Final

Phase II Borrow Reconnaissance, Faro Mine Remediation Project

Prepared for

Government of Yukon and Government of Canada as represented by Aboriginal Affairs and Northern Development Canada

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The document contained herein should be considered Final as approved by the Government of Yukon on August 27, 2014, with no changes made since the draft submission.

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Acronyms and Abbreviations

°	degrees
>	greater than
<	less than
µS/cm	micro Siemens per centimetre
ABA	Acid Base Accounting
AP	acid potential
APHA	American Public Health Association
ASTM	ASTM International
$CaCO_3$/tonne	calcite per tonne
CEC	cation exchange capacity
CEQG	Canadian Environmental Quality Guidelines
CH2M HILL	CH2M HILL Canada Limited
Curragh	Curragh Resources Inc.
DQE	data quality evaluation
dS/m	deciSiemens per metre
ESP	exchangeable sodium percentage
FMC	Faro Mine Complex
GAI	geochemical abundance index
GARD	Global Acid Rock Drainage
kg	kilogram
km	kilometre
km^2	square kilometre
kN	kiloNewton
m	metre
MEND	Mine Environment Neutral Drainage
meq/100g	milliequivalents per 100 grams
mg/kg	milligrams per kilogram
mgbs	meters below ground surface
mm	millimetre
mPa	milliPascals
Mt	million tonnes
N	normal
NP	neutralization potential

NNP	net neutralization potential
QA/QC	quality assurance and quality control
QAPP	*Quality Assurance Project Plan, Faro Mine Remediation Project*
RCD	Rose Creek Diversion
RGC	Robertson Geoconsultants Inc.
SAR	sodium adsorption ratio
SOP	standard operating procedure
SOW	scope of work
SRK	SRK Consulting Engineers and Scientists
TA	Task Authorization
TAR	Task Authorization Request
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	United States Environmental Protection Agency
WRD	waste rock dump
WTP	water treatment plant
YG	Government of Yukon
YT	Yukon Territory

SECTION 1

Introduction

CH2M HILL Canada Limited (CH2M HILL) was retained by the Government of Yukon (YG) and the Government of Canada as Represented by Aboriginal Affairs and Northern Development Canada to conduct remedial investigations and associated activities at the Faro Mine Complex (FMC), Yukon Territory (YT). These phased activities are conducted to support the overall long-term goal of remediating the FMC and reducing environmental impacts, including those associated with acid rock drainage entering nearby watercourses. This report presents the results of the site-wide borrow investigation carried out under Task Authorisation (TA) 006.

1.1 Site Description

The FMC site is located at 62 degrees (°) 18'39.74"N and 133°18'18.06"W in south-central YT, 15 kilometres (km) north of the Town of Faro and nearly 200 km northeast of the city of Whitehorse. (Figure 1) The FMC has a footprint of over 25 square kilometres (km^2) and consists of the following three distinct areas:

- The Faro Mine Area, incorporating the Faro Pit and associated waste rock dumps (WRD), a no-longer-used mill and associated buildings, and the Emergency Tailings Area (Figure 2)
- The Rose Creek Tailings Area and its impoundment, which is located in Rose Creek Valley (Figure 2)
- The Vangorda/Grum Area, which is located on the Vangorda Plateau and includes the Grum and Vangorda Pits and associated WRD (Figure 2)

The Vangorda/Grum Area consists of two open pits on the Vangorda Plateau: Grum Pit and Vangorda Pit. The pits are located approximately 10 km southeast of Faro Pit at the opposite end of the connecting haul road, as shown on Figure 2. The Grum Overburden Dump is located immediately southeast of the Grum Pit (Figure 3). The Grum Overburden Dump contains overburden material stripped from above the Grum deposit during mine development that was deposited in a series of five 15-metre (m) lifts (Robertson Geoconsultants Inc. [RGC], 1996). The dump is estimated to contain a mass of 24 million tonnes (Mt) of overburden material (SRK Consulting [SRK], 2003). Water treatment plant (WTP) sludge is stored at the northern edge of the Grum Overburden Dump in an unlined impoundment on the dump's upper surface. The sludge produced by the Vangorda WTP is periodically dredged from the WTP settling pond and transported to this location.

The "North Wall of Grum Pit/Grum Overburden Foundation" describes a till blanket to the east of Grum Pit. Geological maps and historical records (RGC, 1996; Bond, 1999; Curragh Resources Inc. [Curragh], 1979) indicate that the surficial geology in the area of the Grum Pit consists of a thick blanket of glacial till layered with thinner confined intervals of glacio-fluvial silts, sands, and gravels. This material underlies the Grum Overburden Dump and the eastern portion of the Grum Waste Dump and is bordered to the east and west by surficial materials described as a thin veneer of till (Bond, 1999; RGC, 1996) or colluvium (Curragh, 1979), overlying bedrock. The depth of overburden is deepest where it fills a buried channel that trends north-south through the pit area. Overburden depths in the pit area vary from approximately 100 m at the east wall to 40 m at the north wall and south portion of the slot cut, and pinch out at the west edge of the pit. The deposit extends approximately 1,100 m east from the eastern wall of Grum Pit, beyond the Vangorda WTP, thinning gradually toward its boundary. Mapped surficial geology soil is shown in Figure 3. A map of overburden depths produced using exploration borehole logs from the Vangorda Plateau (Curragh, 1979) is provided in Appendix A.

The "Ridge North of Grum Pit" describes a large ridge that comprises a southern spur of Mount Mye. The ridge is aligned along a northeast-southwest axis, and the western slope of the ridge forms the eastern flank of the South Fork Rose Creek drainage valley. Geological maps (Bond, 1999), indicate the upper surfaces of the ridge are composed of granitic bedrock that is predominately overlain with thin colluvium material, except in some areas of outcrop exposure. The lower slopes of the ridge above the creek are composed of distinct deposits of glacial till, glacio-fluvial sediments, or a mix of both (Bond, 1999). The ridge slopes are lightly covered with brushy vegetation

and small trees, and a broad marshy area covers the valley floor (CH2M HILL, 2013). The ridge extends outside the Order In Council boundary.

The Rose Creek Diversion (RCD) Quarry is located on the south side of the Rose Creek channel, opposite the Intermediate Dam (Figure 2). The quarry contains phyllite schist that is classified by SRK as variably strong to very strong, slightly weathered with closely to moderately spaced joints (SRK, 2003). The rock quality ranges from fair to good. Quarry access requires crossing the RCD.

1.2 Purpose

The 2013 borrow program was carried out to meet the needs of TA 006 (Site-Wide Engineering FY 2013-2014), TA013 (Water Treatment Plant Detailed Design), TA016 (Down Valley Interim Hydraulic Upgrades– Phase 1 Design Definition) and TA018 (Vangorda Diversion Design Definition). The results of the investigation will be presented under separate data reports corresponding to each TA. This report presents the results of the TA006 borrow investigation. The areas targeted under TA006 include the North Wall of Grum Pit/Grum Overburden Foundation, the Grum Overburden Dump, the Ridge North of Grum Pit, and the RCD Quarry.

The North Wall of Grum Pit/Grum Overburden Foundation and the Grum Overburden Dump were investigated as a potential borrow source for low permeability material to use for construction of covers, and the Ridge North of Grum Pit was investigated as a potential borrow source for riprap and granular materials. The RCD Quarry was initially targeted for investigation as a potential quarry for riprap materials; however, it was not investigated in 2013 because of access and safety concerns and because potential quarry investigations for other TAs would likely fill the required riprap requirements.

The objectives of the borrow investigation program include the following:

- Geochemically characterize the potential borrows to determine if the material would contribute to contaminant loading if it were relocated.
- Geotechnically characterize the material to determine whether it is suitable for the engineering applications it is sought to satisfy.
- Assess the suitability of selected low permeability borrow material as a growth medium.
- Delineate the extents of the potential borrow sources to provide rough volume estimates.

1.3 Scope of Work

The scope of work (SOW) to execute the borrow program is defined in Task Authorisation Request (TAR) 007(I), *Fiscal Year 2013-2014 Field Investigation* (CH2M HILL, 2013a), with details provided in *Develop and Decommission the Faro–Grum-Vangorda Borrow Sources, Field Sampling Plan* (CH2M HILL, 2013b). The SOW included the following:

- Review existing available data and information.
- Excavate, log, and visually classify materials encountered in 23 surface samples, 14 machine-excavated test pits, 6 sonic borings, and 10 Pionjar borings.
- Collect and analyze rock samples for riprap potential at 2 locations.
- Collect and analyze soil samples for aggregate potential at 1 location.
- Collect and analyze soil samples for plasticity and verify visual classifications at 20 locations.
- Collect soil samples and geochemically analyze at 36 locations.
- Collect soil samples and analyze for soil fertility at 24 locations.
- Conduct geological mapping at the Ridge North of Grum Pit and the RCD Quarry.
- Summarize laboratory testing.
- Prepare a data report.

1.3.1 Deviations from Initial Scope of Work

While executing the planned field work, the following deviations were made from the original SOW:

- Two of the five planned surface samples from the Ridge North of Grum Pit were not collected because of safety concerns associated with transporting rock samples on foot in an area with uneven/steep terrain and poor access.
- Exploration of the RCD Quarry was eliminated from the work plan because of access concerns related to the required crossing of the RCD.
- One of the five test pits planned for the North Wall of Grum Pit/Grum Overburden Dump Foundation was not excavated when visual reconnaissance determined that the marshy conditions of the location would not be a suitable low permeability source

1.4 Background/Previous Investigations

In 2002, SRK (then operating as Steffen Robertson and Kirsten Canada Inc.) performed a preliminary borrow investigation based on information compiled from various historical Investigations (SRK, 2002). Areas investigated included existing developed borrow sources and potential new borrow sources located within the Faro Mine Area and Vangorda/Grum Area of the site, as well as nearby offsite locations. Based on the results of the 2002 sampling program, a more comprehensive field investigation was carried out in 2003 that included the excavation of 60 test pits with limited analytical soil sampling. Laboratory analysis was performed to classify soil types and to assess soil for revegetation potential.

The 2002 SRK report included an assessment of location, volumes, and characteristics of potential borrow materials. The investigation found that sources of organic soil were insufficient, while sources of riprap, granular soils, and fine-grained, cohesive materials were potentially sufficient. However, these materials appeared to be distributed in relatively isolated pockets within the FMC; as a result, haulage costs could be relatively high (SRK, 2003).

In 2004, SRK contracted Aurora Geoscience to perform surface ground-penetrating radar and seismic refraction surveys along three alignments located at the Vangorda/Grum side of the FMC to gather stratigraphic information at potential borrow locations. Bedrock depths along the completed alignments could not be confirmed, and drilling was recommended to calibrate the data (SRK, 2006a).

In 2005, SRK investigated potential sources of fine-grained borrow material by performing drilling and sampling at the following five locations: (1) the North Slope above the Cross Valley Dam, (2) between the Faro Main Dump and the Original Tailings Impoundment, (3) east of the former Fresh Water Supply Reservoir, (4) east of the North Fork Rose Creek, and (5) northwest of the Faro Valley WRD. The investigation estimated potential quantities of borrow material and indicated that the excavation and haulage efficiencies, physical footprint size, and impacts of incremental disturbance would need to be considered if these potential borrow sources were developed (SRK, 2006b).

In 2012, CH2M HILL carried out an investigation of borrow material within the Grum Overburden Dump and performed a reconnaissance of potential borrow material sources around the FMC. The investigation of the Grum Overburden Dump involved the advancement of six boreholes and seven test pits on the Overburden Dump. The results of the investigation indicated that the sampled material contained some elevated metals with the potential to mobilize and some intervals of phyllite waste rock, but overall the material was suitable for use as cover. CH2M HILL recommended further investigation in this area (CH2M HILL, 2013c).

The findings of the 2012 borrow material reconnaissance are presented in *Limited Borrow Material Reconnaissance* (CH2M HILL, 2013d). The following seven general areas were investigated: (1) the area between the Faro Main Dump and the Original Tailings area, (2) the area east of the former Fresh Water Supply Reservoir, (3) the Vangorda/Grum Back Road, (4) the North Wall of the Grum Pit and the Grum Overburden Foundation, (5) the Grum Dump Rock Quarry, (6) the Ridge North of Grum Pit, and 7) the Faro mine Access Road granitic outcrop. The investigation consisted of digging, logging, and sampling shallow test pits and logging road cuts at

15 locations. Seventeen samples were sent for analysis of general chemistry parameters. Results indicated that the fine-grained material investigated within the North Wall of the Grum Pit/Grum Overburden Foundation was likely acceptable for use as cover, drainage material, or growth medium. Further investigation was recommended to more thoroughly characterize the total size of the deposit, its geochemical composition, and its suitability as a growth medium. The results from investigation of the Ridge North of Grum Pit confirmed that the exposed outcrops and talus slopes were composed of granitic rock that could be a suitable source of rip rap material. Results from investigation of the glaciofluvial deposits at the base of the ridge characterized the material as loose, poorly graded sand and gravel that could be a suitable source of granular material. Additional investigations were recommended to prove the borrow material potential at the Ridge North of Grum Pit (CH2M HILL, 2013d).

1.5 Geochemical Screening Criteria

The following screening criteria were used to provide a context for lab data collected across the site. These criteria were not used to identify regulatory exceedance.

1.5.1 Solids

Total metal analysis was conducted on borrow source materials to determine if any of the materials under evaluation contain elevated metal concentrations relative to several standards. The results of the total metals analysis represent what is potentially environmentally available, but they do not reflect what is immediately environmentally available. The values are meant as a general guidance to determine if further evaluation is merited. Samples with elevated metal concentrations do not correlate directly to what might be observed in future drainage from this material and, as such, do not necessarily present a potential issue to the receiving environment. It is the reactivity of the material that will control the availability or release, and over the longer term, how the reactivity of the material changes through weathering. Thus, the total metal analysis are used as a screening tool to evaluate whether additional reactivity and leachability testing is merited.

The total soil metals concentrations are compared with the median soil concentrations and elemental crustal abundance concentrations to identify relative elevated concentrations. The median soil content concentrations are reported from the Global Acid Rock Drainage Guide (GARD Guide) *(*International Network for Acid Prevention, 2010). Concentration of elemental crustal abundance are sourced from Price (1997) and presented as 10 times the average value in the continental crust. Concentrations that are 12 to 24 times the median soil content are considered elevated and have a geochemical abundance index (GAI) of 3, calculated by:

$$GAI = \log_2(\text{element concentration}/1.5*\text{median soil concentration})$$

Table 3 shows concentrations that are considered elevated (i.e., have a GAI of 3 or greater) as shaded with a grey background. Concentrations that are considered elevated based on comparisons to 10 times the elemental crustal abundance concentration are shown with italic font. When a concentration exceeds both the median soil concentration (i.e. GAI greater than three) and the 10 times crustal abundance concentration, it is shown in italic font with grey background.

1.5.2 Leach Extraction

The results from the 96-hour deionized water leach extraction were compared with the Federal Interim Groundwater Quality Guidelines for the protection of Aquatic Life assuming Industrial Land Use. The federal guidelines are based on the assumption that there is at least a 10-m flow path between the sample location and the nearest surface water body, which prevents exposure to freshwater aquatic life (Environment Canada, 2010).

1.5.3 Soil Fertility

A wide range in soil fertility values was expected. There is no single, exhaustive reference or criteria of fertility standards for restoration. The most limiting criteria for most sites are pH and salinity – if these conditions are extreme compared to the needs of the target plant community, the availability of plant nutrients is not a factor. Many plants are only adapted to a relatively narrow range of pH, and can only tolerate salinity only up to a species-specific threshold. Extremes of pH and salinity can directly prevent germination and limit growth.

Salinity Screening –Sensitive plants can tolerate up to 1,500 micro Siemens per centimetre (µS/cm) salinity (saturation extract) (Maas, 1996). Soil salinity guidelines for unrestricted land use in Alberta suggest soil quality is 'good' if soil salinity is less than (<) 2,000, fair at 2,000 to 4,000, poor at 4,000 to 8,000, and unsuitable if greater than (>) 8,000 µS/cm (Alberta Environment, 2001).

- Screening criteria were set at 1,000 to 2,000 µS/cm (i.e., salinity could be an issue for sensitive plants), and >2,000 µS/cm (i.e., salinity could be an issue for a wider range of plants).

pH Screening – Soil pH (1:2 Soil pH) is a master variable, affecting the availability and uptake of many nutrients and potential toxicants. As a general rule, root growth for many plants is not greatly affected within a pH range of 5.0 to 7.5 (Marschner, 1995). Soil pH values below 5.0 to 5.5 can indicate potential for toxic levels of aluminum or manganese (McBride, 1994), even in uncontaminated soils. Alkaline soils typically have very low levels of available metal nutrients, such as zinc. Soil pH values above 8.5 typically indicate excess sodium (McBride, 1994).

- Screening criteria were set at a pH of <5.5 or >7.5. Soils inside this range should support a wide range of plants with modest if any soil amendments for pH.

Boron Screening – Boron is somewhat unusual among the essential nutrients in that the desirable concentration range is narrow – higher or lower concentrations can mean toxicity or nutrient deficiency respectively. Most crop requirements for boron are met with 0.5 to 1.0 milligrams per kilogram (mg/kg) hot water extractable boron, with toxicity a problem with levels above 5 mg/kg (Ponnamperuma et al., 1981, as cited in Johnson and Fixen, 1990).

- Screening criteria were set at <0.3 and >1 mg/kg

Cation Exchange Capacity – The soil cation exchange capacity (CEC) influences the availability of nutrients such as calcium, magnesium, and potassium. If soil chemistry needs to be adjusted with amendments, lower rates are required for low CEC soils, and higher rates for higher CEC soils. A typical range for CEC is 3 to 5 milliequivalents per 100 grams (meq/100g) (sands) to 50 to 100 meq/100g (organic soils such as mucks).

- A screening criteria of <10 meq/100g was set as a means of identifying the more infertile soils.

Exchangeable Sodium Percentage/Sodium Adsorption Ratio – Excess sodium is problematic for soils, primarily because of its adverse impacts on soil structure (dispersion of soil clay particles), but also for potential extremes of pH (above 8.5), nutrient imbalances, and potential toxicity for some plants. The most commonly used traditional threshold to characterize soils as 'sodic' is an exchangeable sodium percentage (ESP) of 15 percent or more. Studies in some areas have shown that sodium can adversely affect soils at much lower ESP values (Sumner, 1993). Soil sodium adsorption ratio (SAR) is easier to measure accurately than ESP, but can be converted using a standard equation to a reasonable estimate of ESP. The values of ESP and SAR are typically numerically similar for most soil conditions.

- A screening criteria of >5 percent ESP was set as a conservative means of identifying soils affected by sodium.

1.5.4 Acid Base Accounting

The Acid Base Accounting (ABA) dataset for the borrow source investigation was compiled to evaluate the potential for borrow material to generate (or neutralize) acid. This evaluation will be used to support engineering and design applications, and assess the suitability of the borrow material as a growth medium. Generally, acid potential (AP) is determined based on some form of the sulphur content in the material and converted to units of calcite per tonne ($CaCO_3$/tonne); however, AP can represent a calculation based (1) solely on total sulphur content, (2) on total sulphur minus sulphate sulphur, or (3) by direct measurement of the sulphide sulphur content (Mine Environment Neutral Drainage [MEND], 1991). AP calculations can also be determined using the total sulphur content, subtracting the acid-soluble sulphate sulphur, the barium sulphate sulphur, and the amount of theoretical sulphur associated with non-acid generating metal sulphides such as lead and zinc. These complex calculations used concentrations of barium, lead, and zinc to estimate the sulphur content not associated with highly reactive iron sulphides. The calculations generally followed the equation (SRK, 2004):

$$S_{Fe}(\%) = S_{total}(\%) - 32.15 * \left[\frac{Zn\,(\%)}{65.4} + \frac{Pb\,(\%)}{207} + \frac{Ba(\%)}{137}\right] - S_{sulphate}(\%)$$

Where:

S_{Fe} = lead sulphide as sulphur
S_{total} = total sulphur
Zn = zinc
Pb = lead
Ba = barium
$S_{sulphate}$ = sulphate as sulphur
% = mass percent

This study calculated the AP by removing the sulphur contribution from acid soluble and barium sulphates and the concentration of metal sulphide minerals that were not expected to contribute acid to the system (i.e., Pb and Zn).

Values of neutralization potential (NP) were determined using the modified Sobek method (MEND, 1991; Lawrence et al, 1989). The modified Sobek method for NP determination requires a 24-hour acid digest at room temperature (MEND, 1991). Analyzing NP by the modified Sobek method (MEND, 1991; Lawrence et al., 1989) may provide a more realistic indication of the readily available carbonate minerals than other NP determination methods, such as the standard Sobek method (MEND, 1991).

Although these methods provide a fast and cost-effective means of measuring the ABA properties of a material, the interpretations may be limited by the following factors (which static tests do not measure) (MEND, 1991):

- Rates of acid generation and NP depletion
- Actual sample stoichiometries
- Presence of long-term acid consuming materials versus highly reactive and readily available acid consuming materials
- Sample variability

1.5.5 Data Review

ABA testing is generally used to predict the tendency of a material to generate or neutralize acid by providing a snapshot of the balance between the acid production and acid neutralization, based on the sulphur content and presence of neutralizing species such as carbonate minerals. Numerous interpretive indices are used to evaluate ABA data, including paste pH, NP:AP ratios, and net neutralization potential (NNP). Paste pH provides an estimate of the readily available acidity or alkalinity in a solid. Generally, a paste pH greater than 7 indicates the presence of a reactive carbonate phase, and a paste pH less than 5 may signify the sample has already gone acidic (i.e., is a previously weathered sample) (MEND, 1991). The relative amount of NP and AP is typically assessed through the NP:AP ratio, calculated by dividing the NP by the AP, and through the NNP, calculated by subtracting the AP from the NP. Various guidance criteria are published and used in decision-making. Generally, these criteria are divided into categories of “potentially acid-generating,” “non-acid-generating,” and “intermediate” for the ABA characteristics, and provide the following threshold values (United States Environmental Protection Agency [USEPA], 1999):

- NP:AP values greater than 3:1 suggest non-acid-generating material
- NP:AP values less than 1:1 suggest potentially acid-generating material
- NP:AP values between 1:1 and 3:1 suggest intermediate or uncertain material
- NNP values greater than zero suggests net acid-neutralizing material
- NNP values less than zero suggests net acid-generating material

These criteria provide the basis for determining whether a particular rock type will be suitable borrow material for future construction at the FMC.

SECTION 2

Field Investigation Activities

2.1 Summary

The following sections detail the field investigation completed between June 6 and September 3, 2013, under TA006.

2.2 Surface Samples

A total of 15 surface soil sample locations were logged and sampled at selected locations in the North Wall of Grum Pit/Grum Overburden Foundation between July 8 and July 15, 2013. The locations are shown on Figure 3. Soil profiles were logged by either observing existing vertical exposures, such as road cuts, pit wall slopes or existing borrow excavations or where existing vertical exposures were absent, a hand shovel and pick were used to excavate small test pits 0.5- to 1.0-m deep. Soil was logged following the procedure for test pit logging, described in standard operating procedure (SOP) INV017, Logging and Sampling of Test Pits (CH2M HILL, 2012a). Soils were classified following ASTM International (ASTM) D2488, Standard for Description and Identification of Solid (Visual-Manual Procedure) (ASTM, 2012). The collected samples were labelled in accordance with SOP SMP011, Sample Nomenclature (CH2M HILL, 2012b) and shipped to the testing laboratory in accordance with SOP PCS002, Sample Packing, Shipping and Storage (Environmental) (CH2M HILL, 2012c) and SOP PCS016, Sample Packing, Shipping and Storage (Geotechnical) (CH2M HILL, 2012d).

A total of three surface bedrock locations were logged in the Ridge North of Grum Pit on September 3, 2013; these sites are shown on Figure 4. Geological characteristics were logged using visual observation at sites with existing bedrock exposures, including outcrops and existing borrow areas. A pick axe and sledge hammer were used to break pieces of the exposed bedrock free to expose fresh rock surfaces. These surfaces were logged following the procedure described in ASTM D5435-12, Standard Guide for Field Logging of Subsurface Explorations of Soil and Rock. A total of 2 rock samples were collected for laboratory analysis. Efforts were made to obtain fresh rock samples by selecting rock pieces with minimal evidence of weathering. At locations where no fresh rock pieces were available, samples were obtained by breaking fresh pieces of rock from the bedrock exposure using a sledge hammer. The collected samples were labelled in accordance with SOP SMP011, Sample Nomenclature (CH2M HILL, 2012b) and shipped to the testing laboratory in accordance with SOP PCS002 Sample Packing, Shipping and Storage (Environmental) (CH2M HILL, 2012c) and SOP PCS016, Sample Packing, Shipping and Storage (Geotechnical) (CH2M HILL, 2012d).

Field logs are presented in Appendix B, Boring Logs. Photos from the borrow program are provided in Appendix C, Photographic Log. A summary of completion depths and locations is provided in Table 1, while analytical results are provided in Tables 2 through 7.

2.3 Pionjar Drilling

A total of 10 boreholes were completed between August 8 and August 25, 2013, at selected locations in the Ridge North of Grum Pit and the North Wall of Grum Pit/Grum Overburden Foundation using a Pionjar backpack-portable drill rig. The locations of the boreholes are shown on Figures 3 and 4. Boreholes were completed in unconsolidated materials to refusal depth, bedrock contact, 2 to 3 m below the water table, or to the limit of the available drill string length, whichever was reached first. Composite soil samples were collected below the topsoil interval; all organics were excluded from sample.

At some sites, the sample volume recovered from the drill core was insufficient for the prescribed laboratory analyses. At these locations, the sample was supplemented with material gathered from hand-excavated test pits dug adjacent to the boring. The samples from the test pit and borehole were visually examined to confirm similar gain size distribution. Geochemical analysis was run on both samples in order to ensure consistency.

Pionjar borehole drilling was undertaken by Kryotek Ltd. and was completed between August 20 and August 26, 2013. CH2M HILL personnel identified the proposed location of each borehole using a GPS unit, supervised the drilling, collected soil samples from and logged each borehole in accordance with SOP PCS001, Boring Logs Completion, Soil Classification, and Logging (CH2M HILL, 2012e). The collected samples were labelled in accordance with SOP SMP011, Sample Nomenclature (CH2M HILL, 2012b) and shipped to the testing laboratory in accordance with SOP PCS002 Sample Packing, Shipping and Storage (Environmental) (CH2M HILL, 2012c) and SOP PCS016, Sample Packing, Shipping and Storage (Geotechnical) (CH2M HILL, 2012d).

Boring logs are presented in Appendix B and photos from the borrow program are provided in Appendix C. A summary of completion depths and locations is provided in Table 1, while analytical results are provided in Tables 2 through 7.

2.3.1 Test Pits

A total of 14 test pits were excavated between August 13 and August 27, 2013, at selected locations in the Overburden Dump and east of the North Wall of Grum Pit/Grum Overburden Foundation using a Cat 345 Excavator with a 4-foot-wide bucket equipped with a thumb. The locations of the test pits are shown on Figure 3. Test pit excavation was completed by Tlicho Engineering and Environmental Services Ltd. and was completed between July 3 and August 27, 2013. CH2M HILL personnel identified the proposed location of each testpit using a GPS unit, supervised the excavation, collected soil samples, and logged each test pit. The test pits were logged and described according to SOP INV017, Logging and Sampling of Test Pits (CH2M HILL, 2012a).

Boring logs are presented in Appendix B and photos from the borrow program are provided in Appendix C. A summary of completion depths and locations is provided in Table 1, while analytical results are provided in Tables 2 through 7.

2.3.2 Sonic Drilling

A total of six boreholes were advanced between July 18 and July 23, 2013, in the Overburden Dump and North Wall of Grum Pit/Grum Overburden Foundation using a truck-mounted Rotosonic drill rig. The locations of the boreholes are shown on Figure 3. Boreholes CH13-311-BH011 through CH13-311-BH015 were advanced within the Grum Overburden Dump area and CH13-311-BH010 was installed in the North Wall of Grum Pit/Grum Overburden Foundation close to the Vangorda WTP. The boreholes were advanced to approximately 50 metres below ground surface (mbgs) or bedrock contact, whichever was reached first.

The six boreholes were advanced by Tervita, under subcontract to CH2M HILL, using a truck-mounted Gus Pech sonic drill rig. A pipe truck with a Hiab loader crane was also used to handle drill pipe and casing. The boreholes were advanced through overburden using a nominal 100 millimetres (mm) inside-diameter sonic drill barrel inside of a nominal 150-mm inside-diameter casing. Boreholes were drilled in accordance with SOP INV001, Drilling (CH2M HILL, 2012f) and were logged by CH2M HILL field staff in accordance with SOP PC001, Boring Logs Completion, Soil Classification, and Logging (CH2M HILL, 2012e).

Continuous soil samples were obtained via recovery of soil with the sonic drill rig. Composite grab samples from approximately 1-m-long sections of recovered soil core were collected for possible laboratory analyses at approximate 5-m intervals, dependent upon the material observed in the soil cores. Soil samples were collected in accordance with SOP INV003, Borehole Sampling and Testing (CH2M HILL, 2012g). The collected samples were labelled in accordance with SOP SMP011, Sample Nomenclature (CH2M HILL, 2012b) and shipped to the testing laboratory in accordance with SOP PCS002 Sample Packing, Shipping and Storage (Environmental) (CH2M HILL, 2012c) and SOP PCS016, Sample Packing, Shipping and Storage (Geotechnical) (CH2M HILL, 2012d).

Challenger Geomatics Ltd. surveyed the drilled locations August 24, 2013, in accordance with SOP MSR006, Geographic Land Surveying and Field Surveying Procedures (CH2M HILL, 2012h). The surveyed coordinates (northings and eastings) and ground elevations are provided in Table 1 and indicated in the borehole logs in Appendix B.

All boreholes were backfilled with 9.5-mm (3/8-inch) bentonite chips after reaching the target depth.

Boring logs are presented in Appendix B and photos from the borrow program are provided in Appendix C. A summary of completion depths and locations is provided in Table 1, while analytical results are provided in Tables 2 through 7.

2.3.3 Laboratory Testing

Laboratory testing for geochemical characterisation of rock and soil samples, was completed by ALS in Whitehorse, YT, under subcontract to CH2M HILL. Laboratory testing was performed in accordance with the *Quality Assurance Project Plan, Faro Mine Remediation Project* (QAPP) (CH2M HILL, 2013e). All rock samples submitted to ALS were crushed in the laboratory to prepare them for geochemical testing. Samples (64 environmental samples and 10 field duplicates) were collected between July 12 and August 27, 2013, and were submitted to ALS. Laboratory reports are provided in Appendix D. Analytical results are tabulated in Tables 2 through 7.

Laboratory testing for geotechnical characterisation for gradation, moisture, and Atterberg limit testing of soil samples was completed by ALS under subcontract to CH2M HILL. Laboratory testing for geotechnical characterisation for unconfined compressive strength, petrographic analysis, and concrete aggregate testing was completed by Golder Associates Ltd. (Golder) under subcontract to CH2M HILL. Three samples were collected between August 24 and September 3, 2013, and submitted to Golder in Burnaby, British Columbia. Laboratory reports are provided in Appendix D. Analytical results are tabulated in Tables 8 through 9. The following subsections summarize the laboratory tests performed and the methods used.

2.3.3.1 Geochemical Testing

A total of 36 samples were submitted for geochemical lab analysis (Appendix E). The samples were subjected to the following analyses:

- Paste pH testing (Sobek et al., 1978)
- Total metal analysis (prepared using USEPA 3050B or equivalent and analyzed using USEPA SW6010B/SW6020 or equivalent) for aluminum, antimony, arsenic, barium, calcium, cadmium, cobalt, copper, iron, lead, magnesium, manganese, molybdenum, nickel, phosphorus, potassium, selenium, silver, sodium, strontium, sulphur, thallium, titanium, uranium, and zinc

A total of 64 samples were submitted for ABA analysis (following SOP SMP014 and Price, 2009) to characterize the material's propensity to generate or neutralize acid. This analysis included the following tests:

- Total inorganic carbon (American Public Health Association [APHA] SM5310C)
- Total sulphur (Leco Combustion)
- Modified neutralization potential (Modified Sobek)
- Acid-soluble sulphate-S (Method E600/2-78-054)
- Ba (Li-Metaborate)

Twelve samples identified by the project geochemist as having elevated total metal concentrations were subjected to the following additional analysis:

- A 96-hour deionized water leach extraction following SOP SMP014 with leachate analyzed for:
  - Paste pH, pH, and paste pH (CSSS/APHA 4500H and CSSS/APHA 4500H_DI)
  - Alkalinity (including calculated carbonate and bicarbonate) on samples with pH >4.5 (Method SM2320B_DI)
  - Acidity (Method SM2310_DI)
  - Sulphate (Method SM4110B_DI)
  - Dissolved metals (aluminum, antimony, arsenic, barium, calcium, cadmium, cobalt, copper, iron, lead, lithium, magnesium, manganese, molybdenum, nickel, potassium, selenium, silica, silver, sodium, strontium, sulphur, thallium, titanium, uranium, and zinc) (Method SW6020A_DI)

Forty-five samples were submitted for soil fertility/salinity analysis using the following tests:

- pH (1:2 $CaCl_2$)
- Shoemaker-McLean-Pratt buffer method (SMP) Buffer pH (for pH<6.0)
- 1 Normal (N), pH 7.0 ammonium acetate (NH_4OAc) extractable calcium, magnesium, potassium, sodium
- Available phosphorus (Mehlich 3)
- Calcium dihydrogen phosphate ($Ca[H_2PO_4]_2.H_2O$), extractable sulphate-sulphur (SO_4-S)
- Available micronutrients (zinc, iron, copper, manganese) (Mehlich 3 Extraction)
- Soluble salts (1:1 paste as initial screening)
- Electrical conductivity of the soil saturation extract (EC_e) (saturation paste) (run on any sample with soluble salts >0.5 deciSiemens per metre [dS/m])
- SAR, based on Ca, Mg, and Na in soil saturation extract (run on any sample with soluble salts > 0.5 dS/m)
- Calcium carbonate equivalent (run on any sample with pH > 7.5; gravimetric method for loss of carbon dioxide)
- Total N (Leco Combustion)
- Total Organic Carbon (Walkley-Black)
- Cation exchange capacity (estimated from NH_4OAc-exchangable cations)
- Ammonium-N (NH_4-N) (2N potassium chloride extraction)
- Nitrate nitrogen (NO_3-N) (2N potassium chloride extraction)

2.3.3.2 Geotechnical Testing

A total of 43 samples were submitted for geotechnical and geological laboratory analysis, including 40 samples of low permeability soils, 1 sample of granular soil and 2 rock samples. The 40 samples of low permeability soil were subjected to the following analyses by ALS:

- Gradation by sieve and hydrometer testing
- Moisture content (results from locations CH13-311-BH010 – CH13-311-BH015 may be affected by the use of fluids during drilling)
- Plasticity using moisture content at the liquid limit and Atterberg Limits tests

Two rock samples collected from the Ridge North of Grum Pit were subjected to the following analyses by Golder:

- Unconfined compressive strength to evaluate the rocks strength and assist with evaluating quarry wall strength
- Petrographic examination to identify deleterious minerals

One sample of coarse-grained soil was submitted to Golder for the following analyses:

- Organic impurities
- Petrographic examination
- Relative density and absorption
- Particle shape (flat and elongate)

Results from the organic impurities test revealed unacceptable quantities of organic material within the sample. Consequently, the petrographic examination, relative density & absorption and particle shape analyses were cancelled and not performed.

2.3.3.3 QA/QC

CH2M HILL has incorporated a quality assurance and quality control (QA/QC) plan into field sampling programs. QA/QC field samples were collected during soil sampling activities and were used to evaluate the quality of the analytical data generated. QA/QC measures during the 2013 field program included the collection and submission of (1) duplicate samples amounting to at least 10 percent of the samples collected and (2) equipment blank samples. No duplicates or equipment blanks were collected for geotechnical samples. The laboratory data that CH2M HILL collected in 2013 was validated in accordance with the QAPP (CH2M HILL, 2013e). The findings of this data validation will be reported in two separate data quality summary reports, specific to each sample matrix (i.e., solids or water). Analytical data is stored in the Environmental Quality Information System (EQuIS) (https://equis.critigen.com/FaroMine) database.

Field QA/QC samples are designed to (1) identify potential matrix interferences, (2) evaluate sources of sample contamination (equipment blanks) and variation introduced by the process of sample collection, handling, and analysis (duplicate field samples), (3) and verify the effectiveness of analytical methods (matrix spike/matrix spike duplicate samples).

2.3.4 Sample Handling

Specific laboratory methods, bottle requirements, field preservation requirements, and sample volumes for the analyses are provided in the QAPP (CH2M HILL, 2013e). Samples were assigned a unique identification number (that is, an alpha-numeric code, in accordance with SOP SMP011 [CH2M HILL, 2012b]).

Sample handling procedures followed SOPs PCS002 and PCS0016 (CH2M HILL, 2012c and 2012d). Soil samples for geochemical analysis were collected in sealable plastic bags and placed in a second plastic bag after labelling to provide added protection from tears, label removal, and melted ice. Sample bags were placed inside coolers and shipped to ALS in Whitehorse, YT.

Soil samples for geotechnical analysis at Golder were collected in 20-litre buckets and smaller rock samples were collected in woven plastic bags. The filled sample buckets and bags were arranged inside wooden “apple box” crates that were subsequently lidded and palletized for shipping.

The onsite sample manager, in coordination with the project chemist and the project geotechnical and geochemistry teams, determined which samples were sent to the laboratory and which analytical methods were selected when field decisions were required.

2.3.5 Data Quality Evaluation Reports

Data quality evaluation (DQE) reports were generated for the analytical geochemical data produced in the 2013 TA006 borrow investigation. The report presents general data quality assessments that summarize validation methodologies, issues encountered, and flags assigned to data.

No samples were rejected, but some samples were flagged as a result of exceeding short holding times and sample temperature acceptance criteria. The holding time and temperature exceedances were a result of the site’s remote location, insufficient ice, and laboratory capacity shortages. Corrective actions were taken to ensure exceedances were not repeated. The overall quality of the analytical program and laboratory met the standards of 90 percent completeness set out by the QAPP. Appendix E presents the complete DQE Reports.

SECTION 3

Data Analysis

Analytical results were tabulated and compared with the selected screening criteria, and are presented as follows:

- Table 1: summary of borehole and test pit completions
- Table 2: summary of analytical gradation and Atterberg limits test results
- Table 3: results of general chemistry analyses
- Table 4: results of leach extraction analyses
- Tables 5 and 6: ABA analysis results
- Table 7: results of soil fertility analyses

Appendix D provides a copy of the laboratory certificates. The analytical data is stored in the EQuIS database (https://equis.critigen.com/FaroMine). The following subsections summarize the analytical results from each area investigated.

3.1 Grum Overburden Dump

The following subsections provide the results of the field investigation activities relating the Grum Overburden Dump.

3.1.1 Geology

Field logging and geotechnical analysis of laboratory samples indicate the subsurface profile within the Grum Overburden Dump consists of mixed glacial till and glacio-fluvial material predominately composed of either silty/clayey sand or sandy silt/clay with occasional fractions of gravel. Some infrequent thin intervals of waste rock were encountered. Soil texture was determined from laboratory gradation results based on the Unified Soil Classification System (USCS) and the U.S. Department of Agriculture (USDA) soil classification system (Table 2). The predominant soil texture of the samples analysed from the Grum Overburden Dump is loam (75.7 percent) and sandy loam (24.3 percent). The predominant USCS lithology is silty sand (41.4 percent), followed by clayey sand (10.4 percent), sandy lean clay (10.4 percent), sandy silt (10.4 percent), silty clayey sand (6.9 percent), silty clay with sand (6.9 percent), clayey sand with gravel (3.4 percent), gravelly clay with sand (3.4 percent), silt with sand (3.4 percent) and silty sand (3.4 percent).

The volume of the Grum Overburden Dump was estimated using geographic information system software by calculating the volume between raster surfaces interpolated from contour lines representative of the Overburden Dump's current topography and the original topography within the footprint of the Overburden Dump. Results from this calculation produced an estimated mass of 24 Mt.

3.1.2 Geochemical Results

A total of 35 samples (not including duplicates) collected from test pits and boreholes in the Grum Overburden Dump were submitted for geochemical analysis.

Comparison of total metal results to the GARD guidelines indicate that the majority of the results fall within the guidelines (Table 3). Of the 35 samples analyzed from the 2013 field program, seven had elevated arsenic levels, three had elevated cadmium, eight had elevated lead, six had elevated mercury, five had elevated phosphorus, and five had elevated zinc. Comparison of the total metal concentrations to the MEND guidelines found that 10 samples had elevated antimony, 14 had elevated arsenic, 31 had elevated bismuth, 6 had elevated cadmium, 11 had elevated lead, 12 had elevated selenium, 9 had elevated silver, and 7 had elevated zinc.

Two samples (from test pits CH13-311-TP004 and CH13-311-TP006) were selected for a 96-hour deionized water leach test. Concentrations of soluble constituents mobilized through deionized water extraction exceeded the

Canadian Environmental Quality Guidelines (CEQG) guidelines (Canadian Council of Ministers of the Environment, 2007) for cadmium, selenium, sulfate, uranium and zinc (Table 4).

Results from ABA analyses carried out on samples collected from the Grum Overburden Dump indicated neutral paste pH (median 7.45) and NP values ranging from 19 tonne $CaCO_3$ equivalent/1000 tonne to 75 tonne $CaCO_3$ equivalent /1000 tonne (Tables 5 and 6). The median NP:AP ratio (8.83) and NNP value (18.86 tonne $CaCO_3$ equivalent /1000 tonne) identify the Grum Overburden Dump as a net-neutralizing material. Of the three main areas (Grum Overburden Dump, North Wall of Grum Pit, and the Ridge North of Grum Pit), the Grum Overburden Dump exhibited the greatest values of NP, and the greatest median values of NP:AP and NNP.

Of the three main areas investigated (Grum Overburden Dump, North Wall of Grum Pit, and the Ridge North of Grum Pit), total metals concentrations were most elevated in samples collected from the Grum Overburden Dump. This may be attributed to the origin of the material within the dump; the Grum Overburden Dump consists of material excavated from directly above the Grum ore body and containing a small fraction of waste rock, whereas the native material north and east of the Grum Pit is more distant from the ore body and consists of undisturbed glacial deposits. While the geochemical results from samples collected within the Grum Overburden Dump varied between test locations and across various depths, no spatial patterns were discerned. Samples from two test pits (CH13-311-TP003 and CH13-311-TP002) located adjacent to the WTP sludge impoundment exhibited similar metal contents to samples collected distant from the sludge impoundment, and therefore did not appear to be affected by proximity to the stored sludge.

3.1.3 Soil Fertility

Twenty-nine samples and nine duplicates collected from the Grum Overburden Dump were analyzed for soil fertility (Tables 7a and 7b). The material had low boron, available phosphate, organic matter, and CEC, indicating an overall low fertility. In general, all of the samples from the Grum Overburden Dump had low fertility, with low levels of inorganic nitrogen (NO3-N and NH4-N), low plant available phosphorus, low potassium, and low organic matter. Soil organic matter levels were variable, ranging from 0.35 to 2.39 percent; however, values were generally very low, typical of subsoil materials. Exchangeable potassium values were extremely low, generally below detection limits.

A significant factor affecting the results of some samples is the presence of free carbonates, especially calcium carbonate. In general, free carbonates are present and influence fertility data in cases where soil pH was greater than 7.5 and inorganic carbon (as $CaCO_3$ equivalent) was greater than 1 percent. In such cases, the exchangeable calcium exceeded the total CEC. As a result, in instances where there are free carbonates, CEC and exchangeable cation data are not reliable. In contrast, where pH values were low, cation exchange data do not reflect the presence of exchangeable acidity (i.e., Al3+ and H+), which will consume part of the CEC. Detailed data on exchangeable acidity are found in other sections of this report. Following are the results relative to screening criteria:

- Salinity – all samples were well within screening criteria, and this parameter should not significantly affect revegetation planning.
- ESP/SAR – SAR data are well within screening criteria, and this parameter should not significantly affect revegetation planning. ESP values were not determined because of low levels of exchangeable sodium.
- pH – Samples indicated a relatively narrow range of soil reaction, ranging from 7.62 to 7.97 (1:2 CaCl2), slightly above the screening criteria. These alkaline soils may affect plant selection, but will not likely require pH-lowering amendments.
- Boron – Values were all below the screening criteria, suggesting fertilization with boron may be beneficial. Organic amendments are often the best means of supplying additional boron. Native species may be tolerant of very low levels of boron.
- CEC – All samples were below the screening criteria. Some soil amendment rates will need to be adjusted for low CEC. Organic amendments will be helpful.

3.2 The North Wall of Grum Pit/ Grum Overburden Foundation

The following sections provides the results of the field investigation activities relating the North Wall of Grum Pit/ Grum Overburden Foundation.

3.2.1 Subsurface Conditions

Results from field logging and geotechnical analysis of laboratory samples indicate the subsurface profile within the North Wall of Grum Pit/Grum Overburden Foundation consists predominantly of glacial till composed of either silty or clayey sand. Soil texture was determined from laboratory gradation results based on the USCS and USDA soil texture classification system (Table 2). The predominant USDA soil texture of the samples analysed from the Grum Overburden Foundation and North Wall of Grum Pit/Grum Overburden Foundation is sandy loam (60 percent) followed by loam (30 percent) and loamy sand (10 percent). The predominant USCS lithology is silty sand (50 percent), followed by silty sand with gravel (30 percent), silty clayey sand (10 percent) and well-graded gravel with sand (10 percent). Surface samples collected from the North Wall of Grum Pit/Grum Overburden Foundation contained a smaller fraction of fines than samples collected from the Grum Overburden Dump. It is believed this may be caused by washing of the fines resulting from runoff down the surface of the pit walls.

In the majority of test pits and boreholes completed in the North Wall of Grum Pit/ Grum Overburden Foundation, no groundwater was encountered. However, groundwater was encountered in CH13-311-BH003 and CH13-311-BH004 at depths of 3.7 mbgs and 0.61 mbgs, respectively. Both of these boreholes were completed relatively close (within 30 m) to a marsh with pooled surface water that drains west toward Grum Pit. Borehole CH13-311-BH010 was also located close (20 m) to the marsh and pooled surface water, but no groundwater was conclusively identified at this location; intervals of wet soil were encountered at 1.5 mbgs and 10.6 mbgs. Water was also encountered at CH13-311-TP001 at the northwest edge of the Grum Overburden Dump a depth of 1.83 mbgs; the source of water at this location is unclear.

The completion depths and soil types observed in the Grum Dump and Grum Dump Foundation corroborate the overburden depths and surficial geology indicated in Curragh (1979) and Bond (1999), with the exception of observations in the northeast boundary of the till deposit at boreholes CH13-311-BH010, CH13-311-BH003, and CH13-311-BH004. While Curragh indicates these borehole locations are situated beyond the northeast boundary between the till blanket unit and a unit of thin colluvium over bedrock, till material was observed in each borehole, and bedrock contact was encountered at 15.24 mbgs at CH13-311-BH010.

The volume of overburden material within the Grum Overburden foundation and North wall of Grum Pit was estimated from existing maps of overburden depth using geographic information system software. The total volume of overburden material above bedrock within the area depicted in Figure 3 was calculated to be 20 million cubic metres (Mm^3). However, it is assumed that the volume of material that could be used for borrow would be much smaller, because the excavation depths would be limited by the depth of the water table and slope stability considerations. Assuming maximum excavation depths of 5 m, 10 m, and 20 m, material volumes of 5.2 Mm^3, 9.3 Mm^3, and 14.2 Mm^3 were estimated, respectively. This correspond to masses of 14 Mt, 24 Mt, and 36 Mt respectively, assuming a specific gravity of 2.6.

3.2.2 Geochemistry

A total of 15 samples from the North Wall of Grum Pit/Grum Overburden Foundation area were analysed for total metals. Comparing the results to the GARD guidelines, most samples were found to be within the guideline, with the exception of elevated phosphorous concentrations found in four samples. Comparing the results to the MEND guidelines, elevated arsenic concentrations were found in four samples, elevated bismuth concentrations were found in fifteen samples, and elevated selenium concentrations were found in one sample (Table 3).

Ten samples from this area were selected for a 96-hour deionized water leach test. Concentrations of soluble constituents mobilized through deionized water extraction exceeded the CEQG guidelines for arsenic (three samples), chromium (two samples), copper (five samples), iron (three samples), lead (three samples), nickel (two samples), selenium (five samples), silver (two samples), sulfate (nine samples), and zinc (two samples) (Table 4).

Results from ABA analyses carried out on samples collected from the North Wall of Grum Pit/Grum Overburden Foundation indicated neutral paste pH (median 7.39) and NP values ranging from 3 tonne $CaCO_3$ equivalent/ 1000 tonne to 67 tonne $CaCO_3$ equivalent /1000 tonne (Tables 5 and 6). The median NP:AP ratio (8.83) and NNP value (9.62 tonne $CaCO_3$ equivalent /1000 tonne) identify this area as composed of net-neutralizing material.

3.2.3 Soil Fertility

Nine samples and one duplicate from the North Wall of Grum Pit/Grum Overburden Foundation were analyzed for soil fertility (Tables 7a and 7b). Most of the results fell within the expected ranges. In general, all of the samples from the North Wall of Grum Pit/Grum Overburden Foundation had low fertility, with low levels of inorganic nitrogen (NO3-N and NH4-N), low plant available phosphorus, potassium, low cation exchange capacity, and low organic matter. Soil organic matter levels were quite variable, ranging from 0.3 percent to more than 3 percent, but in general, values were very low, typical of subsoil materials. Exchangeable potassium values were extremely low, generally below detection limits.

A significant factor affecting the results of some samples is the presence of free carbonates, especially calcium carbonate. In general, where soil pH was greater than 7.5, inorganic carbon (as $CaCO_3$ equivalent) was 1 percent or more, and exchangeable calcium exceeds CEC, free carbonates are present and influence fertility data. Where there are free carbonates, CEC and exchangeable cation data are not reliable without special procedures such as pre-treatment. In contrast, where pH values were low, cation exchange data do not reflect the presence of exchangeable acidity (i.e., Al3+ and H+), which will consume part of the CEC. Detailed data on exchangeable acidity are found in other sections of this report. Following are the results relative to screening criteria:

- Salinity – all samples were well within screening criteria, and this parameter should not significantly affect revegetation planning.
- ESP/SAR – SAR data are well within screening criteria, and this parameter should not significantly affect revegetation planning. ESP values were not determined because of low levels of exchangeable sodium.
- pH – Samples indicated a wide range of soil reaction, ranging from 5.07 to 7.83 (1:2 $CaCl_2$), below and above the screening criteria. The more acidic soils may need soil amendments such as lime to prevent toxicity of metal elements such as aluminum and manganese, and may affect plant selection. The more alkaline samples will affect plant selection, but will not likely require pH-lowering amendments.
- Boron – Values were all below the screening criteria, suggesting fertilization with boron may be beneficial. Organic amendments are often the best means of supplying additional boron. Native species may be tolerant of very low levels of boron.
- CEC – Most samples were below the screening criteria. Some soil amendment rates will need to be adjusted for low CEC. Organic amendments will be helpful.

3.3 The Ridge North of Grum Pit

The following sections provides the results of the field investigation activities relating the Ridge North of Grum Pit.

3.3.1 Subsurface Profile

The results from field logging, geological analysis and geotechnical analysis of bedrock exposures on the Ridge North of Grum Pit confirm that the ridge is composed of granite. CH2M HILL personnel noted that the ridge is composed of a medium strong to strong course grained granite with moderate weathering and close joint spacing. Petrographic analysis and unconfined compressive strength tests were conducted on rock samples from two locations at the Ridge North of Grum Pit, CH12-311-SS038, and CH12-311-SS039 (Figure 4). Sample CH13-311-SS038 was found to be a medium grained gneissic granodiorite that contained 86.9 percent “good,” 12.4 percent “fair” and 0.7 percent “poor” quality material (Table 8A). The sample failed at a maximum load of 153.70 kiloNewtons (kN) under a stress of 94.0 Mpa by vertical fracturing. The sample collected from location CH13-311-SS039 was gneissic granodiorite that contained 83.9 percent good material, 15.7 percent fair and 0.4 percent poor quality material (Table 8B). The sample failed at a maximum load of 80.40 kN under a stress of 49.8 milliPascals (MPa) by vertical fracturing.

The soil samples collected from the Pionjar boreholes completed in the glacio-fluvial deposits at the base of the Ridge North of Grum Pit were analyzed for gradation and Atterberg limits. The results and soil lithology classifications are presented in Table 2. The USDA soil texture of the samples analysed from the Ridge North of Grum Pit ranged from sandy loam to sand, and the USCS lithology varied from well graded sand to sandy elastic silt with gravel. These observations show good agreement with the existing surficial geology maps (Bond, 1999), which indicate the presence of till material in the areas where predominantly fine-grained material was encountered (CH13-311-BH023 and CH13-311-BH020) and glacio-fluvial deposits where soils with minor fines contents were encountered (CH13-311-BH021, CH13-311-BH022, CH13-311-BH024). Of the locations investigated, only one location, CH13-311-BH024, appeared to be well suited for use as an aggregate source because of the low fines fraction encountered there.

A sample from CH13-311-BH022 was submitted for geotechnical testing to appraise its suitability for concrete aggregate. The sample was first tested for organic impurities and was found to have a colour plate value of 5. Since colour plate values greater than No. 3 are considered unsuitable for use as concrete (Canadian Standards Association, 2011), further aggregate testing on the sample was not performed.

3.3.2 Geochemistry

A total of six soil samples from the Ridge North of Grum Pit were analysed for total metals. Comparing the results to the GARD guideline, all samples were found to be within the guidelines; comparing the results to the MEND guidelines, bismuth concentrations were found in all samples (Table 3).

Results from ABA analyses carried out on samples collected from the Ridge North of Grum Pit indicated slightly acidic paste pH (median 5.82) and NP values ranging from 1 tonne $CaCO_3$ equivalent /1000 tonne to 5 tonne $CaCO_3$ equivalent /1000 tonne . The median NP:AP ratio (2.68) and NNP value (1.88 tonne $CaCO_3$ equivalent/1000 tonne) identify this area as composed of intermediate materials with respect to acid-generation potential.

3.3.3 Soil Fertility

Three samples and one duplicate from the base of the Ridge North of Grum Pit were analyzed for soil fertility (Tables 7a and 7b). In general, all of the samples from the Ridge North of Grum Pit exhibited low fertility, with low levels of inorganic nitrogen (NO3-N and NH4-N), low plant available phosphorus, low potassium, low cation exchange capacity, and low organic matter.

A significant factor affecting the results of some samples is the presence of free carbonates, especially calcium carbonate. In general, free carbonates are present and influence fertility data in cases where soil pH was greater than 7.5, inorganic carbon (as $CaCO_3$ equivalent) was 1 percent or more, and exchangeable calcium exceeds CEC. Where there are free carbonates, CEC and exchangeable cation data are not reliable without special procedures such as pre-treatment. In contrast, where pH values were low, cation exchange data do not reflect the presence of exchangeable acidity (i.e., Al3+ and H+), which will consume part of the CEC. Detailed data on exchangeable acidity are found in other sections of this report. Following are the results relative to screening criteria:

- Salinity – all samples were well within screening criteria, and this parameter should not significantly affect revegetation planning.
- ESP/SAR – SAR data are well within screening criteria, and this parameter should not significantly affect revegetation planning. ESP values were not determined because of low levels of exchangeable sodium.
- pH – Samples indicated acidic soils, ranging from 5.0 to 5.49 (1:2 $CaCl_2$), slightly below the screening criteria. Soil amendments to raise pH such as limestone may be required for establishment of some plant species.
- Boron – Values were all below the screening criteria (non-detect), suggesting fertilization with boron may be beneficial. Organic amendments are often the best means of supplying additional boron. Native species may be tolerant of very low levels of boron.
- CEC – All samples were below the screening criteria. Some soil amendment rates will need to be adjusted for low CEC. Organic amendments will be helpful.

SECTION 4

Summary and Recommendations

4.1 Summary

The lithology observed in the Grum Overburden Dump was consistent with observations from previous investigations. The predominant lithology consisted of mixed glacial till and glacio-fluvial material composed of either silty/clayey sand or sandy silt/clay, with occasional fractions of gravel and infrequent thin intervals of waste rock. Analytical results showed some elevated concentrations of antimony, bismuth, cadmium, arsenic, lead, silver, selenium, zinc, and phosphorous, relative to GARD and MEND guidelines. Leach extraction analysis produced elevated concentrations of cadmium, selenium, sulphate, uranium, and zinc relative to CEQG guidelines. ABA analysis results from the Grum Overburden Dump identify the soil as a net-neutralizing material and show higher NP than results from either the North Wall of Grum Pit/Grum Overburden Foundation or the Ridge North of Grum Pit. The estimated total mass of material stored in the Grum Overburden Dump is approximately 24 Mt. Although elevated total metals were detected in multiple samples, the Grum Overburden Dump is probably the best suited cover material available in large quantities onsite. The elevated concentrations in the leach extractions were generally only slightly higher than the CEQG guidelines and are very low compared to the concentrations leaching from the surrounding impacted WRDs. When considering the neutralization capacity of the material and the total metal concentration relative to the highly impacted WRD material that it will be covering, the benefits of the material far outweigh any concerns.

The lithology observed in the north wall of Grum Pit and Grum Overburden Foundation was generally consistent with existing surficial geology and overburden depth maps. The predominant lithology consisted of glacial till composed of either silty or clayey sand. Analytical results revealed some elevated concentrations of phosphorous, arsenic, bismuth, and selenium, relative to GARD and MEND guidelines. Leach extraction analysis produced elevated concentrations of arsenic, chromium, copper, iron, lead, nickel, selenium, silver, sulphate, and zinc, relative to CEQG guidelines. ABA analysis results from the North Wall of Grum Pit/Grum Overburden Foundation identify the soil as a net-neutralizing material. The estimated volume of material that could be excavated for borrow from this area ranges from 5.2 Mm^3 to 14.2 Mm^3, based on various preliminary assumptions of feasible excavation depths. As with the Grum Overburden Dump material, the most important quality of these materials is the fact that they are net-neutralizing and not highly mineralized. The total metals are relatively low and although a number of elements were measured above the CEQG guidelines in the leach testing, they were only slightly above the guidelines. Overall these materials are deemed suitable for cover material at an impacted mine site.

The lithology observed at the base of the Ridge North of Grum Pit was consistent with existing surficial geology maps and varied from Well Graded Sand to Sandy Plastic Silt with Gravel. Of the locations investigated, only location CH13-311-BH024 appeared to be well suited for use as an aggregate source because of the low fines fraction encountered there. Additional geotechnical testing for use as concrete aggregate on a sample from CH13-311-BH022 was cancelled after significant organic impurities were detected at the lab. Analytical results revealed elevated concentrations bismuth relative to the MEND guidelines. ABA analysis results from the base of the Ridge North of Grum Pit identify the soil as being intermediate with respect to acid generating potential, showing much lower NP than results from either the North Wall of Grum Pit/Grum Overburden Foundation or the Grum Overburden Dump.

The results from the investigation of bedrock exposures on the Ridge North of Grum Pit confirmed the existing geological map's indications, and found that the ridge is composed of a medium grained gneissic granodiorite consisting of over 80 percent good material. Two samples subjected to unconfined compressive strength testing each failed under maximum loads ranging from 80.40 kN to 153.70 kN and stresses ranging from 49.8 MPa to 94.0 MPa. Both samples failed by fracturing vertically.

Based on the results of the soil fertility analysis, material at all three borrows have a low fertility. The more acidic soils may need soil amendments such as lime to prevent toxicity of metal elements such as aluminum and manganese, and may affect plant selection. The more alkaline soils will affect plant selection, but will not likely require pH-lowering amendments. Some soil amendment rates will need to be adjusted for low CEC. Organic amendments will be helpful for both CEC and boron deficiencies.

4.2 Recommendations

Based on the findings detailed in this report, the following recommendations were developed:

- Assemble a combined database of exploration and environmental investigation borehole logs from the entire FMC and develop refined bedrock topography and groundwater depth maps.
- Locate the monitoring wells and pumping wells installed above the Northeast Wall of Grum Pit (GPH-89-01, GPH-89-02, GPH-89-03, GDW-89-01, and GDW-89-02) and survey their water levels to determine the groundwater elevations for possible future use in evaluating borrow excavation configurations in the North Wall of Grum Pit.
- Use organic amendments to supplement growth mediums from the Ridge North of Grum Pit, Grum Overburden Dump, and/or the North Wall of Grum Pit/Grum Overburden Foundation.

SECTION 5

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Tables

TABLE 1

Borehole and Test Pit Completion Summary

Faro Mine Remediation Project

Location	Location ID	Investigation Type	Northing	Easting	Surface Elevation	Completion Depth	Geological Unit at Completion Depth	Depth to Groundwater (mbgs)
N. Wall	CH13-311-BH001	Pionjar Borehole				1.47 (refusal)	Well-Graded Gravel with Sand (GW)	NE
N. Wall	CH13-311-BH002	Pionjar Borehole				0.66 (refusal)	Poorly Graded Sand (SP)	NE
N. Wall	CH13-311-BH003	Pionjar Borehole				3.79	Clayey Gravel (GC)	3.7
N. Wall	CH13-311-BH004	Pionjar Borehole				3.12	Clay with Silt and Gravel (CH)	0.61
N. Wall	CH13-311-BH005	Pionjar Borehole				2.44 (refusal)	Clay / Silt (CL-ML)	NE
N. Wall	CH13-311-BH010	Rotosonic Borehole				17.7	Weathered Bedrock. Interface with Silty Sand with Gravel (SM) at 15	NE
N. Wall	CH13-311-TP021	Test Pit				5.79	Clayey Sand (SC)	NE
N. Wall	CH13-311-TP022	Test Pit				5.79	Silt (ML)	NE
N. Wall	CH13-311-TP023	Test Pit				3.05 (refusal)	Bedrock Contact. Interface with Gravelly Silt (ML)	NE
N. Wall	CH13-311-TP024	Test Pit				0.9	Silt (ML)	NE
N. Wall	CH13-311-SS023	Surface Sample				0.5	Silty Sand (SM)	NE
N. Wall	CH13-311-SS024	Surface Sample				0.5	Silty Sand (SM)	NE
N. Wall	CH13-311-SS025	Surface Sample				0.5	Silty Sand (SM)	NE
N. Wall	CH13-311-SS027	Surface Sample				0.5	Sandy Silt with Gravel (ML)	NE
N. Wall	CH13-311-SS028	Surface Sample				0.5	Silty Sand (SM)	NE
N. Wall	CH13-311-SS029	Surface Sample				0.5	Silty Gravel (GM)	NE
N. Wall	CH13-311-SS030	Surface Sample				0.5	Silty Sand (SM)	NE
N. Wall	CH13-311-SS031	Surface Sample				0.5	Silty Gravel (GM)	NE
N. Wall	CH13-311-SS032	Surface Sample				0.5	Silty Gravel with Sand (GM)	NE
N. Wall	CH13-311-SS033	Surface Sample				0.5	Silty Sand with Gravel (SM)	NE
N. Wall	CH13-311-SS034	Surface Sample				0.5	Silty Sand/Gravel (SM-GM)	NE
N. Wall	CH13-311-SS035	Surface Sample				0.5	Silty Sand with Gravel (SM)	NE
N. Wall	CH13-311-SS036	Surface Sample				0.5	Gravelly Silt with Sand (ML)	NE
N. Wall	CH13-311-SS037	Surface Sample				0.5	Silty Sand with Gravel (SM)	NE
OBD	CH13-311-BH011	Rotosonic Borehole				50.29	Clay with Gravel (CL)	NE
OBD	CH13-311-BH012	Rotosonic Borehole				50.29	Clay with Gravel (CL)	NE
OBD	CH13-311-BH013	Rotosonic Borehole				50.29	Gravelly Silt (ML)	NE
OBD	CH13-311-BH014	Rotosonic Borehole				50.29	Silt (ML)	NE
OBD	CH13-311-BH015	Rotosonic Borehole				44.19	Bedrock. Interface with Silty Sand (SM) @ 41.15m	NE
OBD	CH13-311-TP001	Test Pit				5.49	Silt (ML)	1.83
OBD	CH13-311-TP002	Test Pit				4.57	Silt with Sand (ML)	NE
OBD	CH13-311-TP003	Test Pit				5.18	Clayey Sand (SC)	NE
OBD	CH13-311-TP004	Test Pit				5.49	Silty Gravel with Sand (GM)	NE
OBD	CH13-311-TP005	Test Pit				5.18	Sandy Gravelly Silt (ML)	NE
OBD	CH13-311-TP006	Test Pit				5.18	Silty Clayey Sand (SC-SM)	NE
OBD	CH13-311-TP007	Test Pit				5.5	Silt (ML)	NE
OBD	CH13-311-TP008	Test Pit				3.96 (caving)	Sandy Silt with Gravel (ML)	NE
OBD	CH13-311-TP009	Test Pit				4.26 (caving)	Silty Gravel with Sand (GM)	NE
OBD	CH13-311-TP010	Test Pit				4.3	Boulder	NE
RNGP	CH13-311-BH020	Pionjar Borehole				3.2	Elastic Silt with Gravel and Sand (MH)	NE
RNGP	CH13-311-BH021	Pionjar Borehole				2.74	Silty Sand (SM)	NE
RNGP	CH13-311-BH022	Pionjar Borehole				1.07 (refusal)	Silty Clayey Sand with Gravel (SC/SM)	0.4572
RNGP	CH13-311-BH023	Pionjar Borehole				3.35	Sandy Elastic Silt with Gravel (MH)	1.2
RNGP	CH13-311-BH024	Pionjar Borehole				3.35	Well-Graded Sand with Gravel (SW)	NE

Notes:

1. Gradation totals may not equal 100 because of rounding
2. USCS Classification is based on laboratory sample and may not reflect larger particle sizes observed in the field

ID = identification
mbgs = metre below ground surface
OBD = Over Burden Dump
RNGP = Ridge North of Grum Pit

TABLE 2
Grain Size Distribution
Faro Mine Remediation Project

						Gradation[a] %									
Location ID	Sample ID	Location	Sample Date	Start Depth (mbgs)	End Depth (mbgs)	Gravel (4.75 to 76.2 mm)	Coarse Sand (2.0 to 4.75 mm)	Medium Sand (0.425 to 2.0 mm)	Fine Sand (0.075 to 0.425 mm)	Fines (<0.075 mm)	Moisture Content[b] %	Liquid Limit %	Plasticity Index %	USCS[c]	USDA
CH13-311-BH001	CH13-311-BH001_SOa	N. Wall	8/23/2013	0	0.03	-	-	-	-	-	6.05	-	-	-	-
CH13-311-BH001	CH13-311-BH001_SOb	N. Wall	8/23/2013	0.03	0.45	58	18	15	5	4	9.14	27	4	WELL-GRADED GRAVEL WITH SAND (GW)	-
CH13-311-BH002	CH13-311-BH002_SOb	N. Wall	8/22/2013	0.06	0.20	-	-	-	-	-	15.3	-	-	-	Loamy Sand
CH13-311-BH003	CH13-311-BH003_SOa	N. Wall	8/22/2013	0	1.13	-	-	-	-	-	13.4	-	-	-	-
CH13-311-BH003	CH13-311-BH003_SOb	N. Wall	8/22/2013	0.03	0.05	-	-	-	-	-	13.7	-	-	-	-
CH13-311-BH003	CH13-311-BH903_SOb	N. Wall	8/22/2013	0.06	0.12	-	-	-	-	-	14	-	-	-	-
CH13-311-BH004	CH13-311-BH004_SOa	N. Wall	8/23/2013	0.4	0.98	-	-	-	-	-	< 0.25	23	6	-	-
CH13-311-BH005	CH13-311-BH005_SOa	N. Wall	8/23/2013	0.03	0.74	-	-	-	-	-	17.8 J	-	-	-	-
CH13-311-BH005	CH13-311-BH005_SOb	N. Wall	8/23/2013	0.03	0.13	-	-	-	-	-	25.7 J	-	-	-	-
CH13-311-BH010	CH13-311-BH010_SOa	N. Wall	7/18/2013	0.15	0.46	11	18	19	16	37	8.98	27	6	SILTY CLAYEY SAND (SC-SM)	Loam
CH13-311-BH010	CH13-311-BH010_SOb	N. Wall	7/18/2013	0.91	1.22	10	22	35	17	16	7.44	-	-	SILTY SAND (SM)	Sandy Loam
CH13-311-BH010	CH13-311-BH010_SOc	N. Wall	7/18/2013	3.05	3.51	-	-	-	-	-	12.3 J	-	-	-	-
CH13-311-BH010	CH13-311-BH010_SOd	N. Wall	7/18/2013	3.96	4.27	17	20	20	16	27	4.71 J	-	-	SILTY SAND WITH GRAVEL (SM)	Sandy Loam
CH13-311-SS023	CH13-311-SS023_SOa	N. Wall	7/12/2013	0	0.05	6	12	18	20	44	8.17	26	8	SILTY SAND (SM)	Loam
CH13-311-SS024	CH13-311-SS024_SOa	N. Wall	7/12/2013	0	0.05	12	12	17	18	41	7.49	23	8	SILTY SAND (SM)	Loam
CH13-311-SS025	CH13-311-SS025_SOa	N. Wall	7/12/2013	0	0.05	6	9	23	23	39	9.83	22	7	SILTY SAND (SM)	Sandy Loam
CH13-311-SS027	CH13-311-SS027_SOa	N. Wall	7/15/2013	0	0.05	-	-	-	-	-	9.69	-	-	-	-
CH13-311-SS028	CH13-311-SS028_SOa	N. Wall	7/15/2013	0	0.05	-	-	-	-	-	10.5	-	-	-	-
CH13-311-SS029	CH13-311-SS029_SOa	N. Wall	7/15/2013	0	0.05	-	-	-	-	-	10.4	-	-	-	-
CH13-311-SS030	CH13-311-SS030_SOA	N. Wall	7/15/2013	0	0.00	7	8	26	20	40	7.79	24	9	SILTY SAND (SM)	Sandy Loam
CH13-311-SS031	CH13-311-SS031_SOa	N. Wall	7/15/2013	0	0.05	-	-	-	-	-	8.38	-	-	-	-
CH13-311-SS032	CH13-311-SS032_SOa	N. Wall	7/15/2013	0	0.05	-	-	-	-	-	8.07	-	-	-	-
CH13-311-SS033	CH13-311-SS033_SOA	N. Wall	7/15/2013	0	0.00	28	10	17	19	26	4.85	21	6	SILTY SAND WITH GRAVEL (SM)	Sandy Loam
CH13-311-SS034	CH13-311-SS034_SOa	N. Wall	7/15/2013	0	0.05	-	-	-	-	-	9.43	-	-	-	-
CH13-311-SS035	CH13-311-SS035_SOa	N. Wall	7/15/2013	0.0	0.0	-	-	-	-	-	10.2	-	-	-	-
CH13-311-SS036	CH13-311-SS036_SOa	N. Wall	7/15/2013	0.0	0.0	-	-	-	-	-	6.26	-	-	-	-
CH13-311-SS037	CH13-311-SS037_SOA	N. Wall	7/15/2013	0.0	0.0	25	5	10	16	44	8.35	22	5	SILTY SAND WITH GRAVEL (SM)	Sandy Loam
CH13-311-TP021	CH13-311-TP021_SOa	N. Wall	8/27/2013	0.7	0.8	-	-	-	-	-	11.9 J	28	8	-	-
CH13-311-TP022	CH13-311-TP022_SOa	N. Wall	8/26/2013	0.9	1.8	-	-	-	-	-	9.09 J	-	-	-	-
CH13-311-TP023	CH13-311-TP023_SOa	N. Wall	8/26/2013	0.1	0.7	-	-	-	-	-	11.3 J	-	-	-	-
CH13-311-BH011	CH13-311-BH011_SOa	OBD	7/23/2013	1.1	1.4	8	7	19	16	50	7.53	-	-	SANDY SILT (ML)	Loam
CH13-311-BH011	CH13-311-BH011_SOb	OBD	7/23/2013	3.0	3.0	5	15	19	16	45	11.9	-	-	SILTY SAND (SM)	Loam
CH13-311-BH011	CH13-311-BH011_SOc	OBD	7/23/2013	7.6	11.8	12	9	19	15	46	10.4	25	8	CLAYEY SAND (SC)	Loam
CH13-311-BH011	CH13-311-BH011_SOd	OBD	7/23/2013	10.3	11.5	5	8	24	18	46	9.74	-	-	SILTY SAND (SM)	Loam
CH13-311-BH011	CH13-311-BH011_SOe	OBD	7/24/2013	11.3	11.6	4	7	13	16	61	10.6	-	-	SANDY SILT (ML)	Loam
CH13-311-BH011	CH13-311-BH911_SOe	OBD	7/24/2013	11.3	11.6	3	7	18	16	57	10.4	-	-	-	Loam
CH13-311-BH012	CH13-311-BH012_SOa	OBD	7/24/2013	0.2	0.5	8	7	16	21	48	11.7	-	-	SILTY SAND (SM)	Loam
CH13-311-BH012	CH13-311-BH012_SOb	OBD	7/24/2013	3.0	0.2	8	6	19	19	48	9.75	-	-	SILTY SAND (SM)	Loam
CH13-311-BH012	CH13-311-BH012_SOc	OBD	7/24/2013	5.5	3.0	7	8	26	20	39	10.3	-	-	SILTY SAND (SM)	Sandy Loam
CH13-311-BH012	CH13-311-BH012_SOd	OBD	7/25/2013	12.2	0.4	4	9	17	19	52	11.1 J	29	10	SANDY LEAN CLAY (CL)	Loam
CH13-311-BH013	CH13-311-BH013_SOA	OBD	7/18/2013	0.0	0.5	6	10	19	18	47	9.04 J	22	6	SILTY CLAYEY SAND (SC-SM)	Loam
CH13-311-BH013	CH13-311-BH013_SOB	OBD	7/18/2013	6.2	7.2	7	20	34	17	23	4.66 J	-	-	SILTY SAND (SM)	Sandy Loam
CH13-311-BH013	CH13-311-BH013_SOC	OBD	7/18/2013	15.3	16.7	2	10	15	20	54	10.3 J	24	8	SANDY LEAN CLAY (CL)	Loam
CH13-311-BH013	CH13-311-BH013_SOD	OBD	7/19/2013	29.0	0.0	6	14	16	17	47	8.41	-	-	SILTY SAND (SM)	Loam
CH13-311-BH013	CH13-311-BH013_SOE	OBD	7/19/2013	39.5	40.0	0	0	20	20	60	6.12	-	-	SANDY SILT (ML)	Loam
CH13-311-BH013	CH13-311-BH913_SOB	OBD	7/18/2013	6.2	7.2	3	18	37	18	24	4.1 J	-	-	-	Sandy Loam
CH13-311-BH014	CH13-311-BH014_SOA	OBD	7/20/2013	3.0	3.2	8	21	29	19	23	4.9	-	-	SILTY SAND (SM)	Sandy Loam
CH13-311-BH014	CH13-311-BH014_SOB	OBD	7/20/2013	9.2	9.5	4	11	13	19	54	11	25	7	SILTY CLAY WITH SAND (CL-ML)	Loam
CH13-311-BH014	CH13-311-BH014_SOC	OBD	7/20/2013	25.0	25.1	7	14	19	20	41	11.9	-	-	SILTY SAND (SM)	Loam/Sandy Load
CH13-311-BH014	CH13-311-BH014_SOD	OBD	7/20/2013	35.0	35.1	3	15	15	15	52	10.1	-	-	SILT WITH SAND (ML)	Loam
CH13-311-BH014	CH13-311-BH014_SOE	OBD	7/20/2013	42.5	42.8	5	15	15	17	49	11.8	-	-	SILTY SAND (SM)	Loam
CH13-311-BH015	CH13-311-BH015_SOA	OBD	7/22/2013	4.5	4.7	9	15	18	16	42	10.8 J	-	-	SILTY SAND (SM)	Loam
CH13-311-BH015	CH13-311-BH015_SOB	OBD	7/22/2013	9.1	0.5	8	15	23	17	37	13.7 J	-	-	SILTY SAND (SM)	Sandy Loam

TABLE 2
Grain Size Distribution
Faro Mine Remediation Project

						Gradation[a] %									
Location ID	Sample ID	Location	Sample Date	Start Depth (mbgs)	End Depth (mbgs)	Gravel (4.75 to 76.2 mm)	Coarse Sand (2.0 to 4.75 mm)	Medium Sand (0.425 to 2.0 mm)	Fine Sand (0.075 to 0.425 mm)	Fines (<0.075 mm)	Moisture Content[b] %	Liquid Limit %	Plasticity Index %	USCS[c]	USDA
CH13-311-BH015	CH13-311-BH015_SOC	OBD	7/22/2013	13.5	14.0	6	9	20	20	45	8.14 J	-	-	SILTY SAND (SM)	Loam
CH13-311-BH015	CH13-311-BH015_SOD	OBD	7/22/2013	18.2	18.5	10	15	23	18	34	8.62 J	-	-	GRAVELLY CLAY WITH SAND (CL)	Sandy Loam
CH13-311-BH015	CH13-311-BH015_SOE	OBD	7/22/2013	31.0	31.5	7	11	14	16	52	9.51 J	28	8	SANDY LEAN CLAY (CL)	Loam
CH13-311-BH015	CH13-311-BH915_SOC	OBD	7/22/2013	13.5	14.0	7	8	18	19	48	9.4 J	-	-	-	Loam
CH13-311-TP002	CH13-311-TP002_SOa	OBD	8/14/2013	0.0	1.2	11	12	17	17	44	8.6 J	25	8	CLAYEY SAND (SC)	Loam
CH13-311-TP002	CH13-311-TP902_SOa	OBD	8/14/2013	0.0	1.2	9	11	16	17	47	9.51 J	26	9	-	Loam
CH13-311-TP003	CH13-311-TP003_SOa	OBD	8/14/2013	0.0	1.8	11	9	19	18	43	8.98 J	25	9	CLAYEY SAND (SC)	Loam
CH13-311-TP003	CH13-311-TP903_SOa	OBD	8/14/2013	0.0	1.8	10	9	18	18	45	7.68 J	26	11	-	Loam
CH13-311-TP004	CH13-311-TP004_SOa	OBD	8/14/2013	0.3	1.8	23	13	19	15	31	7.94 J	27	6	CLAYEY SAND WITH GRAVEL (SC)	Sandy Loam
CH13-311-TP004	CH13-311-TP904_SOa	OBD	8/14/2013	0.3	1.8	32	15	24	13	16	5.31 J	29	8	-	Sandy Loam
CH13-311-TP005	CH13-311-TP005_SOa	OBD	8/14/2013	0.3	1.8	9	9	14	17	50	9.44 J	25	11	SILTY CLAY WITH SAND (CL-ML)	Loam
CH13-311-TP005	CH13-311-TP905_SOa	OBD	8/14/2013	0.3	1.8	42	6	11	12	28	8.9 J	23	7	-	Loam
CH13-311-TP006	CH13-311-TP006_SOa	OBD	8/13/2013	0.3	1.8	8	13	17	18	44	6.88 J	24	7	SILTY CLAYEY SAND (SC-SM)	Loam
CH13-311-TP006	CH13-311-TP906_SOa	OBD	8/13/2013	0.3	1.8	17	11	15	16	41	9.68 J	27	9	-	Loam
CH13-311-BH022	CH13-311-BH022_SOa	RNGP	8/25/2013	0.3	0.6	-	-	-	-	-	14 J	-	-	-	-
CH13-311-BH022	CH13-311-BH022_SOb	RNGP	8/25/2013	0.0	0.1	-	-	-	-	-	16.1 J	-	-	SILTY SAND (SM)	Loamy Sand
CH13-311-BH023	CH13-311-BH023_SOa	RNGP	8/24/2013	0.0	1.0	3	7	18	16	57	15.9	-	-	-	Sandy Loam
CH13-311-BH023	CH13-311-BH023_SOb	RNGP	8/24/2013	0.0	0.1	-	-	-	-	-	33.7	27	4	SANDY ELASTIC SILT WITH GRAVEL (MH)	-
CH13-311-BH024	CH13-311-BH024_SOa	RNGP	8/24/2013	0.0	1.0	-	-	-	-	-	6.66	-	-	WELL-GRADED SAND (SW)	-
CH13-311-BH024	CH13-311-BH024_SOb	RNGP	8/24/2013	0.0	0.2	-	-	-	-	-	3.72	-	-	-	Sand
CH13-311-BH024	CH13-311-BH924_SOb	RNGP	8/24/2013	0.0	0.2	-	-	-	-	-	3.44	-	-	-	Sand

Notes:
a. Gradation totals may not equal 100 due to rounding
b. results may be affected by fluid use during drilling
c. USCS Classification is based on lab sample and may not reflect larger particle sizes observed in the field

% = Percent
< = less than
CH = fat clay
CL = lean clay
CL-ML = le
GC = clayed gravel
GM = silty gravel
GW = well-graded gravel
ID = Identification
J = Analyte was present but the reported value may not be accurate or precise
mbgs = metre below ground surface
mm = millimetres
MH = elastic silt
ML = silt
N. Wall = North Wall of Grum Pit/Grum Overburden Foundation
OBD = Grum Overburden Dump
RNGP = Ridge North of Grum Pit
SC= clayey sand
SM = silty sand
SP = poorly graded sand
SW = wel graded sand
USCS = Unified Soil Classification System
USDA = United States Department of Agriculture

