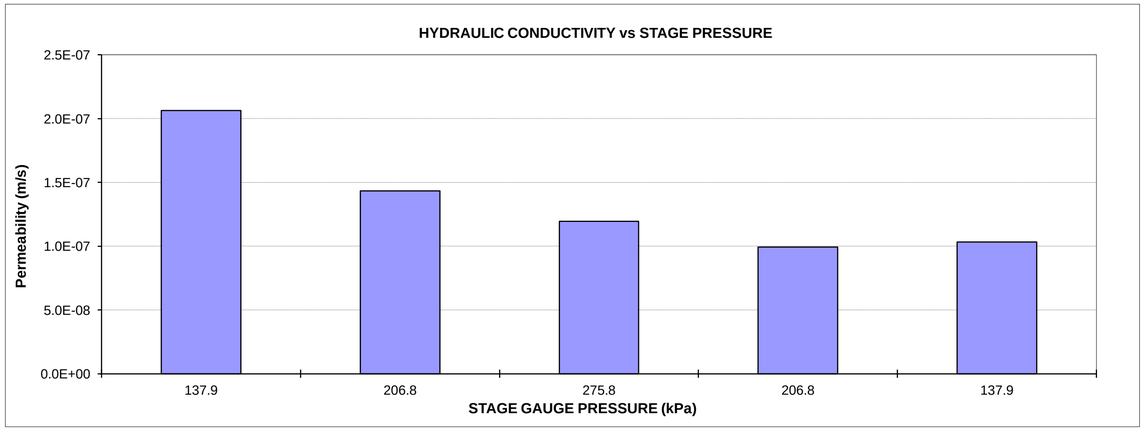
**AREA:** Pit | **TEST DATE:** 23-Sep-13 | **TEST NO:** 7

**DIP:** 90 ° (FROM HORIZONTAL) | **STATIC WATER DEPTH:** 13.0 m (Corrected Vertical) | **TOP OF TEST INTERVAL:** 43.00 m (DOWN HOLE)

**HOLE DIA.** 75.3 mm | **GAUGE HEIGHT** (Above Ground): 1.5 m | **BOTTOM OF TEST INTERVAL:** 50.00 m (DOWN HOLE)

| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.191 | 2.194 | 2.197 | 2.200 | 2.203 | 2.206 | | | | | | | |
| | | | Flow Meter | (litres) | 2191.0 | 2194.0 | 2197.0 | 2200.0 | 2203.0 | 2206.0 | | | | | | | |
| | | | Take | (litres) | 0.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | | | | | |
| 20 | 137.9 | 142.7 | Average Take | (litres / min) | | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | | | | | | 3.00 | 2.06E-07 |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.210 | 2.213 | 2.216 | 2.218 | 2.221 | 2.223 | | | | | | | |
| | | | Flow Meter | (litres) | 2210.0 | 2213.0 | 2216.0 | 2218.0 | 2221.0 | 2223.0 | | | | | | | |
| | | | Take | (litres) | 0.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | | | | | | | |
| 30 | 206.8 | 211.6 | Average Take | (litres / min) | | 3.00 | 3.00 | 2.00 | 3.00 | 2.00 | | | | | | 2.60 | 1.43E-07 |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.225 | 2.228 | 2.230 | 2.233 | 2.235 | 2.238 | | | | | | | |
| | | | Flow Meter | (litres) | 2225.0 | 2228.0 | 2230.0 | 2233.0 | 2235.0 | 2238.0 | | | | | | | |
| | | | Take | (litres) | 0.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | | | | | | | |
| 40 | 275.8 | 280.6 | Average Take | (litres / min) | | 3.00 | 2.00 | 3.00 | 2.00 | 3.00 | | | | | | 2.60 | 1.20E-07 |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.239 | 2.241 | 2.242 | 2.244 | 2.246 | 2.248 | | | | | | | |
| | | | Flow Meter | (litres) | 2239.0 | 2241.0 | 2242.0 | 2244.0 | 2246.0 | 2248.0 | | | | | | | |
| | | | Take | (litres) | 0.0 | 2.0 | 1.0 | 2.0 | 2.0 | 2.0 | | | | | | | |
| 30 | 206.8 | 211.6 | Average Take | (litres / min) | | 2.00 | 1.00 | 2.00 | 2.00 | 2.00 | | | | | | 1.80 | 9.92E-08 |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.249 | 2.251 | 2.252 | 2.254 | 2.255 | 2.257 | | | | | | | |
| | | | Flow Meter | (litres) | 2249.0 | 2250.5 | 2252.0 | 2253.5 | 2255.0 | 2256.5 | | | | | | | |
| | | | Take | (litres) | 0.0 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | | | | | | | |
| 20 | 137.9 | 142.7 | Average Take | (litres / min) | | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | | | | | | 1.50 | 1.03E-07 |




**STATIC WTR LEVEL DETERMINATION:**

**INTERPRETATION REFERENCE:** "Field Permeability Test Methods and Applications to Solution Mining" - USB of Mines, 1977

**INTERPRETATION TYPE OF FLOW:**

| | |
|---|---|
| LAMINAR | NO |
| TURBULENT | NO |
| DILATION | NO |
| WASH-OUT | NO |
| VOID FILLING | YES |

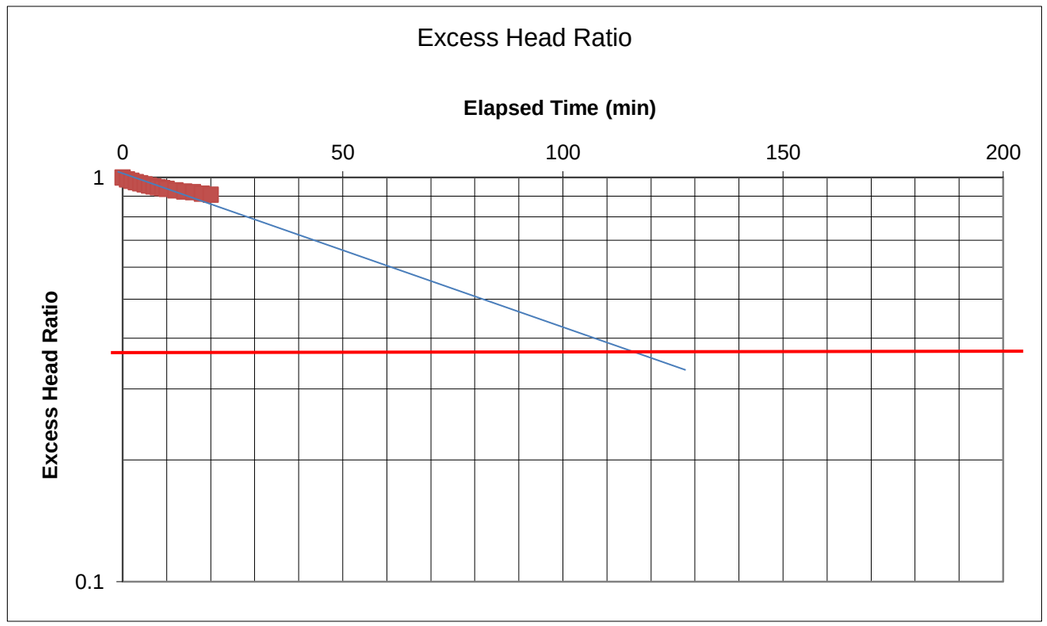
| Hydraulic Conductivity | m/s |
|---|---|
| MAX k= | 2.06E-07 |
| MIN k= | 9.92E-08 |
| AVG k= | 1.34E-07 |
| **Interpreted k =** | 1.03E-07 |

Mount Nansen

**CH-P-13-06** | **Test 1 10-16 m depth** | **Date: 23-Sep-13**

**Falling Head data**

| | Elapsed Time (min) | Depth to Water (m) | Excess Head Ratio | = | 1-[(h-H)/(Ho-H)] |
|---|---|---|---|---|---|
| 0.29 | 0 | 0 | 1 | | |
| 0.41 | 1 | 0.12 | 0.989565217 | | |
| 0.5 | 2 | 0.21 | 0.98173913 | | |
| 0.59 | 3 | 0.3 | 0.973913043 | | |
| 0.66 | 4 | 0.37 | 0.967826087 | | |
| 0.73 | 5 | 0.44 | 0.96173913 | | |
| 0.8 | 6 | 0.51 | 0.955652174 | | |
| 0.86 | 7 | 0.57 | 0.950434783 | | |
| 0.91 | 8 | 0.62 | 0.946086957 | | |
| 0.96 | 9 | 0.67 | 0.94173913 | | |
| 1.01 | 10 | 0.72 | 0.937391304 | | |
| 1.1 | 12 | 0.81 | 0.929565217 | | |
| 1.17 | 14 | 0.88 | 0.923478261 | | |
| 1.21 | 16 | 0.92 | 0.92 | | |
| 1.3 | 18 | 1.01 | 0.912173913 | | |
| 1.36 | 20 | 1.07 | 0.906956522 | | |




| | | |
|---|---|---|
| Date | | |
| Packer Inflation Pres | 250 | psi |
| Standpipe | 1.5 | m |
| Static water level | 11.5 | m |
| h = | measured water level | |
| H = | Initial water level | |
| Ho = | Static water level | |
| Top of interval | 10 | m |
| Bottom of interval | 16 | m |
| **NQ** | | |
| R(borehole) = | 0.0379 | m |
| r (drill rod) = | 0.0302 | m |
| L = | 6 | |
| To = 37% head ratio in sec | 115 | min |
| | 6900 | sec |

**K =** **5.5786E-08** m/s

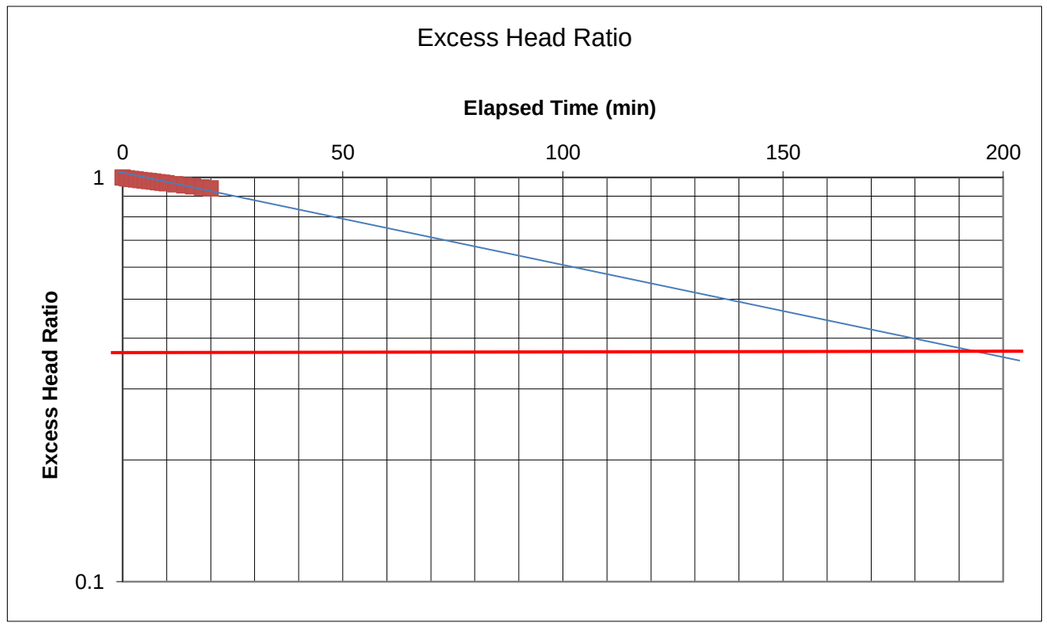
$$K = \frac{r^2 \ln \frac{L}{R}}{2LT_0}$$

Mount Nansen

**CH-P-13-06** | **Test 2 16-22 m depth** | **Date: 24-Sep-13**

**Falling Head data**

| | Elapsed Time (min) | Depth to Water (m) | Excess Head Ratio | = | 1-[(h-H)/(Ho-H)] |
|---|---|---|---|---|---|
| 0.22 | 0 | 0 | 1 | | |
| 0.3 | 1 | 0.08 | 0.995428571 | | |
| 0.36 | 2 | 0.14 | 0.992 | | |
| 0.41 | 3 | 0.19 | 0.989142857 | | |
| 0.47 | 4 | 0.25 | 0.985714286 | | |
| 0.52 | 5 | 0.3 | 0.982857143 | | |
| 0.57 | 6 | 0.35 | 0.98 | | |
| 0.62 | 7 | 0.4 | 0.977142857 | | |
| 0.68 | 8 | 0.46 | 0.973714286 | | |
| 0.73 | 9 | 0.51 | 0.970857143 | | |
| 0.78 | 10 | 0.56 | 0.968 | | |
| 0.88 | 12 | 0.66 | 0.962285714 | | |
| 0.98 | 14 | 0.76 | 0.956571429 | | |
| 1.08 | 16 | 0.86 | 0.950857143 | | |
| 1.18 | 18 | 0.96 | 0.945142857 | | |
| 1.27 | 20 | 1.05 | 0.94 | | |




| | | |
|---|---|---|
| Date | | |
| Packer Inflation Pres | 250 | psi |
| Standpipe | 1.5 | m |
| Static water level | 17.5 | m |
| h = | measured water level | |
| H = | Initial water level | |
| Ho = | Static water level | |
| Top of interval | 16 | m |
| Bottom of interval | 22 | m |
| **NQ** | | |
| R(borehole) = | 0.0379 | m |
| r (drill rod) = | 0.0302 | m |
| L = | 6 | |
| To = 37% head ratio in sec | 190 | min |
| | 11400 | sec |

**K =** **3.37652E-08** m/s

$$K = \frac{r^2 \ln \frac{L}{R}}{2LT_0}$$

SHEET 1 OF 1

# CONSTANT HEAD TEST FIELD DATA SHEET

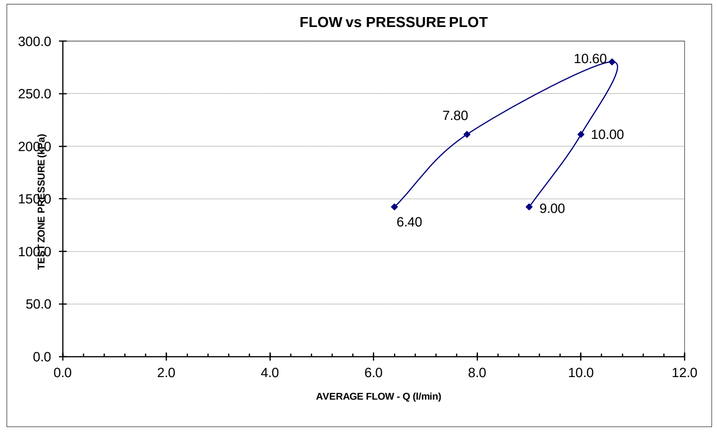
**PROJECT:** Mount Nansen | **PROJECT NO:** VM00605 | **DRILLHOLE:** CH-P-13-06

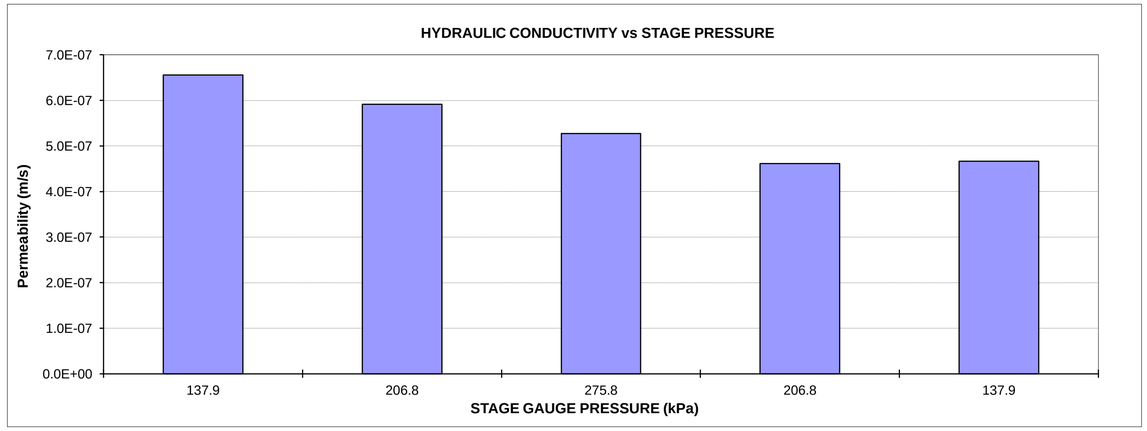
**AREA:** Pit | **TEST DATE:** 27-Sep-13 | **TEST NO:** 6

**DIP:** 90 ° (FROM HORIZONTAL) | **STATIC WATER DEPTH:** 15.0 m (Corrected Vertical) | **TOP OF TEST INTERVAL:** 40.00 m (DOWN HOLE)

**HOLE DIA.** 75.3 mm | **GAUGE HEIGHT** (Above Ground): 1.5 m | **BOTTOM OF TEST INTERVAL:** 46.00 m (DOWN HOLE)

| GAUGE PRESSURE (psi) | GAUGE PRESSURE (kPa) | EFFECTIVE TEST ZONE PRESSURE (kPa) | | | | | | | | | | | | STEADY FLOW (litres / min) | K (m/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | 0:06:00 | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.328 | 2.338 | 2.346 | 2.357 | 2.364 | 2.371 | 2.382 | | | | | | |
| | | | Flow Meter | (litres) | 2328.0 | 2338.0 | 2346.0 | 2357.0 | 2364.0 | 2371.0 | 2382.0 | | | | | | |
| | | | Take | (litres) | 0.0 | 10.0 | 8.0 | 11.0 | 7.0 | 7.0 | 11.0 | | | | | | |
| 20 | 137.9 | 142.3 | Average Take | (litres / min) | | 10.00 | 8.00 | 11.00 | 7.00 | 7.00 | 11.00 | | | | | 9.00 | 6.56E-07 |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | | | | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.408 | 2.417 | 2.428 | 2.438 | | | | | | | | | |
| | | | Flow Meter | (litres) | 2408.0 | 2417.0 | 2428.0 | 2438.0 | | | | | | | | | |
| | | | Take | (litres) | 0.0 | 9.0 | 11.0 | 10.0 | | | | | | | | | |
| 30 | 206.8 | 211.3 | Average Take | (litres / min) | | 9.00 | 11.00 | 10.00 | | | | | | | | 10.00 | 5.91E-07 |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.453 | 2.463 | 2.475 | 2.485 | 2.495 | 2.506 | | | | | | | |
| | | | Flow Meter | (litres) | 2453.0 | 2463.0 | 2475.0 | 2485.0 | 2495.0 | 2506.0 | | | | | | | |
| | | | Take | (litres) | 0.0 | 10.0 | 12.0 | 10.0 | 10.0 | 11.0 | | | | | | | |
| 40 | 275.8 | 280.2 | Average Take | (litres / min) | | 10.00 | 12.00 | 10.00 | 10.00 | 11.00 | | | | | | 10.60 | 5.27E-07 |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.514 | 2.520 | 2.528 | 2.537 | 2.546 | 2.553 | | | | | | | |
| | | | Flow Meter | (litres) | 2514.0 | 2520.0 | 2528.0 | 2537.0 | 2546.0 | 2553.0 | | | | | | | |
| | | | Take | (litres) | 0.0 | 6.0 | 8.0 | 9.0 | 9.0 | 7.0 | | | | | | | |
| 30 | 206.8 | 211.3 | Average Take | (litres / min) | | 6.00 | 8.00 | 9.00 | 9.00 | 7.00 | | | | | | 7.80 | 4.61E-07 |
| | | | Time | (min) | 0:00:00 | 0:01:00 | 0:02:00 | 0:03:00 | 0:04:00 | 0:05:00 | | | | | | | |
| | | | Flow Meter | ($m^3$) | 2.553 | 2.560 | 2.565 | 2.572 | 2.577 | 2.585 | | | | | | | |
| | | | Flow Meter | (litres) | 2553.0 | 2560.0 | 2565.0 | 2572.0 | 2577.0 | 2585.0 | | | | | | | |
| | | | Take | (litres) | 0.0 | 7.0 | 5.0 | 7.0 | 5.0 | 8.0 | | | | | | | |
| 20 | 137.9 | 142.3 | Average Take | (litres / min) | | 7.00 | 5.00 | 7.00 | 5.00 | 8.00 | | | | | | 6.40 | 4.66E-07 |




**STATIC WTR LEVEL DETERMINATION:**

**INTERPRETATION REFERENCE:** "Field Permeability Test Methods and Applications to Solution Mining" - USB of Mines, 1977

**INTERPRETATION TYPE OF FLOW:**

| | |
|---|---|
| LAMINAR | NO |
| TURBULENT | NO |
| DILATION | NO |
| WASH-OUT | NO |
| VOID FILLING | YES |

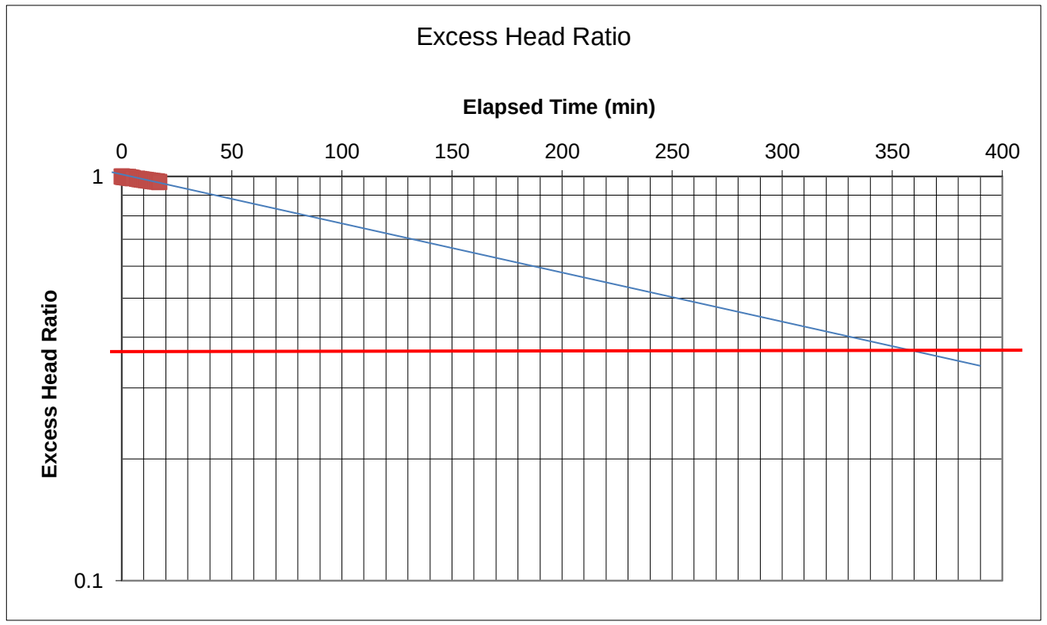
| Hydraulic Conductivity | m/s |
|---|---|
| MAX k= | 6.56E-07 |
| MIN k= | 4.61E-07 |
| AVG k= | 5.40E-07 |
| **Interpreted k =** | 4.66E-07 |

Mount Nansen

**CH-P-13-06** | **Test 8 52-60 m depth** | **Date: 27-Sep-13**

**Falling Head data**

| | Elapsed Time (min) | Depth to Water (m) | Excess Head Ratio | = | 1-[(h-H)/(Ho-H)] |
|---|---|---|---|---|---|
| 0.2 | 0 | 0 | 1 | | |
| 0.235 | 0.5 | 0.035 | 0.998939394 | | |
| 0.265 | 1 | 0.065 | 0.998030303 | | |
| 0.295 | 1.5 | 0.095 | 0.997121212 | | |
| 0.33 | 2 | 0.13 | 0.996060606 | | |
| 0.36 | 2.5 | 0.16 | 0.995151515 | | |
| 0.29 | 3 | 0.09 | 0.997272727 | | |
| 0.415 | 3.5 | 0.215 | 0.993484848 | | |
| 0.44 | 4 | 0.24 | 0.992727273 | | |
| 0.475 | 4.5 | 0.275 | 0.991666667 | | |
| 0.5 | 5 | 0.3 | 0.990909091 | | |
| 0.615 | 7 | 0.415 | 0.987424242 | | |
| 0.685 | 8 | 0.485 | 0.98530303 | | |
| 0.75 | 9 | 0.55 | 0.983333333 | | |
| 0.805 | 10 | 0.605 | 0.981666667 | | |
| 0.865 | 11 | 0.665 | 0.979848485 | | |
| 0.92 | 12 | 0.72 | 0.978181818 | | |
| 0.98 | 13 | 0.78 | 0.976363636 | | |
| 1.04 | 14 | 0.84 | 0.974545455 | | |
| 1.1 | 15 | 0.9 | 0.972727273 | | |
| 1.116 | 16 | 0.916 | 0.972242424 | | |
| 1.22 | 17 | 1.02 | 0.969090909 | | |
| 1.28 | 18 | 1.08 | 0.967272727 | | |
| 1.33 | 19 | 1.13 | 0.965757576 | | |
| 1.39 | 20 | 1.19 | 0.963939394 | | |




| | | |
|---|---|---|
| Date | | |
| Packer Inflation Pres | 250 | psi |
| Standpipe | 1.5 | m |
| Static water level | 33 | m |
| h = | measured water level | |
| H = | Initial water level | |
| Ho = | Static water level | |
| Top of interval | 52 | m |
| Bottom of interval | 60 | m |
| **NQ** | | |
| R(borehole) = | 0.0379 | m |
| r (drill rod) = | 0.0302 | m |
| L = | 8 | |
| To = 37% head ratio in sec | 355 | min |
| | 21300 | sec |

**K =** **1.43235E-08** m/s

$$K = \frac{r^2 \ln \frac{L}{R}}{2LT_0}$$

# APPENDIX G

# GEOPHYSICS PLANS AND SECTIONS

# Mount Nansen 2013 Site Investigation

## LIST OF GEOPHYSICS PLANS AND SECTIONS

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FIGURE 2: Tailings Storage Facility Geophysics Plan ..... 2
FIGURE 3: Heustis Adit Area Plan ..... 3

**GEOPHYSICS PLANS AND SECTIONS ..... 4**

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FIGURE 5: NA 2 Section ..... 5
FIGURE 6: NA 3 Section ..... 6
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FIGURE 9: NA 6 Section ..... 9
FIGURE 10: NA 7 Section ..... 10
FIGURE 11: NA 8 Section ..... 11
FIGURE 12: NA 9 Section ..... 12
FIGURE 13: NA 10 Section ..... 13
FIGURE 14: NA 11 Section ..... 14
FIGURE 15: NA 12 Section ..... 15

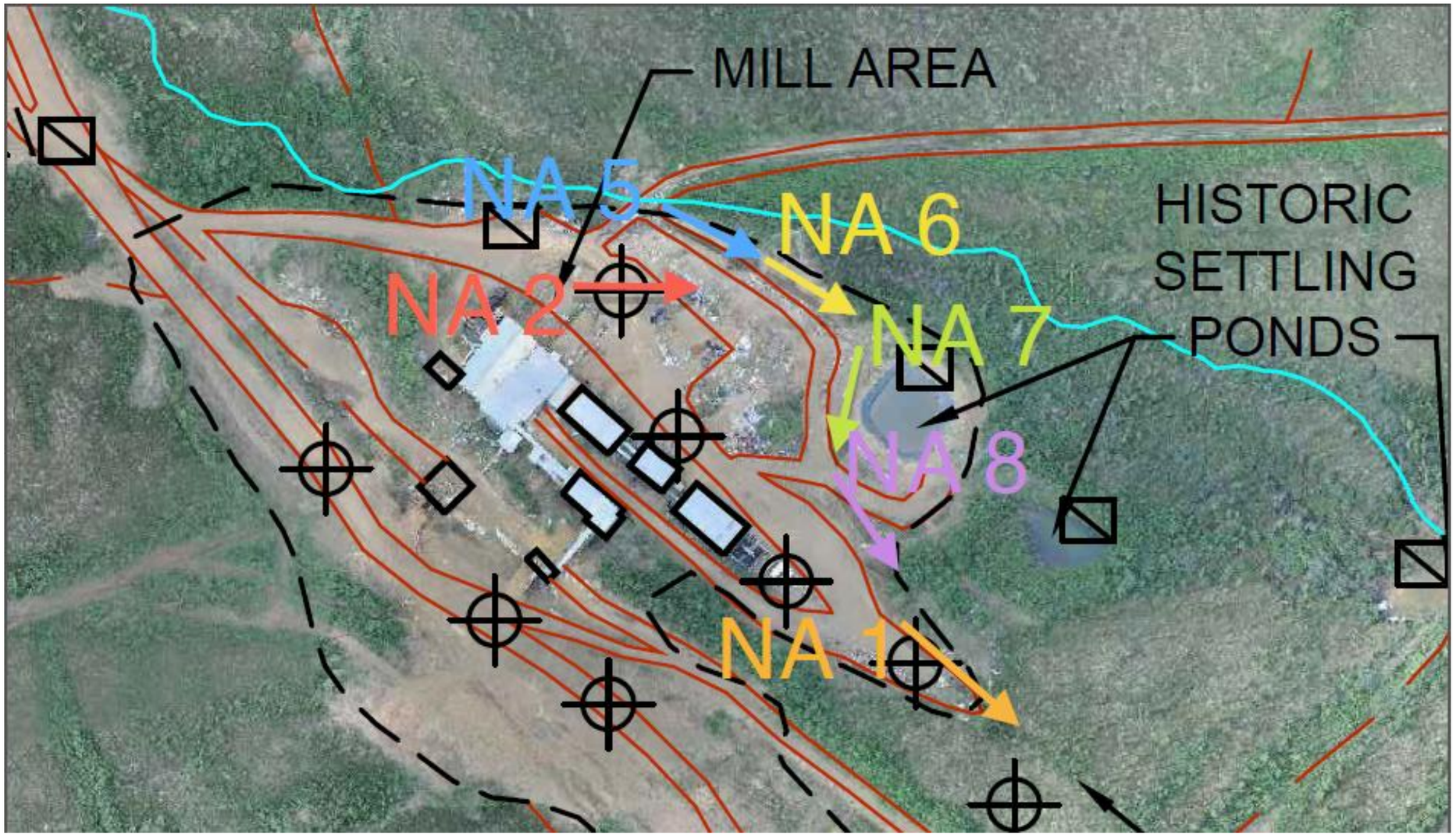



FIGURE 1: Mill Area Plan

| | | | | |
|---|---|---|---|---|
| Geophysics performed and interpretted by Kryotec Arctic Innovation Inc. | | Yukon Energy, Mines and Resources | Government of Yukon - AAM<br>Mount Nansen 2013 Site Investigation<br>Geophysics Plans and Sections | |
| | Scale: NTS | Date: Oct 2013 | | Page 1 |

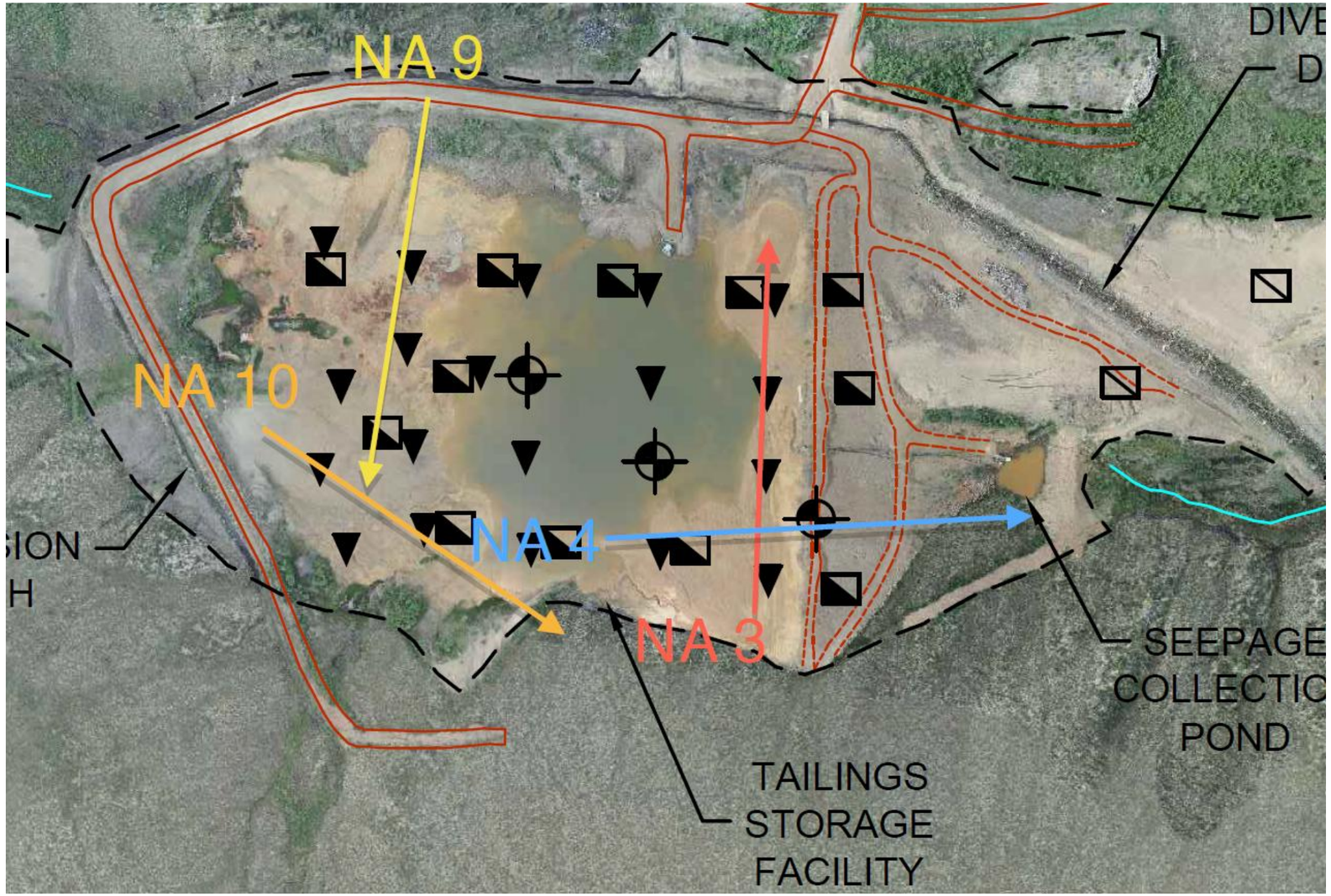


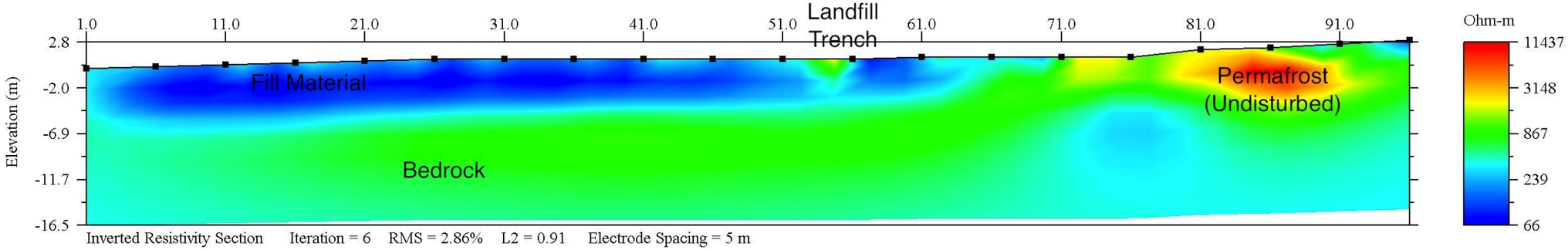

FIGURE 2: Tailings Storage Facility Geophysics Plan

| | | | | |
|---|---|---|---|---|
| Geophysics performed and interpretted by Kryotec Arctic Innovation Inc. | | Yukon Energy, Mines and Resources | Government of Yukon - AAM<br>Mount Nansen 2013 Site Investigation<br>Geophysics Plans and Sections | |
| | Scale: NTS | Date: Oct 2013 | | Page 2 |

FIGURE 3: Heustis Adit Area Plan

| | | | | |
|---|---|---|---|---|
| Geophysics performed and interpretted by Kryotec Arctic Innovation Inc. | | Yukon Energy, Mines and Resources | Government of Yukon - AAM<br>Mount Nansen 2013 Site Investigation<br>Geophysics Plans and Sections | |
| | Scale: NTS | Date: Oct 2013 | | Page 3 |

## Inverted Resistivity and IP Sections



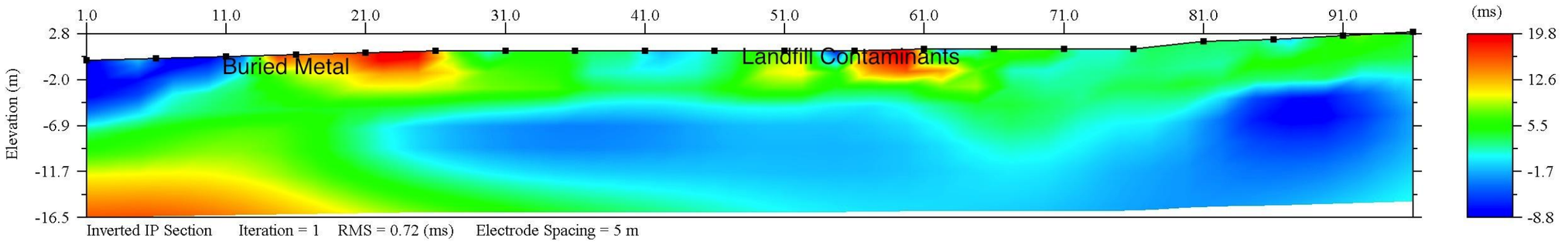




FIGURE 4: NA 1 Section

| | | | | |
|---|---|---|---|---|
| Geophysics performed and interpretted by Kryotec Arctic Innovation Inc. | | Yukon Energy, Mines and Resources | Government of Yukon - AAM<br>Mount Nansen 2013 Site Investigation<br>Geophysics Plans and Sections | |
| | Scale: NTS | Date: Oct 2013 | | Page 4 |

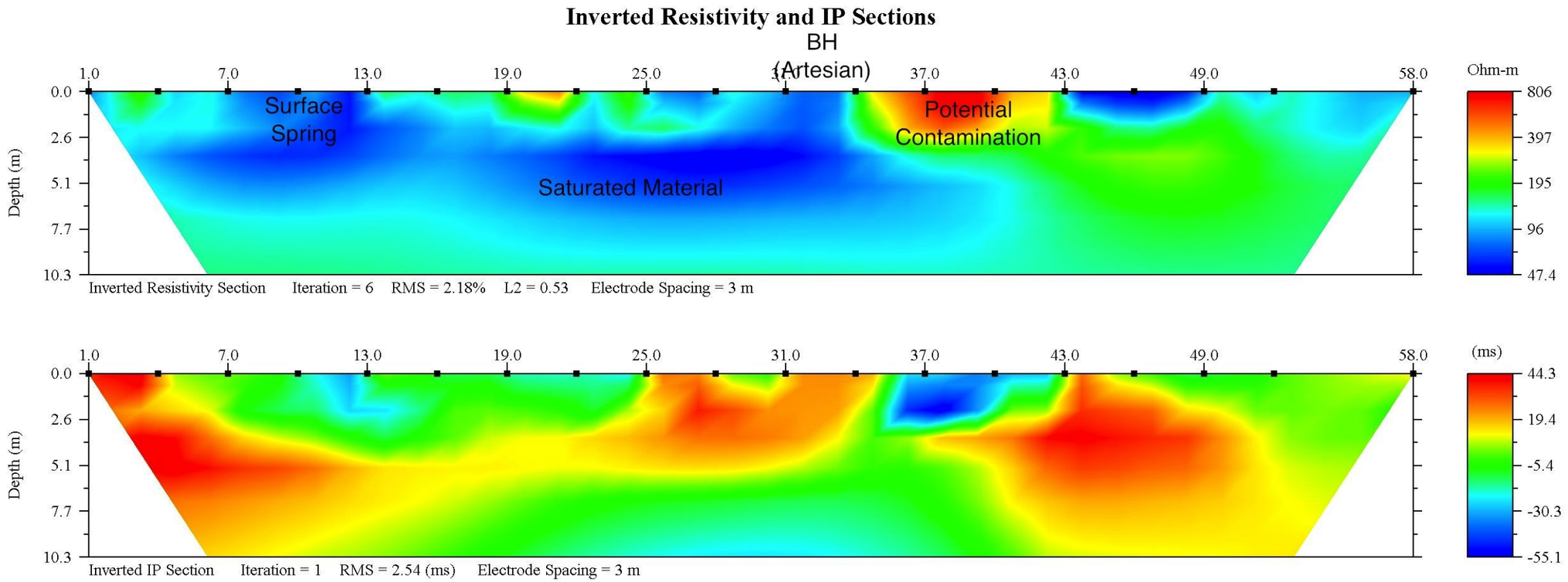



FIGURE 5: NA 2 Section

| | | | | |
|---|---|---|---|---|
| Geophysics performed and interpretted by Kryotec Arctic Innovation Inc. | | Yukon Energy, Mines and Resources | Government of Yukon - AAM<br>Mount Nansen 2013 Site Investigation<br>Geophysics Plans and Sections | |
| | Scale: NTS | Date: Oct 2013 | | Page 5 |

## Inverted Resistivity and IP Sections

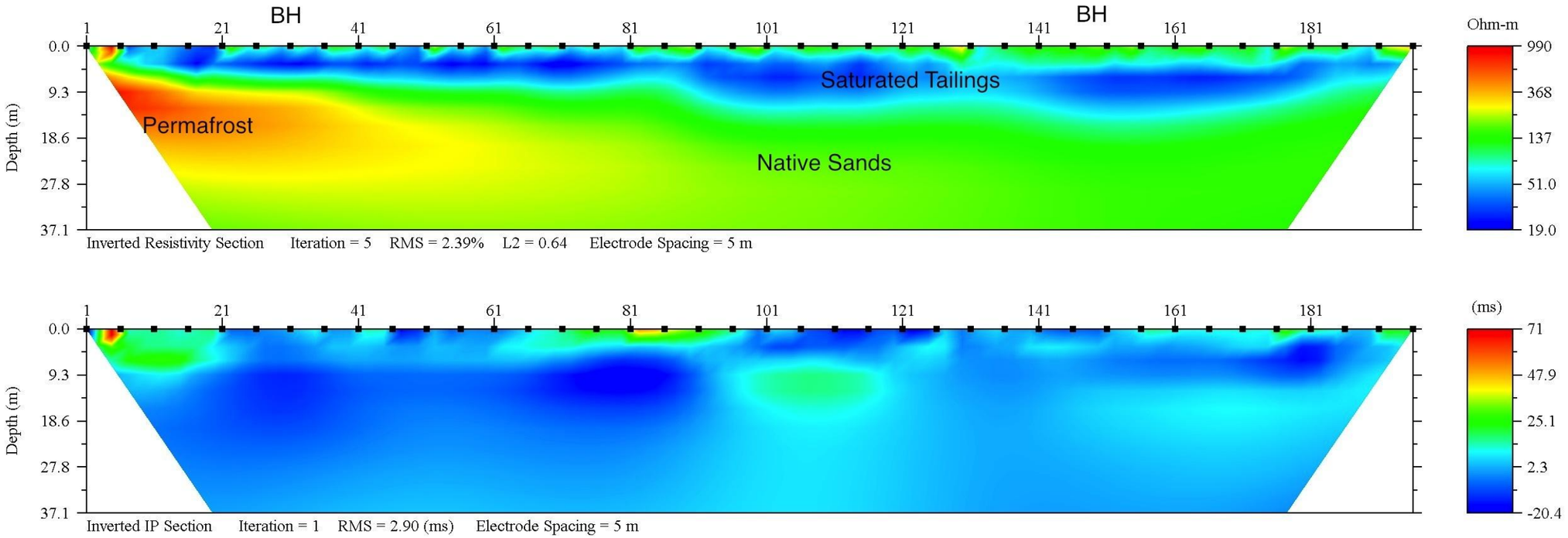



FIGURE 6: NA 3 Section

| | | | | |
|---|---|---|---|---|
| Geophysics performed and interpretted by Kryotec Arctic Innovation Inc. | | Yukon Energy, Mines and Resources | Government of Yukon - AAM<br>Mount Nansen 2013 Site Investigation<br>Geophysics Plans and Sections | |
| | Scale: NTS | Date: Oct 2013 | | Page 6 |

## Inverted Resistivity Section

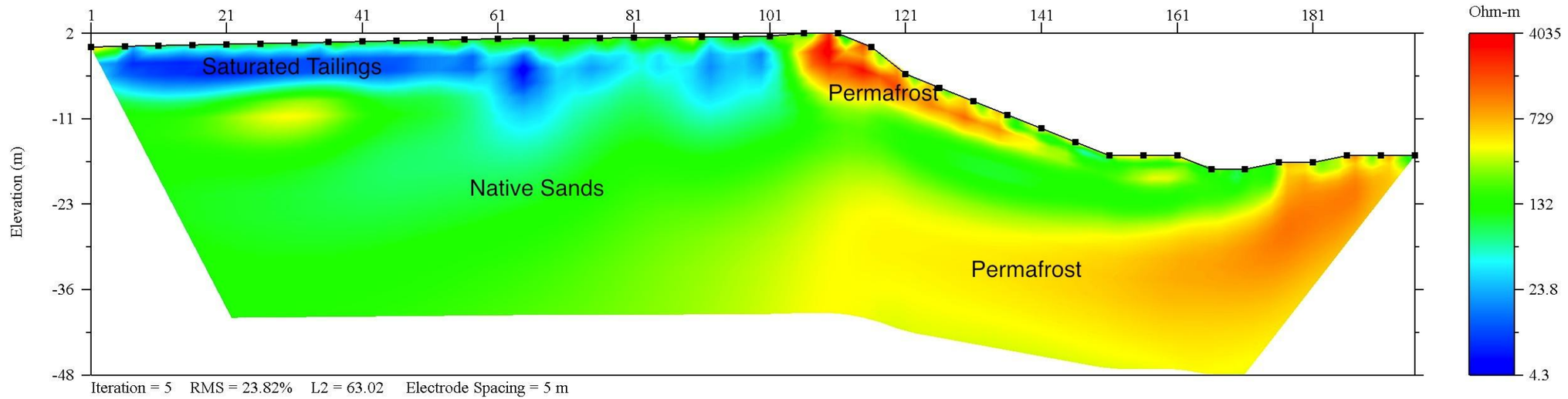



FIGURE 7: NA 4 Section

| | | | | |
|---|---|---|---|---|
| Geophysics performed and interpretted by Kryotec Arctic Innovation Inc. | | Yukon Energy, Mines and Resources | Government of Yukon - AAM<br>Mount Nansen 2013 Site Investigation<br>Geophysics Plans and Sections | |
| | Scale: NTS | Date: Oct 2013 | | Page 7 |

## Inverted Resistivity and IP Sections

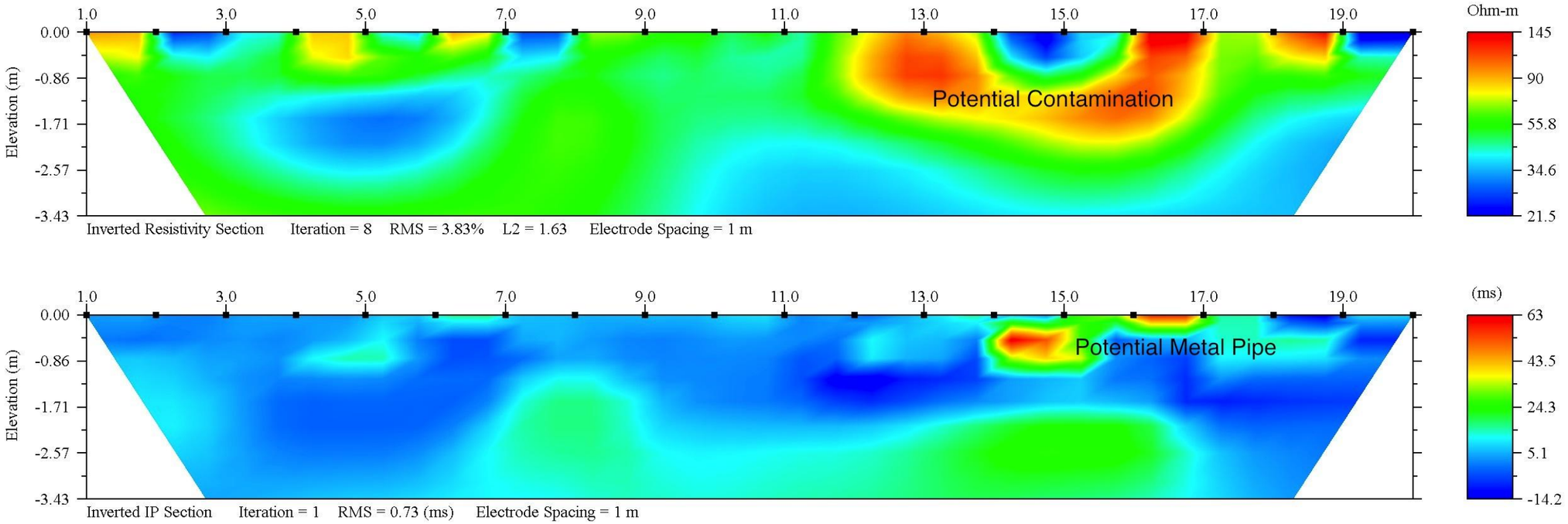



FIGURE 8: NA 5 Section

| | | | | |
|---|---|---|---|---|
| Geophysics performed and interpretted by Kryotec Arctic Innovation Inc. | | Yukon Energy, Mines and Resources | Government of Yukon - AAM<br>Mount Nansen 2013 Site Investigation<br>Geophysics Plans and Sections | |
| | Scale: NTS | Date: Oct 2013 | | Page 8 |

## Inverted Resistivity and IP Sections

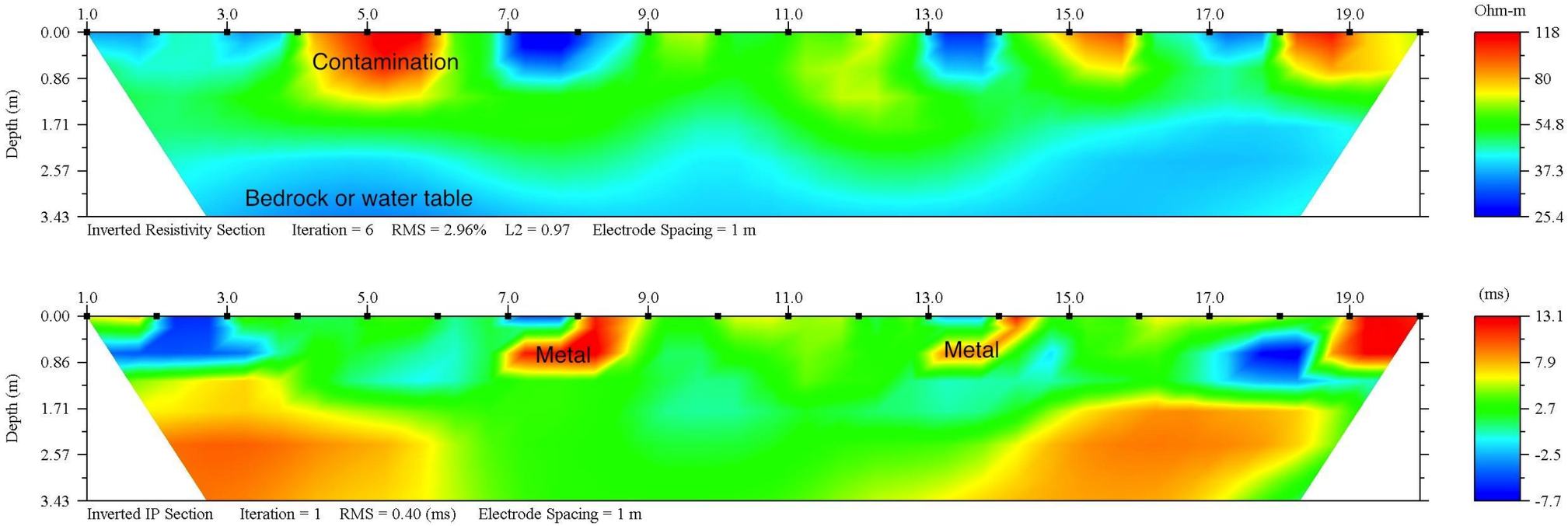



FIGURE 9: NA 6 Section

| | | | | |
|---|---|---|---|---|
| Geophysics performed and interpretted by Kryotec Arctic Innovation Inc. | | Yukon Energy, Mines and Resources | Government of Yukon - AAM<br>Mount Nansen 2013 Site Investigation<br>Geophysics Plans and Sections | |
| | Scale: NTS | Date: Oct 2013 | | Page 9 |

## Inverted Resistivity and IP Sections

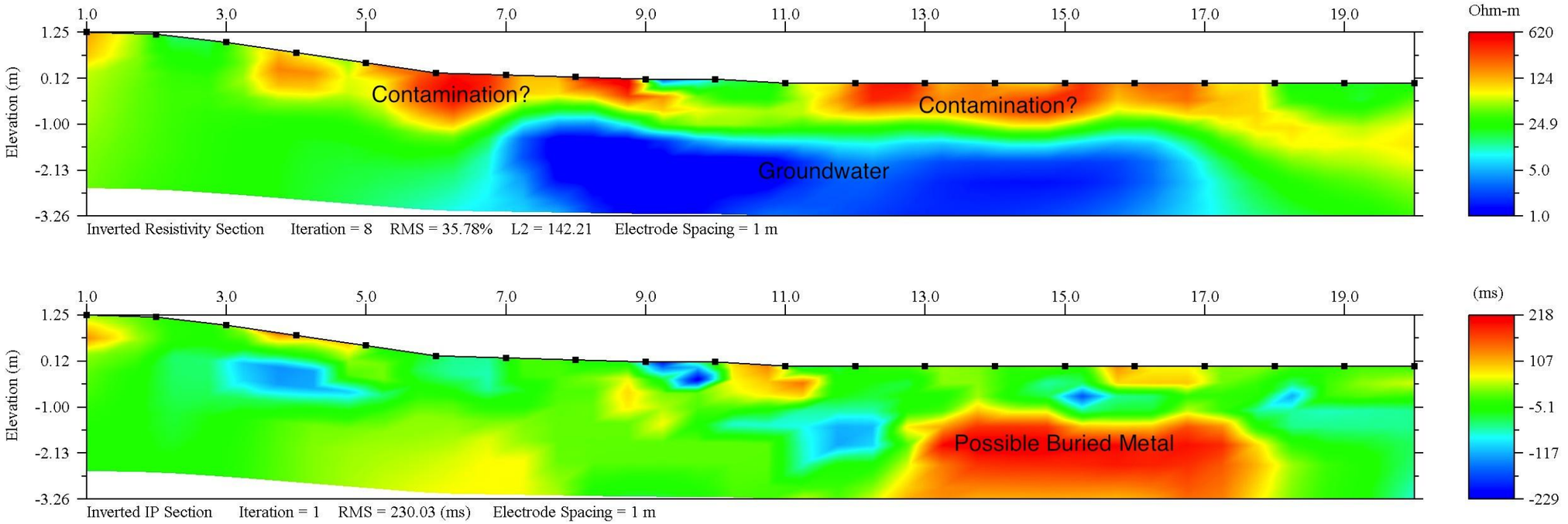



FIGURE 10: NA 7 Section

| | | | | |
|---|---|---|---|---|
| Geophysics performed and interpretted by Kryotec Arctic Innovation Inc. | | Yukon Energy, Mines and Resources | Government of Yukon - AAM<br>Mount Nansen 2013 Site Investigation<br>Geophysics Plans and Sections | |
| | Scale: NTS | Date: Oct 2013 | | Page 10 |