TABLE 3
General Chemistry
Faro Mine Remediation Project

				Location	CH13-311-BH001		CH13-311-BH002	CH13-311-BH003			CH13-311-BH004	CH13-311-BH005	
				Sample ID	CH13-311-BH001_SOa	CH13-311-BH001_SOb	CH13-311-BH002_SOb	CH13-311-BH003_SOa	CH13-311-BH003_SOb	CH13-311-BH903_SOb	CH13-311-BH004_SOa	CH13-311-BH005_SOb	CH13-311-BH005_SOa
				Sample Depth (ft)	0 - 0.1	0.15 - 1.46	0.2 - 0.66	0 - 3.7	0.1 - 0.17	0.2 - 0.4	1.37 - 3.2	0.15 - 0.42	0.15 - 2.43
				Sample Date	8/23/2013	8/23/2013	8/22/2013	8/22/2013	8/22/2013	8/22/2013	8/23/2013	8/23/2013	8/23/2013
				Sub Area	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall
Analyte		GARD[b]	MEND[c]										
Aluminum	mg/kg	852,000	823,000		**20200**	**20100**	**13200**	**23200**	**18100**	**20000**	**20600**	**15700**	**18400**
Antimony	mg/kg	60	2		**0.49**	**0.39**	**0.33**	**0.84**	**0.59**	**0.71**	**0.54**	**0.48**	**1.07**
Arsenic	mg/kg	72	18		**16.3**	**18.1**	**12.1 J**	**22.1 J**	**12.9 J**	**15.2**	**11.2**	**11.8**	**14.8**
Barium	mg/kg	6,000	4,250		**150**	**72.5**	**118**	**349**	**241**	**293**	**295**	**149**	**457**
Beryllium	mg/kg	72	28		**0.66**	**0.72**	**0.38**	**0.82**	**0.57**	**0.63**	**0.7**	**0.4**	**0.73**
Bismuth	mg/kg	-	0.09		**0.31**	**0.26**	**0.25**	**0.37**	**0.24**	**0.29**	**0.38**	**0.23**	**0.29**
Boron	mg/kg	-	-		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Cadmium	mg/kg	4.2	1.5		**0.216**	**0.309**	**0.119**	**0.493**	**0.203**	**0.252**	**0.443**	**0.157**	**0.46**
Calcium	mg/kg	180,000	415,000		**1950**	**1660**	**2550**	**5780**	**2540**	**2740**	**3550**	**1440**	**4050**
Chromium	mg/kg	840	1,020		**41.2**	**28.9**	**24.3**	**62.6**	**44.1**	**52.6**	**74.9**	**34.2**	**33.5**
Cobalt	mg/kg	96	250		**18.3**	**14.6**	**9.22**	**18.5**	**14.5**	**15.8**	**16.3**	**9.12**	**11.4**
Copper	mg/kg	360	600		**36.6**	**20.7**	**15.9**	**42.8**	**26.6**	**33.3**	**38.9**	**22.1**	**32.4**
Inorganic Carbon (as CACO3 Equivalent)	% $CaCO_3$	-	-		< 0.8	< 0.8	**0.82**	**0.83**	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Iron	mg/kg	480,000	563,000		**35500**	**30300**	**23900**	**36900**	**28500**	**31200**	**33300**	**23600**	**27800**
Lead	mg/kg	420	140		**15.4**	**14.9**	**9.19**	**17.1**	**13.8**	**15.2**	**19.3**	**11.1**	**14**
Lithium	mg/kg	300	200		**33.8**	**26.9**	**19.9**	**32.9**	**27.4**	**29**	**33.3**	**19.4**	**22.9**
Magnesium	mg/kg	60,000	200,000		**8100**	**5390**	**5560**	**9720**	**7330**	**7950**	**8540**	**5970**	**5820**
Manganese	mg/kg	12,000	9,500		**524**	**335**	**262**	**632**	**461**	**544**	**488**	**276**	**556**
Mercury	mg/kg	0.72	-		**0.0189**	**0.0222**	**0.0133**	**0.0449**	**0.032**	**0.0412**	**0.031**	**0.0274**	**0.0661**
Moisture	%	-	-		**6.05**	**9.14**	**15.3**	**13.4**	**13.7**	**14**	< 0.25	**25.7 J**	**17.8 J**
Molybdenum	mg/kg	24	12		**0.85**	**0.95**	**1.2**	**1.03**	**0.61**	**0.7**	**1.09**	**0.79**	**1.38**
Nickel	mg/kg	600	840		**40.7**	**32.8**	**19.8**	**59.7**	**36.8**	**44**	**51.5**	**28.2**	**34.7**
Organic Matter	%	-	-		< 0.7	**2.69**	**1.49**	< 0.7	< 0.7	< 0.7	< 0.7	**3.35**	**1.56**
Paste pH	pH Units	-	-		**6.08**	**5.46**	**5.58**	**7.77**	**5.85**	**6.67**	**5.37**	**6.06**	**5.99**
pH (1:2 soil:water)	pH Units	-	-		**6.1**	**5.22**	**5.27**	**7.94**	**5.88**	**6.35**	**5.57**	**4.83**	**6.5**
Potassium	mg/kg	168,000	200000		**1500**	**770**	**710**	**2920**	**1370**	**1710**	**2020**	**1220**	**1770**
Selenium	mg/kg	4.8	0.5		**0.21**	**0.25**	< 0.2	**0.29**	**0.25**	**0.27**	**0.26**	**0.22**	**0.42**
Silver	mg/kg	-	0.75		< 0.1	**0.11**	< 0.1	**0.16**	< 0.1	< 0.1	**0.16**	**0.14**	**0.21**
Sodium	mg/kg	60,000	236000		**120**	< 100	**210**	**300**	**160**	**180**	**290**	**220**	**190**
Strontium	mg/kg	3,000	3700		**15.1**	**16.5**	**17.2**	**30.6**	**18.8**	**19.1**	**24.2**	**12.5**	**32.1**
Thallium	mg/kg	108	96		**0.163**	**0.096**	**0.136**	**0.248**	**0.151**	**0.179**	**0.19**	**0.147**	**0.212**
Tin	mg/kg	48	23		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Titanium	mg/kg	-	56,500		**391**	**332**	**418**	**591**	**514**	**525**	**537**	**376**	**390**
Total Carbon (Leco)	%	NV	NV		NA	**1.2**	**0.6**	NA	**0.4**	NA	NA	**1.4**	NA
Total Inorganic Carbon	%	NV	NV		< 0.1	< 0.1	**0.1**	**0.1**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Nitrogen (Leco)	%	NV	NV		NA	**0.064**	NA	NA	NA	NA	NA	NA	NA
Total organic carbon	%	NV	NV		**0.4**	**1.6**	**0.9**	< 0.4	**0.42**	< 0.4	**0.4**	**1.9**	**0.9**
Total Phosphorus	mg/kg	800	10,500		**591**	*823*	**614 J**	*874 J*	**632 J**	**635**	**798**	**463**	*1030*
Uranium	mg/kg	24	27		**1.2**	**0.818**	**1.35**	**1.09**	**0.86**	**0.93**	**1.6**	**0.664**	**1.27**
Vanadium	mg/kg	1,080	1,200		**32.3**	**29.7**	**36.6**	**53.2**	**38.9**	**43.9**	**42**	**37.3**	**51.3**
Zinc	mg/kg	1,080	700		**87.2**	**71.5**	**59.5**	**108**	**71**	**86.6**	**102**	**57.6**	**88.6**

Notes:
a. results may be affected by fluid use during drilling

b. Median soil content reported from the Global Acid Rock Drainage Guide (GARD Guide) (http://www.gardguide.com/ index.php/Main_Page) accessed on November 15, 2012.
c. Values from Price, 1997

Values indicated with shading were identified at concentrations which are 12 to 24 times the median soil content determined as having a geochemical abundance index (GAI) of 3 calculated by GAI = log2(conc/1.5*mean_soil_conc)
Values indicated in red italics were identified at concentrations that exceed 10 times the crustal abundance.
Bold indicates the analyte was detected

% = percent
< = Denotes less than laboratory method detection limit
$CaCO_3$ = calcium carbonate
ft = feet
GARD = global acid rock drainage
ID = identification
J = Analyte was present but the reported value may not be accurate or precise
MEND = Mine Environment Neutral Drainage
mg/kg = milligram per kilogram
N. Wall = North Wall of Grum Pit/ Grum Overburden Foundation
NA = not analyzed
NV = no value
OBD = Grum Overburden Dump

TABLE 3
General Chemistry
Faro Mine Remediation Project

			Location	CH13-311-BH010[a]				CH13-311-BH011*					
			Sample ID	CH13-311-BH010_SOa	CH13-311-BH010_SOc	CH13-311-BH010_SOd	CH13-311-BH010_SOb	CH13-311-BH011_SOc	CH13-311-BH011_SOa	CH13-311-BH011_SOd	CH13-311-BH011_SOb	CH13-311-BH011_SOe	CH13-311-BH911_SOe
			Sample Depth (ft)	0.5 - 1.5	10.5 - 11.5	13 - 14	3 - 4	25 - 25.91	3.66 - 4.57	34.14 - 35.05	9.75 - 10.67	37.19 - 38.1	37.19 - 38.1
			Sample Date	7/18/2013	7/18/2013	7/18/2013	7/18/2013	7/23/2013	7/23/2013	7/23/2013	7/23/2013	7/24/2013	7/24/2013
			Sub Area	N. Wall	N. Wall	N. Wall	N. Wall	OBD	OBD	OBD	OBD	OBD	OBD
Analyte		GARD[b]	MEND[c]										
Aluminum	mg/kg	852,000	823,000	**21300**	**15300**	**22600**	**21800**	**19200**	**20000**	**20700**	**16900**	**19600**	**19100**
Antimony	mg/kg	60	2	**0.64**	**0.66**	**0.1**	**0.32**	**0.69**	**0.62**	**0.51**	**3.2**	**1.02**	**0.97**
Arsenic	mg/kg	72	18	**15.8**	**11.3**	**1.62**	**19.1**	**15.3**	**11.2**	**16.4**	**50.8**	**26.3 J**	**15 J**
Barium	mg/kg	6,000	4,250	**271**	**240**	**30.5**	**88.3**	**265**	**202**	**227**	**290**	**383**	**353**
Beryllium	mg/kg	72	28	**0.74**	**0.74**	**0.78**	**0.76**	**0.6**	**0.68**	**0.63**	**0.67**	**0.68**	**0.68**
Bismuth	mg/kg	-	0.09	**1.18**	**0.3**	**0.24**	**0.31**	**0.31**	**0.35**	**0.29**	**0.32**	**0.31**	**0.34**
Boron	mg/kg	-	-	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Cadmium	mg/kg	4.2	1.5	**0.441**	**0.425**	**0.052**	**0.234**	**0.411**	**0.265**	**0.328**	**0.871**	**0.558**	**0.539**
Calcium	mg/kg	180,000	415,000	**5700**	**8580**	**4950**	**1630**	**11600**	**13600**	**19600**	**11100**	**17800**	**14100**
Chromium	mg/kg	840	1,020	**46.6**	**35.6**	**31.6**	**31.1**	**45.9**	**44.8**	**61.5**	**48.7**	**45.7**	**43**
Cobalt	mg/kg	96	250	**17.3**	**16.3**	**18.5**	**22.3**	**14.1**	**12.7**	**15.4**	**14.3**	**12.6**	**12.7**
Copper	mg/kg	360	600	**36.6**	**31**	**24.3**	**34.7**	**33.4**	**26.9**	**29.7**	**46.5**	**31.9**	**29.6**
Inorganic Carbon (as CACO3 Equivalent)	% $CaCO_3$	-	-	< 0.8	**4.34**	**2.5**	< 0.8	**2.92**	**3.25**	**3.62**	**3.57**	**3.45**	**3.51**
Iron	mg/kg	480,000	563,000	**37100**	**36200**	**52500**	**39300**	**31500**	**29100**	**32200**	**31000**	**29700**	**29100**
Lead	mg/kg	420	140	**15.4**	**24**	**7.89**	**15.5**	**15.4**	**18.9**	**16**	*485*	**19.4**	**21**
Lithium	mg/kg	300	200	**35**	**25.7**	**49.8**	**40.5**	**29.8**	**32.3**	**34.6**	**28.4**	**33.6**	**33.5**
Magnesium	mg/kg	60,000	200,000	**9430**	**9340**	**13400**	**8160**	**9970**	**9390**	**12800**	**9400**	**10700**	**10500**
Manganese	mg/kg	12,000	9,500	**513**	**472**	**526**	**375**	**465**	**456**	**574**	**400**	**476**	**462**
Mercury	mg/kg	0.72	-	**0.0344**	**0.0391**	< 0.005	**0.0113**	**0.0378**	**0.0253**	**0.0239**	**0.336**	**0.0578**	**0.0531**
Moisture	%	-	-	**8.98**	**12.3 J**	**4.71 J**	**7.44**	**10.4**	**7.53**	**9.74**	**11.9**	**10.6**	**10.4**
Molybdenum	mg/kg	24	12	**0.85**	**2**	< 0.5	**0.75**	< 0.85	< 0.7	< 0.61	**1.22**	**1.57**	**1.13**
Nickel	mg/kg	600	840	**46.6**	**44.3**	**38.4**	**46**	**42.5**	**39**	**49.1**	**48.2**	**40.9**	**41.1**
Organic Matter	%	-	-	< 0.7	< 0.7	**1.01**	**0.8**	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	**0.85**
Paste pH	pH Units	-	-	**7.51**	**7.41**	**7.73**	**6.1**	**7.3**	**7.11**	**7.73**	**7.23**	**7.83**	**6.64**
pH (1:2 soil:water)	pH Units	-	-	**8.07**	**8.34**	**8.62**	**5.65**	**8.25**	**8.23**	**8.5**	**8.29**	**8.36**	**8.33**
Potassium	mg/kg	168,000	200000	**2260**	**1860**	**620**	**1520**	**2380**	**2580**	**2200**	**2110**	**3040**	**2720**
Selenium	mg/kg	4.8	0.5	**0.24**	**0.51**	< 0.2	**0.33**	**0.54**	**0.38**	**0.33**	**0.5**	**0.86**	**0.82**
Silver	mg/kg	-	0.75	**0.17**	**0.17**	< 0.1	< 0.1	**0.16**	**0.15**	< 0.12	**0.99**	**0.22**	**0.21**
Sodium	mg/kg	60,000	236000	**280**	**180**	**130**	**180**	**250**	**230**	**190**	**180**	**230**	**170**
Strontium	mg/kg	3,000	3700	**32.3**	**41.1**	**25.6**	**14.1**	**52.3**	**58**	**71.9**	**49.4**	**93**	**65.8**
Thallium	mg/kg	108	96	**0.184**	**0.131**	< 0.05	**0.148**	**0.184**	**0.184**	**0.171**	**0.291**	**0.203**	**0.194**
Tin	mg/kg	48	23	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Titanium	mg/kg	-	56,500	**426**	**295**	**43.5**	**368**	**460**	**545**	**491**	**424**	**423**	**362**
Total Carbon (Leco)	%	NV	NV	**0.2**	NA	**0.7**	**0.7**	**0.6**	**0.5**	**0.6**	**0.6**	**0.9**	**0.8**
Total Inorganic Carbon	%	NV	NV	**0.13**	**0.52**	**0.41**	< 0.1	**0.31**	**0.39**	**0.52**	**0.36**	**0.47**	**0.36**
Total Nitrogen (Leco)	%	NV	NV	**0.036**	NA	NA	NA	**0.044**	NA	NA	NA	NA	NA
Total organic carbon	%	NV	NV	**0.23**	**0.4**	**0.6**	**0.69**	**0.27**	**0.13**	**0.2**	**0.18**	**0.44**	**0.5**
Total Phosphorus	mg/kg	800	10,500	**653**	**644**	**566**	**481**	**649**	**608**	**704**	**608**	*1290 J*	**727 J**
Uranium	mg/kg	24	27	**1.08**	**1.61**	**1.43**	**1.19**	**1.49**	**2.23**	**1.49**	**1.95**	**1.82**	**1.76**
Vanadium	mg/kg	1,080	1,200	**42.7**	**36.8**	**19.3**	**27.5**	**39.6**	**36.8**	**41.3**	**37.7**	**47.3**	**43.3**
Zinc	mg/kg	1,080	700	**102**	**104**	**106**	**97.1**	**87.1**	**79.1**	**85.5**	**602**	**98.1**	**98.2**

Notes:
a. results may be affected by fluid use during drilling

b. Median soil content reported from the Global Acid Rock Drainage Guide (GARD Guide) (http://www.gardguide.com/ index.php/Main_Page) accessed on November 15, 2012.
c. Values from Price, 1997

Values indicated with shading were identified at concentrations which are 12 to 24 times the median soil content determined as having a geochemical abundance index (GAI) of 3 calculated by GAI = log2(conc/1.5*mean_soil_conc)
Values indicated in red italics were identified at concentrations that exceed 10 times the crustal abundance.
Bold indicates the analyte was detected

% = percent
< = Denotes less than laboratory method detection limit
$CaCO_3$ = calcium carbonate
ft = feet
GARD = global acid rock drainage
ID = identification
J = Analyte was present but the reported value may not be accurate or precise
MEND = Mine Environment Neutral Drainage
mg/kg = milligram per kilogram
N. Wall = North Wall of Grum Pit/ Grum Overburden Foundation
NA = not analyzed
NV = no value
OBD = Grum Overburden Dump

TABLE 3
General Chemistry
Faro Mine Remediation Project

				Location	CH13-311-BH012[a]				CH13-311-BH013[a]					
				Sample ID	CH13-311-BH012_SOa	CH13-311-BH012_SOc	CH13-311-BH012_SOb	CH13-311-BH012_SOd	CH13-311-BH013_SOA	CH13-311-BH013_SOB	CH13-311-BH013_SOC	CH13-311-BH913_SOB	CH13-311-BH013_SOD	CH13-311-BH013_SOE
				Sample Depth (ft)	0.61 - 1.5	18.9 - 19.81	9.75 - 10.67	40.23 - 41.15	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0
				Sample Date	7/24/2013	7/24/2013	7/24/2013	7/25/2013	7/18/2013	7/18/2013	7/18/2013	7/18/2013	7/19/2013	7/19/2013
				Sub Area	OBD	OBD	OBD	OBD	OBD	OBD	OBD	OBD	OBD	OBD
Analyte		GARD[b]	MEND[c]											
Aluminum	mg/kg	852,000	823,000		**17200**	**16600**	**17200**	**21000**	**17200**	**7010**	**17300**	**7530**	**20400**	**21000**
Antimony	mg/kg	60	2		**0.76**	**1.05**	**0.98**	**0.63**	**0.81**	**6.99**	**0.62**	**5.7**	**0.98**	**0.43**
Arsenic	mg/kg	72	18		**10**	**16.8**	*212*	**19.7**	**12.1**	**65.9**	**10.4**	**70.1**	**18.1**	**13.1**
Barium	mg/kg	6,000	4,250		**340**	**216**	**326**	**246**	**280**	**91.5**	**202**	**78**	**207**	**150**
Beryllium	mg/kg	72	28		**0.67**	**0.79**	**0.63**	**0.99**	**0.59**	**0.43**	**0.72**	**0.43**	**0.6**	**0.73**
Bismuth	mg/kg	-	0.09		**0.32**	**0.54**	**0.26**	**0.39**	**0.28**	< 0.2	**0.39**	< 0.2	**0.31**	**0.65**
Boron	mg/kg	-	-		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Cadmium	mg/kg	4.2	1.5		**0.369**	**0.567**	**0.394**	**0.411**	**0.403**	**3.02**	**0.261**	**2.28**	**0.436**	**0.263**
Calcium	mg/kg	180,000	415,000		**8530**	**4840**	**10300**	**14700**	**9860**	**9980**	**8620**	**8580**	**14500**	**10800**
Chromium	mg/kg	840	1,020		**27.8**	**34.2**	**28.9**	**52.9**	**32.2**	**33.5**	**36.2**	**33**	**46.5**	**56.5**
Cobalt	mg/kg	96	250		**9.86**	**11**	**10.7**	**16.6**	**10.8**	**25.5**	**10.8**	**26.7**	**17.5**	**15.1**
Copper	mg/kg	360	600		**23.8**	**24.4**	**25**	**38.3**	**76.7**	**36.1**	**21.8**	**57.6**	**35.2**	**32.5**
Inorganic Carbon (as CACO3 Equivalent)	% $CaCO_3$	-	-		**1.34**	**0.95**	**1.95**	**2.01**	**1.65**	**9.6**	**2.72**	**8.73**	**3.79**	**1.95**
Iron	mg/kg	480,000	563,000		**25800**	**26600**	**27200**	**35800**	**27000**	**48300**	**25700**	**51000**	**37000**	**34400**
Lead	mg/kg	420	140		**14.6**	**168**	**18**	**16.9**	**15.3**	*850 J*	**31.8**	*483 J*	**34.1**	**17.4**
Lithium	mg/kg	300	200		**29.5**	**33.2**	**25.2**	**36**	**27.9**	**11.6**	**32.9**	**12.7**	**34.8**	**40**
Magnesium	mg/kg	60,000	200,000		**6950**	**7390**	**7620**	**10600**	**7250**	**11500**	**7810**	**11500**	**12000**	**10200**
Manganese	mg/kg	12,000	9,500		**393**	**371**	**400**	**522**	**434**	**1350**	**410**	**1470**	**577**	**459**
Mercury	mg/kg	0.72	-		**0.0291**	**0.229**	**0.0351**	**0.0362**	**0.0243**	*1.24*	**0.0212**	*0.79*	**0.0395**	**0.0149**
Moisture	%	-	-		**11.7**	**10.3**	**9.75**	**11.1 J**	**9.04 J**	**4.66 J**	**10.3 J**	**4.1 J**	**8.41**	**6.12**
Molybdenum	mg/kg	24	12		**0.9**	**0.71**	**1.17**	**0.86**	**1.58**	**1.19**	**0.59**	**1**	**0.89**	**1.34**
Nickel	mg/kg	600	840		**25.5**	**29.8**	**27.9**	**48.1**	**28.9**	**92.1**	**28.8**	**71.9**	**47.1**	**41.3**
Organic Matter	%	-	-		< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	**1.19**	< 0.7	**0.9**	< 0.7	< 0.7
Paste pH	pH Units	-	-		**7.57**	**7.52**	**7.51**	**7.62**	**7.51**	**7.7**	**7.51**	**7.76**	**7.44**	**7.49**
pH (1:2 soil:water)	pH Units	-	-		**8.29**	**8.23**	**8.07**	**8.22**	**8.39**	**8.07**	**8.42**	**7.92**	**8.36**	**8.46**
Potassium	mg/kg	168,000	200000		**2550**	**2310**	**2280**	**2360**	**2650**	**930**	**2720**	**1150**	**2130**	**3500**
Selenium	mg/kg	4.8	0.5		**0.43**	**0.27**	**0.53**	**0.41**	**0.37**	< 0.2	**0.25**	< 0.2	**0.46**	**0.25**
Silver	mg/kg	-	0.75		**0.15**	**0.42**	**0.16**	**0.16**	**0.15**	**2.28 J**	**0.14**	**1.21 J**	**0.22**	**0.23**
Sodium	mg/kg	60,000	236000		**280**	**170**	**350**	**220**	**340**	< 100	**250**	< 100	**230**	**320**
Strontium	mg/kg	3,000	3700		**44.9**	**26.3**	**49.4**	**67.4**	**46**	**35.1**	**40.1**	**27.8**	**60.9**	**50.6**
Thallium	mg/kg	108	96		**0.192**	**0.25**	**0.159**	**0.171**	**0.182**	**1.24**	**0.206**	**1.32**	**0.181**	**0.237**
Tin	mg/kg	48	23		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Titanium	mg/kg	-	56,500		**592**	**530**	**549**	**363**	**594**	**40 J**	**587**	**73.6 J**	**349**	**491**
Total Carbon (Leco)	%	NV	NV		**0.4**	**0.3**	**0.5**	**0.5**	**0.5**	**2**	**0.6**	**1.9**	**0.8**	**0.5**
Total Inorganic Carbon	%	NV	NV		**0.15**	**0.18**	**0.3**	**0.12**	**0.27**	**1.15**	**0.33**	**1.41**	**0.45**	**0.34**
Total Nitrogen (Leco)	%	NV	NV		NA	NA	NA	**0.045**	**0.038**	NA	NA	NA	NA	NA
Total organic carbon	%	NV	NV		**0.26**	**0.18**	**0.29**	**0.26**	**0.4**	**0.8**	**0.25**	**0.81**	**0.31**	**0.22**
Total Phosphorus	mg/kg	800	10,500		**654**	**623**	**754**	*874*	**653**	**598**	**580**	**597**	*810*	**609**
Uranium	mg/kg	24	27		**2.04**	**2.01**	**1.7**	**1.37**	**3.31**	**1.61**	**2.5**	**1.57**	**1.83**	**2.04**
Vanadium	mg/kg	1,080	1,200		**40.6**	**32.3**	**42**	**40.8**	**40.9**	**19**	**35.4**	**19.7**	**41.1**	**34**
Zinc	mg/kg	1,080	700		**77.6**	**217**	**81.7**	**98.1**	**84.8**	*4310*	**82.6**	*3770*	**445**	**99.8**

Notes:
a. results may be affected by fluid use during drilling

b. Median soil content reported from the Global Acid Rock Drainage Guide (GARD Guide) (http://www.gardguide.com/ index.php/Main_Page) accessed on November 15, 2012.
c. Values from Price, 1997

Values indicated with shading were identified at concentrations which are 12 to 24 times the median soil content determined as having a geochemical abundance index (GAI) of 3 calculated by GAI = log2(conc/1.5*mean_soil_conc)
Values indicated in red italics were identified at concentrations that exceed 10 times the crustal abundance.
Bold indicates the analyte was detected

% = percent
< = Denotes less than laboratory method detection limit
$CaCO_3$ = calcium carbonate
ft = feet
GARD = global acid rock drainage
ID = identification
J = Analyte was present but the reported value may not be accurate or precise
MEND = Mine Environment Neutral Drainage
mg/kg = milligram per kilogram
N. Wall = North Wall of Grum Pit/ Grum Overburden Foundation
NA = not analyzed
NV = no value
OBD = Grum Overburden Dump

TABLE 3
General Chemistry
Faro Mine Remediation Project

			Location	CH13-311-BH014[a]					aCH13-311-BH015[a]				
			Sample ID	CH13-311-BH014_SOA	CH13-311-BH014_SOB	CH13-311-BH014_SOC	CH13-311-BH014_SOD	CH13-311-BH014_SOE	CH13-311-BH015_SOA	CH13-311-BH015_SOB	CH13-311-BH015_SOC	CH13-311-BH015_SOD	CH13-311-BH015_SOE
			Sample Depth (ft)	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0
			Sample Date	7/20/2013	7/20/2013	7/20/2013	7/20/2013	7/20/2013	7/22/2013	7/22/2013	7/22/2013	7/22/2013	7/22/2013
			Sub Area	OBD	OBD	OBD	OBD	OBD	OBD	OBD	OBD	OBD	OBD
Analyte		GARD[b]	MEND[c]										
Aluminum	mg/kg	852,000	823,000	**16800**	**15900**	**17400**	**21400**	**21400**	**14500**	**14900 J**	**15700 J**	**10400 J**	**21400 J**
Antimony	mg/kg	60	2	**7.69**	**2.89**	**0.46**	**0.79**	**0.71**	**4.92 J**	**9.6 J**	**0.75 J**	**4.83 J**	**0.39 J**
Arsenic	mg/kg	72	18	**52.7**	*78.7*	**15.6**	**17**	**15.3**	*72.9 J*	*153 J*	**9.31 J**	*260 J*	**12.1 J**
Barium	mg/kg	6,000	4,250	**119**	**377**	**170**	**287**	**230**	**476 J**	**372 J**	**253 J**	**258 J**	**140 J**
Beryllium	mg/kg	72	28	**0.71**	**0.68**	**0.51**	**0.7**	**0.68**	**0.54 J**	**0.4 J**	**0.62 J**	**0.46 J**	**0.85 J**
Bismuth	mg/kg	-	0.09	**0.24 J**	**0.38 J**	**0.25 J**	**0.41 J**	**0.96 J**	**0.6 J**	**0.23 J**	**0.43 J**	< 0.2	**0.53 J**
Boron	mg/kg	-	-	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Cadmium	mg/kg	4.2	1.5	*7.71*	**0.704**	**0.304**	**0.52**	**0.406**	**1.95 J**	*4.46 J*	**0.322 J**	*8.43 J*	**0.29 J**
Calcium	mg/kg	180,000	415,000	**7190**	**11400**	**9450**	**11600**	**10500**	**11600 J**	**13000 J**	**7490 J**	**15900 J**	**8040 J**
Chromium	mg/kg	840	1,020	**25.4**	**54**	**44.3**	**54.9**	**55.9**	**43.4 J**	**122 J**	**26.3 J**	**256 J**	**46.2 J**
Cobalt	mg/kg	96	250	**16.9**	**15.2**	**14.2**	**18.5**	**18.4**	**14.1 J**	**22.1 J**	**8.71 J**	**29 J**	**14.1 J**
Copper	mg/kg	360	600	**69.1**	**43.1**	**25.8**	**35.2**	**44**	**46.9 J**	**77.8 J**	**17 J**	**65.3 J**	**30 J**
Inorganic Carbon (as CACO3 Equivalent)	% $CaCO_3$	-	-	**0.99**	**1.7**	**2.26**	**2.5**	**2.07**	**2.57**	**3.42**	**1.66**	**3.38**	**1.43**
Iron	mg/kg	480,000	563,000	**48500**	**32500**	**30900**	**36800**	**38700**	**33500 J**	**39800 J**	**22900 J**	**46100 J**	**33000 J**
Lead	mg/kg	420	140	*2000*	**418**	**14.4**	**19**	**19.9**	*497 J*	*986 J*	**13.8 J**	*658 J*	**22.1 J**
Lithium	mg/kg	300	200	**33.7**	**28.3**	**30.6**	**35.7**	**36.8**	**21.4 J**	**22.4 J**	**27.8 J**	**11.8 J**	**43.7 J**
Magnesium	mg/kg	60,000	200,000	**10800**	**9780**	**9470**	**11000**	**11000**	**9430 J**	**13500 J**	**6110 J**	**15500 J**	**9280 J**
Manganese	mg/kg	12,000	9,500	**420**	**459**	**507**	**542**	**546**	**545 J**	**619 J**	**357 J**	**662 J**	**451 J**
Mercury	mg/kg	0.72	-	*1.31*	**0.388**	**0.0257**	**0.0436**	**0.0308**	**0.59 J**	*1.2 J*	**0.0277 J**	*1.45 J*	**0.0155 J**
Moisture	%	-	-	**4.9**	**11**	**11.9**	**10.1**	**11.8**	**10.8 J**	**13.7 J**	**8.14 J**	**8.62 J**	**9.51 J**
Molybdenum	mg/kg	24	12	**4.32**	**1.49**	**0.59**	**1.03**	**1.1**	**1.37 J**	**1.74 J**	**0.73 J**	**2.51 J**	**0.56 J**
Nickel	mg/kg	600	840	**40.8**	**54.5**	**39**	**51.2**	**51**	**47.8 J**	**91.2 J**	**22.5 J**	**202 J**	**37.5 J**
Organic Matter	%	-	-	**2.29**	< 0.7	**0.74**	< 0.7	< 0.7	< 0.7	**1.05 J**	< 0.7	< 0.7	< 0.7
Paste pH	pH Units	-	-	**7.49**	**7.6**	**7.62**	**7.49**	**7.71**	**6.81 J**	**6.9 J**	**7.13 J**	**7.15 J**	**7.29 J**
pH (1:2 soil:water)	pH Units	-	-	**7.8**	**8.32**	**8.02**	**8.13**	**8.15**	**8.13 J**	**8.03 J**	**8.33 J**	**8.02 J**	**8.37 J**
Potassium	mg/kg	168,000	200000	**720**	**2010**	**1620**	**2620**	**2540**	**1630 J**	**1020 J**	**2510 J**	**680 J**	**3540 J**
Selenium	mg/kg	4.8	0.5	**1.72**	**0.61**	**0.29**	**0.52**	**0.5**	**0.59 J**	**0.62 J**	**0.34 J**	**0.63 J**	**0.22 J**
Silver	mg/kg	-	0.75	**4.47**	**0.89**	**0.13**	**0.21**	**0.2**	**0.89 J**	**1.86 J**	**0.13 J**	**1.77 J**	**0.12 J**
Sodium	mg/kg	60,000	236000	< 100	**150**	**180**	**240**	**260**	**200 J**	< 100	**290 J**	< 100	**320 J**
Strontium	mg/kg	3,000	3700	**31.2**	**58.7**	**36.4**	**54.8**	**46.6**	**53.8 J**	**60.9 J**	**36.9 J**	**61.8 J**	**43.6 J**
Thallium	mg/kg	108	96	**0.862**	**0.344**	**0.142**	**0.267**	**0.184**	**0.359 J**	**0.626 J**	**0.183 J**	**0.3 J**	**0.244 J**
Tin	mg/kg	48	23	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Titanium	mg/kg	-	56,500	**63.3**	**421**	**357**	**408**	**393**	**407 J**	**381 J**	**584 J**	**160 J**	**589 J**
Total Carbon (Leco)	%	NV	NV	**0.5**	**0.5**	**0.7**	**0.5**	**0.8**	**0.6**	**0.7**	**0.4**	**0.8**	**0.3**
Total Inorganic Carbon	%	NV	NV	**0.21**	**0.22**	**0.39**	**0.3**	**0.31**	**0.36 J**	**0.44 J**	**0.2**	**0.41**	**0.3 J**
Total Nitrogen (Leco)	%	NV	NV	NA	**0.041**	NA	NA	NA	NA	NA	NA	NA	**0.025**
Total organic carbon	%	NV	NV	**1.3**	**0.28**	**0.46**	**0.22**	**0.56**	**0.4 J**	**0.6 J**	**0.22**	**0.39**	**0.15**
Total Phosphorus	mg/kg	800	10,500	*1350*	**789**	**623**	**774**	**676**	**728 J**	**671 J**	**585 J**	*859 J*	**594 J**
Uranium	mg/kg	24	27	**2.61**	**2.43**	**1.69**	**1.48**	**1.62**	**1.7 J**	**2.16 J**	**1.93 J**	**2.53 J**	**2.43 J**
Vanadium	mg/kg	1,080	1,200	**21.6**	**44.3**	**33.5**	**46.6**	**43.2**	**37.6 J**	**40.8 J**	**35.1 J**	**45.8 J**	**34.8 J**
Zinc	mg/kg	1,080	700	*6490*	**433**	**79.4**	**106**	**104**	**1070 J**	*2700 J*	**70.4 J**	*5190 J*	**99.5 J**

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J = Analyte was present but the reported value may not be accurate or precise
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mg/kg = milligram per kilogram
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NV = no value
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TABLE 3
General Chemistry
Faro Mine Remediation Project

			Location	**CH13-311-BH022**		**CH13-311-BH023**		**CH13-311-BH024**			**CH13-311-SS023**	**CH13-311-SS024**	
			Sample ID	CH13-311-BH915_SOC	CH13-311-BH022_SOb	CH13-311-BH022_SOa	CH13-311-BH023_SOb	CH13-311-BH023_SOa	CH13-311-BH024_SOb	CH13-311-BH924_SOb	CH13-311-BH024_SOa	CH13-311-SS023_SOa	CH13-311-SS024_SOa
			Sample Depth (ft)	0 - 0	0.15 - 0.4	1 - 2	0.1 - 0.38	0.15 - 3.35	0.15 - 0.6	0.15 - 0.6	0.15 - 3.35	0 - 0.15	0 - 0.15
			Sample Date	7/22/2013	8/25/2013	8/25/2013	8/24/2013	8/24/2013	8/24/2013	8/24/2013	8/24/2013	7/12/2013	7/12/2013
			Sub Area	OBD	RNGP	RNGP	RNGP	RNGP	RNGP	RNGP	RNGP	N. Wall	N. Wall
Analyte		GARD[b]	MEND[c]										
Aluminum	mg/kg	852,000	823,000	**16300 J**	**7700**	**6810**	**10000**	**12200**	**5090**	**3820**	**4560**	**17900**	**16200**
Antimony	mg/kg	60	2	**0.75 J**	**0.17**	**0.22**	**0.21**	**0.37**	**0.33**	**0.26**	**0.4**	**0.55**	**1.02**
Arsenic	mg/kg	72	18	**9.34 J**	**6.1**	**7.45**	**5.83**	**11.9**	**7.64 J**	**4.12 J**	**9.36**	**17**	**12.2**
Barium	mg/kg	6,000	4,250	**270 J**	**90.7**	**63**	**99.8**	**121**	**27.8**	**18.4**	**63.1**	**204**	**218**
Beryllium	mg/kg	72	28	**0.62 J**	**0.5**	**0.44**	**1**	**0.89**	**0.41**	**0.31**	**0.48**	**0.55**	**0.58**
Bismuth	mg/kg	-	0.09	**0.28 J**	**0.35**	**0.29**	**0.38**	**0.57**	**0.54 J**	**4.07 J**	**0.42**	**0.29**	**0.29**
Boron	mg/kg	-	-	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Cadmium	mg/kg	4.2	1.5	**0.312 J**	**0.12**	**0.105**	**0.11**	**0.234**	**0.145**	**0.089**	**0.22**	**0.339**	**0.373**
Calcium	mg/kg	180,000	415,000	**8460 J**	**1690**	**1630**	**1810**	**2400**	**1210 J**	**496 J**	**1890**	**6960**	**7880**
Chromium	mg/kg	840	1,020	**26.9 J**	**14**	**11.8**	**12.2**	**18.4**	**13.6 J**	**4.15 J**	**9.82**	**37.7**	**42.9**
Cobalt	mg/kg	96	250	**8.5 J**	**2.95**	**4.77**	**2.92**	**6.66**	**2.76**	**1.92**	**3.04**	**15.5**	**10.3**
Copper	mg/kg	360	600	**18.4 J**	**8.54**	**7.25**	**9.84**	**15**	**4.09**	**2.71**	**7.26**	**33.6**	**18.2**
Inorganic Carbon (as CACO3 Equivalent)	% $CaCO_3$	-	-	**1.23**	**1.05**	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	**1.34**	**2.31**
Iron	mg/kg	480,000	563,000	**23600 J**	**12300**	**10500**	**9710**	**17800**	**7830**	**5730**	**8760**	**30800**	**24900**
Lead	mg/kg	420	140	**12.4 J**	**9.48**	**12**	**16.5**	**23.2**	**16.5**	**10.6**	**15.6**	**19.9**	**15.7**
Lithium	mg/kg	300	200	**27.7 J**	**14.5**	**14.7**	**17.5**	**25.8**	**11.9**	**10.3**	**12.1**	**29.6**	**26.1**
Magnesium	mg/kg	60,000	200,000	**6320 J**	**2480**	**2540**	**2600**	**3780**	**1730**	**1170**	**1740**	**8160**	**7990**
Manganese	mg/kg	12,000	9,500	**371 J**	**120**	**204**	**123**	**309**	**142**	**103**	**170**	**471**	**385**
Mercury	mg/kg	0.72	-	**0.0258 J**	**0.0102**	**0.0074**	**0.0214**	**0.0154**	**0.0069 J**	**0.0234 J**	**0.0118**	< 0.05	< 0.05
Moisture	%	-	-	**9.4 J**	**16.1 J**	**14 J**	**33.7**	**15.9**	**3.72**	**3.44**	**6.66**	**8.17**	**7.49**
Molybdenum	mg/kg	24	12	**0.82 J**	**0.51**	**0.64**	< 0.5	**0.89**	< 0.5	< 0.5	**0.68**	**0.66**	**0.78**
Nickel	mg/kg	600	840	**22.7 J**	**8.24**	**11.2**	**7.57**	**14.9**	**6.41**	**4.04**	**8.22**	**40.4**	**35.9**
Organic Matter	%	-	-	< 0.7	**1.48**	< 0.7	**1.51**	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Paste pH	pH Units	-	-	**7.12 J**	**5.39**	**5.8**	**5.82**	**5.91**	**5.82**	**5.75**	**6.41**	**7.23**	**6.8**
pH (1:2 soil:water)	pH Units	-	-	**8.32 J**	**5.51**	**5.98**	**5.6**	**7.6**	**6.25**	**6.19**	**6.63**	**8.14**	**8.56**
Potassium	mg/kg	168,000	200000	**2630 J**	**630**	**650**	**890**	**2710**	**680**	**550**	**870**	**1630**	**2190**
Selenium	mg/kg	4.8	0.5	**0.33 J**	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	**0.26**
Silver	mg/kg	-	0.75	**0.12 J**	< 0.1	< 0.1	**0.23**	**0.11**	< 0.1	< 0.1	**0.13**	**0.14**	**0.12**
Sodium	mg/kg	60,000	236000	**350 J**	< 100	< 100	**230**	**190**	< 100	< 100	< 100	**200**	**200**
Strontium	mg/kg	3,000	3700	**41.1 J**	**10.4**	**9.19**	**14.5**	**17.8**	**5.19 J**	**2.6 J**	**9.46**	**35.7**	**36.7**
Thallium	mg/kg	108	96	**0.172 J**	**0.134**	< 0.113	**0.227**	**0.298**	**0.13**	**0.09**	**0.174**	**0.149**	**0.185**
Tin	mg/kg	48	23	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Titanium	mg/kg	-	56,500	**609 J**	**226**	**213**	**349**	**469**	**153**	**109**	**190**	**369**	**545**
Total Carbon (Leco)	%	NV	NV	**0.4**	**0.8**	NA	**1.4**	NA	**0.2**	**0.1**	NA	NA	NA
Total Inorganic Carbon	%	NV	NV	**0.24 J**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**0.16**	**0.28**
Total Nitrogen (Leco)	%	NV	NV	NA	**0.049**	NA	**0.087**	NA	< 0.02	< 0.02	NA	NA	**0.029 J**
Total organic carbon	%	NV	NV	**0.26**	**0.69**	< 0.4	**1.37**	< 0.4	**0.16**	**0.14**	< 0.4	**0.4**	< 0.4
Total Phosphorus	mg/kg	800	10,500	**554 J**	**504**	**497**	**520**	**510**	**577 J**	**205 J**	**628**	**618**	**568**
Uranium	mg/kg	24	27	**1.98 J**	**3.35**	**2.94**	**8.79**	**2.87**	**1.15**	**0.842**	**1.58**	**0.991**	**1.83**
Vanadium	mg/kg	1,080	1,200	**37.2 J**	**18.3**	**15.4**	**18.3**	**22.2**	**8.66**	**12.1**	**10.4**	**32.9**	**36.7**
Zinc	mg/kg	1,080	700	**69.3 J**	**39**	**39.3**	**42.4**	**69.8**	**37.8**	**27.9**	**48.2**	**93.6**	**83**

Notes:
a. results may be affected by fluid use during drilling

b. Median soil content reported from the Global Acid Rock Drainage Guide (GARD Guide) (http://www.gardguide.com/ index.php/Main_Page) accessed on November 15, 2012.
c. Values from Price, 1997

Values indicated with shading were identified at concentrations which are 12 to 24 times the median soil content determined as having a geochemical abundance index (GAI) of 3 calculated by GAI = log2(conc/1.5*mean_soil_conc)
Values indicated in red italics were identified at concentrations that exceed 10 times the crustal abundance.
Bold indicates the analyte was detected

% = percent
< = Denotes less than laboratory method detection limit
$CaCO_3$ = calcium carbonate
ft = feet
GARD = global acid rock drainage
ID = identification
J = Analyte was present but the reported value may not be accurate or precise
MEND = Mine Environment Neutral Drainage
mg/kg = milligram per kilogram
N. Wall = North Wall of Grum Pit/ Grum Overburden Foundation
NA = not analyzed
NV = no value
OBD = Grum Overburden Dump

TABLE 3
General Chemistry
Faro Mine Remediation Project

Analyte		GARD[b]	MEND[c]	Location	CH13-311-SS025	CH13-311-SS027	CH13-311-SS028	CH13-311-SS029	CH13-311-SS030	CH13-311-SS031	CH13-311-SS032	CH13-311-SS033	CH13-311-SS034	CH13-311-SS035
				Sample ID	CH13-311-SS025_SOa	CH13-311-SS027_SOa	CH13-311-SS028_SOa	CH13-311-SS029_SOa	CH13-311-SS030_SOA	CH13-311-SS031_SOa	CH13-311-SS032_SOa	CH13-311-SS033_SOA	CH13-311-SS034_SOa	CH13-311-SS035_SOa
				Sample Depth (ft)	0 - 0.15	0 - 0.15	0 - 0.15	0 - 0.15	0 - 0	0 - 0.15	0 - 0.15	0 - 0	0 - 0.15	0 - 0.15
				Sample Date	7/12/2013	7/15/2013	7/15/2013	7/15/2013	7/15/2013	7/15/2013	7/15/2013	7/15/2013	7/15/2013	7/15/2013
				Sub Area	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall
Aluminum	mg/kg	852,000	823,000		**12900**	**16000**	**12900**	**17300**	**18600**	**18000**	**15400**	**15000**	**16500**	**19000**
Antimony	mg/kg	60	2		**0.56**	**0.87**	**0.85**	**0.84**	**0.47**	**0.81**	**0.59**	**0.35**	**0.52**	**0.38**
Arsenic	mg/kg	72	18		**6.52**	**11.4**	**12.4**	**14.9**	**10.5**	**19.3**	**11.7**	**8.79**	**15.2**	**11.7**
Barium	mg/kg	6,000	4,250		**163**	**250**	**237**	**283**	**142**	**161**	**189**	**111**	**176**	**156**
Beryllium	mg/kg	72	28		**0.66**	**0.58**	**0.56**	**0.62**	**0.83**	**0.8**	**0.55**	**0.56**	**0.57**	**0.65**
Bismuth	mg/kg	-	0.09		**0.39**	**0.28**	**0.35**	**0.26**	**0.53**	**0.46**	**0.31**	**0.34**	**0.33**	**0.38**
Boron	mg/kg	-	-		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Cadmium	mg/kg	4.2	1.5		**0.248**	**0.426**	**0.325**	**0.408**	**0.186**	**0.287**	**0.351**	**0.202**	**0.273**	**0.294**
Calcium	mg/kg	180,000	415,000		**4850**	**10100**	**5710**	**11500**	**7260**	**9860**	**11300**	**5820**	**7110**	**4710**
Chromium	mg/kg	840	1,020		**19.2**	**30.9**	**31.4**	**31**	**53.8**	**52.1**	**38.1**	**47.8**	**50.1**	**45.1**
Cobalt	mg/kg	96	250		**6.08**	**10.7**	**10.8**	**11.5**	**12.8**	**13.8**	**11.8**	**11.9**	**13.8**	**17.2**
Copper	mg/kg	360	600		**12.3**	**23.4**	**24.2**	**26**	**24.1**	**26.8**	**21.2**	**23.2**	**35.1**	**31.1**
Inorganic Carbon (as CACO3 Equivalent)	% $CaCO_3$	-	-		**1.01**	**2.22**	**1.4**	**1.98**	**1.63**	**1.87**	**1.92**	**1.76**	**1.52**	**1.19**
Iron	mg/kg	480,000	563,000		**16600**	**25900**	**23600**	**28100**	**29700**	**29400**	**25300**	**26000**	**29500**	**33600**
Lead	mg/kg	420	140		**10.7**	**13.5**	**28.3**	**15.4**	**21.4**	**18.7**	**16.4**	**15.4**	**37.5**	**22.9**
Lithium	mg/kg	300	200		**25**	**26.5**	**23.7**	**27.4**	**42.2**	**41.3**	**27.8**	**29.8**	**30.1**	**33.8**
Magnesium	mg/kg	60,000	200,000		**4330**	**7120**	**6560**	**7750**	**9620**	**9470**	**8430**	**8040**	**8980**	**9590**
Manganese	mg/kg	12,000	9,500		**286**	**417**	**292**	**475**	**393**	**399**	**432**	**354**	**406**	**424**
Mercury	mg/kg	0.72	-		< 0.05	**0.029**	**0.0409**	**0.0289**	**0.0138**	**0.019**	**0.0197**	**0.0127**	**0.022**	**0.0138**
Moisture	%	-	-		**9.83**	**9.69**	**10.5**	**10.4**	**7.79**	**8.38**	**8.07**	**4.85**	**9.43**	**10.2**
Molybdenum	mg/kg	24	12		< 0.5	**0.95**	**0.74**	**1**	< 0.5	< 0.5	**0.66**	< 0.5	**0.72**	< 0.5
Nickel	mg/kg	600	840		**15.9**	**28.1**	**31.8**	**28.6**	**40.9**	**44.3**	**36.5**	**37.8**	**41.9**	**43**
Organic Matter	%	-	-		< 0.7	NA	NA	**0.7**	NA	NA	< 0.7	< 0.7	NA	NA
Paste pH	pH Units	-	-		**7.54**	**7.45**	**7.48**	**7.43**	**7.51**	**7.79**	**7.36**	**7.58**	**7.43**	**7.69**
pH (1:2 soil:water)	pH Units	-	-		**8.39**	**8.08**	**8.39**	**8.17**	**8.43**	**8.59**	**8.25**	**8.25**	**8.17**	**8.58**
Potassium	mg/kg	168,000	200000		**2230**	**1980**	**1470**	**2170**	**2940**	**3010**	**1940**	**1970**	**1700**	**2130**
Selenium	mg/kg	4.8	0.5		**0.21**	**0.41**	**0.53**	**0.52**	< 0.2	**0.22**	**0.24**	**0.21**	**0.26**	< 0.2
Silver	mg/kg	-	0.75		**0.11**	**0.15**	**0.14**	**0.35**	**0.12**	**0.12**	**0.11**	< 0.1	**0.13**	< 0.1
Sodium	mg/kg	60,000	236000		**170**	**290**	**130**	**330**	**190**	**140**	**210**	**160**	**160**	**220**
Strontium	mg/kg	3,000	3700		**25.9**	**49**	**34.6**	**51.3**	**38**	**44.6**	**50.8**	**29.1**	**33.2**	**30.1**
Thallium	mg/kg	108	96		**0.209**	**0.147**	**0.16**	**0.157**	**0.242**	**0.259**	**0.144**	**0.174**	**0.146**	**0.164**
Tin	mg/kg	48	23		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Titanium	mg/kg	-	56,500		**485**	**518**	**487**	**568**	**537**	**532**	**448**	**409**	**433**	**454**
Total Carbon (Leco)	%	NV	NV		NA	NA	NA	NA	**0.3**	NA	NA	**0.3**	NA	NA
Total Inorganic Carbon	%	NV	NV		**0.12**	**0.27**	**0.17**	**0.24**	**0.2**	**0.22**	**0.23**	**0.21**	**0.18**	**0.14**
Total Nitrogen (Leco)	%	NV	NV		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon	%	NV	NV		< 0.4	NA	NA	**0.4**	< 0.1	NA	< 0.4	< 0.4	NA	NA
Total Phosphorus	mg/kg	800	10,500		**529**	**691**	**566**	**648**	**593**	**558**	*886*	**514**	**624**	**524**
Uranium	mg/kg	24	27		**1.79**	**1.59**	**2.11**	**1.74**	**2.11**	**4.69**	**1.8**	**1.4**	**1.4**	**1.44**
Vanadium	mg/kg	1,080	1,200		**27.7**	**38.9**	**31.1**	**42.2**	**32.3**	**35.1**	**32.8**	**25.3**	**30**	**30.8**
Zinc	mg/kg	1,080	700		**56.4**	**75**	**86.5**	**79.7**	**92.2**	**88.7**	**120**	**89.2**	**102**	**146**

Notes:
a. results may be affected by fluid use during drilling

b. Median soil content reported from the Global Acid Rock Drainage Guide (GARD Guide) (http://www.gardguide.com/ index.php/Main_Page) accessed on November 15, 2012.
c. Values from Price, 1997

Values indicated with shading were identified at concentrations which are 12 to 24 times the median soil content determined as having a geochemical abundance index (GAI) of 3 calculated by GAI = log2(conc/1.5*mean_soil_conc)
Values indicated in red italics were identified at concentrations that exceed 10 times the crustal abundance.
Bold indicates the analyte was detected

% = percent
< = Denotes less than laboratory method detection limit
$CaCO_3$ = calcium carbonate
ft = feet
GARD = global acid rock drainage
ID = identification
J = Analyte was present but the reported value may not be accurate or precise
MEND = Mine Environment Neutral Drainage
mg/kg = milligram per kilogram
N. Wall = North Wall of Grum Pit/ Grum Overburden Foundation
NA = not analyzed
NV = no value
OBD = Grum Overburden Dump

TABLE 3
General Chemistry
Faro Mine Remediation Project

				Location	CH13-311-SS036	CH13-311-SS037	CH13-311-TP002		CH13-311-TP003		CH13-311-TP004		CH13-311-TP005	
				Sample ID	CH13-311-SS036_SOa	CH13-311-SS037_SOA	CH13-311-TP002_SOa	CH13-311-TP902_SOa	CH13-311-TP003_SOa	CH13-311-TP903_SOa	CH13-311-TP004_SOa	CH13-311-TP904_SOa	CH13-311-TP005_SOa	CH13-311-TP905_SOa
				Sample Depth (ft)	0 - 0.15	0 - 0	0 - 4	0 - 4	0 - 6	0 - 6	1 - 6	1 - 6	1 - 6	1 - 6
				Sample Date	7/15/2013	7/15/2013	8/14/2013	8/14/2013	8/14/2013	8/14/2013	8/14/2013	8/14/2013	8/14/2013	8/14/2013
				Sub Area	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall
Analyte		GARD[b]	MEND[c]											
Aluminum	mg/kg	852,000	823,000		**14300**	**16900**	**18200**	**20000**	**16100**	**15600**	**12800**	**11900**	**16600**	**16100**
Antimony	mg/kg	60	2		**0.67**	**0.9**	**0.58**	**0.5**	**1.77 J**	**0.58 J**	**6.44 J**	**3.01 J**	**0.87**	**0.77**
Arsenic	mg/kg	72	18		**10.3**	**11.2**	**12.8**	**12**	**11.2**	**8.08**	*86.2*	*77.9*	**10.2**	**10**
Barium	mg/kg	6,000	4,250		**230**	**312**	**198**	**190**	**177**	**192**	**281**	**371**	**266**	**253**
Beryllium	mg/kg	72	28		**0.54**	**0.59**	**0.67**	**0.67**	**0.64**	**0.71**	**0.57**	**0.49**	**0.69**	**0.74**
Bismuth	mg/kg	-	0.09		**0.28**	**0.28**	**0.38**	**0.62**	**0.43**	**0.39**	**0.56**	< 0.2	**0.39**	**0.37**
Boron	mg/kg	-	-		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Cadmium	mg/kg	4.2	1.5		**0.404**	**0.427**	**0.372**	**0.31**	**0.271**	**0.261**	**1.06**	**0.864**	**0.374**	**0.338**
Calcium	mg/kg	180,000	415,000		**9900**	**9830**	**6860**	**7260**	**8160**	**8080**	**10600**	**10100**	**8210**	**8040**
Chromium	mg/kg	840	1,020		**29.3**	**27.7**	**46.1**	**43.8**	**40.4**	**35.5**	**37.8 J**	**77.5 J**	**29**	**27.6**
Cobalt	mg/kg	96	250		**10.2**	**10.4**	**15.6**	**15**	**12.6**	**9.74**	**18**	**24.9**	**10.6**	**9.82**
Copper	mg/kg	360	600		**21.7**	**21.3**	**36.5**	**35.6**	**24.8**	**19.4**	**64 J**	**36.8 J**	**22.6**	**21**
Inorganic Carbon (as CACO3 Equivalent)	% $CaCO_3$	-	-		**2.41**	**2.18**	**1.06**	**1.09**	**1.09**	**1.8**	**4.35**	**6.03**	**1.41**	**1.77**
Iron	mg/kg	480,000	563,000		**24000**	**26200**	**32500**	**33400**	**28600**	**23900**	**42000**	**50500**	**26400**	**25600**
Lead	mg/kg	420	140		**11.6**	**12.5**	**19.2**	**17.4**	**22.4**	**14.8**	*996 J*	**378 J**	**17.7**	**14.7**
Lithium	mg/kg	300	200		**26.8**	**26.7**	**36.1**	**39.3**	**33.1**	**32.1**	**25.3**	**20.7**	**31.6**	**32.2**
Magnesium	mg/kg	60,000	200,000		**7220**	**6790**	**8560**	**9080**	**8400**	**6850**	**10300**	**14900**	**6900**	**6750**
Manganese	mg/kg	12,000	9,500		**360**	**458**	**449**	**418**	**407**	**366**	**461**	**606**	**403**	**390**
Mercury	mg/kg	0.72	-		**0.0363**	**0.0317**	**0.0316**	**0.0315**	**0.027**	**0.0226**	*0.735 J*	**0.349 J**	**0.126 J**	**0.036 J**
Moisture	%	-	-		**6.26**	**8.35**	**8.6 J**	**9.51 J**	**8.98 J**	**7.68 J**	**7.94 J**	**5.31 J**	**9.44 J**	**8.9 J**
Molybdenum	mg/kg	24	12		**0.74**	**1.55**	**0.84**	**0.68**	**0.69**	**0.52**	**1.22**	**0.88**	**0.98**	**0.79**
Nickel	mg/kg	600	840		**28.1**	**26**	**41.8**	**38.8**	**37.1**	**29.7**	**44.7 J**	**82.9 J**	**26.9**	**25.5**
Organic Matter	%	-	-		< 0.7	< 0.7	**0.78**	< 0.7	< 0.7	< 0.7	**0.99**	**1.07**	< 0.7	< 0.7
Paste pH	pH Units	-	-		**7.59**	**7.59**	**7.45**	**7.29**	**7.35**	**7.44**	**7.42**	**7.36**	**7.59**	**7.56**
pH (1:2 soil:water)	pH Units	-	-		**8.35**	**8.37**	**7.99**	**7.99**	**8.09**	**8.27**	**8.18**	**8.32**	**8.39**	**8.38**
Potassium	mg/kg	168,000	200000		**1930**	**2330**	**2130**	**2670**	**2190**	**2580**	**1390**	**950**	**2600**	**2650**
Selenium	mg/kg	4.8	0.5		**0.48**	**0.49**	**0.24**	**0.29**	**0.24**	**0.25**	**0.33**	**0.31**	**0.4**	**0.44**
Silver	mg/kg	-	0.75		**0.15**	**0.2**	**0.15**	**0.16**	**0.15**	**0.11**	**2.08 J**	**0.74 J**	**0.16**	**0.17**
Sodium	mg/kg	60,000	236000		**180**	**300**	**250**	**320**	**180**	**220**	**110**	< 100	**280**	**250**
Strontium	mg/kg	3,000	3700		**45.5**	**48.4**	**36.8**	**41.6**	**38.1**	**44.1**	**49.7**	**41.2**	**41.6**	**40.6**
Thallium	mg/kg	108	96		**0.145**	**0.174**	**0.178**	**0.191**	**0.22**	**0.201**	**0.56**	**0.634**	**0.211**	**0.198**
Tin	mg/kg	48	23		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Titanium	mg/kg	-	56,500		**362**	**545**	**374**	**488**	**448**	**540**	**226 J**	**118 J**	**564**	**559**
Total Carbon (Leco)	%	NV	NV		NA	**0.6**	**0.6 J**	**0.3 J**	**0.3**	**0.4**	**0.9**	**1**	**0.3**	**0.4**
Total Inorganic Carbon	%	NV	NV		**0.29**	**0.26**	**0.18**	**0.13**	**0.2**	**0.16**	**0.75**	**0.6**	**0.21**	**0.25**
Total Nitrogen (Leco)	%	NV	NV		NA	**0.029**	**0.032**	**0.027**	NA	NA	NA	NA	NA	NA
Total organic carbon	%	NV	NV		< 0.4	**0.3**	**0.5**	**0.4**	**0.21**	**0.16**	**0.6**	**0.6**	**0.4**	**0.24**
Total Phosphorus	mg/kg	800	10,500		**609**	**647**	**691**	**674**	**550**	**516**	**627**	**570**	**667**	**534**
Uranium	mg/kg	24	27		**1.69**	**2.36**	**1.76**	**1.77**	**2.12**	**2.32**	**1.98**	**1.67**	**2.42**	**2.48**
Vanadium	mg/kg	1,080	1,200		**32**	**42.5**	**36.4**	**35.4**	**31.9**	**32.8**	**26.1**	**24.2**	**38.1**	**36.7**
Zinc	mg/kg	1,080	700		**76.5**	**76.9**	**95.3**	**94.3**	**88.8**	**93.1**	**812**	**572**	**82.5**	**77.2**

Notes:
a. results may be affected by fluid use during drilling

b. Median soil content reported from the Global Acid Rock Drainage Guide (GARD Guide) (http://www.gardguide.com/ index.php/Main_Page) accessed on November 15, 2012.
c. Values from Price, 1997

Values indicated with shading were identified at concentrations which are 12 to 24 times the median soil content determined as having a geochemical abundance index (GAI) of 3 calculated by GAI = log2(conc/1.5*mean_soil_conc)
Values indicated in red italics were identified at concentrations that exceed 10 times the crustal abundance.
Bold indicates the analyte was detected

% = percent
< = Denotes less than laboratory method detection limit
$CaCO_3$ = calcium carbonate
ft = feet
GARD = global acid rock drainage
ID = identification
J = Analyte was present but the reported value may not be accurate or precise
MEND = Mine Environment Neutral Drainage
mg/kg = milligram per kilogram
N. Wall = North Wall of Grum Pit/ Grum Overburden Foundation
NA = not analyzed
NV = no value
OBD = Grum Overburden Dump

TABLE 3
General Chemistry
Faro Mine Remediation Project

Analyte		GARD[b]	MEND[c]	Location	CH13-311-TP006		CH13-311-TP021	CH13-311-TP022	CH13-311-TP023
				Sample ID	CH13-311-TP006_SOa	CH13-311-TP906_SOa	Ch13-311-TP021_SOa	CH13-311-TP022_SOa	CH13-311-TP023_SOa
				Sample Depth (ft)	1 - 6	1 - 6	2.43 - 2.74	3.04 - 5.79	0.3 - 2.43
				Sample Date	8/13/2013	8/13/2013	8/27/2013	8/26/2013	8/26/2013
				Sub Area	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall
Aluminum	mg/kg	852,000	823,000		**17900**	**17200**	**23100**	**19500**	**21000**
Antimony	mg/kg	60	2		**0.79**	**0.72**	**0.5**	**0.83**	**0.57**
Arsenic	mg/kg	72	18		**12.2**	**11.6**	**18**	**14**	**17.3**
Barium	mg/kg	6,000	4,250		**202**	**192**	**269**	**349**	**225**
Beryllium	mg/kg	72	28		**0.81**	**0.7**	**0.84**	**0.68**	**0.72**
Bismuth	mg/kg	-	0.09		**0.42**	**0.47**	**0.33**	**0.33**	**0.37**
Boron	mg/kg	-	-		< 10	< 10	< 10	< 10	< 10
Cadmium	mg/kg	4.2	1.5		**0.287**	**0.277**	**0.201**	**0.505**	**0.293**
Calcium	mg/kg	180,000	415,000		**9780**	**9210**	**4070**	**3850**	**2280**
Chromium	mg/kg	840	1,020		**43.3**	**41**	**44.6**	**47.3**	**45.1**
Cobalt	mg/kg	96	250		**12.4**	**11.7**	**16**	**15**	**18.9**
Copper	mg/kg	360	600		**25.4**	**26.3**	**36.6**	**36**	**41.5**
Inorganic Carbon (as CACO3 Equivalent)	% $CaCO_3$	-	-		**2.34**	**1.99**	< 0.8	**6.18**	< 0.8
Iron	mg/kg	480,000	563,000		**28900**	**28800**	**39200**	**32700**	**36900**
Lead	mg/kg	420	140		**18.9**	**19.2**	**12.8**	**13.7 J**	**33.3 J**
Lithium	mg/kg	300	200		**38.1**	**36.6**	**37.2**	**31.4**	**35.3**
Magnesium	mg/kg	60,000	200,000		**8390**	**8200**	**9140**	**8570**	**9790**
Manganese	mg/kg	12,000	9,500		**422**	**398**	**344**	**463**	**573**
Mercury	mg/kg	0.72	-		**0.0194**	**0.0231**	**0.0202**	**0.0499**	**0.0251**
Moisture	%	-	-		**6.88 J**	**9.68 J**	**11.9 J**	**9.09 J**	**11.3 J**
Molybdenum	mg/kg	24	12		**0.64**	**0.71**	**0.81**	**0.85**	**0.65**
Nickel	mg/kg	600	840		**36.4**	**34.2**	**43.3**	**44.7**	**46.6**
Organic Matter	%	-	-		< 0.7	**0.77**	< 0.7	**1.9**	< 0.7
Paste pH	pH Units	-	-		**7.59**	**7.45**	**5.08 J**	**6.98 J**	**6.17 J**
pH (1:2 soil:water)	pH Units	-	-		**8.3**	**8.11**	**4.57**	**7.83**	**6.92**
Potassium	mg/kg	168,000	200000		**2860**	**2500**	**2730**	**2330**	**2020**
Selenium	mg/kg	4.8	0.5		**0.31**	**0.32**	< 0.2	**0.28**	< 0.2
Silver	mg/kg	-	0.75		**0.15**	**0.15**	**0.13**	**0.16**	**0.14**
Sodium	mg/kg	60,000	236000		**230**	**220**	**460**	**250**	**140**
Strontium	mg/kg	3,000	3700		**45.1**	**45.3**	**42**	**26.9**	**17**
Thallium	mg/kg	108	96		**0.236**	**0.213**	**0.214**	**0.196**	**0.162**
Tin	mg/kg	48	23		< 2	< 2	< 2	< 2	< 2
Titanium	mg/kg	-	56,500		**625**	**530**	**549**	**458**	**406**
Total Carbon (Leco)	%	NV	NV		**0.5**	**0.5**	**0.3**	NA	NA
Total Inorganic Carbon	%	NV	NV		**0.24**	**0.21**	< 0.1	**0.74**	< 0.1
Total Nitrogen (Leco)	%	NV	NV		NA	NA	**0.035**	NA	NA
Total organic carbon	%	NV	NV		**0.18**	**0.4**	**0.26**	**1.1**	< 0.4
Total Phosphorus	mg/kg	800	10,500		**591**	**607**	**773**	**733**	**630**
Uranium	mg/kg	24	27		**3.25**	**2.98**	**1.24**	**0.832**	**1.01**
Vanadium	mg/kg	1,080	1,200		**37.9**	**35**	**38.4**	**45.6**	**37.7**
Zinc	mg/kg	1,080	700		**81.2**	**81.6**	**93.1**	**100**	**97**

Notes:
a. results may be affected by fluid use during drilling

b. Median soil content reported from the Global Acid Rock Drainage Guide (GARD Guide) (http://www.gardguide.com/ index.php/Main_Page) accessed on November 15, 2012.
c. Values from Price, 1997

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Values indicated in red italics were identified at concentrations that exceed 10 times the crustal abundance.
Bold indicates the analyte was detected

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$CaCO_3$ = calcium carbonate
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GARD = global acid rock drainage
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MEND = Mine Environment Neutral Drainage
mg/kg = milligram per kilogram
N. Wall = North Wall of Grum Pit/ Grum Overburden Foundation
NA = not analyzed
NV = no value
OBD = Grum Overburden Dump

TABLE 4
Leach Test
Faro Mine Remediation Project

		Location	CH13-311-BH001		CH13-311-BH002	CH13-311-BH003		CH13-311-SS029	CH13-311-SS032	CH13-311-SS033	CH13-311-SS036	CH13-311-SS037	CH13-311-TP004		CH13-311-TP006	
		Sample ID	CH13-311-BH001_SOa	CH13-311-BH001_SOb	CH13-311-BH002_SOb	CH13-311-BH003_Soa	CH13-311-BH003_Sob	CH13-311-SS029_Soa	CH13-311-SS032_SOa	CH13-311-SS033_SOA	CH13-311-SS036_SOa	CH13-311-SS037_SOA	CH13-311-TP004_SOa	CH13-311-TP904_SOa	CH13-311-TP006_SOa	CH13-311-TP906_SOa
		Sample Depth (ft)	0 - 0.1	0.15 - 1.46	0.2 - 0.66	0 - 3.7	0.1 - 0.17	0 - 0.15	0 - 0.15	0 - 0	0 - 0.15	0 - 0	1 - 6	1 - 6	1 - 6	1 - 6
		Sample Date	8/23/2013	8/23/2013	8/22/2013	8/22/2013	8/22/2013	7/15/2013	7/15/2013	7/15/2013	7/15/2013	7/15/2013	8/14/2013	8/14/2013	8/13/2013	8/13/2013
		Sub Area	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	OBD	OBD	OBD	OBD
Analyte	**Units**	CCME														
Acidty	mg/L	-	**2.9**	**6.4**	**6.7**	**2.8**	**2.4**	**8.7**	**3.8**	**2.9**	**2.5**	**2.3**	**6.4**	**6.5**	**11.7 J**	**6.2 J**
Alkalinity Total	mg/L	-	**114 J**	**21.1 J**	**13.2**	**90.7**	**37.2**	**60**	**53.5**	**45.1**	**66.8**	**59.4**	**155**	**207**	**67.3**	**82.4**
Aluminum	mg/L	0.005 to 0.1 [a]	**0.0287**	**32.4**	**24.2 J**	< 0.0086	**1.15 J**	**0.0237**	**0.0335**	**0.0504**	**0.0165**	**0.0268**	**0.0097**	**0.0083**	**0.0211**	**0.0244**
Antimony	mg/L	-	**0.00032**	**0.00074**	**0.00121**	**0.00017**	**0.00067**	**0.00235**	**0.00237**	**0.0012**	**0.00253**	**0.00299**	**0.00977 J**	**0.00174 J**	**0.00268**	**0.00223**
Arsenic	mg/L	0.005	< 0.001	**0.0271**	**0.0579 J**	< 0.001	**0.0091 J**	**0.0011**	**0.0027**	**0.0021**	**0.0012**	**0.0017**	**0.0034**	**0.0012**	**0.0013**	**0.0015**
Barium	mg/L	-	**0.0995**	**0.218**	**0.388**	**0.106**	**0.121**	**0.069**	**0.0704**	**0.0761**	**0.12**	**0.105**	**0.0667 J**	**0.0398 J**	**0.0861**	**0.103**
Beryllium	mg/L	-	< 0.0005	**0.00108**	**0.00114**	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Boron	mg/L	1.5	**0.024**	**0.038**	**0.034**	**0.013**	**0.014**	**0.017**	**0.017**	**0.011**	**0.021**	**0.015**	**0.016**	**0.016**	**0.014**	**0.015**
Bromide	mg/L	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	mg/L	Variable [b]	< 0.00005	**0.000402**	**0.000269**	< 0.00005	**0.000123**	**0.000122**	< 0.00005	< 0.00005	< 0.00005	**0.000061**	**0.000645 J**	**0.000257 J**	**0.000062**	< 0.00005
Calcium	mg/L	-	**36.6**	**1.27**	**4.22**	**26.4**	**9.87**	**71.8**	**63.1**	**50.9**	**42.7**	**38.4**	**79.9**	**78.4**	**64.1**	**55.1**
Chromium	mg/L	0.0089	< 0.0005	**0.03**	**0.0359 J**	< 0.0005	**0.00336 J**	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Cobalt	mg/L	-	**0.00034**	**0.019**	**0.0357**	< 0.0001	**0.00394**	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	**0.00158 J**	**0.00087 J**	**0.00015**	**0.00011**
Copper	mg/L	0.002	**0.0027**	**0.0274**	0.0455 J	< 0.001	**0.0167 J**	**0.0132**	**0.0013**	**0.001**	**0.0013**	**0.0016**	**0.0014**	< 0.001	**0.0013**	**0.0012**
Iron	mg/L	0.3	**0.06**	**31.3**	**48.4**	< 0.03	**6.61**	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Lead	mg/L	0.001	**0.00012**	**0.0256**	**0.034**	< 0.0001	**0.00666**	**0.00023**	< 0.0001	< 0.0001	< 0.0001	< 0.0001	**0.0699 J**	**0.00355 J**	< 0.0001	< 0.0001
Lithium	mg/L	-	< 0.005	**0.0127**	**0.0153**	**0.0078**	< 0.005	< 0.005	< 0.005	< 0.005	**0.0062**	< 0.005	**0.032**	**0.0347**	< 0.005	< 0.005
Magnesium	mg/L	-	**6.05**	**2.64**	**3.49**	**2.69**	**2.31**	**11**	**9.36**	**6.85**	**7.5**	**5.26**	**30.4 J**	**61.6 J**	**9.84**	**9.12**
Manganese	mg/L	-	**0.00517**	**0.555**	**0.961**	**0.00055**	**0.167**	**0.0355**	**0.00864**	**0.017**	**0.00487**	**0.0015**	**0.226 J**	**0.0856 J**	**0.0633**	**0.0453**
Mercury	mg/L	2.60E-05	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Molybdenum	mg/L	0.073	**0.00322**	**0.00123**	**0.00512**	**0.00486**	**0.00064**	**0.0405**	**0.0179**	**0.00698**	**0.0214**	**0.0659**	**0.00428**	**0.00275**	**0.0211**	**0.0197**
Nickel	mg/L	0.025	**0.00132**	**0.0301**	**0.0491**	< 0.0005	**0.0115**	**0.00086**	**0.00096**	**0.00056**	**0.00072**	< 0.0005	**0.00437**	**0.00459**	**0.00117**	**0.00101**
ORP Leachable	mV	-	**461**	**455**	**482**	**472**	**457**	**386**	**395**	**380**	**395**	**394**	**277**	**294**	**339**	**330**
pH	pH Units	-	**7.02**	**6.25**	**6.3**	**7.77**	**6.75**	**8.03**	**8.21**	**8.21**	**8.17**	**8.27**	**7.68**	**7.59**	**8.18**	**8.15**
Potassium	mg/L	-	**8.1**	**11.7**	**7.3**	**3.2**	< 2	**9.9**	**7.9**	**10.2**	**6.9**	**5.2**	**15**	**24.2**	**9.3**	**9.1**
Selenium	mg/L	0.001	< 0.0005	**0.00054**	< 0.0005	< 0.0005	< 0.0005	**0.00131**	**0.0016**	**0.00434**	**0.00261**	**0.00371**	**0.00148**	**0.00052**	**0.00217**	**0.00156**
Silicon	mg/L	-	**6.79**	**44.7**	**54.8**	**6.38**	**9.68**	**2.62**	**3.72**	**4.26**	**2.98**	**2.54**	**4.01**	**3.44**	**3.07**	**3.07**
Silver	mg/L	0.0001	< 0.00005	**0.000175**	**0.000261**	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Soum	mg/L	-	**5.2**	**6.9**	**10.7**	**2.4**	< 2	**9.9**	**5.7**	**4.5**	**3.6**	**5.1**	**6.2**	**3.5**	**6.8**	**7.8**
Specific Conductance	uS/cm	-	**254**	**49.9**	**71.8**	**162**	**73**	**489**	**422**	**352**	**298**	**263**	**619**	**808**	**418**	**376**
Strontium	mg/L	-	**0.119**	**0.0241**	**0.0437**	**0.0878**	**0.054**	**0.304**	**0.257**	**0.248**	**0.23**	**0.229**	**0.421 J**	**0.243 J**	**0.303**	**0.282**
Sulphate	mg/L		**20.6**	**8.2**	**16.9**	< 0.5	**2.52**	**192**	**146**	**122**	**80.8**	**69**	**191 J**	**271 J**	**142**	**111**
Sulphur	mg/L	-	**6.85**	**1.24**	**5.17**	< 0.5	**0.72**	**62**	**51.2**	**40.1**	**25.6**	**22.6**	**64.1**	**90.8**	**48.3**	**38.1**
Thallium	mg/L	0.0008	< 0.0001	**0.00019**	**0.0003**	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	**0.00024**	**0.00032**	< 0.0001	< 0.0001
Titanium	mg/L	-	< 0.01	**0.725**	**1.49**	< 0.01	**0.119**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Uranium	mg/L	0.015	**0.000436**	**0.00109**	**0.00212**	**0.00116**	**0.000404**	**0.00839**	**0.0105**	**0.00353**	**0.00951**	**0.00669**	**0.0175 J**	**0.00614 J**	**0.0323**	**0.0214**
Vanadium	mg/L	-	< 0.001	**0.0401**	**0.0863 J**	< 0.001	**0.0079 J**	< 0.001	**0.0017**	**0.0017**	< 0.001	**0.0012**	< 0.001	< 0.001	< 0.001	< 0.001
Zinc	mg/L	0.03	< 0.01	**0.053**	**0.122**	< 0.01	**0.022**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	**0.034**	**0.017**	< 0.01	< 0.01

Notes:

[a] CCME guideline is pH dependent; 0.005 mg/L if pH < 6.5, 0.1 mg/L if pH≥ 6.5

[b] CCME guideline is hardness dependent; cadmium concentration = $1C^{0.86[\log10(\text{hardness})]-3.2}$ / 1000 mg/L

Bold indicates the analyte was detected

Shading indicates the result exceeded screening criteria

-- = no guideline
< = less than
CCME = Canadian Council of the Ministers of the Environment
ft = feet
J = analyte was present but the reported value may not be accurate or precise
mg/L = milligrams per liter
N. Wall = North Wall of Grum Pit/ Grum Overburden Foundation
NA = not analyzed
OBD = Grum Overburden Dump
U = analyte was analyzed for but not detected at the specified detection limit

TABLE 5

Summary of Acid Base Accounting

Faro Mine Remediation Project

Area		Paste pH	NP:AP	NNP ($T\ CaCO_3$ Eq./ 1000 T)
Grum Overburden Dump	MIN	7.29	4.69	14.95
	MAX	7.59	18.08	63.20
	AVE	7.45	10.11	27.53
	MEDIAN	7.45	8.83	18.86
North Wall of Grum Pit/Grum Overburden Dump Foundation	MIN	5.08	1.04	0.31
	MAX	7.79	73.15	66.08
	AVE	6.88	11.53	13.05
	MEDIAN	7.39	8.83	9.62
The Ridge North of Grum Pit	MIN	5.39	0.86	-0.16
	MAX	6.41	4.83	3.96
	AVE	5.84	2.66	1.74
	MEDIAN	5.82	2.68	1.88

Notes:

% = percent

AP = Acid Potential

Ave = average

Eq. = equivalent

Min = minimum

Max = maximum

NNP = Net Neutralization Potential

NP = Neturalization Potential

TABLE 6
Acid Base Accounting
Faro Mine Remediation Project

Analyte	Barium	Barium	Barium, LMB	Lead	Lead	Neutralization Potential, (as $CaCO_3$ Eq.)	Paste pH	Sulphate, Acid Soluble	Sulphate, DI	Sulphur	Sulphur	Sulphur (As SO4) Saturated	Zinc	Zinc	Sulfide , calculated	AP calculated	NP:AP	NNP
Units	mg/kg	%	ppm	mg/kg	%	T $CaCO_3$ Eq./ 1000 T	pH Units	percent	mg/L	mg/kg	%	mg/L	mg/kg	%	%	(T $CaCO_3$ Eq./1000 T)	-	(T $CaCO_3$ Eq./1000 T)
Grum Over Burden Dump																		
CH13-311-TP002_SOA	198	0.0198	1185	19.2	0.00192	21	7.45	0.02		900	0.09	1860	95.3	0.00953	0.060	1.875	11.199	19.125
CH13-311-TP003_SOA	177	0.0177	1090	22.4	0.00224	31	7.35	0.01		800	0.08	1850	88.8	0.00888	0.061	1.900	16.314	29.100
CH13-311-TP004_SOA	281	0.0281	3200	996	0.0996	75	7.42	0.02	191	4600	0.46	1830	812	0.0812	0.378	11.797	6.358	63.203
CH13-311-TP005_SOA	266	0.0266	1175	17.7	0.00177	22	7.59	0.01		600	0.06	514	82.5	0.00825	0.039	1.217	18.081	20.783
CH13-311-TP006_SOA	202	0.0202	1075	18.9	0.00189	22	7.59	0.01	142	1600	0.16	321	81.2	0.00812	0.141	4.394	5.007	17.606
CH13-311-TP902_SOA	190	0.019	1180	17.4	0.00174	20	7.29	0.01		700	0.07	253	94.3	0.00943	0.050	1.571	12.728	18.429
CH13-311-TP903_SOA	192	0.0192	1075	14.8	0.00148	19	7.44	0.01		600	0.06	1280	93.1	0.00931	0.040	1.260	15.075	17.740
CH13-311-TP904_SOA	371	0.0371	3360	378	0.0378	66	7.36	0.02	271	3900	0.39	1540	572	0.0572	0.327	10.207	6.466	55.793
CH13-311-TP905_SOA	253	0.0253	1190	14.7	0.00147	19	7.56	0.01		1500	0.15	197	77.2	0.00772	0.130	4.049	4.692	14.951
CH13-311-TP906_SOA	192	0.0192	1100	19.2	0.00192	23	7.45	0.01	111	1600	0.16	343	81.6	0.00816	0.141	4.401	5.226	18.599
North Wall of Grum Pit/Grum Overburden Foundation																		
CH13-311-BH001_SOA	150	0.015	815	15.4	0.00154	4	6.08	0.01	20.6	600	0.06		87.2	0.00872	0.042	1.302	3.071	2.698
CH13-311-BH001_SOB	72.5	0.00725	854	14.9	0.00149	4	5.46	0.01	8.2	600	0.06	5	71.5	0.00715	0.044	1.388	2.882	2.612
CH13-311-BH002_SOB	118	0.0118	837	9.19	0.000919	4	5.58	0.02	16.9	1000	0.1	26.2	59.5	0.00595	0.074	2.311	1.731	1.689
CH13-311-BH003_SOA	349	0.0349	1150	17.1	0.00171	10	7.77	0.02	0.5	700	0.07		108	0.0108	0.036	1.112	8.991	8.888
CH13-311-BH003_SOB	241	0.0241	1070	13.8	0.00138	5	5.85	0.01	2.52	600	0.06	11	71	0.0071	0.040	1.256	3.981	3.744
CH13-311-BH004_SOA	295	0.0295	1025	19.3	0.00193	5	5.37	0.01		500	0.05		102	0.0102	0.027	0.851	5.878	4.149
CH13-311-BH005_SOA	457	0.0457	1050	14	0.0014	7	5.99	0.01		500	0.05		88.6	0.00886	0.024	0.746	9.389	6.254
CH13-311-BH005_SOB	149	0.0149	752	11.1	0.00111	4	6.06	0.01		500	0.05	19.9	57.6	0.00576	0.033	1.038	3.853	2.962
CH13-311-BH010_SOA[a]	271	0.0271	NA	15.4	0.00154	10	7.51			500	0.05	66	102	0.0102	0.038	1.184	8.446	8.816
CH13-311-BH010_SOB[a]	88.3	0.00883	NA	15.5	0.00155	3	6.1			500	0.05	66.4	97.1	0.00971	0.043	1.336	2.246	1.664
CH13-311-BH010_SOC[a]	240	0.024	NA	24	0.0024	35	7.41			1400	0.14		104	0.0104	0.128	4.014	8.720	30.986
CH13-311-BH010_SOD[a]	30.5	0.00305	NA	7.89	0.000789	16	7.73			3200	0.32	178	106	0.0106	0.314	9.809	1.631	6.191
CH13-311-BH903_SOB	293	0.0293	1070	15.2	0.00152	6	6.67	0.01		500	0.05		86.6	0.00866	0.028	0.878	6.835	5.122
CH13-311-SS027_SOA	250	0.025	1135	13.5	0.00135	23	7.45	0.01		600	0.06		75	0.0075	0.040	1.243	18.504	21.757
CH13-311-SS028_SOA	237	0.0237	NA	28.3	0.00283	67	7.48	0.01		500	0.05		86.5	0.00865	0.029	0.916	73.153	66.084
CH13-311-SS029_SOA	283	0.0283	1100	15.4	0.00154	20	7.43	0.01	192	700	0.07		79.7	0.00797	0.049	1.521	13.147	18.479
CH13-311-SS030_SOA	142	0.0142	NA	21.4	0.00214	19	7.51	0.01		500	0.05	424	92.2	0.00922	0.032	0.986	19.277	18.014
CH13-311-SS031_SOA	161	0.0161	NA	18.7	0.00187	18	7.79	0.01		500	0.05		88.7	0.00887	0.031	0.977	18.418	17.023
CH13-311-SS032_SOA	189	0.0189	959	16.4	0.00164	23	7.36	0.01	146	700	0.07		120	0.012	0.049	1.533	15.002	21.467
CH13-311-SS033_SOA	111	0.0111	548	15.4	0.00154	12	7.58	0.01	122	700	0.07	884	89.2	0.00892	0.053	1.643	7.305	10.357
CH13-311-SS034_SOA	176	0.0176		37.5	0.00375	17	7.43	0.01		500	0.05		102	0.0102	0.030	0.936	18.165	16.064
CH13-311-SS035_SOA	156	0.0156		22.9	0.00229	14	7.69	0.01		500	0.05		146	0.0146	0.029	0.891	15.709	13.109
CH13-311-SS036_SOA	230	0.023	1090	11.6	0.00116	24	7.59	0.01	80.8	1000	0.1		76.5	0.00765	0.080	2.507	9.572	21.493
CH13-311-SS037_SOA	312	0.0312	1200	12.5	0.00125	24	7.59	0.01	69	700	0.07	307	76.9	0.00769	0.048	1.504	15.958	22.496
CH13-311-TP021_SOA	269	0.0269	1235	12.8	0.00128	5	5.08	0.01		500	0.05	296	93.1	0.00931	0.028	0.888	5.631	4.112
CH13-311-TP022_SOA	349	0.0349	1240	13.7	0.00137	8	6.98	0.01		2700	0.27		100	0.01	0.246	7.689	1.040	0.311
CH13-311-TP023_SOA	225	0.0225	1190	33.3	0.00333	5	6.17	0.01		600	0.06		97	0.0097	0.039	1.219	4.101	3.781
Ridge North of Grum Pit											0							
CH13-311-BH022_SOA	63	0.0063	788	12	0.0012	3	5.8	0.01		600	0.06		39.3	0.00393	0.046	1.446	2.074	1.554
CH13-311-BH022_SOB	90.7	0.00907	775	9.48	0.000948	3	5.39	0.01		500	0.05	12.5	39	0.0039	0.036	1.114	2.694	1.886
CH13-311-BH023_SOA	121	0.0121	816	23.2	0.00232	5	5.91	0.01		500	0.05		69.8	0.00698	0.033	1.036	4.827	3.964
CH13-311-BH023_SOB	99.8	0.00998	830	16.5	0.00165	3	5.82	0.02		500	0.05	26.5	42.4	0.00424	0.025	0.785	3.820	2.215
CH13-311-BH024_SOA	63.1	0.00631	813	15.6	0.00156	3	6.41	0.01		500	0.05		48.2	0.00482	0.036	1.118	2.682	1.882
CH13-311-BH024_SOB	27.8	0.00278	679	16.5	0.00165	1	5.82	0.01		500	0.05	5	37.8	0.00378	0.037	1.162	0.861	-0.162
CH13-311-BH924_SOB	18.4	0.00184	710	10.6	0.00106	2	5.75	0.01		500	0.05	5	27.9	0.00279	0.038	1.187	1.684	0.813

a. results may be affected by fluid use during drilling

Notes:
% = percent
AP = Acid Generating Potential
$CaCO_3$ = calcium carbonate
Eq. = equivalent
DI = Deionized Water Extract
LMB = Lithium Metaborate Fusion
mg/kg = milligrams per kilogram
mg/L = miligrams litre
NNP = Net Neutralization Potential
NP = Neutralization Potential
ppm = parts per million
SO_3 = Sulphate
SP = Saturation Paste
T = tonne

TABLE 7a

Soil Fertility

Faro Mine Remediation Project

Analyte	Units	Expected Range	Screening	OBD			North Wall of Grum Pit/Grum Overburden Foundation			Ridge North of Grum Pit		
				Min	Max	median	Min	Max	Median	Min	Max	Median
Nutrients												
Ammonium-N, Available	mg/kg	0 - 100	-	1.5	5	2.8	1.1	5.8	2.2	1.3	5.2	3.6
Nitrate-N, Available	mg/kg	0-3	<15	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phosphate-P, Available (Mehlich 3)	mg/kg	1-30	<10	1.4	9	4.6	0.5	7.6	2.3	1	16.2	9.3
Sulphate-S, Available	mg/kg	3-60	-	13.7	247	38.8	1.5	40.2	9	1.5	5.1	1.5
Nitrogen, Total	%	0-1	-	0.025	0.045	0.0395	0.029	0.064	0.0355	0.01	0.087	0.0295
Phosphorus, Total	mg/kg	0-2000	-	550	1350	654	463	823	632	205	577	512
Boron, Available	mg/kg	0-5	0.3 - 1	0.1	0.27	0.1	0.1	0.29	0.1	ND	ND	ND
Copper, Available	mg/kg	0.1-50	-	0.48	9.1	4.26	0.42	3.95	0.78	0.16	1.57	0.555
Iron, Available	mg/kg	0.1-50	-	28.9	146	53.5	30.4	264	60.9	8.5	120	61.8
Manganese, Available	mg/kg	0.1-50	-	2.47	46.5	20.9	2.48	13.9	5.37	0.357	10	0.6305
Zinc, Available	mg/kg	0.1-50	-	0.52	169	2.24	0.43	1.53	0.48	0.1	1.02	0.5
Exchangeable Cations												
Cation Exchange Capacity	meq/100g	4-30	<10	2.79	6.17	5.59	2.72	11.3	6.85	2.19	8.82	4.76
Calcium, NH_4OAc	% of CEC	-	-	79%	459%	318%	9%	156%	52%	11%	42%	40%
Magnesium, NH_4OAc	% of CEC	-	-	35%	33%	26%	9%	14%	10%	11%	7%	8%
Potassium, NH_4OAc	% of CEC	-	-	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium, NH_4OAc	% of CEC	-	-	ND	ND	ND	ND	ND	ND	ND	ND	ND
Exchangeable Sodium Percentage	%	0-50	>5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Saturated Paste Extractables												
Conductivity	dS/m	0.1-2.0	1-2 ; > 2	0.05	0.69	0.12	0.0078	0.69	0.12	0.05	0.19	0.05
pH	pH Units	-	-	7.63	8.23	7.98	5.08	8.16	5.83	5.45	6.16	5.925
Saturation	%	-	-	32.7	47.4	37.9	24.5	41.1	34.95	29	46.7	31.15
SAR	SAR	0.1-50	>3	0.26	2.12	0.61	0.17	1.78	0.5	0.32	0.33	0.325
Calcium	mg/L	-	-	45.3	540	99.1	1	111	20.9	1	24	4.45
Chloride	mg/L	-	-	1	196	15.7	3.9	47.6	6.7	1	10.2	2.7
Magnesium	mg/L	-	-	7.8	152	21.8	1	17.4	5.1	1	4.2	1.9
Potassium	mg/L	-	-	3.6	47	11.1	3.2	22.7	6.8	2.2	2.6	2.4
Sodium	mg/L	-	-	8.6	114	28.9	5.5	40.1	7.2	2	6.6	3.05
Sulphur (As SO_4)	mg/L	-	-	148	1860	321	2.5	307	66	2.5	26.5	7.5
Carbon Compostion												
Inorganic Carbon (as $CaCO_3$ Equivalent)	% CaCO3	-	-	0.95	9.6	2.26	0.4	2.5	0.4	0.4	1.05	0.4
Organic Matter	%	0-5	-	0.35	2.29	0.35	0.35	3.35	0.8	0.35	1.51	0.915
Total Carbon (Leco)	%	0-2.5	-	0.3	2	0.5	0.2	1.4	0.6	0.1	1.4	0.5
Total Inorganic Carbon	%	-	-	0.12	1.15	0.31	0.05	0.41	0.05	ND	ND	ND
Total organic carbon	%	0.1-5	-	0.13	1.3	0.28	0.23	1.6	0.42	0.14	1.37	0.445

TABLE 7a

Soil Fertility

Faro Mine Remediation Project

Analyte	Units	Expected Range	Screening	OBD			North Wall of Grum Pit/Grum Overburden Foundation			Ridge North of Grum Pit		
				Min	Max	median	Min	Max	Median	Min	Max	Median
General												
Paste pH	pH Units	2-8.5	<5.5; >7.5	6.81	7.83	7.49	5.08	7.73	6.06	5.39	5.82	5.785
pH (1:2 $CaCl_2$)	pH Units	2-8.5	<5.5; >7.5	7.62	7.97	7.88	5.07	7.83	5.7	5	5.49	5.075
pH (1:2 soil:water)	pH Units	2-8.5	<5.5; >7.5	7.8	8.5	8.23	4.57	8.62	5.65	5.51	6.25	5.895

Notes:

Dark shading indicates the results were outside of the expected range

Light Shading indicated the result exceeded the screening criteria

Bold indicates the analyte was detected

Underlined text indicates that the reported value may be skewed by the presences of free cabonates.