## Inverted Resistivity and IP Sections

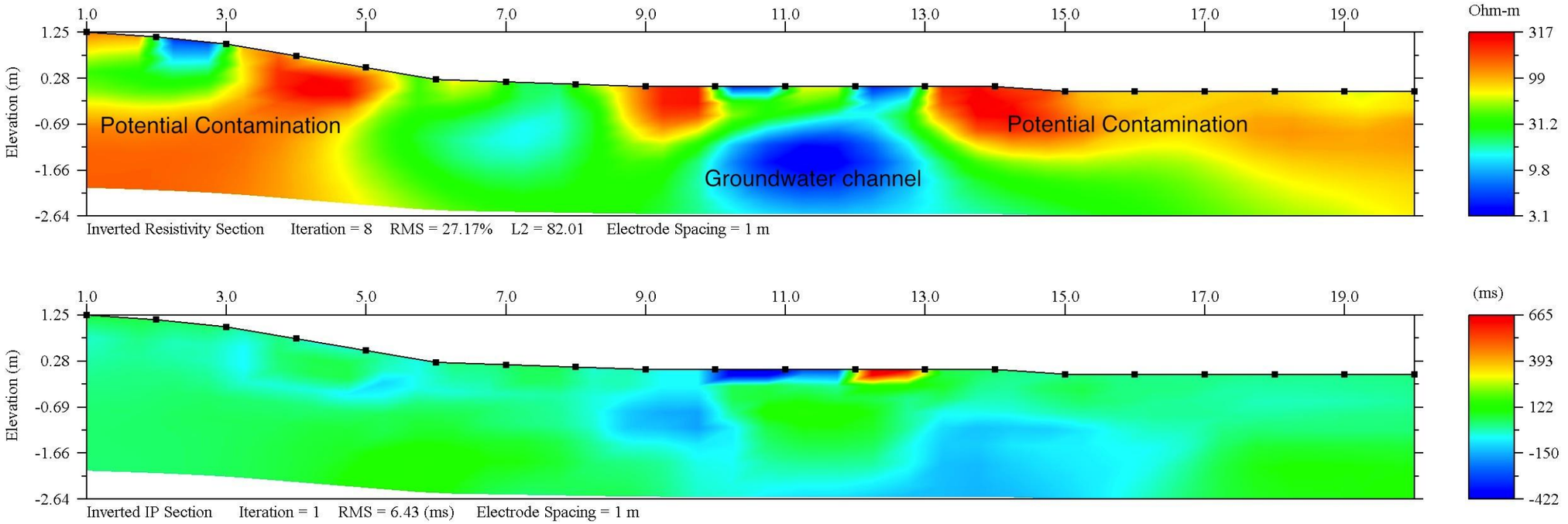



FIGURE 11: NA 8 Section

| | | | | |
|---|---|---|---|---|
| Geophysics performed and interpretted by Kryotec Arctic Innovation Inc. | | Yukon Energy, Mines and Resources | Government of Yukon - AAM<br>Mount Nansen 2013 Site Investigation<br>Geophysics Plans and Sections | |
| | Scale: NTS | Date: Oct 2013 | | Page 11 |

## Inverted Resistivity Section

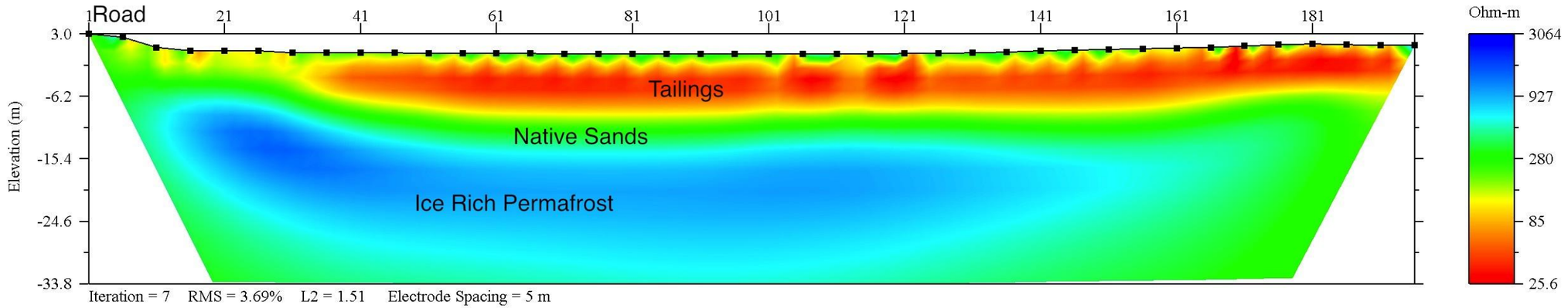



FIGURE 12: NA 9 Section

| | | | | |
|---|---|---|---|---|
| Geophysics performed and interpretted by Kryotec Arctic Innovation Inc. | | Yukon Energy, Mines and Resources | Government of Yukon - AAM<br>Mount Nansen 2013 Site Investigation<br>Geophysics Plans and Sections | |
| | Scale: NTS | Date: Oct 2013 | | Page 12 |

## Inverted Resistivity Section

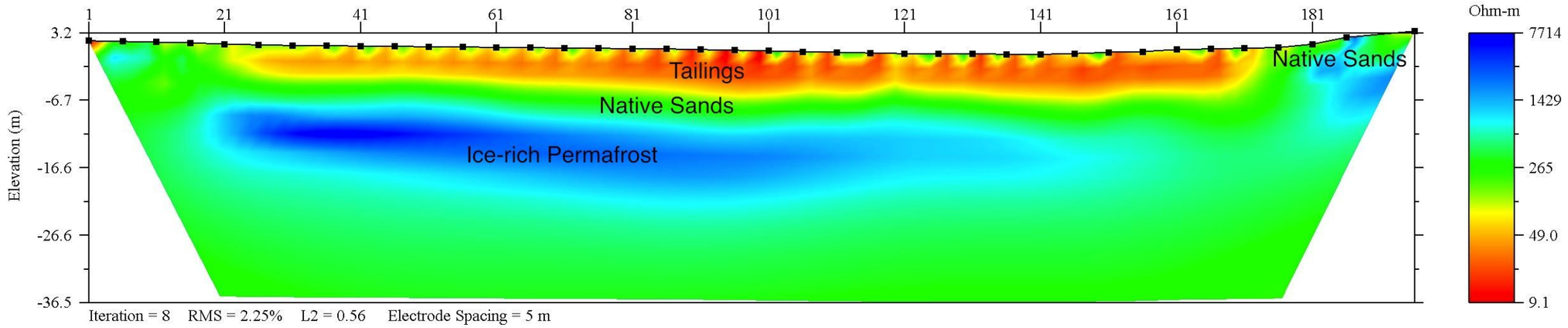



FIGURE 13: NA 10 Section

| | | | | |
|---|---|---|---|---|
| Geophysics performed and interpretted by Kryotec Arctic Innovation Inc. | | Yukon Energy, Mines and Resources | Government of Yukon - AAM<br>Mount Nansen 2013 Site Investigation<br>Geophysics Plans and Sections | |
| | Scale: NTS | Date: Oct 2013 | | Page 13 |

## Inverted Resistivity and IP Sections

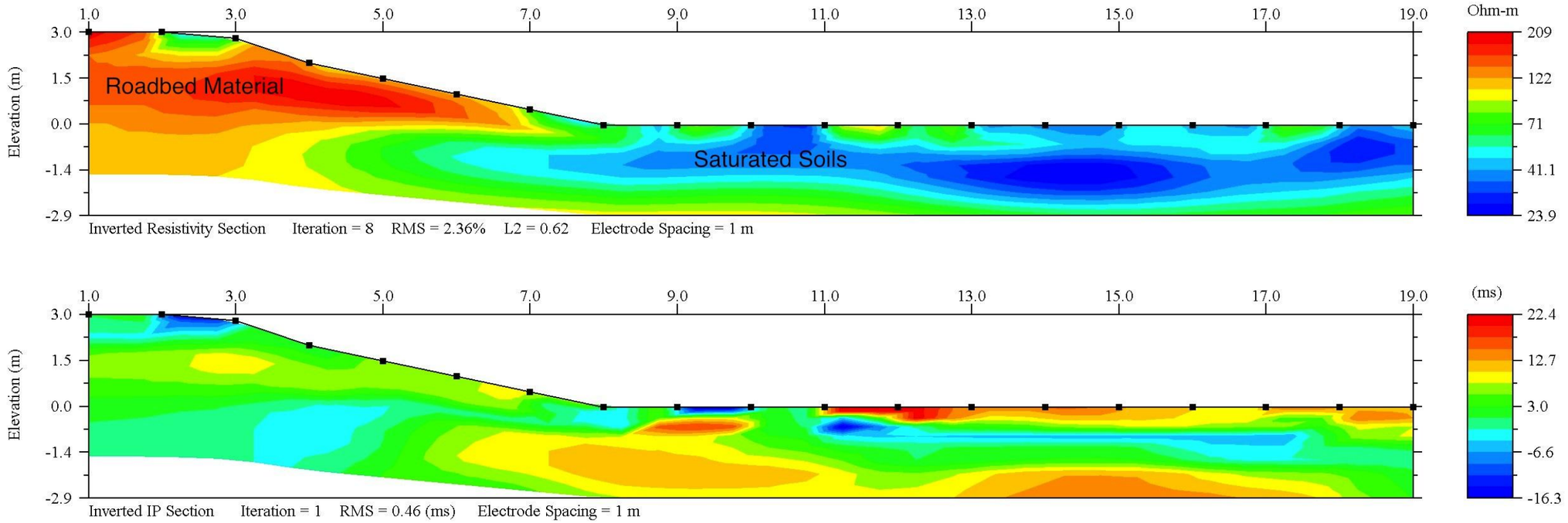



FIGURE 14: NA 11 Section

| | | | | |
|---|---|---|---|---|
| Geophysics performed and interpretted by Kryotec Arctic Innovation Inc. | | Yukon Energy, Mines and Resources | Government of Yukon - AAM<br>Mount Nansen 2013 Site Investigation<br>Geophysics Plans and Sections | |
| | Scale: NTS | Date: Oct 2013 | | Page 14 |

## Inverted Resistivity and IP Sections

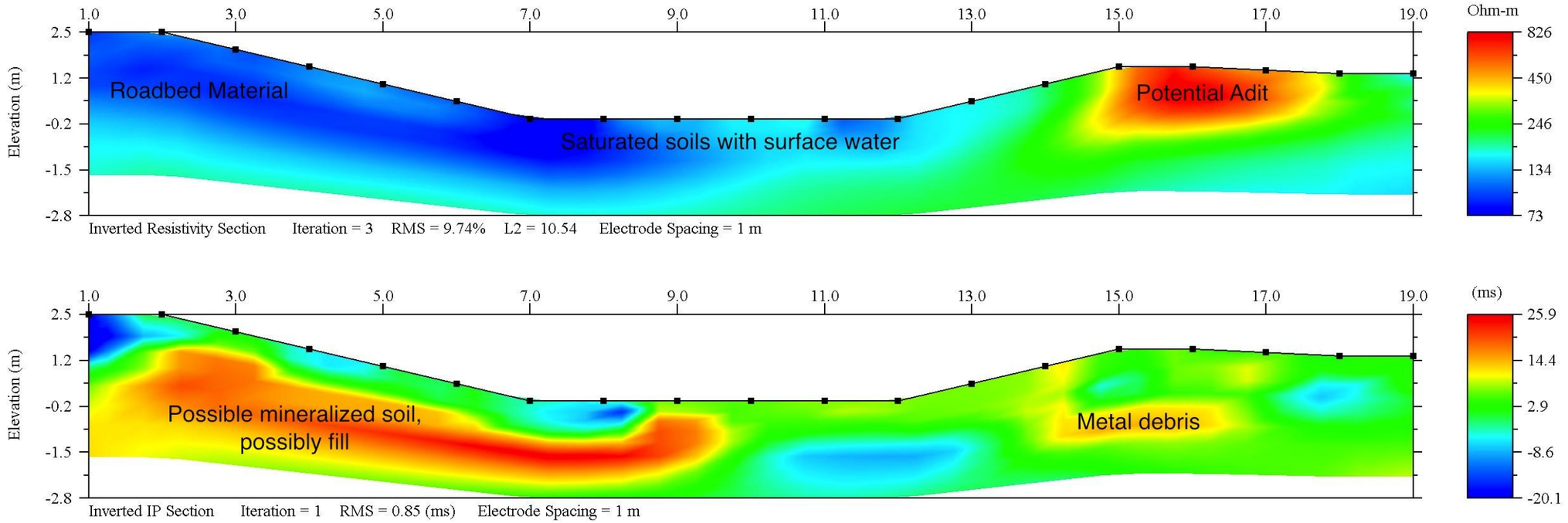



FIGURE 15: NA 12 Section

| | | | | |
|---|---|---|---|---|
| Geophysics performed and interpretted by Kryotec Arctic Innovation Inc. | | Yukon Energy, Mines and Resources | Government of Yukon - AAM<br>Mount Nansen 2013 Site Investigation<br>Geophysics Plans and Sections | |
| | Scale: NTS | Date: Oct 2013 | | Page 15 |

# APPENDIX H

# SI PROGRAM SUMMARY MEMO

**MEMO**

| | | | |
|---|---|---|---|
| **To** | Josée Perron | | |
| **From** | Renata Wood | | |
| **Tel** | 604-294-3811 | **AMEC File No.** | VM00605E |
| **Fax** | 604-294-4664 | **cc** | Patricia Randell |
| **Date** | 02 April 2014 | | |

**Subject** **Mount Nansen Remediation Project - Summary of 2013 Site Investigation Program, Rev 2**

## 1.0 INTRODUCTION

AMEC in association with Associated Engineering carried out an investigation program at the Mount Nansen site in September and October 2013. The investigation was completed to support the remediation design effort and was developed based on the findings from the gap analysis completed (AMEC 2013a[1], 2013b[2]). The work was carried out under TA 4 and 5.

The following memorandum summarizes the work that was completed during the fall 2013 investigation program and is intended to simply present a record of the work completed. It has been issued as Rev 1 to address comments provided by the Mount Nansen Remediation Project (MNRP) partners. The memo has not been otherwise updated to include information that has become available since the original date the memo was issued (November 15, 2013). The results of the investigations, including a similar summary of work completed, will be presented under separate cover (AMEC 2013c[3] and AMEC 2014[4]) with the reporting work completed under TA6. Drafts of these reports will be submitted during the month of December with finalized documents produced by March 31, 2014.

## 2.0 OBJECTIVES OF INVESTIGATION PROGRAM

The investigation program was a multidisciplinary effort with the following broad objectives:

- Improve the geotechnical characterization of the tailings particularly with regards to response to excavation and trafficability.

1 AMEC 2013a, "Mount Nansen Remediation Project Data Gap Analysis", Memo submitted to Josée Perron, Assessment and Abandoned Mines, Energy Mines and Resources, 24 July 2014.
2 AMEC 2013b, "Mount Nansen Remediation Project 2013 Site Investigation Plan", Memo submitted to Josée Perron, Assessment and Abandoned Mines, Energy Mines and Resources, 25 July 2014.
3 AMEC 2013c, "Mount Nansen Remediation Project 2013 Site Investigation Data Report - DRAFT", Draft Report submitted to Assessment and Abandoned Mines, Energy Mines and Resources, December 2013. Report to be finalized March 2014
4 AMEC 2014, "Mount Nansen Remediation Project Site Characterization Report" Draft Report submitted to Assessment and Abandoned Mines, Energy Mines and Resources, January 2014. Report to be finalized March 2014.

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- Expand the geochemical dataset for the waste rock material to provide an improved estimate of the volumes of material requiring storage in the open pit vs. volumes available for borrow.
- Improve the geotechnical characterization of the waste rock, primarily with regards to grain size and the type of borrow material that could be expected from the waste rock.
- Improve the geotechnical and geochemical characterization of the insitu material under the tailings and the understanding of the thermal regime in the insitu material.
- Confirm the general type of onsite borrow material available including geotechnical and geochemical assessment.
- Confirm the general understanding of the site wide geotechnical framework.
- Observe, document, and quantify watershed and creek characteristics.
- Characterize the type and geochemical nature of creek sediments.
- Improve the understanding of groundwater flow pathways from the open pit (towards Dome Creek primarily).
- Improve the understanding of the thermal regime around the open pit.
- Quantify groundwater - surface water interaction and quality along Dome and Pony Creeks.
- Improve understanding of groundwater flow and quality around the Huestis adit.
- Increase groundwater chemistry data set by sampling all existing wells on site.
- Increase surface water chemistry dataset to better understand the conditions and in particular the spatial heterogeneity of surface water chemistry.
- Increase the geochemical dataset for fill materials in mill area and along roads where additional information needed to quantify remediation volumes.
- Develop geochemical dataset for the dam fill material to quantify the volume available for borrow and volume requiring storage in the open pit.
- Improve the understanding of the materials at the mill and historic tailings areas to identify and quantify materials requiring relocation during remediation activities through reconnaissance and limited grab samples.
- Complete hazardous material inventory including sampling of the rail car contents.
- Develop a dataset of soil contamination in areas of known / suspected contaminant release to quantify degree of contamination and approximate volumes.
- Characterize potential landfill contaminant plume.
- Preliminarily confirm and improve the assessment of the building infrastructure to identify scope of work required to support the development of demolition plans and volumes.

- Develop preliminary site reclamation objectives and confirm existing landform, soils and vegetation conditions.

The site investigation completed to achieve these objectives is shown in Figures 1 through 5 and presented in the attached Tables 1, 2 and 3 which summarize the original high level work plan, provide details of the site investigation completed, and list the groundwater wells that were sampled.

## 3.0 SUMMARY OF WORK COMPLETE

The investigation locations are shown in Figures 1 through 5 attached. The program included various investigative techniques as listed below and briefly described in the following subsections.

- Drilling
- Test pitting and hand augers
- Instrumentation and well installation
- In-situ testing and measurements
- Groundwater sampling
- Surface water and sediment sampling
- Hazardous material sampling
- Visual reconnaissance
- Geophysics
- Surveying
- Laboratory testing

### 3.1 Drilling, Test pits and Hand Augers

Table 1 summarizes the drill holes and test pits advanced at the site during the 2013 investigation. Soil and rock was visually classified by on-site field personnel. Where conditions allowed, rock core was oriented to allow more detailed logging of fractures. An on-site laboratory was used to measure the moisture content of tailings and insitu samples in select locations. Selected soil soils were sent to offsite laboratories for additional geotechnical, geochemical and environmental testing. The drilling and test pitting comprised generally of:

- 40 test pits - advanced with a tracked excavator in the waste rock area, sand borrow areas, the historic “shale” borrow area, the mill site, historic tailings disposal locations, and on the tailings beach to characterize the soil conditions and collect samples for geotechnical, geochemical and environmental testing. The test pits on the tailings beach also provided an opportunity to observe the response of the tailings to excavation. Select samples from the waste rock and tailings area test pits were shipped off site for

laboratory testing. The rest have been stored inside the old cook shack, with each sample placed at the recovered moisture content in a labelled plastic bag and then grouped into larger rice bags by test pit. Large bulk samples are stored in 5-gallon pails.

- 16 sonic drill holes - advanced at the waste rock area, tailings beach, tailings dam, mill area, and former Ketza shop. Select holes drilled from the tailings beach had standpipe piezometers installed. Samples were collected and sent to laboratories for additional environmental, geochemical and geotechnical testing. The remaining soil core from the tailings facility and waste rock area was placed in core boxes which are stored outside in the core racks near the bunk house.
- 9 GeoProbe holes – advanced into the tailings from a barge on the tailings pond and from the tailings beach in areas where the sonic drill could not traffic. Select samples were sent to the laboratory for geotechnical and chemical analyses. Remaining samples were placed at the recovered moisture content into labelled plastic bags grouped into larger rice bags by borehole and stored inside the old cook shack on site should they be required for future testing.
- 4 hand augers – completed in the sand borrow area upstream of the tailings facility to replace two of the test pits (where excavator access was not possible) and along Dome creek as simple probe locations to confirm ground conditions inferred from refusal during installation of the mini piezometers (see Section 3.2). Samples from the borrow area were sent to the laboratory for geochemical and geotechnical testing.
- 10 diamond drill holes – advanced in and around the open pit. In four locations the holes were paired with a deep and shallow hole drilled. Monitoring wells and instrumentation were installed in all holes except the deep hole at CH-P-13-01 where high artesian pressure 11 m above the ground surface was encountered preventing installation of instrumentation without mobilizing a much larger water well type drill that could counteract the pressure. While installing instrumentation at this location would have provided ongoing information to potentially provide some certainty with regards to the flow regime, the single point information obtained (pressure and flow), is useful and has significantly increased our knowledge about the groundwater flow regime. As the design evolves, the potential benefit of greater certainty with regards to the hydrogeology in this area and the impact on the design should be assessed to determine if additional investigation is warranted however at the current time the cost and effort is not considered to be balanced by the likely outcomes.

**Table 1: Summary of Drill Hole and Test Pits**

| Location Area | | Summary of Work Completed |
|---|---|---|
| Ketza Shop | (BH-KZ) | 2 sonic drill holes |
| | (TP-KZ) | 2 test pits |
| Mill Area | (BH-M) | 8 sonic drill holes |
| | (TP-M) | 5 test pits |
| | (TP-SP) | 4 grab sample locations at the former explosives storage area |

| Location Area | | Summary of Work Completed |
|---|---|---|
| Former Explosive Storage Area (TP-SP) | | 4 grab samples |
| Waste Rock Area | (TP-W) | 11 test pits |
| | (BH-W) | 1 sonic drill hole |
| Open Pit | (CH-P) | 10 diamond drill holes at 6 sites |
| Tailings Facility | (TP-TD) | 3 test pits on the tailings dam |
| | (BH-TD) | 1 sonic drill hole on the tailings dam |
| | (TP-T) | 7 test pits on the tailings surface |
| | (BH-T) | 4 sonic drill holes on the tailings surface |
| | (CPT-T) | 8 CPTs advanced from the barge (CPT-T-13-03,04,08,09,10,13, 14, 18)<br>12 CPTs advanced from the tailings surface<br>11 dissipation tests completed in CPT-T-13-10,13,18,14,12,15 and 19 |
| | (GP-T) | 5 geoprobe holes from the barge (GP-T-13-01,02,03,04 and 10)<br>4 geoprobe holes on the tailings beach surface |
| | (HA-B) | 2 hand augers in the borrow area upstream of the tailings facility |
| | (TP-B) | 3 test pits in the sand borrow area downstream of the tailings facility<br>3 test pit in the shale borrow area north of the tailings facility |
| Roads | (TP-R) | 5 test pits on the roads |
| Dome Creek | (HA-DC) | 2 and augers advanced as probes to confirm refusal conditions encountered when installing drive point piezometers |

### 3.2 Instrumentation and Well Installations

Instrumentation and monitoring wells were installed at various locations around the site to provide information with regards to the groundwater and thermal regimes. The installations are detailed in Table 2 appended and consisted of:

- 14 paired mini piezometers – at each location paired mini piezometers were manually driven into the ground near the creek bank. An upper piezometer was installed at about 1.1 m depth and a lower piezometer at a depth of 2 to 3 m, depending on ground conditions, to measure the groundwater – surface water interaction and also allow collection of water quality samples. Ten sites were planned along Dome Creek, however although several attempts were made at location 4 installation was not possible due to ground conditions and was abandoned resulting in nine sites along Dome Creek. Five sites were installed along Pony Creek. These are semi permanent installations and should be monitored in the spring.
- 6 single point mini piezometers – 5 installed near the Huestis adit to allow groundwater monitoring, 1 installed in a sonic hole at the mill where seepage flow had been observed.
- 3 deep monitoring wells plus a vibrating wire with temperature measurement - installed in CH-P-13-03/50 and CH-P-13-04/50 around the open pit and in CH-13-05/50 located in the open pit to measure water level, temperature and allow collection of groundwater sample. Heat tracing was provided should the monitoring well be in groundwater below a

permafrost unit. The heat tracing would allow thawing of the portion of the well that is installed in permafrost so that a sample of the underlying groundwater can be obtained. The vibrating wires were connected to data loggers to allow frequent readings to be recorded and subsequently to provide information regarding connectivity to the open pit on November 14 and 15, 2013.

- 2 strings of 5 nested vibrating wire piezometers with temperature measurement – installed in CH-P-13-06/VWP which was drilled from the base of the open pit at an angle of 45 degrees and in CH-P-13-02/50 located south of the pit. Vibrating wires are located at 10 m intervals and measure water pressure and temperature. The vibrating wires are connected to data loggers to provide information regarding connectivity to the open pit.
- 4 shallow monitoring wells - installed around the open pit in CH-P-13-01/10, CH-P-13-02/10, CH-P-13-03/10 and CH-P-13-04/10.

### 3.3 In-situ testing and Measurements

The in-situ testing and measurements completed during the 2013 investigation program included:

- 20 cone penetration tests (CPT) completed through the tailings deposits from a barge and from the tailings beach. Dissipation tests were also completed at select locations.
- 23 packer tests completed in the deep diamond drill holes. Where conditions allowed, packers were completed at 5 m intervals using single packers as the hole was drilled.
- Flow measurements completed at 5 locations in Dome Creek.
- Flow measurements completed at 2 locations in Pony Creek.
- 14 seepage meter measurements competed at 10 locations in Dome and 4 locations in Pony Creeks (at locations of mini piezometer installations; several duplicate measurements made for quality assurance are not included in total number).
- 47 temperature and electrical conductivity readings in Dome and Pony Creeks.
- 15 pneumatic piezometer readings at 8 existing locations.
- Thermistor readings at 19 existing instrumentation locations.
- Pressure and flow measurement of artesian conditions in CH-P-01 prior to plugging the hole.

### 3.4 Groundwater Sampling

Groundwater sampling locations from the fall 2013 investigation program are shown in Figure 2. Samples were also gathered during a site visit completed during freshet (AMEC 2013d[5]). At select locations duplicate samples were collected to examine the potential for a field bias due to the presence of sulphide in the groundwater. In addition during the groundwater monitoring

[5] AMEC 2013d, “Freshet Site Visits memo.

program, gas concentrations were monitored in the well headspace and other potential areas of concern. The groundwater sampling program consisted of:

- Samples from 24 existing groundwater well locations and locations of interest around the site. Some of the existing wells had been destroyed or were dry or frozen and could therefore not be sampled. The wells that were successfully sampled are summarized in Table 3. Gas concentrations in well headspace was also monitored during groundwater sampling.
- Collection of groundwater samples from 19 newly installed monitoring locations in and around the open pit, at the mill area near the Huestis adit, and along Pony and Dome Creeks. Samples could not be obtained from some of the newly installed drive point piezometers (GSI locations) due to freezing conditions. The successful sampling is summarized in Table 3.
- On site assessment of sulphide concentration was completed.

### 3.5 Surface Water and Sediment Sampling

The surface water and sediment sampling program consisted of:

- Sampling ore and waste rock leachate bins.
- Samples from three locations in the open pit to delineate the vertical profile.
- On site assessment of sulphide concentration was completed.
- 20 sediment soil grab samples were completed in Dome Creek and sent to a laboratory for particle size and chemical analyses.

### 3.6 Hazardous Material Sampling

An inventory of the chemicals remaining on site was completed and where significant volumes of material were observed, samples were obtained. The inventory and sampling program included:

- 21 samples gathered mainly from the mill tanks.
- Attempted sampling of the rail tanker. The rail tanker was found to be empty although a small amount of sulphur dioxide gas was released upon opening the first valve.
- Inventory of tanks, drums and other vessels around the site.

### 3.7 Reconnaissances

Several general reconnaissances were completed to support the 2013 site investigation. These included:

- Visual assessment of existing topography and features in support of the development of landform design and final grading concepts.

- Surveys of the surficial soils and vegetation including collection of grab samples to confirm current conditions and help develop reclamation concepts. The surveys focused on the disturbed areas within the project area and the adjacent undisturbed areas but also included some offsite areas.
- Assessment of the general condition of the mill building, bunkhouse and cookhouse.
- General visual reconnaissance with regards to on site borrow characteristics and availability as well as a visual reconnaissance of the Victoria Creek borrow area.
- General visual reconnaissance of site around major project components with regards to major geohazards.
- Visual assessment of tailings performance and behaviour when subjected to loading by different equipment (excavator, trucks, drill rigs, foot traffic) and the behaviour of tailings samples when transported in the truck.
- Visual reconnaissance of the mill and historic tailings disposal area focused on observing surficial materials and in particular areas of waste rock and tailings.
- Observation and documentation of the undisturbed conditions in Dome and Pony Creeks.

### 3.8 Geophysics

Twelve resistivity surveys were completed at the site as follows:

- 3 lines completed at the tailings facility to provide insight into the permafrost conditions
- 2 lines completed near the Huestis adit to aide in locating the buried adit and thus target locations for well points.
- 7 lines completed in the mill area to clear investigation locations of utilities and underground obstructions; delineate potential voids and potential flow or contaminant plumes.

### 3.9 Surveying

To support analyses of the data gathered during the 2013 investigation program and to confirm historic information the following survey work was completed:

- Survey of newly installed wells and instrumentation.
- Confirmation of existing well elevations of interest.
- Survey of Dome Creek, 11 cross sections and 2 longitudinal sections.
- Landfill perimeter.
- Pony Creek adit (exposed ties).

### 3.10 Laboratory Program

The laboratory program is currently underway and is a phased program. To date the laboratory testing includes approximately:

- 82 grain size tests on waste rock, tailings, and insitu soil materials.
- 117 geochemical analyses of soil samples including acid base accounting, total inorganic carbon, sulphate-sulphur, leachable metals and shake flask extraction tests.
- Environmental analyses of approximately 50 soil samples including tests for hydrocarbons, volatiles, metals, glycols, cyanide and alkalinity.
- 20 grain size tests and metal and cyanide concentration analyses on sediment samples
- Analyses of surface and groundwater samples collected (see Section 3.4 and 3.5) including general chemistry, dissolved and total metals, cyanide species and nitrogen species.
- 4 specific gravity tests on tailings samples.
- 8 Atterberg limits tests on tailings samples.
- 63 moisture content tests completed on site on tailings and insitu samples.
- 3 tailings samples tested for cyanide.
- 21 hazcat tests on hazardous materials chemicals.

Further testing will be completed based on the results of the initial rounds of testing. This is expected to include:

- Additional environmental sampling (“step out – step down” testing).
- Additional geotechnical index testing as required (sieves, hydrometers, Atterberg limits)
- Proctor tests on tailings samples
- Odometer tests (1-dimension) on tailings samples.
- Tempe cell or similar tests on tailings samples.

## 4.0 CONCLUSION

The work completed in the 2013 Site Investigation program at the Mount Nansen Site was generally consistent with the planned activities. Certain aspects such as specific location or depth of investigation were altered based on the conditions encountered. There were several changes of significance from the scope of work outlined in TA 5. These were discussed during the program with AAM and included:

- Replacing the CMT well with conventional monitoring wells and vibrating wire installations and deletion of borehole geophysical surveys (acoustic televiewer, heat pulse flow survey and temperature measurement). The change was made in response to the observed ground conditions which indicated that the boreholes were unlikely to

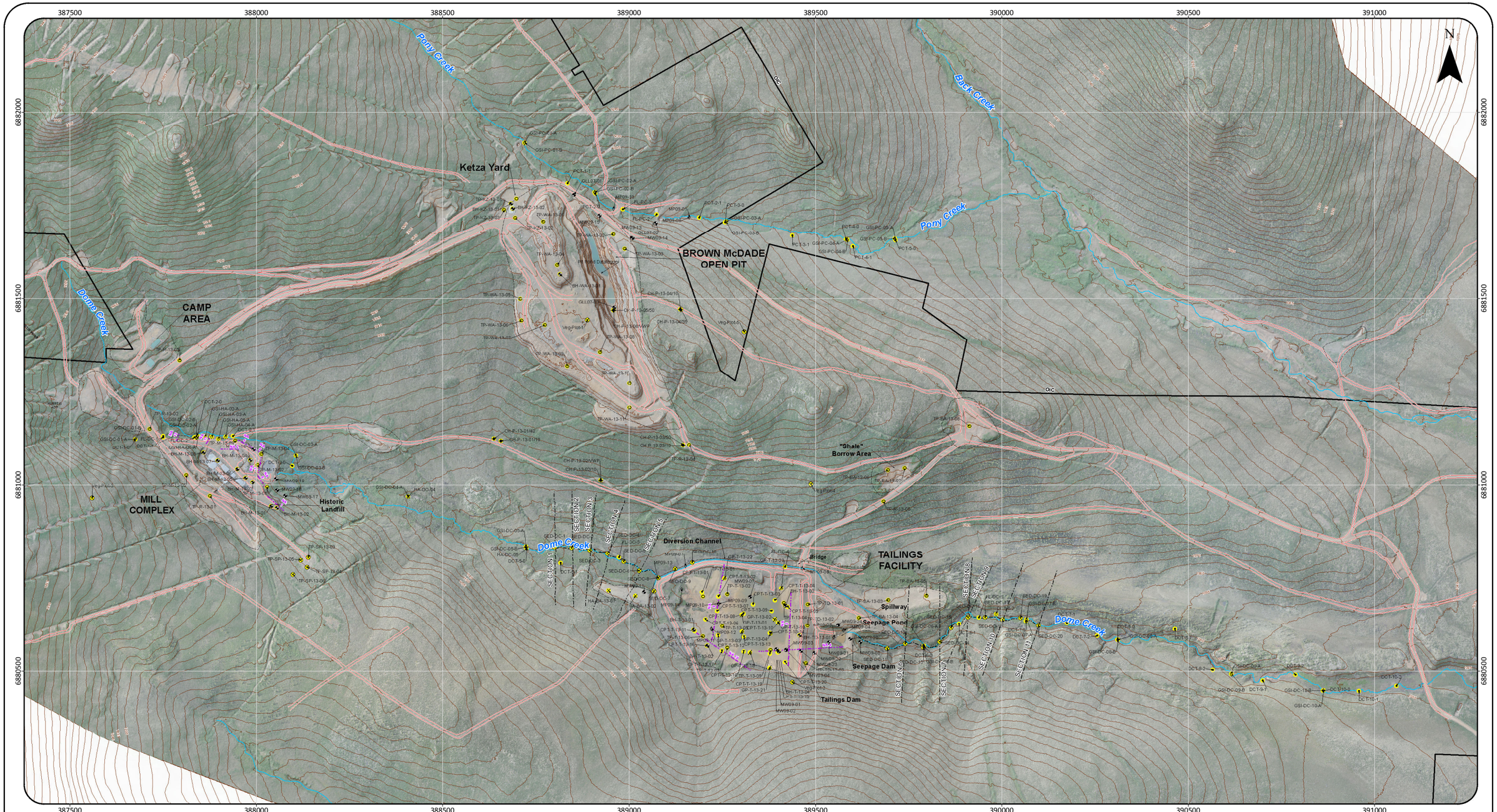
remain open for the geophysical surveys and/or for the installation of the CMT wells. Installation of the vibrating wires will compensate for information not obtained through the geophysics by providing stabilized temperature readings and where thawed conditions are present, continuously monitored pore pressure readings. This will allow measurement of the interconnectivity between the installation locations and the pit and will provide a better understanding of the thermal regime. Paired shallow wells were drilled at each location allowing installation of a deep and shallow monitoring well providing the same groundwater coverage as would have been provided by the CMT wells.

- Replacing the open pit and adit reconnaissances with desktop studies. This was done because the available information is considered to be sufficiently detailed for the current design needs, particularly with regards to the open pit. Further assessment would be more effectively completed once the base case design is further developed and a better understanding of the role of the Pony Creek adit in the final pit configuration exists. Should further assessment be required to support design efforts, it will not require drilling or mobilization of a subcontractor to site and it therefore can be completed if or when it is needed.
- Inclusion of geophysics to confirm safety of investigation locations with regards to underground obstruction and utilities, provide insight into permafrost, and aide in locating the groundwater piezometers around the Huestis adit.
- Only one groundwater sampling campaign was completed rather than two. When the program was initially developed, it was envisioned that there would be a late spring / early summer sampling program and a fall program. Given the start date of the investigation program the first sampling event was not possible.

Although upcoming design work may uncover issues and questions that require additional information to reduce uncertainty, the project team is confident that the information obtained in the 2013 program has provided the information necessary to complete the preliminary design. Follow up site visits to provide additional details regarding the building and infrastructure are planned and were included in TA6. Investigation needs may evolve as the design progresses but other than those stated, there are currently no significant outstanding information needs identified at this time.

**FIGURES**

Figure 1: 2013 Site Investigation - Overview Site Plan
Figure 2: 2013 Site Investigation - Groundwater Monitoring Locations Fall 2013
Figure 3: 2013 Site Investigation – Open Pit Detail
Figure 4: 2013 Site Investigation – Mill Detail
Figure 5: 2013 Site Investigation – Tailings Facility Detail




**Data Source:**

Roads, trails, streams, waterbodies, watercourses and infrastructure areas digitized using 2008 Quickbird imagery (courtesy of Yukon Geomatics) and spatial data provided by Yukon government.
Heli LIDAR Data Survey and Imagery, 2012

National Topographic Data Base (NTDB) compiled by Natural Resources Canada at a scale of 1:50,000. Cadastral data compiled by Natural Resources Canada. Reproduced under license from Her Majesty the Queen in Right of Canada, Department of Natural Resources Canada. All rights Reserved.

Datum: NAD 1983 CSRS UTM Zone 8N

**Legend**

- Borehole
- Hydrogeological
- CPT
- Geoprobe
- Grab Sample
- Hand Auger
- Mini Piezometer
- Temperature or Flow Measurement
- Test Pit
- 2013 Locations
- OIC
- Geophysics Lines
- Surveyed Sections
- Contour (5 m)
- Disturbed Area
- Roads
- Streams

Associated Engineering — Global Perspective. Local Focus.

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Yukon
Energy, Mines and Resources
Assessment and Abandoned Mines

**MOUNT NANSEN REMEDIATION PROJECT**
**Figure 1**

**SITE INVESTIGATION COMPLETION MEMO**

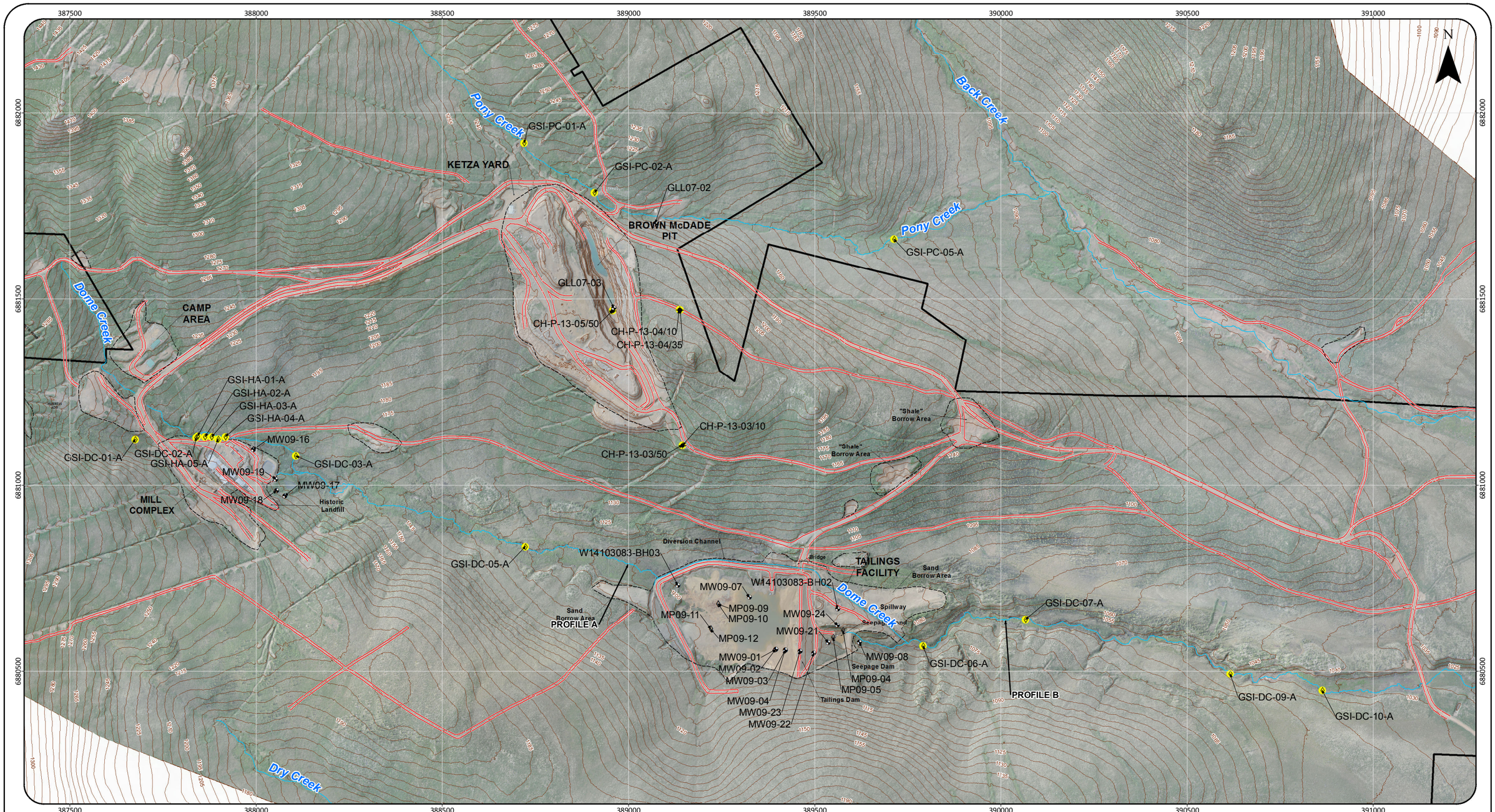
**2013 SITE INVESTIGATION OVERVIEW SITE PLAN**

Scale 1:10,000
Metres

0 250 500

March 7, 2014

S:\PROJECTS\VM00605 - Mount Nansen\GIS\Mapping\VM00605_0014d_11x17_2013SiteInvestigationPlan_overviewsiteplan.mxd




**Data Source:**

Roads, trails, streams, waterbodies, watercourses and infrastructure areas digitized using 2008 Quickbird imagery (courtesy of Yukon Geomatics) and spatial data provided by Yukon government.

Heli LIDAR Data Survey and Imagery, 2012

Datum: NAD 1983 CSRS UTM Zone 8N

**Legend**

- Borehole
- Hydrogeological
- CPT
- Geoprobe
- Grab Sample
- Hand Auger
- Mini Piezometer
- Temperature or Flow Measurement
- Test Pit
- 2013 Locations
- OIC
- Contour (5 m)
- Disturbed Area
- Roads
- Streams

Note:
Refer to Appendix B7 and D3 in the 2013 Site Investigation Report for details of groundwater sampling.

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**MOUNT NANSEN REMEDIATION PROJECT**
**Figure 2**

**SITE INVESTIGATION COMPLETION MEMO**

**2013 SITE INVESTIGATION**
**GROUNDWATER MONITORING LOCATIONS FALL 2013**

Scale 1:10,000
Metres
0 250 500

April 2, 2014

S:\PROJECTS\VM00605 - Mount Nansen\GIS\Mapping\VM00605_0010b_11x17_2013SiteInvestigationPlan_groundwater.mxd

| Testhole | Drilled Depth (m) | Instrument(s) Installed |
|---|---|---|
| CH-P-13-01/10 | 10 | MW |
| CH-P-13-01/40 | 40 | - |
| CH-P-13-02/10 | 10 | MW |
| CH-P-13-02/VWP | 50 | VWP |
| CH-P-13-03/10 | 10 | MW |
| CH-P-13-03/50 | 50 | MW, VWP |
| CH-P-13-04/10 | 10 | MW |
| CH-P-13-04/35 | 50 | MW, VWP |
| CH-P-13-05/50 | 50 | MW, VWP |
| CH-P-13-06/VWP | 60 | VWP |

MW = Monitoring Well
VWP = Vibrating Wire Piezometer with temperature measurement

388000 388500 389000 389500

6882000 6881500 6881000

N

Pony Creek
GSI-PC-01-A
GSI-PC-01-B
Ketza Yard
PCT-1-1
GLL07-01
GSI-PC-02-A
GSI-PC-02-B
MP09-03
FL-PC-1
PCT-2-0
TP-KZ-13-01
BH-KZ-13-01
BH-KZ-13-02
TP-KZ-13-03
TP-WA-13-01
TP-KZ-13-02
MW09-15
MW09-13
GLL07-02
MW09-14
PONY CREEK ADIT
TP-WA-13-02
Northwest Pile
East Pile
TP-WA-13-03
TP-WA-13-04
Pit Pond Datalogger
BROWN McDADE OPEN PIT
BH-WA-13-01
TP-WA-13-05
WASTE ROCK AREA
GLL07-03
Ore Stockpile
CH-P-13-05/50
CH-P-13-04/10
CH-P-13-04/35
Veg-Plot-5
TP-WA-13-06
Veg-Plot-1
CH-P-13-06/VWP
TP-WA-13-07
TP-WA-13-08
West Mid Pile
TP-WA-13-09
South Pile
Low Grade Ore Backfill
West Lower Pile
TP-WA-13-10
Southwest Upper Pile
TP-WA-13-11
CH-P-13-01/40
CH-P-13-01/10
Southwest Lower Pile
CH-P-13-03/50
CH-P-13-03/10
TP-R-13-04
GSI-DC-03-A
TP-M-13-04
DCT13-0
GSI-DC-03-B
TP-M-13-02
MW09-19
CH-P-13-02/VWP
CH-P-13-02/10
PCT-2-1
PCT-3-0
MP09-01
FL-PC-2
MP09-08
GSI-PC-03-A
GSI-PC-03-B
PCT-3-1
PCT-4-0
GSI-PC-05-A
GSI-PC-05-B
PCT-5-0
GSI-PC-04-A
GSI-PC-04-B
PCT-4-1
Pony Creek
"Shale" Borrow Area
TP-BA-13-08
"Shale" Borrow Area
TP-BA-13-06
TP-BA-13-07

**Data Source:**

Roads, trails, streams, waterbodies, watercourses and infrastructure areas digitized using 2008 Quickbird imagery (courtesy of Yukon Geomatics) and spatial data provided by Yukon government.
Heli LIDAR Data Survey and Imagery, 2012

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Datum: NAD 1983 CSRS UTM Zone 8N

**Legend**

- Borehole
- Hydrogeological
- CPT
- Geoprobe
- Grab Sample
- Hand Auger
- Mini Piezometer
- Temperature or Flow Measurement
- Test Pit
- 2013 Locations
- OIC
- Contour (5 m)
- Disturbed Area
- Roads
- Streams
- Waste Pile Area

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MOUNT NANSEN REMEDIATION PROJECT
Figure 3

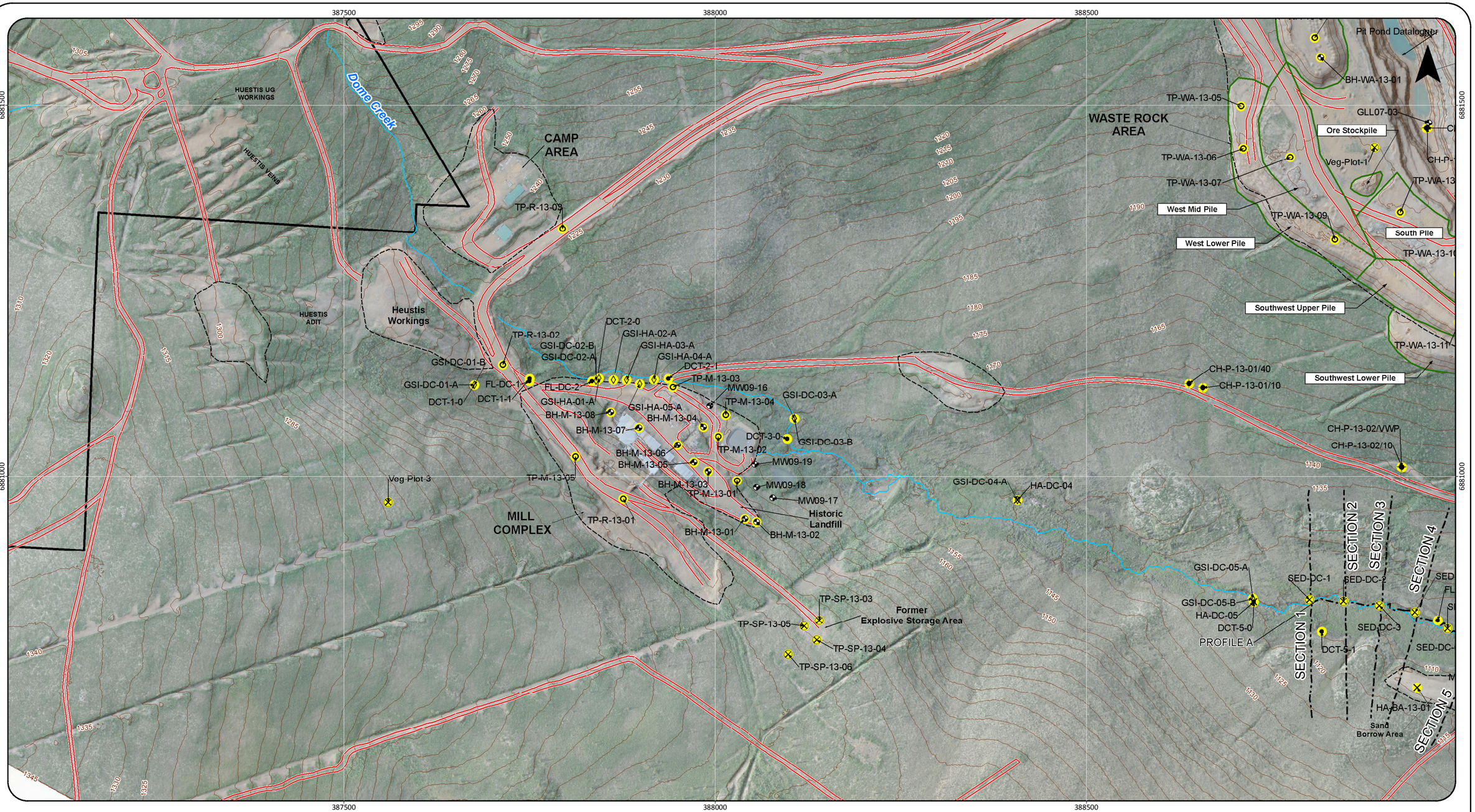
SITE INVESTIGATION COMPLETION MEMO

2013 SITE INVESTIGATION
OPEN PIT DETAIL

Scale 1:5,000
Metres
0 125 250

March 7, 2014

S:\PROJECTS\VM00605 - Mount Nansen\GIS\Mapping\VM00605_0014e_11x17_2013SiteInvestigationPlan_PitDetail.mxd




**Data Source:**

Roads, trails, streams, waterbodies, watercourses and infrastructure areas digitized using 2008 Quickbird imagery (courtesy of Yukon Geomatics) and spatial data provided by Yukon government.
Heli LIDAR Data Survey and Imagery, 2012

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Datum: NAD 1983 CSRS UTM Zone 8N

**Legend**

- Borehole
- Hydrogeological
- CPT
- Geoprobe
- Grab Sample
- Hand Auger
- Mini Piezometer
- Temperature or Flow Measurement
- Test Pit
- 2013 Locations
- OIC
- Contour (5 m)
- Disturbed Area
- Roads
- Streams
- Waste Pile Area

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Assessment and Abandoned Mines

**MOUNT NANSEN REMEDIATION PROJECT**
**Figure 4**

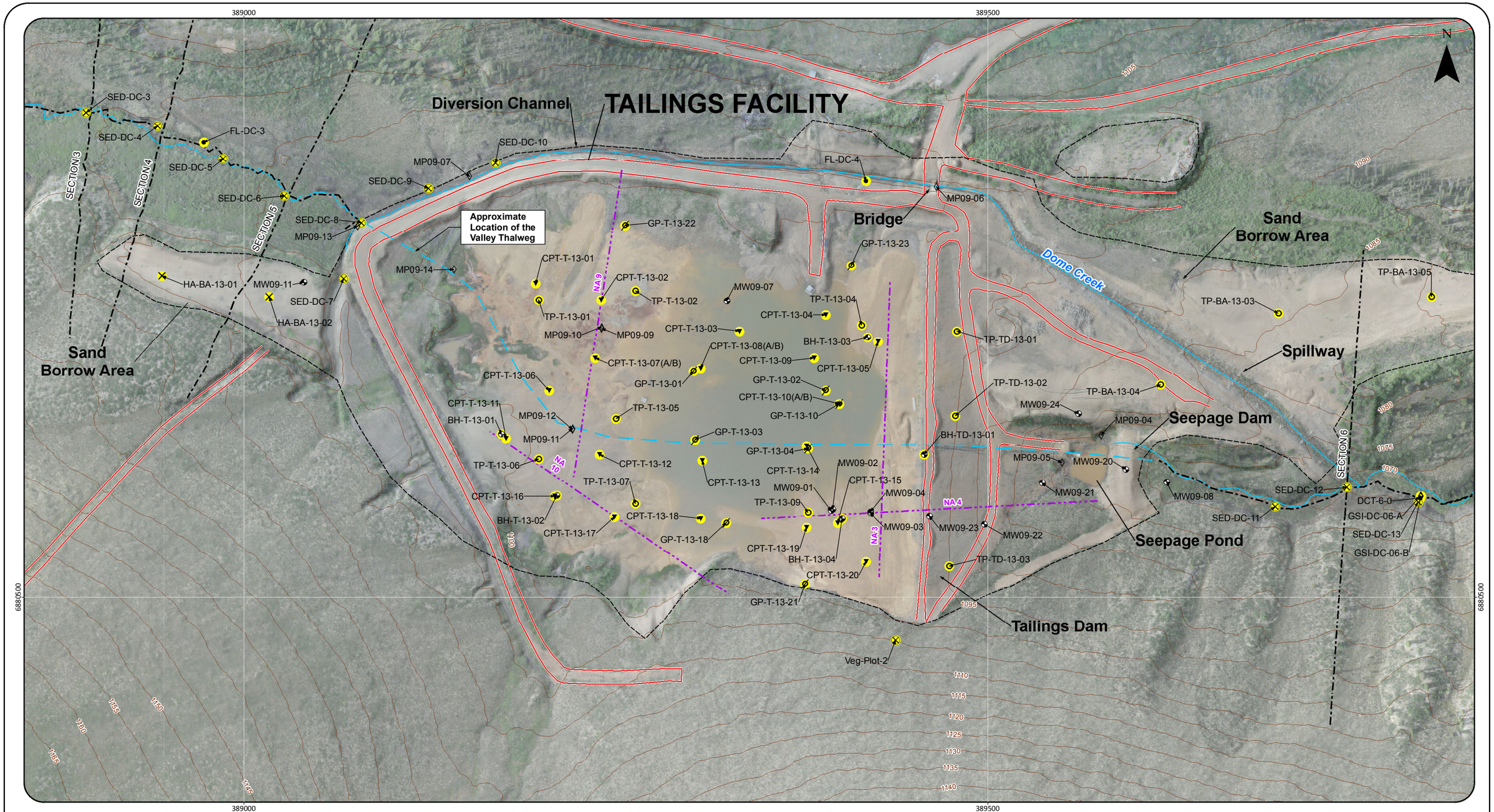
**SITE INVESTIGATION COMPLETION MEMO**

**2013 SITE INVESTIGATION MILL DETAIL**

Scale 1:5,000
Metres
0 125 250

March 7, 2014

S:\PROJECTS\VM00605 - Mount Nansen\GIS\Mapping\VM00605_0014e_11x17_2013SiteInvestigationPlan_MillDetail.mxd




**Data Source:**

Roads, trails, streams, waterbodies, watercourses and infrastructure areas digitized using 2008 Quickbird imagery (courtesy of Yukon Geomatics) and spatial data provided by Yukon government.
Heli LIDAR Data Survey and Imagery, 2012

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Datum: NAD 1983 CSRS UTM Zone 8N

**Legend**

- Borehole
- Hydrogeological
- CPT
- Geoprobe
- Grab Sample
- Hand Auger
- Mini Piezometer
- Temperature or Flow Measurement
- Test Pit
- 2013 Locations
- OIC
- Geophysics Lines
- Surveyed Sections
- Contour (5 m)
- Disturbed Area
- Roads
- Streams
- Waste Pile Area

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Assessment and Abandoned Mines

MOUNT NANSEN REMEDIATION PROJECT
Figure 5

SITE INVESTIGATION COMPLETION MEMO

2013 SITE INVESTIGATION
TAILINGS FACILITY DETAIL

Scale 1:2,500
Metres
0 60 120

March 7, 2014

S:\PROJECTS\VM00605 - Mount Nansen\GIS\Mapping\VM00605_0014e_11x17_2013SiteInvestigationPlan_TSFDetail.mxd