< = less than

% CEC = expressed as a precent of the total Cation Exchange Capacity

% CaCO3 = percent calcium carbonate equivalent

$CaCO_3$ = calcium carbonate

dS/cm = deciseiman per metre

ft = feet

J = Analyte was present but the reported value may not be accurate or precise

Leco = Leco Combustion

Max = maximum

meq/100 g = milliequivalent per 100 grams

mg/kg = milligram per kilogram

mg/L = milligram per litre

Min = minimum

mV = Millivolt

N.Wall/OBD Foundation = North Wall of Grum Pit/Grum OverBurden Dump Foudation

ND = Parameter was not detected

NH_4Ac = 1 Normal (N) ammonium acetate extractable

OBD=Overburden Foundation

ppm = parts per million

RNGP = Ridge North of Grum Pit

SAR = Sodium Adsorption Ratio

SO_4 = sulphate

TABLE 7b
Soil Fertility
Faro Mine Remediation Project

			Location	CH13-311-BH001	CH13-311-BH002	CH13-311-BH003	CH13-311-BH005					
			Sample ID	CH13-311-BH001_SOb	CH13-311-BH002_SOb	CH13-311-BH003_SOb	CH13-311-BH005_SOb	CH13-311-BH010_SOa	CH13-311-BH010_SOb	CH13-311-BH010_SOd	CH13-311-BH011_SOa	CH13-311-BH011_SOb
			Sample Depth (ft)	0.15 - 1.46	0.2 - 0.66	0.1 - 0.17	0.15 - 0.42	0.5 - 1.5	3 - 4	13 - 14	3.66 - 4.57	9.75 - 10.67
			Sample Date	8/23/2013	8/22/2013	8/22/2013	8/23/2013	7/18/2013	7/18/2013	7/18/2013	7/23/2013	7/23/2013
			Sub Area	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	N. Wall	OBD	OBD
Analyte	**Screening Level**	**Expected Range**	**Screening**									
Nutrients												
Ammonium-N, Available	mg/kg	0 - 100	-	**5.8**	NA	NA	NA	**1.1**	NA	NA	NA	NA
Nitrate-N, Available	mg/kg	0-3	<15	< 2	NA	NA	NA	< 2	NA	NA	NA	NA
Phosphate-P, Available (Mehlich 3)	mg/kg	1-30	<10	**3.1**	< 2	< 2	< 2	**5**	**2.3**	< 1	**3.8**	**2.2**
Sulphate-S, Available	mg/kg	3-60	-	**5**	**3.8**	< 3	**4.1**	**9**	**37**	**26**	**73.3**	**56.5**
Nitrogen, Total	%	0-1	-	**0.064**	NA	NA	NA	**0.036**	NA	NA	NA	NA
Phosphorus, Total	mg/kg	0-2000	-	**823**	**614 J**	**632 J**	**463**	**653**	**481**	**566**	**608**	**608**
Boron, Available	mg/kg	0-5	0.3 - 1	**0.29**	**0.2**	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	**0.27**	**0.22**
Copper, Available	mg/kg	0.1-50	-	**0.77**	**0.73**	**0.76**	**0.92**	**0.78**	**0.84**	**0.42**	**5.12**	**3.16**
Iron, Available	mg/kg	0.1-50	-	**76.7**	**63.1**	**57.5**	**264**	**30.4**	**54.8**	**60.9**	**63.6**	**47.8**
Manganese, Available	mg/kg	0.1-50	-	**4.74**	**2.48**	**4.22**	**5.37**	**5.82**	**4.38**	**6.52**	**21.3**	**26.5**
Zinc, Available	mg/kg	0.1-50	-	**0.48**	**0.7**	**0.47**	**0.47**	**0.61**	**0.43**	**0.45**	**2.37**	**1.79**
Exchangeable Cations												
Cation Exchange Capacity	meq/100g	4-30	<10	**11.3**	**6.63**	**6.85**	**10.5**	**7.41**	**6.48**	**2.72**	**5.59**	**5.97**
Calcium, NH_4OAc	% CEC			**ND**	**62**	**45**	**14**	**93**	**10**	**130**	**506**	**454**
Inorganic Carbon (as $CaCO_3$ Equivalent)	% $CaCO_3$	-	-	< 0.8	**0.82**	< 0.8	< 0.8	< 0.8	< 0.8	**2.5**	**3.25**	**3.57**
Organic Matter	%	0-5	-	**2.69**	**1.49**	< 0.7	**3.35**	< 0.7	**0.8**	**1.01**	< 0.7	< 0.7
Total Carbon (Leco)	%	0-2.5	-	**1.2**	**0.6**	**0.4**	**1.4**	**0.2**	**0.7**	**0.7**	**0.5**	**0.6**
Total Inorganic Carbon	%	-	-	< 0.1	**0.1**	< 0.1	< 0.1	**0.13**	< 0.1	**0.41**	**0.39**	**0.36**
Total organic carbon	%	0.1-5	-	**1.6**	**0.9**	**0.42**	**0.9**	**0.23**	**0.4**	**0.69**	**0.27**	**0.13**
pH												
Paste pH	pH Units	2-8.5	<5.5; >7.5	**5.46**	**5.58**	**5.85**	**6.06**	**7.51**	**6.1**	**7.73**	**7.11**	**7.23**
pH (1:2 $CaCl_2$)	pH Units	2-8.5	<5.5; >7.6	**5.7**	**5.29**	**5.14**	**5.34**	**7.32**	**5.07**	**7.8**	**7.88**	**7.88**
pH (1:2 soil:water)	pH Units	2-8.5	<5.5; >7.7	**5.22**	**5.27**	**5.88**	**4.83**	**8.07**	**5.65**	**8.62**	**8.23**	**8.29**

a. results may be affected by fluid use during drilling

Notes:
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% $CaCO_3$ = percent calcium carbonate equivalent
dS/cm = deciseiman per metre
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ID = identification
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Leco = Leco Combustion
meq/100 g = milliequivalens per 100 gram
mg/kg = milligram per kilogram
mg/L = milligram per litre
mV = Millivolt
N.Wall = North Wall of Grum Pit/Grum OverBurden Dump Foudation
NA = not analyzed
ND = parameter was not detected
NH_4Ac = 1 Normal (N) ammonium acetate extractable
OBD=Overburden Foundation
ppm = parts per million
RNGP = Ridge North of Grum Pit
SAR = Sodium Adsorption Ratio
SO_4 = sulphate

TABLE 7b
Soil Fertility
Faro Mine Remediation Project

			Location	CH13-311-BH011[a]				CH13-311-BH012[a]			
			Sample ID	CH13-311-BH011_SOc	CH13-311-BH011_SOd	CH13-311-BH011_SOe	CH13-311-BH911_SOe	CH13-311-BH012_SOa	CH13-311-BH012_SOb	CH13-311-BH012_SOc	CH13-311-BH012_SOd
			Sample Depth (ft)	25 - 25.91	34.14 - 35.05	37.19 - 38.1	37.19 - 38.1	0.61 - 1.5	9.75 - 10.67	18.9 - 19.81	40.23 - 41.15
			Sample Date	7/23/2013	7/23/2013	7/24/2013	7/24/2013	7/24/2013	7/24/2013	7/24/2013	7/25/2013
			Sub Area	OBD	OBD	OBD	OBD	OBD	OBD	OBD	OBD
Analyte	**Screening Level**	**Expected Range**	**Screening**								
Nutrients											
Ammonium-N, Available	mg/kg	0 - 100	-	**5**	NA	NA	NA	NA	NA	NA	**1.6**
Nitrate-N, Available	mg/kg	0-3	<15	< 2	NA	NA	NA	NA	NA	NA	< 2
Phosphate-P, Available (Mehlich 3)	mg/kg	1-30	<10	**3.2**	**2.2**	**5**	**4.4**	**7.2**	**7.2**	**6.2**	**4.2**
Sulphate-S, Available	mg/kg	3-60	-	**77.4**	**15.8**	**30**	**33.4**	**16**	**96.2**	**20.4**	**32.4**
Nitrogen, Total	%	0-1	-	**0.044**	NA	NA	NA	NA	NA	NA	**0.045**
Phosphorus, Total	mg/kg	0-2000	-	**649**	**704**	**1290 J**	**727 J**	**654**	**754**	**623**	**874**
Boron, Available	mg/kg	0-5	0.3 - 1	**0.24**	< 0.2	**0.27**	**0.26**	< 0.2	**0.25**	< 0.2	**0.2**
Copper, Available	mg/kg	0.1-50	-	**4.85**	**3.97**	**6.77**	**6.49**	**2.47**	**4.96**	**2.93**	**4.47**
Iron, Available	mg/kg	0.1-50	-	**37.4**	**33.5**	**51**	**51.3**	**82.1**	**146**	**31.6**	**28.9**
Manganese, Available	mg/kg	0.1-50	-	**19.3**	**19.8**	**23.7**	**23.1**	**3.77**	**46.4**	**30.1**	**30.5**
Zinc, Available	mg/kg	0.1-50	-	**1.23**	**0.52**	**2.05**	**1.94**	**2.19**	**3.22**	**2.28**	**0.81**
Exchangeable Cations											
Cation Exchange Capacity	meq/100g	4-30	<10	**4.91**	**3.97**	**5.76**	**5.75**	**6.03**	**6.13**	**5.59**	**6.03**
Calcium, NH_4OAc	% CEC			**460**	**660**	**469**	**450**	**255**	**308**	**159**	**348**
Inorganic Carbon (as $CaCO_3$ Equivalent)	% $CaCO_3$	-	-	**2.92**	**3.62**	**3.45**	**3.51**	**1.34**	**1.95**	**0.95**	**2.01**
Organic Matter	%	0-5	-	< 0.7	< 0.7	< 0.7	**0.85**	< 0.7	< 0.7	< 0.7	< 0.7
Total Carbon (Leco)	%	0-2.5	-	**0.6**	**0.6**	**0.9**	**0.8**	**0.4**	**0.5**	**0.3**	**0.5**
Total Inorganic Carbon	%	-	-	**0.31**	**0.52**	**0.47**	**0.36**	**0.15**	**0.3**	**0.18**	**0.12**
Total organic carbon	%	0.1-5	-	**0.2**	**0.18**	**0.44**	**0.5**	**0.26**	**0.18**	**0.29**	**0.26**
pH											
Paste pH	pH Units	2-8.5	<5.5; >7.5	**7.3**	**7.73**	**7.83**	**6.64**	**7.57**	**7.51**	**7.52**	**7.62**
pH (1:2 $CaCl_2$)	pH Units	2-8.5	<5.5; >7.6	**7.88**	**7.94**	**7.93**	**7.95**	**7.8**	**7.94**	**7.89**	**7.88**
pH (1:2 soil:water)	pH Units	2-8.5	<5.5; >7.7	**8.25**	**8.5**	**8.36**	**8.33**	**8.29**	**8.07**	**8.23**	**8.22**

a. results may be affected by fluid use during drilling

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dS/cm = deciseiman per metre
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Leco = Leco Combustion
meq/100 g = milliequivalens per 100 gram
mg/kg = milligram per kilogram
mg/L = milligram per litre
mV = Millivolt
N.Wall = North Wall of Grum Pit/Grum OverBurden Dump Foudation
NA = not analyzed
ND = parameter was not detected
NH_4Ac = 1 Normal (N) ammonium acetate extractable
OBD=Overburden Foundation
ppm = parts per million
RNGP = Ridge North of Grum Pit
SAR = Sodium Adsorption Ratio
SO_4 = sulphate

TABLE 7b
Soil Fertility
Faro Mine Remediation Project

				Location	CH13-311-BH013[a]							
				Sample ID	CH13-311-BH013_SOA	CH13-311-BH013_SOB	CH13-311-BH013_SOC	CH13-311-BH913_SOB	CH13-311-BH013_SOD	CH13-311-BH013_SOE	CH13-311-BH014_SOA	CH13-311-BH014_SOB
				Sample Depth (ft)	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0
				Sample Date	7/18/2013	7/18/2013	7/18/2013	7/18/2013	7/19/2013	7/19/2013	7/20/2013	7/20/2013
				Sub Area	OBD	OBD	OBD	OBD	OBD	OBD	OBD	OBD
Analyte	**Screening Level**	**Expected Range**	**Screening**									
Nutrients												
Ammonium-N, Available	mg/kg	0 - 100	-		**2.4**	NA	NA	NA	NA	NA	NA	**4.5**
Nitrate-N, Available	mg/kg	0-3	<15		< 2	NA	NA	NA	NA	NA	NA	< 4
Phosphate-P, Available (Mehlich 3)	mg/kg	1-30	<10		**9**	**1.4**	**6.8**	< 1	**3.2**	**6**	**1.8**	**6.2**
Sulphate-S, Available	mg/kg	3-60	-		**23.2**	**49**	**28.9**	**45.4**	**31**	**37.3**	**140**	**18.7**
Nitrogen, Total	%	0-1	-		**0.038**	NA	NA	NA	NA	NA	NA	**0.041**
Phosphorus, Total	mg/kg	0-2000	-		**653**	**598**	**580**	**597**	**810**	**609**	**1350**	**789**
Boron, Available	mg/kg	0-5	0.3 - 1		**0.21**	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Copper, Available	mg/kg	0.1-50	-		**3.41**	**0.51**	**4.63**	**0.42**	**3.72**	**4.95**	**0.48**	**5.44**
Iron, Available	mg/kg	0.1-50	-		**125**	**65.9**	**70.9**	**56.1**	**50.8**	**44.5**	**33.3**	**55.1**
Manganese, Available	mg/kg	0.1-50	-		**4.5**	**20.6**	**20.1**	**15.4**	**22.7**	**20.9**	**2.47**	**16.9**
Zinc, Available	mg/kg	0.1-50	-		**1.91**	**92.6**	**2.16**	**67.6**	**1.2**	**0.82**	**18**	**5.43**
Exchangeable Cations												
Cation Exchange Capacity	meq/100g	4-30	<10		**6.01**	NA	NA	NA	NA	NA	NA	**5.34**
Calcium, NH_4OAc	% CEC				**<u>290</u>**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**<u>215</u>**
Inorganic Carbon (as $CaCO_3$ Equivalent)	% $CaCO_3$	-	-		**1.65**	**9.6**	**2.72**	**8.73**	**3.79**	**1.95**	**0.99**	**1.7**
Organic Matter	%	0-5	-		< 0.7	**1.19**	< 0.7	**0.9**	< 0.7	< 0.7	**2.29**	< 0.7
Total Carbon (Leco)	%	0-2.5	-		**0.5**	**2**	**0.6**	**1.9**	**0.8**	**0.5**	**0.5**	**0.5**
Total Inorganic Carbon	%	-	-		**0.27**	**1.15**	**0.33**	**1.41**	**0.45**	**0.34**	**0.21**	**0.22**
Total organic carbon	%	0.1-5	-		**0.4**	**0.8**	**0.25**	**0.81**	**0.31**	**0.22**	**1.3**	**0.28**
pH												
Paste pH	pH Units	2-8.5	<5.5; >7.5		**7.51**	**7.7**	**7.51**	**7.76**	**7.44**	**7.49**	**7.49**	**7.6**
pH (1:2 $CaCl_2$)	pH Units	2-8.5	<5.5; >7.6		**7.89**	**7.62**	**7.95**	**7.69**	**7.84**	**7.95**	**7.82**	**7.88**
pH (1:2 soil:water)	pH Units	2-8.5	<5.5; >7.7		**8.39**	**8.07**	**8.42**	**7.92**	**8.36**	**8.46**	**7.8**	**8.32**

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OBD=Overburden Foundation
ppm = parts per million
RNGP = Ridge North of Grum Pit
SAR = Sodium Adsorption Ratio
SO_4 = sulphate

TABLE 7b
Soil Fertility
Faro Mine Remediation Project

			Location	CH13-311-BH014[a]			CH13-311-BH015[a]					
			Sample ID	CH13-311-BH014_SOC	CH13-311-BH014_SOD	CH13-311-BH014_SOE	CH13-311-BH015_SOA	CH13-311-BH015_SOB	CH13-311-BH015_SOC	CH13-311-BH015_SOD	CH13-311-BH015_SOE	CH13-311-BH915_SOC
			Sample Depth (ft)	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0
			Sample Date	7/20/2013	7/20/2013	7/20/2013	7/22/2013	7/22/2013	7/22/2013	7/22/2013	7/22/2013	7/22/2013
			Sub Area	OBD	OBD	OBD	OBD	OBD	OBD	OBD	OBD	OBD
Analyte	**Screening Level**	**Expected Range**	**Screening**									
Nutrients												
Ammonium-N, Available	mg/kg	0 - 100	-	NA	NA	NA	NA	NA	NA	NA	**3.2**	NA
Nitrate-N, Available	mg/kg	0-3	<15	NA	NA	NA	NA	NA	NA	NA	< 4	NA
Phosphate-P, Available (Mehlich 3)	mg/kg	1-30	<10	**2**	**3.8**	**2.4**	**6.4**	**4.8**	**7.6**	**5.2**	**5.6**	**7.4**
Sulphate-S, Available	mg/kg	3-60	-	**13.7**	**29.6**	**23**	**101**	**78.2**	**51.3**	**65.4**	**38.8**	**48.6**
Nitrogen, Total	%	0-1	-	NA	NA	NA	NA	NA	NA	NA	**0.025**	NA
Phosphorus, Total	mg/kg	0-2000	-	**623**	**774**	**676**	**728 J**	**671 J**	**585 J**	**859 J**	**594 J**	**554 J**
Boron, Available	mg/kg	0-5	0.3 - 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Copper, Available	mg/kg	0.1-50	-	**2.15**	**6.19**	**4.46**	**4.68**	**6.06**	**4.02**	**5.86**	**4.26**	**3.81**
Iron, Available	mg/kg	0.1-50	-	**34.3**	**55.8**	**53.5**	**80.4**	**54.6**	**97.1**	**36**	**29.3**	**92.1**
Manganese, Available	mg/kg	0.1-50	-	**46.5**	**29.5**	**42.2**	**38.5**	**25.9**	**34.4**	**29.2**	**20.8**	**34**
Zinc, Available	mg/kg	0.1-50	-	**0.68**	**0.97**	**0.93**	**15.7**	**35.2**	**2.65**	**169**	**1.38**	**2.57**
Exchangeable Cations												
Cation Exchange Capacity	meq/100g	4-30	<10	NA	NA	NA	NA	NA	NA	NA	**6.17**	NA
Calcium, NH_4OAc	% CEC			**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**<u>288</u>**	**ND**
Inorganic Carbon (as $CaCO_3$ Equivalent)	% $CaCO_3$	-	-	**2.26**	**2.5**	**2.07**	**2.57**	**3.42**	**1.66**	**3.38**	**1.43**	**1.23**
Organic Matter	%	0-5	-	**0.74**	< 0.7	< 0.7	< 0.7	**1.05 J**	< 0.7	< 0.7	< 0.7	< 0.7
Total Carbon (Leco)	%	0-2.5	-	**0.7**	**0.5**	**0.8**	**0.6**	**0.7**	**0.4**	**0.8**	**0.3**	**0.4**
Total Inorganic Carbon	%	-	-	**0.39**	**0.3**	**0.31**	**0.36 J**	**0.44 J**	**0.2**	**0.41**	**0.3 J**	**0.24 J**
Total organic carbon	%	0.1-5	-	**0.46**	**0.22**	**0.56**	**0.4 J**	**0.6 J**	**0.22**	**0.39**	**0.15**	**0.26**
pH												
Paste pH	pH Units	2-8.5	<5.5; >7.5	**7.62**	**7.49**	**7.71**	**6.81 J**	**6.9 J**	**7.13 J**	**7.15 J**	**7.29 J**	**7.12 J**
pH (1:2 $CaCl_2$)	pH Units	2-8.5	<5.5; >7.6	**7.73**	**7.88**	**7.86**	**7.86**	**7.85**	**7.94**	**7.83**	**7.97**	**8**
pH (1:2 soil:water)	pH Units	2-8.5	<5.5; >7.7	**8.02**	**8.13**	**8.15**	**8.13 J**	**8.03 J**	**8.33 J**	**8.02 J**	**8.37 J**	**8.32 J**

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ppm = parts per million
RNGP = Ridge North of Grum Pit
SAR = Sodium Adsorption Ratio
SO_4 = sulphate

TABLE 7b
Soil Fertility
Faro Mine Remediation Project

			Location	CH13-311-BH022	CH13-311-BH023	CH13-311-BH024_SOb		CH13-311-SS037	CH13-311-TP002		CH13-311-TP003	
			Sample ID	CH13-311-BH022_SOb	CH13-311-BH023_SOb	CH13-311-BH024	CH13-311-BH924_SOb	CH13-311-SS037_SOA	CH13-311-TP002_SOa	CH13-311-TP902_SOa	CH13-311-TP003_SOa	CH13-311-TP903_SOa
			Sample Depth (ft)	0.15 - 0.4	0.1 - 0.38	0.15 - 0.6	0.15 - 0.6	0 - 0	0 - 4	0 - 4	0 - 6	0 - 6
			Sample Date	8/25/2013	8/24/2013	8/24/2013	8/24/2013	7/15/2013	8/14/2013	8/14/2013	8/14/2013	8/14/2013
			Sub Area	RNGP	RNGP	RNGP	RNGP	N.Wall	OBD	OBD	OBD	OBD
Analyte	**Screening Level**	**Expected Range**	**Screening**									
Nutrients												
Ammonium-N, Available	mg/kg	0 - 100	-	**1.3**	**5.2**	**3.5**	**3.7**	**1.7**	**1.5 J**	**2.6 J**	NA	NA
Nitrate-N, Available	mg/kg	0-3	<15	< 2	< 2	< 2	< 2	< 2	< 2	< 2	NA	NA
Phosphate-P, Available (Mehlich 3)	mg/kg	1-30	<10	**2.7**	< 2	**16.2**	**15.9**	**7**	**2.8 J**	**5.2 J**	**3 J**	**5.4 J**
Sulphate-S, Available	mg/kg	3-60	-	< 3	**5.1**	< 3	< 3	**25.2**	**176 J**	**25.7 J**	**247 J**	**99.2 J**
Nitrogen, Total	%	0-1	-	**0.049**	**0.087**	< 0.02	< 0.02	**0.029**	**0.032**	**0.027**	NA	NA
Phosphorus, Total	mg/kg	0-2000	-	**504**	**520**	**577 J**	**205 J**	**647**	**691**	**674**	**550**	**516**
Boron, Available	mg/kg	0-5	0.3 - 1	< 0.2	< 0.2	< 0.2	< 0.2	**0.21**	< 0.2	< 0.2	< 0.2	**0.2**
Copper, Available	mg/kg	0.1-50	-	**0.94**	**1.57**	**0.16**	**0.17**	**3.02**	**2.41**	**2.18**	**2.46**	**3.51**
Iron, Available	mg/kg	0.1-50	-	**120**	**115**	**8.5**	**8.6**	**109**	**47 J**	**89.4 J**	**45.7 J**	**121 J**
Manganese, Available	mg/kg	0.1-50	-	**0.897**	**10**	**0.357**	**0.364**	**5.55**	**6.95**	**6.58**	**4.04**	**6.4**
Zinc, Available	mg/kg	0.1-50	-	**0.71**	**1.02**	< 0.2	**0.29**	**1.53**	**2.24**	**14.6 J**	**2.6**	**5.23 J**
Exchangeable Cations												
Cation Exchange Capacity	meq/100g	4-30	<10	**8.82**	**7.13**	**2.19**	**2.39**	**7.91**	**4.57**	**4.79**	**4.07**	**4.58**
Calcium, NH_4OAc	% CEC			**40**	**52**	**ND**	**ND**	**223**	**267**	**263**	**327**	**334**
Inorganic Carbon (as $CaCO_3$ Equivalent)	% $CaCO_3$	-	-	**1.05**	< 0.8	< 0.8	< 0.8	**2.18**	**1.06**	**1.09**	**1.09**	**1.8**
Organic Matter	%	0-5	-	**1.48**	**1.51**	< 0.7	< 0.7	< 0.7	**0.78**	< 0.7	< 0.7	< 0.7
Total Carbon (Leco)	%	0-2.5	-	**0.8**	**1.4**	**0.2**	**0.1**	**0.6**	**0.6 J**	**0.3 J**	**0.3**	**0.4**
Total Inorganic Carbon	%	-	-	< 0.1	< 0.1	< 0.1	< 0.1	**0.26**	**0.18**	**0.13**	**0.2**	**0.16**
Total organic carbon	%	0.1-5	-	**0.69**	**1.37**	**0.14**	< 0.4	**0.3**	**0.5**	**0.4**	**0.21**	**0.16**
pH												
Paste pH	pH Units	2-8.5	<5.5; >7.5	**5.39**	**5.82**	**5.82**	**5.75**	**7.59**	**7.45**	**7.29**	**7.35**	**7.44**
pH (1:2 $CaCl_2$)	pH Units	2-8.5	<5.5; >7.6	**5.14**	**5.49**	**5.01**	**5**	**7.83**	**7.81**	**7.86**	**7.86**	**7.88**
pH (1:2 soil:water)	pH Units	2-8.5	<5.5; >7.7	**5.51**	**5.6**	**6.25**	**6.19**	**8.37**	**7.99**	**7.99**	**8.09**	**8.27**

a. results may be affected by fluid use during drilling

Notes:
Dark shading indicates the results were outside of the expected range
Light Shading indicated the result exceeded the screening criteria
Bold indicates the analyte was detected
Underlined tect indicates that the reported value may be skewed by the presences of free cabonates.
< = less than
> = greater than
% = percent
% CEC = expressed as a precent of the total Cation Exchange Capacity
% $CaCO_3$ = percent calcium carbonate equivalent
dS/cm = deciseiman per metre
ft = feet
ID = identification
J = Analyte was present but the reported value may not be accurate or precise
Leco = Leco Combustion
meq/100 g = milliequivalens per 100 gram
mg/kg = milligram per kilogram
mg/L = milligram per litre
mV = Millivolt
N.Wall = North Wall of Grum Pit/Grum OverBurden Dump Foudation
NA = not analyzed
ND = parameter was not detected
NH_4Ac = 1 Normal (N) ammonium acetate extractable
OBD=Overburden Foundation
ppm = parts per million
RNGP = Ridge North of Grum Pit
SAR = Sodium Adsorption Ratio
SO_4 = sulphate

TABLE 7b
Soil Fertility
Faro Mine Remediation Project

				Location	CH13-311-TP004		CH13-311-TP005		CH13-311-TP006		CH13-311-TP021
				Sample ID	CH13-311-TP004_SOa	CH13-311-TP904_SOa	CH13-311-TP005_SOa	CH13-311-TP905_SOa	CH13-311-TP006_SOa	CH13-311-TP906_SOa	Ch13-311-TP021_SOa
				Sample Depth (ft)	1 - 6	1 - 6	1 - 6	1 - 6	1 - 6	1 - 6	2.43 - 2.74
				Sample Date	8/14/2013	8/14/2013	8/14/2013	8/14/2013	8/13/2013	8/13/2013	8/27/2013
				Sub Area	OBD	OBD	OBD	OBD	OBD	OBD	N.Wall
Analyte	**Screening Level**	**Expected Range**	**Screening**								
Nutrients											
Ammonium-N, Available	mg/kg	0 - 100	-		NA	NA	NA	NA	NA	NA	**2.7**
Nitrate-N, Available	mg/kg	0-3	<15		NA	NA	NA	NA	NA	NA	< 2
Phosphate-P, Available (Mehlich 3)	mg/kg	1-30	<10		**4.4 J**	**8.4 J**	**4.6 J**	**9.2 J**	**4.6**	**5.6**	**7.6**
Sulphate-S, Available	mg/kg	3-60	-		**149**	**155**	**53.3 J**	**19.3 J**	**28.3**	**30.7**	**40.2**
Nitrogen, Total	%	0-1	-		NA	NA	NA	NA	NA	NA	**0.035**
Phosphorus, Total	mg/kg	0-2000	-		**627**	**570**	**667**	**534**	**591**	**607**	**773**
Boron, Available	mg/kg	0-5	0.3 - 1		< 0.2	**0.32**	**0.24**	**0.25**	< 0.2	**0.2**	< 0.2
Copper, Available	mg/kg	0.1-50	-		**9.1**	**14.9**	**3.71**	**3.24**	**3.2**	**3.11**	**3.95**
Iron, Available	mg/kg	0.1-50	-		**58.4**	**71.6**	**81.6**	**115**	**90.3**	**95.2**	**32.5**
Manganese, Available	mg/kg	0.1-50	-		**19.4 J**	**11.1 J**	**16.1 J**	**6.67 J**	**7.15**	**6.13**	**13.9**
Zinc, Available	mg/kg	0.1-50	-		**49.6**	**119 J**	**2.91**	**2.72**	**2.25**	**2.27**	**0.5**
Exchangeable Cations											
Cation Exchange Capacity	meq/100g	4-30	<10		**2.79**	**3.59**	**4.52**	**5.16**	**4.73**	**4.94**	**4.47**
Calcium, NH_4OAc	% CEC				**244**	**235**	**345**	**320**	**383**	**395**	**162**
Inorganic Carbon (as $CaCO_3$ Equivalent)	% $CaCO_3$	-	-		**4.35**	**6.03**	**1.41**	**1.77**	**2.34**	**1.99**	< 0.8
Organic Matter	%	0-5	-		**0.99**	**1.07**	< 0.7	< 0.7	< 0.7	**0.77**	< 0.7
Total Carbon (Leco)	%	0-2.5	-		**0.9**	**1**	**0.3**	**0.4**	**0.5**	**0.5**	**0.3**
Total Inorganic Carbon	%	-	-		**0.75**	**0.6**	**0.21**	**0.25**	**0.24**	**0.21**	< 0.1
Total organic carbon	%	0.1-5	-		**0.6**	**0.6**	**0.4**	**0.24**	**0.18**	**0.4**	**0.26**
pH											
Paste pH	pH Units	2-8.5	<5.5; >7.5		**7.42**	**7.36**	**7.59**	**7.56**	**7.59**	**7.45**	**5.08 J**
pH (1:2 $CaCl_2$)	pH Units	2-8.5	<5.5; >7.6		**7.85**	**7.73**	**7.88**	**7.87**	**7.84**	**7.86**	**7.38**
pH (1:2 soil:water)	pH Units	2-8.5	<5.5; >7.7		**8.18**	**8.32**	**8.39**	**8.38**	**8.3**	**8.11**	**4.57**

a. results may be affected by fluid use during drilling

Notes:
Dark shading indicates the results were outside of the expected range
Light Shading indicated the result exceeded the screening criteria
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% $CaCO_3$ = percent calcium carbonate equivalent
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J = Analyte was present but the reported value may not be accurate or precise
Leco = Leco Combustion
meq/100 g = milliequivalens per 100 gram
mg/kg = milligram per kilogram
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mV = Millivolt
N.Wall = North Wall of Grum Pit/Grum OverBurden Dump Foudation
NA = not analyzed
ND = parameter was not detected
NH_4Ac = 1 Normal (N) ammonium acetate extractable
OBD=Overburden Foundation
ppm = parts per million
RNGP = Ridge North of Grum Pit
SAR = Sodium Adsorption Ratio
SO_4 = sulphate

TABLE 8A

Petrographic Examination of Coarse Aggregate

Faro Mine Remediation Project

	Sample ID	CH13-311-SS038_Rka		
	Petrographic Description / Physical Quality	**Percent by Count (mm)**		
		19 x 12.5	**12.5 x 9.5**	**Total**
Good	Gneissic granodiorite -black/white speckled, 1-3 mm grain size: Quartz, plagioclase, alkali feldspar, biotite and muscovite. Fresh, trace weathering of occasional feldspar.	18.6	18.6	18.6
	Gneissic granodiorite - As above, minor weathering and oxidation, giving the rock a yellowish tint. Strong	48.5	46.6	47.5
	Gneissic granodiorite - As above, moderate weathering, yellow to brown particle surfaces. Strong.	8.8	12.1	10.5
	Gneissic granodiorite - As above, orange to brown, pronounced weathering/oxidation on all surfaces. Strong.	9.4	11.1	10.3
	Subtotal	**85.3**	**88.4**	**86.9**
Fair	Gneissic granodiorite - Fresh, moderate strength	0.8	2.4	1.6
	Gneissic granodiorite - Minor weathering/oxidation, moderate strength.	6.1	3.4	4.7
	Gneissic granodiorite - Moderate weathering, moderate strength	2.2	2.4	2.3
	Gneissic granodiorite - pronounced weathering/oxidation, moderate strength	4.2	3.4	3.8
	Subtotal	**13.3**	**11.6**	**12.4**
Poor	Gneissic granodiorite - Minor weathering/oxidation, weak	0.8	-	0.4
	Gneissic granodiorite - pronounced weathering/oxidation, weak	0.6	-	0.3
	Subtotal	1.4	-	0.7
	TOTALS	**100.0**	**100.0**	**100.0**

Notes:

ID = identification

mm = millimetre

TABLE 8B

Petrographic Examination of Coarse Aggregate

Faro Mine Remediation Project

	Sample ID	CH13-311-SS039_Rka		
Petrographic Description / Physical Quality		**Percent by Count (mm)**		
		19 x 12.5	**12.5 x 9.5**	**Total**
Good	Gneissic granodiorite - black/white speckled, 0.5 - 2-mm grain size: Quartz, plagioclase, biotite and muscovite. Orange specks, about 0.5 mm in size, indicate oxidation.	10.6	8.5	9.6
	Gneissic granodiorite - As above, moderate weathering, orange staining and occasional clay/leucoxene accumulations. Strong.	44.5	42.1	43.3
	Gneissic granodiorite - As above, orange staining and clay on all surfaces, pronounced weathering/oxidation on all surfaces. Strong.	31.9	30.1	31.0
	Subtotal	**87.0**	**80.7**	**83.9**
Fair	Gneissic granodiorite - Minor weathering and oxidation, moderate strength	1.2	2.0	1.6
	Gneissic granodiorite - Moderate weathering, moderate strength	7.5	8.5	8.0
	Gneissic granodiorite - pronounced weathering/oxidation, moderate strength	4.3	8.0	6.1
	Subtotal	**13.0**	**18.5**	**15.7**
Poor	Gneissic granodiorite - Moderate weathering/oxidation, weak	-	0.5	0.3
	Gneissic granodiorite - Pronounced weathering/oxidation, weak	-	0.3	0.1
	Subtotal	**-**	**0.8**	**0.4**
	TOTALS	**100.0**	**100.0**	**100.0**

Notes:

ID = identification

mm = millimetre

TABLE 9

Unconfined Compressive Strength of Intact Rock Core Specimens

Faro Mine Remediation Project

Sample ID	Diameter (mm)	Height (mm)	Area (cm^2)	Volume (cm^3)	Mass (g)	Wet Density (kg/m^3)	Moisture (%)	Dry Density (kg/m^3)	Maximum Load (kN)	Stress (s) (Mpa)	Failure Mode Type
CH13-311-SS038_Rka	45.62	92.94	16.35	151.92	400.00	2633	0.15	2629	153.70	94	Vertical fracture
CH13-311-SS039_Rka	45.32	94.89	16.13	153.07	393.80	2573	0.35	2564	80.40	49.8	Vertical fracture

Notes:

cm^2 = square centimetre

cm^3 = cubic centimetre

g = gram

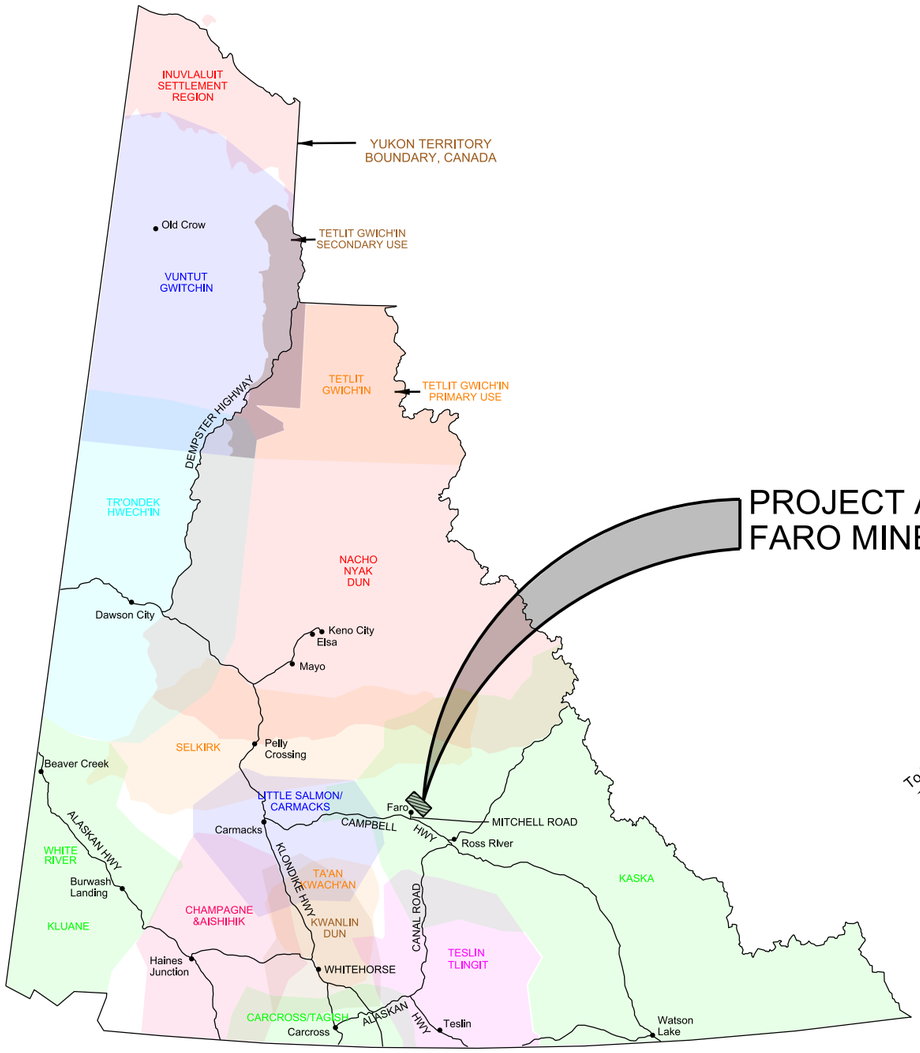
kg/m^3 = kilogram per cubic metre

kN = kilonewton

mm = millimetre

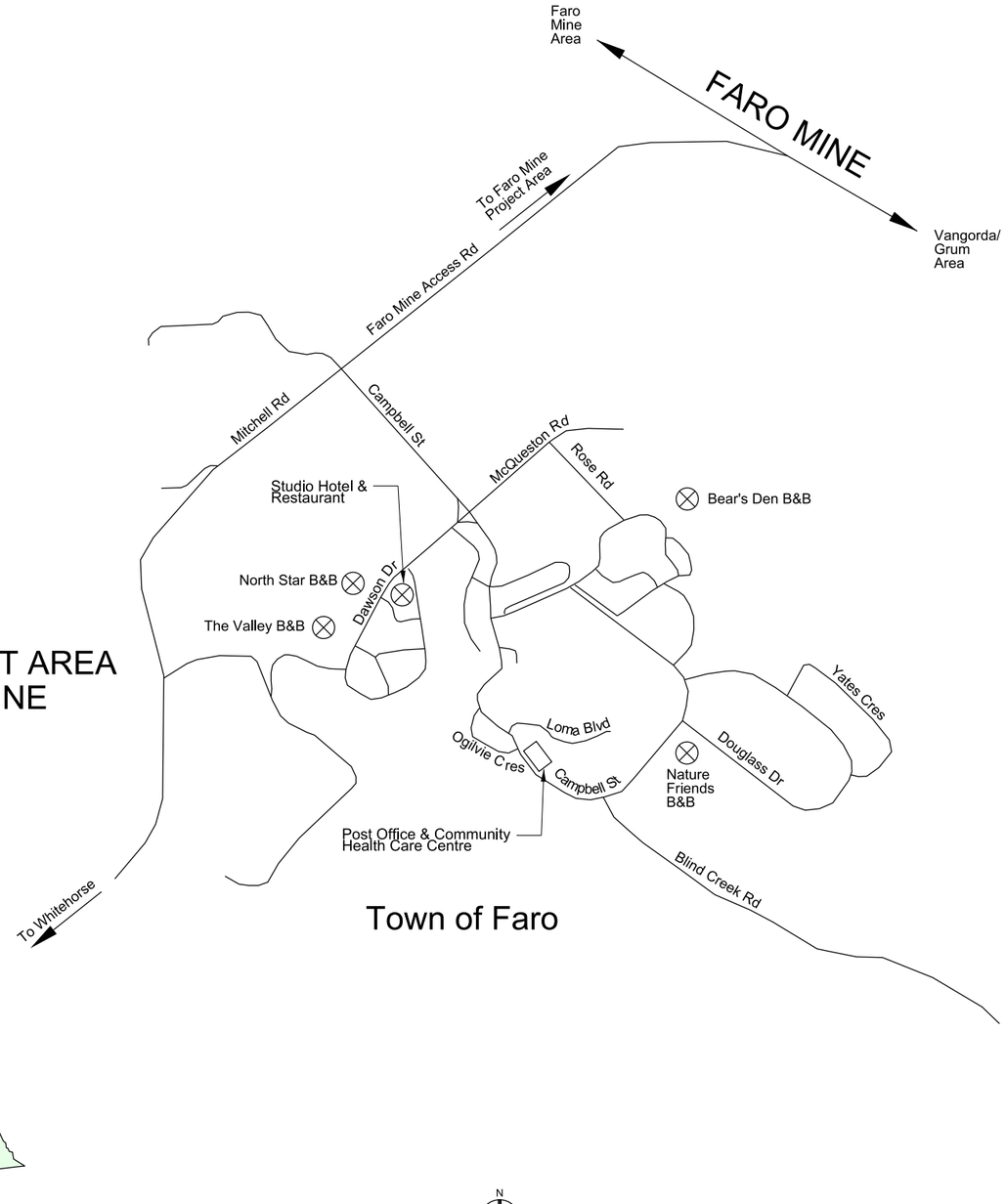
MPa = megapascal

Figures



VICINITY MAP

NOT TO SCALE

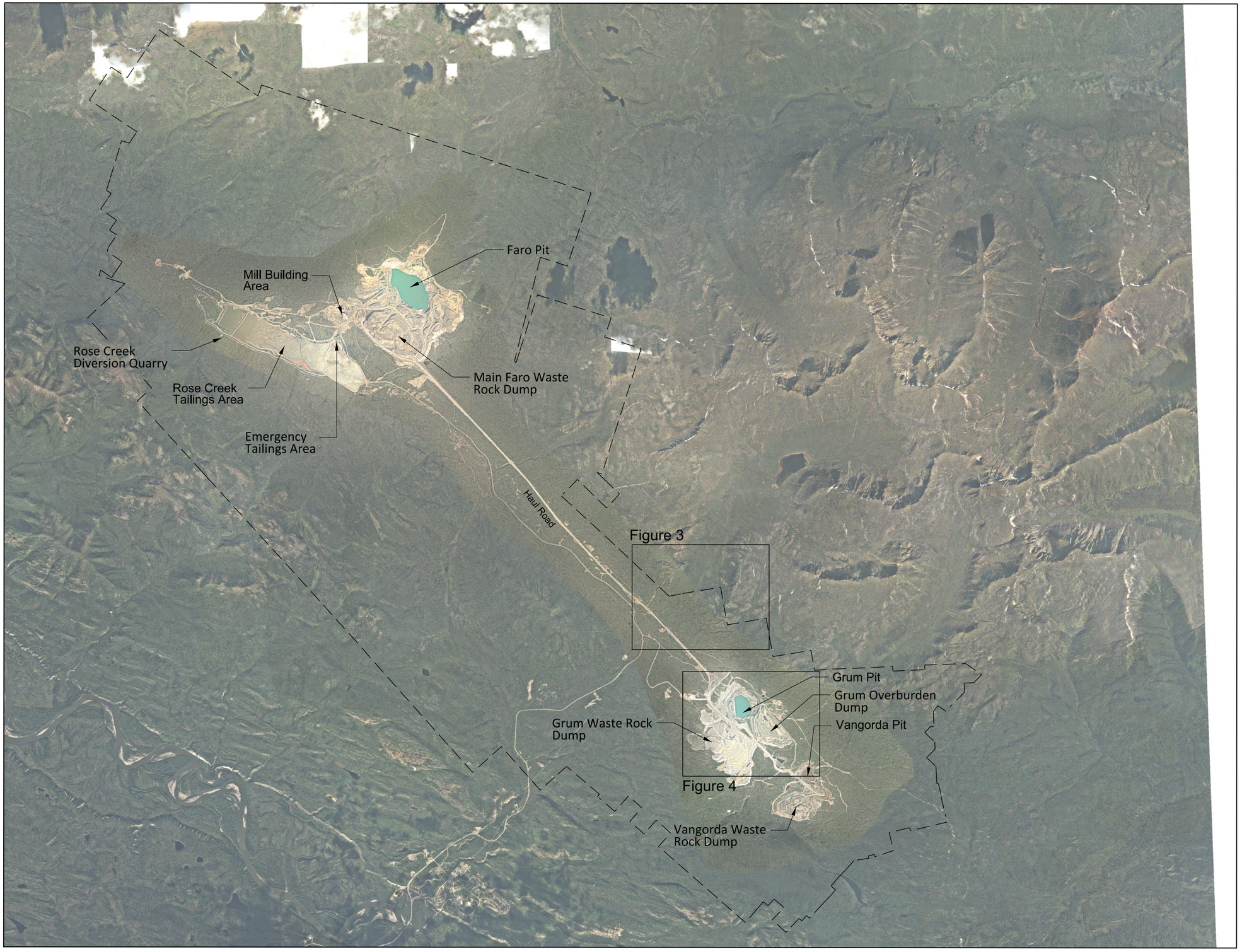


LOCATION MAP

NOT TO SCALE

FIGURE 1
Vicinity and Location Map
Faro Mine Remediation Project

CH2MHILL



N

0 1800 3600

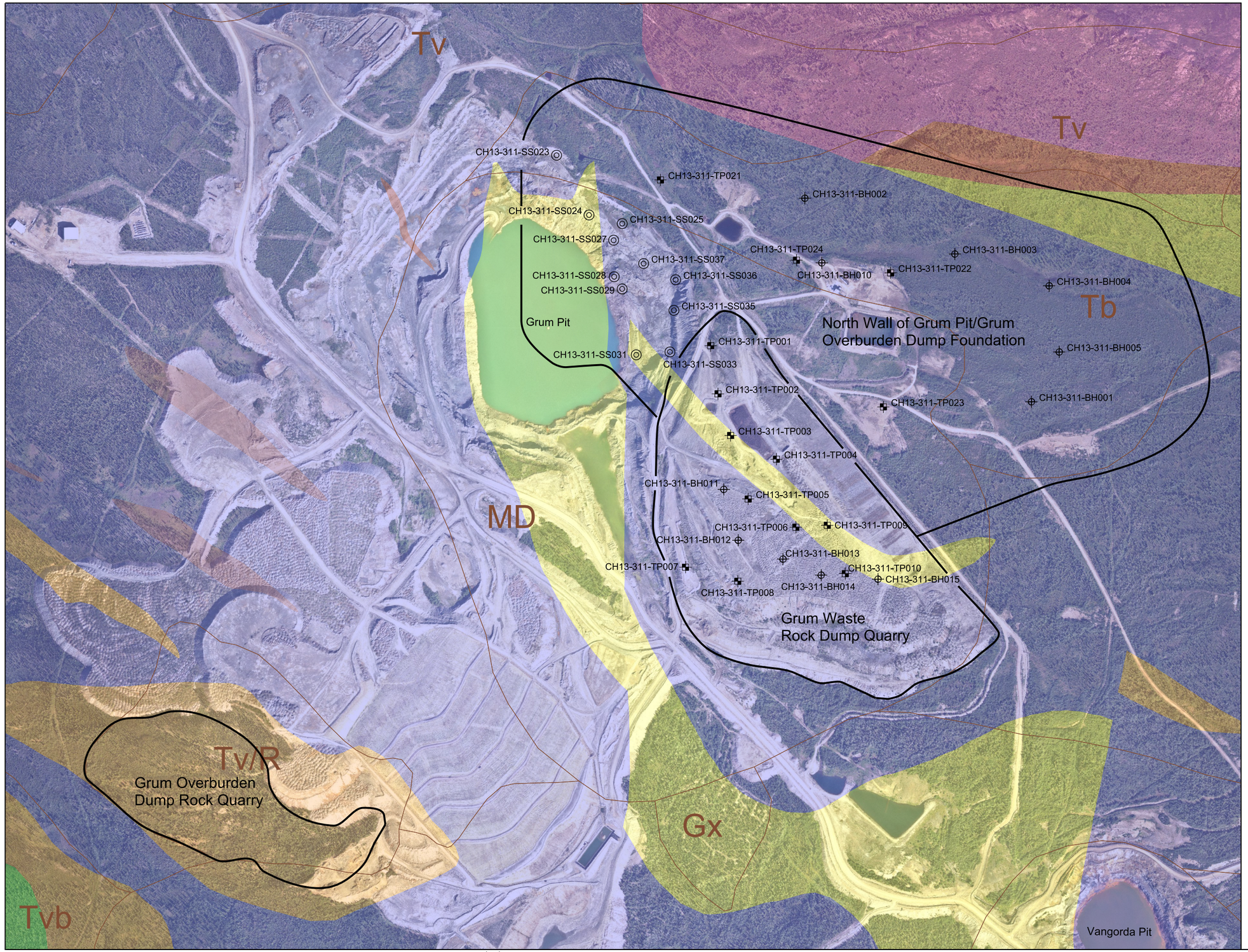
METRES

LEGEND

– – – – Area Withdrawn from Staking Mineral Claims (OIC #2008/168

Note:
Aerial photo shown dated August 2012.

FIGURE 2
Figure Keymap of Faro Mine Complex
Faro Mine Remediation Project



N

0 200 400

METRES

LEGEND

Surficial Geology (Note 2)

Area Withdrawn from Staking Mineral Claims (OIC #2008/168

Bedrock Geology (Pigage, 2004)

- Gabbro (OSMg)
- Granodiorite (MKOg) - Tay River Plutonic Suite
- Biotite-Muscovite Granite (mKMMg) - Anvil Plutonic Suite
- Calc-cilicate (COVcs)
- Basalt (COVp)
- Phyllite (ODDl)
- Shist (UPCMMs)
- Marble (UPCMMi)

2013 Borehole Location (Note 3)

2013 Test Pit Location (Note 3)

2013 Shallow Test Pit Location (Note 3)

Surficial Geology (Bond, 1999)

QUATERNARY

HOLOCENE

MINE DISTURBANCE

MD- mine disturbance; consisting of an open-pit and stripped till and bedrock accumulations. Bedrock and surficial sediments exposed in open-pit.

MINE TAILINGS

MT - mine tailings; consisting of sand, silt and some clay.

ORGANIC DEPOSITS

O - organics; consisting of woody sedge peat, variable thickness. White River ash accumulations are commonly associated with poorly drained peaty areas.

ALLUVIAL DEPOSITS

Ap - alluvial plain; silt, sand and pebbles with reworked cobbles and boulders occurring as bars, overbank floodplain deposits, 0 - 10 m thick; floodplain subject to periodic floods. Small valley alluvial plains may not be mapped at this scale.

Ap (active) - alluvial plain; area of Pelly River floodplain that has been recently active.

At - alluvial terrace; silt, sand, and pebbles with reworked cobbles and boulders occurring as low terrace deposits, 0 - 10 m thick.

Af - alluvial fan; coarse sand, pebbles, cobbles and mudflow deposits, up to or >10 m thick. Appear as vegetated, often peat covered, landforms developed during post-glacial sedimentation.

Ax - complexes of Ap and Af undivided. Common when a stream is unconfined and also in narrow valleys where side-entry alluvial fans cannot be differentiated from an alluvial plain.

PLEISTOCENE AND HOLOCENE (UNDIVIDED)

COLLUVIAL DEPOSITS

Cv - colluvium veneer; conforms to bedrock topography, <1 m thick.

Ca - colluvium apron; coalescing colluvial fans at the base of a slope, >1 m thick.

Cz - mass wasting; includes slumping, debris slides and rockfalls. Slumping and rockfalls are Common on Mt. Mye.

LATE PLEISTOCENE (WISCONSINAN) - McCONNELL GLACIATION

GLACIOLACUSTRINE DEPOSITS

Lb - glaciolacustrine blanket; 1- 40 m thick.

GLACIOFLUVIAL DEPOSITS

Gp - glaciofluvial plain; 3 - 10 m thick.

Gt - glaciofluvial terrace; <10 m thick.

Gx - glaciofluvial complex; 1 - 30 m thick, composed of deposits of outwash, glaciolacustrine and minor till deposited in an ice contact environment. Hummocky topography is associated with this depositional setting. Crevasse fillings were mapped in the upper part of Vangorda Creek valley.

GLACIAL DEPOSITS

Tv - till veneer; conforms to underlying topography, <1 m thick.

Tb - till blanket; gently to moderately sloping plain controlled by bedrock or underlying surficial deposits, >1 m thick.

Tx - till complex; till blanket or veneer composed of meltout till and minor ice contact glaciofluvial deposits.

LOWER CAMBRIAN TO CRETACEOUS

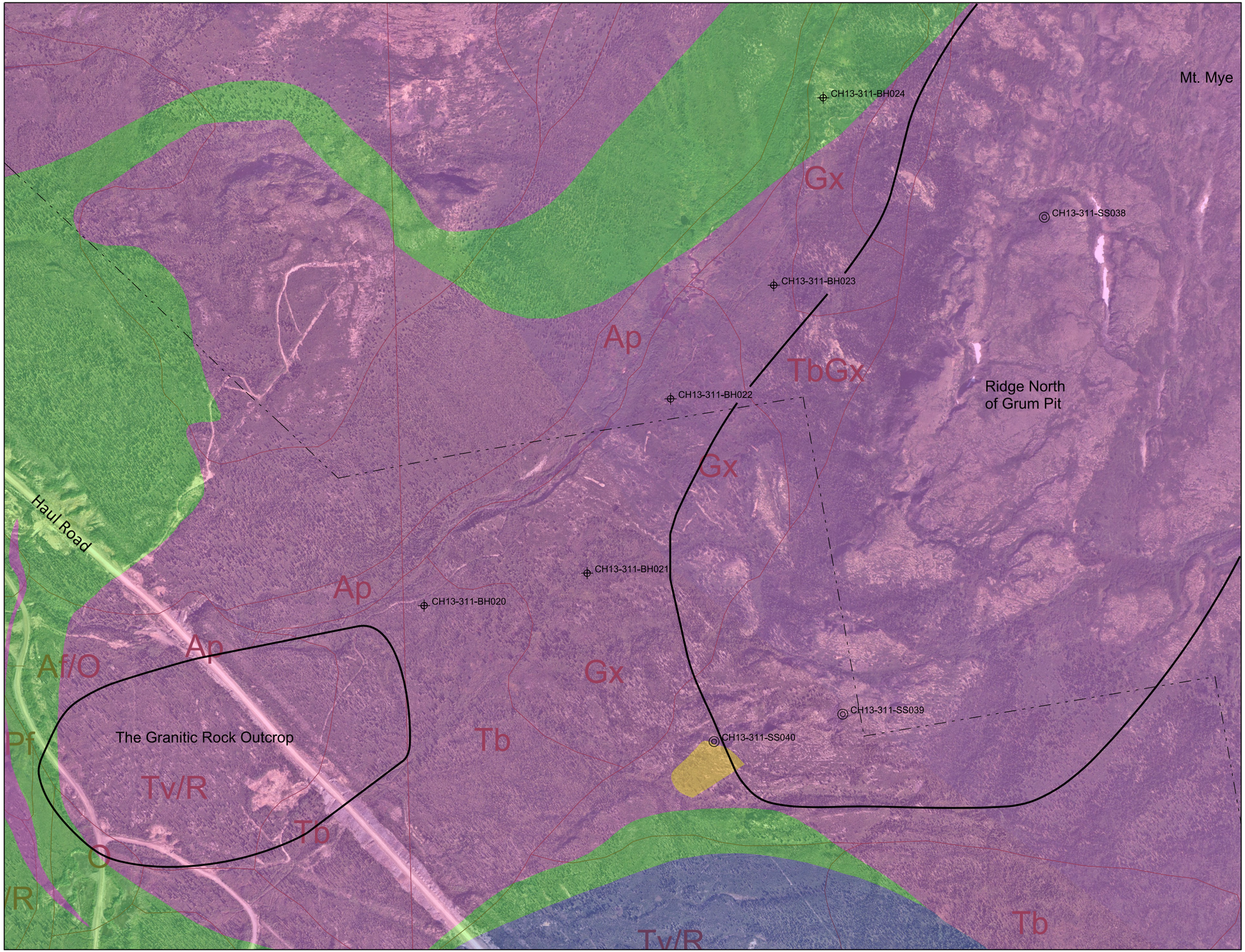
BEDROCK

R - becrock; common on plateau summits and ridges on Mt. Mye and Sheep Mountain.

Notes:
1. Aerial photo shown dated August 2012.
2. Sources: Bond, 1999
   Bond, 2001
   Pigage, 2004
3. Locations shown based on Handheld GPS.

FIGURE 3
2013 Borrow Source Search
Faro Mine Remediation Project

CH2MHILL.



N

0 200 400

METRES

LEGEND

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Bedrock Geology (Pigage, 2004)

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2013 Shallow Test Pit Location (Note 3)

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QUATERNARY

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LOWER CAMBRIAN TO CRETACEOUS

BEDROCK

R - bedrock; common on plateau summits and ridges on Mt. Mye and Sheep Mountain.

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2. Sources: Bond, 1999
   Bond, 2001
   Pigage, 2004
3. Location shown based on Handheld GPS.

FIGURE 4
2013 Borrow Source Search
Faro Mine Remediation Project

CH2MHILL.

Appendix A
Overburden Thickness Contour Map

SHEET Nº. F-6-3 E ½
GEOLOGY MAP

SHEET Nº. F-6-3 E ½
GEOLOGY MAP

ADJOINS SHEET Nº. F-6-3 W ½

ADJOINS SHEET Nº. F-6-4 W ½

NO DATA

THIN COLLUVIUM on BEDROCK
TILL

THIN COLLUVIUM on BEDROCK

EA71162
EA71165
EA71166
EA71163
EA71175
EA71179
EA71180
EA71200
EA71182
EA71183
EA71204
EA71184
EA71208
EA71177
EA71178
EA71176
EA72X23
EA76X11
EA74X06
EA66S04
FABIAX2
FABIAX5
FABIAX4
FABIAX1
FABIAX3
FABA049
FABA226
FABA219
FABA211
FABA214
FABA215
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FABA265
FABA266

Appendix B
Boring Logs

SHEET 1 of 1	PROJECT NUMBER:	BORING NUMBER: *CH13-311-TP001*

TEST PIT LOG

PROJECT NAME: Faro Mine Remediation Project	**HOLE DEPTH (m):** 5.49	**EXCAVATION CONTRACTOR:** TEES	
TOP OF CASING ELEVATION: 1291.010	**NORTHING:** 6905056.000	**EASTING:** 592789.000	**DATE STARTED:** 8/14/2013 / **DATE COMPLETED:** 8/14/2013
WATER LEVEL: --1.8	**DATUM:** GPS/2011 LiDAR	**EXCAVATION EQUIPMENT:** Cat 345CL Excavator with 4' Bucket	
LOCATION: Grum Overburden Dump		**LOGGED BY:** J. Baak	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
										SANDY SILT WITH GRAVEL (ML), dark gray (2.5Y 4/1), moist, slight plasticity, trace organics, rootlets on surface.		Start test pit at 15:15.
		1-B										Sample 1-B at 15:24. Fill.
1										Dry, stiff after .91 m bgs.		
										Band of color change to olive brown (2.5Y 4/3), 50% silt.		
2										**SILT (ML)**, light olive brown (2.5Y 5/4), moist, slight plasticity, stiff, 80% silt, 5% gravel (subrounded), 5% cobbles (subrounded), 10% sand firm.		Possibly native soils as nearby trees are present. Appears to be a former riparian area. Groundwater encountered at 1.8m bgs.
3												
4												
5										Color change to black (2.5Y 2.5/1).		Sample 2-B at 15:55.
										Test Pit Terminated at 5.49 metres bgs		

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER:	BORING NUMBER: *CH13-311-TP002*

TEST PIT LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 4.57	**EXCAVATION CONTRACTOR:** TEES	
TOP OF CASING ELEVATION: 1295.940	**NORTHING:** 6904930.000	**EASTING:** 592808.000	**DATE STARTED:** 8/14/2013	**DATE COMPLETED:** 8/14/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**EXCAVATION EQUIPMENT:** Cat 345CL Excavator with 4' Bucket	
LOCATION: Grum Overburden Dump			**LOGGED BY:** J. Baak	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
		1-B		11	45	44				**(FILL) CLAYEY SAND (SC)**, very dark gray (2.5Y 3/1), moist, stiff, 25% subrounded gravel, 20% sand, 2.5% subrounded cobbles, trace subrounded boulders.		SOa Start test pit at 13:00. Material is similar to TP003 and TP005. --Groundwater not encountered.
												Sample 1-B at 13:28.
1												
2												
3												
										(FILL) SILT WITH SAND (ML), color change to dark grayish brown (2.5Y 4/2), increased cobble to 5%, increased boulders to 5%, permafrost.		Sample 2-B. Collect sample and backfill. Color change, tougher excavating, material appears to be permafrost.
4		2-B					9	25	8			
										Test Pit Terminated at 4.57 metres bgs		Test pit caving. No further excavation. Shut down at 13:55 due to thunderstorm.

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER:	BORING NUMBER: *CH13-311-TP003*

TEST PIT LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 5.18	**EXCAVATION CONTRACTOR:** TEES	
TOP OF CASING ELEVATION: 1296.630	**NORTHING:** 6904821.000	**EASTING:** 592841.000	**DATE STARTED:** 8/14/2013	**DATE COMPLETED:** 8/14/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**EXCAVATION EQUIPMENT:** Cat 345CL Excavator with 4' Bucket	
LOCATION: Grum Overburden Dump			**LOGGED BY:** J. Baak	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
0		1-B		11	46	43	9	25	9	**(FILL) CLAYEY SAND (SC)**, very dark gray (2.5Y 3/1), moist, stiff, low plasticity, trace cobbles, 25% subrounded gravel, 20% fine to medium grained sand, 5% subrounded cobbles.		SOa Dry from 0 to 0.30. Same material as TP005. --Groundwater not encountered.
1												Sample 1-B at 12:20.
2										**(PHYLLITE)**, noted in stockpile, trace brown staining, subrounded granite cobbles and boulders.		
3												
4												Test pit begins to cave.
5		2-B										Sample 2-B at 12:39.
										Test Pit Terminated at 5.18 metres bgs		

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER:	BORING NUMBER: *CH13-311-TP004*

TEST PIT LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 5.49	**EXCAVATION CONTRACTOR:** TEES	
TOP OF CASING ELEVATION: 1294.750	**NORTHING:** 6904759.000	**EASTING:** 592961.000	**DATE STARTED:** 8/14/2013	**DATE COMPLETED:** 8/14/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**EXCAVATION EQUIPMENT:** Cat 345CL Excavator with 4' Bucket	
LOCATION: Grum Overburden Dump			**LOGGED BY:** J. Baak	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				23	46	31				**(FILL) CLAYEY SAND WITH GRAVEL (SC)**, light gray (5Y 6/1), dry, dense, firm sand, angular cobbles and gravels.		Test pit staying open to 3.66m bgs. This material is typical of local surface material and much different than material encountered in other 2013 test pits on Overburden dump; mixed with layers of phyllite waste rock. --Groundwater not encountered.
										Same as 0 to 0.61m bgs, color change to very dark gray (5Y 3/1), increase in fines.		Sample 1-B at 10:56.
1		1-B					8	27	6			SOa
										Color change to brownish yellow (10YR 6/8).		
										(FILL) SILTY GRAVEL WITH SAND (GM), very dark gray (5Y 3/1), dry.		
2												
3												
										(FILL) SILTY GRAVEL WITH SAND (GM), moist, trace cobbles, trace boulders, granite, organic odor.		
4												
5										Intermixed with light gray and brown.		
		2-B								Boulders encountered at 5.18m bgs. Color change to light gray (5Y 7/1).		Sample 2-B at 11:24. Test pit remaining open to 5.18m bgs.
										Test Pit Terminated at 5.49 metres bgs		Test pit remaining open to 5.49m bgs. Encountered boulders and end test pit.

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER:	BORING NUMBER: *CH13-311-TP005*

TEST PIT LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 5.18	**EXCAVATION CONTRACTOR:** TEES	
TOP OF CASING ELEVATION: 1293.590	**NORTHING:** 6904655.000	**EASTING:** 592887.000	**DATE STARTED:** 8/14/2013	**DATE COMPLETED:** 8/14/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**EXCAVATION EQUIPMENT:** Cat 345CL Excavator with 4' Bucket	
LOCATION: Grum Overburden Dump			**LOGGED BY:** J. Baak	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				9	41	50				**SANDY GRAVELLY SILT (ML)**, very dark gray (2.5Y 3/1), moist, low plasticity, trace cobbles, trace boulder, 20% gravel, 5% cobbles/boulders.		--Groundwater not encountered. Start test pit at 09:15.
												Sample 1-B at 09:35 (2 gallon bags).
1		1-B					9	25	11			S0a
										With pockets of wet silt.		
2												
3												
4												
		2-B										Sample 2-B at 10:03 (2 gallon bags).
5												
										Test Pit Terminated at 5.18 metres bgs		Test pit caved. Sample intervals are approximate.

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER:	BORING NUMBER: *CH13-311-TP006*

TEST PIT LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 5.18	**EXCAVATION CONTRACTOR:** TEES	
TOP OF CASING ELEVATION: 1294.730	**NORTHING:** 6904581.000	**EASTING:** 593012.000	**DATE STARTED:** 8/13/2013	**DATE COMPLETED:** 8/13/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**EXCAVATION EQUIPMENT:** Cat 345CL Excavator with 4' Bucket	
LOCATION: Grum Overburden Dump			**LOGGED BY:** M. Franklyne	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				8	44	44	7	24	7	**(FILL/REWORKED TILL) SILTY CLAYEY SAND (SC-SM)**, very dark gray (2.5Y 3/1), moist, soft, estimated 50% low plasticity silt, 30% well-graded fine to coarse sand, 15% fine to coarse gravels, 5% rounded to subrounded cobbles.		--Groundwater not encountered. Begin excavation at 16:45.
		1-B										SOa Sample 1-B at 16:55 (2 gallon bags).
1												
												Material appears to be reworked till.
2												
3												
4		2-B										
												Sample 2-B at 17:13 (2 gallon bags).
5												
										Test Pit Terminated at 5.18 metres bgs		Pit wall caves and fills test pit to 2.4m bgs. B/F to surface with compacted soils. Finish backfill at 17:25.

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER: 472645	BORING NUMBER: *CH13-311-TP007*

TEST PIT LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 5.50	**EXCAVATION CONTRACTOR:** TEES	
TOP OF CASING ELEVATION: 1261.010	**NORTHING:** 6904476.490	**EASTING:** 592723.140	**DATE STARTED:** 8/26/2013	**DATE COMPLETED:** 8/26/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**EXCAVATION EQUIPMENT:** Cat 345CL Excavator with 4' Bucket	
LOCATION: Grum Overburden Dump			**LOGGED BY:** M. Franklyne	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
0										Trace vegetation at ground surface. **WASTEROCK**, extremely bouldery and cobbly with few to little silt and coarse sand, boulders and cobbles (>90%), boulders and cobbles are sub-rounded to angular, variety of rock types (granite, schist, slate).		Lots of sloughing and cave-in --Groundwater not encountered.
1												
2												
3												
4												
5										**SILT (ML)**, brown, moist, semi-plastic, silt (80%), sand (10%), gravel (10%).		
										Test Pit Terminated at 5.5 metres bgs		

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER: 472645	BORING NUMBER: *CH13-311-TP008*

TEST PIT LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 3.96	**EXCAVATION CONTRACTOR:** TEES	
TOP OF CASING ELEVATION: 1290.500	**NORTHING:** 6904439.760	**EASTING:** 592859.890	**DATE STARTED:** 8/26/2013	**DATE COMPLETED:** 8/26/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**EXCAVATION EQUIPMENT:** Cat 345CL Excavator with 4' Bucket	
LOCATION: Grum Overburden Dump			**LOGGED BY:** J. Marriott	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
										Trace vegetation at ground surface. **SILT WITH SAND (ML)**, dark grey, moist, silt (60%), sand (20%), gravel (15%), cobble (5%), cobbles are angular to sub-sangular.		Sloughing and cave-in --Groundwater not encountered.
1										**SANDY SILT WITH GRAVEL (ML)**, brown, silt (50%), sand (30%), gravel/boulder (20%), very bouldery.		at 1.5m distinct color change, dark grey to brown
2												
3												
										Test Pit Terminated at 3.96 metres bgs		

CH2MHILL

SHEET 1 of 1	**PROJECT NUMBER:**	**BORING NUMBER:** *CH13-311-TP009*

TEST PIT LOG

PROJECT NAME: Faro Mine Remediation Project	**HOLE DEPTH (m):** 4.26	**EXCAVATION CONTRACTOR:** TEES	
TOP OF CASING ELEVATION: 1293.570	**NORTHING:** 6904586.000	**EASTING:** 593094.000	**DATE STARTED:** 8/15/2013 / **DATE COMPLETED:** 8/15/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR	**EXCAVATION EQUIPMENT:** Cat 345CL Excavator with 4' Bucket	
LOCATION: Grum Overburden Dump		**LOGGED BY:** J. Baak	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
0										**SANDY SILT WITH GRAVEL (ML)**, very dark gray (2.5Y 3/1), moist, soft, 30% fine to coarse grained sand, weakly cemented, 15% fine to subrounded gravel, 15% subrounded cobbles.		
1										Color change to olive gray (5Y 5/2).		
2												
3										**(FILL) SILTY GRAVEL WITH SAND (GM)**, gray (5Y 5/1), moist to wet, stiff, 25 to 30% angular gravel, 25% low plasticity silt, 10% angular cobbles, 15% angular boulder.		Caving walls has filled test pit to 3.35m bgs. --Groundwater not encountered.
4										Moist becoming wet.		
										Test Pit Terminated at 4.26 metres bgs		Intervals are approximate due to test pit caving (based on earlier measurements). Test pit ended and backfill at 16:00.

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER: 472645	BORING NUMBER: *CH13-311-TP010*

TEST PIT LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 4.30	**EXCAVATION CONTRACTOR:** TEES	
TOP OF CASING ELEVATION: 1292.470	**NORTHING:** 6904459.670	**EASTING:** 593141.150	**DATE STARTED:** 8/26/2013	**DATE COMPLETED:** 8/26/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**EXCAVATION EQUIPMENT:** Cat 345CL Excavator with 4' Bucket	
LOCATION: Grum Overburden Dump			**LOGGED BY:** J. Marriott	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
0										Trace organics at ground surface.		
										SILT WITH SAND (ML), grayish brown, semi-plastic, moist, trace cobbles, silt (60%), sand (20%), gravel (15%), cobble (5%).		Plenty of sloughing and cave in --Groundwater not encountered.
1												
2												Slough and cave in both sides
										At 2.4m color change to brown		
3												No samples collected
4										At 4.0m large boulder, gray schist-platy texture, graphite, biotite, muscovite.		
										Test Pit Terminated at 4.3 metres bgs		

CH2MHILL

SHEET 1 of 9	PROJECT NUMBER: 472645.07.SW.FI.BW.03	BORING NUMBER: *CH13-311-BH011*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project	**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita	
TOP OF CASING ELEVATION: 1292.540	**NORTHING:** 6904680.032	**EASTING:** 592823.176	**DATE STARTED:** 7/23/2013 / **DATE COMPLETED:** 7/23/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic	**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted	
LOCATION: Grum Overburden Dump		**LOGGED BY:** L. Totzke	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
1				20	10	70				**GRAVELLY SILT (ML)**, low plasticity.		--Groundwater not encountered.
2				20	0	80				**SILT WITH GRAVEL (ML)**, very stiff, low plasticity.		
3										**SANDY SILT (ML)**, very stiff, low plasticity.		
4				8	42	50	8					SOa
5				30	15	55				**GRAVELLY CLAY WITH SAND (CL)**, firm to stiff, medium plasticity.		
6												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH011*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1292.540	**NORTHING:** 6904680.032	**EASTING:** 592823.176	**DATE STARTED:** 7/23/2013 / **DATE COMPLETED:** 7/23/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				25	10	65				**GRAVELLY CLAY (CL)**, firm, medium plasticity.		
7												
				30	10	60				Stiff.		
8												
9												
										SILTY SAND (SM)		
				5	50	45	12					SOb
10												
				0	0	0				No recovery.		
11												
12												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH011*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1292.540	**NORTHING:** 6904680.032	**EASTING:** 592823.176	**DATE STARTED:** 7/23/2013 / **DATE COMPLETED:** 7/23/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				0	0	0				No recovery.		
13												
				65	35	0				**WELL-GRADED GRAVEL WITH SAND (GW)**, loose, angular, medium sand, trace waste rock.		
14												
15				30	70	0				**WELL-GRADED SAND WITH GRAVEL (SW)**, medium dense, very soft, subangular, coarse gravel.		
				70	30	0				**GRAVEL WITH TRACE SAND (SW)**, angular platy, loose, coarse (19-75mm) gravel, medium sand, some waste rock.		
16												
17				65	35	0				**WELL-GRADED GRAVEL WITH SILT AND SAND (GW-GM)**, medium dense, angular, trace waste rock.		
18												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH011*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1292.540	**NORTHING:** 6904680.032	**EASTING:** 592823.176	**DATE STARTED:** 7/23/2013 / **DATE COMPLETED:** 7/23/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				40	45	0				**WELL-GRADED GRAVEL WITH SAND (GW)**, medium dense, angular, waste rock.		
19				40	10	50				**(FILL/REWORKED TILL) GRAVELLY SILT (ML)**, low plasticity, well-rounded, fine grained gravel, medium grained sand.		
20				35	15	50				**(FILL/REWORKED TILL) GRAVELLY SILT WITH SAND (ML)**, stiff, low plasticity.		
21				30	10	60				Hard.		
22												
23				35	10	55				**(FILL/REWORKED TILL) GRAVELLY SILT (ML)**, very stiff, low plasticity.		
24												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH011*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1292.540	**NORTHING:** 6904680.032	**EASTING:** 592823.176	**DATE STARTED:** 7/23/2013 / **DATE COMPLETED:** 7/23/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
25				12	42	46	10	25	8	**CLAYEY SAND (SC)**		SOc
26				30	20	50				**(FILL/REWORKED TILL) GRAVELLY SILT WITH SAND (ML)**, stiff, medium plasticity.		
27												
				30	20	50						
28												
29				30	10	60				**(FILL/REWORKED TILL) GRAVELLY CLAY (CL)**, firm, medium plasticity.		
30												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH011*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1292.540	**NORTHING:** 6904680.032	**EASTING:** 592823.176	**DATE STARTED:** 7/23/2013 / **DATE COMPLETED:** 7/23/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				25	15	60				**(FILL/REWORKED TILL) GRAVELLY SILT WITH SAND (ML)**, very stiff, low plasticity, trace waste rock.		
31												
32				10	10	80				**(FILL/REWORKED TILL) SILT (ML)**, very stiff, low plasticity.		
33												
34				5	49	46	8			**SILTY SAND (SM)**		SOd
35				20	5	75				**(FILL/REWORKED TILL) GRAVELLY CLAY (CL)**, very stiff, low plasticity.		
36												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH011*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1292.540	**NORTHING:** 6904680.032	**EASTING:** 592823.176	**DATE STARTED:** 7/23/2013 / **DATE COMPLETED:** 7/23/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
37				4	35	61	11			**SANDY SILT (ML)**, very stiff, low plasticity.		SOe
38				20	0	70				**(FILL/REWORKED TILL) GRAVELLY CLAY (CL)**, very stiff, low plasticity.		
39				15	5	80				**(FILL/REWORKED TILL) CLAY WITH GRAVEL (CL)**, very stiff, low plasticity.		
40				60	40	0				**WELL-GRADED GRAVEL WITH SAND (GW)**, dry, subangular.		
41				15	85	0				**(FILL/REWORKED TILL) POORLY GRADED SAND WITH GRAVEL (SP)**, loose, subrounded.		
42				10	10	80				**(FILL/REWORKED TILL) CLAY (CL)**, very stiff, medium plasticity.		

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH011*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1292.540	**NORTHING:** 6904680.032	**EASTING:** 592823.176	**DATE STARTED:** 7/23/2013 / **DATE COMPLETED:** 7/23/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
43				15	5	80				**(FILL/REWORKED TILL) CLAY WITH GRAVEL (CL)**, dry, very stiff, low plasticity.		
44				25	0	75				**(FILL/REWORKED TILL) GRAVELLY CLAY (CL)**, dry, very stiff, low plasticity.		
45												
46				15	5	80				**(FILL/REWORKED TILL) CLAY WITH GRAVEL (CL)**, dry, very stiff, low plasticity.		
47												
48				15	5	80						

PROJECT NUMBER:	BORING NUMBER:
472645.07.SW.FI.BW.03	*CH13-311-BH011*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1292.540	**NORTHING:** 6904680.032	**EASTING:** 592823.176	**DATE STARTED:** 7/23/2013 / **DATE COMPLETED:** 7/23/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
49												
50										Boring Terminated at 50.29 metres bgs		

SHEET 1 of 9	PROJECT NUMBER: 472645.07.SW.FI.BW.03	BORING NUMBER: *CH13-311-BH012*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project	**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita	
TOP OF CASING ELEVATION: 1292.920	**NORTHING:** 6904546.831	**EASTING:** 592861.037	**DATE STARTED:** 7/24/2013 / **DATE COMPLETED:** 7/24/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic	**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted	
LOCATION: Grum Overburden Dump		**LOGGED BY:** L. Totzke	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
0										**SILTY SAND (SM)**, dark gray, moist, low plasticity, firm.		--Groundwater not encountered.
				8	44	48	12					SOa
1												
				15	30	55				**(FILL/REWORKED TILL) SANDY SILT WITH GRAVEL (ML)**, dark gray, moist, medium plasticity, firm.		
2												
3				10	40	50				**(FILL/REWORKED TILL) SANDY SILT (ML)**, dark gray, moist, medium plasticity, firm.		
4												
				10	30	60				**(FILL/REWORKED TILL) SANDY SILT (ML)**, dark gray, moist, low plasticity.		
5												
				90	10	0				**(WASTE ROCK) POORLY GRADED GRAVEL (GP)**,rock fragments, platy, some shale, loose from 17 to 20ft, nonplastic, angular, coarse grained gravel, medium sand.		
6												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH012*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1292.920	**NORTHING:** 6904546.831	**EASTING:** 592861.037	**DATE STARTED:** 7/24/2013 / **DATE COMPLETED:** 7/24/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
7				70	20	10				**(WASTE ROCK) WELL-GRADED GRAVEL WITH SILT AND SAND (GP-GM)**, grayish black to yellowish brown, dry, angular, loose.		
				20	10	70				**(FILL/REWORKED TILL) GRAVELLY SILT (ML)**, stiff, low plasticity.		
8				25	20	55				**(FILL/REWORKED TILL) GRAVELLY CLAY WITH SAND (CL)**, dark gray, moist, medium plasticity, firm to soft.		
9												
10				8	44	48	10			**SILTY SAND (SM)**, dark gray, moist, medium plasticity, firm.		SOb
11				40	20	40				**(FILL/REWORKED TILL) SILTY GRAVEL WITH SAND (GM)**, gray brown, moist, loose.		
12												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH012*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1292.920	**NORTHING:** 6904546.831	**EASTING:** 592861.037	**DATE STARTED:** 7/24/2013 / **DATE COMPLETED:** 7/24/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
13												
14				70	30	0				**WELL-GRADED GRAVEL WITH SAND (GW)**, waste rock, grayish black to yellowish brown, wet, angular.		
15				90	10	0				**WELL-GRADED GRAVEL (GW)**, waste rock, white gray, dry, angular, loose.		
16												
17				15	25	60				**(FILL/REWORKED TILL) SANDY SILT WITH GRAVEL (ML)**, gray brown, wet, low to medium plasticity, soft.		
18												

PROJECT NUMBER:	BORING NUMBER:
472645.07.SW.FI.BW.03	*CH13-311-BH012*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project	**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita	
TOP OF CASING ELEVATION: 1292.920	**NORTHING:** 6904546.831	**EASTING:** 592861.037	**DATE STARTED:** 7/24/2013 / **DATE COMPLETED:** 7/24/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic	**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted	
LOCATION: Grum Overburden Dump		**LOGGED BY:** L. Totzke	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
19				7	54	39	10			**SILTY SAND (SM)**, gray brown, moist, low plasticity, firm.		SOc
20				25	20	55				**(FILL/REWORKED TILL) GRAVELLY SILT WITH SAND (ML)**, gray brown to gray, moist, low plasticity, firm.		
21												
22				20	20	60				**(FILL/REWORKED TILL) SILT WITH SAND AND GRAVEL (ML)**, gray, moist, low plasticity, firm.		
23				25	15	60				**(WASTE ROCK) GRAVELLY CLAY WITH SAND (CL)**, waste rock, dark gray, moist, medium plasticity, stiff.		
24												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH012*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1292.920	**NORTHING:** 6904546.831	**EASTING:** 592861.037	**DATE STARTED:** 7/24/2013 / **DATE COMPLETED:** 7/24/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
25				30	10	60				**(WASTE ROCK) GRAVELLY CLAY (CL)**, dark gray, moist, medium plasticity, firm.		
26				20	15	65				**(FILL/REWORKED TILL) GRAVELLY SILT WITH SAND (ML)**, dark gray, moist, low plasticity, firm.		
27												
28				20	15	65						
29				20	10	70				**(FILL/REWORKED TILL) GRAVELLY CLAY (CL)**, dark gray, moist, medium plasticity, stiff.		
30												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH012*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1292.920	**NORTHING:** 6904546.831	**EASTING:** 592861.037	**DATE STARTED:** 7/24/2013 / **DATE COMPLETED:** 7/24/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				30	20	50				**(FILL/REWORKED TILL) GRAVELLY CLAY WITH SAND (CL)**, dark gray, moist, low plasticity, stiff, some platy shale from 31.7 to 32m bgs.		
31												
32				20	15	65				**(FILL/REWORKED TILL) GRAVELLY CLAY WITH SAND (CL)**, dark gray, moist, low plasticity, stiff.		
33												
				20	30	50				**(FILL/REWORKED TILL) SANDY CLAY WITH GRAVEL (CL)**, dark gray to brown, moist, low plasticity, stiff to firm.		
34												
35				15	20	65				**(FILL/REWORKED TILL) SANDY CLAY WITH GRAVEL (CL)**, dark gray, moist, low plasticity, stiff.		
36												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH012*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1292.920	**NORTHING:** 6904546.831	**EASTING:** 592861.037	**DATE STARTED:** 7/24/2013 / **DATE COMPLETED:** 7/24/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
37				15	25	60				**(FILL/REWORKED TILL) SANDY CLAY WITH GRAVEL (CL)**,dark gray to brown, moist, low plasticity, firm to stiff.		
38				20	30	50				**(FILL/REWORKED TILL) SANDY SILT WITH GRAVEL (ML)**, gray, moist, low plasticity, stiff,		
39												
40				4	44	52	11	29	10	**SANDY LEAN CLAY (CL)**, gray to gray brown, moist, medium plasticity, stiff.		SOd
41				15	25	60				**(FILL/REWORKED TILL) SANDY CLAY WITH GRAVEL (CL)**, gray brown to gray, dry, low plasticity, stiff.		
42												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH012*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1292.920	**NORTHING:** 6904546.831	**EASTING:** 592861.037	**DATE STARTED:** 7/24/2013 / **DATE COMPLETED:** 7/24/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
43				10	10	80				**(FILL/REWORKED TILL) CLAY (CL)**, dark gray to very dark gray, dry, medium plasticity, stiff to very stiff.		
44				20	0	80				**(FILL/REWORKED TILL) CLAY WITH GRAVEL (CL)**, dark gray, dry, medium plasticity, very stiff.		
45												
46				25	0	75				**(FILL/REWORKED TILL) CLAY WITH GRAVEL (CL), very dark gray, dry, medium plasticity, rounded gravel, very stiff.**		
47												
48				25	0	75						

PROJECT NUMBER:	BORING NUMBER:
472645.07.SW.FI.BW.03	*CH13-311-BH012*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project	**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita	
TOP OF CASING ELEVATION: 1292.920	**NORTHING:** 6904546.831	**EASTING:** 592861.037	**DATE STARTED:** 7/24/2013 / **DATE COMPLETED:** 7/24/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic	**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted	
LOCATION: Grum Overburden Dump		**LOGGED BY:** L. Totzke	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
49				25	0	75				**(FILL/REWORKED TILL) CLAY WITH GRAVEL (CL)**, very dark gray, dry, medium plasticity, very stiff.		
50										Boring Terminated at 50.29 metres bgs		

SHEET 1 of 9	PROJECT NUMBER: 472645.07.SW.FI.BW.03	BORING NUMBER: *CH13-311-BH013*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project	**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita	
TOP OF CASING ELEVATION: 1293.940	**NORTHING:** 6904497.709	**EASTING:** 592978.095	**DATE STARTED:** 7/18/2013 / **DATE COMPLETED:** 7/18/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic	**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted	
LOCATION: Grum Overburden Dump		**LOGGED BY:** L. Totzke	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
0										**SILTY CLAYEY SAND (SC-SM)**, gray, moist, low plasticity, stiff.		--Groundwater not encountered.
				6	47	47	9	22	6			SOa
1												
				15	10	75				**(FILL/REWORKED TILL) SILT WITH GRAVEL (ML)**, gray, moist, medium plasticity, firm.		
2												
3				20	5	75				**(FILL/REWORKED TILL) SILT WITH GRAVEL (ML)**, dark gray, dry, low plasticity, stiff, weak cementation.		
4												
				20	0	80				**(FILL/REWORKED TILL) SILT WITH GRAVEL (ML)**, dark gray, moist, low plasticity, very soft.		
5												
6												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH013*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1293.940	**NORTHING:** 6904497.709	**EASTING:** 592978.095	**DATE STARTED:** 7/18/2013 / **DATE COMPLETED:** 7/18/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
7				7	70	23	5			**SILTY SAND (SM)**, gray, dry, non-plastic, very soft, laminated.		SOb
8										No recovery.		
9				10	30	60				**(FILL/REWORKED TILL) SANDY SILT (ML)**, gray, moist to wet, fine sand.		
10												
11										No recovery.		
12												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH013*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1293.940	**NORTHING:** 6904497.709	**EASTING:** 592978.095	**DATE STARTED:** 7/18/2013 / **DATE COMPLETED:** 7/18/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
13												
14				10	5	85				**(FILL/REWORKED TILL) CLAY (CL)**, gray, moist, medium plasticity, firm.		
15												
16				2	44	54	10	24	8	**SANDY LEAN CLAY (CL)**, dark gray, dry, low plasticity, very stiff.		SOc
17				10	0	90				**(FILL/REWORKED TILL) CLAY (CL)**, dark gray, moist, low plasticity, stiff.		
18												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH013*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1293.940	**NORTHING:** 6904497.709	**EASTING:** 592978.095	**DATE STARTED:** 7/18/2013 / **DATE COMPLETED:** 7/18/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				10	0	90				**(FILL/REWORKED TILL) SILT (ML)**, dark gray to brown, dry, stiff.		
19												
				10	0	90				**(FILL/REWORKED TILL) CLAY (CL)**, brown, moist, medium plasticity, firm.		
20												
21												
				15	0	85				**(FILL/REWORKED TILL) CLAY WITH GRAVEL (CL)**, gray to brown, moist.		
22												
				10	10	80				**(FILL/REWORKED TILL) SILT (ML)**, dark gray, moist, low plasticity, stiff.		
23												
24												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH013*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1293.940	**NORTHING:** 6904497.709	**EASTING:** 592978.095	**DATE STARTED:** 7/18/2013 / **DATE COMPLETED:** 7/18/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
25				15	0	85				**CLAY WITH GRAVEL (CL)**, gray to brown, moist.		
26				10	0	90				**(FILL/REWORKED TILL) CLAY (CL)**, dark gray, moist, very stiff, medium plasticity.		
27												
28				10	0	90						
29										**SILTY SAND (SM)**		
30				6	47	47	8					SOd

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH013*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1293.940	**NORTHING:** 6904497.709	**EASTING:** 592978.095	**DATE STARTED:** 7/18/2013 / **DATE COMPLETED:** 7/18/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
31				20	0	80				**(FILL/REWORKED TILL) CLAY WITH GRAVEL (CL)** dark gray, moist, low plasticity, very stiff.		
32				15	0	85				**(FILL/REWORKED TILL) CLAY WITH GRAVEL (CL)** dark gray, moist, low plasticity, very stiff.		
33				10	0	90				**(FILL/REWORKED TILL) CLAY (CL)** , dark gray, moist, medium plasticity, very stiff.		
34												
35				25	25	50				**CLAYEY SAND WITH GRAVEL (SC/GC)**, dark gray, wet, dense.		
36												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH013*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1293.940	**NORTHING:** 6904497.709	**EASTING:** 592978.095	**DATE STARTED:** 7/18/2013 / **DATE COMPLETED:** 7/18/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				30	25	40				**SILTY SAND WITH GRAVEL (SM/GM)**, gray brown, moist, non-plastic, firm.		
37												
38				10	5	85				**(FILL/REWORKED TILL) SILT (ML)**, dark gray, dry, non-plastic to low plasticity, hard, trace rounded gravel.		
39												
				60	40	0				**SANDY SILT (ML)**, gray, dry, low plasticity, hard, rounded gravel.		
40							6					SOe
41												
				20	10	70				**(FILL/REWORKED TILL) CLAY WITH GRAVEL (GC)**, gray to dark gray, moist, low plasticity, firm.		
42												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH013*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1293.940	**NORTHING:** 6904497.709	**EASTING:** 592978.095	**DATE STARTED:** 7/18/2013 / **DATE COMPLETED:** 7/18/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				5	5	90				**SILT (ML)**, gray, dry, non-plastic, very soft, with trace angular gravel.		
				5	5	90				**(FILL/REWORKED TILL) SILT (ML)** dark gray, dry, low plasticity, hard.		
43												
44												
				5	10	85				**(FILL/REWORKED TILL) SILT (ML)**, gray, moist, low plasticity, very stiff.		
45												
				5	10	85				**((FILL/REWORKED TILL) SILT (ML)** , gray, dry, low plasticity, hard.		
46				60	20	10				**POORLY GRADED GRAVEL WITH SAND (GP)**, heterogeneous, subangular gravel, dark gray, dry, dense, peat, with organic rootlets from 46.32m-46.74m.		
47												
				20	10	70				**(TILL) GRAVELLY SILT (ML)**, dark gray, dry, non-plastic to low plasticity, very stiff.		
48												

PROJECT NUMBER:	BORING NUMBER:
472645.07.SW.FI.BW.03	*CH13-311-BH013*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1293.940	**NORTHING:** 6904497.709	**EASTING:** 592978.095	**DATE STARTED:** 7/18/2013 / **DATE COMPLETED:** 7/18/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
49												
50										Boring Terminated at 50.29 metres bgs		

SHEET 1 of 9	PROJECT NUMBER: 472645.07.SW.FI.BW.03	BORING NUMBER: *CH13-311-BH014*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project	**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** tervita	
TOP OF CASING ELEVATION: 1290.890	**NORTHING:** 6904455.761	**EASTING:** 593078.039	**DATE STARTED:** 7/20/2013 / **DATE COMPLETED:** 7/20/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic	**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted	
LOCATION: Grum Overburden Dump		**LOGGED BY:** L. Totzke	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
0				15	0	85				**(FILL/REWORKED TILL) SILT WITH GRAVEL (ML)**, gray, moist, low plasticity, subangular gravel.		--Groundwater not encountered.
1				15	10	75				**(FILL/REWORKED TILL) SILT WITH GRAVEL (ML)**, gray, moist, low plasticity.		
2				10	0	90				**(FILL/REWORKED TILL) SILT (ML)**, dark gray, dry, low plasticity.		
3				8	69	23	5			**SILTY SAND (SM)** some platy layers, gray, dry, nonplastic, angular gravel, coarse gravel, fine sand.		S0a
4				25	60	15				**(WASTE ROCK) SILTY SAND WITH GRAVEL (SM)**, dark gray , moist, angular, fine gravel, fine sand.		
5				15	15	70				**(FILL/REWORKED TILL) SILT WITH SAND AND GRAVEL (ML)**, low plasticity, hard.		
6												

PROJECT NUMBER:	BORING NUMBER:
472645.07.SW.FI.BW.03	*CH13-311-BH014*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project	**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** tervita	
TOP OF CASING ELEVATION: 1290.890	**NORTHING:** 6904455.761	**EASTING:** 593078.039	**DATE STARTED:** 7/20/2013 / **DATE COMPLETED:** 7/20/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				10	30	60				**(FILL/REWORKED TILL) SANDY SILT (ML)**, dark gray , moist, medium plasticity, fine gravel.		
				30	20	50				**GRAVELLY SILT WITH SAND (ML)**, gray, firm, low plasticity.		
7												
				15	30	55				**(FILL/REWORKED TILL) SANDY SILT WITH GRAVEL (ML)**, gray, moist, medium plasticity, coarse (19-75mm) to fine gravel.		
8												
9												
				4	42	54				**SILTY CLAY WITH SAND (CL-ML)**, gray, moist, medium plasticity, coarse (19-75mm) to fine gravel.		
							11	25	7			SOb
10												
				5	30	65				**(FILL/REWORKED TILL) SANDY SILT (ML)**, gray, moist, subrounded, fine gravel.		
11												
12												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH014*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** tervita
TOP OF CASING ELEVATION: 1290.890	**NORTHING:** 6904455.761	**EASTING:** 593078.039	**DATE STARTED:** 7/20/2013 / **DATE COMPLETED:** 7/20/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				15	20	65				**(FILL/REWORKED TILL) SANDY SILT WITH GRAVEL (ML)**, gray, moist, low plasticity.		
13												
				20	10	70				**(FILL/REWORKED TILL) GRAVELLY CLAY (CL)**, dark gray, moist, medium plasticity, fine gravel.		
14												
15												
				10	10	80				**(FILL/REWORKED TILL) CLAY (CL)**, dark gray to brown, moist.		
16												
				10	10	80				**(FILL/REWORKED TILL) CLAY (CL)**, dark gray, moist, medium plasticity.		
17												
18												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH014*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** tervita
TOP OF CASING ELEVATION: 1290.890	**NORTHING:** 6904455.761	**EASTING:** 593078.039	**DATE STARTED:** 7/20/2013 / **DATE COMPLETED:** 7/20/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				15	15	70				**(FILL/REWORKED TILL) CLAY WITH SAND AND GRAVEL (CL)**, gray to brown, moist, medium plasticity.		
19												
				20	20	60				**(WASTE ROCK) GRAVELLY/SANDY CLAY (CL)**, gray, moist, medium plasticity.		
20												
21												
				20	15	65				**(WASTE ROCK) CLAY WITH TRACE GRAVEL AND SAND (CL)**, brown, moist, low plasticity.		
				45	30	25				**(WASTE ROCK) SILTY GRAVEL WITH SAND (GM)**, with silver platy layers from 21.79m-22.86m (71.5 To 74ft), nonplastic, well-rounded, fine gravel, fine sand.		
22												
				45	25	30				**(WASTE ROCK) SILTY GRAVEL WITH SAND (GM)**, brown, wet, low plasticity, coarse (19-75mm) gravel.		
23												
24												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH014*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** tervita
TOP OF CASING ELEVATION: 1290.890	**NORTHING:** 6904455.761	**EASTING:** 593078.039	**DATE STARTED:** 7/20/2013 / **DATE COMPLETED:** 7/20/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
25				15	25	60	12			**(FILL/REWORKED TILL) SANDY SILT WITH GRAVEL (ML)**, brown, moist, low plasticity, fine gravel..		SOc
26				7	52	41				**SILTY SAND (SM)**, gray, moist, medium plasticity.		
27												
28				25	10	65				**(FILL/REWORKED TILL) GRAVELLY CLAY (CL)**, gray, moist, medium plasticity.		
29				0	0	0				No recovery, waste rock, dry.		
30												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH014*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** tervita
TOP OF CASING ELEVATION: 1290.890	**NORTHING:** 6904455.761	**EASTING:** 593078.039	**DATE STARTED:** 7/20/2013 / **DATE COMPLETED:** 7/20/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
31												
32				0	0	0				No recovery, waste rock, dry.		Rock being pushed in gravel.
33												
34												
35				3	45	52	10			**SILT WITH SAND (ML)**, dark gray, moist, low plasticity.		SOd
36												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH014*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** tervita
TOP OF CASING ELEVATION: 1290.890	**NORTHING:** 6904455.761	**EASTING:** 593078.039	**DATE STARTED:** 7/20/2013 / **DATE COMPLETED:** 7/20/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
37				15	20	65				**(FILL/REWORKED TILL) SANDY SILT WITH GRAVEL (ML)**, dark gray, moist, low plasticity.		
38				10	5	85				**(FILL/REWORKED TILL) SILT (ML)**, dark gray, dry, low plasticity, few coarse (19-75mm) gravel.		
39												
40				15	0	85				**(FILL/REWORKED TILL) SILT WITH GRAVEL (ML)**, dark gray, dry, low plasticity.		
41				15	10	75				**(FILL/REWORKED TILL) SILT WITH GRAVEL (ML)**, dark gray, moist, low plasticity, fine gravel.		
42												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH014*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** tervita
TOP OF CASING ELEVATION: 1290.890	**NORTHING:** 6904455.761	**EASTING:** 593078.039	**DATE STARTED:** 7/20/2013 / **DATE COMPLETED:** 7/20/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				5	46	49	12			**SILTY SAND (SM)**, dark gray, moist, low plasticity.		SOe
43												
44				10	90	0				**(WASTE ROCK) WELL-GRADED (SW)**, dark brown, moist, non-plastic, few coarse (19-75mm) gravel, medium sand.		
45				5	20	75				**SILT WITH SAND (ML)**, gray, low plasticity, hard.		
				10	10	80				**(TILL) CLAY (CL)**, very dark gray, dry, medium plasticity, trace fine gravel, possibly native.		
46												
47				5	5	90				**(TILL) SILT (ML)**, very dark gray, dry, low plasticity, very stiff.		
48												

PROJECT NUMBER:	BORING NUMBER:
472645.07.SW.FI.BW.03	*CH13-311-BH014*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 50.29	**DRILLING CONTRACTOR:** tervita
TOP OF CASING ELEVATION: 1290.890	**NORTHING:** 6904455.761	**EASTING:** 593078.039	**DATE STARTED:** 7/20/2013 / **DATE COMPLETED:** 7/20/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
49												
50										Boring Terminated at 50.29 metres bgs		

SHEET 1 of 8	PROJECT NUMBER: 472645.07.SW.FI.BW.03	BORING NUMBER: *CH13-311-BH015*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project	**HOLE DEPTH (m):** 44.19	**DRILLING CONTRACTOR:** Tervita	
TOP OF CASING ELEVATION: 1291.210	**NORTHING:** 6904445.177	**EASTING:** 593226.831	**DATE STARTED:** 7/22/2013 / **DATE COMPLETED:** 7/22/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic	**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted	
LOCATION: Grum Overburden Dump		**LOGGED BY:** L. Totzke	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
0				20	20	60				**(FILL/REWORKED TILL) SILT WITH GRAVEL AND SAND (ML)**, gray, moist, sub-rounded, 19-75mm gravel, fine sand		--Groundwater not encountered.
1				25	25	50				**(FILL/REWORKED TILL) GRAVELLY SANDY SILT (ML)**, gray, dry, low plasticity.		
2												
3				25	20	55				**(FILL/REWORKED TILL) GRAVELLY SILT WITH SAND (ML)**, gray, moist, low plasticity.		
4												
5				9	49	42	11			**SILTY SAND (SM)**, dark gray, moist, low plasticity.		SOa
6												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH015*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 44.19	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1291.210	**NORTHING:** 6904445.177	**EASTING:** 593226.831	**DATE STARTED:** 7/22/2013 / **DATE COMPLETED:** 7/22/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
7				20	25	55				**(FILL/REWORKED TILL) SANDY SILT WITH GRAVEL (ML)**, dark gray, moist, low to medium plasticity.		
8				75	25	0				**(WASTE ROCK) WELL-GRADED GRAVEL WITH SAND (GW)**, silver gray, dry, platy, angular, fine gravel, medium dense.		
9				25	25	50				**(FILL/REWORKED TILL) GRAVELLY/SANDY SILT (ML)**, gray, dry, medium plasticity.		
10				8	55	37	14			**SILTY SAND (SM)**, gray, moist, medium plasticity.		SOb
11				10	20	70				**(FILL/REWORKED TILL) SILT WITH SAND (ML)**, gray, moist, medium plasticity, stiff.		
12												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH015*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 44.19	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1291.210	**NORTHING:** 6904445.177	**EASTING:** 593226.831	**DATE STARTED:** 7/22/2013 / **DATE COMPLETED:** 7/22/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				10	10	80				**(FILL/REWORKED TILL) CLAY (CL)**, dark gray, moist, medium plasticity stiff.		
13												
				6	49	45	8			**SILTY SAND (SM)**, gray, moist, low plasticity, stiff.		SOc
14												
15												
				0	75	25				**(FILL/REWORKED TILL) SILTY SAND (SM)**, dark gray, moist, low plasticity, firm.		
16												
				35	10	55				**(FILL/REWORKED TILL) SILTY CLAY (ML)**, gray, moist, low plasticity, firm.		
17												
				70	30	0				**(WASTE ROCK) WELL-GRADED GRAVEL WITH SAND (GW)**, dark brown, moist, nonplastic, subrounded, coarse (19-75mm) gravel, medium sand.		
18												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH015*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 44.19	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1291.210	**NORTHING:** 6904445.177	**EASTING:** 593226.831	**DATE STARTED:** 7/22/2013 / **DATE COMPLETED:** 7/22/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				25	20	55	9			**(FILL/REWORKED TILL) GRAVELLY CLAY WITH SAND (CL)**, dark gray, moist, medium plasticity, stiff.		SOd
19												
				10	56	34				**SILTY SAND (SM)**, yellowish brown, wet, angular, fine gravel, medium dense.		
20												
				40	60	0				**(WASTE ROCK) WELL-GRADED SAND WITH GRAVEL (SW)**, yellowish brown, dry, well-rounded, fine grained gravel, medium sand.		
21												
				30	70	0				**(FILL/REWORKED TILL) WELL-GRADED SAND WITH GRAVEL (SW)**, light grayish white, dry, angular, 19-75mm gravel, loose.		
22												
				5	20	75				**SILT WITH SAND (ML)**, low plasticity, gray, hard.		
				100	0	0				**(WASTE ROCK) WELL-GRADED GRAVEL (GW)**, dry, non-plastic, no recovery.		
23												
24												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH015*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 44.19	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1291.210	**NORTHING:** 6904445.177	**EASTING:** 593226.831	**DATE STARTED:** 7/22/2013 / **DATE COMPLETED:** 7/22/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				15	15	70				**(FILL/REWORKED TILL) CLAY WITH SAND AND GRAVEL (CL)**, dark gray, moist, medium plasticity, stiff.		
25												
26				30	50	20				**(WASTE ROCK) SILTY SAND WITH GRAVEL (SM)**, light gray, dry, non-plastic, medium dense.		
27												
				15	10	75				**(FILL/REWORKED TILL) SILT WITH GRAVEL (ML)**, dark gray, dry, low plasticity, stiff.		
28												
29				10	10	80				**(FILL/REWORKED TILL) CLAY (CL)**, brown gray, moist, medium plasticity, stiff.		
30												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH015*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 44.19	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1291.210	**NORTHING:** 6904445.177	**EASTING:** 593226.831	**DATE STARTED:** 7/22/2013 / **DATE COMPLETED:** 7/22/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
31				7	41	52	10	28	8	**SANDY LEAN CLAY (CL)**, dark gray, moist, medium plasticity, stiff.		SOe
32				20	0	80				**(ALLUVIUM) CLAY WITH GRAVEL (CL)**, dark gray, dry, low plasticity, stiff.		
33												
34				15	10	75				**(FILL/REWORKED TILL) CLAY WITH GRAVEL (CL)**, dark gray, moist, medium plasticity, stiff.		
35				15	10	75						
36												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH015*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 44.19	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1291.210	**NORTHING:** 6904445.177	**EASTING:** 593226.831	**DATE STARTED:** 7/22/2013 / **DATE COMPLETED:** 7/22/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
37				15	10	75						
38				25	60	15				**SILTY SAND WITH GRAVEL (SM)**, gray, moist, non-plastic, fine gravel, medium dense.		
39												
40				40	20	40				**GRAVELLY SILT (ML)**, brown gray, dry, non-plastic, fine gravel.		
41				0	80	20				**SILTY SAND (SM)**, brownish white, dry, fine grained sand, nonplastic.		
42				0	0	0				**(BEDROCK)**, white and gray bedrock fragments, dry, angular.		

PROJECT NUMBER:	BORING NUMBER:
472645.07.SW.FI.BW.03	*CH13-311-BH015*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 44.19	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1291.210	**NORTHING:** 6904445.177	**EASTING:** 593226.831	**DATE STARTED:** 7/22/2013 / **DATE COMPLETED:** 7/22/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: Grum Overburden Dump			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
43												
44										Boring Terminated at 44.19 metres bgs		

SHEET 1 of 1	PROJECT NUMBER: 472645	BORING NUMBER: *CH13-311-BH001*

SOIL BORING LOG

PROJECT NAME:	HOLE DEPTH (m):	DRILLING CONTRACTOR:	
Faro Mine Remediation Project	1.47	Kryrotech	
TOP OF CASING ELEVATION:	**NORTHING:**	**EASTING:**	**DATE STARTED:** / **DATE COMPLETED:**
1301.320	6904909.220	593628.380	8/23/2013 / 8/23/2013
WATER LEVEL:	**DATUM:**	**DRILLING EQUIPMENT:**	
--	GPS/2011 LiDAR	Pionjar	
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation		**LOGGED BY:** J. Marriott	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
	100	SS-1		58	38	4	6			**ORGANIC SOIL (OL-OH)**, moss and lichen, sandy, blackish-brown.		SOa
							9	27	4			SOb
										WELL-GRADED SAND WITH GRAVEL (SW), brown, moist, gravel angular to sub-angular, some pulverized rock fragments, sand (80%), gravel (20%).		--Groundwater not encountered. Sample collected below organics.
	100	SS-2										
1										**CLAYEY SAND WITH GRAVEL (SC)**, brown, moist, plastic, sand (40%), clay (30%), gravel (25%), silt (5%).		
										WELL-GRADED GRAVEL WITH SAND (GW), coarse, grayish-brown, moist, angular, some pulverized rock fragments, sand (80%), gravel (20%).		
										Boring Terminated at 1.47 metres bgs		Refusal.

CH2MHILL

SHEET 1 of 1

PROJECT NUMBER: 472645

BORING NUMBER: *CH13-311-BH002*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project	**HOLE DEPTH (m):** 0.66	**DRILLING CONTRACTOR:** Kryrotech	
TOP OF CASING ELEVATION: 1315.720	**NORTHING:** 6905441.890	**EASTING:** 593035.370	**DATE STARTED:** 8/22/2013 / **DATE COMPLETED:** 8/22/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR	**DRILLING EQUIPMENT:** Pionjar	
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation		**LOGGED BY:** J. Marriott	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
										ORGANIC SOIL (OL-OH), moss, lichen, woody debris, rootlets, moist.		
							15			**ORGANIC SOIL (OL-OH)**, some sand, black, moist.		SOa Sample collected below organics. --Groundwater not encountered.
										POORLY GRADED SAND (SP), light brown, moist, trace coarse grained sand lense. At 0.25m high concentration of cobbles and gravel, angular to sub-angular (schist, phyllite, and granite) within a brown coarse grained sand matrix (20%), moist, gravel (70%-80%). Boring Terminated at 0.66 metres bgs		Refusal. Pionjar refusal occurs just below organics due to high concentration of cobbles and boulders. Unable to complete borehole due to pionjar refusal, decided to excavate testpit using hand shovel.

CH2MHILL

SHEET 1 of 1

PROJECT NUMBER: 472645

BORING NUMBER: *CH13-311-BH003*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 3.79	**DRILLING CONTRACTOR:** Kryrotech
TOP OF CASING ELEVATION: 1315.720	**NORTHING:** 6905295.890	**EASTING:** 593427.930	**DATE STARTED:** 8/22/2013 / **DATE COMPLETED:** 8/22/2013
WATER LEVEL: --3.7	**DATUM:** GPS/2011 LiDAR		**DRILLING EQUIPMENT:** Pionjar
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation			**LOGGED BY:** J. Marriott

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
	100	SS-1					13			**ORGANIC SOIL (OL-OH)**, moss, lichen, black, moist.		SOa
							14					SOb
										CLAYEY GRAVEL (GC), angular to sub-angular gravel, schist, granite, shale, phyllite, clay matrix, very moist, plastic, gravel (60%), clay (30%), very coarse sand (5%), silt (5%).		Sample collected below organics.
	100	SS-2										
1												
	100	SS-3										
	100	SS-4										
2												
	50	SS-5										
3												
												At 3.7m groundwater encountered, 5th spoonful of water.
										Boring Terminated at 3.79 metres bgs		

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER: 472645	BORING NUMBER: *CH13-311-BH004*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 3.12	**DRILLING CONTRACTOR:** Kryrotech	
TOP OF CASING ELEVATION: 1321.850	**NORTHING:** 6905212.680	**EASTING:** 593674.770	**DATE STARTED:** 8/23/2013	**DATE COMPLETED:** 8/23/2013
WATER LEVEL: --.61	**DATUM:** GPS/2011 LiDAR		**DRILLING EQUIPMENT:** Pionjar	
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation			**LOGGED BY:** J. Marriott	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
	100	SS-1								**ORGANIC SOIL (OL/OH)**, moss, lichen, woody debris, wet.		
	100	SS-2										At 0.61m groundwater encountered.
1	100	SS-3										
							0	23	6	**CLAY WITH SILT AND GRAVEL (CH)**, very moist, plastic, gray, clay (40%), silt (40%), gravel (20%).		SOa Sample collected below organics.
2												
3										Boring Terminated at 3.12 metres bgs		

CH2MHILL

SHEET 1 of 1

PROJECT NUMBER: 472645

BORING NUMBER: *CH13-311-BH005*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project

HOLE DEPTH (m): 2.44

DRILLING CONTRACTOR: Kryrotech

TOP OF CASING ELEVATION: 1321.850

NORTHING: 6905039.570

EASTING: 593701.150

DATE STARTED: 8/23/2013

DATE COMPLETED: 8/23/2013

WATER LEVEL: --

DATUM: GPS/2011 LiDAR

DRILLING EQUIPMENT: Pionjar

LOCATION: North Wall of Grum Pit/Grum Overburden Foundation

LOGGED BY: J. Marriott

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
	100	SS-1					26			**ORGANIC SOIL (OL-OH)**, moss, lichen, moist.		SOa
							18			**CLAY / SILT (CL-ML)**, brown, trace light brown, coarse grained sand lense, trace angular gravel, pulverized rock fragments, clay (40%), silt (40%), sand (15%), gravel (5%).		SOb Sample collected below organics.
	100	SS-2										
1												
	100	SS-3										
2												
										Boring Terminated at 2.44 metres bgs		At 2.4m pionjar refusal. --Groundwater not encountered.

CH2MHILL

SHEET 1 of 3

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH010*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project

HOLE DEPTH (m): 17.70

DRILLING CONTRACTOR: Tervita

TOP OF CASING ELEVATION: 1308.930

NORTHING: 6905272.684

EASTING: 593079.798

DATE STARTED: 7/18/2013

DATE COMPLETED: 7/18/2013

WATER LEVEL: --

DATUM: NAD83 CSRS/Field Survey by Challenger Geomatic

DRILLING EQUIPMENT: Gus-Pech Rotosonic Truck Mounted

LOCATION: North Wall of Grum Pit/Grum Overburden Foundation

LOGGED BY: L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
										SILTY CLAYEY SAND (SC-SM), gray, dry, non-plastic, firm, stratified, weak cementation.		--Groundwater not measured or not encountered.
				11	52	37	9	27	6			SOa
1												
				40	30	30				**(FILL) SILTY GRAVEL WITH SAND (GM)**, brown, wet, non-plastic, firm, homogenous.		
2												
3				10	74	16	7			**SILTY SAND (SM)**, dark brown, dry, angular, well-graded gravel, fine, very loose, homogenous, sample collected.		SOb
4												
				95	5	0				**WELL-GRADED GRAVEL (GW)**, dry, loose, well-rounded, trace fine gravel, trace coarse sand, homogenous.		
5				10	0	90				**(ALLUVIUM) SILT (ML)**, gray, moist, low plasticity, very soft, homogenous.		
6												

CH2MHILL

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH010*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 17.70	**DRILLING CONTRACTOR:** Tervita
TOP OF CASING ELEVATION: 1308.930	**NORTHING:** 6905272.684	**EASTING:** 593079.798	**DATE STARTED:** 7/18/2013 / **DATE COMPLETED:** 7/18/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic		**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation			**LOGGED BY:** L. Totzke

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				10	0	90				**(ALLUVIUM) CLAY (CL)**, gray, moist, moderate cementation.		
7												
				0	5	95				**(ALLUVIUM) CLAY (CL)**, gray, moist, low plasticity, very stiff, homogenous, moderate cementation.		
8												
9				10	0	90				**(ALLUVIUM) CLAY (CL)**, dark gray, dry, homogenous.		
10												
				25	5	70				**(ALLUVIUM) GRAVELLY CLAY (CL)**, dark gray, wet, low plasticity, very soft.		
11							12					SOc
12												

PROJECT NUMBER: 472645.07.SW.FI.BW.03

BORING NUMBER: *CH13-311-BH010*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project	**HOLE DEPTH (m):** 17.70	**DRILLING CONTRACTOR:** Tervita	
TOP OF CASING ELEVATION: 1308.930	**NORTHING:** 6905272.684	**EASTING:** 593079.798	**DATE STARTED:** 7/18/2013 / **DATE COMPLETED:** 7/18/2013
WATER LEVEL: --	**DATUM:** NAD83 CSRS/Field Survey by Challenger Geomatic	**DRILLING EQUIPMENT:** Gus-Pech Rotosonic Truck Mounted	
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation		**LOGGED BY:** L. Totzke	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				10	5	85				**(ALLUVIUM) CLAY (CL)**, gray, moist, low plasticity, very stiff.		
13				17	56	27				**SILTY SAND WITH GRAVEL (SM)**, light gray, dry, medium dense, layered.		
14							5					SOd
15				0	0	0				**(WEATHERED BEDROCK)** light gray, dry, angular, very dense, moderate cementation.		
16												
17												
										Boring Terminated at 17.7 metres bgs		

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER: 472645.07.FI.BW.03	BORING NUMBER: *CH13-311-SS023*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project	**HOLE DEPTH (m):** 0.50	**DRILLING CONTRACTOR:**	
TOP OF CASING ELEVATION: 1289.980	**NORTHING:** 6905554.260	**EASTING:** 592385.540	**DATE STARTED:** 7/12/2013 / **DATE COMPLETED:** 7/12/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR	**DRILLING EQUIPMENT:** Surface Sample/Hand Shovel	
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation		**LOGGED BY:** M. Franklyne	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				6	50	44	8	26	8	**SILTY SAND (SM)**, very pale brown (10YR 8/2) dry, dense, subangular.		SOa Could contain slough from top of pit wall, cemented silt with cobbles. --Groundwater not encountered.
										Boring Terminated at 0.5 metres bgs		

CH2MHILL

SHEET 1 of 1

PROJECT NUMBER: 472645.07.FI.BW.03

BORING NUMBER: *CH13-311-SS024*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 0.50	**DRILLING CONTRACTOR:**
TOP OF CASING ELEVATION: 1269.930	**NORTHING:** 6905397.940	**EASTING:** 592470.460	**DATE STARTED:** 7/12/2013 / **DATE COMPLETED:** 7/12/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**DRILLING EQUIPMENT:** Surface Sample/Hand Shovel
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation			**LOGGED BY:** M. Franklyne

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				12	47	41	0	23	8	**SILTY SAND (SM)**, light gray (5B 7/1), dry, stiff, subangular.		SOa Hard cemented soil, cemented silt with cobbles. 0% Organic, 5% Boulders, 15% Cobbles, 5% Clay --Groundwater not encountered.
										Boring Terminated at 0.5 metres bgs		

CH2MHILL

SHEET 1 of 1	**PROJECT NUMBER:** 472645.07.FI.BW.03	**BORING NUMBER:** *CH13-311-SS025*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project	**HOLE DEPTH (m):** 0.50	**DRILLING CONTRACTOR:**	
TOP OF CASING ELEVATION: 1277.980	**NORTHING:** 6905375.450	**EASTING:** 592557.390	**DATE STARTED:** 7/12/2013 / **DATE COMPLETED:** 7/12/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**DRILLING EQUIPMENT:** Surface Sample/Hand Shovel
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation			**LOGGED BY:** M. Franklyne

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				6	55	39	10	22	7	**SILTY SAND (SM)**, dark gray (5GY 4/1), moist, stiff, silt with rounded granitic cobbles.		SOa Cemented silt with cobbles. 5% Organic, 5% Boulders, 20% Cobbles, 10% Clay --Groundwater not encountered.
										Boring Terminated at 0.5 metres bgs		

CH2MHILL

SHEET 1 of 1

PROJECT NUMBER: 472645.07.FI.BW.03

BORING NUMBER: *CH13-311-SS027*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project

HOLE DEPTH (m): 0.50

DRILLING CONTRACTOR:

TOP OF CASING ELEVATION: 1253.090

NORTHING: 6905332.010

EASTING: 592534.910

DATE STARTED: 7/15/2013

DATE COMPLETED: 7/15/2013

WATER LEVEL: --

DATUM: GPS/2011 LiDAR

DRILLING EQUIPMENT: Surface Sample/Hand Shovel

LOCATION: North Wall of Grum Pit/Grum Overburden Foundation

LOGGED BY: M. Franklyne

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				15	15	35	10			**(TILL) SILTY GRAVEL WITH SAND (GM)**, dark gray (5YR 4/1), moist, dense, subangular, subrounded.		S0a Silt with cobbles mixed in. 0% Organic, 0% Boulders, 35% Cobbles --Groundwater not encountered.
										Boring Terminated at 0.5 metres bgs		

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER: 472645.07.FI.BW.03	BORING NUMBER: *CH13-311-SS028*

SOIL BORING LOG

PROJECT NAME:	HOLE DEPTH (m):	DRILLING CONTRACTOR:	
Faro Mine Remediation Project	0.50		
TOP OF CASING ELEVATION: 1233.550	**NORTHING:** 6905236.430	**EASTING:** 592536.400	**DATE STARTED:** 7/15/2013 / **DATE COMPLETED:** 7/15/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR	**DRILLING EQUIPMENT:** Surface Sample/Hand Shovel	
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation		**LOGGED BY:** M. Franklyne	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				10	30	19	11			**(TILL) SILTY SAND (SM)**, well-graded, dark gray (5YR 4/1), dry, dense, subangular, subrounded.		S0a Collected near water. Some of the fines may have been washed out. --Groundwater not encountered.
										Boring Terminated at 0.5 metres bgs		

CH2MHILL

SHEET 1 of 1	**PROJECT NUMBER:** 472645.07.FI.BW.03	**BORING NUMBER:** *CH13-311-SS029*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project	**HOLE DEPTH (m):** 0.50	**DRILLING CONTRACTOR:**	
TOP OF CASING ELEVATION: 1231.390	**NORTHING:** 6905204.510	**EASTING:** 592557.200	**DATE STARTED:** 7/15/2013 / **DATE COMPLETED:** 7/15/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR	**DRILLING EQUIPMENT:** Surface Sample/Hand Shovel	
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation		**LOGGED BY:** M. Franklyne	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				20	10	38	10			**(TILL) SILTY GRAVEL (GM)**, well-graded, gray (5YR 4/1), moist, dense, subangular, subrounded.		SOa Silt cobbles. 2% Organic, 0% Boulders, 30% Cobbles --Groundwater not encountered.
										Boring Terminated at 0.5 metres bgs		

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER: 472645.07.FI.BW.03	BORING NUMBER: *CH13-311-SS030*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 0.50	**DRILLING CONTRACTOR:**	
TOP OF CASING ELEVATION: 1224.330	**NORTHING:** 6905120.610	**EASTING:** 592583.100	**DATE STARTED:** 7/15/2013	**DATE COMPLETED:** 7/15/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**DRILLING EQUIPMENT:** Surface Sample/Hand Shovel	
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation			**LOGGED BY:** M. Franklyne	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				7	53	40	8	24	9	**SILTY SAND (SM)**, dark gray (5YR 4/1), dry, dense, subangular, subrounded.		SOa Cemented. Silt with cobbles. Some growth. 0% Organic, 2% Boulders, 30% Cobbles --Groundwater not encountered.
										Boring Terminated at 0.5 metres bgs		

CH2MHILL

SHEET 1 of 1	**PROJECT NUMBER:** 472645.07.FI.BW.03	**BORING NUMBER:** *CH13-311-SS031*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project	**HOLE DEPTH (m):** 0.50	**DRILLING CONTRACTOR:**	
TOP OF CASING ELEVATION: 1221.530	**NORTHING:** 6905032.110	**EASTING:** 592594.000	**DATE STARTED:** 7/15/2013 / **DATE COMPLETED:** 7/15/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR	**DRILLING EQUIPMENT:** Surface Sample/Hand Shovel	
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation		**LOGGED BY:** M. Franklyne	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				30	8	30	8			**(TILL) SILTY GRAVEL (GM)**, well-graded, dark gray (5YR 4/1, dry), dense, subangular, subrounded, mixed.		S0a 0% Organic, 2% Boulders, 30% Cobbles --Groundwater not encountered.
										Boring Terminated at 0.5 metres bgs		

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER: 472645.07.FI.BW.03	BORING NUMBER: *CH13-311-SS032*

SOIL BORING LOG

PROJECT NAME:	HOLE DEPTH (m):	DRILLING CONTRACTOR:	
Faro Mine Remediation Project	0.50		
TOP OF CASING ELEVATION: 1231.490	**NORTHING:** 6904973.510	**EASTING:** 592610.740	**DATE STARTED:** 7/15/2013 / **DATE COMPLETED:** 7/15/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR	**DRILLING EQUIPMENT:** Surface Sample/Hand Shovel	
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation		**LOGGED BY:** M. Franklyne	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				20	15	30	8			**(TILL) SILTY GRAVEL WITH SAND (GM)**, well-graded, dark gray (5YR 4/1), dry, dense, subangular, subrounded.		S0a 0% Organic, 5% Boulders, 30% Cobbles --Groundwater not encountered.
										Boring Terminated at 0.5 metres bgs		

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER: 472645.07.FI.BW.03	BORING NUMBER: *CH13-311-SS033*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project	**HOLE DEPTH (m):** 0.50	**DRILLING CONTRACTOR:**	
TOP OF CASING ELEVATION: 1242.360	**NORTHING:** 6905039.720	**EASTING:** 592682.300	**DATE STARTED:** 7/15/2013 / **DATE COMPLETED:** 7/15/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR	**DRILLING EQUIPMENT:** Surface Sample/Hand Shovel	
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation		**LOGGED BY:** M. Franklyne	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				28	46	26	5	21	6	**SILTY SAND WITH GRAVEL (SM)**, well-graded, dark gray (5YR 4/1), dry, dense, subangular, subrounded.		SOa Very deep slough very deep. Cemented more sand and gravel. 0% Organic, 5% Boulders, 25% Cobbles --Groundwater not encountered.
										Boring Terminated at 0.5 metres bgs		

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER: 472645.07.FI.BW.03	BORING NUMBER: *CH13-311-SS034*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 0.50	**DRILLING CONTRACTOR:**	
TOP OF CASING ELEVATION: 1238.750	**NORTHING:** 6905065.050	**EASTING:** 592675.400	**DATE STARTED:** 7/15/2013	**DATE COMPLETED:** 7/15/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**DRILLING EQUIPMENT:** Surface Sample/Hand Shovel	
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation			**LOGGED BY:** M. Franklyne	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				25	25	30	9			**(TILL) SILTY SAND/GRAVEL (SM-GM)**, well-graded, dark gray (5YR 4/1), moist, dense, subangular, subrounded, mixed		S0a 0% Organic, 2% Boulders, 18% Cobbles --Groundwater not encountered.
										Boring Terminated at 0.5 metres bgs		

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER: 472645.07.FI.BW.03	BORING NUMBER: *CH13-311-SS035*

SOIL BORING LOG

PROJECT NAME:	HOLE DEPTH (m):	DRILLING CONTRACTOR:	
Faro Mine Remediation Project	0.50		
TOP OF CASING ELEVATION: 1253.600	**NORTHING:** 6905148.480	**EASTING:** 592692.610	**DATE STARTED:** 7/15/2013 / **DATE COMPLETED:** 7/15/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR	**DRILLING EQUIPMENT:** Surface Sample/Hand Shovel	
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation		**LOGGED BY:** M. Franklyne	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				30	35	15	10			**(ALLUVIUM) SILTY SAND WITH GRAVEL (SM)**, well-graded, dark gray (5YR 4/1), moist, dense, subangular, subrounded.		S0a Different lots of sand old river bed? 0% Organic, 0% Boulders, 15% Cobbles, 5% Clay --Groundwater not encountered.
										Boring Terminated at 0.5 metres bgs		

CH2MHILL

SHEET 1 of 1	**PROJECT NUMBER:** 472645.07.FI.BW.03	**BORING NUMBER:** *CH13-311-SS036*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project	**HOLE DEPTH (m):** 0.50	**DRILLING CONTRACTOR:**	
TOP OF CASING ELEVATION: 1270.190	**NORTHING:** 6905228.610	**EASTING:** 592697.210	**DATE STARTED:** 7/15/2013 / **DATE COMPLETED:** 7/15/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR	**DRILLING EQUIPMENT:** Surface Sample/Hand Shovel	
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation		**LOGGED BY:** M. Franklyne	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				20	15	50	6			**(TILL) GRAVELLY SILT WITH SAND SAND (ML)**, well-graded, dark gray (5YR 4/1), dry, dense, subangular, subrounded.		S0a 0% Organic, 2% Boulders, 12% Cobbles --Groundwater not encountered.
										Boring Terminated at 0.5 metres bgs		

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER: 472645.07.FI.BW.03	BORING NUMBER: *CH13-311-SS037*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 0.50	**DRILLING CONTRACTOR:**	
TOP OF CASING ELEVATION: 1249.720	**NORTHING:** 6905270.890	**EASTING:** 592613.380	**DATE STARTED:** 7/15/2013	**DATE COMPLETED:** 7/15/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**DRILLING EQUIPMENT:** Surface Sample/Hand Shovel	
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation			**LOGGED BY:** M. Franklyne	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
				25	31	44	8	22	5	**SILTY SAND WITH GRAVEL (SM)**, well-graded, dark gray (5YR 4/1), dry, dense, subangular, subrounded.		SOa 0% Organic, 2% Boulders, 30% Cobbles --Groundwater not encountered.
										Boring Terminated at 0.5 metres bgs		

CH2MHILL

SHEET 1 of 1

PROJECT NUMBER: 472645

BORING NUMBER: *CH13-311-TP021*

TEST PIT LOG

PROJECT NAME: Faro Mine Remediation Project

HOLE DEPTH (m): 5.79

EXCAVATION CONTRACTOR: TEES

TOP OF CASING ELEVATION: 1304.580

NORTHING: 6905489.790

EASTING: 592657.490

DATE STARTED: 8/27/2013

DATE COMPLETED: 8/27/2013

WATER LEVEL: --

DATUM: GPS/2011 LiDAR

EXCAVATION EQUIPMENT: Cat 345CL Excavator with 4' Bucket

LOCATION: North Wall of Grum Pit/Grum Overburden Foundation

LOGGED BY: J. Marriott

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
0										Small vegetation at ground surface.		
										SILT WITH GRAVEL (ML), brown, moist, trace cobble, silt (65%), gravel (20%), sand (15%), cobble (5%).		
										At 0.61m slight color change, dark reddish brown, some boulders, sub-rounded.		No sloughing occurred --Groundwater not encountered.
1										**SILT WITH GRAVEL (ML)**, grey, moist, silt (70%), gravel (20%), sand (10%).		
										CLAYEY SAND (SC), brown, firm, non-plastic, silt (60%), coarse sand (20%), gravel (20%).		
2				28	31	41	12	28	8			S0a At 2.4m to 2.7m sample collected
										At 3.7m color change to bluish-grey		
3												At 3.8m to 4.6m sample collected
4												
5										Test Pit Terminated at 5.79 metres bgs		

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER: 472645	BORING NUMBER: *CH13-311-TP022*

TEST PIT LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 5.79	**EXCAVATION CONTRACTOR:** TEES	
TOP OF CASING ELEVATION: 1311.750	**NORTHING:** 6905246.620	**EASTING:** 593259.810	**DATE STARTED:** 8/27/2013	**DATE COMPLETED:** 8/27/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**EXCAVATION EQUIPMENT:** Cat 345CL Excavator with 4' Bucket	
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation			**LOGGED BY:** J. Marriott	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
										Some vegetation at ground surface. **POORLY GRADED SAND (SP)**, coarse, reddish brown.		
										High concentration of angular pebbles, cobbles and boulders (>90%), max boulder size 61cm (a-axis).		
1												Sloughing occurred along walls --Groundwater not encountered.
2												
3							9			**SILT (ML)**, greyish brown, firm, non-plastic, friable, dry, silt (80%), sand (10%), gravel (10%).		Groundwater not encountered SOa At 3.1m composite sample collected [CH.13.311.TP022]
4												
5												
										Test Pit Terminated at 5.79 metres bgs		

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER: 472645	BORING NUMBER: *CH13-311-TP023*

TEST PIT LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 3.10	**EXCAVATION CONTRACTOR:** TEES	
TOP OF CASING ELEVATION: 1287.380	**NORTHING:** 6904895.800	**EASTING:** 593240.910	**DATE STARTED:** 8/26/2013	**DATE COMPLETED:** 8/26/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**EXCAVATION EQUIPMENT:** Cat 345CL Excavator with 4' Bucket	
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation			**LOGGED BY:** J. Marriott	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
										Ground surface: Trace vegetation. **SILT (ML)**, brown, moist, trace clay, gravel, and boulders (largest boulder 50 cm).		Composite sample collected (0.3 to 2.5 m).
1										Color change to dark brown. Color continues laterally, band approximately 3 cm thick.		
										Color change back to brown.		Sloughing and cave-in prominent.
2												
3										Test Pit Terminated at 3.1 metres bgs		Bedrock (phylitte or schist). Operator indicates change in material competency. Groundwater not encountered, slight water seepage at 3 m.

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER: 472645	BORING NUMBER: *CH13-311-TP024*

TEST PIT LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 0.90	**EXCAVATION CONTRACTOR:** TEES	
TOP OF CASING ELEVATION: 1306.100	**NORTHING:** 6905279.850	**EASTING:** 593013.530	**DATE STARTED:** 8/26/2013	**DATE COMPLETED:** 8/26/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**EXCAVATION EQUIPMENT:** Cat 345CL Excavator with 4' Bucket	
LOCATION: North Wall of Grum Pit/Grum Overburden Foundation			**LOGGED BY:** J. Marriott	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
										SILT (ML), grayish brown, moist, silt (>80%), sand (10%), gravel (10%)		Gouged into an unused 10cm HDPE water line, HITS incident report was filed --Groundwater not encountered.
										Test Pit Terminated at 0.9 metres bgs		Test pit ponded with water, unable to excavate to further depth

CH2MHILL

SHEET 1 of 1

PROJECT NUMBER: 472645

BORING NUMBER: *CH13-311-BH020*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project

HOLE DEPTH (m): 3.20

DRILLING CONTRACTOR: Kryrotech

TOP OF CASING ELEVATION: 1279.800

NORTHING: 6907392.020

EASTING: 590842.530

DATE STARTED: 8/25/2013

DATE COMPLETED: 8/25/2013

WATER LEVEL: --

DATUM: GPS/2011 LiDAR

DRILLING EQUIPMENT: Pionjar

LOCATION: Ridge North of Grum

LOGGED BY: J. Marriott

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
	100	SS-1								**ORGANIC SOIL WITH SAND (OL-OH)**, moss, lichen, moist.		--Groundwater not encountered. Sample collected below organics.
	100	SS-2								**ELASTIC SILT WITH GRAVEL AND SAND (MH)**, brownish-gray, moist, plastic, gravel angular to sub-angular, some pulverized rock fragments, silt (40%), clay (20%), gravel (20%), sand (20%).		
1												
	100	SS-3										
	100	SS-4										
2												
3										Boring Terminated at 3.2 metres bgs		

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER: 472645	BORING NUMBER: *CH13-311-BH021*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 2.74	**DRILLING CONTRACTOR:** Kryrotech	
TOP OF CASING ELEVATION: 1295.250	**NORTHING:** 6907476.800	**EASTING:** 591268.790	**DATE STARTED:** 8/25/2013	**DATE COMPLETED:** 8/25/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**DRILLING EQUIPMENT:** Pionjar	
LOCATION: Ridge North of Grum			**LOGGED BY:** J. Marriott	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
	50	SS-1								**ORGANIC SOIL (OL-OH)**, moss, lichen.		S0a
										SILT (ML), dark brown, trace angular pebble / gravel.		
										SILTY SAND (SM), brown, moist, gravel angular to sub-angular, sand (60%), silt (20%), clay (15%), gravel (5%).		Sample collected below organics.
	100	SS-2										
1												
	100	SS-3										
2										At 2.3m increasing sand, becoming coarser.		
										Boring Terminated at 2.74 metres bgs		--Groundwater not encountered.

CH2MHILL

SHEET 1 of 1	PROJECT NUMBER: 472645	BORING NUMBER: *CH13-311-BH022*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 1.07	**DRILLING CONTRACTOR:** Kryrotech	
TOP OF CASING ELEVATION: 1319.250	**NORTHING:** 6907932.770	**EASTING:** 591486.960	**DATE STARTED:** 8/24/2013	**DATE COMPLETED:** 8/24/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**DRILLING EQUIPMENT:** Pionjar	
LOCATION: Ridge North of Grum			**LOGGED BY:** J. Marriott	

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
	50	SS-1					16			**ORGANIC SOIL WITH SAND (OL-OH)**, moss, lichen, brownish-black.		SOa
										SILTY SAND WITH GRAVEL (SM), dark brown, semi-plastic, sand (60%), silt (20%), gravel (20%).		Sample collected below organics.
	100	SS-2										
1										**SILTY CLAYEY SAND WITH GRAVEL (SC/SM)**, moist, semi-plastic, sand (60%), silt (10%), clay (10%), gravel (10%).		
				1	67	22	14			**SILTY SAND (SM)**.		SOb
										Boring Terminated at 1.07 metres bgs		--Groundwater not encountered. At 1.1m refusal.

CH2MHILL

SHEET 1 of 1

PROJECT NUMBER: 472645

BORING NUMBER: *CH13-311-BH023*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project

HOLE DEPTH (m): 3.35

DRILLING CONTRACTOR: Kryrotech

TOP OF CASING ELEVATION: 1332.610

NORTHING: 6908229.870

EASTING: 591756.750

DATE STARTED: 8/24/2013

DATE COMPLETED: 8/24/2013

WATER LEVEL: --1.2

DATUM: GPS/2011 LiDAR

DRILLING EQUIPMENT: Pionjar

LOCATION: Ridge North of Grum

LOGGED BY: J. Marriott

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
	100	SS-1					34		4	**SILTY SAND (SM)**, moss, lichen, gravel, moist.		S0a
				7	50	43	16	27		**SANDY ELASTIC SILT WITH GRAVEL (MH)**, light brown, moist, plastic, gravel angular to sub-angular, trace coarse grained sand lense (poorly graded), silt (40%), clay (30%), sand (15%), gravel (15%).		S0b Collected below organics.
	100	SS-2										
1	100	SS-3										At 1.2m wet.
	100	SS-4										
2	50	SS-5										
3										Boring Terminated at 3.35 metres bgs		

CH2MHILL

SHEET 1 of 1

PROJECT NUMBER: 472645

BORING NUMBER: *CH13-311-BH024*

SOIL BORING LOG

PROJECT NAME: Faro Mine Remediation Project		**HOLE DEPTH (m):** 3.35	**DRILLING CONTRACTOR:** Kryrotech
TOP OF CASING ELEVATION: 1363.000	**NORTHING:** 6908720.050	**EASTING:** 591886.000	**DATE STARTED:** 8/24/2013 / **DATE COMPLETED:** 8/24/2013
WATER LEVEL: --	**DATUM:** GPS/2011 LiDAR		**DRILLING EQUIPMENT:** Pionjar
LOCATION: Ridge North of Grum			**LOGGED BY:** J. Marriott

DEPTH (m bgs)	RECOVERY (%)	SAMPLE TYPE	SPT RESULTS 6"-6"-6" (N)	SIZE DISTRIBUTION %G	%S	%F	Moisture Content	Liquid Limit	Plasticity Index	SOIL DESCRIPTION	Graphic Log	COMMENTS (e.g.: DRILLING FLUID LOSS, TESTS, OR DRILLER COMMENTS, ETC.)
	100	SS-1		8	89	3	4			**WELL-GRADED SAND (SW)**, moss, lichen, some sandy topsoil.		S0a From 0m-0.5m 1st Spoon
												From 0.4m-1.4m 2nd Spoon Sample collected below organics.
	100	SS-2					7					S0b
1												
	100	SS-3										From 1.4m-2.0m 3rd Spoon
										WELL-GRADED SAND WITH GRAVEL (SW), light brown, moist, medium grained sand, gravel sub-rounded to rounded, sand (85%), gravel (15%).		
	100	SS-4										
2										**WELL-GRADED SAND WITH GRAVEL (SW)**, brown, moist, medium grained, trace gravel angular to sub-angular, trace coarse grained sand lense, sand (80%), gravel (20%).		From 2.0m-2.4m 4th Spoon
	100	SS-5										From 2.4m-3.1m 5th Spoon
3												
	100	SS-6										From 3.1m-3.4m 6th Spoon
										Boring Terminated at 3.35 metres bgs		--Groundwater not encountered.

CH2MHILL

Appendix C
Photographic Log



***Photo 1**: CH13-311-BH004*
Grey clay with some silt trace angular pebbles at 5ft bgs



***Photo 2:** CH13-311-SS031*
Looking North from the South end of Grum Pit.



***Photo 3:** CH13-311-BH001*
Dominated by brown very coarse sand with angular pebbles and pulverized rock fragments



Photo 4: *CH13-311-BH001*
Sample collected below topsoil



Photo 5: *CH13-311-BH001*
Borehole setup



Photo 6: *CH13-311-BH002*
Testpit completed, sample collected below topsoil



Photo 7: *CH13-311-BH002*
Borehole Setup



Photo 8: *CH13-311-BH003*
Testpit



Photo 9: *CH13-311-BH003*
Borehole setup



Photo 10: *CH13-311-BH003*
Core



Photo 11: *CH13-311-BH004*
Testpit completed, unable to sample below organic layer due to water infiltration



Photo 12: *CH13-311-BH004*
Borehole Setup



Photo 13: *CH13-311-BH004*
Core



Photo 14: *CH13-311-BH005*



Photo 15: *CH13-311-BH005*
Core



Photo 16: *CH13-311-BH010*
Run 1 complete soil core



Photo 17: *CH13-311-BH010*
Run 2 closeup of soil core



Photo 18: *CH13-311-BH010*
Run 4 closeup of soil core



Photo 19: *CH13-311-BH010*
Run 4 complete soil core



Photo 20: *CH13-311-BH010*
Run 6 complete soil core



Photo 21: *CH13-311-BH010*
Run 8 complete soil core



Photo 22: *CH13-311-BH010*
Run 9 complete soil core



Photo 23: *CH13-311-BH010*
Borehole setup



Photo 24: *CH13-311-SS027*
General location image



Photo 25: *CH13-311-SS028*
Collected sample



Photo 26: *CH13-311-SS029*
Collected sample



Photo 27: *CH13-311-SS029*
General location image



Photo 28: *CH13-311-SS030*
Collected sample



Photo 29: *CH13-311-SS031*
Collected sample



Photo 30: *CH13-311-SS032*
Collected sample



Photo 31: *CH13-311-SS032*



Photo 32: *CH13-311-SS032*



Photo 33: *CH13-311-SS032*
Test pit wall



Photo 34: *CH13-311-SS033*
Collected sample



Photo 35: *CH13-311-SS035*
Collected sample



Photo 36: *CH13-311-SS036*
Collected sample



Photo 37: *CH13-311-SS037*
General location image



Photo 38: *CH13-311-SS06*
Collected sample



Photo 39: *CH13-311-SS07*
Collected sample



Photo 40: *CH13-311-SS08*
Collected sample



Photo 41: *CH13-311-TP022*



Photo 42: *CH13-311-TP023*
Bedrock at approximately 10ft



Photo 43: *CH13-311-BH011*
Run 8 complete soil core



Photo 44: *CH13-311-BH011*
Run 9 complete soil core



Photo 45: *CH13-311-BH011*
Run 12 complete soil core



Photo 46: *CH13-311-BH011*
Run 15 complete soil core



Photo 47: *CH13-311-BH011*
Run 16 closeup of soil core



Photo 48: *CH13-311-BH011*
Run 16 complete soil core



Photo 49: *CH13-311-BH011*
Run 20 closeup of soil core



Photo 50: *CH13-311-BH011*
Run 20 complete soil core



Photo 51: *CH13-311-BH011*
Run 23 closeup of soil core



Photo 52: *CH13-311-BH011*
Run 23 complete soil core



Photo 53: *CH13-311-BH011*
Run 24 closeup of soil core



Photo 54: *CH13-311-BH011*
Run 24 complete soil core



Photo 55: *CH13-311-BH011*
Run 27 complete soil core



Photo 56: *CH13-311-BH011*
Run 28 closeup of soil core



Photo 57: *CH13-311-BH011*
Run 28 complete soil core



Photo 58: *CH13-311-BH011*
Run 29 closeup of soil core



Photo 59: *CH13-311-BH011*
Run 29 complete soil core



Photo 60: *CH13-311-BH011*
Run 32 complete soil core



Photo 61: *CH13-311-BH012*
Run 1 complete soil core



Photo 62: *CH13-311-BH012*
Run 12 closeup of soil core



Photo 63: *CH13-311-BH012*
Run 12 complete soil core



Photo 64: *CH13-311-BH012*
Run 13 closeup of soil core



Photo 65: *CH13-311-BH012*
Run 13 complete soil core



Photo 66: *CH13-311-BH012*
Run 16 closeup of soil core



Photo 67: *CH13-311-BH012*
Run 16 complete soil core



Photo 68: *CH13-311-BH012*
Run 17 closeup of soil core



Photo 69: *CH13-311-BH012*
Run 17 complete soil core



Photo 70: *CH13-311-BH012*
Run 18 closeup of soil core



Photo 71: *CH13-311-BH012*
Run 18 complete soil core



Photo 72: *CH13-311-BH012*
Run 23 complete soil core



Photo 73: *CH13-311-BH012*
Run 27 complete soil core



Photo 74: *CH13-311-BH012*
Run 30 complete soil core



Photo 75: *CH13-311-BH012*
Run 32 complete soil core



Photo 76: *CH13-311-BH012*
Run 4 complete soil core



Photo 77: *CH13-311-BH012*
Run 7 complete soil core



Photo 78: *CH13-311-BH013*
Borehole setup



Photo 79: *CH13-311-BH013*
Borehole setup



Photo 80: *CH13-311-BH013*
Boulder at 14ft



Photo 81: *CH13-311-BH013*
Cored through boulder at 14ft



Photo 82: *CH13-311-BH013*
Run 1 complete soil core



Photo 83: *CH13-311-BH013*
Run 13 complete soil core



Photo 84: *CH13-311-BH013*
Run 14 complete soil core



Photo 85: *CH13-311-BH013*
Run 4 complete soil core



Photo 86: *CH13-311-BH013*
Run 6 complete soil core



Photo 87: *CH13-311-BH013*
Run 7 closeup of soil core



Photo 88: *CH13-311-BH013*
Run 7 complete soil core



Photo 89: *CH13-311-BH014*
Run 1 complete soil core



Photo 90: *CH13-311-BH014*
Run 10 closeup of soil core



Photo 91: *CH13-311-BH014*
Run 10 complete soil core



Photo 92: *CH13-311-BH014*
Run 13 complete soil core



Photo 93: *CH13-311-BH014*
Run 17 closeup of soil core



Photo 94: *CH13-311-BH014*
Run 19 complete soil core

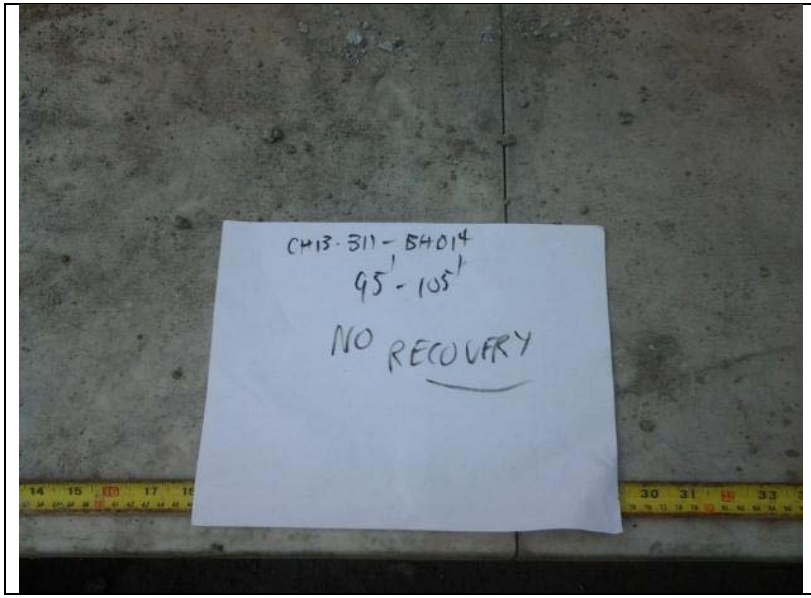


Photo 95: *CH13-311-BH014*
Run 20 complete soil core



Photo 96: *CH13-311-BH014*
Run 22 closeup of soil core



Photo 97: *CH13-311-BH014*
Run 22 complete soil core



Photo 98: *CH13-311-BH014*
Run 2 closeup of soil core



Photo 99: *CH13-311-BH014*
Run 30 complete soil core



Photo 100: *CH13-311-BH014*
Run 4 closeup of soil core



Photo 101: *CH13-311-BH014*
Run 6 complete soil core



Photo 102: *CH13-311-BH015*
Run 1 closeup of soil core



Photo 103: *CH13-311-BH015*
Run 1 complete soil core



Photo 104: *CH13-311-BH015*
Run 13 complete soil core



Photo 105: *CH13-311-BH015*
Run 18 complete soil core



Photo 106: *CH13-311-BH015*
Run 25 complete soil core



Photo 107: *CH13-311-BH015*
Run 28 complete soil core



Photo 108: *CH13-311-BH015*
Run 3 complete soil core



Photo 109: *CH13-311-BH015*
Run 5 complete soil core



Photo 110: *CH13-311-BH015*
Run 8 complete soil core



Photo 111: *CH13-311-TP001*
Closeup of testpit



Photo 112: *CH13-311-TP001*
Closeup of testpit



Photo 113: *CH13-311-TP002*
Closeup of testpit



Photo 114: *CH13-311-TP002*
Closeup of testpit



Photo 115: *CH13-311-TP003*

Closeup of testpit



Photo 116: *CH13-311-TP003*

Closeup of testpit



Photo 117: *CH13-311-TP003*

Closeup of testpit



Photo 118: *CH13-311-TP008*

Closeup of testpit



Photo 119: *CH13-311-TP009*
Closeup of testpit



Photo 120: *CH13-311-TP009*
Closeup of testpit



Photo 121: *CH13-311-BH004*
Grey clay with some silt at 5ft bgs



Photo 122: *CH13-311-BH020*
Run 0 shallow test pit adjacent to borehole



Photo 123: *CH13-311-BH020*
Run 4 closeup of soil core



Photo 124: *CH13-311-BH020*
Run 4 complete soil core



Photo 125: *CH13-311-BH020*
Borehole Setup



Photo 126: *CH13-311-BH021*
Core



Photo 127: *CH13-311-BH021*
Borehole setup



Photo 128: *CH13-311-BH021*
Borehole setup



Photo 129: *CH13-311-BH022*
Core at top of core at bag



Photo 130: *CH13-311-BH022*
Testpit, water infiltration occurred at 1ft 6in



Photo 131: *CH13-311-BH023*
Closeup of core



Photo 132: *CH13-311-BH023*
Core



Photo 133: *CH13-311-BH023*
Testpit



Photo 134: *CH13-311-BH023*
Borehole Setup



Photo 135: *CH13-311-BH024*
Run 0, bottom of test pit



Photo 136: *CH13-311-BH024*
Run 0, test pit beside borehole



Photo 137: *CH13-311-BH024*
Run 1 closeup of soil core



Photo 138: *CH13-311-BH024*
Run 1 complete soil core, runs 2 and 3 shown below run 1



Photo 139: *CH13-311-BH024*
Run 3, drilling Run



Photo 140: *CH13-311-BH024*
Run 3 jacking drill rod out of ground



Photo 141: *CH13-311-BH024*
Run 6 closeup of soil core



Photo 142: *CH13-311-BH024*
Run 6 complete soil core, 0-11ft 3in



Photo 143: *CH13-311-BH024*
Borehole Setup



Photo 144: *CH13-311-BH024*
Borehole Setup



Photo 145: *CH13-311-SS038*
General location



Photo 146: *CH13-311-SS038*
Rock closeup



Photo 147: *CH13-311-SS039*
General Location



Photo 148: *CH13-311-SS039*
Rock closeup



Photo 149: *CH13-311-SS040*
Rock closeup



Photo 150: *CH13-311-SS040*
Rock closeup

Appendix D
Laboratory Results

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Unconfined Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-10 Method C

Project No.:	13-1417-0047/4000
Project:	BSI RIDGE NORTH OF GRUM 2013
Client:	CH2M HILL
Location:	FARO MINE COMPLEX -FARO YK
Lab ID	194

Failure Mode

(1) Diagonal shear plane(s) (5) Conical
(2) Vertical fracture(s) (6) Spalling
(3) Vertical splitting (7) Other
(4) Shear along foliation / discontinuity Note: (deg) measured from core axis

	TAR 6								Wet		Dry	Maximum	Stress			
No.	**Borehole**	**Sample**	**Depth**	**Dia**	**Ht**	**A**	**V**	**Mass**	**Density**	**W**	**Density**	**Load**	**σ**	**Rock Type**	**Failure Mode**	
	#	#	(m)	(mm)	(mm)	(cm^2)	(cm^3)	(g)	(kg/m^3)	(%)	(kg/m^3)	(kN)	(MPa)		Type	(deg)
1	CH13-311	SS038_RKa	N/A	45.62	92.94	16.35	151.92	400.00	2633	0.15	2629	153.70	94.0	Not Provided	2	N/A
2	CH13-311	SS039_RKa	N/A	45.32	94.89	16.13	153.07	393.80	2573	0.35	2564	80.40	49.8	Not Provided	2	N/A

G. Patton	October 10, 2013	L.Perrey	October15,2013
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Unconfined Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-10 Method C

Project No.:	13-1417-0047/4000	**TAR 6 - Borehole:**	**CH13-311**
Project:	BSI RIDGE NORTH OF GRUM 2013	**Sample Number:**	SS038_RKa
Location:	FARO MINE COMPLEX -FARO YK	**Depth (m):**	N/A
Client:	CH2M HILL	**Lab ID No:**	194

Testing Results		Sample Measurements	
Max Load (kN)	**153.70**	Diameter (mm)	45.62
		Height (mm)	92.94
Stress σ (MPa)	**94.0**	Area (cm^2)	16.35
		Volume (cm^3)	151.92
Pace Rate (kN/s)	1.25	Mass (g)	400.00
		Moisture Content (%)	0.15
Lithology	Not Provided	Wet Density (kg/m^3)	2633.04
		Dry Density (kg/m^3)	2629.08

Failure Mode	Notes
	- Water content as received
Type: **2**	**Mode:**
	(1) Diagonal shear plane(s)
Degrees:* **N/A**	(2) Vertical fracture(s)
	(3) Vertical splitting
	(4) Shear along foliation /discontinuity
	(5) Conical
* Degrees measured with respect to core axis.	(6) Spalling
	(7) Other

Comments



BEFORE TEST



AFTER TEST

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

G. Patton	October 10, 2013	L.Perrey	October15,2013
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Unconfined Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-10 Method C

Project No.:	13-1417-0047/4000	**TAR 6 - Borehole:**	**CH13-311**
Project:	BSI RIDGE NORTH OF GRUM 2013	**Sample Number:**	SS039_RKa
Location:	FARO MINE COMPLEX -FARO YK	**Depth (m):**	N/A
Client:	CH2M HILL	**Lab ID No:**	194

Testing Results

Max Load (kN)	**80.40**
Stress σ (MPa)	**49.8**
Pace Rate (kN/s)	1.25
Lithology	Not Provided

Sample Measurements

Diameter (mm)	45.32
Height (mm)	94.89
Area (cm^2)	16.13
Volume (cm^3)	153.07
Mass (g)	393.80
Moisture Content (%)	0.35
Wet Density (kg/m^3)	2572.68
Dry Density (kg/m^3)	2563.64

Failure Mode

Type: **2**

Degrees:* **N/A**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:

(1) Diagonal shear plane(s)
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*



BEFORE TEST



AFTER TEST

G. Patton	October 10, 2013	L.Perrey	October15,2013
TESTED BY	DATE	CHECKED BY	DATE

ORGANIC IMPURITIES IN FINE AGGREGATES FOR CONCRETE

CSA A23.2-7A

October 3, 2013
Project Number: 13-1417-0047-4000

CH2M Hill
1100 – 1st Street SE
Calgary, Alberta
T2G 1B1

ATTENTION: Mr. Mark Cichy

PROJECT: BSI Ridge North of Grum 2013

Sample:	**CH13-311-BH022_SOb**
Source:	**Ridge North of Grum, Tar #6, Faro Mine Complex, Yukon**

Date sampled: August 25, 2013
Date tested: October 2, 2013

Sampled by: Client
Tested by: DC

COLOUR PLATE VALUE	**5**

Note: Colour plate values range from No.1 to 5, with No. 1 being the lightest.