# TABLES

Table 1A: Work Plan for Drilling
Table 1B: Work Plan for Test Pit
Table 1C: Installations and Reconnaissances Work Plan
Table 2: Fall 2013 Investigations Completed
Table 3: Fall 2013 Groundwater Sampling Location

## Table 1A Work Plan for Drilling – details of actual work completed included in Table 2

| ID | Planned | | | | | | | | | | | | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | Location | Planned E (UTM) | Planned N (UTM) | Location Comments | Responsible Discipline | Purpose | Target Depth | Expected depth | Sampling / in-situ testing | Observations Required | Installations | |
| BH-T-13-01 | Sonic drill hole | Tailings | 389,241 | 6,880,654 | Locations selected to target areas of thickest tailings (see tailings isopach map) and underlying thalweg and should be located along this orientation as close as safely possible to the pond. | Geotech | - characterize tailings, particularly gradation, moisture content, density, location of water table and permafrost if any (not expected within tailings)<br>- characterize insitu material particularly type, moisture content, presence of permafrost<br>- obtain geochemical samples of insitu material to assess how much material requires excavation<br>- establish depth to permafrost or bedrock (whichever is shallowest) to assess effect of thawing and freeze back and to support hydrogeologic understanding.<br>- allow correlation to CPT measurements | permafrost or bedrock + 5 m (shallowest) | 15 to 25 m (based on tailings thickness 5 m to 15 m + permafrost several meters below tailings) | -SPT at 1.5 m interval in upper 10 m (whether tailings or in-situ) then at 3 m intervals. Can modify based on consistency. If insitu materials are gravelly and SPT not meaningful, can discontinue unless stratigraphy changes.<br>- continuous sonic samples<br>- geochemical sampling in insitu (frozen and unfrozen)<br>-approximately 5 field moisture contents per location in tailings (or every 2 m whichever is less), ensure moisture content sample gathered above water table and below water table.<br>- moisture content in insitu materials in each material unit, especially in any silt or finer grained material and minimum 2 m intervals. | - photograph of samples<br>- soil description per logging conventions<br>- water levels<br>- permafrost description per logging conventions<br>- temperature measurement (not necessary when clearly unfrozen)<br>- observations and comments about drill rig trafficability<br>- general drilling conditions<br>- response of tailings deposit to drilling | Standpipe within tailings deposit (below water table, about mid thickness) | Completed 4 boreholes with some modification<br>- SPTs not completed, relied on CPT tip resistance.<br>- Standpipe piezometer not installed in BH-T-13-01 due to drilling conditions. |
| BH-T-13-02 | Sonic drill hole | Tailings | 389,247 | 6,880,604 | | Geotech | | | | | | | |
| BH-T-13-03 | Sonic drill hole | Tailings | 389,432 | 6,880,588 | | Geotech | | | | | | | |
| BH-T-13-04 | Sonic drill hole | Tailings | 389,427 | 6,880,539 | | Geotech | | | | | | | |

| ID | Planned | | | | | | | | | | | | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | Location | Planned E (UTM) | Planned N (UTM) | Location Comments | Responsible Discipline | Purpose | Target Depth | Expected depth | Sampling / in-situ testing | Observations Required | Installations | |
| BH-TD-13-01 | Sonic drill hole | Tailings Dam | 389,461 | 6,880,599 | Location targeted highest dam section. Can be field fit for access / safety while maintaining intent of location. | Geotech | - geochemical characterization of the dam fill (sand) and underlying insitu materials<br>- geotechnical characterization of dam fill and underlying insitu materials<br>- establish depth of material to be removed during remediation | permafrost or bedrock + 5 m (shallowest) | 30 m (based on dam height of 20 m + permafrost several meters below tailings) | - SPTs not required<br>- continuous sonic samples<br>- geochemical sub samples<br>- on site moisture content of insitu materials | - photograph of samples<br>- soil description per logging conventions<br>- permafrost description per logging conventions<br>- water levels<br>- general drilling conditions | None | Completed |
| BH-WA-13-01 | Odex / Sonic drill hole | Waste Rock Area | 388,816 | 6,881,563 | Location targeted in thickest waste rock area. Can be field fit several meters for access/safety | Geotech | - geochemical characterization of the waste rock<br>- geotechnical characterization of the waste rock, particularly gradation<br>- geotechnical characterization of the underlying foundation<br>-assess location of water table (if any) and permafrost depth | Bedrock + 2 m | 11 m (7 m waste rock thickness + 2 m overburden + 2 m into bedrock) | - continuous sonic sampling if possible otherwise Odex cuttings.<br>- geochemical subsamples at 1 m intervals in waste material. | - photograph of samples<br>- soil description including amount of oversize per logging convention<br>- permafrost description<br>- water levels<br>- general drilling conditions. | If water is encountered during drilling, standpipe should be installed below water table. It isn't expected that groundwater will be encountered so no expecting an installation. | Completed, no groundwater encountered so no standpipe installed. |
| BH-M-13-01 | Sonic drill hole | Mill Site | 388,026 | 6,880,954 | Location is approximate. Can be field fit for access, safety or in consideration of visual observation of conditions and materials | Site Charac. | Delineation (depth) of hazardous materials from landfill and waste rock/tailings to depth (directly adjacent to landfill) | To where field screening indicates no contamination exits (at least below the road material) or to 1.5 m below gw | 10 m | PCOCs are hydrocarbons, landfill parameters and leachable metals. Photo-ionization detector screening to be done every 0.5 m and soil sampling to be done above, at and below potentially contaminated materials. | Soil stratigraphy and depth to groundwater (if reached). | N/A | Completed 8 boreholes at the mill |

| ID | Planned | | | | | | | | | | | | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | Location | Planned E (UTM) | Planned N (UTM) | Location Comments | Responsible Discipline | Purpose | Target Depth | Expected depth | Sampling / in-situ testing | Observations Required | Installations | |
| BH-M-13-02 | Sonic drill hole | Mill Site | 388,041 | 6,880,943 | | Site Charac. | Delineation (to the south) of hazardous materials from landfill and waste rock/tailings to depth<br>Characterization of materials to determine if tailings or waste rock was used in the construction of the area | To where field screening indicates no contaminatio n exits (at least below the road material) or to 1.5 m below gw | 10 m | PCOCs are geochemicals, metals and hydrocarbons. Photo-ionization detector screening to be done every 0.5 m and soil sampling to be done above, at and below potentially contaminated materials. | Soil stratigraphy and depth to groundwater (if reached). | N/A | |
| BH-M-13-03 | Sonic drill hole | Mill Site | 387,986 | 6,881,001 | Location is approximate based on historic spill records. Can be field fit based on access, safety or visual observation of contamination | Site Charac. | Characterization of materials which may have been contaminated by 2 historical fuel spills<br>Characterization of materials to determine if tailings or waste rock was used in the construction of the area<br>Characterize if contaminants form waste oil barrel storage exists at this location | | 4 m | | Soil stratigraphy and depth to groundwater (if reached). | N/A | |
| BH-M-13-04 | Sonic drill hole | | 387,973 | 6,881,072 | Location is approximate based on historic spill records. Can be field fit based on access, safety or visual observation of contamination | Site Charac. | Characterization of materials which may have been contaminated by 2 historical fuel spills<br>Characterization of spills near transformer storage area<br>Characterization of materials to determine if tailings or waste rock was used in the construction of the area | | 4 m | | Soil stratigraphy and depth to groundwater (if reached). | N/A | |
| BH-M-13-05 | Sonic drill hole | Mill Site | 387,957 | 6,881,018 | | Site Charac. | Characterization of materials which may have been contaminated by 2 historical fuel spills<br>Characterization of spills near transformer storage area<br>Characterization of materials to determine if tailings or waste rock was used in the construction of the area | To where field screening indicates no contaminatio n exits (at least below the road material) or to 1.5 m below gw | 3 m | PCOCs are geochemicals, cyanide, metals and hydrocarbons. Photo-ionization detector screening to be done every 0.5 m and soil sampling to be done above, at and below potentially contaminated materials. | Soil stratigraphy and depth to groundwater (if reached). | N/A | |

| ID | Planned | | | | | | | | | | | | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | Location | Planned E (UTM) | Planned N (UTM) | Location Comments | Responsible Discipline | Purpose | Target Depth | Expected depth | Sampling / in-situ testing | Observations Required | Installations | |
| BH-M-13-06 | Sonic drill hole | Mill Site | 387,943 | 6,881,038 | Location is approximate based on historic spill records. Can be field fit based on access, safety or visual observation of contamination | Site Charac. | Characterization of materials which may have been contaminated by 2 historical fuel spillsConfirm waste oil soil contamination from drum storage has not extended to this locationConfirm if contamination from the AST is at this locationCharacterization of materials to determine if tailings or waste rock was used in the construction of the area | To where field screening indicates no contaminatio n exits (at least below the road material) or to 1.5 m below gw | 3 m | to be confirmed as drilling approaches | Soil stratigraphy and depth to groundwater (if reached). | N/A | |
| BH-M-13-07 | Sonic drill hole | Mill Site | 387,903 | 6,881,073 | | Site Charac. | Characterization of materials which may have been contaminated by 2 historical fuel spills<br>Confirm contamination in stained soil in front of generator building<br>Determine if contamination from fuel storage and spills in the generator building have extended to this location<br>Characterization of materials to determine if tailings or waste rock was used in the construction of the area | To where field screening indicates no contaminatio n exits (at least below the road material) or to 1.5 m below gw | 3 m | PCOCs are geochemicals, metals, antifreeze parameters and hydrocarbons. Photo-ionization detector screening to be done every 0.5 m and soil sampling to be done above, at and below potentially contaminated materials. Additionally, cyanide and metals. | Soil stratigraphy and depth to groundwater (if reached). | N/A | |
| BH-M-13-08 | Sonic drill hole | Mill Site | 387,859 | 6,881,087 | Location is approximate based on historic spill records. Can be field fit based on access, safety or visual observation of contamination | Site Charac. | Characterization of materials which may have been contaminated by 2 historical fuel spills<br>Determine if contamination from spills in the mill building have extended to this location<br>Characterization of materials to determine if tailings or waste rock was used in the construction of the area | To where field screening indicates no contaminatio n exits (at least below the road material) or to 1.5 m below gw | 3 m | PCOCs are geochemicals, metals and hydrocarbons. Photo-ionization detector screening to be done every 0.5 m and soil sampling to be done above, at and below potentially contaminated materials. Additionally, cyanide and metals. | Soil stratigraphy and depth to groundwater (if reached). | N/A | |

| ID | Planned | | | | | | | | | | | | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | Location | Planned E (UTM) | Planned N (UTM) | Location Comments | Responsible Discipline | Purpose | Target Depth | Expected depth | Sampling / in-situ testing | Observations Required | Installations | |
| BH-KZ-13-01 | Sonic drill hole | Former Ketza shop | 388,676 | 6,881,732 | Location is approximate based on historic spill records. Can be field fit based on access, safety or visual observation of contamination | Site Charac. | Delineate hydrocarbon contamination from spills (depth of spill beneath former AST) | Beneath area of hydrocarbon contamination | 4 m | PCOCs are hydrocarbons and their associated metals. Photo-ionization detector screening to be done every 0.5 m and soil sampling to be done above, at and below potentially contaminated materials. | Soil stratigraphy | N/A | Completed 2 boreholes at the Ketza shop. |
| BH-KZ-13-02 | Sonic drill hole | Former Ketza shop | 388,687 | 6,881,742 | | Site Charac. | Delineate hydrocarbon contamination from spills (depth of spill beneath former Ketza Shop) | Beneath area of hydrocarbon contamination | 3 m | | Soil stratigraphy | N/A | |
| CH-P-13-01 | Core drill hole | South of pit | 388,641 | 6,881,128 | location can be modified for access / safety | Hydrogeo | - characterize bedrock rock mass;- characterize fractures;- assess groundwater pathways by packer testing (K);- allow geophysical logging on open core holes;- install groundwater monitor wells for groundwater quality.- characterize the overburden soils including presence of permafrost | through permafrost | 50 | - continuous coringshort core runs at low RPM to reduce heat energy imparted to cores;- packer testing at 5 m intervals (single packer, on the way down) follow AMEC procedures and SOP;- geophysical e-logs: (1) temperature (2) acoustic televiewer (3) heat pulse flow meter;- | - rock core logging, using AMEC work method, including: RQD, SCR and permafrost; - basic overburden description (especially type, presence of permafrost);- permafrost logging (US Army Corp manual);- rock logging, RQD, | - core holes to fully topped up with drill water on completion and safety cover place over open core hole;- nominal casing from 0.5 m AGL socketed into bedrock surface, to protect collar and case off overburden;- geophysics will | Completed drilling at 6 locations and added paired shallow holes at the four locations outside the pit.<br><br>Geophysics not completed in favour of instrumentation installation and in consideration of ground conditions.<br><br>CMT wells |
| CH-P-13-02 | Core drill hole | South of pit | 388,928 | 6,881,014 | | Hydrogeo | | through permafrost | 50 | | | | |
| CH-P-13-03 | Core drill hole | South of pit | 389,185 | 6,881,002 | Location will be modified to provide better access | Hydrogeo | | through permafrost | 50 | | | | |
| CH-P-13-04 | Core drill hole | North east of pit | 389,016 | 6,881,699 | location can be modified for access/safety | Hydrogeo | | through permafrost | 50 | | | | |
| CH-P-13-05 | Core drill hole | Pit bottom | 388,958 | 6,881,481 | location can be modified for safety / access in same | Hydrogeo | | below open pit pond invert. | 50 | | | | |

| ID | Planned | | | | | | | | | | | | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | Location | Planned E (UTM) | Planned N (UTM) | Location Comments | Responsible Discipline | Purpose | Target Depth | Expected depth | Sampling / in-situ testing | Observations Required | Installations | |
| | | | | | general area - note once safety measures in place hole location should not be changed. | | | | | water quality sampling to follow. | SCR- fracture characterization;- core hole conditions from Driller (e.g., caving, lost circulation, etc.);- photo log cores in boxes c/w labels showing: run number, top and bottom depths, 'Sharpie' way up arrows across all solid core and fractures, use colour reference chart and wet core (use spray bottle). | follow ~7 days after each core hole completion for follow-on geophysics.- following geophysics groundwater monitoring wells will be manually installed (i.e. without drill rig) | substituted with vibrating wire piezometers and monitoring wells.<br><br>No deep installation in CH-P-13-01 because of high artesian pressures. |
| CH-P-13-06 | Core drill hole | Pit bottom - inclined | 388,962 | 6,881,471 | | Hydrogeo | | span across Hanging Wall Fault. | 50 | | | | |
| CPT-T-13-01 | CPT | Tailings | 389,198 | 6,880,711 | Locations selected to provide a general grid of CPTs. Can be field fit based on pond and access constraints.4 locations should be paired with the Sonic hole locationsAnticipated that about half will require use of the barge. | Geotech | -CPTu measurements of tailings and insitu soils until refusal (sleeve friction, tip resistance and pore pressure). This will allow measurement of dynamic pore pressure, correlations to strength, material type and other properties.-Dissipation tests to measure static water level and estimate hydraulic conductivity. | refusal | 7 to 20 m based on tailings thickness + permafrost several meters below tailings | -dissipation tests near surface and near bottom of tailings (to assess potential for downward seepage gradient) | - rig trafficability- general CPT conditions- response of tailings deposit to work, traffic, etc. | None | Completed 20 CPTs and 11 dissipations (note an additional 15 dissipations were attempted but either the pore pressure was already below hydrostatic or sufficient pore pressure dissipation was not achieved during the test) |
| CPT-T-13-02 | CPT | Tailings | 389,244 | 6,880,699 | | Geotech | | | | | | | |
| CPT-T-13-03 | CPT | Tailings | 389,306 | 6,880,692 | | Geotech | | | | | | | |
| CPT-T-13-04 | CPT | Tailings | 389,370 | 6,880,687 | | Geotech | | | | | | | |
| CPT-T-13-05 | CPT | Tailings | 389,437 | 6,880,681 | | Geotech | | | | | | | |
| CPT-T-13-06 | CPT | Tailings | 389,207 | 6,880,635 | | Geotech | | | | | | | |
| CPT-T-13-07 | CPT | Tailings | 389,243 | 6,880,655 | | Geotech | | | | | | | |
| CPT-T-13-08 | CPT | Tailings | 389,306 | 6,880,640 | | Geotech | | | | | | | |
| CPT-T-13-09 | CPT | Tailings | 389,372 | 6,880,637 | | Geotech | | | | | | | |
| CPT-T-13-10 | CPT | Tailings | 389,432 | 6,880,632 | | Geotech | | | | | | | |
| CPT-T-13-11 | CPT | Tailings | 389,196 | 6,880,592 | | Geotech | | | | | | | |
| CPT-T-13-12 | CPT | Tailings | 389,245 | 6,880,604 | | Geotech | | | | | | | |
| CPT-T-13-13 | CPT | Tailings | 389,305 | 6,880,598 | | Geotech | | | | | | | |
| CPT-T-13-14 | CPT | Tailings | 389,373 | 6,880,594 | | Geotech | | | | | | | |
| CPT-T-13-15 | CPT | Tailings | 389,433 | 6,880,588 | | Geotech | | | | | | | |
| CPT-T-13-16 | CPT | Tailings | 389,209 | 6,880,549 | | Geotech | | | | | | | |
| CPT-T-13-17 | CPT | Tailings | 389,251 | 6,880,560 | | Geotech | | | | | | | |
| CPT-T-13-18 | CPT | Tailings | 389,308 | 6,880,549 | | Geotech | | | | | | | |
| CPT-T-13-19 | CPT | Tailings | 389,376 | 6,880,547 | | Geotech | | | | | | | |
| CPT-T-13-20 | CPT | Tailings | 389,433 | 6,880,532 | | Geotech | | | | | | | |
| GP-T-13-01 | geoprobe | Tailings | 389,304 | 6,880,639 | Locations selected to pair with CPT locations in the pond, | Geotech | Obtain samples to correlate CPT measurements | refusal likely on permafrost | 15 to 20 m based on tailings | - continuous sample - subsamples for geochemistry if insitu | - soil description per logging conventions | None | Completed 9 GeoProbe holes. Individual holes |

| ID | Planned | | | | | | | | | | | | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | Location | Planned E (UTM) | Planned N (UTM) | Location Comments | Responsible Discipline | Purpose | Target Depth | Expected depth | Sampling / in-situ testing | Observations Required | Installations | |
| GP-T-13-02 | geoprobe | Tailings | 389,371 | 6,880,637 | particularly in areas with thickest tailings.<br><br>Can be field fit to maintain this intent | Geotech | | | thickness + permafrost several meters below tailings | material encountered<br>- sub samples for onsite moisture content | - permafrost description per logging conventions photograph of samples<br>- water levels<br>- observations of drill rig trafficability<br>- general drilling conditions<br>- response of tailings deposit to drilling | | depth less than expected, due to thin tailings thickness and refusal in insitu soils. Five additional holes were included (to result in a total of 9) added to provide information in areas where excavator could not traffic. |
| GP-T-13-03 | geoprobe | Tailings | 389,304 | 6,880,597 | | Geotech | | | | | | | |
| GP-T-13-04 | geoprobe | Tailings | 389,373 | 6,880,593 | | Geotech | | | | | | | |

## Table 1B Work Plan for Test Pits

| ID | Type | Location | E (UTM) | N (UTM) | Location comments | Responsible Discipline | Purpose | Target Depth | Expected Depth | Sampling / in-situ testing | Observations Required | Install | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TP-BA-13-01 | Test Pit | Sand Borrow Area | 388,942 | 6,880,721 | Coordinates are approximate. Locations can be changed in the field as required for access, safety or to a more representative location within the general area. | Geotech | - geotechnical characterization of sand borrow material<br>- obtain bulk samples for testing if required during design<br>- obtain geochemical samples to confirm suitability for use in reclamation | reach of excavator | 6 m | - photograph of test pit<br>- samples at 0.5 to 1 m intervals as appropriate for geotechnical index testing<br>- samples at 1 m intervals for geochemical testing<br>- 1 bulk sample (5 gallon pail) approximately every other test pit as appropriate or combined from adjacent test pits to provide representative sample. | - geotechnical characterization of materials per logging conventions.<br>- observations test pit wall stability<br>- observations of seepage if any<br>-observations of permafrost, if any | None | Completed as 2 hand augers due to access restrictions for excavator. |
| TP-BA-13-02 | Test Pit | Sand Borrow Area | 389,019 | 6,880,703 | | Geotech | | | | | | | |
| TP-BA-13-03 | Test Pit | Sand Borrow Area | 389,620 | 6,880,636 | | Geotech | | | | | | | Completed 3 test pits. |
| TP-BA-13-04 | Test Pit | Sand Borrow Area | 389,701 | 6,880,687 | | Geotech | | | | | | | |
| TP-BA-13-05 | Test Pit | Sand Borrow Area | 389,773 | 6,880,701 | | Geotech | | | | | | | |
| TP-BA-13-06 | Test Pit | Gravel / Rock Borrow Area | 389,696 | 6,881,016 | Coordinates are intended to provide general area. Within the area, test pit locations and number should be field fit based on conditions. Intent it to find source of good, strong rock. | Geotech | - geotechnical characterization of "shale" borrow source, potential source of gravel or rip rap<br>- assess ripability<br>- obtain samples for geochemical testing to confirm suitability for use in reclamation (if required) | refusal / reach of excavator | 2 m | - photograph of test pit<br>- samples for geochemical testing<br>- samples for durability testing as appropriate based on conditions | - geotechnical / geological characterization / classification of material<br>- indication of ease of excavation | None | Completed 3 test pits |
| TP-BA-13-07 | Test Pit | Gravel / Rock Borrow Area | 389,735 | 6,881,040 | | Geotech | | | | | | | |
| TP-BA-13-08 | Test Pit | Gravel / Rock Borrow Area | 389,922 | 6,881,161 | | Geotech | | | | | | | |
| TP-KZ-13-01 | Test Pit | Former Ketza Shop | 388,703 | 6,881,766 | Coordinates are approximate, location can be field fit for safety, access or in consideration of visual observation of contamination while maintaining the purpose of the location. | Site Charac. | - Delineation (to the north) of hydrocarbon spills (from within the shop, to the west of the shop and to the south of the shop) | To where field screening indicates no contamination exits (at least below 2 m) or to 1.5 m below gw | 3 m | - PCOCs are geochemicals, hydrocarbons and their associated metals.<br>- Photo-ionization detector screening to be done every 0.5 m<br>- Soil sampling to be done above, at and below potentially contaminated materials. | Soil stratigraphy and depth to groundwater (if reached). | None | Completed 3 test pits. |
| TP-KZ-13-02 | Test Pit | Former Ketza Shop | 388,694 | 6,881,717 | | Site Charac. | - Delineation (to the west) of hydrocarbon spills (from within the shop, to the west of the shop and to the south of the shop) | | 3 m | | | None | |
| TP-KZ-13-03 | Test Pit | Former Ketza Shop | 388,660 | 6,881,742 | | Site Charac. | - Delineation (to the southwest) of hydrocarbon spills (from within the shop, to the west of the shop and to the south of the shop) | | 3 m | | | None | |

| ID | Type | Location | E (UTM) | N (UTM) | Location comments | Responsible Discipline | Purpose | Target Depth | Expected Depth | Sampling / in-situ testing | Observations Required | Install | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TP-M-13-01 | Test Pit | Mill Site | 388,029 | 6,880,995 | Coordinates are based on reported spill locations. Locations can be modified for safety or access or based on visual indications of contamination | Site Charac. | -Characterization of materials which may have been contaminated by 2 historical fuel spills<br>-Characterization of materials to determine if tailings or waste rock was used in the construction of the area | To where field screening indicates no contamination exits (at least below 2 m) or to 1.5 m below gw | 3 m | - PCOCs are geochemicals, hydrocarbons and their associated metals.<br>- Photo-ionization detector screening to be done every 0.5 m<br>- Soil sampling to be done above, at and below potentially contaminated materials. | Soil stratigraphy and depth to groundwater (if reached). | None | Completed 5 test pits. |
| TP-M-13-02 | Test Pit | Mill Site | 388,004 | 6,881,054 | | Site Charac. | - Characterization of materials which may have been contaminated by 2 historical fuel spills<br>- Characterization of spills near transformer storage area<br>- Characterization of materials to determine if tailings or waste rock was used in the construction of the area | | 3 m | - PCOCs are geochemicals, cyanide, metals and hydrocarbons.<br>- Photo-ionization detector screening to be done every 0.5 m<br>- soil sampling to be done above, at and below potentially contaminated materials. | Soil stratigraphy and depth to groundwater (if reached). | None | |
| TP-M-13-03 | Test Pit | Mill Site | 387,943 | 6,881,120 | Coordinates are based on reported spill locations. Locations can be modified for safety or access or based on visual indications of contamination | Site Charac. | - Characterization of materials which may have been contaminated by 2 historical fuel spills- Characterization of spills near transformer storage area- Characterization of materials to determine if tailings or waste rock was used in the construction of the area | To where field screening indicates no contamination exits (at least below 2 m) or to 1.5 m below gw | 3 m | - PCOCs are geochemicals, cyanide, metals and hydrocarbons.- Photo-ionization detector screening to be done every 0.5 m- soil sampling to be done above, at and below potentially contaminated materials. | Soil stratigraphy and depth to groundwater (if reached). | None | |
| TP-M-13-04 | Test Pit | Mill Site | 388,014 | 6,881,083 | | Site Charac. | - Characterization of materials which may have been contaminated by 2 historical fuel spills<br>- Characterization of spills near transformer storage area<br>- Characterization of materials to determine if tailings or waste rock was used in the construction of the area | | 3 m | | Soil stratigraphy and depth to groundwater (if reached). | None | |

| ID | Type | Location | E (UTM) | N (UTM) | Location comments | Responsible Discipline | Purpose | Target Depth | Expected Depth | Sampling / in-situ testing | Observations Required | Install | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TP-M-13-05 | Test Pit | Mill Site | 387,812 | 6,881,027 | | Site Charac. | - Delineation (vertical) of hydrocarbon contamination from a spill | | 3 m | - PCOCs are geochemicals, hydrocarbons (with their associated metals).<br>- Photo-ionization detector screening to be done every 0.5 m<br>- Soil sampling to be done above, at and below potentially contaminated materials. | Soil stratigraphy and depth to groundwater (if reached). | None | |
| TP-R-13-01 | Test Pit | Road | 387,876 | 6,880,970 | Coordinates are approximate. Locations can be changed in the field for safety / access or based on visual observations of contamination | Site Charac. | - Characterization of materials to determine if hydrocarbons were used on the road<br>- Characterization of materials to determine if tailings or waste rock was used in the construction of the area | 2 m or, if hydrocarbon contamination is indicated, to beneath area of contamination. | 2 m | - PCOCs are geochemicals, hydrocarbons and their associated metals.<br>- Photo-ionization detector screening to be done every 0.5 m<br>- Soil sampling to be done above, at and below potentially contaminated materials. | Soil stratigraphy and depth to groundwater (if reached). | None | Completed 5 test pits |
| TP-R-13-02 | Test Pit | Road | 387,714 | 6,881,151 | | Site Charac. | | | 2 m | | | None | |
| TP-R-13-03 | Test Pit | Road | 387,794 | 6,881,334 | | Site Charac. | | | 2 m | | | None | |
| TP-R-13-04 | Test Pit | Road | 389,161 | 6,881,108 | | Site Charac. | | | 2 m | | | None | |
| TP-R-13-05 | Test Pit | Road | 389,683 | 6,880,956 | | Site Charac. | | | 2 m | | | None | |
| TP-SP-13-01 | Hand Auger | Historic tailings in Dome Creek | 388,228 | 6,880,990 | Locations are approximate. Actual locations and final number of auger locations will be determined from field reconnaissance. | Site Charac. | - Characterization of historical tailings, mainly to understand type, saturation and methods of relocation.<br>- Obtain samples for geochemical characterization of the tailings and underlying insitu materials | Extent of hand auger | 2 m | - samples for potential geotechnical index testing and geochemical testing within each stratigraphic unit or at 0.5 m intervals (whichever is more frequent) | - photograph of location and general area<br>- description of tailings and underlying insitu material per conventions, particularly moisture (saturated or not), type (coarse or fine) and consistency | None | Not completed at planned locations due to excavator access restrictions. Historic tailings area was visually assessed but hand augers not advanced to avoid damaging the liner. Four new locations labelled “TP-SP-03 through -06” were sampled as grab samples at the former explosives area. |
| TP-SP-13-02 | Hand Auger | | 388,101 | 6,881,007 | | Site Charac. | | | 2 m | | | None | |
| TP-T-13-01 | Test Pit | Tailings | 389,198 | 6,880,696 | Co-ordinates are approximate. Intent is that locations will be field fit with a focus on excavating test pits as close as safely possible to | Geotech | - characterize tailings, particularly response to excavation, seepage, etc.- obtain bulk samples for characterization and lab testing- characterize insitu material if encountered- observe groundwater and permafrost conditions | reach of excavator | 6 m | - photograph of test pit- video of behaviour if warranted- samples at 1 m intervals as appropriate for index testing or at each change in stratigraphy (whichever is more frequent )- 1 bulk sample (5 gallon pail) of tailings approximately every other hole or combined from | - description of behaviour during and after excavation- geotechnical characterization of tailings and insitu soil per logging conventions- | None | Completed 7 test pits (TP-T-13-03 and 08 were not completed due to unsafe access). Locations field fit based on pond extent, trafficability and coverage. Some |
| TP-T-13-02 | Test Pit | Tailings | 389,290 | 6,880,695 | | Geotech | | | | | | | |
| TP-T-13-03 | Test Pit | Tailings | 389,354 | 6,880,690 | | Geotech | | | | | | | |
| TP-T-13-04 | Test Pit | Tailings | 389,422 | 6,880,684 | | Geotech | | | | | | | |