Reported by: S. John, AScT

Reviewed by: _____
L. Hu, M. Sc. E., P.Eng.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

PETROGRAPHIC EXAMINATION OF COARSE AGGREGATE

ASTM C 295

CH2M Hill
1100 – 1st Street SE
Calgary, Alberta, T2G 1B1

November 12, 2013
Project Number: 13-1417-0047.4000

Attention: Mr. Mark Cichy

PROJECT: **BSI RIDGE NORTH OF GRUM 2013**

Sample:	**CH13-311-SS038_Rka**

Date sampled: September 2013 **Sampled by:** Client

	PETROGRAPHIC DESCRIPTION/ PHYSICAL QUALITY	PERCENT BY SIEVE FRACTION (mm)		
		12.5 mm	9.5 mm	TOTAL
GOOD	**Gneissic granodiorite** - black/white speckled, 1-3 mm grain size: Quartz, plagioclase, alkali feldspar, biotite and muscovite. Fresh, trace weathering of occasional feldspar.	18.6	18.6	**18.6**
GOOD	**Gneissic granodiorite** - As above, minor weathering and oxidation, giving the rock a yellowish tint. Strong.	48.5	46.6	**47.5**
GOOD	**Gneissic granodiorite** – As above, moderate weathering, yellow to brown particle surfaces. Strong.	8.8	12.1	**10.5**
GOOD	**Gneissic granodiorite -** As above, orange to brown, pronounced weathering/oxidation on all surfaces. Strong.	9.4	11.1	**10.3**
GOOD	*Subtotal*	**85.3**	**88.4**	**86.9**
FAIR	**Gneissic granodiorite -** Fresh, moderate strength	0.8	2.4	**1.6**
FAIR	**Gneissic granodiorite -** Minor weathering/oxidation, moderate strength.	6.1	3.4	**4.7**
FAIR	**Gneissic granodiorite** – Moderate weathering, moderate strength	2.2	2.4	**2.3**
FAIR	**Gneissic granodiorite** – pronounced weathering/oxidation, moderate strength	4.2	3.4	**3.8**
FAIR	*Subtotal*	**13.3**	**11.6**	**12.4**
POOR	**Gneissic granodiorite -** Minor weathering/oxidation, weak	0.8	--	**0.4**
POOR	**Gneissic granodiorite** – pronounced weathering/oxidation, weak	0.6	--	**0.3**
POOR	*Subtotal*	**1.4**	**--**	**0.7**
	TOTALS	**100.0**	**100.0**	**100.0**

PETROGRAPHER: _____
A. Briggs, M.Sc., P. Geo.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

Sample CH13-311-SS038_Rka

General

The sample consisted entirely of crushed material, which was generated by crushing cobble-sized rock particles in a laboratory crusher. It was split and sieved into its constituent sieve size fractions in preparation for the petrographic examination.

Particle shape was angular with a morphology which was mostly cubic with some flat and/or elongated pieces. All of the particles had rough, fresh fracture surfaces on all sides, and sharp edges.

Lithologic Composition

Identification of rock types and minerals was done using a stereomicroscope with magnifications from 8x to about 50x, supplemented by basic geologic diagnostic methods. One thin section was examined to aid in the identification of constituent minerals. Chemical analysis was not carried out.

The sample was composed entirely of Gneissic granodiorite. It was fine to medium grained and generally black and white; in weathered particles the colour trended towards yellow, orange and brown. The mineral composition in the fresh rock consisted of quartz, plagioclase, alkali feldspar, biotite and muscovite. Some of the quartz exhibited undulatory extinction, which is an indication of strain in the crystal. The mica minerals were preferentially oriented; this defined the gneissic texture of the rock. Compositional banding was not observed.

The rock material was further sorted depending on degree of weathering observed in the individual particles. Weathering was manifested primarily as oxidation staining, resulting in yellow, orange and brown colouration. The proportion of weathered particles is an indication of the depth of the weathering rind along the outer surface and any fractures that existed in the original cobble-sized particles. In the thin section representing particles that exhibit minor staining, feldspar exhibited widespread, moderate to severe sericite alteration, and metal oxide inclusions were observed in some quartz and feldspar grains. Mica minerals, dominated by muscovite, were mostly fresh with only minor clay alteration and oxidation along grain boundaries and cleavage planes.

About 20% of the particles consisted of fresh or only slightly weathered gneissic granodiorite. Most of these particles were strong with a small amount being brittle and of moderate strength.

The majority of the particles, nearly 53% of the sample, exhibited minor weathering. In this group, the oxidized feldspar imparted a yellowish tint to the particles, although some surfaces on individual particles were fresh and unweathered. Most of these particles were strong. However, about 10% of the particles in this category were of moderate or lesser strength.

Particles that were moderately weathered typically were yellow to brown on most surfaces, but occasional individual particle surfaces were fresh. These made up almost 13% of the sample; about 20% of the particles were of moderate strength only.

More than 14% of the particles were completely weathered with the oxidation imparting orange to brown colouration. Weak and moderately strong particles accounted for more than a quarter of this category.

Physical-Mechanical Quality

In addition to the geologic classification of the aggregate, the sample was also examined for characteristics relevant to engineering uses. Aspects such as porosity, strength, tenacity, presence or absence of vugs, voids, fissures, cracks, coatings, particle shape and impurities in the particles were considered in the assignment of individual particles into various quality classifications.

Consistent with the CSA A23.2-15A method, the relative proportions of material classified as being of "Good", "Fair" and "Poor" physical-mechanical quality were determined, as presented in the table above.

Based on the Petrographic examination of the sample CH13-311-SS038_Rka the material would be considered suitable for use in a variety of applications, including some concrete, subject to demonstrated compliance with all relevant specification requirements.

Alkali-Aggregate Reaction Potential

The Petrographic Examination indicates that the sample was composed of Gneissic granodiorite, a rock type that contains some quartz, which may contribute under certain circumstances to a deleterious expansive reaction in concrete termed *"Alkali-Aggregate Reaction"* (AAR). Strained quartz, which was observed in the thin section, is associated with a higher likelihood of AAR.

In order to evaluate this potential, the sample should be tested using a suitable method, such as the method given in CSA A23.2-25A, should the material be considered for use as concrete aggregate.

Summary

The crushed sample CH13-311-SS038_Rka was composed of fine to medium grained Gneissic granodiorite and contained 86.9% "Good" quality material, 12.4% "Fair" and 0.7% "Poor" quality material.

On the basis of the Petrographic Examination, and subject to satisfactory compliance with applicable specification requirements and subject to evaluation of the potential for AAR, Sample CH13-311-SS038_Rka would be considered suitable for a variety of aggregate uses, including concrete aggregate.

A. Briggs, M.Sc., P. Geo.

Reviewed by:

FOR: F. Shrimer, P.Geo.

PETROGRAPHIC EXAMINATION OF COARSE AGGREGATE

ASTM C 295

CH2M Hill
1100 – 1st Street SE
Calgary, Alberta, T2G 1B1

November 12, 2013
Project Number: 13-1417-0047.4000

Attention: Mr. Mark Cichy

PROJECT: **BSI RIDGE NORTH OF GRUM 2013**

Sample:	**CH13-311-SS039_Rka**

Date sampled: September 2013 **Sampled by:** Client

	PETROGRAPHIC DESCRIPTION/ PHYSICAL QUALITY	PERCENT BY SIEVE FRACTION (mm)		
		12.5 mm	9.5 mm	TOTAL
GOOD	**Gneissic granodiorite** - black/white speckled, 0.5 - 2 mm grain size: Quartz, plagioclase, biotite and muscovite. Orange specks, about 0.5 mm in size, indicate oxidation.	10.6	8.5	**9.6**
GOOD	**Gneissic granodiorite** – As above, moderate weathering, orange staining and occasional clay/leucoxene accumulations. Strong.	44.5	42.1	**43.3**
GOOD	**Gneissic granodiorite -** As above, orange staining and clay on all surfaces, pronounced weathering/oxidation on all surfaces. Strong.	31.9	30.1	**31.0**
GOOD	*Subtotal*	**87.0**	**80.7**	**83.9**
FAIR	**Gneissic granodiorite** – Minor weathering and oxidation, moderate strength	1.2	2.0	**1.6**
FAIR	**Gneissic granodiorite** – Moderate weathering, moderate strength	7.5	8.5	**8.0**
FAIR	**Gneissic granodiorite** – pronounced weathering/oxidation, moderate strength	4.3	8.0	**6.1**
FAIR	*Subtotal*	**13.0**	**18.5**	**15.7**
POOR	**Gneissic granodiorite -** Moderate weathering/oxidation, weak	--	0.5	**0.3**
POOR	**Gneissic granodiorite** – Pronounced weathering/oxidation, weak	--	0.3	**0.1**
POOR	*Subtotal*	**--**	**0.8**	**0.4**
TOTALS		**100.0**	**100.0**	**100.0**

PETROGRAPHER: _____
A. Briggs, M.Sc., P. Geo.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

Sample CH13-311-SS039_Rka

General

The sample consisted entirely of crushed material, which was generated by crushing cobble-sized rock particles in a laboratory crusher. It was split and sieved into its constituent sieve size fractions in preparation for the petrographic examination.

Particle shape was angular with a morphology which was mostly cubic with some flat and/or elongated pieces. All of the particles had rough, fresh fracture surfaces on all sides and sharp edges.

Lithologic Composition

Identification of rock types and minerals was done using a stereomicroscope with magnifications from 8x to about 50x, supplemented by basic geologic diagnostic methods. One thin section was examined to aid in the identification of constituent minerals. Chemical analysis was not carried out.

The sample was composed entirely of Gneissic granodiorite. It was fine to medium grained and generally black and white; in weathered particles the colour trended towards orange. The mineral composition in the fresh rock consisted of quartz, plagioclase, alkali feldspar, biotite and muscovite. The mica minerals were preferentially oriented; this defined the gneissic texture of the rock. Compositional banding was not observed. Undulatory extinction in the quartz was widespread; this is an indication of strain in the crystal.

The rock material was sorted depending on degree of weathering and oxidation observed in the individual particles. Weathering was manifested as oxidation staining and the presence of clay deposits that were typically smaller than 0.5 mm in size. In the thin section prepared from a moderately stained particle, very fine discontinuous fractures that measured 0.001 – 0.005 in width cut across quartz and feldspar grains as well as between grains. These fractures contained iron oxidation product; these are likely responsible for the widespread oxidation staining observed in the sample. Biotite was partially altered to chlorite and clay and sericite alteration of feldspar was widespread.

About 11% of the particles consisted of slightly weathered gneissic granodiorite. Orange specks 0.1 – 0.5 mm in size were observed in these particles. Most of these particles were strong with a small amount being brittle and of moderate strength.

The majority of the particles, nearly 52% of the sample, exhibited moderate weathering. In this group, the oxidized feldspar imparted orange staining to the particles, although some surfaces on individual particles were fresh and unweathered. Most of these particles were strong. However, about 16% of the particles in this category were of moderate or lesser strength.

More than 32% of the particles exhibited pronounced weathering and oxidation with orange staining and clay deposits on all surfaces. The majority of the particles that belonged to this category were strong. The pronounced weathering and oxidation did not appear to have a detrimental effect, because the proportion of particles that were weak or of moderate strength in this category did not differ from that of the moderately weathered group of particles.

Physical-Mechanical Quality

In addition to the geologic classification of the aggregate, the sample was also examined for

characteristics relevant to engineering uses. Aspects such as porosity, strength, tenacity, presence or absence of vugs, voids, fissures, cracks, coatings, particle shape and impurities in the particles were considered in the assignment of individual particles into various quality classifications.

Consistent with the CSA A23.2-15A method, the relative proportions of material classified as being of "Good", "Fair" and "Poor" physical-mechanical quality were determined, as presented in the table above.

Based on the Petrographic examination of the sample CH13-311-SS039_Rka the material would be considered unsuitable for use in some applications, including some concrete exposure classes, railroad ballast and rock for erosion control. This is mainly due to the widespread oxidation staining thought to be due to the observed discontinuous microfractures and clay alteration of the biotite.

Alkali-Aggregate Reaction Potential

The Petrographic Examination indicates that the sample was composed of Gneissic granodiorite, a rock type that contains some quartz, which may contribute under certain circumstances to a deleterious expansive reaction in concrete termed *"Alkali-Aggregate Reaction"* (AAR). Strained quartz, which was observed in the thin section, is associated with a higher likelihood of AAR.

In order to evaluate this potential, the sample should be tested using a suitable method, such as the method given in CSA A23.2-25A, should the material be considered for use as concrete aggregate.

Summary

The crushed sample CH13-311-SS039_Rka was composed of fine to medium grained granitic and contained 83.9% "Good" quality material, 15.7% "Fair" and 0.4% "Poor" quality material.

On the basis of the Petrographic Examination, Sample CH13-311-SS039_Rka would be considered unsuitable for many aggregate uses, including some concrete, railroad ballast and erosion control applications. It could be considered suitable in some lower end aggregate uses including road base and general fill, provided that some attrition of the material could be tolerated, and if it complies with applicable specification requirements.

A. Briggs, M.Sc., P. Geo.

Reviewed by:

FOR: F. Shrimer, P.Geo.

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 13-JUN-13
Report Date: 03-JUL-13 13:35 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1316343

Project P.O. #: 472645.06.AD.01.04.13 PO=604564
Job Reference: WASTE ROCK DUMP MW 2013 SW-014B
C of C Numbers: ALS06121301
Legal Site Desc:

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316343-1	L1316343-2	L1316343-3		
	Description	Water	Water	Water		
	Sampled Date	11-JUN-13	11-JUN-13	11-JUN-13		
	Sampled Time	13:35	17:00	17:00		
	Client ID	CH12-014-MW003_GW0613	CH12-014-MW007_GW0613	CH12-014-MW907_GW0613		
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	2510	6380	6100		
	pH (pH)	7.52	6.87	7.00		
	Total Suspended Solids (mg/L)	13.4	17.4	11.8		
	Total Dissolved Solids (mg/L)	3530	9950	10300		
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	51.4	645	636		
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	626	628	703		
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<20	<20	<20		
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<20	<20	<20		
	Alkalinity, Total (as CaCO3) (mg/L)	626	628	703		
	Ammonia, Total (as N) (mg/L)	0.0702	0.229	0.221		
	Chloride (Cl) (mg/L)	20 DLA	<25	<25 DLA		
	Fluoride (F) (mg/L)	<0.40	1.3	1.2		
	Nitrate (as N) (mg/L)	5.00 DLA	0.70	0.73		
	Nitrite (as N) (mg/L)	<0.020	0.303	0.275		
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	0.0011	<0.0010		
	Sulfate (SO4) (mg/L)	2260 DLM	7190 DLM	7060 DLM		
Cyanides	Cyanide, Free (mg/L)	<0.020	<0.010	<0.010		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	3.90	9.56	9.61		
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	<0.0050 DLA	<0.050 DLA	<0.050 DLA		
	Antimony (Sb)-Dissolved (mg/L)	<0.00050 DLA	<0.0050 DLA	<0.0050 DLA		
	Arsenic (As)-Dissolved (mg/L)	<0.00050 DLA	<0.0050 DLA	<0.0050 DLA		
	Barium (Ba)-Dissolved (mg/L)	0.0348	0.0249	0.0264		
	Beryllium (Be)-Dissolved (mg/L)	<0.00050 DLA	<0.0050 DLA	<0.0050 DLA		
	Boron (B)-Dissolved (mg/L)	<0.050 DLA	<0.50 DLA	<0.50 DLA		
	Cadmium (Cd)-Dissolved (mg/L)	0.000657	0.444	0.459		
	Calcium (Ca)-Dissolved (mg/L)	734	540	538		
	Chromium (Cr)-Dissolved (mg/L)	<0.00050 DLA	<0.0050 DLA	<0.0050 DLA		
	Cobalt (Co)-Dissolved (mg/L)	0.0169	1.56	1.65		
	Copper (Cu)-Dissolved (mg/L)	0.0011	<0.010 DLA	<0.010 DLA		
	Iron (Fe)-Dissolved (mg/L)	1.47	0.340	0.336		
	Ferrous Iron, Dissolved (mg/L)	1.96	0.246	0.247		
	Lead (Pb)-Dissolved (mg/L)	<0.00025 DLA	<0.0025 DLA	<0.0025 DLA		
	Lithium (Li)-Dissolved (mg/L)	0.0618	0.122	0.134		
	Magnesium (Mg)-Dissolved (mg/L)	165	1220	1160		
	Manganese (Mn)-Dissolved (mg/L)	3.91	104	109		

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316343-1	L1316343-2	L1316343-3		
	Description	Water	Water	Water		
	Sampled Date	11-JUN-13	11-JUN-13	11-JUN-13		
	Sampled Time	13:35	17:00	17:00		
	Client ID	CH12-014-MW003_GW0613	CH12-014-MW007_GW0613	CH12-014-MW907_GW0613		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Molybdenum (Mo)-Dissolved (mg/L)	0.00055	<0.0025 DLA	<0.0025 DLA		
	Nickel (Ni)-Dissolved (mg/L)	0.0840	3.13	3.30		
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.90 DLA	<0.90 DLA		
	Potassium (K)-Dissolved (mg/L)	10.8	13.1	13.4		
	Selenium (Se)-Dissolved (mg/L)	0.00111	<0.0050 DLA	<0.0050 DLA		
	Silicon (Si)-Dissolved (mg/L)	9.37	14.0	13.2		
	Silicon (as SiO2)-Dissolved (mg/L)	20.0	29.9	28.2		
	Silver (Ag)-Dissolved (mg/L)	<0.000050 DLA	<0.00050 DLA	<0.00050 DLA		
	Sodium (Na)-Dissolved (mg/L)	32.7	17.6	18.3		
	Strontium (Sr)-Dissolved (mg/L)	2.40	1.76	1.87		
	Sulfur (S)-Dissolved (mg/L)	645	2090	2050		
	Thallium (Tl)-Dissolved (mg/L)	0.000071	<0.00050 DLA	<0.00050 DLA		
	Titanium (Ti)-Dissolved (mg/L)	<0.050 DLA	<0.50 DLA	<0.50 DLA		
	Uranium (U)-Dissolved (mg/L)	0.0176	0.0497	0.0526		
	Vanadium (V)-Dissolved (mg/L)	<0.0050 DLA	<0.050 DLA	<0.050 DLA		
	Zinc (Zn)-Dissolved (mg/L)	0.647	358	380		

* 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	L1316343-1, -2, -3
Duplicate	Arsenic (As)-Dissolved	DLA	L1316343-1, -2, -3
Duplicate	Beryllium (Be)-Dissolved	DLA	L1316343-1, -2, -3
Duplicate	Boron (B)-Dissolved	DLA	L1316343-1, -2, -3
Duplicate	Chromium (Cr)-Dissolved	DLA	L1316343-1, -2, -3
Duplicate	Lead (Pb)-Dissolved	DLA	L1316343-1, -2, -3
Duplicate	Silver (Ag)-Dissolved	DLA	L1316343-1, -2, -3
Duplicate	Titanium (Ti)-Dissolved	DLA	L1316343-1, -2, -3
Duplicate	Vanadium (V)-Dissolved	DLA	L1316343-1, -2, -3
Duplicate	Aluminum (Al)-Dissolved	DLA	L1316343-1, -2, -3
Duplicate	Cyanide, Free	DLM	L1316343-1, -2, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1316343-1, -2, -3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1316343-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1316343-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1316343-1, -2, -3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1316343-1, -2, -3
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1316343-1, -2, -3
Matrix Spike	Sulfate (SO4)	MS-B	L1316343-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
DLM	Detection Limit Adjusted For 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**
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-SCR-VA	Water	Alkalinity by colour or titration	EPA 310.2 OR APHA 2320

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
OR
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.

Reference Information

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-DOC-VA	Water	Dissolved 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)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

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.

FE2-D-COL-VA	Water	Diss. Ferrous Iron in Water by Colour	James W. Ball et al (1999)

This analysis is carried out using procedures adapted from "A New Method for the Direct Determination of Dissolved Iron Concentration in Acid Mine Waters" published by James W. Ball et al (1999). The procedures involves preliminary sample filtration (0.1um filter) and Ferrous Iron is determined using the "FerroZine" colorimteric method.

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).

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).

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.

PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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

Reference Information

all non-volatile forms of sulfur present in a particular sample.

SIO2-D-CALC-VA Water Dissolved Silicon (reported as Silica) CALCULATION

Dissolved Silicon (as SiO2) is a calculated parameter. Dissolved Silicon (as SiO2 mg/L) = 2.139 x Dissolved Silicon (mg/L).

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-LOW-VA Water Total Suspended Solids by Grav. (1 mg/L) APHA 2540 Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** 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:

ALS06121301

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-PCT-VA	**Water**							
Batch R2636372								
WG1693649-9 CRM		**VA-ACY-CONTROL**						
Acidity (as CaCO3)			104.1		%		85-115	21-JUN-13
WG1693649-33 DUP		**L1316343-1**						
Acidity (as CaCO3)		51.4	51.1		mg/L	0.5	20	21-JUN-13
ALK-SCR-VA	**Water**							
Batch R2637533								
WG1694921-2 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			97.2		%		85-115	25-JUN-13
WG1694921-16 DUP		**L1316343-1**						
Alkalinity, Total (as CaCO3)		626	637		mg/L	1.7	20	25-JUN-13
WG1694921-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	25-JUN-13
ANIONS-CL-IC-WR	**Water**							
Batch R2642144								
WG1699552-3 DUP		**L1316343-1**						
Chloride (Cl)		20	22		mg/L	12	20	14-JUN-13
WG1699552-2 LCS								
Chloride (Cl)			103.9		%		85-115	14-JUN-13
WG1699552-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	14-JUN-13
WG1699552-4 MS		**L1316343-1**						
Chloride (Cl)			101.7		%		75-125	14-JUN-13
ANIONS-F-IC-WR	**Water**							
Batch R2642144								
WG1699552-3 DUP		**L1316343-1**						
Fluoride (F)		<0.40	<0.40	RPD-NA	mg/L	N/A	20	14-JUN-13
WG1699552-2 LCS								
Fluoride (F)			104.6		%		85-115	14-JUN-13
WG1699552-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	14-JUN-13
WG1699552-4 MS		**L1316343-1**						
Fluoride (F)			108.5		%		75-125	14-JUN-13
ANIONS-NO2-IC-WR	**Water**							
Batch R2642144								
WG1699552-3 DUP		**L1316343-1**						
Nitrite (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	14-JUN-13
WG1699552-2 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-NO2-IC-WR	**Water**							
Batch R2642144								
WG1699552-2 LCS								
Nitrite (as N)			102.4		%		85-115	14-JUN-13
WG1699552-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	14-JUN-13
WG1699552-4 MS		**L1316343-1**						
Nitrite (as N)			94.8		%		75-125	14-JUN-13
ANIONS-NO3-IC-WR	**Water**							
Batch R2642144								
WG1699552-3 DUP		**L1316343-1**						
Nitrate (as N)		5.00	5.12		mg/L	2.4	20	14-JUN-13
WG1699552-2 LCS								
Nitrate (as N)			104.4		%		85-115	14-JUN-13
WG1699552-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	14-JUN-13
WG1699552-4 MS		**L1316343-1**						
Nitrate (as N)			101.5		%		75-125	14-JUN-13
ANIONS-SO4-IC-WR	**Water**							
Batch R2642144								
WG1699552-3 DUP		**L1316343-1**						
Sulfate (SO4)		2260	2360		mg/L	4.2	20	14-JUN-13
WG1699552-2 LCS								
Sulfate (SO4)			105.7		%		85-115	14-JUN-13
WG1699552-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	14-JUN-13
WG1699552-4 MS		**L1316343-1**						
Sulfate (SO4)			N/A	MS-B	%		-	14-JUN-13
CARBONS-DOC-VA	**Water**							
Batch R2641235								
WG1697382-1 DUP		**L1316343-1**						
Dissolved Organic Carbon		3.90	3.72		mg/L	4.8	20	30-JUN-13
WG1697382-6 LCS								
Dissolved Organic Carbon			108.5		%		80-120	30-JUN-13
WG1697382-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	30-JUN-13
WG1697382-2 MS		**L1316343-1**						
Dissolved Organic Carbon			104.4		%		70-130	30-JUN-13
CN-FREE-CFA-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-FREE-CFA-VA	**Water**							
Batch R2641282								
WG1698224-3 DUP		**L1316343-1**						
Cyanide, Free		<0.020	<0.020	RPD-NA	mg/L	N/A	20	28-JUN-13
WG1698224-2 LCS								
Cyanide, Free			101.0		%		80-120	28-JUN-13
WG1698224-1 MB								
Cyanide, Free			<0.0050		mg/L		0.005	28-JUN-13
WG1698224-4 MS		**L1316343-1**						
Cyanide, Free			97.0		%		70-130	28-JUN-13
FE2-D-COL-VA	**Water**							
Batch R2633546								
WG1689893-3 DUP		**L1316343-1**						
Ferrous Iron, Dissolved		1.96	1.89		mg/L	3.5	20	17-JUN-13
WG1689893-2 LCS								
Ferrous Iron, Dissolved			103.6		%		80-120	17-JUN-13
WG1689893-1 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	17-JUN-13
WG1689893-4 MS		**L1316343-1**						
Ferrous Iron, Dissolved			107.0		%		70-130	17-JUN-13
WG1689893-6 MS		**L1316379-10**						
Ferrous Iron, Dissolved			90.4		%		70-130	17-JUN-13
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2633814								
WG1689957-3 LCS								
Mercury (Hg)-Dissolved			101.0		%		80-120	18-JUN-13
WG1689957-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	18-JUN-13
Batch R2633849								
WG1689957-4 DUP		**L1316343-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	18-JUN-13
WG1689957-5 MS		**L1316343-1**						
Mercury (Hg)-Dissolved			90.2		%		70-130	18-JUN-13
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1689957-2 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Dissolved			101.3		%		80-120	17-JUN-13
Antimony (Sb)-Dissolved			98.8		%		80-120	17-JUN-13
Arsenic (As)-Dissolved			99.6		%		80-120	17-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1689957-2 CRM		**VA-HIGH-WATRM**						
Barium (Ba)-Dissolved			99.8		%		80-120	17-JUN-13
Beryllium (Be)-Dissolved			97.0		%		80-120	17-JUN-13
Boron (B)-Dissolved			92.2		%		80-120	17-JUN-13
Cadmium (Cd)-Dissolved			101.1		%		80-120	17-JUN-13
Chromium (Cr)-Dissolved			100.6		%		80-120	17-JUN-13
Cobalt (Co)-Dissolved			96.3		%		80-120	17-JUN-13
Copper (Cu)-Dissolved			95.7		%		80-120	17-JUN-13
Lead (Pb)-Dissolved			100.5		%		80-120	17-JUN-13
Lithium (Li)-Dissolved			99.4		%		80-120	17-JUN-13
Manganese (Mn)-Dissolved			99.4		%		80-120	17-JUN-13
Molybdenum (Mo)-Dissolved			100.9		%		80-120	17-JUN-13
Nickel (Ni)-Dissolved			98.1		%		80-120	17-JUN-13
Potassium (K)-Dissolved			99.1		%		80-120	17-JUN-13
Selenium (Se)-Dissolved			99.7		%		80-120	17-JUN-13
Silver (Ag)-Dissolved			97.9		%		80-120	17-JUN-13
Sodium (Na)-Dissolved			101.9		%		80-120	17-JUN-13
Strontium (Sr)-Dissolved			97.8		%		80-120	17-JUN-13
Thallium (Tl)-Dissolved			100.5		%		80-120	17-JUN-13
Titanium (Ti)-Dissolved			103.5		%		80-120	17-JUN-13
Uranium (U)-Dissolved			100.1		%		80-120	17-JUN-13
Vanadium (V)-Dissolved			99.8		%		80-120	17-JUN-13
Zinc (Zn)-Dissolved			96.3		%		80-120	17-JUN-13
WG1689957-4 DUP		**L1316343-1**						
Aluminum (Al)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	28-JUN-13
Antimony (Sb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	25-JUN-13
Arsenic (As)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	25-JUN-13
Barium (Ba)-Dissolved		0.0348	0.0353		mg/L	1.4	20	25-JUN-13
Beryllium (Be)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	25-JUN-13
Boron (B)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	25-JUN-13
Cadmium (Cd)-Dissolved		0.000657	0.000697		mg/L	6.0	20	25-JUN-13
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	25-JUN-13
Cobalt (Co)-Dissolved		0.0169	0.0162		mg/L	4.1	20	25-JUN-13
Copper (Cu)-Dissolved		0.0011	0.0010		mg/L	12	20	25-JUN-13
Lead (Pb)-Dissolved		<0.00025	<0.00025	RPD-NA	mg/L	N/A	20	25-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1689957-4 DUP		**L1316343-1**						
Lithium (Li)-Dissolved		0.0618	0.0619		mg/L	0.3	20	25-JUN-13
Manganese (Mn)-Dissolved		3.91	3.67		mg/L	6.2	20	25-JUN-13
Molybdenum (Mo)-Dissolved		0.00055	0.00041	J	mg/L	0.00013	0.0005	25-JUN-13
Nickel (Ni)-Dissolved		0.0840	0.0803		mg/L	4.4	20	25-JUN-13
Potassium (K)-Dissolved		10.8	10.5		mg/L	3.3	20	25-JUN-13
Selenium (Se)-Dissolved		0.00111	0.00095		mg/L	16	20	25-JUN-13
Silver (Ag)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	25-JUN-13
Sodium (Na)-Dissolved		32.7	31.0		mg/L	5.4	20	25-JUN-13
Strontium (Sr)-Dissolved		2.40	2.34		mg/L	2.3	20	25-JUN-13
Thallium (Tl)-Dissolved		0.000071	0.000104	J	mg/L	0.000033	0.0001	25-JUN-13
Titanium (Ti)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	25-JUN-13
Uranium (U)-Dissolved		0.0176	0.0186		mg/L	5.5	20	25-JUN-13
Vanadium (V)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	25-JUN-13
Zinc (Zn)-Dissolved		0.647	0.607		mg/L	6.3	20	25-JUN-13
WG1689957-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	17-JUN-13
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Boron (B)-Dissolved			<0.010		mg/L		0.01	17-JUN-13
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	17-JUN-13
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Lithium (Li)-Dissolved			<0.00050		mg/L		0.0005	17-JUN-13
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	17-JUN-13
Potassium (K)-Dissolved			<0.050		mg/L		0.05	17-JUN-13
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	17-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1689957-1 MB								
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	17-JUN-13
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	17-JUN-13
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	17-JUN-13
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	17-JUN-13
WG1689957-5 MS		**L1316343-1**						
Aluminum (Al)-Dissolved			94.5		%		70-130	27-JUN-13
Antimony (Sb)-Dissolved			101.8		%		70-130	25-JUN-13
Arsenic (As)-Dissolved			102.4		%		70-130	25-JUN-13
Barium (Ba)-Dissolved			100.8		%		70-130	25-JUN-13
Beryllium (Be)-Dissolved			92.9		%		70-130	25-JUN-13
Boron (B)-Dissolved			89.7		%		70-130	25-JUN-13
Cadmium (Cd)-Dissolved			94.1		%		70-130	25-JUN-13
Chromium (Cr)-Dissolved			94.6		%		70-130	25-JUN-13
Cobalt (Co)-Dissolved			91.0		%		70-130	25-JUN-13
Copper (Cu)-Dissolved			89.6		%		70-130	25-JUN-13
Lead (Pb)-Dissolved			95.0		%		70-130	25-JUN-13
Lithium (Li)-Dissolved			92.4		%		70-130	25-JUN-13
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	25-JUN-13
Molybdenum (Mo)-Dissolved			100.9		%		70-130	25-JUN-13
Nickel (Ni)-Dissolved			87.9		%		70-130	25-JUN-13
Potassium (K)-Dissolved			93.3		%		70-130	25-JUN-13
Selenium (Se)-Dissolved			104.3		%		70-130	25-JUN-13
Silver (Ag)-Dissolved			93.7		%		70-130	25-JUN-13
Sodium (Na)-Dissolved			N/A	MS-B	%		-	25-JUN-13
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	25-JUN-13
Thallium (Tl)-Dissolved			97.3		%		70-130	25-JUN-13
Titanium (Ti)-Dissolved			100.2		%		70-130	25-JUN-13
Uranium (U)-Dissolved			105.8		%		70-130	25-JUN-13
Vanadium (V)-Dissolved			95.4		%		70-130	25-JUN-13
Zinc (Zn)-Dissolved			87.0		%		70-130	25-JUN-13
MET-DIS-ICP-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA	**Water**							
Batch R2633893								
WG1689957-2 CRM		**VA-HIGH-WATRM**						
Calcium (Ca)-Dissolved			100.5		%		80-120	18-JUN-13
Iron (Fe)-Dissolved			100.3		%		80-120	18-JUN-13
Magnesium (Mg)-Dissolved			100.1		%		80-120	18-JUN-13
Phosphorus (P)-Dissolved			98.6		%		80-120	18-JUN-13
Silicon (Si)-Dissolved			101.0		%		80-120	18-JUN-13
WG1689957-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	18-JUN-13
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	18-JUN-13
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	18-JUN-13
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	18-JUN-13
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	18-JUN-13
Batch R2638735								
WG1689957-4 DUP		**L1316343-1**						
Calcium (Ca)-Dissolved		734	745		mg/L	1.5	20	23-JUN-13
Iron (Fe)-Dissolved		1.47	1.49		mg/L	1.8	20	23-JUN-13
Magnesium (Mg)-Dissolved		165	164		mg/L	0.4	20	23-JUN-13
Phosphorus (P)-Dissolved		<0.30	<0.30	RPD-NA	mg/L	N/A	20	23-JUN-13
Silicon (Si)-Dissolved		9.37	9.64		mg/L	2.8	20	23-JUN-13
WG1689957-5 MS		**L1316343-1**						
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	23-JUN-13
Iron (Fe)-Dissolved			93.2		%		70-130	23-JUN-13
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	23-JUN-13
NH3-F-VA	**Water**							
Batch R2634755								
WG1690296-2 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			104.8		%		85-115	19-JUN-13
WG1690296-3 DUP		**L1316343-1**						
Ammonia, Total (as N)		0.0702	0.0685		mg/L	2.4	20	19-JUN-13
WG1690296-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	19-JUN-13
WG1690296-4 MS		**L1316343-1**						
Ammonia, Total (as N)			103.5		%		75-125	19-JUN-13
PH-PCT-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-PCT-VA	**Water**							
Batch R2636372								
WG1693649-25 CRM		**VA-PH7-BUF**						
pH			7.00		pH		6.9-7.1	21-JUN-13
WG1693649-33 DUP		**L1316343-1**						
pH		7.52	7.54	J	pH	0.02	0.3	21-JUN-13
PO4-DO-COL-VA	**Water**							
Batch R2633438								
WG1689226-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			103.0		%		80-120	14-JUN-13
WG1689226-7 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			93.3		%		80-120	14-JUN-13
WG1689226-3 DUP		**L1316343-1**						
Orthophosphate-Dissolved (as P)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	14-JUN-13
WG1689226-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	14-JUN-13
WG1689226-6 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	14-JUN-13
WG1689226-4 MS		**L1316343-1**						
Orthophosphate-Dissolved (as P)			89.8		%		70-130	14-JUN-13
S-DIS-ICP-VA	**Water**							
Batch R2633893								
WG1689957-2 CRM		**VA-HIGH-WATRM**						
Sulfur (S)-Dissolved			101.3		%		80-120	18-JUN-13
WG1689957-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	18-JUN-13
Batch R2638735								
WG1689957-4 DUP		**L1316343-1**						
Sulfur (S)-Dissolved		645	647		mg/L	0.3	20	23-JUN-13
WG1689957-5 MS		**L1316343-1**						
Sulfur (S)-Dissolved			N/A	MS-B	%		-	23-JUN-13
TDS-VA	**Water**							
Batch R2633124								
WG1689242-3 DUP		**L1316343-1**						
Total Dissolved Solids		3530	3690		mg/L	4.5	20	15-JUN-13
WG1689242-2 LCS								
Total Dissolved Solids			101.2		%		85-115	15-JUN-13
WG1689242-1 MB								
Total Dissolved Solids			<10		mg/L		10	15-JUN-13
TSS-LOW-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TSS-LOW-VA	**Water**							
Batch R2633045								
WG1689246-2 LCS								
Total Suspended Solids			94.7		%		85-115	15-JUN-13
WG1689246-1 MB								
Total Suspended Solids			<1.0		mg/L		1	15-JUN-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	11-JUN-13 13:35	21-JUN-13 23:00	0.25	249	hours	EHTR-FM
	2	11-JUN-13 17:00	21-JUN-13 23:00	0.25	246	hours	EHTR-FM
	3	11-JUN-13 17:00	21-JUN-13 23:00	0.25	246	hours	EHTR-FM
Cyanides							
Free Cyanide in water by CFA							
	1	11-JUN-13 13:35	28-JUN-13 11:57	14	17	days	EHT
	2	11-JUN-13 17:00	28-JUN-13 11:57	14	17	days	EHT
	3	11-JUN-13 17:00	28-JUN-13 11:57	14	17	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 L1316343 were received on 13-JUN-13 09:00.

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.

CHAIN OF CUSTODY RECORD

6/12/2013 12:26:11 PM

CH2MHILL

Project Name Faro Mine
Location Faro Mine Complex - Faro YK
Project Number 472645.07.EM.RM.02.0
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-014
Project WASTE ROCK DUMP MW 2013 SW-014B
Turnaround Time 3 Days
Shipping Date: 6/12/2013
COC Number: ALS06121301

	Container:	125mL Poly	250ml Poly	125ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	250ml Glass	250ml Poly	250ml glass			
	Preservatives:	NaOH, 4'C	HNO3, 4'C	HCl, 4'C	4C	4C	4'C	4'C	4'C	4'C	H2SO4, pH<2, 4'C	HNO3, 4'C	H2SO4, pH<2, 4C			
	Filtered:	NA	Field	Field	NA	NA	NA	NA	NA	NA	Field	Field	NA			
	Holding Time:	14	180/28	180	14	14	7	7	3	3	28	180/28	28			
		(ASTM 7237) Free Cyanide	(E245.7) Field Filtered Dissolved Hg	(Ferrozine Method) Field Filtered Ferrous Iron	(SM2310) Acidity - Run Hot H2O2 if Fe > 15ppm	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM4110B) CL F NO2 NO3 and SO4	(SM4500P) ortho-Phosphate	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered For Metals Analyte List see Table 1	Ammonia (JEM/SM4500NH3) Ammonia		Number of Containers	COMMENTS
DATE / TIME / Matrix																
CH12-014-MW003_GW0613	6/11/2013 13:35 Water	X	X	X	X	X	X	X	X	X	X	X	X		8	LAB DUP/MS
CH12-014-MW007_GW0613	6/11/2013 17:00 Water	X	X	X	X	X	X	X	X	X	X	X	X		8	
CH12-014-MW907_GW0613	6/11/2013 17:00 Water	X	X	X	X	X	X	X	X	X	X	X	X		8	
														TOTAL NUMBER OF CONTAINERS	24	

L1316343-COFC

Signatures	Date/Time
Approved by	
Sampled by	6/12/13 1300
Relinquished by	
Received by	6/13/13 9:00
Relinquished by	
Received by	5.1

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Perform Lab Dup/MS on these samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 13-JUN-13
Report Date: 03-JUL-13 15:06 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1316379

Project P.O. #: 472645.06.AD.01.04.13 "PO=604564"
Job Reference: FARO MINE SEEP SAMPLING 2013 SW-015
C of C Numbers: ALS06121304
Legal Site Desc:

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316379-1	L1316379-2	L1316379-3	L1316379-4	L1316379-5
	Description	water	water	water	water	water
	Sampled Date	11-JUN-13	11-JUN-13	11-JUN-13	11-JUN-13	11-JUN-13
	Sampled Time	10:00	10:00	12:10	13:35	13:35
	Client ID	CH-MILL-03_SESP13	CH-MILL-903_SESP13	FCS-2_SESP13	FCS-4_SESP13	FCS-94_SESP13
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	3000	2950	6300	5860	5930
	pH (pH)	3.18	3.17	3.92	4.10	4.15
	Total Suspended Solids (mg/L)	15.2	27.2	67.8	136	139
	Total Dissolved Solids (mg/L)	19200	19300	16100	15000	14700
Anions and Nutrients	Acidity (as CaCO3) (mg/L)					
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)	7330	7340	3550	2830	2940
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	<2.0	<2.0	<1.0	<1.0	<1.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0	<2.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0	<2.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	<2.0	<2.0	<1.0	<1.0	<1.0
	Ammonia, Total (as N) (mg/L)	0.266	0.264	0.668	0.724	0.737
	Chloride (Cl) (mg/L)	<25 DLA	<25 DLA	<25 DLA	<25 DLA	<25 DLA
	Fluoride (F) (mg/L)	5.9	5.9	2.3	1.8	2.4
	Nitrate (as N) (mg/L)	<0.25 DLA	<0.25 DLA	1.84	1.16	1.18
	Nitrite (as N) (mg/L)	<0.050 DLA	<0.050 DLA	<0.050 DLA	<0.050 DLA	<0.050 DLA
	Orthophosphate-Dissolved (as P) (mg/L)	0.0071	0.0048	<0.0010	<0.0010	<0.0010
	Sulfate (SO4) (mg/L)	12000	12100	10500	9640	9740
Cyanides	Cyanide, Free (mg/L)	<0.020 DLM	<0.020 DLM			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	11.2	11.4	7.99	7.86	7.85
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	127	136	23.8	8.79	9.72
	Antimony (Sb)-Dissolved (mg/L)	<0.050 DLA	<0.050 DLA	<0.020 DLA	<0.020 DLA	<0.020 DLA
	Arsenic (As)-Dissolved (mg/L)	1.54	0.088	0.022	<0.020 DLA	<0.020 DLA
	Barium (Ba)-Dissolved (mg/L)	<0.025 DLA	<0.025 DLA	0.027	0.025	0.031
	Beryllium (Be)-Dissolved (mg/L)	<0.050 DLA	<0.050 DLA	<0.020 DLA	<0.020 DLA	<0.020 DLA
	Boron (B)-Dissolved (mg/L)	<5.0 DLA	<5.0 DLA	<2.0 DLA	<2.0 DLA	<2.0 DLA
	Cadmium (Cd)-Dissolved (mg/L)	2.53	2.56	0.993	0.693	0.720
	Calcium (Ca)-Dissolved (mg/L)	378	367	435	453	452
	Chromium (Cr)-Dissolved (mg/L)	0.110	0.100	<0.020 DLA	<0.020 DLA	<0.020 DLA
	Cobalt (Co)-Dissolved (mg/L)	3.14	3.27	2.68	2.25	2.28
	Copper (Cu)-Dissolved (mg/L)	4.04	3.89	1.27	0.893	0.840
	Iron (Fe)-Dissolved (mg/L)	1840	1770	537	707	707
	Ferrous Iron, Dissolved (mg/L)	1650	1700	581	774	778
	Lead (Pb)-Dissolved (mg/L)	1.17	1.21	0.477	0.312	0.328
	Lithium (Li)-Dissolved (mg/L)	<0.25 DLA	<0.25 DLA	0.21	0.16	0.17
	Magnesium (Mg)-Dissolved (mg/L)	499	495	1270	1150	1160

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316379-6	L1316379-7	L1316379-8	L1316379-9	L1316379-10
	Description	water	water	water	water	water
	Sampled Date	11-JUN-13	11-JUN-13	11-JUN-13	11-JUN-13	11-JUN-13
	Sampled Time	14:10	16:00	10:10	17:15	12:45
	Client ID	SRK-FD09_SESP13	SRK-FD13_SESP13	SRK-FD19_SESP13	SRK-FD24_SESP13	SRK-FD31_SESP13
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	4740	15200	5190	1510	7290
	pH (pH)	4.38	2.60	7.07	3.38	4.05
	Total Suspended Solids (mg/L)	81.4	72.0	40.6	9.8	160
	Total Dissolved Solids (mg/L)	11600	60800 AI	8540	2740	19500
Anions and Nutrients	Acidity (as CaCO3) (mg/L)			457		
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)	2740	19500		249	4090
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	<1.0	<1.0	189	<2.0	<1.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<2.0	<2.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<2.0	<2.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	<1.0	<1.0	189	<2.0	<1.0
	Ammonia, Total (as N) (mg/L)	0.407	<0.0050	0.120	0.0487	0.673
	Chloride (Cl) (mg/L)	<25 DLA	<50 DLA	<25 DLA	<10 DLA	<25
	Fluoride (F) (mg/L)	1.6	45.9	1.1	0.87	2.6
	Nitrate (as N) (mg/L)	2.72	3.39	1.84	0.81	2.60
	Nitrite (as N) (mg/L)	0.067	<0.10 DLA	<0.050 DLA	<0.020 DLA	<0.050
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	1.85	<0.0010	<0.0010	<0.0010
	Sulfate (SO4) (mg/L)	7210	37400	5840	2370	12400
Cyanides	Cyanide, Free (mg/L)	<0.020 DLM				<0.020 DLM
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	6.52	12.9	8.24	2.39	8.76
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.83	484	2.48	10.9	5.09
	Antimony (Sb)-Dissolved (mg/L)	<0.020 DLA	<0.10 DLA	<0.0050 DLA	<0.0010 DLA	<0.020 DLA
	Arsenic (As)-Dissolved (mg/L)	<0.020 DLA	3.44	0.0069	0.0036	<0.020 DLA
	Barium (Ba)-Dissolved (mg/L)	0.022	0.641	0.0396	0.00843	0.027
	Beryllium (Be)-Dissolved (mg/L)	<0.020 DLA	0.20	<0.0050 DLA	0.0042	<0.020 DLA
	Boron (B)-Dissolved (mg/L)	<2.0 DLA	<10 DLA	<0.50 DLA	<0.10 DLA	<2.0 DLA
	Cadmium (Cd)-Dissolved (mg/L)	0.969	6.30	0.239	0.124	1.31
	Calcium (Ca)-Dissolved (mg/L)	332	400	499	235	502
	Chromium (Cr)-Dissolved (mg/L)	<0.020 DLA	0.55	<0.0050 DLA	0.0055	<0.020 DLA
	Cobalt (Co)-Dissolved (mg/L)	2.02	11.7	0.860	0.331	2.91
	Copper (Cu)-Dissolved (mg/L)	0.113	63.1	0.884	1.01	1.73
	Iron (Fe)-Dissolved (mg/L)	600	4030	0.698	16.8	821
	Ferrous Iron, Dissolved (mg/L)	560	2550	0.612	10.0	912
	Lead (Pb)-Dissolved (mg/L)	0.218	0.625	0.0192	1.03	0.042
	Lithium (Li)-Dissolved (mg/L)	0.14	0.85	0.066	0.0849	0.13
	Magnesium (Mg)-Dissolved (mg/L)	950	3460	957	223	1470

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316379-11	L1316379-12	L1316379-13	L1316379-14	
	Description	water	water	water	water	
	Sampled Date	11-JUN-13	11-JUN-13	12-JUN-13	12-JUN-13	
	Sampled Time	16:20	16:40	10:30	12:20	
	Client ID	SRK-FD56_SESP13	SRK-FD956_SESP13	FCS-5_SESP13	SRK-FD18_SESP13	
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	7690	7580	2090	98.4	
	pH (pH)	3.60	3.56	4.38	8.09	
	Total Suspended Solids (mg/L)	36.8	36.0	377	43.2	
	Total Dissolved Solids (mg/L)	13500	13500	5120	138	
Anions and Nutrients	Acidity (as CaCO3) (mg/L)				2.7	
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)	1600	1220	1030		
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	61.4	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<2.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<2.0	
	Alkalinity, Total (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	61.4	
	Ammonia, Total (as N) (mg/L)	1.23	1.21	0.295	0.0100	
	Chloride (Cl) (mg/L)	<25 DLA	<25 DLA	<25 DLA	<0.50	
	Fluoride (F) (mg/L)	2.8	2.7	1.9	0.116	
	Nitrate (as N) (mg/L)	1.20	1.10	0.82	0.0632	
	Nitrite (as N) (mg/L)	<0.050 DLA	<0.050 DLA	<0.050 DLA	<0.0010	
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	0.0025	<0.0010	
	Sulfate (SO4) (mg/L)	9340	9380	7430	35.5	
Cyanides	Cyanide, Free (mg/L)	<0.010 DLM	<0.010 DLM	<0.020 DLM		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	7.25	7.26	3.07	6.60	
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Aluminum (Al)-Dissolved (mg/L)	12.0	11.5	5.90	0.0165	
	Antimony (Sb)-Dissolved (mg/L)	<0.010 DLA	<0.010 DLA	<0.0050 DLA	<0.00010	
	Arsenic (As)-Dissolved (mg/L)	<0.010 DLA	<0.010 DLA	<0.0050 DLA	0.00020	
	Barium (Ba)-Dissolved (mg/L)	0.0325	0.0343	0.0176	0.0710	
	Beryllium (Be)-Dissolved (mg/L)	<0.010 DLA	<0.010 DLA	<0.0050 DLA	<0.00010	
	Boron (B)-Dissolved (mg/L)	<1.0 DLA	<1.0 DLA	<0.50 DLA	<0.010	
	Cadmium (Cd)-Dissolved (mg/L)	0.393	0.395	0.227	0.000264	
	Calcium (Ca)-Dissolved (mg/L)	445	433	241	32.9	
	Chromium (Cr)-Dissolved (mg/L)	<0.010 DLA	<0.010 DLA	<0.0050 DLA	<0.00010	
	Cobalt (Co)-Dissolved (mg/L)	2.12	2.07	0.700	<0.00010	
	Copper (Cu)-Dissolved (mg/L)	0.530	0.482	0.359	0.00598	
	Iron (Fe)-Dissolved (mg/L)	42.9	43.2	215	0.047	
	Ferrous Iron, Dissolved (mg/L)	44.0	43.8	320	0.056	
	Lead (Pb)-Dissolved (mg/L)	0.259	0.248	0.626	0.00299	
	Lithium (Li)-Dissolved (mg/L)	0.273	0.274	0.062	0.00219	
	Magnesium (Mg)-Dissolved (mg/L)	1600	1580	361	5.54	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316379-1	L1316379-2	L1316379-3	L1316379-4	L1316379-5
	Description	water	water	water	water	water
	Sampled Date	11-JUN-13	11-JUN-13	11-JUN-13	11-JUN-13	11-JUN-13
	Sampled Time	10:00	10:00	12:10	13:35	13:35
	Client ID	CH-MILL-03_SESP13	CH-MILL-903_SESP13	FCS-2_SESP13	FCS-4_SESP13	FCS-94_SESP13
Grouping	**Analyte**					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	143	148	163	145	149
	Mercury (Hg)-Dissolved (mg/L)	0.000489	0.000381	0.000037	0.000014	0.000014
	Molybdenum (Mo)-Dissolved (mg/L)	DLA <0.025	DLA <0.025	DLA <0.010	DLA <0.010	DLA <0.010
	Nickel (Ni)-Dissolved (mg/L)	3.11	3.14	2.76	2.32	2.37
	Phosphorus (P)-Dissolved (mg/L)	DLA <1.5	DLA <1.5	DLA <1.5	DLA <1.5	DLA <1.5
	Potassium (K)-Dissolved (mg/L)	DLA <25	DLA <25	18	18	18
	Selenium (Se)-Dissolved (mg/L)	DLA <0.050	DLA <0.050	DLA <0.020	DLA <0.020	DLA <0.020
	Silicon (Si)-Dissolved (mg/L)	31.3	30.4	15.9	15.0	15.0
	Silicon (as SiO2)-Dissolved (mg/L)	66.8	64.9	34.1	32.0	32.1
	Silver (Ag)-Dissolved (mg/L)	DLA <0.0050	DLA <0.0050	DLA <0.0020	DLA <0.0020	DLA <0.0020
	Sodium (Na)-Dissolved (mg/L)	110	119	57	62	64
	Strontium (Sr)-Dissolved (mg/L)	1.40	1.40	3.85	3.91	4.04
	Sulfur (S)-Dissolved (mg/L)	3660	3640	3270	3010	3030
	Thallium (Tl)-Dissolved (mg/L)	0.0107	0.0124	0.0021	0.0021	DLA <0.0020
	Titanium (Ti)-Dissolved (mg/L)	DLA <5.0	DLA <5.0	DLA <2.0	DLA <2.0	DLA <2.0
	Uranium (U)-Dissolved (mg/L)	0.0339	0.0326	0.0317	0.0194	0.0188
	Vanadium (V)-Dissolved (mg/L)	DLA <0.50	DLA <0.50	DLA <0.20	DLA <0.20	DLA <0.20
	Zinc (Zn)-Dissolved (mg/L)	2360	2460	1380	1080	1140

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316379-6	L1316379-7	L1316379-8	L1316379-9	L1316379-10
	Description	water	water	water	water	water
	Sampled Date	11-JUN-13	11-JUN-13	11-JUN-13	11-JUN-13	11-JUN-13
	Sampled Time	14:10	16:00	10:10	17:15	12:45
	Client ID	SRK-FD09_SESP13	SRK-FD13_SESP13	SRK-FD19_SESP13	SRK-FD24_SESP13	SRK-FD31_SESP13
Grouping	**Analyte**					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	118	495	61.6	13.4	169
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	0.000100	<0.000010	<0.000010	0.000024
	Molybdenum (Mo)-Dissolved (mg/L)	DLA <0.010	DLA <0.050	DLA <0.0025	DLA <0.00050	DLA <0.010
	Nickel (Ni)-Dissolved (mg/L)	2.23	18.4	1.13	0.431	3.35
	Phosphorus (P)-Dissolved (mg/L)	DLA <1.5	DLA <6.0	DLA <0.90	<0.30	DLA <1.5
	Potassium (K)-Dissolved (mg/L)	17	DLA <50	11.0	5.21	16
	Selenium (Se)-Dissolved (mg/L)	DLA <0.020	DLA <0.10	0.0075	DLA <0.0010	DLA <0.020
	Silicon (Si)-Dissolved (mg/L)	7.02	33.1	6.05	8.38	12.1
	Silicon (as SiO2)-Dissolved (mg/L)	15.0	70.8	12.9	17.9	25.8
	Silver (Ag)-Dissolved (mg/L)	DLA <0.0020	DLA <0.010	DLA <0.00050	0.00016	DLA <0.0020
	Sodium (Na)-Dissolved (mg/L)	45	DLA <50	22.3	5.83	56
	Strontium (Sr)-Dissolved (mg/L)	2.59	0.94	3.14	0.682	3.96
	Sulfur (S)-Dissolved (mg/L)	2600	11300	1760	548	3850
	Thallium (Tl)-Dissolved (mg/L)	0.0022	DLA <0.010	DLA <0.00050	0.00251	0.0028
	Titanium (Ti)-Dissolved (mg/L)	DLA <2.0	DLA <10	DLA <0.50	DLA <0.10	DLA <2.0
	Uranium (U)-Dissolved (mg/L)	0.0064	0.526	0.0159	0.00832	0.0252
	Vanadium (V)-Dissolved (mg/L)	DLA <0.20	DLA <1.0	DLA <0.050	DLA <0.010	DLA <0.20
	Zinc (Zn)-Dissolved (mg/L)	1220	5040	269	89.9	1690

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316379-11	L1316379-12	L1316379-13	L1316379-14	
	Description	water	water	water	water	
	Sampled Date	11-JUN-13	11-JUN-13	12-JUN-13	12-JUN-13	
	Sampled Time	16:20	16:40	10:30	12:20	
	Client ID	SRK-FD56_SESP13	SRK-FD956_SESP13	FCS-5_SESP13	SRK-FD18_SESP13	
Grouping	**Analyte**					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	119	117	55.7	0.00328	
	Mercury (Hg)-Dissolved (mg/L)	0.000030 DLA	0.000019 DLA	0.000106 DLA	0.000027	
	Molybdenum (Mo)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0025	0.000949	
	Nickel (Ni)-Dissolved (mg/L)	3.19 DLA	3.13 DLA	0.703	0.00109	
	Phosphorus (P)-Dissolved (mg/L)	<1.5	<1.5	<0.30	<0.30	
	Potassium (K)-Dissolved (mg/L)	19.3 DLA	18.7 DLA	7.2 DLA	1.21	
	Selenium (Se)-Dissolved (mg/L)	<0.010	<0.010	<0.0050	0.00019	
	Silicon (Si)-Dissolved (mg/L)	6.96	6.79	7.52	5.08	
	Silicon (as SiO2)-Dissolved (mg/L)	14.9 DLA	14.5 DLA	16.1 DLA	11.1	
	Silver (Ag)-Dissolved (mg/L)	<0.0010	<0.0010	<0.00050	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	76.3	75.0	21.0	1.86	
	Strontium (Sr)-Dissolved (mg/L)	2.08	2.04	1.35	0.0975	
	Sulfur (S)-Dissolved (mg/L)	2910	2880	978	10.9	
	Thallium (Tl)-Dissolved (mg/L)	0.0055 DLA	0.0054 DLA	0.00125 DLA	0.000077	
	Titanium (Ti)-Dissolved (mg/L)	<1.0	<1.0	<0.50	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.0209 DLA	0.0205 DLA	0.0103 DLA	0.000892	
	Vanadium (V)-Dissolved (mg/L)	<0.10	<0.10	<0.050	<0.0010	
	Zinc (Zn)-Dissolved (mg/L)	662	648	361	0.109	

* 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	Phosphorus (P)-Dissolved	DLA	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Antimony (Sb)-Dissolved	DLA	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Arsenic (As)-Dissolved	DLA	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Beryllium (Be)-Dissolved	DLA	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Boron (B)-Dissolved	DLA	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Chromium (Cr)-Dissolved	DLA	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Molybdenum (Mo)-Dissolved	DLA	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Selenium (Se)-Dissolved	DLA	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Silver (Ag)-Dissolved	DLA	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Titanium (Ti)-Dissolved	DLA	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Vanadium (V)-Dissolved	DLA	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cyanide, Free	DLM	L1316379-1, -10, -11, -12, -13, -2, -6
Matrix Spike	Ammonia, Total (as N)	MS-B	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Cadmium (Cd)-Dissolved	MS-B	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Cobalt (Co)-Dissolved	MS-B	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Nickel (Ni)-Dissolved	MS-B	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Copper (Cu)-Dissolved	MS-B	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Dissolved Organic Carbon	MS-B	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1316379-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
AI	Analytical interferences may be present. Result may be biased high.
DLA	Detection Limit Adjusted For required dilution
DLM	Detection Limit Adjusted For 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**
ACY-H2O2-MAN-VA	Water	Acidity by Hot Peroxide Manual Titration	APHA - ACIDITY (2310)

Reference Information

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". The procedure involves preliminary sample treatment by the hot peroxide procedure, and Acidity is subsequently determined by potentiometric titration to a specified endpoint (i.e. pH = 8.3).

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-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.

ALK-SCR-VA Water Alkalinity by colour or titration EPA 310.2 OR APHA 2320

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
OR
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-DOC-VA Water Dissolved 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)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

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.

FE2-D-COL-VA Water Diss. Ferrous Iron in Water by Colour James W. Ball et al (1999)

This analysis is carried out using procedures adapted from "A New Method for the Direct Determination of Dissolved Iron Concentration in Acid Mine Waters" published by James W. Ball et al (1999). The procedures involves preliminary sample filtration (0.1um filter) and Ferrous Iron is determined using the "FerroZine" colorimteric method.

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).

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).

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.

PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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.

SIO2-D-CALC-VA Water Dissolved Silicon (reported as Silica) CALCULATION

Dissolved Silicon (as SiO2) is a calculated parameter. Dissolved Silicon (as SiO2 mg/L) = 2.139 x Dissolved Silicon (mg/L).

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-LOW-VA Water Total Suspended Solids by Grav. (1 mg/L) APHA 2540 Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** 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:

ALS06121304

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-H2O2-MAN-VA	**Water**							
Batch R2634731								
WG1691956-2 CRM		**VA-ACY-M-CONTROL**						
Acidity-Hot Peroxide Treated (as CaCO3)			98.9		%		85-115	19-JUN-13
WG1691956-3 DUP		**L1316379-10**						
Acidity-Hot Peroxide Treated (as CaCO3)		4090	4020		mg/L	1.7	20	19-JUN-13
WG1691956-1 MB								
Acidity-Hot Peroxide Treated (as CaCO3)			<25		mg/L		25	19-JUN-13
ACY-PCT-VA	**Water**							
Batch R2634711								
WG1691294-10 CRM		**VA-ACY-CONTROL**						
Acidity (as CaCO3)			101.9		%		85-115	19-JUN-13
WG1691294-11 CRM		**VA-ACY-CONTROL**						
Acidity (as CaCO3)			101.1		%		85-115	19-JUN-13
WG1691294-12 CRM		**VA-ACY-CONTROL**						
Acidity (as CaCO3)			104.3		%		85-115	19-JUN-13
WG1691294-14 CRM		**VA-ACY-CONTROL**						
Acidity (as CaCO3)			99.1		%		85-115	19-JUN-13
WG1691294-15 CRM		**VA-ACY-CONTROL**						
Acidity (as CaCO3)			100.2		%		85-115	19-JUN-13
WG1691294-16 CRM		**VA-ACY-CONTROL**						
Acidity (as CaCO3)			100.8		%		85-115	19-JUN-13
WG1691294-9 CRM		**VA-ACY-CONTROL**						
Acidity (as CaCO3)			94.5		%		85-115	19-JUN-13
ALK-PCT-VA	**Water**							
Batch R2638529								
WG1695189-9 CRM		**VA-ALK-PCT-CONTROL**						
Alkalinity, Total (as CaCO3)			101.4		%		85-115	25-JUN-13
WG1695189-33 DUP		**L1316379-10**						
Alkalinity, Total (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	25-JUN-13
Alkalinity, Bicarbonate (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	25-JUN-13
Alkalinity, Carbonate (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	25	25-JUN-13
Alkalinity, Hydroxide (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	25-JUN-13
WG1695189-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	25-JUN-13
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	25-JUN-13
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	25-JUN-13
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	25-JUN-13
ALK-SCR-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-SCR-VA	**Water**							
Batch R2637533								
WG1694921-2 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			97.2		%		85-115	25-JUN-13
WG1694921-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	25-JUN-13
Batch R2642170								
WG1699491-2 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			97.2		%		85-115	25-JUN-13
WG1699491-4 CRM		**VA-ALKM-CONTROL**						
Alkalinity, Total (as CaCO3)			101.0		%		85-115	25-JUN-13
WG1699491-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	25-JUN-13
ANIONS-CL-IC-WR	**Water**							
Batch R2642291								
WG1699914-3 DUP		**L1316379-10**						
Chloride (Cl)		<25	<25	RPD-NA	mg/L	N/A	20	14-JUN-13
WG1699914-2 LCS								
Chloride (Cl)			103.0		%		85-115	14-JUN-13
WG1699914-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	14-JUN-13
WG1699914-4 MS		**L1316379-10**						
Chloride (Cl)			103.7		%		75-125	14-JUN-13
ANIONS-F-IC-WR	**Water**							
Batch R2642291								
WG1699914-3 DUP		**L1316379-10**						
Fluoride (F)		2.6	2.6		mg/L	1.7	20	14-JUN-13
WG1699914-2 LCS								
Fluoride (F)			104.6		%		85-115	14-JUN-13
WG1699914-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	14-JUN-13
WG1699914-4 MS		**L1316379-10**						
Fluoride (F)			115.5		%		75-125	14-JUN-13
ANIONS-NO2-IC-WR	**Water**							
Batch R2642291								
WG1699914-3 DUP		**L1316379-10**						
Nitrite (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	14-JUN-13
WG1699914-2 LCS								
Nitrite (as N)			98.6		%		85-115	14-JUN-13
WG1699914-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-NO2-IC-WR	**Water**							
Batch R2642291								
WG1699914-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	14-JUN-13
WG1699914-4 MS		**L1316379-10**						
Nitrite (as N)			93.6		%		75-125	14-JUN-13
ANIONS-NO3-IC-WR	**Water**							
Batch R2642291								
WG1699914-3 DUP		**L1316379-10**						
Nitrate (as N)		2.60	2.59		mg/L	0.4	20	14-JUN-13
WG1699914-2 LCS								
Nitrate (as N)			103.7		%		85-115	14-JUN-13
WG1699914-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	14-JUN-13
WG1699914-4 MS		**L1316379-10**						
Nitrate (as N)			103.4		%		75-125	14-JUN-13
ANIONS-SO4-IC-WR	**Water**							
Batch R2642291								
WG1699914-3 DUP		**L1316379-10**						
Sulfate (SO4)		12400	12400		mg/L	0.1	20	14-JUN-13
WG1699914-2 LCS								
Sulfate (SO4)			106.3		%		85-115	14-JUN-13
WG1699914-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	14-JUN-13
WG1699914-4 MS		**L1316379-10**						
Sulfate (SO4)			N/A	MS-B	%		-	14-JUN-13
CARBONS-DOC-VA	**Water**							
Batch R2641235								
WG1697382-6 LCS								
Dissolved Organic Carbon			108.5		%		80-120	30-JUN-13
WG1697382-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	30-JUN-13
WG1697382-2 MS		**L1316343-1**						
Dissolved Organic Carbon			104.4		%		70-130	30-JUN-13
Batch R2641786								
WG1699338-3 LCS								
Dissolved Organic Carbon			99.6		%		80-120	01-JUL-13
WG1699338-2 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	01-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CARBONS-DOC-VA	**Water**							
Batch R2641900								
WG1699475-1 DUP		**L1316379-10**						
Dissolved Organic Carbon		8.76	9.01		mg/L	2.9	20	30-JUN-13
WG1699475-4 LCS								
Dissolved Organic Carbon			108.5		%		80-120	30-JUN-13
WG1699475-3 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	30-JUN-13
WG1699475-2 MS		**L1316379-10**						
Dissolved Organic Carbon			N/A	MS-B	%		-	30-JUN-13
CN-FREE-CFA-VA	**Water**							
Batch R2642477								
WG1700073-3 DUP		**L1316379-10**						
Cyanide, Free		<0.020	<0.020	RPD-NA	mg/L	N/A	20	28-JUN-13
WG1700073-2 LCS								
Cyanide, Free			101.0		%		80-120	28-JUN-13
WG1700073-1 MB								
Cyanide, Free			<0.0050		mg/L		0.005	28-JUN-13
WG1700073-4 MS		**L1316379-10**						
Cyanide, Free			77.0		%		70-130	28-JUN-13
FE2-D-COL-VA	**Water**							
Batch R2633546								
WG1689893-5 DUP		**L1316379-10**						
Ferrous Iron, Dissolved		912	914		mg/L	0.2	20	17-JUN-13
WG1689893-2 LCS								
Ferrous Iron, Dissolved			103.6		%		80-120	17-JUN-13
WG1689893-1 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	17-JUN-13
WG1689893-4 MS		**L1316343-1**						
Ferrous Iron, Dissolved			107.0		%		70-130	17-JUN-13
WG1689893-6 MS		**L1316379-10**						
Ferrous Iron, Dissolved			90.4		%		70-130	17-JUN-13
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2633814								
WG1689998-3 LCS								
Mercury (Hg)-Dissolved			98.6		%		80-120	18-JUN-13
WG1689998-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	18-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2634898								
WG1689998-4 DUP		**L1316379-10**						
Mercury (Hg)-Dissolved		0.000024	0.000023		mg/L	5.7	20	19-JUN-13
WG1689998-5 MS		**L1316379-10**						
Mercury (Hg)-Dissolved			92.8		%		70-130	19-JUN-13
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1689998-2 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Dissolved			98.4		%		80-120	17-JUN-13
Antimony (Sb)-Dissolved			101.8		%		80-120	17-JUN-13
Arsenic (As)-Dissolved			97.9		%		80-120	17-JUN-13
Barium (Ba)-Dissolved			98.9		%		80-120	17-JUN-13
Beryllium (Be)-Dissolved			95.5		%		80-120	17-JUN-13
Boron (B)-Dissolved			90.4		%		80-120	17-JUN-13
Cadmium (Cd)-Dissolved			99.9		%		80-120	17-JUN-13
Chromium (Cr)-Dissolved			98.6		%		80-120	17-JUN-13
Cobalt (Co)-Dissolved			95.2		%		80-120	17-JUN-13
Copper (Cu)-Dissolved			94.1		%		80-120	17-JUN-13
Lead (Pb)-Dissolved			98.5		%		80-120	17-JUN-13
Lithium (Li)-Dissolved			97.0		%		80-120	17-JUN-13
Manganese (Mn)-Dissolved			96.0		%		80-120	17-JUN-13
Molybdenum (Mo)-Dissolved			97.6		%		80-120	17-JUN-13
Nickel (Ni)-Dissolved			95.8		%		80-120	17-JUN-13
Potassium (K)-Dissolved			96.8		%		80-120	17-JUN-13
Selenium (Se)-Dissolved			96.4		%		80-120	17-JUN-13
Silver (Ag)-Dissolved			99.0		%		80-120	17-JUN-13
Sodium (Na)-Dissolved			99.5		%		80-120	17-JUN-13
Strontium (Sr)-Dissolved			97.3		%		80-120	17-JUN-13
Thallium (Tl)-Dissolved			99.3		%		80-120	17-JUN-13
Titanium (Ti)-Dissolved			88.0		%		80-120	17-JUN-13
Uranium (U)-Dissolved			98.5		%		80-120	17-JUN-13
Vanadium (V)-Dissolved			97.2		%		80-120	17-JUN-13
Zinc (Zn)-Dissolved			94.6		%		80-120	17-JUN-13
WG1689998-4 DUP		**L1316379-10**						
Aluminum (Al)-Dissolved		5.09	5.39		mg/L	5.7	20	27-JUN-13
Antimony (Sb)-Dissolved		<0.020	<0.020	RPD-NA	mg/L	N/A	20	27-JUN-13
Arsenic (As)-Dissolved		<0.020	<0.020	RPD-NA	mg/L	N/A	20	27-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1689998-4 DUP		**L1316379-10**						
Barium (Ba)-Dissolved		0.027	0.029		mg/L	5.7	20	27-JUN-13
Beryllium (Be)-Dissolved		<0.020	<0.020	RPD-NA	mg/L	N/A	20	27-JUN-13
Boron (B)-Dissolved		<2.0	<2.0	RPD-NA	mg/L	N/A	20	27-JUN-13
Cadmium (Cd)-Dissolved		1.31	1.36		mg/L	3.6	20	27-JUN-13
Chromium (Cr)-Dissolved		<0.020	<0.020	RPD-NA	mg/L	N/A	20	27-JUN-13
Cobalt (Co)-Dissolved		2.91	2.99		mg/L	2.6	20	27-JUN-13
Copper (Cu)-Dissolved		1.73	1.80		mg/L	3.7	20	27-JUN-13
Lead (Pb)-Dissolved		0.042	0.041		mg/L	4.3	20	27-JUN-13
Lithium (Li)-Dissolved		0.13	0.13		mg/L	5.4	20	27-JUN-13
Manganese (Mn)-Dissolved		169	174		mg/L	3.0	20	27-JUN-13
Molybdenum (Mo)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	27-JUN-13
Nickel (Ni)-Dissolved		3.35	3.49		mg/L	4.1	20	27-JUN-13
Potassium (K)-Dissolved		16	17		mg/L	5.1	20	27-JUN-13
Selenium (Se)-Dissolved		<0.020	<0.020	RPD-NA	mg/L	N/A	20	27-JUN-13
Silver (Ag)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	27-JUN-13
Sodium (Na)-Dissolved		56	59		mg/L	3.7	20	27-JUN-13
Strontium (Sr)-Dissolved		3.96	4.09		mg/L	3.4	20	27-JUN-13
Thallium (Tl)-Dissolved		0.0028	0.0027		mg/L	3.8	20	27-JUN-13
Titanium (Ti)-Dissolved		<2.0	<2.0	RPD-NA	mg/L	N/A	20	27-JUN-13
Uranium (U)-Dissolved		0.0252	0.0251		mg/L	0.4	20	27-JUN-13
Vanadium (V)-Dissolved		<0.20	<0.20	RPD-NA	mg/L	N/A	20	27-JUN-13
Zinc (Zn)-Dissolved		1690	1750		mg/L	3.3	20	27-JUN-13
WG1689998-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	17-JUN-13
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Boron (B)-Dissolved			<0.010		mg/L		0.01	17-JUN-13
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	17-JUN-13
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1689998-1 MB								
Lithium (Li)-Dissolved			<0.00050		mg/L		0.0005	17-JUN-13
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	17-JUN-13
Potassium (K)-Dissolved			<0.050		mg/L		0.05	17-JUN-13
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	17-JUN-13
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	17-JUN-13
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	17-JUN-13
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	17-JUN-13
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	17-JUN-13
WG1689998-5 MS		**L1316379-10**						
Aluminum (Al)-Dissolved			117.2		%		70-130	25-JUN-13
Antimony (Sb)-Dissolved			102.5		%		70-130	25-JUN-13
Arsenic (As)-Dissolved			105.1		%		70-130	27-JUN-13
Barium (Ba)-Dissolved			103.3		%		70-130	25-JUN-13
Beryllium (Be)-Dissolved			96.3		%		70-130	25-JUN-13
Boron (B)-Dissolved			92.5		%		70-130	25-JUN-13
Cadmium (Cd)-Dissolved			N/A	MS-B	%		-	25-JUN-13
Chromium (Cr)-Dissolved			96.1		%		70-130	25-JUN-13
Cobalt (Co)-Dissolved			167.7	MS-B	%		70-130	25-JUN-13
Copper (Cu)-Dissolved			N/A	MS-B	%		-	27-JUN-13
Lead (Pb)-Dissolved			100.9		%		70-130	25-JUN-13
Lithium (Li)-Dissolved			100.6		%		70-130	25-JUN-13
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	25-JUN-13
Molybdenum (Mo)-Dissolved			103.3		%		70-130	25-JUN-13
Nickel (Ni)-Dissolved			136.9	MS-B	%		70-130	25-JUN-13
Potassium (K)-Dissolved			98.8		%		70-130	25-JUN-13
Selenium (Se)-Dissolved			97.9		%		70-130	25-JUN-13
Silver (Ag)-Dissolved			100.9		%		70-130	25-JUN-13
Sodium (Na)-Dissolved			110.9		%		70-130	25-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1689998-5 MS		**L1316379-10**						
Strontium (Sr)-Dissolved			195.4	MS-B	%		70-130	25-JUN-13
Thallium (Tl)-Dissolved			98.5		%		70-130	25-JUN-13
Titanium (Ti)-Dissolved			99.5		%		70-130	25-JUN-13
Uranium (U)-Dissolved			104.1		%		70-130	25-JUN-13
Vanadium (V)-Dissolved			97.8		%		70-130	25-JUN-13
Zinc (Zn)-Dissolved			N/A	MS-B	%		-	25-JUN-13
MET-DIS-ICP-VA	**Water**							
Batch R2633893								
WG1689998-2 CRM		**VA-HIGH-WATRM**						
Calcium (Ca)-Dissolved			98.3		%		80-120	18-JUN-13
Iron (Fe)-Dissolved			99.4		%		80-120	18-JUN-13
Magnesium (Mg)-Dissolved			102.5		%		80-120	18-JUN-13
Phosphorus (P)-Dissolved			99.5		%		80-120	18-JUN-13
Silicon (Si)-Dissolved			99.1		%		80-120	18-JUN-13
WG1689998-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	18-JUN-13
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	18-JUN-13
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	18-JUN-13
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	18-JUN-13
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	18-JUN-13
Batch R2639755								
WG1689998-4 DUP		**L1316379-10**						
Calcium (Ca)-Dissolved		502	501		mg/L	0.3	20	26-JUN-13
Iron (Fe)-Dissolved		821	822		mg/L	0.1	20	26-JUN-13
Magnesium (Mg)-Dissolved		1470	1470		mg/L	0.1	20	26-JUN-13
Phosphorus (P)-Dissolved		<1.5	<1.5	RPD-NA	mg/L	N/A	20	26-JUN-13
Silicon (Si)-Dissolved		12.1	12.1		mg/L	0.2	20	26-JUN-13
WG1689998-5 MS		**L1316379-10**						
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	26-JUN-13
Iron (Fe)-Dissolved			N/A	MS-B	%		-	26-JUN-13
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	26-JUN-13
NH3-F-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-F-VA	**Water**							
Batch R2634754								
WG1689429-2 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			105.3		%		85-115	19-JUN-13
WG1689429-6 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			100.7		%		85-115	19-JUN-13
WG1689429-4 DUP		**L1316379-10**						
Ammonia, Total (as N)		0.673	0.631		mg/L	6.5	20	19-JUN-13
WG1689429-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	19-JUN-13
WG1689429-3 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	19-JUN-13
WG1689429-5 MS		**L1316379-10**						
Ammonia, Total (as N)			N/A	MS-B	%		-	19-JUN-13
PH-PCT-VA	**Water**							
Batch R2634711								
WG1691294-25 CRM		**VA-PH7-BUF**						
pH			7.02		pH		6.9-7.1	19-JUN-13
WG1691294-26 CRM		**VA-PH7-BUF**						
pH			7.04		pH		6.9-7.1	19-JUN-13
WG1691294-27 CRM		**VA-PH7-BUF**						
pH			7.03		pH		6.9-7.1	19-JUN-13
WG1691294-28 CRM		**VA-PH7-BUF**						
pH			7.02		pH		6.9-7.1	19-JUN-13
WG1691294-29 CRM		**VA-PH7-BUF**						
pH			7.02		pH		6.9-7.1	19-JUN-13
WG1691294-30 CRM		**VA-PH7-BUF**						
pH			7.02		pH		6.9-7.1	19-JUN-13
WG1691294-31 CRM		**VA-PH7-BUF**						
pH			7.02		pH		6.9-7.1	19-JUN-13
WG1691294-32 CRM		**VA-PH7-BUF**						
pH			7.00		pH		6.9-7.1	19-JUN-13
Batch R2635377								
WG1691354-26 CRM		**VA-PH7-BUF**						
pH			7.08		pH		6.9-7.1	19-JUN-13
WG1691354-33 DUP		**L1316379-13**						
pH		4.38	4.08	J	pH	0.30	0.3	19-JUN-13
PO4-DO-COL-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4-DO-COL-VA	**Water**							
Batch R2633164								
WG1689230-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			95.3		%		80-120	14-JUN-13
WG1689230-6 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			88.4		%		80-120	14-JUN-13
WG1689230-3 DUP		**L1316379-10**						
Orthophosphate-Dissolved (as P)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	14-JUN-13
WG1689230-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	14-JUN-13
WG1689230-5 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	14-JUN-13
WG1689230-4 MS		**L1316379-10**						
Orthophosphate-Dissolved (as P)			93.1		%		70-130	14-JUN-13
S-DIS-ICP-VA	**Water**							
Batch R2633893								
WG1689998-2 CRM		**VA-HIGH-WATRM**						
Sulfur (S)-Dissolved			101.9		%		80-120	18-JUN-13
WG1689998-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	18-JUN-13
Batch R2639755								
WG1689998-4 DUP		**L1316379-10**						
Sulfur (S)-Dissolved		3850	3860		mg/L	0.1	20	26-JUN-13
WG1689998-5 MS		**L1316379-10**						
Sulfur (S)-Dissolved			N/A	MS-B	%		-	26-JUN-13
TDS-VA	**Water**							
Batch R2633139								
WG1689232-3 DUP		**L1316379-10**						
Total Dissolved Solids		19500	18900		mg/L	2.8	20	14-JUN-13
WG1689232-2 LCS								
Total Dissolved Solids			103.5		%		85-115	14-JUN-13
WG1689232-1 MB								
Total Dissolved Solids			<10		mg/L		10	14-JUN-13
TSS-LOW-VA	**Water**							
Batch R2633060								
WG1689247-2 LCS								
Total Suspended Solids			93.3		%		85-115	15-JUN-13
WG1689247-1 MB								
Total Suspended Solids			<1.0		mg/L		1	15-JUN-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 (Automated)							
	1	11-JUN-13 10:00	19-JUN-13 23:52	0.25	206	hours	EHTR-FM
	2	11-JUN-13 10:00	19-JUN-13 23:52	0.25	206	hours	EHTR-FM
	3	11-JUN-13 12:10	19-JUN-13 23:52	0.25	204	hours	EHTR-FM
	4	11-JUN-13 13:35	19-JUN-13 23:52	0.25	202	hours	EHTR-FM
	5	11-JUN-13 13:35	19-JUN-13 23:52	0.25	202	hours	EHTR-FM
	6	11-JUN-13 14:10	19-JUN-13 23:52	0.25	202	hours	EHTR-FM
	7	11-JUN-13 16:00	19-JUN-13 23:52	0.25	200	hours	EHTR-FM
	8	11-JUN-13 10:10	19-JUN-13 23:25	0.25	205	hours	EHTR-FM
	9	11-JUN-13 17:15	19-JUN-13 23:52	0.25	199	hours	EHTR-FM
	10	11-JUN-13 12:45	19-JUN-13 23:52	0.25	203	hours	EHTR-FM
	11	11-JUN-13 16:20	19-JUN-13 23:52	0.25	199	hours	EHTR-FM
	12	11-JUN-13 16:40	19-JUN-13 23:52	0.25	199	hours	EHTR-FM
	13	12-JUN-13 10:30	19-JUN-13 23:52	0.25	181	hours	EHTR-FM
	14	12-JUN-13 12:20	19-JUN-13 23:25	0.25	179	hours	EHTR-FM
Cyanides							
Free Cyanide in water by CFA							
	1	11-JUN-13 10:00	28-JUN-13 12:47	14	17	days	EHT
	2	11-JUN-13 10:00	28-JUN-13 12:47	14	17	days	EHT
	6	11-JUN-13 14:10	28-JUN-13 12:47	14	17	days	EHT
	10	11-JUN-13 12:45	28-JUN-13 12:47	14	17	days	EHT
	11	11-JUN-13 16:20	28-JUN-13 12:47	14	17	days	EHT
	12	11-JUN-13 16:40	28-JUN-13 12:47	14	17	days	EHT
	13	12-JUN-13 10:30	28-JUN-13 12:47	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 L1316379 were received on 13-JUN-13 09:00.

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.



L1316379-COFC

CH2MHILL **CHAIN OF CUSTODY RECORD** *6/12/2013 1:35:53 PM* Page 1 OF 2

Project Name Faro Mine
Location Faro Mine Complex - Faro YK
Project Number 472645.07.EM.SS.02.0
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-015
Project FARO MINE SEEP SAMPLING 2013
Turnaround Time 10 Days
Shipping Date: 6/12/2013
COC Number: ALS06121304

	DATE	TIME	Matrix	Container:	500ml Poly	125mL Poly	250ml Poly	125ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	250ml Glass	250ml Poly	250ml glass		Number of Containers	.COMMENTS
				Preservatives:	4C	NaOH, 4'C	HNO3, 4'C	HCl, 4'C	4C	4C	4'C	4'C	4'C	4'C	H2SO4, pH<2, 4'C	HNO3, 4'C	H2SO4, pH<2, 4C			
				Filtered:	NA	NA	Field	Field	NA	NA	NA	NA	NA	NA	Field	Field	NA			
				Holding Time:	14	14	180/28	180	14	14	7	7	3	3	28	180/28	28			
					Acidity - Run Hot H2O2	(ASTM 7237) Free Cyanide	(E245.7) Field Filtered Dissolved Hg	(Ferrozine Method) Field Filtered Ferrous Iron	(SM2310) Acidity - Run Hot H2O2 if Fe >15ppm	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM4110B) CL F NO2 NO3 and SO4	(SM4500P) ortho-Phosphate	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered For Metals Analyte List see Table 1	Ammonia (JEM/SM4500NH3) Ammonia			
CH-MILL-03_SESP13	6/11/2013	10:00	Water		X	X	X	X		X	X	X	X	X	X	X	X		8	
CH-MILL-903_SESP13	6/11/2013	10:00	Water		X	X	X	X		X	X	X	X	X	X	X	X		8	
FCS-2_SESP13	6/11/2013	12:10	Water		X		X	X		X	X	X	X	X	X	X	X		7	
FCS-4_SESP13	6/11/2013	13:35	Water		X		X	X		X	X	X	X	X	X	X	X		7	
FCS-94_SESP13	6/11/2013	13:35	Water		X		X	X		X	X	X	X	X	X	X	X		7	
SRK-FD09_SESP13	6/11/2013	14:10	Water		X	X	X	X		X	X	X	X	X	X	X	X		8	
SRK-FD13_SESP13	6/11/2013	16:00	Water		X		X	X		X	X	X	X	X	X	X	X		7	
SRK-FD19_SESP13	6/11/2013	10:10	Water				X	X	X	X	X	X	X	X	X	X	X		7	
SRK-FD24_SESP13	6/11/2013	17:15	Water		X		X	X		X	X	X	X	X	X	X	X		7	
SRK-FD31_SESP13	6/11/2013	12:45	Water		X	X	X	X		X	X	X	X	X	X	X	X		8	LAB DUP/MS
SRK-FD56_SESP13	6/11/2013	16:20	Water		X	X	X	X		X	X	X	X	X	X	X	X		8	
SRK-FD956_SESP13	6/11/2013	16:40	Water		X	X	X	X		X	X	X	X	X	X	X	X		8	
FCS-5_SESP13	6/12/2013	10:30	Water		X	X	X	X		X	X	X	X	X	X	X	X		8	
SRK-FD18_SESP13	6/12/2013	12:20	Water				X	X	X	X	X	X	X	X	X	X	X		7	

Signatures	Date/Time
Approved by	6/12/13 1340
Sampled by	
Relinquished by	
Received by	6/13/13
Relinquished by	
Received by	6,2

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
PO: 604564 on Invoice Perform Lab Dup/MS on the samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 13-JUN-13
Report Date: 04-JUL-13 11:34 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1316410

Project P.O. #: 472645.06.AD.01.04.13 "PO=604564"
Job Reference: FARO MINE SEEP SAMPLING 2013 SW-015
C of C Numbers: ALS06121302
Legal Site Desc:

Amber Springer
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316410-1	L1316410-2			
	Description	Water	Water			
	Sampled Date	10-JUN-13	10-JUN-13			
	Sampled Time	15:15	16:50			
	Client ID	SRK-FD01_SESP13	SRK-FD37_SESP13			
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	3270	5480			
	pH (pH)	7.32				
	Total Suspended Solids (mg/L)	77.4	213			
	Total Dissolved Solids (mg/L)	5150	146000			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	201				
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)		67600			
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	205				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0				
	Alkalinity, Total (as CaCO3) (mg/L)	205				
	Ammonia, Total (as N) (mg/L)	0.0259	0.0123			
	Chloride (Cl) (mg/L)	<10 DLA	<50 DLA			
	Fluoride (F) (mg/L)	<0.40 DLA	16.1			
	Nitrate (as N) (mg/L)	1.58	<0.50 DLA			
	Nitrite (as N) (mg/L)	<0.020 DLA	<0.10 DLA			
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	47.7			
	Sulfate (SO4) (mg/L)	3630	89800			
Cyanides	Cyanide, Free (mg/L)	<0.0050	<0.020 DLM			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	6.56	28.7			
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	0.167	940			
	Antimony (Sb)-Dissolved (mg/L)	<0.0020 DLA	1.71			
	Arsenic (As)-Dissolved (mg/L)	<0.0020 DLA	385			
	Barium (Ba)-Dissolved (mg/L)	0.0288	<0.25 DLA			
	Beryllium (Be)-Dissolved (mg/L)	<0.0020 DLA	<0.50 DLA			
	Boron (B)-Dissolved (mg/L)	<0.20 DLA	<50 DLA			
	Cadmium (Cd)-Dissolved (mg/L)	0.0861	60.9			
	Calcium (Ca)-Dissolved (mg/L)	533	360			
	Chromium (Cr)-Dissolved (mg/L)	<0.0020 DLA	0.92			
	Cobalt (Co)-Dissolved (mg/L)	0.0788	22.5			
	Copper (Cu)-Dissolved (mg/L)	0.0761	1100			
	Iron (Fe)-Dissolved (mg/L)	4.47	10400			
	Ferrous Iron, Dissolved (mg/L)	4.26	7290			
	Lead (Pb)-Dissolved (mg/L)	0.0016	4.98			
	Lithium (Li)-Dissolved (mg/L)	0.046	2.6			
	Magnesium (Mg)-Dissolved (mg/L)	471	1110			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316410-1	L1316410-2			
	Description	Water	Water			
	Sampled Date	10-JUN-13	10-JUN-13			
	Sampled Time	15:15	16:50			
	Client ID	SRK-FD01_SESP13	SRK-FD37_SESP13			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	9.72	841			
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	0.000056			
	Molybdenum (Mo)-Dissolved (mg/L)	<0.0010 DLA	<0.25 DLA			
	Nickel (Ni)-Dissolved (mg/L)	0.309	19.7			
	Phosphorus (P)-Dissolved (mg/L)	<0.60 DLA	19			
	Potassium (K)-Dissolved (mg/L)	9.2	<250 DLA			
	Selenium (Se)-Dissolved (mg/L)	0.0035	<0.50 DLA			
	Silicon (Si)-Dissolved (mg/L)	5.13	47.0			
	Silicon (as SiO2)-Dissolved (mg/L)	11.0	100			
	Silver (Ag)-Dissolved (mg/L)	<0.00020 DLA	<0.050 DLA			
	Sodium (Na)-Dissolved (mg/L)	26.0	<250 DLA			
	Strontium (Sr)-Dissolved (mg/L)	2.90	3.3			
	Sulfur (S)-Dissolved (mg/L)	1050	27800 DLA			
	Thallium (Tl)-Dissolved (mg/L)	0.00060	<0.050 DLA			
	Titanium (Ti)-Dissolved (mg/L)	<0.20 DLA	<50 DLA			
	Uranium (U)-Dissolved (mg/L)	0.00704	2.60			
	Vanadium (V)-Dissolved (mg/L)	<0.020 DLA	<5.0 DLA			
	Zinc (Zn)-Dissolved (mg/L)	116	35400			

* 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	L1316410-1, -2
Duplicate	Arsenic (As)-Dissolved	DLA	L1316410-1, -2
Duplicate	Beryllium (Be)-Dissolved	DLA	L1316410-1, -2
Duplicate	Boron (B)-Dissolved	DLA	L1316410-1, -2
Duplicate	Chromium (Cr)-Dissolved	DLA	L1316410-1, -2
Duplicate	Molybdenum (Mo)-Dissolved	DLA	L1316410-1, -2
Duplicate	Silver (Ag)-Dissolved	DLA	L1316410-1, -2
Duplicate	Titanium (Ti)-Dissolved	DLA	L1316410-1, -2
Duplicate	Vanadium (V)-Dissolved	DLA	L1316410-1, -2
Duplicate	Phosphorus (P)-Dissolved	DLA	L1316410-1, -2
Matrix Spike	Cadmium (Cd)-Dissolved	MS-B	L1316410-1, -2
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1316410-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1316410-1, -2
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1316410-1, -2
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1316410-1, -2
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1316410-1, -2
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1316410-1, -2
Matrix Spike	Dissolved Organic Carbon	MS-B	L1316410-1
Matrix Spike	Sulfate (SO4)	MS-B	L1316410-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
DLM	Detection Limit Adjusted For 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**
ACY-H2O2-MAN-VA	Water	Acidity by Hot Peroxide Manual Titration	APHA - ACIDITY (2310)

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". The procedure involves preliminary sample treatment by the hot peroxide procedure, and Acidity is subsequently determined by potentiometric titration to a specified endpoint (i.e. pH = 8.3).

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-SCR-VA	Water	Alkalinity by colour or titration	EPA 310.2 OR APHA 2320

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
OR
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.

Reference Information

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-DOC-VA	Water	Dissolved 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)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

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.

FE2-D-COL-VA	Water	Diss. Ferrous Iron in Water by Colour	James W. Ball et al (1999)

This analysis is carried out using procedures adapted from "A New Method for the Direct Determination of Dissolved Iron Concentration in Acid Mine Waters" published by James W. Ball et al (1999). The procedures involves preliminary sample filtration (0.1um filter) and Ferrous Iron is determined using the "FerroZine" colorimteric method.

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).

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).

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.

PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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

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.

SIO2-D-CALC-VA Water Dissolved Silicon (reported as Silica) CALCULATION

Dissolved Silicon (as SiO2) is a calculated parameter. Dissolved Silicon (as SiO2 mg/L) = 2.139 x Dissolved Silicon (mg/L).

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-LOW-VA Water Total Suspended Solids by Grav. (1 mg/L) APHA 2540 Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** 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:

ALS06121302

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-H2O2-MAN-VA	**Water**							
Batch R2634731								
WG1691956-2 CRM		**VA-ACY-M-CONTROL**						
Acidity-Hot Peroxide Treated (as CaCO3)			98.9		%		85-115	19-JUN-13
WG1691956-1 MB								
Acidity-Hot Peroxide Treated (as CaCO3)			<25		mg/L		25	19-JUN-13
ACY-PCT-VA	**Water**							
Batch R2636259								
WG1691376-9 CRM		**VA-ACY-CONTROL**						
Acidity (as CaCO3)			94.5		%		85-115	19-JUN-13
WG1691376-33 DUP		**L1316410-1**						
Acidity (as CaCO3)		201	210		mg/L	4.1	20	19-JUN-13
ALK-SCR-VA	**Water**							
Batch R2637009								
WG1693971-2 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			94.8		%		85-115	23-JUN-13
WG1693971-5 CRM		**VA-ALKM-CONTROL**						
Alkalinity, Total (as CaCO3)			101.0		%		85-115	23-JUN-13
WG1693971-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	23-JUN-13
WG1693971-4 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	23-JUN-13
WG1693971-7 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	23-JUN-13
ANIONS-CL-IC-WR	**Water**							
Batch R2642291								
WG1699914-2 LCS								
Chloride (Cl)			103.0		%		85-115	14-JUN-13
WG1699914-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	14-JUN-13
WG1699914-4 MS		**L1316379-10**						
Chloride (Cl)			103.7		%		75-125	14-JUN-13
ANIONS-F-IC-WR	**Water**							
Batch R2642291								
WG1699914-2 LCS								
Fluoride (F)			104.6		%		85-115	14-JUN-13
WG1699914-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	14-JUN-13
WG1699914-4 MS		**L1316379-10**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-F-IC-WR	**Water**							
Batch R2642291								
WG1699914-4 MS		**L1316379-10**						
Fluoride (F)			115.5		%		75-125	14-JUN-13
ANIONS-NO2-IC-WR	**Water**							
Batch R2642291								
WG1699914-2 LCS								
Nitrite (as N)			98.6		%		85-115	14-JUN-13
WG1699914-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	14-JUN-13
WG1699914-4 MS		**L1316379-10**						
Nitrite (as N)			93.6		%		75-125	14-JUN-13
ANIONS-NO3-IC-WR	**Water**							
Batch R2642291								
WG1699914-2 LCS								
Nitrate (as N)			103.7		%		85-115	14-JUN-13
WG1699914-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	14-JUN-13
WG1699914-4 MS		**L1316379-10**						
Nitrate (as N)			103.4		%		75-125	14-JUN-13
ANIONS-SO4-IC-WR	**Water**							
Batch R2642291								
WG1699914-2 LCS								
Sulfate (SO4)			106.3		%		85-115	14-JUN-13
WG1699914-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	14-JUN-13
WG1699914-4 MS		**L1316379-10**						
Sulfate (SO4)			N/A	MS-B	%		-	14-JUN-13
CARBONS-DOC-VA	**Water**							
Batch R2641235								
WG1697382-6 LCS								
Dissolved Organic Carbon			108.5		%		80-120	30-JUN-13
WG1697382-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	30-JUN-13
WG1697382-2 MS		**L1316343-1**						
Dissolved Organic Carbon			104.4		%		70-130	30-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CARBONS-DOC-VA	**Water**							
Batch R2641900								
WG1699475-4 LCS								
Dissolved Organic Carbon			108.5		%		80-120	30-JUN-13
WG1699475-3 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	30-JUN-13
WG1699475-2 MS		**L1316379-10**						
Dissolved Organic Carbon			N/A	MS-B	%		-	30-JUN-13
Batch R2642664								
WG1700207-3 LCS								
Dissolved Organic Carbon			107.8		%		80-120	02-JUL-13
WG1700207-2 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	02-JUL-13
CN-FREE-CFA-VA	**Water**							
Batch R2638569								
WG1694540-3 DUP		**L1316410-1**						
Cyanide, Free		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	24-JUN-13
WG1694540-2 LCS								
Cyanide, Free			100.9		%		80-120	24-JUN-13
WG1694540-1 MB								
Cyanide, Free			<0.0050		mg/L		0.005	24-JUN-13
FE2-D-COL-VA	**Water**							
Batch R2633546								
WG1689893-2 LCS								
Ferrous Iron, Dissolved			103.6		%		80-120	17-JUN-13
WG1689893-1 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	17-JUN-13
WG1689893-4 MS		**L1316343-1**						
Ferrous Iron, Dissolved			107.0		%		70-130	17-JUN-13
WG1689893-6 MS		**L1316379-10**						
Ferrous Iron, Dissolved			90.4		%		70-130	17-JUN-13
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2633814								
WG1689951-3 LCS								
Mercury (Hg)-Dissolved			98.8		%		80-120	18-JUN-13
WG1689951-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	18-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2633849								
WG1689951-4 DUP		**L1316410-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	18-JUN-13
WG1689951-5 MS		**L1316410-1**						
Mercury (Hg)-Dissolved			99.6		%		70-130	18-JUN-13
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1689951-2 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Dissolved			119.4		%		80-120	17-JUN-13
Antimony (Sb)-Dissolved			101.2		%		80-120	17-JUN-13
Barium (Ba)-Dissolved			117.2		%		80-120	17-JUN-13
Beryllium (Be)-Dissolved			99.7		%		80-120	17-JUN-13
Boron (B)-Dissolved			96.1		%		80-120	17-JUN-13
Cobalt (Co)-Dissolved			116.4		%		80-120	17-JUN-13
Copper (Cu)-Dissolved			115.2		%		80-120	17-JUN-13
Lead (Pb)-Dissolved			100.4		%		80-120	17-JUN-13
Lithium (Li)-Dissolved			100.9		%		80-120	17-JUN-13
Manganese (Mn)-Dissolved			118.0		%		80-120	17-JUN-13
Molybdenum (Mo)-Dissolved			101.1		%		80-120	17-JUN-13
Nickel (Ni)-Dissolved			117.4		%		80-120	17-JUN-13
Selenium (Se)-Dissolved			98.8		%		80-120	17-JUN-13
Silver (Ag)-Dissolved			99.8		%		80-120	17-JUN-13
Strontium (Sr)-Dissolved			99.7		%		80-120	17-JUN-13
Thallium (Tl)-Dissolved			100.7		%		80-120	17-JUN-13
Uranium (U)-Dissolved			99.2		%		80-120	17-JUN-13
Vanadium (V)-Dissolved			119.1		%		80-120	17-JUN-13
Zinc (Zn)-Dissolved			115.3		%		80-120	17-JUN-13
WG1689951-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	17-JUN-13
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Boron (B)-Dissolved			<0.010		mg/L		0.01	17-JUN-13
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1689951-1 MB								
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	17-JUN-13
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Lithium (Li)-Dissolved			<0.00050		mg/L		0.0005	17-JUN-13
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	17-JUN-13
Potassium (K)-Dissolved			<0.050		mg/L		0.05	17-JUN-13
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	17-JUN-13
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	17-JUN-13
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	17-JUN-13
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	17-JUN-13
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	17-JUN-13
Batch R2634463								
WG1689951-2 CRM		**VA-HIGH-WATRM**						
Arsenic (As)-Dissolved			103.0		%		80-120	27-JUN-13
Cadmium (Cd)-Dissolved			103.9		%		80-120	27-JUN-13
Chromium (Cr)-Dissolved			101.2		%		80-120	27-JUN-13
Potassium (K)-Dissolved			100.8		%		80-120	27-JUN-13
Sodium (Na)-Dissolved			102.4		%		80-120	27-JUN-13
Titanium (Ti)-Dissolved			101.5		%		80-120	27-JUN-13
WG1689951-4 DUP		**L1316410-1**						
Aluminum (Al)-Dissolved		0.167	0.181		mg/L	7.7	20	27-JUN-13
Antimony (Sb)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	25-JUN-13
Arsenic (As)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	25-JUN-13
Barium (Ba)-Dissolved		0.0288	0.0280		mg/L	2.9	20	25-JUN-13
Beryllium (Be)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	25-JUN-13
Boron (B)-Dissolved		<0.20	<0.20	RPD-NA	mg/L	N/A	20	25-JUN-13
Cadmium (Cd)-Dissolved		0.0861	0.0858		mg/L	0.4	20	25-JUN-13
Chromium (Cr)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	25-JUN-13
Cobalt (Co)-Dissolved		0.0788	0.0830		mg/L	5.2	20	25-JUN-13
Copper (Cu)-Dissolved		0.0761	0.0737		mg/L	3.3	20	25-JUN-13
Lead (Pb)-Dissolved		0.0016	0.0017		mg/L	8.7	20	25-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2634463								
WG1689951-4 DUP		**L1316410-1**						
Lithium (Li)-Dissolved		0.046	0.047		mg/L	2.4	20	25-JUN-13
Manganese (Mn)-Dissolved		9.72	9.71		mg/L	0.1	20	25-JUN-13
Molybdenum (Mo)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	25-JUN-13
Nickel (Ni)-Dissolved		0.309	0.314		mg/L	1.5	20	25-JUN-13
Potassium (K)-Dissolved		9.2	8.8		mg/L	3.8	20	25-JUN-13
Selenium (Se)-Dissolved		0.0035	0.0033		mg/L	4.8	20	25-JUN-13
Silver (Ag)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	25-JUN-13
Sodium (Na)-Dissolved		26.0	25.0		mg/L	3.8	20	25-JUN-13
Strontium (Sr)-Dissolved		2.90	2.91		mg/L	0.0	20	25-JUN-13
Thallium (Tl)-Dissolved		0.00060	0.00059		mg/L	2.6	20	25-JUN-13
Titanium (Ti)-Dissolved		<0.20	<0.20	RPD-NA	mg/L	N/A	20	25-JUN-13
Uranium (U)-Dissolved		0.00704	0.00663		mg/L	6.0	20	25-JUN-13
Vanadium (V)-Dissolved		<0.020	<0.020	RPD-NA	mg/L	N/A	20	25-JUN-13
Zinc (Zn)-Dissolved		116	114		mg/L	1.6	20	25-JUN-13
WG1689951-1 MB								
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	18-JUN-13
WG1689951-5 MS		**L1316410-1**						
Aluminum (Al)-Dissolved			92.4		%		70-130	27-JUN-13
Antimony (Sb)-Dissolved			98.4		%		70-130	25-JUN-13
Arsenic (As)-Dissolved			99.6		%		70-130	25-JUN-13
Barium (Ba)-Dissolved			98.8		%		70-130	25-JUN-13
Beryllium (Be)-Dissolved			95.2		%		70-130	25-JUN-13
Boron (B)-Dissolved			89.2		%		70-130	25-JUN-13
Cadmium (Cd)-Dissolved			N/A	MS-B	%		-	25-JUN-13
Chromium (Cr)-Dissolved			93.3		%		70-130	25-JUN-13
Cobalt (Co)-Dissolved			94.7		%		70-130	25-JUN-13
Copper (Cu)-Dissolved			93.1		%		70-130	25-JUN-13
Lead (Pb)-Dissolved			94.1		%		70-130	25-JUN-13
Lithium (Li)-Dissolved			92.8		%		70-130	25-JUN-13
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	25-JUN-13
Molybdenum (Mo)-Dissolved			99.4		%		70-130	25-JUN-13
Nickel (Ni)-Dissolved			94.1		%		70-130	25-JUN-13
Potassium (K)-Dissolved			92.0		%		70-130	25-JUN-13
Selenium (Se)-Dissolved			99.9		%		70-130	25-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2634463								
WG1689951-5 MS		**L1316410-1**						
Silver (Ag)-Dissolved			92.0		%		70-130	25-JUN-13
Sodium (Na)-Dissolved			92.3		%		70-130	25-JUN-13
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	25-JUN-13
Thallium (Tl)-Dissolved			95.4		%		70-130	25-JUN-13
Titanium (Ti)-Dissolved			99.8		%		70-130	25-JUN-13
Uranium (U)-Dissolved			96.6		%		70-130	25-JUN-13
Vanadium (V)-Dissolved			94.5		%		70-130	25-JUN-13
Zinc (Zn)-Dissolved			N/A	MS-B	%		-	25-JUN-13
MET-DIS-ICP-VA	**Water**							
Batch R2634471								
WG1689951-2 CRM		**VA-HIGH-WATRM**						
Calcium (Ca)-Dissolved			102.8		%		80-120	18-JUN-13
Iron (Fe)-Dissolved			94.4		%		80-120	18-JUN-13
Magnesium (Mg)-Dissolved			107.5		%		80-120	18-JUN-13
Phosphorus (P)-Dissolved			99.7		%		80-120	18-JUN-13
Silicon (Si)-Dissolved			103.0		%		80-120	18-JUN-13
WG1689951-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	18-JUN-13
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	18-JUN-13
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	18-JUN-13
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	18-JUN-13
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	18-JUN-13
Batch R2639755								
WG1689951-4 DUP		**L1316410-1**						
Calcium (Ca)-Dissolved		533	531		mg/L	0.2	20	26-JUN-13
Iron (Fe)-Dissolved		4.47	4.49		mg/L	0.4	20	26-JUN-13
Magnesium (Mg)-Dissolved		471	469		mg/L	0.3	20	26-JUN-13
Phosphorus (P)-Dissolved		<0.60	<0.60	RPD-NA	mg/L	N/A	20	26-JUN-13
Silicon (Si)-Dissolved		5.13	5.19		mg/L	1.1	20	26-JUN-13
WG1689951-5 MS		**L1316410-1**						
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	26-JUN-13
Iron (Fe)-Dissolved			89.2		%		70-130	26-JUN-13
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	26-JUN-13
NH3-F-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-F-VA	**Water**							
Batch R2634755								
WG1690296-2 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			104.8		%		85-115	19-JUN-13
WG1690296-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	19-JUN-13
WG1690296-4 MS		**L1316343-1**						
Ammonia, Total (as N)			103.5		%		75-125	19-JUN-13
PH-PCT-VA	**Water**							
Batch R2636259								
WG1691376-25 CRM		**VA-PH7-BUF**						
pH			7.02		pH		6.9-7.1	19-JUN-13
WG1691376-33 DUP		**L1316410-1**						
pH		7.32	7.27	J	pH	0.05	0.3	19-JUN-13
PO4-DO-COL-VA	**Water**							
Batch R2633438								
WG1689226-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			103.0		%		80-120	14-JUN-13
WG1689226-7 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			93.3		%		80-120	14-JUN-13
WG1689226-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	14-JUN-13
WG1689226-6 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	14-JUN-13
WG1689226-4 MS		**L1316343-1**						
Orthophosphate-Dissolved (as P)			89.8		%		70-130	14-JUN-13
S-DIS-ICP-VA	**Water**							
Batch R2634471								
WG1689951-2 CRM		**VA-HIGH-WATRM**						
Sulfur (S)-Dissolved			102.9		%		80-120	18-JUN-13
WG1689951-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	18-JUN-13
Batch R2639755								
WG1689951-4 DUP		**L1316410-1**						
Sulfur (S)-Dissolved		1050	1060		mg/L	0.9	20	26-JUN-13
WG1689951-5 MS		**L1316410-1**						
Sulfur (S)-Dissolved			N/A	MS-B	%		-	26-JUN-13
TDS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TDS-VA	**Water**							
Batch R2633120								
WG1689243-3 DUP		**L1316410-1**						
Total Dissolved Solids		5150	5010		mg/L	2.8	20	15-JUN-13
WG1689243-4 DUP		**L1316410-2**						
Total Dissolved Solids		146000	159000		mg/L	8.8	20	15-JUN-13
WG1689243-2 LCS								
Total Dissolved Solids			95.1		%		85-115	15-JUN-13
WG1689243-1 MB								
Total Dissolved Solids			<10		mg/L		10	15-JUN-13
TSS-LOW-VA	**Water**							
Batch R2633030								
WG1689248-2 LCS								
Total Suspended Solids			101.3		%		85-115	15-JUN-13
WG1689248-1 MB								
Total Suspended Solids			<1.0		mg/L		1	15-JUN-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	10-JUN-13 15:15	19-JUN-13 23:41	0.25	224	hours	EHTR-FM
Anions and Nutrients							
Diss. Orthophosphate in Water by Colour							
	1	10-JUN-13 15:15	14-JUN-13 19:49	3	4	days	EHTL
	2	10-JUN-13 16:50	14-JUN-13 20:12	3	4	days	EHTL
Nitrate Nitrogen by Ion Chromatography							
	1	10-JUN-13 15:15	14-JUN-13 14:10	3	4	days	EHTL
	2	10-JUN-13 16:50	14-JUN-13 14:10	3	4	days	EHTL
Nitrite Nitrogen by Ion Chromatography							
	1	10-JUN-13 15:15	14-JUN-13 14:10	3	4	days	EHTL
	2	10-JUN-13 16:50	14-JUN-13 14:10	3	4	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 L1316410 were received on 13-JUN-13 09:00.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

6/13/2013 10:24:52 AM

Project Name Faro Mine
Location Faro Mine Complex - Faro YK
Project Number 472645.07.EM.SS.02.0
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-015
Project FARO MINE SEEP SAMPLING 2013
Turnaround Time 10 Days
Shipping Date: 6/12/2013
COC Number: ALS06121302

	DATE	TIME	Matrix	(ASTM 7237) Free Cyanide	(E245.7) Field Filtered Dissolved Hg	(Ferrozine Method) Field Filtered Ferrous Iron	(SM2310) Acidity – Run Hot H2O2 if Fe >15ppm	(SM2310_HP) Acidity – Run Hot H2O2	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM4110B) CL F NO2 NO3 and SO4	(SM4500P) ortho-Phosphate	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered For Metals Analyte List see Table 1	Ammonia (JEM/SM4500NH3) Ammonia		Number of Containers	COMMENTS
Container:				125mL Poly	250ml Poly	125ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	250ml Glass	250ml Poly	250ml glass			
Preservatives:				NaOH, 4'C	HNO3, 4'C	HCl, 4'C	4C	4C	4C	4'C	4'C	4'C	4'C	H2SO4, pH<2, 4'C	HNO3, 4'C	H2SO4, pH<2, 4C			
Filtered:				NA	Field	Field	NA	NA	NA	NA	NA	NA	NA	Field	Field	NA			
Holding Time:				14	180/28	180	14	14	14	7	7	3	3	28	180/28	28			
SRK-FD01_SESP13	6/10/2013	15:15	Water	X	X	X	X		X	X	X	X	X	X	X	X		8	
SRK-FD37_SESP13	6/10/2013	16:50	Water	X	X	X		X		X	X	X	X	X	X	X		8	
																	TOTAL NUMBER OF CONTAINERS	16	

L1316410-COFC

Signatures		Date/Time
Approved by		
Sampled by		
Relinquished by		
Received by		6/13/13 9.00
Relinquished by		
Received by		9.9

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
PO: 604564 on Invoice Perform Lab Dup/MS on the samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 13-JUN-13
Report Date: 05-JUL-13 11:39 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1316422

Project P.O. #: 472645.06.AD.01.04.13 PO=604564
Job Reference: FARO MINE SEEP SAMPLING 2013 SW-015
C of C Numbers: ALS06121303
Legal Site Desc:

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1316422-1 Water 11-JUN-13 08:15 E_015_13_001	L1316422-2 Water 11-JUN-13 08:15 E_015_13_002	L1316422-3 Water 11-JUN-13 09:10 E_015_13_003	L1316422-4 Water 11-JUN-13 08:22 E_015_13_004	L1316422-5 Water 12-JUN-13 09:00 E_015_13_005
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0119			0.0083	
	Chloride (Cl) (mg/L)	<0.50			<0.50	
	Fluoride (F) (mg/L)	<0.020			<0.020	
	Nitrate (as N) (mg/L)	<0.0050			<0.0050	
	Nitrite (as N) (mg/L)	<0.0010			<0.0010	
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010			<0.0010	
	Sulfate (SO4) (mg/L)	<0.50			0.79	
Cyanides	Cyanide, Free (mg/L)	<0.0050			<0.0050	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.79	1.47	1.76	1.15	1.08
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	<0.0010	0.0022	0.0185	0.0482	<0.0010
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	0.00352	0.00029	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.000184	0.000633	0.000850	0.00122	0.000497
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	0.000053	0.000019	0.00116	0.00326	0.000017
	Calcium (Ca)-Dissolved (mg/L)	<0.050	0.082	0.061	<0.050	<0.050
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	0.00041	0.00110	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00031	<0.00020	0.0189	0.0571	<0.00020
	Iron (Fe)-Dissolved (mg/L)	<0.030	<0.030	0.197	0.439	<0.030
	Ferrous Iron, Dissolved (mg/L)	<0.020	<0.020	0.088	0.119	<0.020
	Lead (Pb)-Dissolved (mg/L)	0.000133	0.000383	0.00169	0.000799	0.000110
	Lithium (Li)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Magnesium (Mg)-Dissolved (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Manganese (Mn)-Dissolved (mg/L)	0.00105	0.00112	0.0150	0.0401	0.000226
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	0.00086	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Silicon (as SiO2)-Dissolved (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316422-6				
	Description	Water				
	Sampled Date	12-JUN-13				
	Sampled Time	09:10				
	Client ID	E_015_13_006				
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	<0.50				
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0085				
	Chloride (Cl) (mg/L)	<0.50				
	Fluoride (F) (mg/L)	<0.020				
	Nitrate (as N) (mg/L)	<0.0050				
	Nitrite (as N) (mg/L)	<0.0010				
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010				
	Sulfate (SO4) (mg/L)	<0.50				
Cyanides	Cyanide, Free (mg/L)	<0.0050				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.55				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	<0.0010				
	Antimony (Sb)-Dissolved (mg/L)	<0.00010				
	Arsenic (As)-Dissolved (mg/L)	<0.00010				
	Barium (Ba)-Dissolved (mg/L)	<0.000050				
	Beryllium (Be)-Dissolved (mg/L)	<0.00010				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010				
	Calcium (Ca)-Dissolved (mg/L)	<0.050				
	Chromium (Cr)-Dissolved (mg/L)	<0.00010				
	Cobalt (Co)-Dissolved (mg/L)	<0.00010				
	Copper (Cu)-Dissolved (mg/L)	<0.00020				
	Iron (Fe)-Dissolved (mg/L)	<0.030				
	Ferrous Iron, Dissolved (mg/L)	<0.020				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	<0.00050				
	Magnesium (Mg)-Dissolved (mg/L)	<0.10				
	Manganese (Mn)-Dissolved (mg/L)	<0.000050				
	Mercury (Hg)-Dissolved (mg/L)	<0.000010				
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050				
	Nickel (Ni)-Dissolved (mg/L)	<0.00050				
	Phosphorus (P)-Dissolved (mg/L)	<0.30				
	Potassium (K)-Dissolved (mg/L)	<0.050				
	Selenium (Se)-Dissolved (mg/L)	<0.00010				
	Silicon (Si)-Dissolved (mg/L)	<0.050				
	Silicon (as SiO2)-Dissolved (mg/L)	<0.20				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1316422-1 Water 11-JUN-13 08:15 E_015_13_001	L1316422-2 Water 11-JUN-13 08:15 E_015_13_002	L1316422-3 Water 11-JUN-13 09:10 E_015_13_003	L1316422-4 Water 11-JUN-13 08:22 E_015_13_004	L1316422-5 Water 12-JUN-13 09:00 E_015_13_005
WATER						
Dissolved Metals	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	<0.050	<0.050	0.110	<0.050	<0.050
	Strontium (Sr)-Dissolved (mg/L)	<0.00020	0.00039	0.00063	<0.00020	<0.00020
	Sulfur (S)-Dissolved (mg/L)	<0.50	<0.50	0.58	1.51	<0.50
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010	0.000041	0.000125	<0.000010
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	0.0467	0.0324	0.673	1.81	0.0040

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316422-6				
	Description	Water				
	Sampled Date	12-JUN-13				
	Sampled Time	09:10				
	Client ID	E_015_13_006				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	<0.050				
	Strontium (Sr)-Dissolved (mg/L)	<0.00020				
	Sulfur (S)-Dissolved (mg/L)	<0.50				
	Thallium (Tl)-Dissolved (mg/L)	<0.000010				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	<0.000010				
	Vanadium (V)-Dissolved (mg/L)	<0.0010				
	Zinc (Zn)-Dissolved (mg/L)	<0.0010				

* 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	Cyanide, Free	DLM	L1316422-1
Duplicate	Cyanide, Free	DLM	L1316422-1
Duplicate	Cyanide, Free	DLM	L1316422-1
Duplicate	Cyanide, Free	DLM	L1316422-1
Duplicate	Cyanide, Free	DLM	L1316422-1
Duplicate	Cyanide, Free	DLM	L1316422-1
Duplicate	Cyanide, Free	DLM	L1316422-4, -6
Duplicate	Cyanide, Free	DLM	L1316422-4, -6
Matrix Spike	Dissolved Organic Carbon	MS-B	L1316422-1, -2, -3
Matrix Spike	Sulfate (SO4)	MS-B	L1316422-1, -4, -6

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted For 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**
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-DOC-VA	Water	Dissolved 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)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

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.

FE2-D-COL-VA	Water	Diss. Ferrous Iron in Water by Colour	James W. Ball et al (1999)

This analysis is carried out using procedures adapted from "A New Method for the Direct Determination of Dissolved Iron Concentration in Acid Mine Waters" published by James W. Ball et al (1999). The procedures involves preliminary sample filtration (0.1um filter) and Ferrous Iron is determined using the "FerroZine" colorimteric method.

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).

Reference Information

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).

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.

PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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.

SIO2-D-CALC-VA Water Dissolved Silicon (reported as Silica) CALCULATION

Dissolved Silicon (as SiO2) is a calculated parameter. Dissolved Silicon (as SiO2 mg/L) = 2.139 x Dissolved Silicon (mg/L).

** 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:

ALS06121303

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

Workorder: L1316422 Report Date: 05-JUL-13

Client: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-CL-IC-WR	**Water**							
Batch R2642291								
WG1699914-2 LCS								
Chloride (Cl)			103.0		%		85-115	14-JUN-13
WG1699914-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	14-JUN-13
WG1699914-4 MS		**L1316379-10**						
Chloride (Cl)			103.7		%		75-125	14-JUN-13
ANIONS-F-IC-WR	**Water**							
Batch R2642291								
WG1699914-2 LCS								
Fluoride (F)			104.6		%		85-115	14-JUN-13
WG1699914-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	14-JUN-13
WG1699914-4 MS		**L1316379-10**						
Fluoride (F)			115.5		%		75-125	14-JUN-13
ANIONS-NO2-IC-WR	**Water**							
Batch R2642291								
WG1699914-2 LCS								
Nitrite (as N)			98.6		%		85-115	14-JUN-13
WG1699914-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	14-JUN-13
WG1699914-4 MS		**L1316379-10**						
Nitrite (as N)			93.6		%		75-125	14-JUN-13
ANIONS-NO3-IC-WR	**Water**							
Batch R2642291								
WG1699914-2 LCS								
Nitrate (as N)			103.7		%		85-115	14-JUN-13
WG1699914-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	14-JUN-13
WG1699914-4 MS		**L1316379-10**						
Nitrate (as N)			103.4		%		75-125	14-JUN-13
ANIONS-SO4-IC-WR	**Water**							
Batch R2642291								
WG1699914-2 LCS								
Sulfate (SO4)			106.3		%		85-115	14-JUN-13
WG1699914-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	14-JUN-13
WG1699914-4 MS		**L1316379-10**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-SO4-IC-WR	**Water**							
Batch R2642291								
WG1699914-4 MS		**L1316379-10**						
Sulfate (SO4)			N/A	MS-B	%		-	14-JUN-13
CARBONS-DOC-VA	**Water**							
Batch R2641786								
WG1699338-3 LCS								
Dissolved Organic Carbon			99.6		%		80-120	01-JUL-13
WG1699338-2 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	01-JUL-13
Batch R2641900								
WG1699475-4 LCS								
Dissolved Organic Carbon			108.5		%		80-120	30-JUN-13
WG1699475-3 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	30-JUN-13
WG1699475-2 MS		**L1316379-10**						
Dissolved Organic Carbon			N/A	MS-B	%		-	30-JUN-13
CN-FREE-CFA-VA	**Water**							
Batch R2641282								
WG1698224-2 LCS								
Cyanide, Free			101.0		%		80-120	28-JUN-13
WG1698224-1 MB								
Cyanide, Free			<0.0050		mg/L		0.005	28-JUN-13
WG1698224-4 MS		**L1316343-1**						
Cyanide, Free			97.0		%		70-130	28-JUN-13
Batch R2642485								
WG1700078-2 LCS								
Cyanide, Free			101.0		%		80-120	28-JUN-13
WG1700078-1 MB								
Cyanide, Free			<0.0050		mg/L		0.005	28-JUN-13
WG1700078-10 MS		**L1317621-1**						
Cyanide, Free			98.7		%		70-130	28-JUN-13
WG1700078-4 MS		**L1316422-1**						
Cyanide, Free			99.3		%		70-130	28-JUN-13
WG1700078-6 MS		**L1316438-1**						
Cyanide, Free			115.4		%		70-130	28-JUN-13
WG1700078-8 MS		**L1316792-7**						
Cyanide, Free			103.6		%		70-130	28-JUN-13
FE2-D-COL-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FE2-D-COL-VA	**Water**							
Batch R2634665								
WG1690831-3 DUP		**L1316422-2**						
Ferrous Iron, Dissolved		<0.020	<0.020	RPD-NA	mg/L	N/A	20	19-JUN-13
WG1690831-2 LCS								
Ferrous Iron, Dissolved			104.8		%		80-120	19-JUN-13
WG1690831-1 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	19-JUN-13
WG1690831-4 MS		**L1316422-2**						
Ferrous Iron, Dissolved			104.0		%		70-130	19-JUN-13
WG1690831-6 MS		**L1316792-7**						
Ferrous Iron, Dissolved			108.0		%		70-130	19-JUN-13
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2633814								
WG1690004-8 LCS								
Mercury (Hg)-Dissolved			99.2		%		80-120	18-JUN-13
WG1690004-6 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	18-JUN-13
Batch R2634898								
WG1690004-9 DUP		**L1316422-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	19-JUN-13
WG1690004-10 MS		**L1316422-1**						
Mercury (Hg)-Dissolved			98.7		%		70-130	19-JUN-13
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1690004-7 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Dissolved			99.8		%		80-120	17-JUN-13
Antimony (Sb)-Dissolved			98.4		%		80-120	17-JUN-13
Arsenic (As)-Dissolved			99.8		%		80-120	17-JUN-13
Barium (Ba)-Dissolved			102.2		%		80-120	17-JUN-13
Beryllium (Be)-Dissolved			98.2		%		80-120	17-JUN-13
Boron (B)-Dissolved			93.1		%		80-120	17-JUN-13
Cadmium (Cd)-Dissolved			102.6		%		80-120	17-JUN-13
Chromium (Cr)-Dissolved			98.8		%		80-120	17-JUN-13
Cobalt (Co)-Dissolved			96.7		%		80-120	17-JUN-13
Copper (Cu)-Dissolved			96.4		%		80-120	17-JUN-13
Lead (Pb)-Dissolved			99.1		%		80-120	17-JUN-13
Lithium (Li)-Dissolved			99.9		%		80-120	17-JUN-13
Manganese (Mn)-Dissolved			97.5		%		80-120	17-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1690004-7 CRM		**VA-HIGH-WATRM**						
Molybdenum (Mo)-Dissolved			102.1		%		80-120	17-JUN-13
Nickel (Ni)-Dissolved			97.4		%		80-120	17-JUN-13
Potassium (K)-Dissolved			98.7		%		80-120	17-JUN-13
Selenium (Se)-Dissolved			100.0		%		80-120	17-JUN-13
Silver (Ag)-Dissolved			97.6		%		80-120	17-JUN-13
Sodium (Na)-Dissolved			101.7		%		80-120	17-JUN-13
Strontium (Sr)-Dissolved			99.0		%		80-120	17-JUN-13
Thallium (Tl)-Dissolved			99.6		%		80-120	17-JUN-13
Titanium (Ti)-Dissolved			105.2		%		80-120	17-JUN-13
Uranium (U)-Dissolved			100.7		%		80-120	17-JUN-13
Vanadium (V)-Dissolved			99.4		%		80-120	17-JUN-13
Zinc (Zn)-Dissolved			95.6		%		80-120	17-JUN-13
WG1690004-9 DUP		**L1316422-1**						
Aluminum (Al)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	25-JUN-13
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUN-13
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUN-13
Barium (Ba)-Dissolved		0.000184	0.000198		mg/L	7.7	20	25-JUN-13
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUN-13
Boron (B)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	25-JUN-13
Cadmium (Cd)-Dissolved		0.000053	0.000060		mg/L	12	20	25-JUN-13
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUN-13
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUN-13
Copper (Cu)-Dissolved		0.00031	0.00031		mg/L	0.8	20	25-JUN-13
Lead (Pb)-Dissolved		0.000133	0.000123		mg/L	7.9	20	25-JUN-13
Lithium (Li)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	25-JUN-13
Manganese (Mn)-Dissolved		0.00105	0.00116		mg/L	9.6	20	25-JUN-13
Molybdenum (Mo)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	25-JUN-13
Nickel (Ni)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	25-JUN-13
Potassium (K)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	25-JUN-13
Selenium (Se)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUN-13
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	25-JUN-13
Sodium (Na)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	25-JUN-13
Strontium (Sr)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	25-JUN-13
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	25-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1690004-9 DUP		**L1316422-1**						
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	25-JUN-13
Uranium (U)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	25-JUN-13
Vanadium (V)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	25-JUN-13
Zinc (Zn)-Dissolved		0.0467	0.0460		mg/L	1.6	20	25-JUN-13
WG1690004-6 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	17-JUN-13
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Boron (B)-Dissolved			<0.010		mg/L		0.01	17-JUN-13
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	17-JUN-13
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Lithium (Li)-Dissolved			<0.00050		mg/L		0.0005	17-JUN-13
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	17-JUN-13
Potassium (K)-Dissolved			<0.050		mg/L		0.05	17-JUN-13
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	17-JUN-13
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	17-JUN-13
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	17-JUN-13
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	17-JUN-13
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	17-JUN-13
WG1690004-10 MS		**L1316422-1**						
Aluminum (Al)-Dissolved			94.7		%		70-130	25-JUN-13
Antimony (Sb)-Dissolved			98.3		%		70-130	25-JUN-13
Arsenic (As)-Dissolved			98.6		%		70-130	25-JUN-13
Barium (Ba)-Dissolved			95.4		%		70-130	25-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1690004-10 MS		**L1316422-1**						
Beryllium (Be)-Dissolved			99.4		%		70-130	25-JUN-13
Boron (B)-Dissolved			96.0		%		70-130	25-JUN-13
Cadmium (Cd)-Dissolved			95.7		%		70-130	25-JUN-13
Chromium (Cr)-Dissolved			92.0		%		70-130	25-JUN-13
Cobalt (Co)-Dissolved			93.5		%		70-130	25-JUN-13
Copper (Cu)-Dissolved			93.4		%		70-130	25-JUN-13
Lead (Pb)-Dissolved			95.2		%		70-130	25-JUN-13
Lithium (Li)-Dissolved			97.3		%		70-130	25-JUN-13
Manganese (Mn)-Dissolved			93.9		%		70-130	25-JUN-13
Molybdenum (Mo)-Dissolved			99.6		%		70-130	25-JUN-13
Nickel (Ni)-Dissolved			93.5		%		70-130	25-JUN-13
Potassium (K)-Dissolved			91.7		%		70-130	25-JUN-13
Selenium (Se)-Dissolved			97.6		%		70-130	25-JUN-13
Silver (Ag)-Dissolved			93.8		%		70-130	25-JUN-13
Sodium (Na)-Dissolved			93.1		%		70-130	25-JUN-13
Strontium (Sr)-Dissolved			98.5		%		70-130	25-JUN-13
Thallium (Tl)-Dissolved			96.6		%		70-130	25-JUN-13
Titanium (Ti)-Dissolved			98.1		%		70-130	25-JUN-13
Uranium (U)-Dissolved			97.0		%		70-130	25-JUN-13
Vanadium (V)-Dissolved			92.3		%		70-130	25-JUN-13
Zinc (Zn)-Dissolved			93.2		%		70-130	25-JUN-13
MET-DIS-ICP-VA	**Water**							
Batch R2633893								
WG1690004-7 CRM		**VA-HIGH-WATRM**						
Calcium (Ca)-Dissolved			99.0		%		80-120	18-JUN-13
Iron (Fe)-Dissolved			100.7		%		80-120	18-JUN-13
Magnesium (Mg)-Dissolved			100.7		%		80-120	18-JUN-13
Phosphorus (P)-Dissolved			99.0		%		80-120	18-JUN-13
Silicon (Si)-Dissolved			100.1		%		80-120	18-JUN-13
WG1690004-6 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	18-JUN-13
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	18-JUN-13
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	18-JUN-13
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	18-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA	**Water**							
Batch R2633893								
WG1690004-6 MB								
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	18-JUN-13
Batch R2639755								
WG1690004-9 DUP		**L1316422-1**						
Calcium (Ca)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	26-JUN-13
Iron (Fe)-Dissolved		<0.030	<0.030	RPD-NA	mg/L	N/A	20	26-JUN-13
Magnesium (Mg)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	26-JUN-13
Phosphorus (P)-Dissolved		<0.30	<0.30	RPD-NA	mg/L	N/A	20	26-JUN-13
Silicon (Si)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	26-JUN-13
WG1690004-10 MS		**L1316422-1**						
Calcium (Ca)-Dissolved			107.1		%		70-130	26-JUN-13
Iron (Fe)-Dissolved			97.4		%		70-130	26-JUN-13
Magnesium (Mg)-Dissolved			100.4		%		70-130	26-JUN-13
NH3-F-VA	**Water**							
Batch R2634755								
WG1690296-2 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			104.8		%		85-115	19-JUN-13
WG1690296-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	19-JUN-13
WG1690296-4 MS		**L1316343-1**						
Ammonia, Total (as N)			103.5		%		75-125	19-JUN-13
PO4-DO-COL-VA	**Water**							
Batch R2633438								
WG1689226-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			103.0		%		80-120	14-JUN-13
WG1689226-7 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			93.3		%		80-120	14-JUN-13
WG1689226-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	14-JUN-13
WG1689226-6 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	14-JUN-13
WG1689226-4 MS		**L1316343-1**						
Orthophosphate-Dissolved (as P)			89.8		%		70-130	14-JUN-13
S-DIS-ICP-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-DIS-ICP-VA	**Water**							
Batch R2633893								
WG1690004-7 CRM		**VA-HIGH-WATRM**						
Sulfur (S)-Dissolved			101.6		%		80-120	18-JUN-13
WG1690004-6 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	18-JUN-13
Batch R2639755								
WG1690004-9 DUP		**L1316422-1**						
Sulfur (S)-Dissolved		<0.50	<0.50	RPD-NA	mg/L	N/A	20	26-JUN-13
WG1690004-10 MS		**L1316422-1**						
Sulfur (S)-Dissolved			100.6		%		70-130	26-JUN-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
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
Cyanides							
Free Cyanide in water by CFA							
	1	11-JUN-13 08:15	28-JUN-13 11:57	14	17	days	EHT
	4	11-JUN-13 08:22	28-JUN-13 12:55	14	17	days	EHT
	6	12-JUN-13 09:10	28-JUN-13 12:55	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 L1316422 were received on 13-JUN-13 09:00.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

6/12/2013 12:51:44 PM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.07.EM.SS.02.0
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-015
Project FARO MINE SEEP SAMPLING 2013
Turnaround Time 10 Days
Shipping Date: 6/12/2013
COC Number: ALS06121303

	DATE	TIME	Matrix	(ASTM 7237) Free Cyanide	(E245.7) Field Filtered Dissolved Hg	(Ferrozine Method) Field Filtered Ferrous Iron	(SM4110B) Cl, F, NO2, NO3, and SO4	(SM4500P) ortho-Phosphate	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered For Metals Analyte List see Table 1	Ammonia (JEM/SM4500NH3) Ammonia	Number of Containers	COMMENTS
Container:				125mL Poly	250ml Poly	125ml Poly	500ml Poly	500ml Poly	250ml Glass	250ml Poly	250ml glass		
Preservatives:				NaOH, 4'C	HNO3, 4'C	HCl, 4'C	4'C	4'C	H2SO4, pH<2, 4'C	HNO3, 4'C	H2SO4, pH<2, 4C		
Filtered:				NA	Field	Field	NA	NA	Field	Field	NA		
Holding Time:				14	180/28	180	3	3	28	180/28	28		
E_015_13_001	6/11/2013	8:15	Water	X	X	X	X	X	X	X	X	6	
E_015_13_002	6/11/2013	8:15	Water		X	X			X	X		3	
E_015_13_003	6/11/2013	9:10	Water		X	X			X	X		3	
E_015_13_004	6/11/2013	8:22	Water	X	X	X	X	X	X	X	X	6	
E_015_13_005	6/12/2013	9:00	Water		X	X			X	X		3	
E_015_13_006	6/12/2013	9:10	Water	X	X	X	X	X	X	X	X	6	
											TOTAL NUMBER OF CONTAINERS	27	



L1316422-COFC

Signatures	Date/Time
Approved by	6/12/13
Sampled by	1300
Relinquished by	
Received by	6/13/13
Relinquished by	
Received by	7.8

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
PO: 604564 on Invoice Perform Lab Dup/MS on the samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 13-JUN-13
Report Date: 03-JUL-13 15:48 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1316438

Project P.O. #: 472645.06.AD.01.04.13 PO=604564
Job Reference: FARO MINE SEEP SAMPLING 2013 SW-015
C of C Numbers: ALS06121304
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Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316438-1				
	Description	Water				
	Sampled Date	12-JUN-13				
	Sampled Time	08:30				
	Client ID	SRK-FD30_SESP13				
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	1200				
	pH (pH)	8.11				
	Total Suspended Solids (mg/L)	36.8				
	Total Dissolved Solids (mg/L)	1530				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	6.3				
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	189				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0				
	Alkalinity, Total (as CaCO3) (mg/L)	189				
	Ammonia, Total (as N) (mg/L)	0.0056				
	Chloride (Cl) (mg/L)	<5.0 DLA				
	Fluoride (F) (mg/L)	2.13				
	Nitrate (as N) (mg/L)	<0.050 DLA				
	Nitrite (as N) (mg/L)	<0.010 DLA				
	Orthophosphate-Dissolved (as P) (mg/L)	0.0012				
	Sulfate (SO4) (mg/L)	1010				
Cyanides	Cyanide, Free (mg/L)	<0.010 DLM				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.22				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	0.0917				
	Antimony (Sb)-Dissolved (mg/L)	0.00016				
	Arsenic (As)-Dissolved (mg/L)	0.00062				
	Barium (Ba)-Dissolved (mg/L)	0.0152				
	Beryllium (Be)-Dissolved (mg/L)	<0.00010				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (mg/L)	0.00630				
	Calcium (Ca)-Dissolved (mg/L)	130				
	Chromium (Cr)-Dissolved (mg/L)	<0.00010				
	Cobalt (Co)-Dissolved (mg/L)	0.0292				
	Copper (Cu)-Dissolved (mg/L)	0.00194				
	Iron (Fe)-Dissolved (mg/L)	0.128				
	Ferrous Iron, Dissolved (mg/L)	0.076				
	Lead (Pb)-Dissolved (mg/L)	0.00311				
	Lithium (Li)-Dissolved (mg/L)	0.0700				
	Magnesium (Mg)-Dissolved (mg/L)	212				
	Manganese (Mn)-Dissolved (mg/L)	0.770				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316438-1				
	Description	Water				
	Sampled Date	12-JUN-13				
	Sampled Time	08:30				
	Client ID	SRK-FD30_SESP13				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Mercury (Hg)-Dissolved (mg/L)	<0.000010				
	Molybdenum (Mo)-Dissolved (mg/L)	0.000666				
	Nickel (Ni)-Dissolved (mg/L)	0.0693				
	Phosphorus (P)-Dissolved (mg/L)	<0.30				
	Potassium (K)-Dissolved (mg/L)	13.3				
	Selenium (Se)-Dissolved (mg/L)	0.00108				
	Silicon (Si)-Dissolved (mg/L)	0.575				
	Silicon (as SiO2)-Dissolved (mg/L)	1.23				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	2.48				
	Strontium (Sr)-Dissolved (mg/L)	0.386				
	Sulfur (S)-Dissolved (mg/L)	315				
	Thallium (Tl)-Dissolved (mg/L)	0.000876				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	0.00299				
	Vanadium (V)-Dissolved (mg/L)	<0.0010				
	Zinc (Zn)-Dissolved (mg/L)	5.46				

* 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	Cyanide, Free	DLM	L1316438-1
Duplicate	Cyanide, Free	DLM	L1316438-1
Matrix Spike	Cadmium (Cd)-Dissolved	MS-B	L1316438-1
Matrix Spike	Cobalt (Co)-Dissolved	MS-B	L1316438-1
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1316438-1
Matrix Spike	Nickel (Ni)-Dissolved	MS-B	L1316438-1
Matrix Spike	Potassium (K)-Dissolved	MS-B	L1316438-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1316438-1
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1316438-1
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1316438-1
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1316438-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1316438-1
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1316438-1
Matrix Spike	Sulfate (SO4)	MS-B	L1316438-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
DLM	Detection Limit Adjusted For 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**
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-SCR-VA	Water	Alkalinity by colour or titration	EPA 310.2 OR APHA 2320

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
OR
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-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)

Reference Information

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

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.

FE2-D-COL-VA Water Diss. Ferrous Iron in Water by Colour James W. Ball et al (1999)

This analysis is carried out using procedures adapted from "A New Method for the Direct Determination of Dissolved Iron Concentration in Acid Mine Waters" published by James W. Ball et al (1999). The procedures involves preliminary sample filtration (0.1um filter) and Ferrous Iron is determined using the "FerroZine" colorimteric method.

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).

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).

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.

PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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.

SIO2-D-CALC-VA Water Dissolved Silicon (reported as Silica) CALCULATION

Dissolved Silicon (as SiO2) is a calculated parameter. Dissolved Silicon (as SiO2 mg/L) = 2.139 x Dissolved Silicon (mg/L).

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

Reference Information

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-LOW-VA Water Total Suspended Solids by Grav. (1 mg/L) APHA 2540 Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** 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:

ALS06121304

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

Workorder: L1316438 Report Date: 03-JUL-13

Client: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-PCT-VA	**Water**							
Batch R2636259								
WG1691376-9 CRM		**VA-ACY-CONTROL**						
Acidity (as CaCO3)			94.5		%		85-115	19-JUN-13
WG1691376-34 DUP		**L1316438-1**						
Acidity (as CaCO3)		6.3	6.1		mg/L	3.0	20	19-JUN-13
ALK-SCR-VA	**Water**							
Batch R2637533								
WG1694921-2 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			97.2		%		85-115	25-JUN-13
WG1694921-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	25-JUN-13
Batch R2642178								
WG1699481-2 CRM		**VA-ALKM-CONTROL**						
Alkalinity, Total (as CaCO3)			101.0		%		85-115	25-JUN-13
WG1699481-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	25-JUN-13
ANIONS-CL-IC-WR	**Water**							
Batch R2642291								
WG1699914-2 LCS								
Chloride (Cl)			103.0		%		85-115	14-JUN-13
WG1699914-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	14-JUN-13
WG1699914-4 MS		**L1316379-10**						
Chloride (Cl)			103.7		%		75-125	14-JUN-13
ANIONS-F-IC-WR	**Water**							
Batch R2642291								
WG1699914-2 LCS								
Fluoride (F)			104.6		%		85-115	14-JUN-13
WG1699914-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	14-JUN-13
WG1699914-4 MS		**L1316379-10**						
Fluoride (F)			115.5		%		75-125	14-JUN-13
ANIONS-NO2-IC-WR	**Water**							
Batch R2642291								
WG1699914-2 LCS								
Nitrite (as N)			98.6		%		85-115	14-JUN-13
WG1699914-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	14-JUN-13
WG1699914-4		**L1316379-10**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-NO2-IC-WR	**Water**							
Batch R2642291								
WG1699914-4 MS		**L1316379-10**						
Nitrite (as N)			93.6		%		75-125	14-JUN-13
ANIONS-NO3-IC-WR	**Water**							
Batch R2642291								
WG1699914-2 LCS								
Nitrate (as N)			103.7		%		85-115	14-JUN-13
WG1699914-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	14-JUN-13
WG1699914-4 MS		**L1316379-10**						
Nitrate (as N)			103.4		%		75-125	14-JUN-13
ANIONS-SO4-IC-WR	**Water**							
Batch R2642291								
WG1699914-2 LCS								
Sulfate (SO4)			106.3		%		85-115	14-JUN-13
WG1699914-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	14-JUN-13
WG1699914-4 MS		**L1316379-10**						
Sulfate (SO4)			N/A	MS-B	%		-	14-JUN-13
CARBONS-DOC-VA	**Water**							
Batch R2641786								
WG1699338-3 LCS								
Dissolved Organic Carbon			99.6		%		80-120	01-JUL-13
WG1699338-2 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	01-JUL-13
CN-FREE-CFA-VA	**Water**							
Batch R2642485								
WG1700078-5 DUP		**L1316438-1**						
Cyanide, Free		<0.010	<0.010	RPD-NA	mg/L	N/A	20	28-JUN-13
WG1700078-2 LCS								
Cyanide, Free			101.0		%		80-120	28-JUN-13
WG1700078-1 MB								
Cyanide, Free			<0.0050		mg/L		0.005	28-JUN-13
WG1700078-10 MS		**L1317621-1**						
Cyanide, Free			98.7		%		70-130	28-JUN-13
WG1700078-4 MS		**L1316422-1**						
Cyanide, Free			99.3		%		70-130	28-JUN-13
WG1700078-6 MS		**L1316438-1**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-FREE-CFA-VA	**Water**							
Batch R2642485								
WG1700078-6 MS		**L1316438-1**						
Cyanide, Free			115.4		%		70-130	28-JUN-13
WG1700078-8 MS		**L1316792-7**						
Cyanide, Free			103.6		%		70-130	28-JUN-13
FE2-D-COL-VA	**Water**							
Batch R2633546								
WG1689893-2 LCS								
Ferrous Iron, Dissolved			103.6		%		80-120	17-JUN-13
WG1689893-1 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	17-JUN-13
WG1689893-4 MS		**L1316343-1**						
Ferrous Iron, Dissolved			107.0		%		70-130	17-JUN-13
WG1689893-6 MS		**L1316379-10**						
Ferrous Iron, Dissolved			90.4		%		70-130	17-JUN-13
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2633814								
WG1690000-3 LCS								
Mercury (Hg)-Dissolved			99.5		%		80-120	18-JUN-13
WG1690000-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	18-JUN-13
Batch R2634898								
WG1690000-4 DUP		**L1316438-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	19-JUN-13
WG1690000-5 MS		**L1316438-1**						
Mercury (Hg)-Dissolved			93.2		%		70-130	19-JUN-13
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1690000-2 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Dissolved			99.0		%		80-120	17-JUN-13
Antimony (Sb)-Dissolved			99.0		%		80-120	17-JUN-13
Arsenic (As)-Dissolved			99.4		%		80-120	17-JUN-13
Barium (Ba)-Dissolved			100.8		%		80-120	17-JUN-13
Beryllium (Be)-Dissolved			97.9		%		80-120	17-JUN-13
Boron (B)-Dissolved			92.9		%		80-120	17-JUN-13
Cadmium (Cd)-Dissolved			102.1		%		80-120	17-JUN-13
Chromium (Cr)-Dissolved			99.5		%		80-120	17-JUN-13
Cobalt (Co)-Dissolved			95.6		%		80-120	17-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1690000-2 CRM		**VA-HIGH-WATRM**						
Copper (Cu)-Dissolved			94.9		%		80-120	17-JUN-13
Lead (Pb)-Dissolved			97.8		%		80-120	17-JUN-13
Lithium (Li)-Dissolved			99.6		%		80-120	17-JUN-13
Manganese (Mn)-Dissolved			96.1		%		80-120	17-JUN-13
Molybdenum (Mo)-Dissolved			101.6		%		80-120	17-JUN-13
Nickel (Ni)-Dissolved			97.6		%		80-120	17-JUN-13
Potassium (K)-Dissolved			99.7		%		80-120	17-JUN-13
Selenium (Se)-Dissolved			99.2		%		80-120	17-JUN-13
Silver (Ag)-Dissolved			98.2		%		80-120	17-JUN-13
Sodium (Na)-Dissolved			101.5		%		80-120	17-JUN-13
Strontium (Sr)-Dissolved			100.3		%		80-120	17-JUN-13
Thallium (Tl)-Dissolved			98.3		%		80-120	17-JUN-13
Titanium (Ti)-Dissolved			100.6		%		80-120	17-JUN-13
Uranium (U)-Dissolved			98.9		%		80-120	17-JUN-13
Vanadium (V)-Dissolved			99.0		%		80-120	17-JUN-13
Zinc (Zn)-Dissolved			94.7		%		80-120	17-JUN-13
WG1690000-4 DUP		**L1316438-1**						
Aluminum (Al)-Dissolved		0.0917	0.103		mg/L	11	20	28-JUN-13
Antimony (Sb)-Dissolved		0.00016	0.00014		mg/L	16	20	25-JUN-13
Arsenic (As)-Dissolved		0.00062	0.00062		mg/L	0.9	20	25-JUN-13
Barium (Ba)-Dissolved		0.0152	0.0151		mg/L	0.6	20	25-JUN-13
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUN-13
Boron (B)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	25-JUN-13
Cadmium (Cd)-Dissolved		0.00630	0.00624		mg/L	1.1	20	25-JUN-13
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUN-13
Cobalt (Co)-Dissolved		0.0292	0.0293		mg/L	0.4	20	25-JUN-13
Copper (Cu)-Dissolved		0.00194	0.00201		mg/L	4.0	20	25-JUN-13
Lead (Pb)-Dissolved		0.00311	0.00310		mg/L	0.4	20	25-JUN-13
Lithium (Li)-Dissolved		0.0700	0.0699		mg/L	0.2	20	25-JUN-13
Manganese (Mn)-Dissolved		0.770	0.765		mg/L	0.7	20	25-JUN-13
Molybdenum (Mo)-Dissolved		0.000666	0.000632		mg/L	5.3	20	25-JUN-13
Nickel (Ni)-Dissolved		0.0693	0.0691		mg/L	0.4	20	25-JUN-13
Potassium (K)-Dissolved		13.3	13.6		mg/L	2.0	20	25-JUN-13
Selenium (Se)-Dissolved		0.00108	0.00103		mg/L	4.2	20	25-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1690000-4 DUP		**L1316438-1**						
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	28-JUN-13
Sodium (Na)-Dissolved		2.48	2.42		mg/L	2.1	20	25-JUN-13
Strontium (Sr)-Dissolved		0.386	0.382		mg/L	1.1	20	25-JUN-13
Thallium (Tl)-Dissolved		0.000876	0.000864		mg/L	1.3	20	25-JUN-13
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	25-JUN-13
Uranium (U)-Dissolved		0.00299	0.00293		mg/L	2.0	20	25-JUN-13
Vanadium (V)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	25-JUN-13
Zinc (Zn)-Dissolved		5.46	5.49		mg/L	0.5	20	25-JUN-13
WG1690000-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	17-JUN-13
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Boron (B)-Dissolved			<0.010		mg/L		0.01	17-JUN-13
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	17-JUN-13
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Lithium (Li)-Dissolved			<0.00050		mg/L		0.0005	17-JUN-13
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	17-JUN-13
Potassium (K)-Dissolved			<0.050		mg/L		0.05	17-JUN-13
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	17-JUN-13
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	17-JUN-13
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	17-JUN-13
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	17-JUN-13
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	17-JUN-13
WG1690000-5 MS		**L1316438-1**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1690000-5 MS		**L1316438-1**						
Aluminum (Al)-Dissolved			89.1		%		70-130	27-JUN-13
Antimony (Sb)-Dissolved			101.8		%		70-130	25-JUN-13
Arsenic (As)-Dissolved			104.8		%		70-130	25-JUN-13
Barium (Ba)-Dissolved			94.1		%		70-130	25-JUN-13
Beryllium (Be)-Dissolved			94.4		%		70-130	25-JUN-13
Boron (B)-Dissolved			93.9		%		70-130	25-JUN-13
Cadmium (Cd)-Dissolved			N/A	MS-B	%		-	25-JUN-13
Chromium (Cr)-Dissolved			93.9		%		70-130	25-JUN-13
Cobalt (Co)-Dissolved			N/A	MS-B	%		-	25-JUN-13
Copper (Cu)-Dissolved			90.8		%		70-130	25-JUN-13
Lead (Pb)-Dissolved			91.8		%		70-130	25-JUN-13
Lithium (Li)-Dissolved			86.2		%		70-130	25-JUN-13
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	25-JUN-13
Molybdenum (Mo)-Dissolved			99.4		%		70-130	25-JUN-13
Nickel (Ni)-Dissolved			N/A	MS-B	%		-	25-JUN-13
Potassium (K)-Dissolved			N/A	MS-B	%		-	25-JUN-13
Selenium (Se)-Dissolved			106.2		%		70-130	25-JUN-13
Silver (Ag)-Dissolved			101.1		%		70-130	27-JUN-13
Sodium (Na)-Dissolved			N/A	MS-B	%		-	25-JUN-13
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	25-JUN-13
Thallium (Tl)-Dissolved			95.3		%		70-130	25-JUN-13
Titanium (Ti)-Dissolved			106.3		%		70-130	25-JUN-13
Uranium (U)-Dissolved			96.8		%		70-130	25-JUN-13
Vanadium (V)-Dissolved			96.6		%		70-130	25-JUN-13
Zinc (Zn)-Dissolved			N/A	MS-B	%		-	25-JUN-13
MET-DIS-ICP-VA	**Water**							
Batch R2633893								
WG1690000-2 CRM		**VA-HIGH-WATRM**						
Calcium (Ca)-Dissolved			99.2		%		80-120	18-JUN-13
Iron (Fe)-Dissolved			99.9		%		80-120	18-JUN-13
Magnesium (Mg)-Dissolved			100.1		%		80-120	18-JUN-13
Phosphorus (P)-Dissolved			99.5		%		80-120	18-JUN-13
Silicon (Si)-Dissolved			99.9		%		80-120	18-JUN-13
WG1690000-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA	**Water**							
Batch R2633893								
WG1690000-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	18-JUN-13
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	18-JUN-13
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	18-JUN-13
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	18-JUN-13
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	18-JUN-13
Batch R2639755								
WG1690000-4 DUP		**L1316438-1**						
Calcium (Ca)-Dissolved		130	130		mg/L	0.1	20	26-JUN-13
Iron (Fe)-Dissolved		0.128	0.129		mg/L	0.9	20	26-JUN-13
Magnesium (Mg)-Dissolved		212	213		mg/L	0.7	20	26-JUN-13
Phosphorus (P)-Dissolved		<0.30	<0.30	RPD-NA	mg/L	N/A	20	26-JUN-13
Silicon (Si)-Dissolved		0.575	0.567		mg/L	1.5	20	26-JUN-13
WG1690000-5 MS		**L1316438-1**						
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	26-JUN-13
Iron (Fe)-Dissolved			91.8		%		70-130	26-JUN-13
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	26-JUN-13
NH3-F-VA	**Water**							
Batch R2639854								
WG1696504-2 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			104.0		%		85-115	27-JUN-13
WG1696504-3 DUP		**L1316438-1**						
Ammonia, Total (as N)		0.0056	0.0052		mg/L	7.8	20	27-JUN-13
WG1696504-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	27-JUN-13
WG1696504-4 MS		**L1316438-1**						
Ammonia, Total (as N)			100.9		%		75-125	27-JUN-13
PH-PCT-VA	**Water**							
Batch R2636259								
WG1691376-25 CRM		**VA-PH7-BUF**						
pH			7.02		pH		6.9-7.1	19-JUN-13
WG1691376-34 DUP		**L1316438-1**						
pH		8.11	8.11	J	pH	0.00	0.3	19-JUN-13
PO4-DO-COL-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4-DO-COL-VA	**Water**							
Batch R2633438								
WG1689226-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			103.0		%		80-120	14-JUN-13
WG1689226-7 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			93.3		%		80-120	14-JUN-13
WG1689226-5 DUP		**L1316438-1**						
Orthophosphate-Dissolved (as P)		0.0012	0.0011		mg/L	6.0	20	14-JUN-13
WG1689226-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	14-JUN-13
WG1689226-6 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	14-JUN-13
WG1689226-4 MS		**L1316343-1**						
Orthophosphate-Dissolved (as P)			89.8		%		70-130	14-JUN-13
S-DIS-ICP-VA	**Water**							
Batch R2633893								
WG1690000-2 CRM		**VA-HIGH-WATRM**						
Sulfur (S)-Dissolved			101.0		%		80-120	18-JUN-13
WG1690000-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	18-JUN-13
Batch R2639755								
WG1690000-4 DUP		**L1316438-1**						
Sulfur (S)-Dissolved		315	316		mg/L	0.4	20	26-JUN-13
WG1690000-5 MS		**L1316438-1**						
Sulfur (S)-Dissolved			N/A	MS-B	%		-	26-JUN-13
TDS-VA	**Water**							
Batch R2633117								
WG1689244-3 DUP		**L1316438-1**						
Total Dissolved Solids		1530	1500		mg/L	1.9	20	15-JUN-13
WG1689244-2 LCS								
Total Dissolved Solids			96.5		%		85-115	15-JUN-13
WG1689244-1 MB								
Total Dissolved Solids			<10		mg/L		10	15-JUN-13
TSS-LOW-VA	**Water**							
Batch R2633044								
WG1689249-2 LCS								
Total Suspended Solids			98.7		%		85-115	15-JUN-13
WG1689249-1 MB								
Total Suspended Solids			<1.0		mg/L		1	15-JUN-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	12-JUN-13 08:30	19-JUN-13 23:41	0.25	183	hours	EHTR-FM
Cyanides							
Free Cyanide in water by CFA							
	1	12-JUN-13 08:30	28-JUN-13 12:55	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 L1316438 were received on 13-JUN-13 09:00.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

Project Name Faro Mine
Location Faro Mine Complex - Faro YK
Project Number 472645.07.EM.SS.02.0
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-015
Project FARO MINE SEEP SAMPLING 2013
Turnaround Time 10 Days
Shipping Date: 6/12/2013
COC Number: ALS06121304

	DATE	TIME	Matrix	(ASTM 7237) Free Cyanide	(E245.7) Field Filtered Dissolved Hg	(Ferrozine Method) Field Filtered Ferrous Iron	(SM2310) Acidity – Run Hot H2O2 if Fe >15ppm	(SM2310_HP) Acidity – Run Hot H2O2	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM4110B) CL F NO2 NO3 and SO4	(SM4500P) ortho-Phosphate	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered For Metals Analyte List see Table 1	Ammonia (JEM/SM4500NH3) Ammonia		Number of Containers	COMMENTS
Container:				125mL Poly	250ml Poly	125ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	250ml Glass	250ml Poly	250ml glass			
Preservatives:				NaOH, 4°C	HNO3, 4°C	HCl, 4°C	4C	4C	4C	4°C	4°C	4°C	4°C	H2SO4, pH<2, 4°C	HNO3, 4°C	H2SO4, pH<2, 4C			
Filtered:				NA	Field	Field	NA	NA	NA	NA	NA	NA	NA	Field	Field	NA			
Holding Time:				14	180/28	180	14	14	14	7	7	3	3	28	180/28	28			
SRK-FD30_SESP13	6/12/2013	8:30	Water	X	X	X	X		X	X	X	X	X	X	X	X		8	
																	TOTAL NUMBER OF CONTAINERS	113	


L1316438-COFC

Signatures	Date/Time
Approved by	
Sampled by	
Relinquished by	
Received by	6/13/13
Relinquished by	
Received by	7.0

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
PO: 604564 on Invoice Perform Lab Dup/MS on the samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 14-JUN-13
Report Date: 16-AUG-13 11:26 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1316792

Project P.O. #: 472645.06.AD.01.04.13 "PO= 604564"
Job Reference: FARO MINE SEEP SAMPLING 2013 SW-015
C of C Numbers: ALS06131301
Legal Site Desc:

Comments:

16-AUG-13: Corrected sample id's to match the chain of custody.