| ID | Type | Location | E (UTM) | N (UTM) | Location comments | Responsible Discipline | Purpose | Target Depth | Expected Depth | Sampling / in-situ testing | Observations Required | Install | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TP-T-13-05 | Test Pit | Tailings | 389,266 | 6,880,639 | the tailings pond, in areas of thick tailings. Additional test pits should also be excavated to provide representative coverage in tailings area. | Geotech | | | | adjacent test pits to provide representative material.- if insitu material is encountered, obtain sample suitable for geochemical testing at 0.5 m intervals. | description of trafficability and tailings response to work- observations of seepage, water table, any permafrost etc. | | additional geoprobe holes were advance to provide additional coverage in very soft areas. |
| TP-T-13-06 | Test Pit | Tailings | 389,229 | 6,880,609 | | Geotech | | | | | | | |
| TP-T-13-07 | Test Pit | Tailings | 389,267 | 6,880,559 | | Geotech | | | | | | | |
| TP-T-13-08 | Test Pit | Tailings | 389,323 | 6,880,551 | | Geotech | | | | | | | |
| TP-T-13-09 | Test Pit | Tailings | 389,392 | 6,880,547 | | Geotech | | | | | | | |
| TP-TD-13-01 | Test Pit | Tailings Dam | 389,474 | 6,880,685 | Co-ordinates have been selected to provide representative coverage. Locations can be field fit for access, safety or to a more representative location based on conditions encountered. | Geotech | - obtain samples for geochemical characterization of dam fill to assess suitability for reclamation work or need to relocate to open pit. | reach of excavator | 6 m | - photograph of test pit<br>- Samples for geochemical testing at 1 m interval and at any change in stratigraphy. Need samples above and below water table | - geotechnical characterization of materials per logging conventions.<br>- observations test pit wall stability<br>- observations of seepage if any<br>-observations of permafrost, if any and measurement of temperature | None | Completed 3 test pits |
| TP-TD-13-02 | Test Pit | Tailings Dam | 389,479 | 6,880,633 | | Geotech | | | | | | | |
| TP-TD-13-03 | Test Pit | Tailings Dam | 389,472 | 6,880,526 | | Geotech | | | | | | | |
| TP-WA-13-01 | Test Pit | Waste Area | 388,778 | 6,881,702 | Locations have been targeted based on previous geochemical sampling to fill in gaps in data. Locations can be moved several meters to facilitate access, for safety etc. | Geotech | - geotechnical characterization of materials, particularly amount of oversize material<br>obtain bulk samples for geotechnical testing if required during design<br>- obtain samples for geochemical testing to assess how much NAG and PAG is present<br>- assess permafrost state<br>- confirm water level below insitu ground<br>- confirm foundation conditions if insitu material encountered. | reach of excavator | 6 m | - photograph of test pit<br>- samples at 0.5 to 1 m intervals as appropriate for geotechnical index testing<br>- samples at 1 m intervals for geochemical testing<br>- 1 bulk sample (5 gallon pail) every other test pit or combined with adjacent test pits to provide representative sample. | - geotechnical characterization of materials per logging conventions.<br>- observations test pit wall stability<br>- observations of seepage if any<br>-observations of permafrost, if any and measurement of temperature. | None | Completed 11 test pits |
| TP-WA-13-02 | Test Pit | Waste Area | 388,961 | 6,881,672 | | Geotech | | | | | | | |
| TP-WA-13-03 | Test Pit | Waste Area | 388,983 | 6,881,642 | | Geotech | | | | | | | |
| TP-WA-13-04 | Test Pit | Waste Area | 388,802 | 6,881,595 | | Geotech | | | | | | | |
| TP-WA-13-05 | Test Pit | Waste Area | 388,705 | 6,881,485 | | Geotech | | | | | | | |
| TP-WA-13-06 | Test Pit | Waste Area | 388,703 | 6,881,446 | | Geotech | | | | | | | |
| TP-WA-13-07 | Test Pit | Waste Area | 388,777 | 6,881,408 | | Geotech | | | | | | | |
| TP-WA-13-08 | Test Pit | Waste Area | 388,922 | 6,881,352 | | Geotech | | | | | | | |
| TP-WA-13-09 | Test Pit | Waste Area | 388,807 | 6,881,320 | | Geotech | | | | | | | |
| TP-WA-13-10 | Test Pit | Waste Area | 388,996 | 6,881,276 | | Geotech | | | | | | | |

| ID | Type | Location | E (UTM) | N (UTM) | Location comments | Responsible Discipline | Purpose | Target Depth | Expected Depth | Sampling / in-situ testing | Observations Required | Install | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TP-WA-13-11 | Test Pit | Waste Area | 388,994 | 6,881,200 | | Geotech | | | | | | | |

## Table 1C Installations and Reconnaissances Work Plan

| Task | Location | Responsible Discipline | Purpose | Observations / Sampling / Testing Required | Status |
|---|---|---|---|---|---|
| Tailings Trafficability and Excavation Assessment | Tailings Impoundment | Geotech | - qualitatively assess tailings trafficability and response to excavation | - drive equipment up and down tailings beach in same tracks, record number of passes that can be safety made, distance to pond that can be safely achieved, changes in tailings response with increasing number of equipment passes, observations of rutting, water upwelling etc.<br>- observations of behaviour of excavated slope (e.g. in test pits), sloughing behaviour, amount of time excavation will stand, seepage etc.<br>- video as appropriate, photos etc.<br>- written record of observations | Completed |
| Read geotechnical instrumentation | Tailings Impoundment | Geotech | - measure conditions during investigation program for calibration of drill observations and understanding of historic measurements | - water levels<br>- thermistor readings | Completed, results provided in data report |
| General site reconnaissance | Site Wide | Geotech | - observe general conditions of disturbed areas to support general site characterization.<br>- observe conditions around open pit to assess constraints on backfill configuration and potential stability concerns<br>- observe conditions at mill, old landfill, and in historic tailings deposition in Dome Creek area<br>- observe conditions at seepage collection pond and tailings pond in consideration of relocation efforts and methods | - photographs with written log and observations<br>- if warranted obtain grab samples in areas of interest (e.g. seepage collection pond, historic tailings area etc.) | Completed |
| Reconnaissance, flow measurement and sediment sampling - Dome Creek | Dome Creek | Hydrology | - characterization of the watershed and channel of Dome creek to support hydrological modeling - characterization of undisturbed portions of the Dome channel upstream and downstream of the tailings area to support design of reclaimed Dome Creek<br>- Obtain sediment samples for particle size distribution analysis<br>- Obtain sediment geochemical data for water quality model | - photographs and written observations<br>- flow measurement along the creek<br>- sediment samples collected at 50 m intervals (total of 20)<br>- mark locations for channel survey to be completed by YES | Completed flow measured at 5 sites in Dome Creek |
| Reconnaissance and flow measurement - Pony Creek | Pony Creek | Hydrology | - baseline data for creek restoration design.<br>- characterization of the watershed and channel to support hydrological modeling | - photographs and written observations<br>- flow measurement along the creek | Completed flow measured at 2 sites in Pony Creek |
| General reconnaissance and grab samples | Mill Site in particular and site wide as needed | Geochemical / site characterization | - observations to delineate old landfill- observation of historic tailings deposition areas in Dome Creek to assess extent of material likely requiring removal- observation of waste rock used for fill material, particularly looking for signs of ARD or other issues- observation of signs of contaminated material (e.g. from spills etc.) | - photographs and written record of observations with GPS locations of key features- grab samples as appropriate in areas of concern. | Completed |
| Hazardous material inventory | Mill site | Site Characterization | - confirm hazardous material inventory on site and amount and nature of sampling required to characterize and quantify hazardous materials. | - photographs<br>- written record of observations and inventory | Completed |

| Task | Location | Responsible Discipline | Purpose | Observations / Sampling / Testing Required | Status |
|---|---|---|---|---|---|
| Water quality sampling of pit pond | Open Pit water quality profile | water quality | - obtain vertical profiles of water quality in open pit to support water quality model | - water quality sampling per protocols | Completed |
| Water quality sampling of tailings pond | Tailings Area | water quality | - obtain vertical profile of water quality in tailings pond as representative of tailings pore water chemistry to support water quality model | - water quality sampling per protocols | Not deemed necessary, existing information sufficient |
| Groundwater sampling of existing wells | Site Wide | water quality | - obtain groundwater quality samples in support of water quality model | - water quality sampling per protocols | Completed some wells, dry, frozen or destroyed, see Table 3 or successful sampling locations |
| Water quality sample from seeps and adits | Seeps/Adits (near mill site) | water quality | - obtain water quality samples in support of water quality model | - water quality sampling per protocols | Completed, results provided in data report |
| Clear walkway access to creek mini-piezometer sites (~10) | Creeks | Hydrogeo | - provide access for mini piezometer installations (hand clearing of brush and willows) | | Completed |
| Install shallow and deep mini-piezometers (pair), creek bed manometer testing, creek bed seepage meter testing, creek bed temperature survey. | Dome Ck (10 stations), Pony Ck (5 stations), temperature survey every 50 to 100 m. | Hydrogeo | - allow measurement groundwater surface water interaction in support of hydrogeology and water quality model | - install mini piezometers at 50 to 100 m intervals along creek per protocols<br>- log of observed conditions and installation details<br>- photograph of each installation<br>- GPS coordinates of each location<br>- installation of location marker (stake with flagging) | Completed 9 installations, one site (GSI-DC-04) abandoned due to refusal |
| Install single mini-piezometers (up to 5) at Huestis Adit opening. | Huestis Adit opening approximated from aerial photo, upper Dome Ck. | Hydrogeo | - allow measurement of water levels and sampling of groundwater in area of Huestis adit in support of water quality model | - install mini piezometer per protocols<br>- log of observed conditions and installation details<br>- photograph of each installation<br>- GPS coordinates of each location<br>- installation of location marker (stake with flagging) | Completed, locations finalized through geophysics |
| Groundwater sampling - Dome Creek mini-piezometers (10) | Dome Creek | water quality | - obtain groundwater quality samples in support of water quality model | - collect groundwater samples per protocols | Completed, some locations had low flow / were frozen and could not be sampled (see Table 3 for sampled locations) |
| Groundwater sampling - Pony Creek mini-piezometers (5) | Pony Creek | water quality | - obtain groundwater quality samples in support of water quality model | - collect groundwater samples per protocols | Completed, some locations had low flow / were frozen and could not be sampled (see Table 3 for sampled locations) |
| 3 e-logs: temperature, acoustic televiewer and heat pulse flow meter. | Open pit, north of pit and south of pit. | Hydrogeo (done by Worley Parsons) | - characterize rock mass and groundwater flow regime around open pit in support of developing a groundwater glow model | - complete surveys listed | Not completed in favour of permanent instrumentation installations and |

| Task | Location | Responsible Discipline | Purpose | Observations / Sampling / Testing Required | Status |
|---|---|---|---|---|---|
| Geophysics first day help setup, open pit safety person. | Open pit, north of pit and south of pit. | Hydrogeo | | | because of concerns about the ability to complete the geophysics given the fractured rock conditions encountered. |
| Install monitor wells, c/w pre-packed well screens, one-strand heat tracing, plus pneumatic piezometers (2 per core hole). | 6 core holes, including: open pit (2), north pit (1) and south pit (4). | Hydrogeo | - piezometric elevations;<br>- in-well hydraulic conductivity testing<br>- water quality. | - install wells per protocols | Replaced with conventional shallow wells (paired deep and shallow holes) |
| Initial TAR 5 Reconnaissance for Landform and revegetation | Site wide | Landform / Reveg | - complete initial high level reconnaissance of natural topography, landforms and vegetation and assess conditions of disturbed areas | - photographs<br>- written log of observations<br>- sketches<br>- grab samples of soil as required | Completed |
| Initial TAR 5 Reconnaissance for Initial reconnaissance for buildings and infrastructure | Site wide | Infrastructure | - complete high level reconnaissance to identify and confirm key infrastructure on site, assess requirements for additional surveys and develop concepts for demolition and on site storage of debris, recycling etc. | - photographs<br>- written log of observations<br>- preliminary inventory | Completed |
| TAR 6 hazmat sampling | Mill Area | Site Characterization | To come upon TAR approval | | To come if required |
| TAR 6 building and infrastructure surveys and inventories | Site Wide | Infrastructure | To come upon TAR approval | | Planned |
| TAR 6 reveg and landform surveys and observations | Site Wide | Landform / Reveg | To come upon TAR approval | | TA5 work was somewhat augmented and likely sufficient for design. |

## Table 2 Fall 2013 Investigations Completed

| Location ID | Type of Investigation [1] | Investigation Location (UTM Zone 8, NAD83) | | | | Summary of Installations, Lab Tests and Insitu Tests | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Area | Easting, UTM (m) | Northing, UTM (m) | Ground Elevation (masl) | Depth of Investigation | Installations [2,3] | Lab tests[3] | Insitu Tests[3,4] |
| BH-KZ-13-01 | BH | Ketza Shop | 388,683.4 | 6,881,754.8 | 1232.2 | 4.0 | | Environmental | Volatile organic compounds |
| BH-KZ-13-02 | BH | Ketza Shop | 388,687.4 | 6,881,741.8 | 1232.1 | 5.0 | | Environmental | Volatile organic compounds |
| BH-M-13-01 | BH | Mill | 388,026.0 | 6,880,954.0 | 1192.3 | 3.0 | | Environmental | Volatile organic compounds |
| BH-M-13-02 | BH | Mill | 388,055.4 | 6,880,939.0 | 1191.1 | 3.5 | | Environmental | Volatile organic compounds |
| BH-M-13-03 | BH | Mill | 387,990.2 | 6,881,007.1 | 1190.6 | 4.0 | | Environmental | Volatile organic compounds |
| BH-M-13-04 | BH | Mill | 387,983.9 | 6,881,066.6 | 1184.4 | 4.5 | Drive Point Piezo | Geochemistry Environmental | Volatile organic compounds |
| BH-M-13-05 | BH | Mill | 387,971.1 | 6,881,019.5 | 1191.3 | 5.5 | | Environmental | Volatile organic compounds |
| BH-M-13-06 | BH | Mill | 387,949.4 | 6,881,042.7 | 1191.5 | 4.5 | | Environmental | Volatile organic compounds |
| BH-M-13-07 | BH | Mill | 387,903.2 | 6,881,073.2 | 1192.5 | 3.0 | | Environmental | Volatile organic compounds |
| BH-M-13-08 | BH | Mill | 387,862.6 | 6,881,086.5 | 1194.4 | 4.0 | | Environmental | Volatile organic compounds |
| BH-T-13-01 | BH | TSF-Tailings | 389,173.0 | 6,880,610.0 | 1101.2 | 13.5 | | Geochemistry Geotechnical | |
| BH-T-13-02 | BH | TSF-Tailings | 389,210.1 | 6,880,568.4 | 1098.5 | 12.0 | standpipe | Geochemistry Geotechnical | |
| BH-T-13-03 | BH | TSF-Tailings | 389,419.0 | 6,880,675.0 | 1096.8 | 16.5 | standpipe | Geochemistry Geotechnical | |
| BH-T-13-04 | BH | TSF-Tailings | 389,402.0 | 6,880,553.0 | 1097.0 | 18.5 | standpipe | Geochemistry Geotechnical | |
| BH-TD-13-01 | BH | TSF-Dam | 389,457.0 | 6,880,596.0 | 1099.5 | 25.0 | | Geochemistry Geotechnical | |
| BH-WA-13-01 | BH | Waste Area | 388,815.0 | 6,881,564.0 | 1227.9 | 12.5 | | Geotechnical | |
| CH-P-13-01/10 | CH | Open Pit | 388,656.6 | 6,881,119.2 | 1151.0 | 10.0 | MW | | |
| CH-P-13-01/40 | CH | Open Pit | 388,638.0 | 6,881,125.0 | 1150.9 | 40.0 | No - Abandoned | | |
| CH-P-13-02/10 | CH | Open Pit | 388,924.8 | 6,881,012.4 | 1145.9 | 10.0 | MW | | |
| CH-P-13-02/VWP | CH | Open Pit | 388,923.9 | 6,881,013.0 | 1146.0 | 50.0 | 5 nested VWP | | Packer, Falling Head |
| CH-P-13-03/10 | CH | Open Pit | 389,145.1 | 6,881,106.5 | 1184.0 | 10.0 | MW | | |
| CH-P-13-03/50 | CH | Open Pit | 389,144.5 | 6,881,108.0 | 1184.0 | 50.0 | MW and single VWP | Water Quality | Packer, Falling Head |
| CH-P-13-04/10 | CH | Open Pit | 389,137.4 | 6,881,471.0 | 1225.5 | 10.0 | MW | | |
| CH-P-13-04/35 | CH | Open Pit | 389,138.5 | 6,881,470.5 | 1225.5 | 50.0 | MW and single VWP | Water Quality | Packer, Falling Head |
| CH-P-13-05/50 | CH | Open Pit | 388,957.8 | 6,881,468.9 | 1185.0 | 50.0 | MW and single VWP | Water Quality | Packer, Falling Head |
| CH-P-13-06/VWP | CH | Open Pit | 388,958.8 | 6,881,469.2 | 1185.0 | 60.0 | 5 nested VWP | | Packer, Falling Head |
| CPT-T-13-01 | CPT | TSF-Tailings | 389,196.0 | 6,880,711.0 | 1098.1 | 5.9 | | | CPT |
| CPT-T-13-02 | CPT | TSF-Tailings | 389,240.0 | 6,880,700.0 | 1097.3 | 3.9 | | | CPT |
| CPT-T-13-03 | CPT | TSF-Tailings | 389,333.0 | 6,880,679.0 | 1096.0 | 3.4 | | | CPT |
| CPT-T-13-04 | CPT | TSF-Tailings | 389,391.0 | 6,880,690.0 | 1096.0 | 3.0 | | | CPT |
| CPT-T-13-05 | CPT | TSF-Tailings | 389,426.0 | 6,880,672.0 | 1097.0 | 5.0 | | | CPT |
| CPT-T-13-06 | CPT | TSF-Tailings | 389,205.0 | 6,880,639.0 | 1097.2 | 4.0 | | | CPT |
| CPT-T-13-07A/B | CPT | TSF-Tailings | 389,236.0 | 6,880,661.0 | 1096.6 | 4.2 | | | CPT |
| CPT-T-13-08A/B | CPT | TSF-Tailings | 389,307.0 | 6,880,654.0 | 1096.0 | 4.1 | | | CPT |
| CPT-T-13-09 | CPT | TSF-Tailings | 389,383.0 | 6,880,661.0 | 1096.0 | 4.9 | | | CPT |
| CPT-T-13-10A/B | CPT | TSF-Tailings | 389,400.0 | 6,880,630.0 | 1096.0 | 8.7 | | | CPT |
| CPT-T-13-11 | CPT | TSF-Tailings | 389,176.0 | 6,880,607.0 | 1101.1 | 0.5 | | | CPT |
| CPT-T-13-12 | CPT | TSF-Tailings | 389,239.0 | 6,880,596.0 | 1097.2 | 4.3 | | | CPT |
| CPT-T-13-13 | CPT | TSF-Tailings | 389,308.0 | 6,880,592.0 | 1096.0 | 8.2 | | | CPT |
| CPT-T-13-14 | CPT | TSF-Tailings | 389,378.0 | 6,880,602.0 | 1096.0 | 9.7 | | | CPT |
| CPT-T-13-15 | CPT | TSF-Tailings | 389,399.0 | 6,880,550.0 | 1097.0 | 5.2 | | | CPT |
| CPT-T-13-16 | CPT | TSF-Tailings | 389,209.0 | 6,880,568.0 | 1098.6 | 4.7 | | | CPT |
| CPT-T-13-17 | CPT | TSF-Tailings | 389,249.0 | 6,880,554.0 | 1097.3 | 3.4 | | | CPT |
| CPT-T-13-18 | CPT | TSF-Tailings | 389,307.0 | 6,880,553.0 | 1096.1 | 6.6 | | | CPT |

| Location ID | Type of Investigation [1] | Investigation Location (UTM Zone 8, NAD83) | | | | Summary of Installations, Lab Tests and Insitu Tests | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Area | Easting, UTM (m) | Northing, UTM (m) | Ground Elevation (masl) | Depth of Investigation | Installations [2,3] | Lab tests[3] | Insitu Tests[3,4] |
| CPT-T-13-19 | CPT | TSF-Tailings | 389,378.0 | 6,880,547.0 | 1096.7 | 7.7 | | | CPT |
| CPT-T-13-20 | CPT | TSF-Tailings | 389,418.0 | 6,880,524.0 | 1099.7 | 6.2 | | | CPT |
| DCT-10-0 | Temp | Dome Cr | 390,860.9 | 6,880,448.8 | 1030.5 | | | | Temperature, EC Readings |
| DCT-10-1 | Temp | Dome Cr | 390,957.1 | 6,880,447.9 | 1028.6 | | | | Temperature, EC Readings |
| DCT-10-2 | Temp | Dome Cr | 391,058.1 | 6,880,461.2 | 1026.8 | | | | Temperature, EC Readings |
| DCT-1-0 | Temp | Dome Cr | 387,675.7 | 6,881,123.3 | 1218.7 | | | | Temperature, EC Readings |
| DCT-1-1 | Temp | Dome Cr | 387,750.4 | 6,881,131.5 | 1210.4 | | | | Temperature, EC Readings |
| DCT-2-0 | Temp | Dome Cr | 387,839.5 | 6,881,128.5 | 1196.6 | | | | Temperature, EC Readings |
| DCT-2-1 | Temp | Dome Cr | 387,937.2 | 6,881,131.4 | 1189.1 | | | | Temperature, EC Readings |
| DCT-3-0 | Temp | Dome Cr | 388,096.9 | 6,881,051.1 | 1168.8 | | | | Temperature, EC Readings |
| DCT-4-0 | Temp | Dome Cr | 388,406.6 | 6,880,968.3 | 1143.2 | | | | Temperature, EC Readings |
| DCT-4-1 | Temp | Dome Cr | 388,461.5 | 6,880,923.1 | 1140.6 | | | | Temperature, EC Readings |
| DCT-5-0 | Temp | Dome Cr | 388,725.2 | 6,880,830.9 | 1119.6 | | | | Temperature, EC Readings |
| DCT-5-1 | Temp | Dome Cr | 388,816.5 | 6,880,790.9 | 1115.1 | | | | Temperature, EC Readings |
| DCT-6-0 | Temp | Dome Cr | 389,790.6 | 6,880,566.7 | 1066.5 | | | | Temperature, EC Readings |
| DCT-6-1 | Temp | Dome Cr | 389,884.5 | 6,880,626.8 | 1063.1 | | | | Temperature, EC Readings |
| DCT-6-2 | Temp | Dome Cr | 389,985.0 | 6,880,653.0 | 1059.6 | | | | Temperature, EC Readings |
| DCT-7-0 | Temp | Dome Cr | 390,064.2 | 6,880,634.4 | 1057.1 | | | | Temperature, EC Readings |
| DCT-7-1 | Temp | Dome Cr | 390,174.3 | 6,880,628.8 | 1052.9 | | | | Temperature, EC Readings |
| DCT-7-2 | Temp | Dome Cr | 390,255.9 | 6,880,594.9 | 1050.6 | | | | Temperature, EC Readings |
| DCT-8-0 | Temp | Dome Cr | 390,310.0 | 6,880,584.0 | 1048.5 | | | | Temperature, EC Readings |
| DCT-8-1 | Temp | Dome Cr | 390,463.6 | 6,880,613.0 | 1052.6 | | | | Temperature, EC Readings |
| DCT-8-2 | Temp | Dome Cr | 390,565.7 | 6,880,503.9 | 1041.4 | | | | Temperature, EC Readings |
| DCT-9-0 | Temp | Dome Cr | 390,615.5 | 6,880,493.1 | 1037.0 | | | | Temperature, EC Readings |
| DCT-9-1 | Temp | Dome Cr | 390,699.4 | 6,880,475.8 | 1035.7 | | | | Temperature, EC Readings |
| DCT-9-2 | Temp | Dome Cr | 390,787.0 | 6,880,491.0 | 1033.3 | | | | Temperature, EC Readings |
| FL-DC-1 | FL | Dome Cr | 387,750.0 | 6,881,128.0 | 1211.7 | 0 | | | Flow Measurement |
| FL-DC-2 | FL | Dome Cr | 387,834.0 | 6,881,128.0 | 1197.3 | 0 | | | Flow Measurement |
| FL-DC-3 | FL | Dome Cr | 388,973.0 | 6,880,806.0 | 1106.5 | 0 | | | Flow Measurement |
| FL-DC-4 | FL | Dome Cr | 389,418.0 | 6,880,780.0 | 1100.1 | 0 | | | Flow Measurement |
| FL-DC-5 | FL | Dome Cr | 389,938.0 | 6,880,644.0 | 1060.7 | 0 | | | Flow Measurement |
| FL-PC-1 | FL | Pony Cr | 388,983.2 | 6,881,739.7 | 1193.3 | 0 | | | Flow Measurement |
| FL-PC-2 | FL | Pony Cr | 389,073.7 | 6,881,726.1 | 1182.9 | 0 | | | Flow Measurement |
| GP-T-13-01 | GP | TSF-Tailings | 389,302.0 | 6,880,652.0 | 1096.0 | 7.0 | | Geotechnical | |
| GP-T-13-02 | GP | TSF-Tailings | 389,391.0 | 6,880,639.0 | 1096.0 | 6.5 | | Geotechnical | |
| GP-T-13-03 | GP | TSF-Tailings | 389,303.0 | 6,880,606.0 | 1096.0 | 9.0 | | Geotechnical | |
| GP-T-13-04 | GP | TSF-Tailings | 389,379.0 | 6,880,600.0 | 1096.0 | 11.5 | | Geotechnical | |
| GP-T-13-10 | GP | TSF-Tailings | 389,400.0 | 6,880,630.0 | 1096.0 | 9.5 | | Geotechnical | |
| GP-T-13-18 | GP | TSF-Tailings | 389,324.0 | 6,880,550.0 | 1096.0 | 6.3 | | Geotechnical | |
| GP-T-13-21 | GP | TSF-Tailings | 389,377.0 | 6,880,509.0 | 1098.0 | 3.3 | | Geotechnical | |
| GP-T-13-22 | GP | TSF-Tailings | 389,256.0 | 6,880,750.0 | 1097.5 | 5.1 | | Geotechnical | |
| GP-T-13-23 | GP | TSF-Tailings | 389,408.0 | 6,880,723.0 | 1096.8 | 8.8 | | Geotechnical | |
| GSI-DC-01-A | MP-P | Dome Cr | 387,675.7 | 6,881,123.3 | 1218.7 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-01-B | MP-P | Dome Cr | 387,675.7 | 6,881,122.9 | 1218.8 | 2.8 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-DC-02-A | MP-P | Dome Cr | 387,839.5 | 6,881,128.5 | 1196.6 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-02-B | MP-P | Dome Cr | 387,839.7 | 6,881,128.5 | 1196.6 | 3.0 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-DC-03-A | MP-P | Dome Cr | 388,106.5 | 6,881,078.2 | 1170.0 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-03-B | MP-P | Dome Cr | 388,106.8 | 6,881,078.1 | 1170.0 | 2.9 | Drive Point Piezo | Water Quality | Seepage Tests |