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316792-1	L1316792-2	L1316792-3	L1316792-4	L1316792-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	12-JUN-13	12-JUN-13	12-JUN-13	12-JUN-13	12-JUN-13
	Sampled Time	15:07	14:05	16:20	15:30	16:10
	Client ID	A30_SESP13	CH-FP-23_SESP13	CH-FP-30_SESP13	CH-FP-34_SESP13	CH-FP-35_SESP13
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	468	1870	59.4	207	539
	pH (pH)		7.29	8.13	8.01	
	Total Suspended Solids (mg/L)	2.5	99.2	873	<1.0	1330
	Total Dissolved Solids (mg/L)	1240	2880	94	290	932
Anions and Nutrients	Acidity (as CaCO3) (mg/L)		70.1	1.6	3.5	
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)	360				<25
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		125	59.0	100	
	Alkalinity, Carbonate (as CaCO3) (mg/L)		<2.0	<2.0	<2.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)		<2.0	<2.0	<2.0	
	Alkalinity, Total (as CaCO3) (mg/L)		125	59.0	100	
	Ammonia, Total (as N) (mg/L)	0.0242	<0.0050	0.0058	<0.0050	0.0081
	Chloride (Cl) (mg/L)	<5.0 DLA	<10 DLA	<0.50	<0.50	<5.0 DLA
	Fluoride (F) (mg/L)	0.75	0.98	0.424	0.190	0.95
	Nitrate (as N) (mg/L)	0.114	0.39	0.162	0.155	0.213
	Nitrite (as N) (mg/L)	<0.010 DLA	<0.020 DLA	<0.0010	<0.0010	<0.010 DLA
	Orthophosphate-Dissolved (as P) (mg/L)	0.0028	<0.0010	0.0040	<0.0010	<0.0010
	Sulfate (SO4) (mg/L)	798	1930	12.8	116	604
Cyanides	Cyanide, Free (mg/L)					
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	2.54	2.17	1.74	1.16	1.47
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	15.0	0.0185	0.0663	0.0206	0.111
	Antimony (Sb)-Dissolved (mg/L)	<0.0010 DLA	<0.00050 DLA	<0.00010	<0.00010	<0.00050 DLA
	Arsenic (As)-Dissolved (mg/L)	<0.0010 DLA	<0.00050 DLA	0.00016	0.00082	<0.00050 DLA
	Barium (Ba)-Dissolved (mg/L)	0.0142	0.0105	0.0278	0.0690	0.0207
	Beryllium (Be)-Dissolved (mg/L)	0.0056	<0.00050 DLA	<0.00010	<0.00010	0.00060
	Boron (B)-Dissolved (mg/L)	<0.10 DLA	<0.050 DLA	<0.010	<0.010	<0.050 DLA
	Cadmium (Cd)-Dissolved (mg/L)	0.110	0.103	0.000215	0.00206	0.0698
	Calcium (Ca)-Dissolved (mg/L)	56.3	274	18.0	61.5	112
	Chromium (Cr)-Dissolved (mg/L)	0.0127	<0.00050 DLA	0.00038	0.00024	<0.00050 DLA
	Cobalt (Co)-Dissolved (mg/L)	0.232	0.0271	0.00042	0.00012	0.0456
	Copper (Cu)-Dissolved (mg/L)	1.66	0.0380	0.00259	0.00285	0.0972
	Iron (Fe)-Dissolved (mg/L)	20.6	0.061	0.077	0.161	0.032
	Ferrous Iron, Dissolved (mg/L)	1.02	0.026	0.027	<0.020	<0.020
	Lead (Pb)-Dissolved (mg/L)	0.577	0.00881	0.00164	0.00612	0.00235
	Lithium (Li)-Dissolved (mg/L)	0.0430	0.0971	0.0106	0.0158	0.0344
	Magnesium (Mg)-Dissolved (mg/L)	79.5	288	3.54	12.9	63.0

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316792-6	L1316792-7	L1316792-8	L1316792-9	L1316792-10
	Description	Water	Water	Water	Water	Water
	Sampled Date	12-JUN-13	12-JUN-13	12-JUN-13	12-JUN-13	12-JUN-13
	Sampled Time	10:50	13:00	15:00	09:10	16:30
	Client ID	CH-FP-37_SESP13	CH-RCTA-04_SESP13	FP10_SESP13	SRK-FD26_SESP13	SRK-FD40_SESP13
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	1640	710	800	740	523
	pH (pH)	8.22	5.63	7.87	7.78	
	Total Suspended Solids (mg/L)	2.8	114	57.8	17.2	<1.0
	Total Dissolved Solids (mg/L)	2220	1740	1110	1020	1350
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	3.4		8.2	10.6	
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)		221			543
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	221	6.6	175	189	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0	<2.0	<2.0	<2.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0	<2.0	<2.0	<2.0	
	Alkalinity, Total (as CaCO3) (mg/L)	221	6.6	175	189	
	Ammonia, Total (as N) (mg/L)	<0.0050	0.230	0.0082	0.0208	0.0203
	Chloride (Cl) (mg/L)	<10 DLA	<5.0 DLA	<5.0 DLA	<5.0 DLA	<5.0 DLA
	Fluoride (F) (mg/L)	0.69	<0.20 DLA	0.52	0.45	0.70
	Nitrate (as N) (mg/L)	<0.10 DLA	0.087	4.47 DLA	4.70 DLA	0.110
	Nitrite (as N) (mg/L)	<0.020 DLA	<0.010 DLA	<0.010	<0.010 DLA	<0.010 DLA
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	0.0105
	Sulfate (SO4) (mg/L)	1450	1070	620	546	939
Cyanides	Cyanide, Free (mg/L)		<0.010 DLM			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	2.47	1.85	3.39	3.71	2.85
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0305	0.0131	0.0082	0.0350	15.2
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00050 DLA	<0.00010	<0.00010	<0.0010 DLA
	Arsenic (As)-Dissolved (mg/L)	0.00078	<0.00050 DLA	0.00033	0.00031	0.0014
	Barium (Ba)-Dissolved (mg/L)	0.0189	0.0295	0.0141	0.0185	0.0148
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00050 DLA	<0.00010	<0.00010	0.0060
	Boron (B)-Dissolved (mg/L)	<0.010	<0.050 DLA	<0.010	<0.010	<0.10 DLA
	Cadmium (Cd)-Dissolved (mg/L)	0.000142	0.000841	0.00507	0.00374	0.115
	Calcium (Ca)-Dissolved (mg/L)	214	224	134	124	65.0
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00050 DLA	<0.00010	<0.00010	0.0130
	Cobalt (Co)-Dissolved (mg/L)	0.00828	0.0898	0.00171	0.00499	0.240
	Copper (Cu)-Dissolved (mg/L)	0.00126	0.0013	0.00308	0.00725	1.74
	Iron (Fe)-Dissolved (mg/L)	0.100	187	<0.030	0.041	38.4
	Ferrous Iron, Dissolved (mg/L)	<0.020	213	<0.020	0.041	0.561
	Lead (Pb)-Dissolved (mg/L)	0.00161	0.00378	0.00130	0.000310	0.188
	Lithium (Li)-Dissolved (mg/L)	0.0539	0.0115	0.0343	0.0356	0.0440
	Magnesium (Mg)-Dissolved (mg/L)	269	36.9	113	104	87.7

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316792-11	L1316792-12			
	Description	Water	Water			
	Sampled Date	12-JUN-13	13-JUN-13			
	Sampled Time	16:30	09:25			
	Client ID	SRK-FD940_SESP13	SRK-FD05_SESP13			
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	523	1140			
	pH (pH)		7.68			
	Total Suspended Solids (mg/L)	2.2	1.4			
	Total Dissolved Solids (mg/L)	1420	1640			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)		15.9			
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)	391				
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		219			
	Alkalinity, Carbonate (as CaCO3) (mg/L)		<2.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)		<2.0			
	Alkalinity, Total (as CaCO3) (mg/L)		219			
	Ammonia, Total (as N) (mg/L)	0.0203	<0.0050			
	Chloride (Cl) (mg/L)	<5.0 DLA	<5.0 DLA			
	Fluoride (F) (mg/L)	0.74	0.39			
	Nitrate (as N) (mg/L)	0.107	17.7			
	Nitrite (as N) (mg/L)	<0.010 DLA	<0.010 DLA			
	Orthophosphate-Dissolved (as P) (mg/L)	0.0107	<0.0010			
	Sulfate (SO4) (mg/L)	930	904			
Cyanides	Cyanide, Free (mg/L)		<0.0050			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	2.84	3.84			
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	15.8	0.0337			
	Antimony (Sb)-Dissolved (mg/L)	<0.0010 DLA	0.00013			
	Arsenic (As)-Dissolved (mg/L)	0.0018	0.00033			
	Barium (Ba)-Dissolved (mg/L)	0.0156	0.0291			
	Beryllium (Be)-Dissolved (mg/L)	0.0060	<0.00010			
	Boron (B)-Dissolved (mg/L)	<0.10 DLA	0.010			
	Cadmium (Cd)-Dissolved (mg/L)	0.120	0.00504			
	Calcium (Ca)-Dissolved (mg/L)	64.8	174			
	Chromium (Cr)-Dissolved (mg/L)	0.0139	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	0.249	0.00060			
	Copper (Cu)-Dissolved (mg/L)	1.79	0.00247			
	Iron (Fe)-Dissolved (mg/L)	38.5	0.067			
	Ferrous Iron, Dissolved (mg/L)	0.578	<0.020			
	Lead (Pb)-Dissolved (mg/L)	0.194	0.00306			
	Lithium (Li)-Dissolved (mg/L)	0.0437	0.0323			
	Magnesium (Mg)-Dissolved (mg/L)	87.7	171			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316792-1	L1316792-2	L1316792-3	L1316792-4	L1316792-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	12-JUN-13	12-JUN-13	12-JUN-13	12-JUN-13	12-JUN-13
	Sampled Time	15:07	14:05	16:20	15:30	16:10
	Client ID	A30_SESP13	CH-FP-23_SESP13	CH-FP-30_SESP13	CH-FP-34_SESP13	CH-FP-35_SESP13
Grouping	**Analyte**					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	5.19	3.57	0.0110	0.0184	3.00
	Mercury (Hg)-Dissolved (mg/L)	0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	<0.00050 DLA	<0.00025 DLA	0.000773	0.000346	<0.00025 DLA
	Nickel (Ni)-Dissolved (mg/L)	0.197	0.258	0.00074	0.00787	0.177
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	1.30	6.46	0.716	1.19	2.06
	Selenium (Se)-Dissolved (mg/L)	<0.0010 DLA	<0.00050 DLA	0.00023	0.00017	<0.00050 DLA
	Silicon (Si)-Dissolved (mg/L)	7.97	2.38	6.24	8.17	10.6
	Silicon (as SiO2)-Dissolved (mg/L)	17.1	5.10	13.3	17.5	22.7
	Silver (Ag)-Dissolved (mg/L)	0.00060	<0.000050 DLA	<0.000010	<0.000010	<0.000050 DLA
	Sodium (Na)-Dissolved (mg/L)	2.93	5.51	2.73	5.06	5.21
	Strontium (Sr)-Dissolved (mg/L)	0.259	0.624	0.101	0.215	0.324
	Sulfur (S)-Dissolved (mg/L)	257	593	3.99	37.3	188
	Thallium (Tl)-Dissolved (mg/L)	0.00050	0.00215	<0.000010	<0.000010	<0.000050 DLA
	Titanium (Ti)-Dissolved (mg/L)	<0.10 DLA	<0.050 DLA	<0.010	<0.010	<0.050 DLA
	Uranium (U)-Dissolved (mg/L)	0.0122	0.00251	0.00169	0.00296	0.000810
	Vanadium (V)-Dissolved (mg/L)	<0.010 DLA	<0.0050 DLA	<0.0010	<0.0010	<0.0050 DLA
	Zinc (Zn)-Dissolved (mg/L)	66.0	40.1	0.121	1.82	43.2

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1316792-6 Water 12-JUN-13 10:50 CH-FP-37_SESP13	L1316792-7 Water 12-JUN-13 13:00 CH-RCTA-04_SESP13	L1316792-8 Water 12-JUN-13 15:00 FP10_SESP13	L1316792-9 Water 12-JUN-13 09:10 SRK-FD26_SESP13	L1316792-10 Water 12-JUN-13 16:30 SRK-FD40_SESP13
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	0.500	21.5	0.109	0.292	5.46
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	<0.00025 DLA	0.000061	<0.000050	<0.00050 DLA
	Nickel (Ni)-Dissolved (mg/L)	0.0330	0.0669	0.0398	0.0422	0.195
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	4.03	3.14	4.19	3.95	1.30
	Selenium (Se)-Dissolved (mg/L)	0.00086	<0.00050 DLA	0.00094	0.00094	<0.0010 DLA
	Silicon (Si)-Dissolved (mg/L)	1.99	5.76	4.17	4.83	7.64
	Silicon (as SiO2)-Dissolved (mg/L)	4.26	12.3	8.93	11.4	16.3
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000050 DLA	<0.000010	<0.000010	0.00024
	Sodium (Na)-Dissolved (mg/L)	4.79	10.0	6.30	6.13	3.07
	Strontium (Sr)-Dissolved (mg/L)	0.826	0.579	0.405	0.430	0.331
	Sulfur (S)-Dissolved (mg/L)	455	345	195	175	298
	Thallium (Tl)-Dissolved (mg/L)	0.000341	0.000077	0.000099	0.000072	0.00051
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.050 DLA	<0.010	<0.010	<0.10 DLA
	Uranium (U)-Dissolved (mg/L)	0.00367	0.000751	0.00335	0.00400	0.0124
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0050 DLA	<0.0010	<0.0010	<0.010 DLA
	Zinc (Zn)-Dissolved (mg/L)	0.0434	10.1	3.08	3.37	68.6

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1316792-11	L1316792-12			
	Description	Water	Water			
	Sampled Date	12-JUN-13	13-JUN-13			
	Sampled Time	16:30	09:25			
	Client ID	SRK-FD940_SESP13	SRK-FD05_SESP13			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	5.46	0.0135			
	Mercury (Hg)-Dissolved (mg/L)	0.000011	<0.000010			
	Molybdenum (Mo)-Dissolved (mg/L)	<0.00050 DLA	0.000171			
	Nickel (Ni)-Dissolved (mg/L)	0.204	0.0685			
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30			
	Potassium (K)-Dissolved (mg/L)	1.31	4.63			
	Selenium (Se)-Dissolved (mg/L)	<0.0010 DLA	0.00396			
	Silicon (Si)-Dissolved (mg/L)	7.57	5.17			
	Silicon (as SiO2)-Dissolved (mg/L)	16.2	11.1			
	Silver (Ag)-Dissolved (mg/L)	0.00023	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	3.23	9.18			
	Strontium (Sr)-Dissolved (mg/L)	0.340	0.694			
	Sulfur (S)-Dissolved (mg/L)	295	285			
	Thallium (Tl)-Dissolved (mg/L)	0.00052	0.000204			
	Titanium (Ti)-Dissolved (mg/L)	<0.10 DLA	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.0125	0.0163			
	Vanadium (V)-Dissolved (mg/L)	<0.010 DLA	<0.0010			
	Zinc (Zn)-Dissolved (mg/L)	71.9	8.31			

* 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	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Arsenic (As)-Dissolved	DLA	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Beryllium (Be)-Dissolved	DLA	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Boron (B)-Dissolved	DLA	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Chromium (Cr)-Dissolved	DLA	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Molybdenum (Mo)-Dissolved	DLA	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Selenium (Se)-Dissolved	DLA	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Silver (Ag)-Dissolved	DLA	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Titanium (Ti)-Dissolved	DLA	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Vanadium (V)-Dissolved	DLA	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cyanide, Free	DLM	L1316792-12, -7
Duplicate	Cyanide, Free	DLM	L1316792-12, -7
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Ammonia, Total (as N)	MS-B	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1316792-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
DLM	Detection Limit Adjusted For 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**
ACY-H2O2-MAN-VA	Water	Acidity by Hot Peroxide Manual Titration	APHA - ACIDITY (2310)

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". The procedure involves preliminary sample treatment by the hot peroxide procedure, and Acidity is subsequently determined by potentiometric titration to a specified endpoint (i.e. pH = 8.3).

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-SCR-VA	Water	Alkalinity by colour or titration	EPA 310.2 OR APHA 2320

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
OR
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

Reference Information

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-DOC-VA	Water	Dissolved 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)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

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.

FE2-D-COL-VA	Water	Diss. Ferrous Iron in Water by Colour	James W. Ball et al (1999)

This analysis is carried out using procedures adapted from "A New Method for the Direct Determination of Dissolved Iron Concentration in Acid Mine Waters" published by James W. Ball et al (1999). The procedures involves preliminary sample filtration (0.1um filter) and Ferrous Iron is determined using the "FerroZine" colorimteric method.

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).

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).

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.

PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

S-DIS-ICP-VA	Water	Dissolved Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

Reference Information

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.

SIO2-D-CALC-VA Water Dissolved Silicon (reported as Silica) CALCULATION

Dissolved Silicon (as SiO2) is a calculated parameter. Dissolved Silicon (as SiO2 mg/L) = 2.139 x Dissolved Silicon (mg/L).

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-LOW-VA Water Total Suspended Solids by Grav. (1 mg/L) APHA 2540 Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** 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:

ALS06131301

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

Workorder: L1316792 Report Date: 16-AUG-13

Client: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-H2O2-MAN-VA	**Water**							
Batch R2634732								
WG1691959-2 CRM		**VA-ACY-M-CONTROL**						
Acidity-Hot Peroxide Treated (as CaCO3)			98.3		%		85-115	19-JUN-13
WG1691959-3 DUP		**L1316792-7**						
Acidity-Hot Peroxide Treated (as CaCO3)		221	252		mg/L	13	20	19-JUN-13
WG1691959-1 MB								
Acidity-Hot Peroxide Treated (as CaCO3)			<25		mg/L		25	19-JUN-13
Batch R2638090								
WG1695571-2 CRM		**VA-ACY-M-CONTROL**						
Acidity-Hot Peroxide Treated (as CaCO3)			99.0		%		85-115	25-JUN-13
WG1695571-3 DUP		**L1316792-1**						
Acidity-Hot Peroxide Treated (as CaCO3)		360	360		mg/L	0.0	20	25-JUN-13
WG1695571-1 MB								
Acidity-Hot Peroxide Treated (as CaCO3)			<25		mg/L		25	25-JUN-13
ACY-PCT-VA	**Water**							
Batch R2638483								
WG1695597-9 CRM		**VA-ACY-CONTROL**						
Acidity (as CaCO3)			100.0		%		85-115	25-JUN-13
ALK-SCR-VA	**Water**							
Batch R2637533								
WG1694921-2 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			97.2		%		85-115	25-JUN-13
WG1694921-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	25-JUN-13
Batch R2642242								
WG1699485-2 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			97.2		%		85-115	25-JUN-13
WG1699485-4 CRM		**VA-ALKM-CONTROL**						
Alkalinity, Total (as CaCO3)			101.0		%		85-115	25-JUN-13
WG1699485-5 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			98.2		%		85-115	03-JUL-13
WG1699485-3 DUP		**L1316792-7**						
Alkalinity, Total (as CaCO3)		6.6	6.7		mg/L	1.2	20	03-JUL-13
WG1699485-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	25-JUN-13
WG1699485-6 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	03-JUL-13
ANIONS-CL-IC-WR	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-CL-IC-WR	**Water**							
Batch R2642646								
WG1700204-3 DUP		**L1316792-7**						
Chloride (Cl)		<5.0	<5.0	RPD-NA	mg/L	N/A	20	15-JUN-13
WG1700204-2 LCS								
Chloride (Cl)			103.1		%		85-115	15-JUN-13
WG1700204-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	15-JUN-13
WG1700204-4 MS		**L1316792-7**						
Chloride (Cl)			104.2		%		75-125	15-JUN-13
ANIONS-F-IC-WR	**Water**							
Batch R2642646								
WG1700204-3 DUP		**L1316792-7**						
Fluoride (F)		<0.20	<0.20	RPD-NA	mg/L	N/A	20	15-JUN-13
WG1700204-2 LCS								
Fluoride (F)			105.0		%		85-115	15-JUN-13
WG1700204-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	15-JUN-13
WG1700204-4 MS		**L1316792-7**						
Fluoride (F)			115.4		%		75-125	15-JUN-13
ANIONS-NO2-IC-WR	**Water**							
Batch R2642646								
WG1700204-3 DUP		**L1316792-7**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	15-JUN-13
WG1700204-2 LCS								
Nitrite (as N)			100.6		%		85-115	15-JUN-13
WG1700204-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	15-JUN-13
WG1700204-4 MS		**L1316792-7**						
Nitrite (as N)			98.0		%		75-125	15-JUN-13
ANIONS-NO3-IC-WR	**Water**							
Batch R2642646								
WG1700204-3 DUP		**L1316792-7**						
Nitrate (as N)		0.087	0.082		mg/L	6.0	20	15-JUN-13
WG1700204-2 LCS								
Nitrate (as N)			104.1		%		85-115	15-JUN-13
WG1700204-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	15-JUN-13
WG1700204-4 MS		**L1316792-7**						
Nitrate (as N)			104.9		%		75-125	15-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-SO4-IC-WR	**Water**							
Batch R2642646								
WG1700204-3 DUP		**L1316792-7**						
Sulfate (SO4)		1070	1080		mg/L	0.9	20	15-JUN-13
WG1700204-2 LCS								
Sulfate (SO4)			105.9		%		85-115	15-JUN-13
WG1700204-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	15-JUN-13
WG1700204-4 MS		**L1316792-7**						
Sulfate (SO4)			N/A	MS-B	%		-	15-JUN-13
CARBONS-DOC-VA	**Water**							
Batch R2641235								
WG1697382-6 LCS								
Dissolved Organic Carbon			108.5		%		80-120	30-JUN-13
WG1697382-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	30-JUN-13
WG1697382-2 MS		**L1316343-1**						
Dissolved Organic Carbon			104.4		%		70-130	30-JUN-13
Batch R2641786								
WG1699338-1 DUP		**L1316792-7**						
Dissolved Organic Carbon		1.85	1.89		mg/L	2.0	20	01-JUL-13
WG1699338-3 LCS								
Dissolved Organic Carbon			99.6		%		80-120	01-JUL-13
WG1699338-2 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	01-JUL-13
Batch R2641901								
WG1699477-2 LCS								
Dissolved Organic Carbon			108.8		%		80-120	30-JUN-13
WG1699477-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	30-JUN-13
CN-FREE-CFA-VA	**Water**							
Batch R2642485								
WG1700078-7 DUP		**L1316792-7**						
Cyanide, Free		<0.010	<0.010	RPD-NA	mg/L	N/A	20	28-JUN-13
WG1700078-2 LCS								
Cyanide, Free			101.0		%		80-120	28-JUN-13
WG1700078-1 MB								
Cyanide, Free			<0.0050		mg/L		0.005	28-JUN-13
WG1700078-10 MS		**L1317621-1**						
Cyanide, Free			98.7		%		70-130	28-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-FREE-CFA-VA	**Water**							
Batch R2642485								
WG1700078-4 MS		**L1316422-1**						
Cyanide, Free			99.3		%		70-130	28-JUN-13
WG1700078-6 MS		**L1316438-1**						
Cyanide, Free			115.4		%		70-130	28-JUN-13
WG1700078-8 MS		**L1316792-7**						
Cyanide, Free			103.6		%		70-130	28-JUN-13
FE2-D-COL-VA	**Water**							
Batch R2634665								
WG1690831-5 DUP		**L1316792-7**						
Ferrous Iron, Dissolved		213	213		mg/L	0.0	20	19-JUN-13
WG1690831-2 LCS								
Ferrous Iron, Dissolved			104.8		%		80-120	19-JUN-13
WG1690831-1 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	19-JUN-13
WG1690831-4 MS		**L1316422-2**						
Ferrous Iron, Dissolved			104.0		%		70-130	19-JUN-13
WG1690831-6 MS		**L1316792-7**						
Ferrous Iron, Dissolved			108.0		%		70-130	19-JUN-13
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2633814								
WG1689935-3 LCS								
Mercury (Hg)-Dissolved			98.5		%		80-120	18-JUN-13
WG1689935-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	18-JUN-13
Batch R2633849								
WG1689935-4 DUP		**L1316792-7**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	18-JUN-13
WG1689935-5 MS		**L1316792-7**						
Mercury (Hg)-Dissolved			107.6		%		70-130	18-JUN-13
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1689935-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	17-JUN-13
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2633494								
WG1689935-1 MB								
Boron (B)-Dissolved			<0.010		mg/L		0.01	17-JUN-13
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	17-JUN-13
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Lithium (Li)-Dissolved			<0.00050		mg/L		0.0005	17-JUN-13
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-13
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	17-JUN-13
Potassium (K)-Dissolved			<0.050		mg/L		0.05	17-JUN-13
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-13
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	17-JUN-13
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	17-JUN-13
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	17-JUN-13
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-13
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	17-JUN-13
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	17-JUN-13
Batch R2634463								
WG1689935-2 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Dissolved			102.6		%		80-120	17-JUN-13
Antimony (Sb)-Dissolved			100.9		%		80-120	17-JUN-13
Arsenic (As)-Dissolved			100.4		%		80-120	17-JUN-13
Barium (Ba)-Dissolved			98.6		%		80-120	17-JUN-13
Beryllium (Be)-Dissolved			97.6		%		80-120	17-JUN-13
Boron (B)-Dissolved			93.0		%		80-120	17-JUN-13
Cadmium (Cd)-Dissolved			101.4		%		80-120	17-JUN-13
Chromium (Cr)-Dissolved			101.3		%		80-120	17-JUN-13
Cobalt (Co)-Dissolved			98.0		%		80-120	17-JUN-13
Copper (Cu)-Dissolved			97.2		%		80-120	17-JUN-13
Lead (Pb)-Dissolved			97.2		%		80-120	17-JUN-13
Lithium (Li)-Dissolved			98.7		%		80-120	17-JUN-13
Manganese (Mn)-Dissolved			97.5		%		80-120	17-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2634463								
WG1689935-2 CRM		**VA-HIGH-WATRM**						
Molybdenum (Mo)-Dissolved			100.7		%		80-120	17-JUN-13
Nickel (Ni)-Dissolved			99.2		%		80-120	17-JUN-13
Potassium (K)-Dissolved			101.6		%		80-120	17-JUN-13
Selenium (Se)-Dissolved			98.7		%		80-120	17-JUN-13
Silver (Ag)-Dissolved			98.4		%		80-120	17-JUN-13
Sodium (Na)-Dissolved			102.5		%		80-120	17-JUN-13
Strontium (Sr)-Dissolved			99.5		%		80-120	17-JUN-13
Thallium (Tl)-Dissolved			96.8		%		80-120	17-JUN-13
Titanium (Ti)-Dissolved			102.0		%		80-120	17-JUN-13
Uranium (U)-Dissolved			97.2		%		80-120	17-JUN-13
Vanadium (V)-Dissolved			100.1		%		80-120	17-JUN-13
Zinc (Zn)-Dissolved			96.5		%		80-120	17-JUN-13
WG1689935-4 DUP		**L1316792-7**						
Aluminum (Al)-Dissolved		0.0131	0.0131		mg/L	0.2	20	27-JUN-13
Antimony (Sb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-JUN-13
Arsenic (As)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-JUN-13
Barium (Ba)-Dissolved		0.0295	0.0292		mg/L	1.0	20	27-JUN-13
Beryllium (Be)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-JUN-13
Boron (B)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	27-JUN-13
Cadmium (Cd)-Dissolved		0.000841	0.000846		mg/L	0.6	20	27-JUN-13
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-JUN-13
Cobalt (Co)-Dissolved		0.0898	0.0916		mg/L	1.9	20	27-JUN-13
Copper (Cu)-Dissolved		0.0013	0.0013		mg/L	1.2	20	27-JUN-13
Lead (Pb)-Dissolved		0.00378	0.00381		mg/L	1.0	20	27-JUN-13
Lithium (Li)-Dissolved		0.0115	0.0140		mg/L	20	20	27-JUN-13
Manganese (Mn)-Dissolved		21.5	21.6		mg/L	0.2	20	27-JUN-13
Molybdenum (Mo)-Dissolved		<0.00025	<0.00025	RPD-NA	mg/L	N/A	20	27-JUN-13
Nickel (Ni)-Dissolved		0.0669	0.0684		mg/L	2.1	20	27-JUN-13
Potassium (K)-Dissolved		3.14	3.21		mg/L	2.0	20	27-JUN-13
Selenium (Se)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-JUN-13
Silver (Ag)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	27-JUN-13
Sodium (Na)-Dissolved		10.0	10.1		mg/L	1.2	20	27-JUN-13
Strontium (Sr)-Dissolved		0.579	0.633		mg/L	8.9	20	27-JUN-13
Thallium (Tl)-Dissolved		0.000077	0.000134	J	mg/L	0.000057	0.0001	27-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2634463								
WG1689935-4 DUP		**L1316792-7**						
Titanium (Ti)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	27-JUN-13
Uranium (U)-Dissolved		0.000751	0.000777		mg/L	3.5	20	27-JUN-13
Vanadium (V)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	27-JUN-13
Zinc (Zn)-Dissolved		10.1	10.4		mg/L	2.9	20	27-JUN-13
WG1689935-1 MB								
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	18-JUN-13
WG1689935-5 MS		**L1316792-7**						
Aluminum (Al)-Dissolved			93.7		%		70-130	27-JUN-13
Antimony (Sb)-Dissolved			94.1		%		70-130	27-JUN-13
Arsenic (As)-Dissolved			101.0		%		70-130	27-JUN-13
Barium (Ba)-Dissolved			98.3		%		70-130	27-JUN-13
Beryllium (Be)-Dissolved			86.6		%		70-130	27-JUN-13
Boron (B)-Dissolved			80.3		%		70-130	27-JUN-13
Cadmium (Cd)-Dissolved			96.0		%		70-130	27-JUN-13
Chromium (Cr)-Dissolved			92.9		%		70-130	27-JUN-13
Cobalt (Co)-Dissolved			93.2		%		70-130	27-JUN-13
Copper (Cu)-Dissolved			93.8		%		70-130	27-JUN-13
Lead (Pb)-Dissolved			88.5		%		70-130	27-JUN-13
Lithium (Li)-Dissolved			90.0		%		70-130	27-JUN-13
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	27-JUN-13
Molybdenum (Mo)-Dissolved			95.4		%		70-130	27-JUN-13
Nickel (Ni)-Dissolved			94.5		%		70-130	27-JUN-13
Potassium (K)-Dissolved			94.2		%		70-130	27-JUN-13
Selenium (Se)-Dissolved			95.8		%		70-130	27-JUN-13
Silver (Ag)-Dissolved			92.0		%		70-130	27-JUN-13
Sodium (Na)-Dissolved			N/A	MS-B	%		-	27-JUN-13
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	27-JUN-13
Thallium (Tl)-Dissolved			89.9		%		70-130	27-JUN-13
Titanium (Ti)-Dissolved			103.6		%		70-130	27-JUN-13
Uranium (U)-Dissolved			92.2		%		70-130	27-JUN-13
Vanadium (V)-Dissolved			96.1		%		70-130	27-JUN-13
Zinc (Zn)-Dissolved			N/A	MS-B	%		-	27-JUN-13
MET-DIS-ICP-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA	**Water**							
Batch R2633893								
WG1689935-2 CRM		**VA-HIGH-WATRM**						
Calcium (Ca)-Dissolved			99.0		%		80-120	18-JUN-13
Iron (Fe)-Dissolved			99.7		%		80-120	18-JUN-13
Magnesium (Mg)-Dissolved			100.4		%		80-120	18-JUN-13
Phosphorus (P)-Dissolved			99.2		%		80-120	18-JUN-13
Silicon (Si)-Dissolved			101.1		%		80-120	18-JUN-13
WG1689935-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	18-JUN-13
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	18-JUN-13
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	18-JUN-13
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	18-JUN-13
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	18-JUN-13
Batch R2638002								
WG1689935-4 DUP		**L1316792-7**						
Calcium (Ca)-Dissolved		224	218		mg/L	2.3	20	24-JUN-13
Iron (Fe)-Dissolved		187	183		mg/L	2.4	20	24-JUN-13
Magnesium (Mg)-Dissolved		36.9	36.7		mg/L	0.5	20	24-JUN-13
Phosphorus (P)-Dissolved		<0.30	<0.30	RPD-NA	mg/L	N/A	20	24-JUN-13
Silicon (Si)-Dissolved		5.76	5.71		mg/L	0.9	20	24-JUN-13
WG1689935-5 MS		**L1316792-7**						
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	24-JUN-13
Iron (Fe)-Dissolved			N/A	MS-B	%		-	24-JUN-13
Magnesium (Mg)-Dissolved			94.4		%		70-130	24-JUN-13
NH3-F-VA	**Water**							
Batch R2641264								
WG1697450-11 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			90.4		%		85-115	28-JUN-13
WG1697450-12 DUP		**L1316792-7**						
Ammonia, Total (as N)		0.230	0.227		mg/L	1.2	20	28-JUN-13
WG1697450-10 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	28-JUN-13
WG1697450-13 MS		**L1316792-7**						
Ammonia, Total (as N)			N/A	MS-B	%		-	28-JUN-13
PH-PCT-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-PCT-VA	**Water**							
Batch R2636132								
WG1692286-25 CRM		**VA-PH7-BUF**						
pH			7.01		pH		6.9-7.1	20-JUN-13
WG1692286-33 DUP		**L1316792-7**						
pH		5.63	5.40	J	pH	0.23	0.3	20-JUN-13
PO4-DO-COL-VA	**Water**							
Batch R2634284								
WG1689443-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			92.5		%		80-120	15-JUN-13
WG1689443-6 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			92.5		%		80-120	15-JUN-13
WG1689443-3 DUP		**L1316792-7**						
Orthophosphate-Dissolved (as P)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	15-JUN-13
WG1689443-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	15-JUN-13
WG1689443-5 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	15-JUN-13
WG1689443-4 MS		**L1316792-7**						
Orthophosphate-Dissolved (as P)			88.3		%		70-130	15-JUN-13
S-DIS-ICP-VA	**Water**							
Batch R2633893								
WG1689935-2 CRM		**VA-HIGH-WATRM**						
Sulfur (S)-Dissolved			101.3		%		80-120	18-JUN-13
WG1689935-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	18-JUN-13
Batch R2638002								
WG1689935-4 DUP		**L1316792-7**						
Sulfur (S)-Dissolved		345	341		mg/L	1.1	20	24-JUN-13
WG1689935-5 MS		**L1316792-7**						
Sulfur (S)-Dissolved			N/A	MS-B	%		-	24-JUN-13
TDS-VA	**Water**							
Batch R2635326								
WG1691615-3 DUP		**L1316792-7**						
Total Dissolved Solids		1740	1720		mg/L	1.1	20	19-JUN-13
WG1691615-2 LCS								
Total Dissolved Solids			102.9		%		85-115	19-JUN-13
WG1691615-1 MB								
Total Dissolved Solids			<10		mg/L		10	19-JUN-13
TSS-LOW-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TSS-LOW-VA	**Water**							
Batch R2635442								
WG1691149-3 DUP		**L1316792-7**						
Total Suspended Solids		114	115		mg/L	1.1	20	18-JUN-13
WG1691149-2 LCS								
Total Suspended Solids			97.2		%		85-115	18-JUN-13
WG1691149-1 MB								
Total Suspended Solids			<1.0		mg/L		1	18-JUN-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)							
	2	12-JUN-13 14:05	20-JUN-13 23:41	0.25	202	hours	EHTR-FM
	3	12-JUN-13 16:20	20-JUN-13 23:41	0.25	199	hours	EHTR-FM
	4	12-JUN-13 15:30	20-JUN-13 23:41	0.25	200	hours	EHTR-FM
	6	12-JUN-13 10:50	20-JUN-13 23:41	0.25	205	hours	EHTR-FM
	7	12-JUN-13 13:00	20-JUN-13 23:41	0.25	203	hours	EHTR-FM
	8	12-JUN-13 15:00	20-JUN-13 23:41	0.25	201	hours	EHTR-FM
	9	12-JUN-13 09:10	20-JUN-13 23:41	0.25	206	hours	EHTR-FM
	12	13-JUN-13 09:25	20-JUN-13 23:41	0.25	182	hours	EHTR-FM
Anions and Nutrients							
Alkalinity by colour or titration							
	7	12-JUN-13 13:00	03-JUL-13 09:00	14	21	days	EHT
Cyanides							
Free Cyanide in water by CFA							
	7	12-JUN-13 13:00	28-JUN-13 12:55	14	16	days	EHT
	12	13-JUN-13 09:25	28-JUN-13 12:55	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 L1316792 were received on 14-JUN-13 09:45.

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.



L1316792-COFC

CH2MHILL

CHAIN OF CUSTODY RECORD

6/13/2013 10:40:30 AM

Project Name Faro Mine
Location Faro Mine Complex - Faro YK
Project Number 472645.07.EM.SS.02.0
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-015
Project FARO MINE SEEP SAMPLING 2013
Turnaround Time 10 Days
Shipping Date: 6/13/2013
COC Number: ALS06131301

	Container:	125mL Poly	250ml Poly	125ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	250ml Glass	250ml Poly	250ml glass			
	Preservatives:	NaOH, 4°C	HNO3, 4°C	HCl, 4°C	4C	4C	4C	4°C	4°C	4°C	4°C	H2SO4, pH<2, 4°C	HNO3, 4°C	H2SO4, pH<2, 4C			
	Filtered:	NA	Field	Field	NA	NA	NA	NA	NA	NA	NA	Field	Field	NA			
	Holding Time:	14	180/28	180	14	14	14	7	7	3	3	28	180/28	28			
		(ASTM 7237) Free Cyanide	(E245.7) Field Filtered Dissolved Hg	(Ferrozine Method) Field Filtered Ferrous Iron	(SM2310) Acidity – Run Hot H2O2 if Fe >15ppm	(SM2310_HP) Acidity – Run Hot H2O2	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM4110B) CL F NO2 NO3 and SO4	(SM4500P) ortho-Phosphate	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered For Metals Analyte List see Table 1	Ammonia (JEM/SM4500NH3) Ammonia		Number of Containers	COMMENTS
	DATE / TIME / Matrix																
A30_SESP13	6/12/2013 15:07 Water		X	X		X		X	X	X	X	X	X	X		7	
CH-FP-23_SESP13	6/12/2013 14:05 Water		X	X	X		X	X	X	X	X	X	X	X		7	
CH-FP-30_SESP13	6/12/2013 16:20 Water		X	X	X		X	X	X	X	X	X	X	X		7	
CH-FP-34_SESP13	6/12/2013 15:30 Water		X	X	X		X	X	X	X	X	X	X	X		7	
CH-FP-35_SESP13	6/12/2013 16:10 Water		X	X		X		X	X	X	X	X	X	X		7	
CH-FP-37_SESP13	6/12/2013 10:50 Water		X	X	X		X	X	X	X	X	X	X	X		7	
CH-RCTA-04_SESP13	6/12/2013 13:00 Water	X	X	X	X		X	X	X	X	X	X	X	X		8	LAB DUP/MS
FP10_SESP13	6/12/2013 15:00 Water		X	X	X		X	X	X	X	X	X	X	X		7	
SRK-FD26_SESP13	6/12/2013 9:10 Water		X	X	X		X	X	X	X	X	X	X	X		7	
SRK-FD40_SESP13	6/12/2013 16:30 Water		X	X		X		X	X	X	X	X	X	X		7	
SRK-FD940_SESP13	6/12/2013 16:30 Water		X	X		X		X	X	X	X	X	X	X		7	
SRK-FD05_SESP13	6/13/2013 9:25 Water	X	X	X	X		X	X	X	X	X	X	X	X		8	
															TOTAL NUMBER OF CONTAINERS	86	

Signatures	Date/Time
Approved by	
Sampled by	06/13/13 1050
Relinquished by	
Received by	06-14-13 9:45
Relinquished by	
Received by	5.5, 4.7, 5.1

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
PO: 604564 on Invoice Perform Lab Dup/MS on the samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 15-JUN-13
Report Date: 05-JUL-13 11:52 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1317509

Project P.O. #: 472645.06.AD.01.04.13 "PO= 604564"
Job Reference: FARO MINE SEEP SAMPLING 2013 SW-015
C of C Numbers: ALS06141301
Legal Site Desc:

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1317509-1	L1317509-2	L1317509-3	L1317509-4	L1317509-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	13-JUN-13	13-JUN-13	13-JUN-13	13-JUN-13	13-JUN-13
	Sampled Time	17:00	15:30	12:30	11:50	11:15
	Client ID	CH-GP-19_SESP13	CH-GP-22_SESP13	CH-GP-27_SESP13	CH-VP-17_SESP13	CH-VP-18_SESP13
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	751	763	771	1820	2120
	pH (pH)	7.90	8.21	8.44		
	Total Suspended Solids (mg/L)	88.4	2230	70.8	66.4	149
	Total Dissolved Solids (mg/L)	1020	1050	963	9100	7180
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	11.9	2.1	<1.0		
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)				2900	1980
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	342	155	265		
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0	<2.0	4.0		
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0	<2.0	<1.0		
	Alkalinity, Total (as CaCO3) (mg/L)	342	155	269		
	Ammonia, Total (as N) (mg/L)	0.366	0.0665	0.0073	0.198	0.145
	Chloride (Cl) (mg/L)	<5.0	<5.0	<5.0	<10	<10
	Fluoride (F) (mg/L)	<0.20	0.33	<0.20	3.52	2.19
	Nitrate (as N) (mg/L)	<0.050	0.175	0.344	<0.10	<0.10
	Nitrite (as N) (mg/L)	<0.010	<0.010	<0.010	<0.020	<0.020
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	0.0021	<0.0010	0.0024	<0.0010
	Sulfate (SO4) (mg/L)	433	632	420	5610	3700
Cyanides	Cyanide, Free (mg/L)					
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	7.73	2.41	1.25	2.41	1.97
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.121	0.0025	0.0164	28.2	16.4
	Antimony (Sb)-Dissolved (mg/L)	<0.00020 DLA	0.00065	0.00465	<0.010 DLA	<0.010 DLA
	Arsenic (As)-Dissolved (mg/L)	0.00239	0.00084	0.00189	0.143	0.035
	Barium (Ba)-Dissolved (mg/L)	0.0939	0.0507	0.0188	0.0086	0.0189
	Beryllium (Be)-Dissolved (mg/L)	<0.00020 DLA	<0.00010	<0.00010	<0.010 DLA	<0.010 DLA
	Boron (B)-Dissolved (mg/L)	<0.020 DLA	<0.010	<0.010	<1.0 DLA	<1.0 DLA
	Cadmium (Cd)-Dissolved (mg/L)	0.000441	0.000076	0.000738	1.15	0.575
	Calcium (Ca)-Dissolved (mg/L)	202	221	110	284	318
	Chromium (Cr)-Dissolved (mg/L)	0.00040	<0.00010	<0.00010	<0.010 DLA	<0.010 DLA
	Cobalt (Co)-Dissolved (mg/L)	0.0198	0.00026	0.0102	3.18	3.05
	Copper (Cu)-Dissolved (mg/L)	0.00407	0.00125	0.00162	9.85	0.601
	Iron (Fe)-Dissolved (mg/L)	8.60	<0.030	<0.030	1010	467
	Ferrous Iron, Dissolved (mg/L)	10.9	<0.020	<0.020	1000	472
	Lead (Pb)-Dissolved (mg/L)	0.00384	0.000153	0.00515	1.43	1.12
	Lithium (Li)-Dissolved (mg/L)	<0.0010 DLA	0.00554	0.0263	0.090	0.053
	Magnesium (Mg)-Dissolved (mg/L)	59.5	51.6	121	269	322

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1317509-6	L1317509-7	L1317509-8	L1317509-9	L1317509-10
	Description	Water	Water	Water	Water	Water
	Sampled Date	13-JUN-13	13-JUN-13	13-JUN-13	13-JUN-13	13-JUN-13
	Sampled Time	13:15	15:00	10:30	13:30	15:15
	Client ID	CH-VP-20_SESP13	GP02_SESP13	GP09_SESP13	GP12_SESP13	SRK-GD01_SESP13
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	1370	423	935	466	1560
	pH (pH)		8.29	8.16	3.29	7.59
	Total Suspended Solids (mg/L)	310	9800	70.7	171	3.2
	Total Dissolved Solids (mg/L)	6930	526	1200	909	2190
Anions and Nutrients	Acidity (as CaCO3) (mg/L)		<1.0	4.0		26.8
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)	2200			138	
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		186	349	<2.0	359
	Alkalinity, Carbonate (as CaCO3) (mg/L)		<1.0	<2.0	<2.0	<2.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)		<1.0	<2.0	<2.0	<2.0
	Alkalinity, Total (as CaCO3) (mg/L)		186	349	<2.0	359
	Ammonia, Total (as N) (mg/L)	0.0807	0.0339	0.0089	0.116	0.0107
	Chloride (Cl) (mg/L)	<10	<0.50	<5.0	<5.0	<10
	Fluoride (F) (mg/L)	2.04	0.243	0.21	0.31	<0.40
	Nitrate (as N) (mg/L)	<0.10	0.130	0.502	<0.050	5.79
	Nitrite (as N) (mg/L)	<0.020	0.0011	<0.010	<0.010	<0.020
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	0.0023	<0.0010	<0.0010	<0.0010
	Sulfate (SO4) (mg/L)	4350	227	570	605	1260
Cyanides	Cyanide, Free (mg/L)					<0.010 DLM
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	2.11	2.88	0.67	0.87	3.64
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	13.0	0.0020	0.0052	0.484	0.0109
	Antimony (Sb)-Dissolved (mg/L)	<0.010 DLA	0.00129	0.00021	0.00515	0.00064
	Arsenic (As)-Dissolved (mg/L)	0.015	0.00264	0.00043	0.249	0.00156
	Barium (Ba)-Dissolved (mg/L)	0.0100	0.0274	0.0316	0.0199	0.0359
	Beryllium (Be)-Dissolved (mg/L)	<0.010 DLA	<0.00010	<0.00010	<0.00050 DLA	<0.00010
	Boron (B)-Dissolved (mg/L)	<1.0 DLA	<0.010	<0.010	<0.050 DLA	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	0.636	<0.000010	0.000147	0.0373	0.00317
	Calcium (Ca)-Dissolved (mg/L)	253	128	115	112	284
	Chromium (Cr)-Dissolved (mg/L)	<0.010 DLA	<0.00010	<0.00010	<0.00050 DLA	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	2.18	0.00023	0.00033	0.132	0.00272
	Copper (Cu)-Dissolved (mg/L)	4.04	0.00035	0.00114	0.329	0.00229
	Iron (Fe)-Dissolved (mg/L)	750	<0.030	<0.030	47.7	<0.030
	Ferrous Iron, Dissolved (mg/L)	689	0.027	<0.020	55.2	0.044
	Lead (Pb)-Dissolved (mg/L)	1.56	0.000086	0.000643	0.157	0.000860
	Lithium (Li)-Dissolved (mg/L)	<0.050 DLA	0.00225	0.0288	0.0095	0.0228
	Magnesium (Mg)-Dissolved (mg/L)	179	24.8	157	45.1	208

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1317509-11	L1317509-12	L1317509-13	L1317509-14	L1317509-15
	Description	Water	Water	Water	Water	Water
	Sampled Date	13-JUN-13	13-JUN-13	13-JUN-13	13-JUN-13	13-JUN-13
	Sampled Time	13:50	13:15	09:15	17:15	16:20
	Client ID	SRK-GD05_SESP13	SRK-GD06_SESP13	SRK-GD09_SESP13	SRK-GD11_SESP13	SRK-GD19_SESP13
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	2750	2710	385	1150	1970
	pH (pH)	8.09	8.03	8.34	7.62	7.40
	Total Suspended Solids (mg/L)	4.4	3.2	18.6	1.4	176
	Total Dissolved Solids (mg/L)	4230	3950	460	1540	3230
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	16.6	24.6	<1.0	26.1	130
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)					
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	807	779	223	373	133
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<20	<20	<1.0	<2.0	<2.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<20	<20	<1.0	<2.0	<2.0
	Alkalinity, Total (as CaCO3) (mg/L)	807	779	223	373	133
	Ammonia, Total (as N) (mg/L)	<0.0050	0.0062	<0.0050	0.0067	0.0240
	Chloride (Cl) (mg/L)	<10	<10	<0.50	<5.0	<10
	Fluoride (F) (mg/L)	<0.40	<0.40	0.119	<0.20	<0.40
	Nitrate (as N) (mg/L)	10.2	12.5	1.86	4.91	0.38
	Nitrite (as N) (mg/L)	<0.020	<0.020	<0.0010	<0.010	<0.020
	Orthophosphate-Dissolved (as P) (mg/L)	0.0033	0.0011	<0.0010	<0.0010	<0.0010
	Sulfate (SO4) (mg/L)	2330	2260	150	805	2130
Cyanides	Cyanide, Free (mg/L)	<0.010 DLM	<0.010 DLM	<0.0050	<0.010 DLM	<0.010 DLM
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	3.59	8.84	4.01	2.78	2.08
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0076	0.0066	0.0119	0.0047	<0.010 DLA
	Antimony (Sb)-Dissolved (mg/L)	0.00126	0.00103	<0.00010	0.00064	<0.0010 DLA
	Arsenic (As)-Dissolved (mg/L)	0.00430	0.00395	0.00035	0.00085	0.0019
	Barium (Ba)-Dissolved (mg/L)	0.0228	0.0168	0.0618	0.0158	0.0121
	Beryllium (Be)-Dissolved (mg/L)	<0.00020 DLA	<0.00020 DLA	<0.00010	<0.00010	<0.0010 DLA
	Boron (B)-Dissolved (mg/L)	<0.020 DLA	<0.020 DLA	<0.010	<0.010	<0.10 DLA
	Cadmium (Cd)-Dissolved (mg/L)	0.00165	0.00248	0.000021	0.00536	0.107
	Calcium (Ca)-Dissolved (mg/L)	439	444	92.0	195	362
	Chromium (Cr)-Dissolved (mg/L)	<0.00020 DLA	<0.00020 DLA	0.00013	<0.00010	<0.0010 DLA
	Cobalt (Co)-Dissolved (mg/L)	0.00281	0.00126	<0.00010	0.0471	0.603
	Copper (Cu)-Dissolved (mg/L)	0.00190	0.00179	0.00040	0.0914	0.0059
	Iron (Fe)-Dissolved (mg/L)	<0.030	<0.030	<0.030	<0.030	9.15
	Ferrous Iron, Dissolved (mg/L)	<0.020	<0.020	<0.020	0.027	9.81
	Lead (Pb)-Dissolved (mg/L)	0.00168	0.00235	0.000278	0.00246	<0.00050 DLA
	Lithium (Li)-Dissolved (mg/L)	0.0458	0.0517	0.00111	0.0157	0.0437
	Magnesium (Mg)-Dissolved (mg/L)	401	388	37.8	161	258

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1317509-16	L1317509-17	L1317509-18	L1317509-19	
	Description	Water	Water	Water	Water	
	Sampled Date	13-JUN-13	13-JUN-13	13-JUN-13	13-JUN-13	
	Sampled Time	17:15	16:30	17:10	15:00	
	Client ID	SRK-GD911_SESP13	SRK-VD02_SESP13	SRK-VD03_SESP13	SRK-VD09_SESP13	
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	1140	2120	3890	2290	
	pH (pH)	7.69	7.31	6.41		
	Total Suspended Solids (mg/L)	2.0	626	55.5	59.4	
	Total Dissolved Solids (mg/L)	1530	3450	9350	5630	
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	27.5	147			
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)			1440	1390	
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	371	292	43.8		
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0	<2.0	<2.0		
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0	<2.0	<2.0		
	Alkalinity, Total (as CaCO3) (mg/L)	371	292	43.8		
	Ammonia, Total (as N) (mg/L)	0.0069	1.19	2.10	0.0065	
	Chloride (Cl) (mg/L)	<5.0	<10	<25	<10	
	Fluoride (F) (mg/L)	0.21	<0.40	1.1	1.79	
	Nitrate (as N) (mg/L)	4.94	0.45	<0.25	<0.10	
	Nitrite (as N) (mg/L)	<0.010	<0.020	<0.050	<0.020	
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Sulfate (SO4) (mg/L)	805	2140	6200	3470	
Cyanides	Cyanide, Free (mg/L)	<0.010 DLM	<0.010 DLM	<0.020 DLM		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	2.89	2.86	3.90	2.34	
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Aluminum (Al)-Dissolved (mg/L)	0.0050	0.105	0.31	54.1	
	Antimony (Sb)-Dissolved (mg/L)	0.00066	<0.0010 DLA	<0.010 DLA	<0.0050 DLA	
	Arsenic (As)-Dissolved (mg/L)	0.00083	0.0052	0.110	0.0178	
	Barium (Ba)-Dissolved (mg/L)	0.0171	0.0585	0.0184	0.0178	
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.0010 DLA	<0.010 DLA	0.0094	
	Boron (B)-Dissolved (mg/L)	<0.010	<0.10 DLA	<1.0 DLA	<0.50 DLA	
	Cadmium (Cd)-Dissolved (mg/L)	0.00527	0.0643	0.248	0.521	
	Calcium (Ca)-Dissolved (mg/L)	191	466	378	419	
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.0010 DLA	<0.010 DLA	0.0054	
	Cobalt (Co)-Dissolved (mg/L)	0.0465	0.522	3.44	1.91	
	Copper (Cu)-Dissolved (mg/L)	0.0904	0.0111	<0.020 DLA	2.50	
	Iron (Fe)-Dissolved (mg/L)	0.033	8.11	241	132	
	Ferrous Iron, Dissolved (mg/L)	<0.020	8.9	279	130	
	Lead (Pb)-Dissolved (mg/L)	0.00281	0.0209	0.0057	1.35	
	Lithium (Li)-Dissolved (mg/L)	0.0171	0.0454	0.076	0.168	
	Magnesium (Mg)-Dissolved (mg/L)	162	231	715	301	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1317509-1	L1317509-2	L1317509-3	L1317509-4	L1317509-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	13-JUN-13	13-JUN-13	13-JUN-13	13-JUN-13	13-JUN-13
	Sampled Time	17:00	15:30	12:30	11:50	11:15
	Client ID	CH-GP-19_SESP13	CH-GP-22_SESP13	CH-GP-27_SESP13	CH-VP-17_SESP13	CH-VP-18_SESP13
Grouping	**Analyte**					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	17.5	0.132	0.0415	188	121
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	0.000012	0.000045
	Molybdenum (Mo)-Dissolved (mg/L)	0.00191	0.00317	0.00157	<0.0050 DLA	<0.0050
	Nickel (Ni)-Dissolved (mg/L)	0.0094	0.00249	0.0832	1.86	2.45
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.60 DLA	<0.60 DLA
	Potassium (K)-Dissolved (mg/L)	2.94	5.75	2.60	<5.0 DLA	<5.0 DLA
	Selenium (Se)-Dissolved (mg/L)	<0.00020 DLA	0.00496	0.00046	<0.010 DLA	<0.010 DLA
	Silicon (Si)-Dissolved (mg/L)	4.86	2.68	1.15	14.3	8.97
	Silicon (as SiO2)-Dissolved (mg/L)	10.4	5.73	2.47	30.5	19.2
	Silver (Ag)-Dissolved (mg/L)	<0.000020 DLA	<0.000010	<0.000010	<0.0010 DLA	<0.0010 DLA
	Sodium (Na)-Dissolved (mg/L)	11.2	15.3	2.74	<5.0 DLA	<5.0 DLA
	Strontium (Sr)-Dissolved (mg/L)	0.756	0.649	0.670	0.745	1.07
	Sulfur (S)-Dissolved (mg/L)	150	205	159	1680	1340
	Thallium (Tl)-Dissolved (mg/L)	0.000084	0.000023	0.000660	0.0052	0.0011
	Titanium (Ti)-Dissolved (mg/L)	<0.020 DLA	<0.010	<0.010	<1.0 DLA	<1.0 DLA
	Uranium (U)-Dissolved (mg/L)	0.0339	0.0658	0.0135	0.0409	0.0287
	Vanadium (V)-Dissolved (mg/L)	<0.0020 DLA	<0.0010	<0.0010	<0.10 DLA	<0.10 DLA
	Zinc (Zn)-Dissolved (mg/L)	0.0774	0.0028	0.828	735	568

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1317509-6 Water 13-JUN-13 13:15 CH-VP-20_SESP13	L1317509-7 Water 13-JUN-13 15:00 GP02_SESP13	L1317509-8 Water 13-JUN-13 10:30 GP09_SESP13	L1317509-9 Water 13-JUN-13 13:30 GP12_SESP13	L1317509-10 Water 13-JUN-13 15:15 SRK-GD01_SESP13
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	161	0.0574	0.00690	7.05	0.0650
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	<0.0050 DLA	0.00272	0.00149	<0.00025 DLA	0.000722
	Nickel (Ni)-Dissolved (mg/L)	1.20	0.00180	0.0147	0.125	0.198
	Phosphorus (P)-Dissolved (mg/L)	<0.60 DLA	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	<5.0 DLA	2.67	2.88	1.75	4.78
	Selenium (Se)-Dissolved (mg/L)	<0.010 DLA	0.00067	0.00042	<0.00050 DLA	0.00054
	Silicon (Si)-Dissolved (mg/L)	12.0	3.55	1.14	3.48	3.21
	Silicon (as SiO2)-Dissolved (mg/L)	25.7	7.60	2.43	7.44	6.87
	Silver (Ag)-Dissolved (mg/L)	<0.0010 DLA	<0.000010	<0.000010	<0.000050 DLA	<0.000010
	Sodium (Na)-Dissolved (mg/L)	<5.0 DLA	7.63	3.08	6.73	5.54
	Strontium (Sr)-Dissolved (mg/L)	0.568	0.373	0.531	0.369	0.871
	Sulfur (S)-Dissolved (mg/L)	1170	76.2	187	196	388
	Thallium (Tl)-Dissolved (mg/L)	0.0060	<0.000010	0.000114	0.0110	0.000751
	Titanium (Ti)-Dissolved (mg/L)	<1.0 DLA	<0.010	<0.010	<0.050 DLA	<0.010
	Uranium (U)-Dissolved (mg/L)	0.0220	0.0234	0.0206	0.00131	0.0245
	Vanadium (V)-Dissolved (mg/L)	<0.10 DLA	0.0010	<0.0010	<0.0050 DLA	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	419	0.0010	0.0663	34.0	6.64

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1317509-11	L1317509-12	L1317509-13	L1317509-14	L1317509-15
	Description	Water	Water	Water	Water	Water
	Sampled Date	13-JUN-13	13-JUN-13	13-JUN-13	13-JUN-13	13-JUN-13
	Sampled Time	13:50	13:15	09:15	17:15	16:20
	Client ID	SRK-GD05_SESP13	SRK-GD06_SESP13	SRK-GD09_SESP13	SRK-GD11_SESP13	SRK-GD19_SESP13
Grouping	**Analyte**					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	0.0618	0.0820	0.00159	1.17	10.6
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.00094	0.00079	0.000075	0.000560	<0.00050 DLA
	Nickel (Ni)-Dissolved (mg/L)	0.377	0.619	<0.00050	0.243	1.57
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	7.51	7.81	0.342	2.97	5.40
	Selenium (Se)-Dissolved (mg/L)	0.00053	0.00025	0.00031	0.00098	0.0028
	Silicon (Si)-Dissolved (mg/L)	4.72	4.04	2.10	2.55	2.42
	Silicon (as SiO2)-Dissolved (mg/L)	10.1	8.64	4.48	5.46	5.19
	Silver (Ag)-Dissolved (mg/L)	<0.000020 DLA	<0.000020 DLA	<0.000010	<0.000010	<0.00010 DLA
	Sodium (Na)-Dissolved (mg/L)	13.9	15.3	1.06	3.56	4.12
	Strontium (Sr)-Dissolved (mg/L)	1.63	1.87	0.271	0.703	1.19
	Sulfur (S)-Dissolved (mg/L)	686	667	49.1	251	667
	Thallium (Tl)-Dissolved (mg/L)	0.000490	0.000563	<0.000010	0.000510	0.00910
	Titanium (Ti)-Dissolved (mg/L)	<0.020 DLA	<0.020 DLA	<0.010	<0.010	<0.10 DLA
	Uranium (U)-Dissolved (mg/L)	0.0588	0.0664	0.00112	0.0122	0.00219
	Vanadium (V)-Dissolved (mg/L)	<0.0020 DLA	<0.0020 DLA	<0.0010	<0.0010	<0.010 DLA
	Zinc (Zn)-Dissolved (mg/L)	2.95	4.08	0.0101	7.29	84.0

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1317509-16	L1317509-17	L1317509-18	L1317509-19	
	Description	Water	Water	Water	Water	
	Sampled Date	13-JUN-13	13-JUN-13	13-JUN-13	13-JUN-13	
	Sampled Time	17:15	16:30	17:10	15:00	
	Client ID	SRK-GD911_SESP13	SRK-VD02_SESP13	SRK-VD03_SESP13	SRK-VD09_SESP13	
Grouping	**Analyte**					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	1.15	29.9	205	76.6	
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	0.000014	<0.000010	0.000041	
	Molybdenum (Mo)-Dissolved (mg/L)	0.000567	<0.00050 DLA	0.0077	<0.0025 DLA	
	Nickel (Ni)-Dissolved (mg/L)	0.238	1.27	5.10	2.43	
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.60 DLA	<0.60 DLA	
	Potassium (K)-Dissolved (mg/L)	2.95	9.04	6.1	<2.5 DLA	
	Selenium (Se)-Dissolved (mg/L)	0.00091	<0.0010 DLA	<0.010 DLA	<0.0050 DLA	
	Silicon (Si)-Dissolved (mg/L)	2.48	5.30	7.12	12.6	
	Silicon (as SiO2)-Dissolved (mg/L)	5.31	11.3	15.2	27.0	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.00010 DLA	<0.0010 DLA	<0.00050 DLA	
	Sodium (Na)-Dissolved (mg/L)	3.26	5.25	9.4	<2.5 DLA	
	Strontium (Sr)-Dissolved (mg/L)	0.725	1.50	1.38	1.28	
	Sulfur (S)-Dissolved (mg/L)	256	690	1750	1150	
	Thallium (Tl)-Dissolved (mg/L)	0.000574	0.00110	0.0028	0.00279	
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.10 DLA	<1.0 DLA	<0.50 DLA	
	Uranium (U)-Dissolved (mg/L)	0.0129	0.0107	0.0047	0.0823	
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.010 DLA	<0.10 DLA	<0.050 DLA	
	Zinc (Zn)-Dissolved (mg/L)	7.17	75.2	659	401	

* 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	Cyanide, Free	DLM	L1317509-10, -11, -12, -13, -14, -15, -16, -17, -18
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1317509-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1317509-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1317509-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1317509-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1317509-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Nickel (Ni)-Dissolved	MS-B	L1317509-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Potassium (K)-Dissolved	MS-B	L1317509-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1317509-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1317509-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1317509-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1317509-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1317509-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
DLM	Detection Limit Adjusted For 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**
ACY-H2O2-MAN-VA	Water	Acidity by Hot Peroxide Manual Titration	APHA - ACIDITY (2310)

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". The procedure involves preliminary sample treatment by the hot peroxide procedure, and Acidity is subsequently determined by potentiometric titration to a specified endpoint (i.e. pH = 8.3).

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-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.

ALK-SCR-VA	Water	Alkalinity by colour or titration	EPA 310.2 OR APHA 2320

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
OR
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.

Reference Information

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-DOC-VA	Water	Dissolved 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)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

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.

FE2-D-COL-VA	Water	Diss. Ferrous Iron in Water by Colour	James W. Ball et al (1999)

This analysis is carried out using procedures adapted from "A New Method for the Direct Determination of Dissolved Iron Concentration in Acid Mine Waters" published by James W. Ball et al (1999). The procedures involves preliminary sample filtration (0.1um filter) and Ferrous Iron is determined using the "FerroZine" colorimteric method.

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).

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).

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.

Reference Information

PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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.

SIO2-D-CALC-VA Water Dissolved Silicon (reported as Silica) CALCULATION

Dissolved Silicon (as SiO2) is a calculated parameter. Dissolved Silicon (as SiO2 mg/L) = 2.139 x Dissolved Silicon (mg/L).

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-LOW-VA Water Total Suspended Solids by Grav. (1 mg/L) APHA 2540 Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** 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:

ALS06141301

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-H2O2-MAN-VA	**Water**							
Batch R2635591								
WG1692958-2 CRM		**VA-ACY-M-CONTROL**						
Acidity-Hot Peroxide Treated (as CaCO3)			99.0		%		85-115	21-JUN-13
WG1692958-1 MB								
Acidity-Hot Peroxide Treated (as CaCO3)			<25		mg/L		25	21-JUN-13
Batch R2639683								
WG1697204-2 CRM		**VA-ACY-M-CONTROL**						
Acidity-Hot Peroxide Treated (as CaCO3)			99.6		%		85-115	27-JUN-13
WG1697204-3 DUP		**L1317509-9**						
Acidity-Hot Peroxide Treated (as CaCO3)		138	138		mg/L	0.0	20	27-JUN-13
WG1697204-1 MB								
Acidity-Hot Peroxide Treated (as CaCO3)			<25		mg/L		25	27-JUN-13
ACY-PCT-VA	**Water**							
Batch R2636224								
WG1692290-9 CRM		**VA-ACY-CONTROL**						
Acidity (as CaCO3)			102.5		%		85-115	20-JUN-13
WG1692290-33 DUP		**L1317509-10**						
Acidity (as CaCO3)		26.8	25.4		mg/L	5.5	20	20-JUN-13
ALK-PCT-VA	**Water**							
Batch R2638529								
WG1695189-9 CRM		**VA-ALK-PCT-CONTROL**						
Alkalinity, Total (as CaCO3)			101.4		%		85-115	25-JUN-13
WG1695189-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	25-JUN-13
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	25-JUN-13
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	25-JUN-13
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	25-JUN-13
ALK-SCR-VA	**Water**							
Batch R2637533								
WG1694921-2 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			97.2		%		85-115	25-JUN-13
WG1694921-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	25-JUN-13
Batch R2642233								
WG1699487-2 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			98.4		%		85-115	25-JUN-13
WG1699487-4 CRM		**VA-ALKM-CONTROL**						
Alkalinity, Total (as CaCO3)			101.0		%		85-115	25-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-SCR-VA	**Water**							
Batch R2642233								
WG1699487-3 DUP		**L1317509-10**						
Alkalinity, Total (as CaCO3)		359	353		mg/L	1.7	20	25-JUN-13
WG1699487-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	25-JUN-13
ANIONS-CL-IC-WR	**Water**							
Batch R2643118								
WG1700799-3 DUP		**L1317509-7**						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	18-JUN-13
WG1700799-2 LCS								
Chloride (Cl)			102.3		%		85-115	18-JUN-13
WG1700799-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	18-JUN-13
WG1700799-4 MS		**L1317509-7**						
Chloride (Cl)			103.5		%		75-125	18-JUN-13
ANIONS-F-IC-WR	**Water**							
Batch R2643118								
WG1700799-3 DUP		**L1317509-7**						
Fluoride (F)		0.243	0.244		mg/L	0.3	20	18-JUN-13
WG1700799-2 LCS								
Fluoride (F)			103.3		%		85-115	18-JUN-13
WG1700799-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	18-JUN-13
WG1700799-4 MS		**L1317509-7**						
Fluoride (F)			103.7		%		75-125	18-JUN-13
ANIONS-NO2-IC-WR	**Water**							
Batch R2643118								
WG1700799-3 DUP		**L1317509-7**						
Nitrite (as N)		0.0011	<0.0010	RPD-NA	mg/L	N/A	20	18-JUN-13
WG1700799-2 LCS								
Nitrite (as N)			100.9		%		85-115	18-JUN-13
WG1700799-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	18-JUN-13
WG1700799-4 MS		**L1317509-7**						
Nitrite (as N)			97.4		%		75-125	18-JUN-13
ANIONS-NO3-IC-WR	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-NO3-IC-WR	**Water**							
Batch R2643118								
WG1700799-3 DUP		**L1317509-7**						
Nitrate (as N)		0.130	0.130		mg/L	0.5	20	18-JUN-13
WG1700799-2 LCS								
Nitrate (as N)			103.4		%		85-115	18-JUN-13
WG1700799-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	18-JUN-13
WG1700799-4 MS		**L1317509-7**						
Nitrate (as N)			103.7		%		75-125	18-JUN-13
ANIONS-SO4-IC-WR	**Water**							
Batch R2643118								
WG1700799-3 DUP		**L1317509-7**						
Sulfate (SO4)		227	228		mg/L	0.4	20	18-JUN-13
WG1700799-2 LCS								
Sulfate (SO4)			104.4		%		85-115	18-JUN-13
WG1700799-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	18-JUN-13
WG1700799-4 MS		**L1317509-7**						
Sulfate (SO4)			N/A	MS-B	%		-	18-JUN-13
CARBONS-DOC-VA	**Water**							
Batch R2641786								
WG1699338-3 LCS								
Dissolved Organic Carbon			99.6		%		80-120	01-JUL-13
WG1699338-2 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	01-JUL-13
Batch R2641787								
WG1699339-1 DUP		**L1317509-10**						
Dissolved Organic Carbon		3.64	3.73		mg/L	2.6	20	01-JUL-13
WG1699339-3 LCS								
Dissolved Organic Carbon			103.3		%		80-120	01-JUL-13
WG1699339-2 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	01-JUL-13
CN-FREE-CFA-VA	**Water**							
Batch R2643132								
WG1700820-3 DUP		**L1317509-10**						
Cyanide, Free		<0.010	<0.010	RPD-NA	mg/L	N/A	20	28-JUN-13
WG1700820-2 LCS								
Cyanide, Free			101.0		%		80-120	28-JUN-13
WG1700820-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-FREE-CFA-VA	**Water**							
Batch R2643132								
WG1700820-1 MB								
Cyanide, Free			<0.0050		mg/L		0.005	28-JUN-13
WG1700820-4 MS		**L1317509-10**						
Cyanide, Free			98.4		%		70-130	28-JUN-13
FE2-D-COL-VA	**Water**							
Batch R2635431								
WG1691948-3 DUP		**L1317509-10**						
Ferrous Iron, Dissolved		0.044	0.033	J	mg/L	0.011	0.04	20-JUN-13
WG1691948-2 LCS								
Ferrous Iron, Dissolved			103.2		%		80-120	20-JUN-13
WG1691948-1 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	20-JUN-13
WG1691948-4 MS		**L1317509-10**						
Ferrous Iron, Dissolved			103.6		%		70-130	20-JUN-13
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2634898								
WG1691557-4 DUP		**L1317509-10**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	19-JUN-13
WG1691557-5 MS		**L1317509-10**						
Mercury (Hg)-Dissolved			82.6		%		70-130	19-JUN-13
Batch R2635416								
WG1691557-3 LCS								
Mercury (Hg)-Dissolved			105.6		%		80-120	20-JUN-13
WG1691557-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	20-JUN-13
MET-D-CCMS-VA	**Water**							
Batch R2635401								
WG1691557-2 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Dissolved			100.3		%		80-120	19-JUN-13
Antimony (Sb)-Dissolved			100.5		%		80-120	19-JUN-13
Arsenic (As)-Dissolved			99.4		%		80-120	19-JUN-13
Barium (Ba)-Dissolved			100.1		%		80-120	19-JUN-13
Beryllium (Be)-Dissolved			100.7		%		80-120	19-JUN-13
Boron (B)-Dissolved			90.6		%		80-120	19-JUN-13
Cadmium (Cd)-Dissolved			102.6		%		80-120	19-JUN-13
Chromium (Cr)-Dissolved			99.4		%		80-120	19-JUN-13
Cobalt (Co)-Dissolved			97.0		%		80-120	19-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2635401								
WG1691557-2 CRM		**VA-HIGH-WATRM**						
Copper (Cu)-Dissolved			95.8		%		80-120	19-JUN-13
Lead (Pb)-Dissolved			101.2		%		80-120	19-JUN-13
Lithium (Li)-Dissolved			100.2		%		80-120	19-JUN-13
Manganese (Mn)-Dissolved			96.9		%		80-120	19-JUN-13
Molybdenum (Mo)-Dissolved			103.2		%		80-120	19-JUN-13
Nickel (Ni)-Dissolved			97.0		%		80-120	19-JUN-13
Potassium (K)-Dissolved			98.6		%		80-120	19-JUN-13
Selenium (Se)-Dissolved			99.7		%		80-120	19-JUN-13
Silver (Ag)-Dissolved			99.9		%		80-120	19-JUN-13
Sodium (Na)-Dissolved			96.9		%		80-120	19-JUN-13
Strontium (Sr)-Dissolved			100.4		%		80-120	19-JUN-13
Thallium (Tl)-Dissolved			99.2		%		80-120	19-JUN-13
Titanium (Ti)-Dissolved			105.2		%		80-120	19-JUN-13
Uranium (U)-Dissolved			101.1		%		80-120	19-JUN-13
Vanadium (V)-Dissolved			100.2		%		80-120	19-JUN-13
Zinc (Zn)-Dissolved			96.1		%		80-120	19-JUN-13
WG1691557-4 DUP		**L1317509-10**						
Aluminum (Al)-Dissolved		0.0109	0.0096		mg/L	13	20	27-JUN-13
Antimony (Sb)-Dissolved		0.00064	0.00060		mg/L	6.6	20	27-JUN-13
Arsenic (As)-Dissolved		0.00156	0.00161		mg/L	3.4	20	27-JUN-13
Barium (Ba)-Dissolved		0.0359	0.0373		mg/L	3.8	20	27-JUN-13
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	27-JUN-13
Boron (B)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	27-JUN-13
Cadmium (Cd)-Dissolved		0.00317	0.00322		mg/L	1.5	20	27-JUN-13
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	27-JUN-13
Cobalt (Co)-Dissolved		0.00272	0.00279		mg/L	2.4	20	27-JUN-13
Copper (Cu)-Dissolved		0.00229	0.00231		mg/L	1.0	20	27-JUN-13
Lead (Pb)-Dissolved		0.000860	0.000786		mg/L	9.0	20	27-JUN-13
Lithium (Li)-Dissolved		0.0228	0.0215		mg/L	6.1	20	27-JUN-13
Manganese (Mn)-Dissolved		0.0650	0.0658		mg/L	1.3	20	27-JUN-13
Molybdenum (Mo)-Dissolved		0.000722	0.000690		mg/L	4.6	20	27-JUN-13
Nickel (Ni)-Dissolved		0.198	0.203		mg/L	2.8	20	27-JUN-13
Potassium (K)-Dissolved		4.78	4.81		mg/L	0.8	20	27-JUN-13
Selenium (Se)-Dissolved		0.00054	0.00052		mg/L	2.9	20	27-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2635401								
WG1691557-4 DUP		**L1317509-10**						
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	27-JUN-13
Sodium (Na)-Dissolved		5.54	5.59		mg/L	0.9	20	27-JUN-13
Strontium (Sr)-Dissolved		0.871	0.822		mg/L	5.7	20	27-JUN-13
Thallium (Tl)-Dissolved		0.000751	0.000712		mg/L	5.3	20	27-JUN-13
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	27-JUN-13
Uranium (U)-Dissolved		0.0245	0.0233		mg/L	5.0	20	27-JUN-13
Vanadium (V)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-JUN-13
Zinc (Zn)-Dissolved		6.64	6.71		mg/L	1.0	20	27-JUN-13
WG1691557-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	19-JUN-13
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-13
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-13
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	19-JUN-13
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-13
Boron (B)-Dissolved			<0.010		mg/L		0.01	19-JUN-13
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	19-JUN-13
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-13
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-13
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	19-JUN-13
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	19-JUN-13
Lithium (Li)-Dissolved			<0.00050		mg/L		0.0005	19-JUN-13
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	19-JUN-13
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	19-JUN-13
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	19-JUN-13
Potassium (K)-Dissolved			<0.050		mg/L		0.05	19-JUN-13
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-13
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	19-JUN-13
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	19-JUN-13
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	19-JUN-13
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	19-JUN-13
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	19-JUN-13
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	19-JUN-13
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	19-JUN-13
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	19-JUN-13
WG1691557-5 MS		**L1317509-10**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2635401								
WG1691557-5 MS		**L1317509-10**						
Aluminum (Al)-Dissolved			96.7		%		70-130	27-JUN-13
Antimony (Sb)-Dissolved			98.5		%		70-130	27-JUN-13
Arsenic (As)-Dissolved			106.7		%		70-130	27-JUN-13
Barium (Ba)-Dissolved			N/A	MS-B	%		-	27-JUN-13
Beryllium (Be)-Dissolved			90.3		%		70-130	27-JUN-13
Boron (B)-Dissolved			88.4		%		70-130	27-JUN-13
Cadmium (Cd)-Dissolved			99.0		%		70-130	27-JUN-13
Chromium (Cr)-Dissolved			97.1		%		70-130	27-JUN-13
Cobalt (Co)-Dissolved			94.6		%		70-130	27-JUN-13
Copper (Cu)-Dissolved			92.8		%		70-130	27-JUN-13
Lead (Pb)-Dissolved			89.1		%		70-130	27-JUN-13
Lithium (Li)-Dissolved			94.4		%		70-130	27-JUN-13
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	27-JUN-13
Molybdenum (Mo)-Dissolved			97.5		%		70-130	27-JUN-13
Nickel (Ni)-Dissolved			N/A	MS-B	%		-	27-JUN-13
Potassium (K)-Dissolved			N/A	MS-B	%		-	27-JUN-13
Selenium (Se)-Dissolved			105.4		%		70-130	27-JUN-13
Silver (Ag)-Dissolved			91.3		%		70-130	27-JUN-13
Sodium (Na)-Dissolved			N/A	MS-B	%		-	27-JUN-13
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	27-JUN-13
Thallium (Tl)-Dissolved			91.3		%		70-130	27-JUN-13
Titanium (Ti)-Dissolved			110.5		%		70-130	27-JUN-13
Uranium (U)-Dissolved			N/A	MS-B	%		-	27-JUN-13
Vanadium (V)-Dissolved			102.0		%		70-130	27-JUN-13
Zinc (Zn)-Dissolved			N/A	MS-B	%		-	27-JUN-13
MET-DIS-ICP-VA	**Water**							
Batch R2635192								
WG1691557-2 CRM		**VA-HIGH-WATRM**						
Calcium (Ca)-Dissolved			100.5		%		80-120	19-JUN-13
Iron (Fe)-Dissolved			95.7		%		80-120	19-JUN-13
Magnesium (Mg)-Dissolved			96.9		%		80-120	19-JUN-13
Phosphorus (P)-Dissolved			99.0		%		80-120	19-JUN-13
Silicon (Si)-Dissolved			103.3		%		80-120	19-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA	**Water**							
Batch R2635397								
WG1691557-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	20-JUN-13
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	20-JUN-13
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	20-JUN-13
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	20-JUN-13
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	20-JUN-13
Batch R2638002								
WG1691557-4 DUP		**L1317509-10**						
Calcium (Ca)-Dissolved		284	285		mg/L	0.4	20	24-JUN-13
Iron (Fe)-Dissolved		<0.030	<0.030	RPD-NA	mg/L	N/A	20	24-JUN-13
Magnesium (Mg)-Dissolved		208	208		mg/L	0.1	20	24-JUN-13
Phosphorus (P)-Dissolved		<0.30	<0.30	RPD-NA	mg/L	N/A	20	24-JUN-13
Silicon (Si)-Dissolved		3.21	3.18		mg/L	1.1	20	24-JUN-13
WG1691557-5 MS		**L1317509-10**						
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	24-JUN-13
Iron (Fe)-Dissolved			85.7		%		70-130	24-JUN-13
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	24-JUN-13
NH3-F-VA	**Water**							
Batch R2641263								
WG1697452-2 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			92.3		%		85-115	01-JUL-13
WG1697452-3 DUP		**L1317509-10**						
Ammonia, Total (as N)		0.0107	0.0134	J	mg/L	0.0026	0.01	01-JUL-13
WG1697452-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	01-JUL-13
WG1697452-4 MS		**L1317509-10**						
Ammonia, Total (as N)			84.0		%		75-125	01-JUL-13
PH-PCT-VA	**Water**							
Batch R2636224								
WG1692290-25 CRM		**VA-PH7-BUF**						
pH			7.01		pH		6.9-7.1	20-JUN-13
WG1692290-33 DUP		**L1317509-10**						
pH		7.59	7.70	J	pH	0.11	0.3	20-JUN-13
PO4-DO-COL-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4-DO-COL-VA	**Water**							
Batch R2635473								
WG1691122-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			92.8		%		80-120	18-JUN-13
WG1691122-7 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			85.9		%		80-120	18-JUN-13
WG1691122-3 DUP		**L1317509-10**						
Orthophosphate-Dissolved (as P)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	18-JUN-13
WG1691122-5 DUP		**L1317509-19**						
Orthophosphate-Dissolved (as P)		<0.0010	0.0010	RPD-NA	mg/L	N/A	20	18-JUN-13
WG1691122-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	18-JUN-13
WG1691122-6 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	18-JUN-13
WG1691122-4 MS		**L1317509-10**						
Orthophosphate-Dissolved (as P)			100.6		%		70-130	18-JUN-13
S-DIS-ICP-VA	**Water**							
Batch R2635192								
WG1691557-2 CRM		**VA-HIGH-WATRM**						
Sulfur (S)-Dissolved			99.4		%		80-120	19-JUN-13
Batch R2635397								
WG1691557-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	20-JUN-13
Batch R2638002								
WG1691557-4 DUP		**L1317509-10**						
Sulfur (S)-Dissolved		388	385		mg/L	0.7	20	24-JUN-13
WG1691557-5 MS		**L1317509-10**						
Sulfur (S)-Dissolved			N/A	MS-B	%		-	24-JUN-13
TDS-VA	**Water**							
Batch R2636348								
WG1693150-3 DUP		**L1317509-10**						
Total Dissolved Solids		2190	2180		mg/L	0.3	20	21-JUN-13
WG1693150-2 LCS								
Total Dissolved Solids			97.8		%		85-115	21-JUN-13
WG1693150-1 MB								
Total Dissolved Solids			<10		mg/L		10	21-JUN-13
TSS-LOW-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TSS-LOW-VA	**Water**							
Batch R2636502								
WG1693146-2 LCS								
Total Suspended Solids			89.3		%		85-115	21-JUN-13
WG1693146-1 MB								
Total Suspended Solids			<1.0		mg/L		1	21-JUN-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							
Total Dissolved Solids by Gravimetric							
	1	13-JUN-13 17:00	21-JUN-13 10:39	7	8	days	EHT
	2	13-JUN-13 15:30	21-JUN-13 10:39	7	8	days	EHT
	3	13-JUN-13 12:30	21-JUN-13 10:39	7	8	days	EHT
	4	13-JUN-13 11:50	21-JUN-13 10:39	7	8	days	EHT
	5	13-JUN-13 11:15	21-JUN-13 10:39	7	8	days	EHT
	6	13-JUN-13 13:15	21-JUN-13 10:39	7	8	days	EHT
	7	13-JUN-13 15:00	21-JUN-13 10:39	7	8	days	EHT
	8	13-JUN-13 10:30	21-JUN-13 10:39	7	8	days	EHT
	9	13-JUN-13 13:30	21-JUN-13 10:39	7	8	days	EHT
	10	13-JUN-13 15:15	21-JUN-13 10:39	7	8	days	EHT
	11	13-JUN-13 13:50	21-JUN-13 10:39	7	8	days	EHT
	12	13-JUN-13 13:15	21-JUN-13 10:39	7	8	days	EHT
	13	13-JUN-13 09:15	21-JUN-13 10:39	7	8	days	EHT
	14	13-JUN-13 17:15	21-JUN-13 10:39	7	8	days	EHT
	15	13-JUN-13 16:20	21-JUN-13 10:39	7	8	days	EHT
	16	13-JUN-13 17:15	21-JUN-13 10:39	7	8	days	EHT
	17	13-JUN-13 16:30	21-JUN-13 10:39	7	8	days	EHT
	18	13-JUN-13 17:10	21-JUN-13 10:39	7	8	days	EHT
	19	13-JUN-13 15:00	21-JUN-13 10:39	7	8	days	EHT
Total Suspended Solids by Grav. (1 mg/L)							
	1	13-JUN-13 17:00	21-JUN-13 09:44	7	8	days	EHT
	2	13-JUN-13 15:30	21-JUN-13 09:44	7	8	days	EHT
	3	13-JUN-13 12:30	21-JUN-13 09:44	7	8	days	EHT
	4	13-JUN-13 11:50	21-JUN-13 09:44	7	8	days	EHT
	5	13-JUN-13 11:15	21-JUN-13 09:44	7	8	days	EHT
	6	13-JUN-13 13:15	21-JUN-13 09:44	7	8	days	EHT
	7	13-JUN-13 15:00	21-JUN-13 09:44	7	8	days	EHT
	8	13-JUN-13 10:30	21-JUN-13 09:44	7	8	days	EHT
	9	13-JUN-13 13:30	21-JUN-13 09:44	7	8	days	EHT
	10	13-JUN-13 15:15	21-JUN-13 09:44	7	8	days	EHT
	11	13-JUN-13 13:50	21-JUN-13 09:44	7	8	days	EHT
	12	13-JUN-13 13:15	21-JUN-13 09:44	7	8	days	EHT
	13	13-JUN-13 09:15	21-JUN-13 09:44	7	8	days	EHT
	14	13-JUN-13 17:15	21-JUN-13 09:44	7	8	days	EHT
	15	13-JUN-13 16:20	21-JUN-13 09:44	7	8	days	EHT
	16	13-JUN-13 17:15	21-JUN-13 09:44	7	8	days	EHT
	17	13-JUN-13 16:30	21-JUN-13 09:44	7	8	days	EHT
	18	13-JUN-13 17:10	21-JUN-13 09:44	7	8	days	EHT
	19	13-JUN-13 15:00	21-JUN-13 09:44	7	8	days	EHT
pH by Meter (Automated)							
	1	13-JUN-13 17:00	20-JUN-13 23:58	0.25	175	hours	EHTR-FM
	2	13-JUN-13 15:30	20-JUN-13 23:58	0.25	176	hours	EHTR-FM
	3	13-JUN-13 12:30	20-JUN-13 23:58	0.25	180	hours	EHTR-FM
	7	13-JUN-13 15:00	20-JUN-13 23:58	0.25	177	hours	EHTR-FM
	8	13-JUN-13 10:30	20-JUN-13 23:58	0.25	181	hours	EHTR-FM
	9	13-JUN-13 13:30	20-JUN-13 23:58	0.25	179	hours	EHTR-FM
	10	13-JUN-13 15:15	20-JUN-13 23:58	0.25	177	hours	EHTR-FM
	11	13-JUN-13 13:50	20-JUN-13 23:58	0.25	178	hours	EHTR-FM
	12	13-JUN-13 13:15	20-JUN-13 23:58	0.25	179	hours	EHTR-FM
	13	13-JUN-13 09:15	20-JUN-13 23:58	0.25	183	hours	EHTR-FM
	14	13-JUN-13 17:15	20-JUN-13 23:58	0.25	175	hours	EHTR-FM
	15	13-JUN-13 16:20	20-JUN-13 23:58	0.25	176	hours	EHTR-FM
	16	13-JUN-13 17:15	20-JUN-13 23:58	0.25	175	hours	EHTR-FM
	17	13-JUN-13 16:30	20-JUN-13 23:58	0.25	175	hours	EHTR-FM
	18	13-JUN-13 17:10	20-JUN-13 23:58	0.25	175	hours	EHTR-FM
Anions and Nutrients							

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Anions and Nutrients							
Diss. Orthophosphate in Water by Colour							
	1	13-JUN-13 17:00	18-JUN-13 22:07	3	5	days	EHT
	2	13-JUN-13 15:30	18-JUN-13 22:07	3	5	days	EHT
	3	13-JUN-13 12:30	18-JUN-13 22:07	3	5	days	EHTL
	4	13-JUN-13 11:50	18-JUN-13 22:07	3	5	days	EHTL
	5	13-JUN-13 11:15	18-JUN-13 22:07	3	5	days	EHTL
	6	13-JUN-13 13:15	18-JUN-13 22:07	3	5	days	EHTL
	7	13-JUN-13 15:00	18-JUN-13 22:07	3	5	days	EHT
	8	13-JUN-13 10:30	18-JUN-13 22:12	3	5	days	EHTL
	9	13-JUN-13 13:30	18-JUN-13 22:12	3	5	days	EHT
	10	13-JUN-13 15:15	18-JUN-13 22:12	3	5	days	EHT
	11	13-JUN-13 13:50	18-JUN-13 22:12	3	5	days	EHT
	12	13-JUN-13 13:15	18-JUN-13 22:12	3	5	days	EHTL
	13	13-JUN-13 09:15	18-JUN-13 22:12	3	6	days	EHTL
	14	13-JUN-13 17:15	18-JUN-13 22:12	3	5	days	EHT
	15	13-JUN-13 16:20	18-JUN-13 22:15	3	5	days	EHT
	16	13-JUN-13 17:15	18-JUN-13 22:15	3	5	days	EHT
	17	13-JUN-13 16:30	18-JUN-13 22:15	3	5	days	EHT
	18	13-JUN-13 17:10	18-JUN-13 22:15	3	5	days	EHT
	19	13-JUN-13 15:00	18-JUN-13 22:15	3	5	days	EHT
Nitrate Nitrogen by Ion Chromatography							
	1	13-JUN-13 17:00	18-JUN-13 16:09	3	5	days	EHT
	2	13-JUN-13 15:30	18-JUN-13 16:09	3	5	days	EHT
	3	13-JUN-13 12:30	18-JUN-13 16:09	3	5	days	EHTL
	4	13-JUN-13 11:50	18-JUN-13 16:09	3	5	days	EHTL
	5	13-JUN-13 11:15	18-JUN-13 16:09	3	5	days	EHTL
	6	13-JUN-13 13:15	18-JUN-13 16:09	3	5	days	EHTL
	7	13-JUN-13 15:00	18-JUN-13 16:09	3	5	days	EHT
	8	13-JUN-13 10:30	18-JUN-13 16:09	3	5	days	EHTL
	9	13-JUN-13 13:30	18-JUN-13 16:09	3	5	days	EHT
	10	13-JUN-13 15:15	18-JUN-13 16:09	3	5	days	EHT
	11	13-JUN-13 13:50	18-JUN-13 16:09	3	5	days	EHT
	12	13-JUN-13 13:15	18-JUN-13 16:09	3	5	days	EHTL
	13	13-JUN-13 09:15	18-JUN-13 16:09	3	5	days	EHTL
	14	13-JUN-13 17:15	18-JUN-13 16:09	3	5	days	EHT
	15	13-JUN-13 16:20	18-JUN-13 16:09	3	5	days	EHT
	16	13-JUN-13 17:15	18-JUN-13 16:09	3	5	days	EHT
	17	13-JUN-13 16:30	18-JUN-13 16:09	3	5	days	EHT
	18	13-JUN-13 17:10	18-JUN-13 16:09	3	5	days	EHT
	19	13-JUN-13 15:00	18-JUN-13 16:09	3	5	days	EHT
Nitrite Nitrogen by Ion Chromatography							
	1	13-JUN-13 17:00	18-JUN-13 16:09	3	5	days	EHT
	2	13-JUN-13 15:30	18-JUN-13 16:09	3	5	days	EHT
	3	13-JUN-13 12:30	18-JUN-13 16:09	3	5	days	EHTL
	4	13-JUN-13 11:50	18-JUN-13 16:09	3	5	days	EHTL
	5	13-JUN-13 11:15	18-JUN-13 16:09	3	5	days	EHTL
	6	13-JUN-13 13:15	18-JUN-13 16:09	3	5	days	EHTL
	7	13-JUN-13 15:00	18-JUN-13 16:09	3	5	days	EHT
	8	13-JUN-13 10:30	18-JUN-13 16:09	3	5	days	EHTL
	9	13-JUN-13 13:30	18-JUN-13 16:09	3	5	days	EHT
	10	13-JUN-13 15:15	18-JUN-13 16:09	3	5	days	EHT
	11	13-JUN-13 13:50	18-JUN-13 16:09	3	5	days	EHT
	12	13-JUN-13 13:15	18-JUN-13 16:09	3	5	days	EHTL
	13	13-JUN-13 09:15	18-JUN-13 16:09	3	5	days	EHTL
	14	13-JUN-13 17:15	18-JUN-13 16:09	3	5	days	EHT
	15	13-JUN-13 16:20	18-JUN-13 16:09	3	5	days	EHT
	16	13-JUN-13 17:15	18-JUN-13 16:09	3	5	days	EHT
	17	13-JUN-13 16:30	18-JUN-13 16:09	3	5	days	EHT

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Anions and Nutrients							
Nitrite Nitrogen by Ion Chromatography							
	18	13-JUN-13 17:10	18-JUN-13 16:09	3	5	days	EHT
	19	13-JUN-13 15:00	18-JUN-13 16:09	3	5	days	EHT
Cyanides							
Free Cyanide in water by CFA							
	10	13-JUN-13 15:15	28-JUN-13 11:26	14	15	days	EHT
	11	13-JUN-13 13:50	28-JUN-13 11:26	14	15	days	EHT
	12	13-JUN-13 13:15	28-JUN-13 11:26	14	15	days	EHT
	13	13-JUN-13 09:15	28-JUN-13 11:26	14	15	days	EHT
	14	13-JUN-13 17:15	28-JUN-13 11:26	14	15	days	EHT
	15	13-JUN-13 16:20	28-JUN-13 11:26	14	15	days	EHT
	16	13-JUN-13 17:15	28-JUN-13 11:26	14	15	days	EHT
	17	13-JUN-13 16:30	28-JUN-13 11:26	14	15	days	EHT
	18	13-JUN-13 17:10	28-JUN-13 11:26	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 L1317509 were received on 15-JUN-13 13:10.