| Location ID | Type of Investigation [1] | Investigation Location (UTM Zone 8, NAD83) | | | | Summary of Installations, Lab Tests and Insitu Tests | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Area | Easting, UTM (m) | Northing, UTM (m) | Ground Elevation (masl) | Depth of Investigation | Installations [2,3] | Lab tests[3] | Insitu Tests[3,4] |
| GSI-DC-04-A | Seepage | Dome Cr | 388,407.0 | 6,880,968.0 | 1143.1 | 0.0 | | | Seepage Tests |
| GSI-DC-05-A | MP-P | Dome Cr | 388,723.5 | 6,880,835.8 | 1119.2 | 1.0 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-05-B | MP-P | Dome Cr | 388,723.7 | 6,880,835.2 | 1119.2 | 2.3 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-DC-06-A | MP-P | Dome Cr | 389,790.7 | 6,880,568.1 | 1066.6 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-06-B | MP-P | Dome Cr | 389,791.1 | 6,880,568.1 | 1066.5 | 2.4 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-DC-07-A | MP-P | Dome Cr | 390,066.1 | 6,880,639.1 | 1056.7 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-07-B | MP-P | Dome Cr | 390,065.7 | 6,880,639.3 | 1056.7 | 2.9 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-DC-08-A | MP-P | Dome Cr | 390,310.9 | 6,880,583.9 | 1048.5 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-08-B | MP-P | Dome Cr | 390,311.5 | 6,880,583.7 | 1048.5 | 2.5 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-09-A | MP-P | Dome Cr | 390,615.5 | 6,880,493.1 | 1037.0 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-09-B | MP-P | Dome Cr | 390,615.6 | 6,880,492.6 | 1037.0 | 2.9 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-DC-10-A | MP-P | Dome Cr | 390,862.6 | 6,880,449.0 | 1030.6 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-10-B | MP-P | Dome Cr | 390,862.4 | 6,880,449.2 | 1030.6 | 2.8 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-HA-01-A | MP | Mill | 387,843.5 | 6,881,132.0 | 1196.7 | 1.9 | Drive Point Piezo | Water Quality | |
| GSI-HA-02-A | MP | Mill | 387,863.1 | 6,881,129.8 | 1195.9 | 1.6 | Drive Point Piezo | Water Quality | |
| GSI-HA-03-A | MP | Mill | 387,880.8 | 6,881,129.8 | 1194.0 | 1.3 | Drive Point Piezo | Water Quality | |
| GSI-HA-04-A | MP | Mill | 387,917.6 | 6,881,130.5 | 1190.0 | 1.6 | Drive Point Piezo | Water Quality | |
| GSI-HA-05-A | MP | Mill | 387,898.5 | 6,881,124.4 | 1192.4 | 1.3 | Drive Point Piezo | | |
| GSI-PC-01-A | MP-P | Pony Cr | 388,719.8 | 6,881,918.1 | 1224.1 | 1.1 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-PC-01-B | MP-P | Pony Cr | 388,720.1 | 6,881,917.9 | 1224.1 | 2.9 | Drive Point Piezo | | Seepage Tests |
| GSI-PC-02-A | MP-P | Pony Cr | 388,908.6 | 6,881,785.4 | 1202.5 | 1.1 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-PC-02-B | MP-P | Pony Cr | 388,908.1 | 6,881,785.5 | 1202.5 | 2.9 | Drive Point Piezo | | Seepage Tests |
| GSI-PC-03-A | MP-P | Pony Cr | 389,260.0 | 6,881,707.4 | 1159.8 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-PC-03-B | MP-P | Pony Cr | 389,260.3 | 6,881,707.3 | 1159.7 | 2.0 | Drive Point Piezo | | Seepage Tests |
| GSI-PC-04-A | MP-P | Pony Cr | 389,585.4 | 6,881,658.1 | 1129.2 | 1.0 | Drive Point Piezo | | Seepage Tests |
| GSI-PC-04-B | MP-P | Pony Cr | 389,586.0 | 6,881,657.6 | 1129.2 | 2.9 | Drive Point Piezo | | Seepage Tests |
| GSI-PC-05-A | MP-P | Pony Cr | 389,713.0 | 6,881,660.5 | 1116.5 | 1.1 | Drive Point Piezo | Water Quality | |
| GSI-PC-05-B | MP-P | Pony Cr | 389,713.3 | 6,881,660.6 | 1116.4 | 2.8 | Drive Point Piezo | | |
| HA-BA-13-01 | HA | TSF-Borrow | 388,945.0 | 6,880,716.0 | 1113.8 | 3.0 | | Geochemistry Geotechnical | |
| HA-BA-13-02 | HA | TSF-Borrow | 389,017.0 | 6,880,702.0 | 1108.7 | 3.0 | | Geochemistry Geotechnical | |
| HA-DC-04 | HA | Dome Cr | 388,407.0 | 6,880,968.0 | 1143.1 | 1.0 | | | Augers to refusal |
| HA-DC-05 | HA | Dome Cr | 388,725.0 | 6,880,831.0 | 1119.7 | 2.5 | | | Augers to refusal |
| PCT-1-0 | Temp | Pony Cr | 388,711.3 | 6,881,929.2 | 1225.7 | | | | Temperature, EC Readings |
| PCT-1-1 | Temp | Pony Cr | 388,834.8 | 6,881,809.1 | 1210.9 | | | | Temperature, EC Readings |
| PCT-2-0 | Temp | Pony Cr | 388,909.5 | 6,881,781.7 | 1202.4 | | | | Temperature, EC Readings |
| PCT-2-1 | Temp | Pony Cr | 389,188.2 | 6,881,717.9 | 1166.2 | | | | Temperature, EC Readings |
| PCT-3-0 | Temp | Pony Cr | 389,257.2 | 6,881,705.4 | 1160.0 | | | | Temperature, EC Readings |
| PCT-3-1 | Temp | Pony Cr | 389,437.4 | 6,881,669.2 | 1146.4 | | | | Temperature, EC Readings |
| PCT-4-0 | Temp | Pony Cr | 389,581.8 | 6,881,659.1 | 1129.8 | | | | Temperature, EC Readings |
| PCT-4-1 | Temp | Pony Cr | 389,600.5 | 6,881,641.0 | 1128.2 | | | | Temperature, EC Readings |
| PCT-5-0 | Temp | Pony Cr | 389,714.5 | 6,881,656.6 | 1116.5 | | | | Temperature, EC Readings |
| SED-DC-1 | GS | Dome Cr | 388,800.0 | 6,880,834.0 | 1116.4 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-10 | GS | Dome Cr | 389,169.0 | 6,880,792.0 | 1100.2 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-11 | GS | Dome Cr | 389,693.0 | 6,880,561.0 | 1070.8 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-12 | GS | Dome Cr | 389,741.0 | 6,880,574.0 | 1069.2 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-13 | GS | Dome Cr | 389,789.0 | 6,880,564.0 | 1067.3 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-14 | GS | Dome Cr | 389,833.0 | 6,880,579.0 | 1065.0 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-15 | GS | Dome Cr | 389,864.0 | 6,880,616.0 | 1064.0 | 0.2 | | Geochemistry Hydrotechnical | |

| Location ID | Type of Investigation [1] | Investigation Location (UTM Zone 8, NAD83) | | | | Summary of Installations, Lab Tests and Insitu Tests | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Area | Easting, UTM (m) | Northing, UTM (m) | Ground Elevation (masl) | Depth of Investigation | Installations [2,3] | Lab tests[3] | Insitu Tests[3,4] |
| SED-DC-16 | GS | Dome Cr | 389,909.0 | 6,880,645.0 | 1062.3 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-17 | GS | Dome Cr | 389,955.0 | 6,880,645.0 | 1060.1 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-18 | GS | Dome Cr | 390,002.0 | 6,880,639.0 | 1058.4 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-19 | GS | Dome Cr | 390,050.0 | 6,880,643.0 | 1056.9 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-2 | GS | Dome Cr | 388,846.0 | 6,880,832.0 | 1112.6 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-20 | GS | Dome Cr | 390,098.0 | 6,880,623.0 | 1055.6 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-3 | GS | Dome Cr | 388,894.0 | 6,880,826.0 | 1110.4 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-4 | GS | Dome Cr | 388,942.0 | 6,880,817.0 | 1108.1 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-5 | GS | Dome Cr | 388,986.0 | 6,880,795.0 | 1105.9 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-6 | GS | Dome Cr | 389,027.0 | 6,880,770.0 | 1104.1 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-7 | GS | Dome Cr | 389,067.0 | 6,880,714.0 | 1101.2 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-8 | GS | Dome Cr | 389,079.0 | 6,880,752.0 | 1100.4 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-9 | GS | Dome Cr | 389,124.0 | 6,880,775.0 | 1100.9 | 0.2 | | Geochemistry Hydrotechnical | |
| TP-BA-13-03 | TP | TSF-Borrow | 389,695.0 | 6,880,691.0 | 1085.7 | 5.2 | | Geochemistry Geotechnical | |
| TP-BA-13-04 | TP | TSF-Borrow | 389,616.0 | 6,880,643.0 | 1086.6 | 5.5 | | Geochemistry Geotechnical | |
| TP-BA-13-05 | TP | TSF-Borrow | 389,798.0 | 6,880,702.0 | 1079.4 | 5.3 | | Geochemistry Geotechnical | |
| TP-BA-13-06 | TP | TSF-Borrow | 389,694.0 | 6,881,040.0 | 1141.8 | 1.3 | | Geochemistry Geotechnical | |
| TP-BA-13-07 | TP | TSF-Borrow | 389,739.0 | 6,881,045.0 | 1140.5 | 1.2 | | Geochemistry Geotechnical | |
| TP-BA-13-08 | TP | TSF-Borrow | 389,913.0 | 6,881,158.0 | 1147.8 | 1.4 | | Geochemistry Geotechnical | |
| TP-KZ-13-01 | TP | Ketza Shop | 388,683.4 | 6,881,754.8 | 1232.2 | 2.0 | | Environmental | Volatile organic compounds |
| TP-KZ-13-02 | TP | Ketza Shop | 388,694.0 | 6,881,716.5 | 1231.4 | 2.0 | | Environmental | Volatile organic compounds |
| TP-KZ-13-03 | TP | Ketza Shop | 388,665.1 | 6,881,737.6 | 1232.5 | 2.0 | | Environmental | Volatile organic compounds |
| TP-M-13-01 | TP | Mill | 388,029.3 | 6,880,994.6 | 1182.6 | 3.5 | | Geochemistry Environmental | Volatile organic compounds |
| TP-M-13-02 | TP | Mill | 388,003.9 | 6,881,053.9 | 1181.8 | 2.0 | | Geochemistry Environmental | Volatile organic compounds |
| TP-M-13-03 | TP | Mill | 387,943.0 | 6,881,120.0 | 1188.5 | 5.0 | | Geochemistry Environmental | Volatile organic compounds |
| TP-M-13-04 | TP | Mill | 388,014.0 | 6,881,083.0 | 1180.8 | 2.0 | | Geochemistry Environmental | Volatile organic compounds |
| TP-M-13-05 | TP | Mill | 387,811.8 | 6,881,026.9 | 1218.3 | 2.0 | | Geochemistry Environmental | Volatile organic compounds |
| TP-R-13-01 | TP | Road | 387,876.1 | 6,880,969.8 | 1218.6 | 2.0 | | Geochemistry Environmental | Volatile organic compounds |
| TP-R-13-02 | TP | Road | 387,714.1 | 6,881,150.7 | 1217.6 | 1.5 | | Geochemistry Environmental | Volatile organic compounds |
| TP-R-13-03 | TP | Road | 387,794.3 | 6,881,334.1 | 1228.2 | 2.0 | | Geochemistry Environmental | Volatile organic compounds |
| TP-R-13-04 | TP | Road | 389,160.9 | 6,881,108.2 | 1183.4 | 2.0 | | Environmental | Volatile organic compounds |
| TP-R-13-05 | TP | Road | 389,682.7 | 6,880,955.7 | 1127.3 | 2.0 | | Environmental | Volatile organic compounds |
| TP-SP-13-03 | GS | Mill | 388,140.2 | 6,880,806.2 | 1203.6 | | | Environmental | Volatile organic compounds |
| TP-SP-13-04 | GS | Mill | 388,136.7 | 6,880,779.8 | 1204.7 | | | Environmental | Volatile organic compounds |
| TP-SP-13-05 | GS | Mill | 388,119.7 | 6,880,798.6 | 1204.5 | | | Environmental | Volatile organic compounds |
| TP-SP-13-06 | GS | Mill | 388,098.4 | 6,880,760.5 | 1211.9 | | | Environmental | Volatile organic compounds |
| TP-T-13-01 | TP | TSF-Tailings | 389,198.0 | 6,880,700.0 | 1097.7 | 2.7 | | Geochemistry Geotechnical | |
| TP-T-13-02 | TP | TSF-Tailings | 389,263.0 | 6,880,706.0 | 1097.4 | 4.8 | | Geochemistry Geotechnical | |
| TP-T-13-04 | TP | TSF-Tailings | 389,415.0 | 6,880,683.0 | 1096.8 | 5.2 | | Geochemistry Geotechnical | |
| TP-T-13-05 | TP | TSF-Tailings | 389,250.0 | 6,880,620.0 | 1096.8 | 2.6 | | Geotechnical | |
| TP-T-13-06 | TP | TSF-Tailings | 389,198.0 | 6,880,593.0 | 1099.5 | 4.1 | | Geochemistry Geotechnical | |
| TP-T-13-07 | TP | TSF-Tailings | 389,263.0 | 6,880,563.0 | 1097.7 | 3.4 | | Geotechnical | |
| TP-T-13-09 | TP | TSF-Tailings | 389,379.0 | 6,880,557.0 | 1096.5 | 4.4 | | Geotechnical | |
| TP-TD-13-01 | TP | TSF-Dam | 389,479.0 | 6,880,679.0 | 1096.2 | 4.7 | | Geochemistry Geotechnical | |
| TP-TD-13-02 | TP | TSF-Dam | 389,478.0 | 6,880,622.0 | 1095.4 | 6.0 | | Geochemistry Geotechnical | |
| TP-TD-13-03 | TP | TSF-Dam | 389,474.0 | 6,880,521.0 | 1095.0 | 6.0 | | Geochemistry Geotechnical | |
| TP-WA-13-01 | TP | Waste Area | 388,770.0 | 6,881,707.0 | 1231.8 | 4.5 | | Geotechnical | |
| TP-WA-13-02 | TP | Waste Area | 388,958.0 | 6,881,673.0 | 1213.0 | 5.6 | | Geochemistry Geotechnical | |

| Location ID | Type of Investigation [1] | Investigation Location (UTM Zone 8, NAD83) | | | | Summary of Installations, Lab Tests and Insitu Tests | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Area | Easting, UTM (m) | Northing, UTM (m) | Ground Elevation (masl) | Depth of Investigation | Installations [2,3] | Lab tests[3] | Insitu Tests[3,4] |
| TP-WA-13-03 | TP | Waste Area | 388,988.0 | 6,881,634.0 | 1216.8 | 4.6 | | Geochemistry Geotechnical | |
| TP-WA-13-04 | TP | Waste Area | 388,807.0 | 6,881,591.0 | 1228.0 | 6.1 | | Geotechnical | |
| TP-WA-13-05 | TP | Waste Area | 388,708.0 | 6,881,499.0 | 1211.3 | 4.2 | | Geochemistry Geotechnical | |
| TP-WA-13-06 | TP | Waste Area | 388,711.0 | 6,881,442.0 | 1209.1 | 4.5 | | Geochemistry Geotechnical | |
| TP-WA-13-07 | TP | Waste Area | 388,774.0 | 6,881,430.0 | 1214.2 | 5.8 | | Geotechnical | |
| TP-WA-13-08 | TP | Waste Area | 388,922.0 | 6,881,356.0 | 1214.7 | 4.7 | | Geochemistry Geotechnical | |
| TP-WA-13-09 | TP | Waste Area | 388,834.0 | 6,881,319.0 | 1204.9 | 5.2 | | Geochemistry Geotechnical | |
| TP-WA-13-10 | TP | Waste Area | 389,001.0 | 6,881,272.0 | 1214.0 | 4.1 | | Geochemistry Geotechnical | |
| TP-WA-13-11 | TP | Waste Area | 389,001.0 | 6,881,208.0 | 1202.0 | 5.0 | | Geochemistry Geotechnical | |
| Veg-Plot-1 | GS | Waste Area | 388,888.0 | 6,881,443.0 | 1214.0 | 1.0 | | | Vegetation Reclamation |
| Veg-Plot-2 | GS | TSF | 389,438.0 | 6,880,471.0 | 1105.0 | 1.0 | | | Vegetation Reclamation |
| Veg-Plot-3 | GS | Mill | 387,560.0 | 6,880,965.0 | 1275.0 | 1.0 | | | Vegetation Reclamation |
| Veg-Plot-4 | GS | Shale Borrow | 389,488.0 | 6,881,001.0 | 1154.0 | 1.0 | | | Vegetation Reclamation |
| Veg-Plot-5 | GS | Open Pit | 389,309.0 | 6,881,412.0 | 1219.0 | 1.0 | | | Vegetation Reclamation |
| Veg-Plot-6 | GS | Victoria Cr | 391,539.0 | 6,880,871.0 | 1024.0 | 1.0 | | | Vegetation Reclamation |
| Veg-Plot-7 | GS | Off OIC | 411,006.0 | 6,886,033.0 | 916.0 | 1.0 | | | Vegetation Reclamation |

Notes:

1. BH=sonic borehole; CH = diamond core hole; TP = test pit; CPT = cone penetration test; FLOW = flow measurement; TEMP&EC = temperature and electrical conductivity measurement; Seepage = seepage meter test only; DP-P = paired drive point piezometer with temperature and electrical conductivity measurement and seepage meter test location, DP = single drive point piezometer with temperature and electrical conductivity measurement; GS=grab sample, GP=GeoProbe hole, HA=Hand auger.
2. MW = monitoring well, VWP = vibrating wire piezometer with temperature measurement
3. Details of installations, lab and insitu testing provided in data report (AMEC 2013c)
4. In all locations a visual characterization of the soils was completed.

## Table 3 Fall 2013 Groundwater Sampling Locations

| Well ID | Area | Northing | Easting | Ground Surface Elevation | Top of Casing Elevation |
|---|---|---|---|---|---|
| | | (m) | (m) | (mASL) | (mASL) |
| CH-13-03 | open pit | 6881108 | 389145 | 1184.0 | 1184.5 |
| CH-13-04 | open pit | 6881471 | 389138 | 1225.5 | 1226.2 |
| CH-13-05 | open pit | 6881469 | 388958 | 1185.0 | 1185.9 |
| GLL07-02 | open pit | 6881703 | 389072 | 1183.3 | 1184.6 |
| GLL07-03 | open pit | 6881477 | 388961 | 1184.8 | 1185.9 |
| GSI-DC-01-A | Dome Ck | 6881123 | 387676 | 1218.7 | 1219.6 |
| GSI-DC-02-A | Dome Ck | 6881128 | 387840 | 1196.6 | 1197.5 |
| GSI-DC-03-A | Dome Ck | 6881078 | 388107 | 1170.0 | 1170.7 |
| GSI-DC-05-A | Dome Ck | 6880836 | 388723 | 1119.2 | 1120.1 |
| GSI-DC-06-A | Dome Ck | 6880568 | 389791 | 1066.6 | 1067.5 |
| GSI-DC-07-A | Dome Ck | 6880639 | 390066 | 1056.7 | 1057.6 |
| GSI-DC-09-A | Dome Ck | 6880493 | 390615 | 1037.0 | 1037.8 |
| GSI-DC-10-A | Dome Ck | 6880449 | 390863 | 1030.6 | 1031.3 |
| GSI-PC-01-A | Pony Ck | 6881918 | 388720 | 1224.1 | 1224.8 |
| GSI-PC-02-A | Pony Ck | 6881785 | 388909 | 1202.5 | 1203.1 |
| GSI-PC-05-A | Pony Ck | 6881660 | 389713 | 1116.5 | 1117.1 |
| GSI-HA-01-A | Mill - Heustis Adit | 6881132 | 387844 | 1196.7 | 1197.7 |
| GSI-HA-02-A | Mill - Heustis Adit | 6881130 | 387863 | 1195.9 | 1197.2 |
| GSI-HA-03-A | Mill - Heustis Adit | 6881130 | 387881 | 1194.0 | 1194.9 |
| GSI-HA-04-A | Mill - Heustis Adit | 6881130 | 387918 | 1190.0 | 1190.5 |
| GSI-HA-05-A | Mill - Heustis Adit | 6881124 | 387898 | 1192.4 | 1193.1 |
| MP09-04 | TSF | 6880609 | 389576 | 1078.4 | |
| MP09-05 | TSF | 6880591 | 389550 | 1078.0 | 1079.1 |
| MP09-09 | TSF-Tailings | 6880681 | 389240 | 1097.1 | |
| MP09-10 | TSF-Tailings | 6880682 | 389240 | 1097.1 | 1098.9 |
| MP09-11 | TSF-Tailings | 6880614 | 389221 | 1097.8 | 1099.3 |
| MP09-12 | TSF-Tailings | 6880613 | 389221 | 1097.8 | 1099.3 |
| MW09-01 | TSF-Tailings | 6880558 | 389395 | 1096.5 | 1097.3 |
| MW09-02 | TSF-Tailings | 6880559 | 389396 | 1096.5 | 1097.2 |
| MW09-03 | TSF-Tailings | 6880556 | 389421 | 1096.6 | 1096.9 |
| MW09-04 | TSF-Tailings | 6880558 | 389421 | 1096.4 | 1096.8 |
| MW09-07 | TSF-Tailings | 6880699 | 389324 | 1096.0 | 1097.0 |
| MW09-08 | TSF | 6880578 | 389620 | 1074.2 | 1075.2 |
| MW09-16 | Mill | 6881095 | 387992 | 1182.5 | 1183.5 |
| MW09-17 | Mill | 6880971 | 388077 | 1177.7 | 1178.6 |
| MW09-18 | Mill | 6880985 | 388055 | 1178.7 | 1179.6 |

| Well ID | Area | Northing | Easting | Ground Surface Elevation | Top of Casing Elevation |
|---|---|---|---|---|---|
| | | (m) | (m) | (mASL) | (mASL) |
| MW09-19 | Mill | 6881016 | 388053 | 1176.5 | 1177.5 |
| MW09-21 | TSF | 6880577 | 389536 | 1081.0 | 1081.6 |
| MW09-22 | TSF-Dam | 6880549 | 389497 | 1088.6 | 1089.4 |
| MW09-23 | TSF-Dam | 6880555 | 389460 | 1098.7 | 1099.6 |
| MW09-24 | TSF | 6880623 | 389561 | 1087.6 | 1088.3 |
| W1410383-BH02 | TSF | 6880668 | 389561 | 1091.6 | |
| W1410383 BH03 | TSF | 6880732 | 389132 | 1099.0 | |

# APPENDIX I

# INVESTIGATIVE LOCATIONS TABLE

**Mount Nansen Remediation Project**
**2013 Site Investigation Locations**

| Location ID | Type of Investigation [1] | Investiation Location (UTM Zone 8, NAD83) | | | | Summary of Installations, Lab Tests and Insitu Tests | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Area | Easting, UTM (m) | Northing, UTM (m) | Ground Elevation (mASL) | Depth of Investigation | Installations [2] | Lab tests | Insitu Tests |
| BH-KZ-13-01 | BH | Ketza Shop | 388,683.4 | 6,881,754.8 | 1232.2 | 4.0 | | Environmental | Volatile organic compounds |
| BH-KZ-13-02 | BH | Ketza Shop | 388,687.4 | 6,881,741.8 | 1232.1 | 5.0 | | Environmental | Volatile organic compounds |
| BH-M-13-01 | BH | Mill | 388,026.0 | 6,880,954.0 | 1192.3 | 3.0 | | Environmental | Volatile organic compounds |
| BH-M-13-02 | BH | Mill | 388,055.4 | 6,880,939.0 | 1191.1 | 3.5 | | Environmental | Volatile organic compounds |
| BH-M-13-03 | BH | Mill | 387,990.2 | 6,881,007.1 | 1190.6 | 4.0 | | Environmental | Volatile organic compounds |
| BH-M-13-04 | BH | Mill | 387,983.9 | 6,881,066.6 | 1184.4 | 4.5 | Drive Point Piezo | Geochemistry Environmental | Volatile organic compounds |
| BH-M-13-05 | BH | Mill | 387,971.1 | 6,881,019.5 | 1191.3 | 5.5 | | Environmental | Volatile organic compounds |
| BH-M-13-06 | BH | Mill | 387,949.4 | 6,881,042.7 | 1191.5 | 4.5 | | Environmental | Volatile organic compounds |
| BH-M-13-07 | BH | Mill | 387,903.2 | 6,881,073.2 | 1192.5 | 3.0 | | Environmental | Volatile organic compounds |
| BH-M-13-08 | BH | Mill | 387,862.6 | 6,881,086.5 | 1194.4 | 4.0 | | Environmental | Volatile organic compounds |
| BH-T-13-01 | BH | TSF-Tailings | 389,173.0 | 6,880,610.0 | 1101.2 | 13.5 | | Geochemistry Geotechnical | |
| BH-T-13-02 | BH | TSF-Tailings | 389,210.1 | 6,880,568.4 | 1098.5 | 12.0 | standpipe | Geochemistry Geotechnical | |
| BH-T-13-03 | BH | TSF-Tailings | 389,419.0 | 6,880,675.0 | 1096.8 | 16.5 | standpipe | Geochemistry Geotechnical | |
| BH-T-13-04 | BH | TSF-Tailings | 389,402.0 | 6,880,553.0 | 1097.0 | 18.5 | standpipe | Geochemistry Geotechnical | |
| BH-TD-13-01 | BH | TSF-Dam | 389,457.0 | 6,880,596.0 | 1099.5 | 25.0 | | Geochemistry Geotechnical | |
| BH-WA-13-01 | BH | Waste Area | 388,815.0 | 6,881,564.0 | 1227.9 | 12.5 | | Geotechnical | |
| CH-P-13-01/10 | CH | Open Pit | 388,656.6 | 6,881,119.2 | 1151.0 | 10.0 | MW | | |
| CH-P-13-01/40 | CH | Open Pit | 388,638.0 | 6,881,125.0 | 1150.9 | 40.0 | No - Abandoned | | |
| CH-P-13-02/10 | CH | Open Pit | 388,924.8 | 6,881,012.4 | 1145.9 | 10.0 | MW | | |
| CH-P-13-02/VWP | CH | Open Pit | 388,923.9 | 6,881,013.0 | 1146.0 | 50.0 | 5 nested VWP | | Packer, Falling Head |
| CH-P-13-03/10 | CH | Open Pit | 389,145.1 | 6,881,106.5 | 1184.0 | 10.0 | MW | | |
| CH-P-13-03/50 | CH | Open Pit | 389,144.5 | 6,881,108.0 | 1184.0 | 50.0 | MW and single VWP | Water Quality | Packer, Falling Head |
| CH-P-13-04/10 | CH | Open Pit | 389,137.4 | 6,881,471.0 | 1225.5 | 10.0 | MW | | |
| CH-P-13-04/35 | CH | Open Pit | 389,138.5 | 6,881,470.5 | 1225.5 | 50.0 | MW and single VWP | Water Quality | Packer, Falling Head |
| CH-P-13-05/50 | CH | Open Pit | 388,957.8 | 6,881,468.9 | 1185.0 | 50.0 | MW and single VWP | Water Quality | Packer, Falling Head |
| CH-P-13-06/VWP | CH | Open Pit | 388,958.8 | 6,881,469.2 | 1185.0 | 60.0 | 5 nested VWP | | Packer, Falling Head |
| CPT-T-13-01 | CPT | TSF-Tailings | 389,196.0 | 6,880,711.0 | 1098.1 | 5.9 | | | CPT |
| CPT-T-13-02 | CPT | TSF-Tailings | 389,240.0 | 6,880,700.0 | 1097.3 | 3.9 | | | CPT |
| CPT-T-13-03 | CPT | TSF-Tailings | 389,333.0 | 6,880,679.0 | 1096.0 | 3.4 | | | CPT, Disspation Test |
| CPT-T-13-04 | CPT | TSF-Tailings | 389,391.0 | 6,880,690.0 | 1096.0 | 3.0 | | | CPT |
| CPT-T-13-05 | CPT | TSF-Tailings | 389,426.0 | 6,880,672.0 | 1097.0 | 5.0 | | | CPT |
| CPT-T-13-06 | CPT | TSF-Tailings | 389,205.0 | 6,880,639.0 | 1097.2 | 4.0 | | | CPT |
| CPT-T-13-07A/B | CPT | TSF-Tailings | 389,236.0 | 6,880,661.0 | 1096.6 | 4.2 | | | CPT |
| CPT-T-13-08A/B | CPT | TSF-Tailings | 389,307.0 | 6,880,654.0 | 1096.0 | 4.1 | | | CPT, Disspation Test |
| CPT-T-13-09 | CPT | TSF-Tailings | 389,383.0 | 6,880,661.0 | 1096.0 | 4.9 | | | CPT |
| CPT-T-13-10A/B | CPT | TSF-Tailings | 389,400.0 | 6,880,630.0 | 1096.0 | 8.7 | | | CPT, Disspation Test |
| CPT-T-13-11 | CPT | TSF-Tailings | 389,176.0 | 6,880,607.0 | 1101.1 | 0.5 | | | CPT |
| CPT-T-13-12 | CPT | TSF-Tailings | 389,239.0 | 6,880,596.0 | 1097.2 | 4.3 | | | CPT, Disspation Test |
| CPT-T-13-13 | CPT | TSF-Tailings | 389,308.0 | 6,880,592.0 | 1096.0 | 8.2 | | | CPT, Disspation Test |
| CPT-T-13-14 | CPT | TSF-Tailings | 389,378.0 | 6,880,602.0 | 1096.0 | 9.7 | | | CPT, Disspation Test |
| CPT-T-13-15 | CPT | TSF-Tailings | 389,399.0 | 6,880,550.0 | 1097.0 | 5.2 | | | CPT, Disspation Test |
| CPT-T-13-16 | CPT | TSF-Tailings | 389,209.0 | 6,880,568.0 | 1098.6 | 4.7 | | | CPT |
| CPT-T-13-17 | CPT | TSF-Tailings | 389,249.0 | 6,880,554.0 | 1097.3 | 3.4 | | | CPT |
| CPT-T-13-18 | CPT | TSF-Tailings | 389,307.0 | 6,880,553.0 | 1096.1 | 6.6 | | | CPT, Disspation Test |
| CPT-T-13-19 | CPT | TSF-Tailings | 389,378.0 | 6,880,547.0 | 1096.7 | 7.7 | | | CPT, Disspation Test |
| CPT-T-13-20 | CPT | TSF-Tailings | 389,418.0 | 6,880,524.0 | 1099.7 | 6.2 | | | CPT |
| DCT-10-0 | Temp | Dome Cr | 390,860.9 | 6,880,448.8 | 1030.5 | | | | Temperature, EC Readings |

**Mount Nansen Remediation Project**
**2013 Site Investigation Locations**

| Location ID | Type of Investigation [1] | Investiation Location (UTM Zone 8, NAD83) | | | | Summary of Installations, Lab Tests and Insitu Tests | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Area | Easting, UTM (m) | Northing, UTM (m) | Ground Elevation (mASL) | Depth of Investigation | Installations [2] | Lab tests | Insitu Tests |
| DCT-10-1 | Temp | Dome Cr | 390,957.1 | 6,880,447.9 | 1028.6 | | | | Temperature, EC Readings |
| DCT-10-2 | Temp | Dome Cr | 391,058.1 | 6,880,461.2 | 1026.8 | | | | Temperature, EC Readings |
| DCT-1-0 | Temp | Dome Cr | 387,675.7 | 6,881,123.3 | 1218.7 | | | | Temperature, EC Readings |
| DCT-1-1 | Temp | Dome Cr | 387,750.4 | 6,881,131.5 | 1210.4 | | | | Temperature, EC Readings |
| DCT-2-0 | Temp | Dome Cr | 387,839.5 | 6,881,128.5 | 1196.6 | | | | Temperature, EC Readings |
| DCT-2-1 | Temp | Dome Cr | 387,937.2 | 6,881,131.4 | 1189.1 | | | | Temperature, EC Readings |
| DCT-3-0 | Temp | Dome Cr | 388,096.9 | 6,881,051.1 | 1168.8 | | | | Temperature, EC Readings |
| DCT-4-0 | Temp | Dome Cr | 388,406.6 | 6,880,968.3 | 1143.2 | | | | Temperature, EC Readings |
| DCT-4-1 | Temp | Dome Cr | 388,461.5 | 6,880,923.1 | 1140.6 | | | | Temperature, EC Readings |
| DCT-5-0 | Temp | Dome Cr | 388,725.2 | 6,880,830.9 | 1119.6 | | | | Temperature, EC Readings |
| DCT-5-1 | Temp | Dome Cr | 388,816.5 | 6,880,790.9 | 1115.1 | | | | Temperature, EC Readings |
| DCT-6-0 | Temp | Dome Cr | 389,790.6 | 6,880,566.7 | 1066.5 | | | | Temperature, EC Readings |
| DCT-6-1 | Temp | Dome Cr | 389,884.5 | 6,880,626.8 | 1063.1 | | | | Temperature, EC Readings |
| DCT-6-2 | Temp | Dome Cr | 389,985.0 | 6,880,653.0 | 1059.6 | | | | Temperature, EC Readings |
| DCT-7-0 | Temp | Dome Cr | 390,064.2 | 6,880,634.4 | 1057.1 | | | | Temperature, EC Readings |
| DCT-7-1 | Temp | Dome Cr | 390,174.3 | 6,880,628.8 | 1052.9 | | | | Temperature, EC Readings |
| DCT-7-2 | Temp | Dome Cr | 390,255.9 | 6,880,594.9 | 1050.6 | | | | Temperature, EC Readings |
| DCT-8-0 | Temp | Dome Cr | 390,310.0 | 6,880,584.0 | 1048.5 | | | | Temperature, EC Readings |
| DCT-8-1 | Temp | Dome Cr | 390,463.6 | 6,880,613.0 | 1052.6 | | | | Temperature, EC Readings |
| DCT-8-2 | Temp | Dome Cr | 390,565.7 | 6,880,503.9 | 1041.4 | | | | Temperature, EC Readings |
| DCT-9-0 | Temp | Dome Cr | 390,615.5 | 6,880,493.1 | 1037.0 | | | | Temperature, EC Readings |
| DCT-9-1 | Temp | Dome Cr | 390,699.4 | 6,880,475.8 | 1035.7 | | | | Temperature, EC Readings |
| DCT-9-2 | Temp | Dome Cr | 390,787.0 | 6,880,491.0 | 1033.3 | | | | Temperature, EC Readings |
| FL-DC-1 | FL | Dome Cr | 387,750.0 | 6,881,128.0 | 1211.7 | 0 | | | Flow Measurement |
| FL-DC-2 | FL | Dome Cr | 387,834.0 | 6,881,128.0 | 1197.3 | 0 | | | Flow Measurement |
| FL-DC-3 | FL | Dome Cr | 388,973.0 | 6,880,806.0 | 1106.5 | 0 | | | Flow Measurement |
| FL-DC-4 | FL | Dome Cr | 389,418.0 | 6,880,780.0 | 1100.1 | 0 | | | Flow Measurement |
| FL-DC-5 | FL | Dome Cr | 389,938.0 | 6,880,644.0 | 1060.7 | 0 | | | Flow Measurement |
| FL-PC-1 | FL | Pony Cr | 388,983.2 | 6,881,739.7 | 1193.3 | 0 | | | Flow Measurement |
| FL-PC-2 | FL | Pony Cr | 389,073.7 | 6,881,726.1 | 1182.9 | 0 | | | Flow Measurement |
| GP-T-13-01 | GP | TSF-Tailings | 389,302.0 | 6,880,652.0 | 1096.0 | 7.0 | | Geotechnical | |
| GP-T-13-02 | GP | TSF-Tailings | 389,391.0 | 6,880,639.0 | 1096.0 | 6.5 | | Geotechnical | |
| GP-T-13-03 | GP | TSF-Tailings | 389,303.0 | 6,880,606.0 | 1096.0 | 9.0 | | Geotechnical | |
| GP-T-13-04 | GP | TSF-Tailings | 389,379.0 | 6,880,600.0 | 1096.0 | 11.5 | | Geotechnical | |
| GP-T-13-10 | GP | TSF-Tailings | 389,400.0 | 6,880,630.0 | 1096.0 | 9.5 | | Geotechnical | |
| GP-T-13-18 | GP | TSF-Tailings | 389,324.0 | 6,880,550.0 | 1096.0 | 6.3 | | Geotechnical | |
| GP-T-13-21 | GP | TSF-Tailings | 389,377.0 | 6,880,509.0 | 1098.0 | 3.3 | | Geotechnical | |
| GP-T-13-22 | GP | TSF-Tailings | 389,256.0 | 6,880,750.0 | 1097.5 | 5.1 | | Geotechnical | |
| GP-T-13-23 | GP | TSF-Tailings | 389,408.0 | 6,880,723.0 | 1096.8 | 8.8 | | Geotechnical | |
| GSI-DC-01-A | MP-P | Dome Cr | 387,675.7 | 6,881,123.3 | 1218.7 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-01-B | MP-P | Dome Cr | 387,675.7 | 6,881,122.9 | 1218.8 | 2.8 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-DC-02-A | MP-P | Dome Cr | 387,839.5 | 6,881,128.5 | 1196.6 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-02-B | MP-P | Dome Cr | 387,839.7 | 6,881,128.5 | 1196.6 | 3.0 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-DC-03-A | MP-P | Dome Cr | 388,106.5 | 6,881,078.2 | 1170.0 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-03-B | MP-P | Dome Cr | 388,106.8 | 6,881,078.1 | 1170.0 | 2.9 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-DC-04-A | Seepage | Dome Cr | 388,407.0 | 6,880,968.0 | 1143.1 | 0.0 | | | Seepage Tests |
| GSI-DC-05-A | MP-P | Dome Cr | 388,723.5 | 6,880,835.8 | 1119.2 | 1.0 | Drive Point Piezo | | Seepage Tests |

**Mount Nansen Remediation Project**
**2013 Site Investigation Locations**

| Location ID | Type of Investigation [1] | Investiation Location (UTM Zone 8, NAD83) | | | | Summary of Installations, Lab Tests and Insitu Tests | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Area | Easting, UTM (m) | Northing, UTM (m) | Ground Elevation (mASL) | Depth of Investigation | Installations [2] | Lab tests | Insitu Tests |
| GSI-DC-05-B | MP-P | Dome Cr | 388,723.7 | 6,880,835.2 | 1119.2 | 2.3 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-DC-06-A | MP-P | Dome Cr | 389,790.7 | 6,880,568.1 | 1066.6 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-06-B | MP-P | Dome Cr | 389,791.1 | 6,880,568.1 | 1066.5 | 2.4 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-DC-07-A | MP-P | Dome Cr | 390,066.1 | 6,880,639.1 | 1056.7 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-07-B | MP-P | Dome Cr | 390,065.7 | 6,880,639.3 | 1056.7 | 2.9 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-DC-08-A | MP-P | Dome Cr | 390,310.9 | 6,880,583.9 | 1048.5 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-08-B | MP-P | Dome Cr | 390,311.5 | 6,880,583.7 | 1048.5 | 2.5 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-09-A | MP-P | Dome Cr | 390,615.5 | 6,880,493.1 | 1037.0 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-09-B | MP-P | Dome Cr | 390,615.6 | 6,880,492.6 | 1037.0 | 2.9 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-DC-10-A | MP-P | Dome Cr | 390,862.6 | 6,880,449.0 | 1030.6 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-DC-10-B | MP-P | Dome Cr | 390,862.4 | 6,880,449.2 | 1030.6 | 2.8 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-HA-01-A | MP | Mill | 387,843.5 | 6,881,132.0 | 1196.7 | 1.9 | Drive Point Piezo | Water Quality | |
| GSI-HA-02-A | MP | Mill | 387,863.1 | 6,881,129.8 | 1195.9 | 1.6 | Drive Point Piezo | Water Quality | |
| GSI-HA-03-A | MP | Mill | 387,880.8 | 6,881,129.8 | 1194.0 | 1.3 | Drive Point Piezo | Water Quality | |
| GSI-HA-04-A | MP | Mill | 387,917.6 | 6,881,130.5 | 1190.0 | 1.6 | Drive Point Piezo | Water Quality | |
| GSI-HA-05-A | MP | Mill | 387,898.5 | 6,881,124.4 | 1192.4 | 1.3 | Drive Point Piezo | Water Quality | |
| GSI-PC-01-A | MP-P | Pony Cr | 388,719.8 | 6,881,918.1 | 1224.1 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-PC-01-B | MP-P | Pony Cr | 388,720.1 | 6,881,917.9 | 1224.1 | 2.9 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-PC-02-A | MP-P | Pony Cr | 388,908.6 | 6,881,785.4 | 1202.5 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-PC-02-B | MP-P | Pony Cr | 388,908.1 | 6,881,785.5 | 1202.5 | 2.9 | Drive Point Piezo | Water Quality | Seepage Tests |
| GSI-PC-03-A | MP-P | Pony Cr | 389,260.0 | 6,881,707.4 | 1159.8 | 1.1 | Drive Point Piezo | | Seepage Tests |
| GSI-PC-03-B | MP-P | Pony Cr | 389,260.3 | 6,881,707.3 | 1159.7 | 2.0 | Drive Point Piezo | | Seepage Tests |
| GSI-PC-04-A | MP-P | Pony Cr | 389,585.4 | 6,881,658.1 | 1129.2 | 1.0 | Drive Point Piezo | | Seepage Tests |
| GSI-PC-04-B | MP-P | Pony Cr | 389,586.0 | 6,881,657.6 | 1129.2 | 2.9 | Drive Point Piezo | | Seepage Tests |
| GSI-PC-05-A | MP-P | Pony Cr | 389,713.0 | 6,881,660.5 | 1116.5 | 1.1 | Drive Point Piezo | | |
| GSI-PC-05-B | MP-P | Pony Cr | 389,713.3 | 6,881,660.6 | 1116.4 | 2.8 | Drive Point Piezo | Water Quality | |
| HA-BA-13-01 | HA | TSF-Borrow | 388,945.0 | 6,880,716.0 | 1113.8 | 3.0 | | Geochemistry Geotechnical | |
| HA-BA-13-02 | HA | TSF-Borrow | 389,017.0 | 6,880,702.0 | 1108.7 | 3.0 | | Geochemistry Geotechnical | |
| HA-DC-04 | HA | Dome Cr | 388,407.0 | 6,880,968.0 | 1143.1 | 1.0 | | | Augers to refusal |
| HA-DC-05 | HA | Dome Cr | 388,725.0 | 6,880,831.0 | 1119.7 | 2.5 | | | Augers to refusal |
| PCT-1-0 | Temp | Pony Cr | 388,711.3 | 6,881,929.2 | 1225.7 | | | | Temperature, EC Readings |
| PCT-1-1 | Temp | Pony Cr | 388,834.8 | 6,881,809.1 | 1210.9 | | | | Temperature, EC Readings |
| PCT-2-0 | Temp | Pony Cr | 388,909.5 | 6,881,781.7 | 1202.4 | | | | Temperature, EC Readings |
| PCT-2-1 | Temp | Pony Cr | 389,188.2 | 6,881,717.9 | 1166.2 | | | | Temperature, EC Readings |
| PCT-3-0 | Temp | Pony Cr | 389,257.2 | 6,881,705.4 | 1160.0 | | | | Temperature, EC Readings |
| PCT-3-1 | Temp | Pony Cr | 389,437.4 | 6,881,669.2 | 1146.4 | | | | Temperature, EC Readings |
| PCT-4-0 | Temp | Pony Cr | 389,581.8 | 6,881,659.1 | 1129.8 | | | | Temperature, EC Readings |
| PCT-4-1 | Temp | Pony Cr | 389,600.5 | 6,881,641.0 | 1128.2 | | | | Temperature, EC Readings |
| PCT-5-0 | Temp | Pony Cr | 389,714.5 | 6,881,656.6 | 1116.5 | | | | Temperature, EC Readings |
| SED-DC-1 | GS | Dome Cr | 388,800.0 | 6,880,834.0 | 1116.4 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-10 | GS | Dome Cr | 389,169.0 | 6,880,792.0 | 1100.2 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-11 | GS | Dome Cr | 389,693.0 | 6,880,561.0 | 1070.8 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-12 | GS | Dome Cr | 389,741.0 | 6,880,574.0 | 1069.2 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-13 | GS | Dome Cr | 389,789.0 | 6,880,564.0 | 1067.3 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-14 | GS | Dome Cr | 389,833.0 | 6,880,579.0 | 1065.0 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-15 | GS | Dome Cr | 389,864.0 | 6,880,616.0 | 1064.0 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-16 | GS | Dome Cr | 389,909.0 | 6,880,645.0 | 1062.3 | 0.2 | | Geochemistry Hydrotechnical | |

**Mount Nansen Remediation Project**
**2013 Site Investigation Locations**

| Location ID | Type of Investigation [1] | Investiation Location (UTM Zone 8, NAD83) | | | | Summary of Installations, Lab Tests and Insitu Tests | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Area | Easting, UTM (m) | Northing, UTM (m) | Ground Elevation (mASL) | Depth of Investigation | Installations [2] | Lab tests | Insitu Tests |
| SED-DC-17 | GS | Dome Cr | 389,955.0 | 6,880,645.0 | 1060.1 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-18 | GS | Dome Cr | 390,002.0 | 6,880,639.0 | 1058.4 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-19 | GS | Dome Cr | 390,050.0 | 6,880,643.0 | 1056.9 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-2 | GS | Dome Cr | 388,846.0 | 6,880,832.0 | 1112.6 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-20 | GS | Dome Cr | 390,098.0 | 6,880,623.0 | 1055.6 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-3 | GS | Dome Cr | 388,894.0 | 6,880,826.0 | 1110.4 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-4 | GS | Dome Cr | 388,942.0 | 6,880,817.0 | 1108.1 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-5 | GS | Dome Cr | 388,986.0 | 6,880,795.0 | 1105.9 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-6 | GS | Dome Cr | 389,027.0 | 6,880,770.0 | 1104.1 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-7 | GS | Dome Cr | 389,067.0 | 6,880,714.0 | 1101.2 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-8 | GS | Dome Cr | 389,079.0 | 6,880,752.0 | 1100.4 | 0.2 | | Geochemistry Hydrotechnical | |
| SED-DC-9 | GS | Dome Cr | 389,124.0 | 6,880,775.0 | 1100.9 | 0.2 | | Geochemistry Hydrotechnical | |
| TP-BA-13-03 | TP | TSF-Borrow | 389,695.0 | 6,880,691.0 | 1085.7 | 5.2 | | Geochemistry Geotechnical | |
| TP-BA-13-04 | TP | TSF-Borrow | 389,616.0 | 6,880,643.0 | 1086.6 | 5.5 | | Geochemistry Geotechnical | |
| TP-BA-13-05 | TP | TSF-Borrow | 389,798.0 | 6,880,702.0 | 1079.4 | 5.3 | | Geochemistry Geotechnical | |
| TP-BA-13-06 | TP | TSF-Borrow | 389,694.0 | 6,881,040.0 | 1141.8 | 1.3 | | Geochemistry Geotechnical | |
| TP-BA-13-07 | TP | TSF-Borrow | 389,739.0 | 6,881,045.0 | 1140.5 | 1.2 | | Geochemistry Geotechnical | |
| TP-BA-13-08 | TP | TSF-Borrow | 389,913.0 | 6,881,158.0 | 1147.8 | 1.4 | | Geochemistry Geotechnical | |
| TP-KZ-13-01 | TP | Ketza Shop | 388,683.4 | 6,881,754.8 | 1232.2 | 2.0 | | Environmental | Volatile organic compounds |
| TP-KZ-13-02 | TP | Ketza Shop | 388,694.0 | 6,881,716.5 | 1231.4 | 2.0 | | Environmental | Volatile organic compounds |
| TP-KZ-13-03 | TP | Ketza Shop | 388,665.1 | 6,881,737.6 | 1232.5 | 2.0 | | Environmental | Volatile organic compounds |
| TP-M-13-01 | TP | Mill | 388,029.3 | 6,880,994.6 | 1182.6 | 3.5 | | Geochemistry Environmental | Volatile organic compounds |
| TP-M-13-02 | TP | Mill | 388,003.9 | 6,881,053.9 | 1181.8 | 2.0 | | Geochemistry Environmental | Volatile organic compounds |
| TP-M-13-03 | TP | Mill | 387,943.0 | 6,881,120.0 | 1188.5 | 5.0 | | Geochemistry Environmental | Volatile organic compounds |
| TP-M-13-04 | TP | Mill | 388,014.0 | 6,881,083.0 | 1180.8 | 2.0 | | Geochemistry Environmental | Volatile organic compounds |
| TP-M-13-05 | TP | Mill | 387,811.8 | 6,881,026.9 | 1218.3 | 2.0 | | Geochemistry Environmental | Volatile organic compounds |
| TP-R-13-01 | TP | Road | 387,876.1 | 6,880,969.8 | 1218.6 | 2.0 | | Geochemistry Environmental | Volatile organic compounds |
| TP-R-13-02 | TP | Road | 387,714.1 | 6,881,150.7 | 1217.6 | 1.5 | | Geochemistry Environmental | Volatile organic compounds |
| TP-R-13-03 | TP | Road | 387,794.3 | 6,881,334.1 | 1228.2 | 2.0 | | Geochemistry Environmental | Volatile organic compounds |
| TP-R-13-04 | TP | Road | 389,160.9 | 6,881,108.2 | 1183.4 | 2.0 | | Environmental | Volatile organic compounds |
| TP-R-13-05 | TP | Road | 389,682.7 | 6,880,955.7 | 1127.3 | 2.0 | | Environmental | Volatile organic compounds |
| TP-SP-13-03 | GS | Mill | 388,140.2 | 6,880,806.2 | 1203.6 | | | Environmental | Volatile organic compounds |
| TP-SP-13-04 | GS | Mill | 388,136.7 | 6,880,779.8 | 1204.7 | | | Environmental | Volatile organic compounds |
| TP-SP-13-05 | GS | Mill | 388,119.7 | 6,880,798.6 | 1204.5 | | | Environmental | Volatile organic compounds |
| TP-SP-13-06 | GS | Mill | 388,098.4 | 6,880,760.5 | 1211.9 | | | Environmental | Volatile organic compounds |
| TP-T-13-01 | TP | TSF-Tailings | 389,198.0 | 6,880,700.0 | 1097.7 | 2.7 | | Geochemistry Geotechnical | |
| TP-T-13-02 | TP | TSF-Tailings | 389,263.0 | 6,880,706.0 | 1097.4 | 4.8 | | Geochemistry Geotechnical | |
| TP-T-13-04 | TP | TSF-Tailings | 389,415.0 | 6,880,683.0 | 1096.8 | 5.2 | | Geochemistry Geotechnical | |
| TP-T-13-05 | TP | TSF-Tailings | 389,250.0 | 6,880,620.0 | 1096.8 | 2.6 | | Geotechnical | |
| TP-T-13-06 | TP | TSF-Tailings | 389,198.0 | 6,880,593.0 | 1099.5 | 4.1 | | Geochemistry Geotechnical | |
| TP-T-13-07 | TP | TSF-Tailings | 389,263.0 | 6,880,563.0 | 1097.7 | 3.4 | | Geotechnical | |
| TP-T-13-09 | TP | TSF-Tailings | 389,379.0 | 6,880,557.0 | 1096.5 | 4.4 | | Geotechnical | |
| TP-TD-13-01 | TP | TSF-Dam | 389,479.0 | 6,880,679.0 | 1096.2 | 4.7 | | Geochemistry Geotechnical | |
| TP-TD-13-02 | TP | TSF-Dam | 389,478.0 | 6,880,622.0 | 1095.4 | 6.0 | | Geochemistry Geotechnical | |
| TP-TD-13-03 | TP | TSF-Dam | 389,474.0 | 6,880,521.0 | 1095.0 | 6.0 | | Geochemistry Geotechnical | |
| TP-WA-13-01 | TP | Waste Area | 388,770.0 | 6,881,707.0 | 1231.8 | 4.5 | | Geotechnical | |
| TP-WA-13-02 | TP | Waste Area | 388,958.0 | 6,881,673.0 | 1213.0 | 5.6 | | Geochemistry Geotechnical | |

**Mount Nansen Remediation Project**
**2013 Site Investigation Locations**

| Location ID | Type of Investigation [1] | Investiation Location (UTM Zone 8, NAD83) | | | | Summary of Installations, Lab Tests and Insitu Tests | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Area | Easting, UTM (m) | Northing, UTM (m) | Ground Elevation (mASL) | Depth of Investigation | Installations [2] | Lab tests | Insitu Tests |
| TP-WA-13-03 | TP | Waste Area | 388,988.0 | 6,881,634.0 | 1216.8 | 4.6 | | Geochemistry Geotechnical | |
| TP-WA-13-04 | TP | Waste Area | 388,807.0 | 6,881,591.0 | 1228.0 | 6.1 | | Geotechnical | |
| TP-WA-13-05 | TP | Waste Area | 388,708.0 | 6,881,499.0 | 1211.3 | 4.2 | | Geochemistry Geotechnical | |
| TP-WA-13-06 | TP | Waste Area | 388,711.0 | 6,881,442.0 | 1209.1 | 4.5 | | Geochemistry Geotechnical | |
| TP-WA-13-07 | TP | Waste Area | 388,774.0 | 6,881,430.0 | 1214.2 | 5.8 | | Geotechnical | |
| TP-WA-13-08 | TP | Waste Area | 388,922.0 | 6,881,356.0 | 1214.7 | 4.7 | | Geochemistry Geotechnical | |
| TP-WA-13-09 | TP | Waste Area | 388,834.0 | 6,881,319.0 | 1204.9 | 5.2 | | Geochemistry Geotechnical | |
| TP-WA-13-10 | TP | Waste Area | 389,001.0 | 6,881,272.0 | 1214.0 | 4.1 | | Geochemistry Geotechnical | |
| TP-WA-13-11 | TP | Waste Area | 389,001.0 | 6,881,208.0 | 1202.0 | 5.0 | | Geochemistry Geotechnical | |
| Veg-Plot-1 | GS | Waste Area | 388,888.0 | 6,881,443.0 | 1214.0 | 1.0 | | | Vegetation Reclamation |
| Veg-Plot-2 | GS | TSF | 389,438.0 | 6,880,471.0 | 1105.0 | 1.0 | | | Vegetation Reclamation |
| Veg-Plot-3 | GS | Mill | 387,560.0 | 6,880,965.0 | 1275.0 | 1.0 | | | Vegetation Reclamation |
| Veg-Plot-4 | GS | Shale Borrow | 389,488.0 | 6,881,001.0 | 1154.0 | 1.0 | | | Vegetation Reclamation |
| Veg-Plot-5 | GS | Open Pit | 389,309.0 | 6,881,412.0 | 1219.0 | 1.0 | | | Vegetation Reclamation |
| Veg-Plot-6 | GS | Victoria Cr | 391,539.0 | 6,880,871.0 | 1024.0 | 1.0 | | | Vegetation Reclamation |
| Veg-Plot-7 | GS | Off OIC | 411,006.0 | 6,886,033.0 | 916.0 | 1.0 | | | Vegetation Reclamation |

Notes:

1. BH=sonic borehole; CH = diamond core hole; TP = test pit; CPT = cone penetration test; FL = flow measurement;
   TEMP = temperature and electrical conductivity measurement; Seepage = seepage meter test only;
   MP-P = paired mini piezometer (drive points) with temperature and electrical conductivity measurement and seepage meter test location,
   MP = single mini piezometer (drive point) with temperature and electrical conductivity measurement; GS=grab sample, GP=GeoProbe hole, HA=Hand auger.
2. MW = monitoring well, VWP = vibrating wire piezometer with temperature measurement
3. Details of installations, lab and insitu testing provided in data report (AMEC 2013c)