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.



CH2MHILL

CHAIN OF CUSTODY RECORD

6/14/2013 12:48:09 PM

Project Name Faro Mine
Location Faro Mine Complex - Faro YK
Project Number 472645.07.EM.SS.02.0
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-015
Project FARO MINE SEEP SAMPLING 2013
Turnaround Time 10 Days
Shipping Date: 6/14/2013
COC Number: ALS06141301

				Container:	125mL Poly	250ml Poly	125ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	250ml Glass	250ml Poly	250ml glass			
				Preservatives:	NaOH, 4'C	HNO3, 4'C	HCl, 4'C	4C	4C	4C	4'C	4'C	4'C	4'C	H2SO4, pH<2, 4'C	HNO3, 4'C	H2SO4, pH<2, 4C			
				Filtered:	NA	Field	Field	NA	NA	NA	NA	NA	NA	NA	Field	Field	NA			
				Holding Time:	14	180/28	180	14	14	14	7	7	3	3	28	180/28	28			
					(ASTM 7237) Free Cyanide	(E245.7) Field Filtered Dissolved Hg	(Ferrozine Method) Field Filtered Ferrous Iron	(SM2310) Acidity – Run Hot H2O2	(SM2310) Acidity - Run Hot H2O2 if Fe >15ppm	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM4110B) CL F NO2 NO3 and SO4	(SM4500P) ortho-Phosphate	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered For Metals Analyte List see Table 1	Ammonia (JEM/SM4500NH3) Ammonia		Number of Containers	COMMENTS
	DATE	TIME	Matrix																	
CH-GP-19_SESP13	6/13/2013	17:00	Water			X	X		X	X	X	X	X	X	X	X	X		7	
CH-GP-22_SESP13	6/13/2013	15:30	Water			X	X		X	X	X	X	X	X	X	X	X		7	
CH-GP-27_SESP13	6/13/2013	12:30	Water			X	X		X	X	X	X	X	X	X	X	X		7	
CH-VP-17_SESP13	6/13/2013	11:50	Water			X	X	X			X	X	X	X	X	X	X		7	
CH-VP-18_SESP13	6/13/2013	11:15	Water			X	X	X			X	X	X	X	X	X	X		7	
CH-VP-20_SESP13	6/13/2013	13:15	Water			X	X	X			X	X	X	X	X	X	X		7	
GP02_SESP13	6/13/2013	15:00	Water			X	X		X	X	X	X	X	X	X	X	X		7	
GP09_SESP13	6/13/2013	10:30	Water			X	X		X	X	X	X	X	X	X	X	X		7	
GP12_SESP13	6/13/2013	13:30	Water			X	X		X	X	X	X	X	X	X	X	X		7	
SRK-GD01_SESP13	6/13/2013	15:15	Water	X	X	X	X		X	X	X	X	X	X	X	X	X		8	LAB DUP/MS
SRK-GD05_SESP13	6/13/2013	13:50	Water	X	X	X	X		X	X	X	X	X	X	X	X	X		8	
SRK-GD06_SESP13	6/13/2013	13:15	Water	X	X	X	X		X	X	X	X	X	X	X	X	X		8	
SRK-GD09_SESP13	6/13/2013	9:15	Water	X	X	X	X		X	X	X	X	X	X	X	X	X		8	
SRK-GD11_SESP13	6/13/2013	17:15	Water	X	X	X	X		X	X	X	X	X	X	X	X	X		8	

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		6/15/13 13:10
Received by		6/15/13
Relinquished by		
Received by		

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
PO: 604564 on Invoice Perform Lab Dup/MS on the samples

Report Copy to
Bernice Kidd
(530) 229-3203

9.1, 11.7, 11.6, 8.0

CH2MHILL **CHAIN OF CUSTODY RECORD** *6/14/2013 12:48:10 PM*

Project Name Faro Mine
Location Faro Mine Complex - Faro YK
Project Number 472645.07.EM.SS.02.0
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-015
Project FARO MINE SEEP SAMPLING 2013
Turnaround Time 10 Days
Shipping Date: 6/14/2013
COC Number: ALS06141301

	Container:	125mL Poly	250ml Poly	125ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	250ml Glass	250ml Poly	250ml glass			
	Preservatives:	NaOH, 4'C	HNO3, 4'C	HCl, 4'C	4C	4C	4C	4'C	4'C	4'C	4'C	H2SO4, pH<2, 4'C	HNO3, 4'C	H2SO4, pH<2, 4C			
	Filtered:	NA	Field	Field	NA	NA	NA	NA	NA	NA	NA	Field	Field	NA			
	Holding Time:	14	180/28	180	14	14	14	7	7	3	3	28	180/28	28			
		(ASTM 7237) Free Cyanide	(E245.7) Field Filtered Dissolved Hg	(Ferrozine Method) Field Filtered Ferrous Iron	(SM2310) Acidity - Run Hot H2O2	(SM2310) Acidity - Run Hot H2O2 if Fe >15ppm	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM4110B) CL F NO2 NO3 and SO4	(SM4500P) ortho-Phosphate	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered For Metals Analyte List see Table 1	Ammonia (JEM/SM4500NH3) Ammonia		Number of Containers	COMMENTS
SRK-GD19_SESP13	6/13/2013 16:20 Water	X	X	X		X	X	X	X	X	X	X	X	X		8	
SRK-GD911_SESP13	6/13/2013 17:15 Water	X	X	X		X	X	X	X	X	X	X	X	X		8	
SRK-VD02_SESP13	6/13/2013 16:30 Water	X	X	X		X	X	X	X	X	X	X	X	X		8	
SRK-VD03_SESP13	6/13/2013 17:10 Water	X	X	X		X	X	X	X	X	X	X	X	X		8	
SRK-VD09_SESP13	6/13/2013 15:00 Water		X	X	X			X	X	X		X	X	X		7	
															TOTAL NUMBER OF CONTAINERS	142	

L1317509-COFC

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		6/15/13 1310
Received by		
Relinquished by		
Received by		

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
PO: 604564 on Invoice Perform Lab Dup/MS on the samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 15-JUN-13
Report Date: 05-JUL-13 12:39 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1317530

Project P.O. #: 472645.06.AD.01.04.13 "PO: 604564"
Job Reference: FARO MINE SEEP SAMPLING 2013 SW-015
C of C Numbers: ALS06141303
Legal Site Desc:

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1317530-1	L1317530-2	L1317530-3	L1317530-4	L1317530-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	14-JUN-13	14-JUN-13	14-JUN-13	14-JUN-13	14-JUN-13
	Sampled Time	09:00	09:45	10:30	12:00	12:00
	Client ID	CH-FD-66_SESP13	SRK-GD13_SESP13	SRK-VD01_SESP13	SRK-VD04_SESP13	SRK-VD05_SESP13
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	4560	1600	1530	14300	29700
	pH (pH)		8.13			
	Total Suspended Solids (mg/L)	325	5.8	162	262	604
	Total Dissolved Solids (mg/L)	77100	1860	1100	89100	106000
Anions and Nutrients	Acidity (as CaCO3) (mg/L)		8.3			
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)	36400		268	28000	29300
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		418			
	Alkalinity, Carbonate (as CaCO3) (mg/L)		<2.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)		<2.0			
	Alkalinity, Total (as CaCO3) (mg/L)		418			
	Ammonia, Total (as N) (mg/L)	<0.0050 DLA	<0.0050 DLA	0.0090 DLA	0.812 DLA	2.80 DLA
	Chloride (Cl) (mg/L)	<50	<10 DLA	<10	<50	<50
	Fluoride (F) (mg/L)	41.8 DLA	<0.40	0.40 DLA	40.7 DLA	39.1 DLA
	Nitrate (as N) (mg/L)	<0.50 DLA	20.1 DLA	<0.10 DLA	<0.50 DLA	<0.50 DLA
	Nitrite (as N) (mg/L)	<0.10	<0.020	<0.020	<0.10	<0.10
	Orthophosphate-Dissolved (as P) (mg/L)	1.11	0.0041	<0.0010	<0.10	0.41
	Sulfate (SO4) (mg/L)	47200	1110 DLM	1740 DLM	49100 DLM	60000 DLM
Cyanides	Cyanide, Free (mg/L)		<0.010	<0.010	<0.10	<0.10
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	31.7	5.24	1.41	24.7	33.4
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	612	0.0025	2.49	605	670
	Antimony (Sb)-Dissolved (mg/L)	<0.20 DLA	0.00043	<0.0010 DLA	<0.10 DLA	<0.10 DLA
	Arsenic (As)-Dissolved (mg/L)	21.3	0.00331	0.0037	0.30	0.21
	Barium (Ba)-Dissolved (mg/L)	<0.10 DLA	0.0302	0.00880	0.058	0.082
	Beryllium (Be)-Dissolved (mg/L)	0.32	<0.00010	<0.0010 DLA	<0.10 DLA	<0.10 DLA
	Boron (B)-Dissolved (mg/L)	<20 DLA	<0.010	<0.10 DLA	<10 DLA	<10 DLA
	Cadmium (Cd)-Dissolved (mg/L)	17.7	0.000089	0.135	8.76	8.83
	Calcium (Ca)-Dissolved (mg/L)	529	296	182	433	430
	Chromium (Cr)-Dissolved (mg/L)	0.51	<0.00010	<0.0010 DLA	<0.10 DLA	<0.10 DLA
	Cobalt (Co)-Dissolved (mg/L)	11.2	0.00062	0.374	17.7	19.5
	Copper (Cu)-Dissolved (mg/L)	337	0.00142	0.422	3.20	8.94
	Iron (Fe)-Dissolved (mg/L)	11700	<0.030	10.1	5230	8700
	Ferrous Iron, Dissolved (mg/L)	5360	0.031	10.8	4180	7850
	Lead (Pb)-Dissolved (mg/L)	0.26	0.000156	0.417	0.340	2.45
	Lithium (Li)-Dissolved (mg/L)	<1.0 DLA	0.0138	0.0369	<0.50 DLA	0.55
	Magnesium (Mg)-Dissolved (mg/L)	786	218	262	3210	6950

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1317530-6	L1317530-7	L1317530-8		
	Description	Water	Water	Water		
	Sampled Date	14-JUN-13	14-JUN-13	14-JUN-13		
	Sampled Time	12:30	11:15	12:00		
	Client ID	SRK-VD10_SESP13	SRK-VD12_SESP13	SRK-VD905_SESP13		
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	8160	4880	28300		
	pH (pH)	5.06				
	Total Suspended Solids (mg/L)	146	140	485		
	Total Dissolved Solids (mg/L)	22600	15100	103000		
Anions and Nutrients	Acidity (as CaCO3) (mg/L)					
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)	4450	5250	28500		
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	28.6				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0				
	Alkalinity, Total (as CaCO3) (mg/L)	28.6				
	Ammonia, Total (as N) (mg/L)	6.18	0.680	2.72		
	Chloride (Cl) (mg/L)	<25 DLA	<25 DLA	<50 DLA		
	Fluoride (F) (mg/L)	3.6	5.0	40.6		
	Nitrate (as N) (mg/L)	<0.25 DLA	5.84	<0.50 DLA		
	Nitrite (as N) (mg/L)	<0.050 DLA	<0.050 DLA	<0.10 DLA		
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	2.86	0.0070		
	Sulfate (SO4) (mg/L)	14100	8730	62700		
Cyanides	Cyanide, Free (mg/L)	<0.020 DLM	<0.020 DLM	<0.10 DLM		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	15.4	6.53	33.2		
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	6.42	131	624		
	Antimony (Sb)-Dissolved (mg/L)	<0.020 DLA	<0.020 DLA	<0.10 DLA		
	Arsenic (As)-Dissolved (mg/L)	<0.020 DLA	5.13	0.10		
	Barium (Ba)-Dissolved (mg/L)	0.016	0.143	0.085		
	Beryllium (Be)-Dissolved (mg/L)	<0.020 DLA	<0.020 DLA	<0.10 DLA		
	Boron (B)-Dissolved (mg/L)	<2.0 DLA	<2.0 DLA	<10 DLA		
	Cadmium (Cd)-Dissolved (mg/L)	0.161	1.37	8.64		
	Calcium (Ca)-Dissolved (mg/L)	455	345	409		
	Chromium (Cr)-Dissolved (mg/L)	<0.020 DLA	0.115	<0.10 DLA		
	Cobalt (Co)-Dissolved (mg/L)	6.53	6.45	18.5		
	Copper (Cu)-Dissolved (mg/L)	0.054	12.8	8.31		
	Iron (Fe)-Dissolved (mg/L)	1390	748	8270		
	Ferrous Iron, Dissolved (mg/L)	1290	166	7890		
	Lead (Pb)-Dissolved (mg/L)	<0.010 DLA	0.300	2.37		
	Lithium (Li)-Dissolved (mg/L)	<0.10 DLA	<0.10 DLA	0.69		
	Magnesium (Mg)-Dissolved (mg/L)	1710	977	6620		

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1317530-1	L1317530-2	L1317530-3	L1317530-4	L1317530-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	14-JUN-13	14-JUN-13	14-JUN-13	14-JUN-13	14-JUN-13
	Sampled Time	09:00	09:45	10:30	12:00	12:00
	Client ID	CH-FD-66_SESP13	SRK-GD13_SESP13	SRK-VD01_SESP13	SRK-VD04_SESP13	SRK-VD05_SESP13
Grouping	**Analyte**					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	249	0.00715	22.0	2500	3690
	Mercury (Hg)-Dissolved (mg/L)	0.000201	<0.000010	<0.000010	0.000086	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	<0.10 DLA	0.00114	<0.00050 DLA	<0.050 DLA	<0.050 DLA
	Nickel (Ni)-Dissolved (mg/L)	6.7	0.120	0.803	12.0	16.6
	Phosphorus (P)-Dissolved (mg/L)	8.0	<0.30	<0.30	<6.0 DLA	<15 DLA
	Potassium (K)-Dissolved (mg/L)	<100 DLA	3.29	2.39	<50 DLA	<50 DLA
	Selenium (Se)-Dissolved (mg/L)	<0.20 DLA	0.00339	0.0017	<0.10 DLA	<0.10 DLA
	Silicon (Si)-Dissolved (mg/L)	111	4.22	2.70	23.0	10.2
	Silicon (as SiO2)-Dissolved (mg/L)	236	8.70	5.78	49.2	21.8
	Silver (Ag)-Dissolved (mg/L)	<0.020 DLA	<0.000010	<0.00010 DLA	<0.010 DLA	<0.010 DLA
	Sodium (Na)-Dissolved (mg/L)	<100 DLA	5.48	1.38	<50 DLA	<50 DLA
	Strontium (Sr)-Dissolved (mg/L)	1.20	1.09	0.780	1.26	1.92
	Sulfur (S)-Dissolved (mg/L)	17500	357	575	14100	23300
	Thallium (Tl)-Dissolved (mg/L)	<0.020 DLA	0.000073	0.00202	<0.010 DLA	<0.010 DLA
	Titanium (Ti)-Dissolved (mg/L)	<20 DLA	<0.010	<0.10 DLA	<10 DLA	<10 DLA
	Uranium (U)-Dissolved (mg/L)	1.20	0.0274	0.00647	1.13	1.69
	Vanadium (V)-Dissolved (mg/L)	<2.0 DLA	<0.0010	<0.010 DLA	<1.0 DLA	<1.0 DLA
	Zinc (Zn)-Dissolved (mg/L)	12700	0.301	87.3	7890	9770

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1317530-6	L1317530-7	L1317530-8		
	Description	Water	Water	Water		
	Sampled Date	14-JUN-13	14-JUN-13	14-JUN-13		
	Sampled Time	12:30	11:15	12:00		
	Client ID	SRK-VD10_SESP13	SRK-VD12_SESP13	SRK-VD905_SESP13		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Manganese (Mn)-Dissolved (mg/L)	830	250	3470		
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	0.000091	<0.000010		
	Molybdenum (Mo)-Dissolved (mg/L)	<0.010 DLA	<0.010 DLA	<0.050 DLA		
	Nickel (Ni)-Dissolved (mg/L)	4.62	9.38	15.9		
	Phosphorus (P)-Dissolved (mg/L)	<3.0 DLA	4.3	<15 DLA		
	Potassium (K)-Dissolved (mg/L)	<10 DLA	<10 DLA	<50 DLA		
	Selenium (Se)-Dissolved (mg/L)	<0.020 DLA	<0.020 DLA	<0.10 DLA		
	Silicon (Si)-Dissolved (mg/L)	12.7	14.0	10.6		
	Silicon (as SiO2)-Dissolved (mg/L)	27.1	29.8	22.7		
	Silver (Ag)-Dissolved (mg/L)	<0.0020 DLA	<0.0020 DLA	<0.010 DLA		
	Sodium (Na)-Dissolved (mg/L)	16	<10 DLA	<50 DLA		
	Strontium (Sr)-Dissolved (mg/L)	2.08	1.06	1.77		
	Sulfur (S)-Dissolved (mg/L)	4590	3200	22100		
	Thallium (Tl)-Dissolved (mg/L)	0.0040	<0.0020 DLA	<0.010 DLA		
	Titanium (Ti)-Dissolved (mg/L)	<2.0 DLA	<2.0 DLA	<10 DLA		
	Uranium (U)-Dissolved (mg/L)	0.0043	0.241	1.64		
	Vanadium (V)-Dissolved (mg/L)	<0.20 DLA	<0.20 DLA	<1.0 DLA		
	Zinc (Zn)-Dissolved (mg/L)	1470	1230	9880		

* 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	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Duplicate	Beryllium (Be)-Dissolved	DLA	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Duplicate	Boron (B)-Dissolved	DLA	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Duplicate	Chromium (Cr)-Dissolved	DLA	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Duplicate	Lithium (Li)-Dissolved	DLA	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Duplicate	Molybdenum (Mo)-Dissolved	DLA	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Duplicate	Potassium (K)-Dissolved	DLA	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Duplicate	Selenium (Se)-Dissolved	DLA	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Duplicate	Silver (Ag)-Dissolved	DLA	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Duplicate	Sodium (Na)-Dissolved	DLA	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Duplicate	Thallium (Tl)-Dissolved	DLA	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Duplicate	Titanium (Ti)-Dissolved	DLA	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Duplicate	Vanadium (V)-Dissolved	DLA	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Duplicate	Phosphorus (P)-Dissolved	DLA	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Duplicate	Cyanide, Free	DLM	L1317530-2, -3, -4, -5, -6, -7, -8
Matrix Spike	Aluminum (Al)-Dissolved	MS-B	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Cadmium (Cd)-Dissolved	MS-B	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Cobalt (Co)-Dissolved	MS-B	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Ammonia, Total (as N)	MS-B	L1317530-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Dissolved Organic Carbon	MS-B	L1317530-1, -4, -5, -6, -8

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
DLM	Detection Limit Adjusted For 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**
ACY-H2O2-MAN-VA	Water	Acidity by Hot Peroxide Manual Titration	APHA - ACIDITY (2310)

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". The procedure involves preliminary sample treatment by the hot peroxide procedure, and Acidity is subsequently determined by potentiometric titration to a specified endpoint (i.e. pH = 8.3).

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-SCR-VA	Water	Alkalinity by colour or titration	EPA 310.2 OR APHA 2320

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
OR
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

Reference Information

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-DOC-VA	Water	Dissolved 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)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

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.

FE2-D-COL-VA	Water	Diss. Ferrous Iron in Water by Colour	James W. Ball et al (1999)

This analysis is carried out using procedures adapted from "A New Method for the Direct Determination of Dissolved Iron Concentration in Acid Mine Waters" published by James W. Ball et al (1999). The procedures involves preliminary sample filtration (0.1um filter) and Ferrous Iron is determined using the "FerroZine" colorimteric method.

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).

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).

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.

Reference Information

PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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.

SIO2-D-CALC-VA	Water	Dissolved Silicon (reported as Silica)	CALCULATION

Dissolved Silicon (as SiO2) is a calculated parameter. Dissolved Silicon (as SiO2 mg/L) = 2.139 x Dissolved Silicon (mg/L).

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-LOW-VA	Water	Total Suspended Solids by Grav. (1 mg/L)	APHA 2540 Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** 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:

ALS06141303

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

Workorder: L1317530 Report Date: 05-JUL-13

Client: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-H2O2-MAN-VA	**Water**							
Batch R2635591								
WG1692958-2 CRM		**VA-ACY-M-CONTROL**						
Acidity-Hot Peroxide Treated (as CaCO3)			99.0		%		85-115	21-JUN-13
WG1692958-3 DUP		**L1317530-4**						
Acidity-Hot Peroxide Treated (as CaCO3)		28000	28400		mg/L	1.3	20	21-JUN-13
WG1692958-1 MB								
Acidity-Hot Peroxide Treated (as CaCO3)			<25		mg/L		25	21-JUN-13
ACY-PCT-VA	**Water**							
Batch R2636224								
WG1692290-9 CRM		**VA-ACY-CONTROL**						
Acidity (as CaCO3)			102.5		%		85-115	20-JUN-13
ALK-SCR-VA	**Water**							
Batch R2637533								
WG1694921-2 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			97.2		%		85-115	25-JUN-13
WG1694921-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	25-JUN-13
Batch R2642248								
WG1699488-2 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			97.2		%		85-115	25-JUN-13
WG1699488-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	25-JUN-13
ANIONS-CL-IC-WR	**Water**							
Batch R2643134								
WG1700813-2 LCS								
Chloride (Cl)			102.4		%		85-115	18-JUN-13
WG1700813-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	18-JUN-13
WG1700813-4 MS		**L1317621-1**						
Chloride (Cl)			101.9		%		75-125	18-JUN-13
ANIONS-F-IC-WR	**Water**							
Batch R2643134								
WG1700813-2 LCS								
Fluoride (F)			101.9		%		85-115	18-JUN-13
WG1700813-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	18-JUN-13
WG1700813-4 MS		**L1317621-1**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-F-IC-WR	**Water**							
Batch R2643134								
WG1700813-4 MS		**L1317621-1**						
Fluoride (F)			105.0		%		75-125	18-JUN-13
ANIONS-NO2-IC-WR	**Water**							
Batch R2643134								
WG1700813-2 LCS								
Nitrite (as N)			103.0		%		85-115	18-JUN-13
WG1700813-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	18-JUN-13
WG1700813-4 MS		**L1317621-1**						
Nitrite (as N)			100.5		%		75-125	18-JUN-13
ANIONS-NO3-IC-WR	**Water**							
Batch R2643134								
WG1700813-2 LCS								
Nitrate (as N)			103.4		%		85-115	18-JUN-13
WG1700813-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	18-JUN-13
WG1700813-4 MS		**L1317621-1**						
Nitrate (as N)			103.0		%		75-125	18-JUN-13
ANIONS-SO4-IC-WR	**Water**							
Batch R2643134								
WG1700813-2 LCS								
Sulfate (SO4)			105.6		%		85-115	18-JUN-13
WG1700813-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	18-JUN-13
WG1700813-4 MS		**L1317621-1**						
Sulfate (SO4)			106.3		%		75-125	18-JUN-13
CARBONS-DOC-VA	**Water**							
Batch R2641786								
WG1699338-3 LCS								
Dissolved Organic Carbon			99.6		%		80-120	01-JUL-13
WG1699338-2 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	01-JUL-13
Batch R2642664								
WG1700207-1 DUP		**L1317530-4**						
Dissolved Organic Carbon		24.7	24.5		mg/L	0.9	20	02-JUL-13
WG1700207-3 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CARBONS-DOC-VA	**Water**							
Batch R2642664								
WG1700207-3 LCS								
Dissolved Organic Carbon			107.8		%		80-120	02-JUL-13
WG1700207-2 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	02-JUL-13
WG1700207-4 MS		**L1317530-4**						
Dissolved Organic Carbon			N/A	MS-B	%		-	02-JUL-13
CN-FREE-CFA-VA	**Water**							
Batch R2642501								
WG1700085-3 DUP		**L1317530-4**						
Cyanide, Free		<0.10	<0.10	RPD-NA	mg/L	N/A	20	28-JUN-13
WG1700085-2 LCS								
Cyanide, Free			101.0		%		80-120	28-JUN-13
WG1700085-1 MB								
Cyanide, Free			<0.0050		mg/L		0.005	28-JUN-13
WG1700085-4 MS		**L1317530-4**						
Cyanide, Free			97.4		%		70-130	28-JUN-13
FE2-D-COL-VA	**Water**							
Batch R2637139								
WG1692513-3 DUP		**L1317530-4**						
Ferrous Iron, Dissolved		4180	4200		mg/L	0.5	20	21-JUN-13
WG1692513-2 LCS								
Ferrous Iron, Dissolved			104.1		%		80-120	21-JUN-13
WG1692513-1 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	21-JUN-13
WG1692513-4 MS		**L1317530-4**						
Ferrous Iron, Dissolved			124		%		70-130	21-JUN-13
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2635416								
WG1691562-3 LCS								
Mercury (Hg)-Dissolved			105.6		%		80-120	20-JUN-13
WG1691562-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	20-JUN-13
Batch R2638895								
WG1691562-4 DUP		**L1317530-4**						
Mercury (Hg)-Dissolved		0.000086	0.000081		mg/L	6.8	20	26-JUN-13
WG1691562-5 MS		**L1317530-4**						
Mercury (Hg)-Dissolved			87.9		%		70-130	26-JUN-13
MET-D-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2635401								
WG1691562-2 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Dissolved			99.9		%		80-120	19-JUN-13
Antimony (Sb)-Dissolved			98.5		%		80-120	19-JUN-13
Arsenic (As)-Dissolved			99.8		%		80-120	19-JUN-13
Barium (Ba)-Dissolved			100.7		%		80-120	19-JUN-13
Beryllium (Be)-Dissolved			94.0		%		80-120	19-JUN-13
Boron (B)-Dissolved			85.4		%		80-120	19-JUN-13
Cadmium (Cd)-Dissolved			100.8		%		80-120	19-JUN-13
Chromium (Cr)-Dissolved			99.5		%		80-120	19-JUN-13
Cobalt (Co)-Dissolved			96.8		%		80-120	19-JUN-13
Copper (Cu)-Dissolved			96.0		%		80-120	19-JUN-13
Lead (Pb)-Dissolved			97.2		%		80-120	19-JUN-13
Lithium (Li)-Dissolved			92.3		%		80-120	19-JUN-13
Manganese (Mn)-Dissolved			96.2		%		80-120	19-JUN-13
Molybdenum (Mo)-Dissolved			96.2		%		80-120	19-JUN-13
Nickel (Ni)-Dissolved			96.8		%		80-120	19-JUN-13
Potassium (K)-Dissolved			99.4		%		80-120	19-JUN-13
Selenium (Se)-Dissolved			99.6		%		80-120	19-JUN-13
Silver (Ag)-Dissolved			96.9		%		80-120	19-JUN-13
Sodium (Na)-Dissolved			100.5		%		80-120	19-JUN-13
Strontium (Sr)-Dissolved			93.9		%		80-120	19-JUN-13
Thallium (Tl)-Dissolved			97.0		%		80-120	19-JUN-13
Titanium (Ti)-Dissolved			105.6		%		80-120	19-JUN-13
Uranium (U)-Dissolved			99.0		%		80-120	19-JUN-13
Vanadium (V)-Dissolved			99.1		%		80-120	19-JUN-13
Zinc (Zn)-Dissolved			96.3		%		80-120	19-JUN-13
WG1691562-4 DUP		**L1317530-4**						
Aluminum (Al)-Dissolved		605	613		mg/L	1.3	20	25-JUN-13
Antimony (Sb)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	25-JUN-13
Arsenic (As)-Dissolved		0.30	0.29		mg/L	4.5	20	25-JUN-13
Barium (Ba)-Dissolved		0.058	0.051		mg/L	12	20	25-JUN-13
Beryllium (Be)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	25-JUN-13
Boron (B)-Dissolved		<10	<10	RPD-NA	mg/L	N/A	20	25-JUN-13
Cadmium (Cd)-Dissolved		8.76	8.48		mg/L	3.2	20	25-JUN-13
Chromium (Cr)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	25-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2635401								
WG1691562-4 DUP		**L1317530-4**						
Cobalt (Co)-Dissolved		17.7	18.6		mg/L	4.9	20	25-JUN-13
Copper (Cu)-Dissolved		3.20	3.07		mg/L	4.3	20	25-JUN-13
Lead (Pb)-Dissolved		0.340	0.359		mg/L	5.5	20	25-JUN-13
Lithium (Li)-Dissolved		<0.50	<0.50	RPD-NA	mg/L	N/A	20	25-JUN-13
Manganese (Mn)-Dissolved		2500	2650		mg/L	5.5	20	25-JUN-13
Molybdenum (Mo)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	25-JUN-13
Nickel (Ni)-Dissolved		12.0	12.5		mg/L	4.1	20	25-JUN-13
Potassium (K)-Dissolved		<50	<50	RPD-NA	mg/L	N/A	20	25-JUN-13
Selenium (Se)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	25-JUN-13
Silver (Ag)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	25-JUN-13
Sodium (Na)-Dissolved		<50	<50	RPD-NA	mg/L	N/A	20	25-JUN-13
Strontium (Sr)-Dissolved		1.26	1.33		mg/L	5.6	20	25-JUN-13
Thallium (Tl)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	25-JUN-13
Titanium (Ti)-Dissolved		<10	<10	RPD-NA	mg/L	N/A	20	25-JUN-13
Uranium (U)-Dissolved		1.13	1.16		mg/L	2.6	20	25-JUN-13
Vanadium (V)-Dissolved		<1.0	<1.0	RPD-NA	mg/L	N/A	20	25-JUN-13
Zinc (Zn)-Dissolved		7890	8220		mg/L	4.1	20	25-JUN-13
WG1691562-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	19-JUN-13
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-13
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-13
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	19-JUN-13
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-13
Boron (B)-Dissolved			<0.010		mg/L		0.01	19-JUN-13
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	19-JUN-13
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-13
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-13
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	19-JUN-13
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	19-JUN-13
Lithium (Li)-Dissolved			<0.00050		mg/L		0.0005	19-JUN-13
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	19-JUN-13
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	19-JUN-13
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	19-JUN-13
Potassium (K)-Dissolved			<0.050		mg/L		0.05	19-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2635401								
WG1691562-1 MB								
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-13
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	19-JUN-13
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	19-JUN-13
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	19-JUN-13
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	19-JUN-13
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	19-JUN-13
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	19-JUN-13
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	19-JUN-13
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	19-JUN-13
WG1691562-5 MS		**L1317530-4**						
Aluminum (Al)-Dissolved			353.0	MS-B	%		70-130	25-JUN-13
Antimony (Sb)-Dissolved			99.7		%		70-130	25-JUN-13
Arsenic (As)-Dissolved			104.2		%		70-130	25-JUN-13
Barium (Ba)-Dissolved			101.7		%		70-130	25-JUN-13
Beryllium (Be)-Dissolved			89.5		%		70-130	25-JUN-13
Boron (B)-Dissolved			82.3		%		70-130	25-JUN-13
Cadmium (Cd)-Dissolved			273.0	MS-B	%		70-130	25-JUN-13
Chromium (Cr)-Dissolved			96.9		%		70-130	25-JUN-13
Cobalt (Co)-Dissolved			174.3	MS-B	%		70-130	25-JUN-13
Copper (Cu)-Dissolved			100.0		%		70-130	25-JUN-13
Lead (Pb)-Dissolved			92.3		%		70-130	25-JUN-13
Lithium (Li)-Dissolved			89.4		%		70-130	25-JUN-13
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	25-JUN-13
Molybdenum (Mo)-Dissolved			101.8		%		70-130	25-JUN-13
Nickel (Ni)-Dissolved			122.5		%		70-130	25-JUN-13
Potassium (K)-Dissolved			95.9		%		70-130	25-JUN-13
Selenium (Se)-Dissolved			96.9		%		70-130	25-JUN-13
Silver (Ag)-Dissolved			97.8		%		70-130	25-JUN-13
Sodium (Na)-Dissolved			96.6		%		70-130	25-JUN-13
Strontium (Sr)-Dissolved			100.6		%		70-130	25-JUN-13
Thallium (Tl)-Dissolved			89.6		%		70-130	25-JUN-13
Titanium (Ti)-Dissolved			103.4		%		70-130	25-JUN-13
Uranium (U)-Dissolved			112.8		%		70-130	25-JUN-13
Vanadium (V)-Dissolved			97.0		%		70-130	25-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2635401								
WG1691562-5 MS		**L1317530-4**						
Zinc (Zn)-Dissolved			N/A	MS-B	%		-	25-JUN-13
MET-DIS-ICP-VA	**Water**							
Batch R2635192								
WG1691562-2 CRM		**VA-HIGH-WATRM**						
Calcium (Ca)-Dissolved			102.6		%		80-120	19-JUN-13
Iron (Fe)-Dissolved			98.7		%		80-120	19-JUN-13
Magnesium (Mg)-Dissolved			97.3		%		80-120	19-JUN-13
Phosphorus (P)-Dissolved			99.5		%		80-120	19-JUN-13
Silicon (Si)-Dissolved			106.0		%		80-120	19-JUN-13
Batch R2635397								
WG1691562-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	20-JUN-13
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	20-JUN-13
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	20-JUN-13
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	20-JUN-13
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	20-JUN-13
Batch R2639755								
WG1691562-4 DUP		**L1317530-4**						
Calcium (Ca)-Dissolved		433	428		mg/L	1.2	20	26-JUN-13
Iron (Fe)-Dissolved		5230	5130		mg/L	1.8	20	26-JUN-13
Magnesium (Mg)-Dissolved		3210	3170		mg/L	1.1	20	26-JUN-13
Phosphorus (P)-Dissolved		<6.0	<6.0	RPD-NA	mg/L	N/A	20	26-JUN-13
Silicon (Si)-Dissolved		23.0	22.9		mg/L	0.3	20	26-JUN-13
WG1691562-5 MS		**L1317530-4**						
Calcium (Ca)-Dissolved			99.7		%		70-130	26-JUN-13
Iron (Fe)-Dissolved			N/A	MS-B	%		-	26-JUN-13
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	26-JUN-13
NH3-F-VA	**Water**							
Batch R2641848								
WG1697453-2 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			108.3		%		85-115	02-JUL-13
WG1697453-3 DUP		**L1317530-4**						
Ammonia, Total (as N)		0.812	0.755		mg/L	7.3	20	02-JUL-13
WG1697453-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-F-VA	**Water**							
Batch R2641848								
WG1697453-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	02-JUL-13
WG1697453-4 MS		**L1317530-4**						
Ammonia, Total (as N)			N/A	MS-B	%		-	02-JUL-13
PH-PCT-VA	**Water**							
Batch R2636224								
WG1692290-25 CRM		**VA-PH7-BUF**						
pH			7.01		pH		6.9-7.1	20-JUN-13
PO4-DO-COL-VA	**Water**							
Batch R2634770								
WG1691132-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			96.0		%		80-120	18-JUN-13
WG1691132-7 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			92.0		%		80-120	18-JUN-13
WG1691132-3 DUP		**L1317530-4**						
Orthophosphate-Dissolved (as P)		<0.10	<0.10	RPD-NA	mg/L	N/A	20	20-JUN-13
WG1691132-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	18-JUN-13
WG1691132-6 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	18-JUN-13
WG1691132-4 MS		**L1317530-4**						
Orthophosphate-Dissolved (as P)			88.1		%		70-130	20-JUN-13
S-DIS-ICP-VA	**Water**							
Batch R2635192								
WG1691562-2 CRM		**VA-HIGH-WATRM**						
Sulfur (S)-Dissolved			100.2		%		80-120	19-JUN-13
Batch R2635397								
WG1691562-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	20-JUN-13
Batch R2639755								
WG1691562-4 DUP		**L1317530-4**						
Sulfur (S)-Dissolved		14100	13900		mg/L	1.2	20	26-JUN-13
WG1691562-5 MS		**L1317530-4**						
Sulfur (S)-Dissolved			N/A	MS-B	%		-	26-JUN-13
TDS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TDS-VA	**Water**							
Batch R2636338								
WG1693157-3 DUP		**L1317530-4**						
Total Dissolved Solids		89100	86900		mg/L	2.5	20	21-JUN-13
WG1693157-2 LCS								
Total Dissolved Solids			97.5		%		85-115	21-JUN-13
WG1693157-1 MB								
Total Dissolved Solids			<10		mg/L		10	21-JUN-13
TSS-LOW-VA	**Water**							
Batch R2636501								
WG1693161-2 LCS								
Total Suspended Solids			104.0		%		85-115	21-JUN-13
WG1693161-1 MB								
Total Suspended Solids			<1.0		mg/L		1	21-JUN-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)							
	2	14-JUN-13 09:45	20-JUN-13 23:58	0.25	158	hours	EHTR-FM
	6	14-JUN-13 12:30	20-JUN-13 23:58	0.25	156	hours	EHTR-FM
Anions and Nutrients							
Diss. Orthophosphate in Water by Colour							
	1	14-JUN-13 09:00	20-JUN-13 21:04	3	7	days	EHT
	2	14-JUN-13 09:45	18-JUN-13 22:31	3	5	days	EHT
	3	14-JUN-13 10:30	18-JUN-13 22:31	3	5	days	EHT
	4	14-JUN-13 12:00	20-JUN-13 21:04	3	6	days	EHT
	5	14-JUN-13 12:00	18-JUN-13 22:31	3	4	days	EHT
	6	14-JUN-13 12:30	18-JUN-13 23:45	3	4	days	EHT
	7	14-JUN-13 11:15	18-JUN-13 22:31	3	4	days	EHT
	8	14-JUN-13 12:00	18-JUN-13 22:31	3	4	days	EHT
Nitrate Nitrogen by Ion Chromatography							
	1	14-JUN-13 09:00	18-JUN-13 14:10	3	4	days	EHT
	2	14-JUN-13 09:45	18-JUN-13 14:10	3	4	days	EHT
	3	14-JUN-13 10:30	18-JUN-13 14:10	3	4	days	EHT
	4	14-JUN-13 12:00	18-JUN-13 14:10	3	4	days	EHT
	5	14-JUN-13 12:00	18-JUN-13 14:10	3	4	days	EHT
	6	14-JUN-13 12:30	18-JUN-13 14:10	3	4	days	EHT
	7	14-JUN-13 11:15	18-JUN-13 14:10	3	4	days	EHT
	8	14-JUN-13 12:00	18-JUN-13 14:10	3	4	days	EHT
Nitrite Nitrogen by Ion Chromatography							
	1	14-JUN-13 09:00	18-JUN-13 14:10	3	4	days	EHT
	2	14-JUN-13 09:45	18-JUN-13 14:10	3	4	days	EHT
	3	14-JUN-13 10:30	18-JUN-13 14:10	3	4	days	EHT
	4	14-JUN-13 12:00	18-JUN-13 14:10	3	4	days	EHT
	5	14-JUN-13 12:00	18-JUN-13 14:10	3	4	days	EHT
	6	14-JUN-13 12:30	18-JUN-13 14:10	3	4	days	EHT
	7	14-JUN-13 11:15	18-JUN-13 14:10	3	4	days	EHT
	8	14-JUN-13 12:00	18-JUN-13 14:10	3	4	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 L1317530 were received on 15-JUN-13 13:10.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

6/14/2013 3:39:40 PM

Project Name Faro Mine
Location Faro Mine Complex - Faro YK
Project Number 472645.07.EM.SS.02.0
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-015
Project FARO MINE SEEP SAMPLING 2013
Turnaround Time 10 Days
Shipping Date: 6/14/2013
COC Number: ALS06141303

	Container:	125mL Poly	250ml Poly	125ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	250ml Glass	250ml Poly	250ml glass			
	Preservatives:	NaOH, 4'C	HNO3, 4'C	HCl, 4'C	4C	4C	4C	4'C	4'C	4'C	4'C	H2SO4, pH<2, 4'C	HNO3, 4'C	H2SO4, pH<2, 4C			
	Filtered:	NA	Field	Field	NA	NA	NA	NA	NA	NA	NA	Field	Field	NA			
	Holding Time:	14	180/28	180	14	14	14	7	7	3	3	28	180/28	28			
		(ASTM 7237) Free Cyanide	(E245.7) Field Filtered Dissolved Hg	(Ferrozine Method) Field Filtered Ferrous Iron	(SM2310) Acidity – Run Hot H2O2	(SM2310) Acidity – Run Hot H2O2 if Fe >15ppm	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM4110B) CL F NO2 NO3 and SO4	(SM4500P) ortho-Phosphate	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered For Metals Analyte List see Table 1	Ammonia (JEM/SM4500NH3) Ammonia		Number of Containers	COMMENTS
CH-FD-66_SESP13	6/14/2013 9:00 Water		X	X	X			X	X	X	X	X	X	X		7	
SRK-GD13_SESP13	6/14/2013 9:45 Water	X	X	X		X	X	X	X	X	X	X	X	X		8	
SRK-VD01_SESP13	6/14/2013 10:30 Water	X	X	X	X			X	X	X	X	X	X	X		8	
SRK-VD04_SESP13	6/14/2013 12:00 Water	X	X	X	X			X	X	X	X	X	X	X		8	LAB DUP/MS
SRK-VD05_SESP13	6/14/2013 12:00 Water	X	X	X	X			X	X	X	X	X	X	X		8	
SRK-VD10_SESP13	6/14/2013 12:30 Water	X	X	X	X		X	X	X	X	X	X	X	X		8	
SRK-VD12_SESP13	6/14/2013 11:15 Water	X	X	X	X			X	X	X	X	X	X	X		8	
SRK-VD905_SESP13	6/14/2013 12:00 Water	X	X	X	X			X	X	X	X	X	X	X		8	
													OTAL NUMBER OF CONTAINERS			63	

L1317530-COFC

Signatures	Date/Time
Approved by	
Sampled by	6/15/13 1330
Relinquished by	
Received by	
Relinquished by Daisha Zuo	6/15/13 15:10
Received by	C.4, 14.9

Shippin
Method of Shipment:
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

Sample Custody and Amber Springer

ecial Instructions:
. O: 604564 on Invoice Perform Lab Dup/MS on the samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 15-JUN-13
Report Date: 03-JUL-13 15:55 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1317621

Project P.O. #: 472645.06.AD.01.04.13 PO=604564
Job Reference: WASTE ROCK DUMP MW 2013 SW-014B
C of C Numbers: ALS06141302
Legal Site Desc:

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1317621-1				
	Description	Water				
	Sampled Date	14-JUN-13				
	Sampled Time	08:15				
	Client ID	EB_014_13_002				
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	<0.50				
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050				
	Chloride (Cl) (mg/L)	<0.50				
	Fluoride (F) (mg/L)	<0.020				
	Nitrate (as N) (mg/L)	<0.0050				
	Nitrite (as N) (mg/L)	<0.0010				
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010				
	Sulfate (SO4) (mg/L)	<0.50				
Cyanides	Cyanide, Free (mg/L)	<0.0050				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	<0.0010				
	Antimony (Sb)-Dissolved (mg/L)	<0.00010				
	Arsenic (As)-Dissolved (mg/L)	<0.00010				
	Barium (Ba)-Dissolved (mg/L)	<0.000050				
	Beryllium (Be)-Dissolved (mg/L)	<0.00010				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (mg/L)	0.000023				
	Calcium (Ca)-Dissolved (mg/L)	0.081				
	Chromium (Cr)-Dissolved (mg/L)	<0.00010				
	Cobalt (Co)-Dissolved (mg/L)	<0.00010				
	Copper (Cu)-Dissolved (mg/L)	<0.00020				
	Iron (Fe)-Dissolved (mg/L)	<0.030				
	Ferrous Iron, Dissolved (mg/L)	<0.020				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	<0.00050				
	Magnesium (Mg)-Dissolved (mg/L)	<0.10				
	Manganese (Mn)-Dissolved (mg/L)	0.000609				
	Mercury (Hg)-Dissolved (mg/L)	<0.000010				
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050				
	Nickel (Ni)-Dissolved (mg/L)	<0.00050				
	Phosphorus (P)-Dissolved (mg/L)	<0.30				
	Potassium (K)-Dissolved (mg/L)	<0.050				
	Selenium (Se)-Dissolved (mg/L)	<0.00010				
	Silicon (Si)-Dissolved (mg/L)	<0.050				
	Silicon (as SiO2)-Dissolved (mg/L)	<0.20				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1317621-1				
	Description	Water				
	Sampled Date	14-JUN-13				
	Sampled Time	08:15				
	Client ID	EB_014_13_002				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	<0.050				
	Strontium (Sr)-Dissolved (mg/L)	<0.00020				
	Sulfur (S)-Dissolved (mg/L)	<0.50				
	Thallium (Tl)-Dissolved (mg/L)	<0.000010				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	<0.000010				
	Vanadium (V)-Dissolved (mg/L)	<0.0010				
	Zinc (Zn)-Dissolved (mg/L)	0.0065				

* 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	Cyanide, Free	DLM	L1317621-1
Duplicate	Cyanide, Free	DLM	L1317621-1
Matrix Spike	Sulfate (SO4)	MS-B	L1317621-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted For 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**
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-DOC-VA	Water	Dissolved 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)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

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.

FE2-D-COL-VA	Water	Diss. Ferrous Iron in Water by Colour	James W. Ball et al (1999)

This analysis is carried out using procedures adapted from "A New Method for the Direct Determination of Dissolved Iron Concentration in Acid Mine Waters" published by James W. Ball et al (1999). The procedures involves preliminary sample filtration (0.1um filter) and Ferrous Iron is determined using the "FerroZine" colorimteric method.

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).

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

Reference Information

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.

PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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.

SIO2-D-CALC-VA Water Dissolved Silicon (reported as Silica) CALCULATION

Dissolved Silicon (as SiO2) is a calculated parameter. Dissolved Silicon (as SiO2 mg/L) = 2.139 x Dissolved Silicon (mg/L).

** 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:

ALS06141302

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-CL-IC-WR	**Water**							
Batch R2638147								
WG1694509-7 DUP		**L1317621-1**						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	18-JUN-13
WG1694509-2 LCS								
Chloride (Cl)			102.3		%		85-115	18-JUN-13
WG1694509-6 LCS								
Chloride (Cl)			102.4		%		85-115	18-JUN-13
WG1694509-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	18-JUN-13
WG1694509-5 MB								
Chloride (Cl)			<0.50		mg/L		0.5	18-JUN-13
WG1694509-4 MS		**L1317509-7**						
Chloride (Cl)			103.5		%		75-125	18-JUN-13
WG1694509-8 MS		**L1317621-1**						
Chloride (Cl)			101.9		%		75-125	18-JUN-13
ANIONS-F-IC-WR	**Water**							
Batch R2638147								
WG1694509-7 DUP		**L1317621-1**						
Fluoride (F)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	18-JUN-13
WG1694509-2 LCS								
Fluoride (F)			103.3		%		85-115	18-JUN-13
WG1694509-6 LCS								
Fluoride (F)			101.9		%		85-115	18-JUN-13
WG1694509-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	18-JUN-13
WG1694509-5 MB								
Fluoride (F)			<0.020		mg/L		0.02	18-JUN-13
WG1694509-4 MS		**L1317509-7**						
Fluoride (F)			103.7		%		75-125	18-JUN-13
WG1694509-8 MS		**L1317621-1**						
Fluoride (F)			105.0		%		75-125	18-JUN-13
ANIONS-NO2-IC-WR	**Water**							
Batch R2638147								
WG1694509-7 DUP		**L1317621-1**						
Nitrite (as N)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	18-JUN-13
WG1694509-2 LCS								
Nitrite (as N)			100.9		%		85-115	18-JUN-13
WG1694509-6 LCS								
Nitrite (as N)			103.0		%		85-115	18-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-NO2-IC-WR	**Water**							
Batch R2638147								
WG1694509-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	18-JUN-13
WG1694509-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	18-JUN-13
WG1694509-4 MS		**L1317509-7**						
Nitrite (as N)			97.4		%		75-125	18-JUN-13
WG1694509-8 MS		**L1317621-1**						
Nitrite (as N)			100.5		%		75-125	18-JUN-13
ANIONS-NO3-IC-WR	**Water**							
Batch R2638147								
WG1694509-7 DUP		**L1317621-1**						
Nitrate (as N)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	18-JUN-13
WG1694509-2 LCS								
Nitrate (as N)			103.4		%		85-115	18-JUN-13
WG1694509-6 LCS								
Nitrate (as N)			103.4		%		85-115	18-JUN-13
WG1694509-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	18-JUN-13
WG1694509-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	18-JUN-13
WG1694509-4 MS		**L1317509-7**						
Nitrate (as N)			103.7		%		75-125	18-JUN-13
WG1694509-8 MS		**L1317621-1**						
Nitrate (as N)			103.0		%		75-125	18-JUN-13
ANIONS-SO4-IC-WR	**Water**							
Batch R2638147								
WG1694509-7 DUP		**L1317621-1**						
Sulfate (SO4)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	18-JUN-13
WG1694509-2 LCS								
Sulfate (SO4)			104.4		%		85-115	18-JUN-13
WG1694509-6 LCS								
Sulfate (SO4)			105.6		%		85-115	18-JUN-13
WG1694509-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	18-JUN-13
WG1694509-5 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	18-JUN-13
WG1694509-4 MS		**L1317509-7**						
Sulfate (SO4)			N/A	MS-B	%		-	18-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-SO4-IC-WR	**Water**							
Batch R2638147								
WG1694509-8 MS		**L1317621-1**						
Sulfate (SO4)			106.3		%		75-125	18-JUN-13
CARBONS-DOC-VA	**Water**							
Batch R2641787								
WG1699339-3 LCS								
Dissolved Organic Carbon			103.3		%		80-120	01-JUL-13
WG1699339-2 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	01-JUL-13
CN-FREE-CFA-VA	**Water**							
Batch R2642485								
WG1700078-9 DUP		**L1317621-1**						
Cyanide, Free		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	28-JUN-13
WG1700078-2 LCS								
Cyanide, Free			101.0		%		80-120	28-JUN-13
WG1700078-1 MB								
Cyanide, Free			<0.0050		mg/L		0.005	28-JUN-13
WG1700078-10 MS		**L1317621-1**						
Cyanide, Free			98.7		%		70-130	28-JUN-13
WG1700078-4 MS		**L1316422-1**						
Cyanide, Free			99.3		%		70-130	28-JUN-13
WG1700078-6 MS		**L1316438-1**						
Cyanide, Free			115.4		%		70-130	28-JUN-13
WG1700078-8 MS		**L1316792-7**						
Cyanide, Free			103.6		%		70-130	28-JUN-13
FE2-D-COL-VA	**Water**							
Batch R2637139								
WG1692513-2 LCS								
Ferrous Iron, Dissolved			104.1		%		80-120	21-JUN-13
WG1692513-1 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	21-JUN-13
WG1692513-4 MS		**L1317530-4**						
Ferrous Iron, Dissolved			124		%		70-130	21-JUN-13
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2634898								
WG1691559-4 DUP		**L1317621-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	19-JUN-13
WG1691559-5 MS		**L1317621-1**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2634898								
WG1691559-5 MS		**L1317621-1**						
Mercury (Hg)-Dissolved			96.6		%		70-130	19-JUN-13
Batch R2635416								
WG1691559-3 LCS								
Mercury (Hg)-Dissolved			103.0		%		80-120	20-JUN-13
WG1691559-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	20-JUN-13
MET-D-CCMS-VA	**Water**							
Batch R2635401								
WG1691559-2 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Dissolved			97.9		%		80-120	19-JUN-13
Antimony (Sb)-Dissolved			100.0		%		80-120	19-JUN-13
Arsenic (As)-Dissolved			99.1		%		80-120	19-JUN-13
Barium (Ba)-Dissolved			101.9		%		80-120	19-JUN-13
Beryllium (Be)-Dissolved			101.2		%		80-120	19-JUN-13
Boron (B)-Dissolved			90.7		%		80-120	19-JUN-13
Cadmium (Cd)-Dissolved			103.0		%		80-120	19-JUN-13
Chromium (Cr)-Dissolved			98.3		%		80-120	19-JUN-13
Cobalt (Co)-Dissolved			96.8		%		80-120	19-JUN-13
Copper (Cu)-Dissolved			95.5		%		80-120	19-JUN-13
Lead (Pb)-Dissolved			97.0		%		80-120	19-JUN-13
Lithium (Li)-Dissolved			99.9		%		80-120	19-JUN-13
Manganese (Mn)-Dissolved			98.0		%		80-120	19-JUN-13
Molybdenum (Mo)-Dissolved			102.4		%		80-120	19-JUN-13
Nickel (Ni)-Dissolved			95.5		%		80-120	19-JUN-13
Potassium (K)-Dissolved			98.8		%		80-120	19-JUN-13
Selenium (Se)-Dissolved			99.7		%		80-120	19-JUN-13
Silver (Ag)-Dissolved			98.3		%		80-120	19-JUN-13
Sodium (Na)-Dissolved			98.1		%		80-120	19-JUN-13
Strontium (Sr)-Dissolved			100.3		%		80-120	19-JUN-13
Thallium (Tl)-Dissolved			96.6		%		80-120	19-JUN-13
Titanium (Ti)-Dissolved			101.5		%		80-120	19-JUN-13
Uranium (U)-Dissolved			98.2		%		80-120	19-JUN-13
Vanadium (V)-Dissolved			98.6		%		80-120	19-JUN-13
Zinc (Zn)-Dissolved			93.8		%		80-120	19-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2635401								
WG1691559-4 DUP		**L1317621-1**						
Aluminum (Al)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	25-JUN-13
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUN-13
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUN-13
Barium (Ba)-Dissolved		<0.000050	0.000064	RPD-NA	mg/L	N/A	20	25-JUN-13
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUN-13
Boron (B)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	25-JUN-13
Cadmium (Cd)-Dissolved		0.000023	0.000017	J	mg/L	0.000006	0.00002	25-JUN-13
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUN-13
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUN-13
Copper (Cu)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	25-JUN-13
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	25-JUN-13
Lithium (Li)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	25-JUN-13
Manganese (Mn)-Dissolved		0.000609	0.000640		mg/L	5.0	20	27-JUN-13
Molybdenum (Mo)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	25-JUN-13
Nickel (Ni)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	25-JUN-13
Potassium (K)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	25-JUN-13
Selenium (Se)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-JUN-13
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	25-JUN-13
Sodium (Na)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	25-JUN-13
Strontium (Sr)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	25-JUN-13
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	25-JUN-13
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	25-JUN-13
Uranium (U)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	25-JUN-13
Vanadium (V)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	25-JUN-13
Zinc (Zn)-Dissolved		0.0065	0.0063		mg/L	2.3	20	27-JUN-13
WG1691559-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	19-JUN-13
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-13
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-13
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	19-JUN-13
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-13
Boron (B)-Dissolved			<0.010		mg/L		0.01	19-JUN-13
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	19-JUN-13
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2635401								
WG1691559-1 MB								
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	19-JUN-13
Lithium (Li)-Dissolved			<0.00050		mg/L		0.0005	19-JUN-13
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	19-JUN-13
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	19-JUN-13
Potassium (K)-Dissolved			<0.050		mg/L		0.05	19-JUN-13
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-13
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	19-JUN-13
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	19-JUN-13
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	19-JUN-13
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	19-JUN-13
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	19-JUN-13
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	19-JUN-13
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	19-JUN-13
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	19-JUN-13
WG1691559-5 MS		**L1317621-1**						
Aluminum (Al)-Dissolved			99.8		%		70-130	25-JUN-13
Antimony (Sb)-Dissolved			101.8		%		70-130	25-JUN-13
Arsenic (As)-Dissolved			106.0		%		70-130	25-JUN-13
Barium (Ba)-Dissolved			100.1		%		70-130	25-JUN-13
Beryllium (Be)-Dissolved			97.5		%		70-130	25-JUN-13
Boron (B)-Dissolved			93.6		%		70-130	25-JUN-13
Cadmium (Cd)-Dissolved			100.7		%		70-130	25-JUN-13
Chromium (Cr)-Dissolved			95.9		%		70-130	25-JUN-13
Cobalt (Co)-Dissolved			97.1		%		70-130	25-JUN-13
Copper (Cu)-Dissolved			97.9		%		70-130	25-JUN-13
Lead (Pb)-Dissolved			96.0		%		70-130	25-JUN-13
Lithium (Li)-Dissolved			98.4		%		70-130	25-JUN-13
Manganese (Mn)-Dissolved			90.6		%		70-130	25-JUN-13
Molybdenum (Mo)-Dissolved			99.0		%		70-130	25-JUN-13
Nickel (Ni)-Dissolved			96.5		%		70-130	25-JUN-13
Potassium (K)-Dissolved			96.4		%		70-130	25-JUN-13
Selenium (Se)-Dissolved			106.5		%		70-130	25-JUN-13
Silver (Ag)-Dissolved			98.4		%		70-130	25-JUN-13
Sodium (Na)-Dissolved			98.8		%		70-130	25-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2635401								
WG1691559-5 MS		**L1317621-1**						
Strontium (Sr)-Dissolved			95.1		%		70-130	25-JUN-13
Thallium (Tl)-Dissolved			94.2		%		70-130	25-JUN-13
Titanium (Ti)-Dissolved			106.5		%		70-130	25-JUN-13
Uranium (U)-Dissolved			94.9		%		70-130	25-JUN-13
Vanadium (V)-Dissolved			97.1		%		70-130	25-JUN-13
Zinc (Zn)-Dissolved			95.2		%		70-130	25-JUN-13
Batch R2635455								
WG1691559-1 MB								
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	20-JUN-13
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	20-JUN-13
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	20-JUN-13
MET-DIS-ICP-VA	**Water**							
Batch R2635192								
WG1691559-2 CRM		**VA-HIGH-WATRM**						
Calcium (Ca)-Dissolved			102.3		%		80-120	19-JUN-13
Iron (Fe)-Dissolved			96.7		%		80-120	19-JUN-13
Magnesium (Mg)-Dissolved			97.6		%		80-120	19-JUN-13
Phosphorus (P)-Dissolved			100.2		%		80-120	19-JUN-13
Silicon (Si)-Dissolved			104.1		%		80-120	19-JUN-13
Batch R2635397								
WG1691559-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	20-JUN-13
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	20-JUN-13
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	20-JUN-13
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	20-JUN-13
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	20-JUN-13
Batch R2639755								
WG1691559-4 DUP		**L1317621-1**						
Calcium (Ca)-Dissolved		0.081	0.089		mg/L	9.9	20	26-JUN-13
Iron (Fe)-Dissolved		<0.030	<0.030	RPD-NA	mg/L	N/A	20	26-JUN-13
Magnesium (Mg)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	26-JUN-13
Phosphorus (P)-Dissolved		<0.30	<0.30	RPD-NA	mg/L	N/A	20	26-JUN-13
Silicon (Si)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	26-JUN-13
WG1691559-5 MS		**L1317621-1**						
Calcium (Ca)-Dissolved			104.8		%		70-130	26-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA	**Water**							
Batch R2639755								
WG1691559-5 MS		**L1317621-1**						
Iron (Fe)-Dissolved			96.7		%		70-130	26-JUN-13
Magnesium (Mg)-Dissolved			99.97		%		70-130	26-JUN-13
NH3-F-VA	**Water**							
Batch R2641269								
WG1697454-2 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			91.8		%		85-115	28-JUN-13
WG1697454-3 DUP		**L1317621-1**						
Ammonia, Total (as N)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	28-JUN-13
WG1697454-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	28-JUN-13
WG1697454-4 MS		**L1317621-1**						
Ammonia, Total (as N)			84.1		%		75-125	28-JUN-13
PO4-DO-COL-VA	**Water**							
Batch R2634770								
WG1691132-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			96.0		%		80-120	18-JUN-13
WG1691132-7 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			92.0		%		80-120	18-JUN-13
WG1691132-5 DUP		**L1317621-1**						
Orthophosphate-Dissolved (as P)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	18-JUN-13
WG1691132-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	18-JUN-13
WG1691132-6 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	18-JUN-13
WG1691132-4 MS		**L1317530-4**						
Orthophosphate-Dissolved (as P)			88.1		%		70-130	20-JUN-13
S-DIS-ICP-VA	**Water**							
Batch R2635192								
WG1691559-2 CRM		**VA-HIGH-WATRM**						
Sulfur (S)-Dissolved			99.8		%		80-120	19-JUN-13
Batch R2635397								
WG1691559-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	20-JUN-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-DIS-ICP-VA	**Water**							
Batch R2639755								
WG1691559-4 DUP		**L1317621-1**						
Sulfur (S)-Dissolved		<0.50	<0.50	RPD-NA	mg/L	N/A	20	26-JUN-13
WG1691559-5 MS		**L1317621-1**						
Sulfur (S)-Dissolved			99.4		%		70-130	26-JUN-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
Anions and Nutrients							
Diss. Orthophosphate in Water by Colour							
	1	14-JUN-13 08:15	18-JUN-13 23:48	3	5	days	EHT
Nitrate Nitrogen by Ion Chromatography							
	1	14-JUN-13 08:15	18-JUN-13 12:46	3	4	days	EHT
Nitrite Nitrogen by Ion Chromatography							
	1	14-JUN-13 08:15	18-JUN-13 12:46	3	4	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 L1317621 were received on 15-JUN-13 13:10.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

6/14/2013 2:56:17 PM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.07.EM.RM.02.0
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-014
Project WASTE ROCK DUMP MW 2013 SW-014B
Turnaround Time 3 Days
Shipping Date: 6/14/2013
COC Number: ALS06141302

	DATE	TIME	Matrix	(ASTM 7237) Free Cyanide	(E245.7) Field Filtered Dissolved Hg	(Ferrozine Method) Field Filtered Ferrous Iron	(SM4110B) Cl, F, NO2, NO3, and SO4	(SM4500P) ortho-Phosphate	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered For Metals Analyte List see Table 1	Ammonia (JEM/SM4500NH3) Ammonia		Number of Containers	COMMENTS
Container:				125mL Poly	250ml Poly	125ml Poly	500ml Poly	500ml Poly	250ml Glass	250ml Poly	250ml glass			
Preservatives:				NaOH, 4'C	HNO3, 4'C	HCl, 4'C	4'C	4'C	H2SO4, pH<2, 4'C	HNO3, 4'C	H2SO4, pH<2, 4C			
Filtered:				NA	Field	Field	NA	NA	Field	Field	NA			
Holding Time:				14	180/28	180	3	3	28	180/28	28			
EB_014_13_002	6/14/2013	8:15	Water	X	X	X	X	X	X	X	X		6	
												TOTAL NUMBER OF CONTAINERS	6	

L1317621-COFC

	Signatures	Date/Time
Approved by		6/15/13
Sampled by		
Relinquished by		1310
Received by		
Relinquished by		6/15/13 1310
Received by	Daisha Zuo	15.2

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Perform Lab Dup/MS on these samples

Report Copy to
Bernice Kidd
(530) 229-3203

15.2°C

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 04-JUL-13
Report Date: 19-JUL-13 14:49 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1327470

Project P.O. #: 472645.06.AD.01.04.13 PO=604564
Job Reference: WASTE ROCK DUMP MW 2013 SW-014B
C of C Numbers: ALS07041302
Legal Site Desc:

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1327470-1				
	Description	Water				
	Sampled Date	04-JUL-13				
	Sampled Time	12:00				
	Client ID	CH12-014-MW012_GW0613				
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	1240				
	pH (pH)	7.83				
	Total Suspended Solids (mg/L)	151				
	Total Dissolved Solids (mg/L)	1560				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	13.8				
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	382				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0				
	Alkalinity, Total (as CaCO3) (mg/L)	382				
	Ammonia, Total (as N) (mg/L)	0.0473				
	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				
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010				
	Sulfate (SO4) (mg/L)	851				
Cyanides	Cyanide, Free (mg/L)	<0.0050				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.12				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	0.0672				
	Antimony (Sb)-Dissolved (mg/L)	<0.00010				
	Arsenic (As)-Dissolved (mg/L)	0.0155				
	Barium (Ba)-Dissolved (mg/L)	0.0456				
	Beryllium (Be)-Dissolved (mg/L)	<0.00010				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (mg/L)	0.000012				
	Calcium (Ca)-Dissolved (mg/L)	303				
	Chromium (Cr)-Dissolved (mg/L)	0.00492				
	Cobalt (Co)-Dissolved (mg/L)	0.00068				
	Copper (Cu)-Dissolved (mg/L)	0.00049				
	Iron (Fe)-Dissolved (mg/L)	7.28				
	Ferrous Iron, Dissolved (mg/L)	8.0				
	Lead (Pb)-Dissolved (mg/L)	0.00184				
	Lithium (Li)-Dissolved (mg/L)	0.0149				
	Magnesium (Mg)-Dissolved (mg/L)	118				
	Manganese (Mn)-Dissolved (mg/L)	0.351				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1327470-1				
	Description	Water				
	Sampled Date	04-JUL-13				
	Sampled Time	12:00				
	Client ID	CH12-014-MW012_GW0613				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Mercury (Hg)-Dissolved (mg/L)	<0.000010				
	Molybdenum (Mo)-Dissolved (mg/L)	0.00177				
	Nickel (Ni)-Dissolved (mg/L)	0.00486				
	Phosphorus (P)-Dissolved (mg/L)	<0.30				
	Potassium (K)-Dissolved (mg/L)	3.25				
	Selenium (Se)-Dissolved (mg/L)	<0.00010				
	Silicon (Si)-Dissolved (mg/L)	5.46				
	Silicon (as SiO2)-Dissolved (mg/L)	11.7				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	7.58				
	Strontium (Sr)-Dissolved (mg/L)	1.81				
	Sulfur (S)-Dissolved (mg/L)	268				
	Thallium (Tl)-Dissolved (mg/L)	<0.000010				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	0.0219				
	Vanadium (V)-Dissolved (mg/L)	<0.0010				
	Zinc (Zn)-Dissolved (mg/L)	0.0095				

* 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	Phosphorus (P)-Dissolved	DLA	L1327470-1
Duplicate	Antimony (Sb)-Dissolved	DLA	L1327470-1
Duplicate	Beryllium (Be)-Dissolved	DLA	L1327470-1
Duplicate	Boron (B)-Dissolved	DLA	L1327470-1
Duplicate	Chromium (Cr)-Dissolved	DLA	L1327470-1
Duplicate	Copper (Cu)-Dissolved	DLA	L1327470-1
Duplicate	Molybdenum (Mo)-Dissolved	DLA	L1327470-1
Duplicate	Selenium (Se)-Dissolved	DLA	L1327470-1
Duplicate	Silver (Ag)-Dissolved	DLA	L1327470-1
Duplicate	Titanium (Ti)-Dissolved	DLA	L1327470-1
Duplicate	Vanadium (V)-Dissolved	DLA	L1327470-1
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1327470-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1327470-1
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1327470-1
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1327470-1
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1327470-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1327470-1
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1327470-1
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1327470-1

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.

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-SCR-VA	Water	Alkalinity by colour or titration	EPA 310.2 OR APHA 2320

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
OR
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.

		Sulphate by Ion Chromatography	EPA 300.1

Reference Information

ANIONS-SO4-IC-WR Water

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-DOC-VA Water Dissolved 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)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

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.

FE2-D-COL-VA Water Diss. Ferrous Iron in Water by Colour James W. Ball et al (1999)

This analysis is carried out using procedures adapted from "A New Method for the Direct Determination of Dissolved Iron Concentration in Acid Mine Waters" published by James W. Ball et al (1999). The procedures involves preliminary sample filtration (0.1um filter) and Ferrous Iron is determined using the "FerroZine" colorimteric method.

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).

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).

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.

PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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

Reference Information

all non-volatile forms of sulfur present in a particular sample.

SIO2-D-CALC-VA Water Dissolved Silicon (reported as Silica) CALCULATION

Dissolved Silicon (as SiO2) is a calculated parameter. Dissolved Silicon (as SiO2 mg/L) = 2.139 x Dissolved Silicon (mg/L).

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-LOW-VA Water Total Suspended Solids by Grav. (1 mg/L) APHA 2540 Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** 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:

ALS07041302

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-PCT-VA	**Water**							
Batch R2645814								
WG1702499-9 CRM		**VA-ACY-CONTROL**						
Acidity (as CaCO3)			101.2		%		85-115	08-JUL-13
ALK-SCR-VA	**Water**							
Batch R2644521								
WG1702152-2 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			97.7		%		85-115	06-JUL-13
WG1702152-5 CRM		**VA-ALKM-CONTROL**						
Alkalinity, Total (as CaCO3)			96.2		%		85-115	06-JUL-13
WG1702152-3 DUP		**L1327470-1**						
Alkalinity, Total (as CaCO3)		382	385		mg/L	0.7	20	06-JUL-13
WG1702152-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	06-JUL-13
WG1702152-4 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	06-JUL-13
WG1702152-6 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	06-JUL-13
ANIONS-CL-IC-WR	**Water**							
Batch R2647486								
WG1705229-2 LCS								
Chloride (Cl)			95.1		%		85-115	05-JUL-13
WG1705229-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	05-JUL-13
ANIONS-F-IC-WR	**Water**							
Batch R2647486								
WG1705229-2 LCS								
Fluoride (F)			96.2		%		85-115	05-JUL-13
WG1705229-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	05-JUL-13
ANIONS-NO2-IC-WR	**Water**							
Batch R2647486								
WG1705229-2 LCS								
Nitrite (as N)			95.7		%		85-115	05-JUL-13
WG1705229-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	05-JUL-13
ANIONS-NO3-IC-WR	**Water**							

Quality Control Report

Workorder: L1327470 Report Date: 19-JUL-13

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-NO3-IC-WR	**Water**							
Batch R2647486								
WG1705229-2 LCS								
Nitrate (as N)			96.4		%		85-115	05-JUL-13
WG1705229-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	05-JUL-13
ANIONS-SO4-IC-WR	**Water**							
Batch R2647486								
WG1705229-2 LCS								
Sulfate (SO4)			98.2		%		85-115	05-JUL-13
WG1705229-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	05-JUL-13
CARBONS-DOC-VA	**Water**							
Batch R2650868								
WG1708518-4 LCS								
Dissolved Organic Carbon			96.0		%		80-120	16-JUL-13
WG1708518-3 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	16-JUL-13
WG1708518-2 MS		**L1327472-1**						
Dissolved Organic Carbon			99.2		%		70-130	16-JUL-13
CN-FREE-CFA-VA	**Water**							
Batch R2652734								
WG1709775-3 DUP		**L1327470-1**						
Cyanide, Free		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	18-JUL-13
WG1709775-2 LCS								
Cyanide, Free			101.2		%		80-120	18-JUL-13
WG1709775-1 MB								
Cyanide, Free			<0.0050		mg/L		0.005	18-JUL-13
WG1709775-4 MS		**L1327470-1**						
Cyanide, Free			95.9		%		70-130	18-JUL-13
FE2-D-COL-VA	**Water**							
Batch R2646464								
WG1702636-2 LCS								
Ferrous Iron, Dissolved			102.8		%		80-120	08-JUL-13
WG1702636-1 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	08-JUL-13
WG1702636-4 MS		**L1327472-1**						
Ferrous Iron, Dissolved			101.7		%		70-130	08-JUL-13
HG-DIS-LOW-CVAFS-VA	**Water**							

Quality Control Report

Workorder: L1327470 Report Date: 19-JUL-13

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2648707								
WG1705565-3 LCS								
Mercury (Hg)-Dissolved			84.8		%		80-120	12-JUL-13
WG1705565-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	12-JUL-13
WG1705565-5 MS		**L1327470-1**						
Mercury (Hg)-Dissolved			85.9		%		70-130	12-JUL-13
MET-D-CCMS-VA	**Water**							
Batch R2648701								
WG1705565-2 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Dissolved			102.6		%		80-120	12-JUL-13
Antimony (Sb)-Dissolved			102.2		%		80-120	12-JUL-13
Arsenic (As)-Dissolved			102.3		%		80-120	12-JUL-13
Barium (Ba)-Dissolved			100.4		%		80-120	12-JUL-13
Beryllium (Be)-Dissolved			95.5		%		80-120	12-JUL-13
Boron (B)-Dissolved			92.4		%		80-120	12-JUL-13
Cadmium (Cd)-Dissolved			102.8		%		80-120	12-JUL-13
Chromium (Cr)-Dissolved			103.8		%		80-120	12-JUL-13
Cobalt (Co)-Dissolved			99.9		%		80-120	12-JUL-13
Copper (Cu)-Dissolved			98.8		%		80-120	12-JUL-13
Lead (Pb)-Dissolved			100.6		%		80-120	12-JUL-13
Lithium (Li)-Dissolved			95.9		%		80-120	12-JUL-13
Manganese (Mn)-Dissolved			100.3		%		80-120	12-JUL-13
Molybdenum (Mo)-Dissolved			98.1		%		80-120	12-JUL-13
Nickel (Ni)-Dissolved			98.8		%		80-120	12-JUL-13
Potassium (K)-Dissolved			105.2		%		80-120	12-JUL-13
Selenium (Se)-Dissolved			99.4		%		80-120	12-JUL-13
Silver (Ag)-Dissolved			99.1		%		80-120	12-JUL-13
Sodium (Na)-Dissolved			103.5		%		80-120	12-JUL-13
Strontium (Sr)-Dissolved			95.9		%		80-120	12-JUL-13
Thallium (Tl)-Dissolved			99.6		%		80-120	12-JUL-13
Titanium (Ti)-Dissolved			92.6		%		80-120	12-JUL-13
Uranium (U)-Dissolved			101.5		%		80-120	12-JUL-13
Vanadium (V)-Dissolved			102.7		%		80-120	12-JUL-13
Zinc (Zn)-Dissolved			97.0		%		80-120	12-JUL-13
WG1705565-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	12-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2648701								
WG1705565-1 MB								
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	12-JUL-13
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	12-JUL-13
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	12-JUL-13
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	12-JUL-13
Boron (B)-Dissolved			<0.010		mg/L		0.01	12-JUL-13
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	12-JUL-13
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	12-JUL-13
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	12-JUL-13
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	12-JUL-13
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	12-JUL-13
Lithium (Li)-Dissolved			<0.00050		mg/L		0.0005	12-JUL-13
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	12-JUL-13
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	12-JUL-13
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	12-JUL-13
Potassium (K)-Dissolved			<0.050		mg/L		0.05	12-JUL-13
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	12-JUL-13
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	12-JUL-13
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	12-JUL-13
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	12-JUL-13
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	12-JUL-13
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	12-JUL-13
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	12-JUL-13
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	12-JUL-13
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	12-JUL-13
WG1705565-5 MS		**L1327470-1**						
Aluminum (Al)-Dissolved			115.3		%		70-130	15-JUL-13
Antimony (Sb)-Dissolved			105.8		%		70-130	15-JUL-13
Arsenic (As)-Dissolved			109.2		%		70-130	15-JUL-13
Barium (Ba)-Dissolved			N/A	MS-B	%		-	15-JUL-13
Beryllium (Be)-Dissolved			95.5		%		70-130	15-JUL-13
Boron (B)-Dissolved			101.4		%		70-130	15-JUL-13
Cadmium (Cd)-Dissolved			95.4		%		70-130	15-JUL-13
Chromium (Cr)-Dissolved			94.4		%		70-130	15-JUL-13
Cobalt (Co)-Dissolved			92.7		%		70-130	15-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2648701								
WG1705565-5 MS		**L1327470-1**						
Copper (Cu)-Dissolved			86.5		%		70-130	15-JUL-13
Lead (Pb)-Dissolved			90.1		%		70-130	15-JUL-13
Lithium (Li)-Dissolved			92.5		%		70-130	15-JUL-13
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	15-JUL-13
Molybdenum (Mo)-Dissolved			104.5		%		70-130	15-JUL-13
Nickel (Ni)-Dissolved			88.2		%		70-130	15-JUL-13
Potassium (K)-Dissolved			99.9		%		70-130	15-JUL-13
Selenium (Se)-Dissolved			108.7		%		70-130	15-JUL-13
Silver (Ag)-Dissolved			96.0		%		70-130	15-JUL-13
Sodium (Na)-Dissolved			N/A	MS-B	%		-	15-JUL-13
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	15-JUL-13
Thallium (Tl)-Dissolved			92.5		%		70-130	15-JUL-13
Titanium (Ti)-Dissolved			116.1		%		70-130	15-JUL-13
Uranium (U)-Dissolved			N/A	MS-B	%		-	15-JUL-13
Vanadium (V)-Dissolved			101.9		%		70-130	15-JUL-13
Zinc (Zn)-Dissolved			86.1		%		70-130	15-JUL-13
MET-DIS-ICP-VA	**Water**							
Batch R2648300								
WG1705565-2 CRM		**VA-HIGH-WATRM**						
Calcium (Ca)-Dissolved			101.3		%		80-120	11-JUL-13
Iron (Fe)-Dissolved			98.6		%		80-120	11-JUL-13
Magnesium (Mg)-Dissolved			101.8		%		80-120	11-JUL-13
Phosphorus (P)-Dissolved			100.3		%		80-120	11-JUL-13
Silicon (Si)-Dissolved			102.7		%		80-120	11-JUL-13
WG1705565-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	11-JUL-13
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	11-JUL-13
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	11-JUL-13
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	11-JUL-13
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	11-JUL-13
WG1705565-5 MS		**L1327470-1**						
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	11-JUL-13
Iron (Fe)-Dissolved			90.4		%		70-130	11-JUL-13
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	11-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-F-VA	**Water**							
Batch R2652280								
WG1710045-2 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			100.5		%		85-115	18-JUL-13
WG1710045-3 DUP		**L1327470-1**						
Ammonia, Total (as N)		0.0473	0.0446		mg/L	5.9	20	18-JUL-13
WG1710045-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	18-JUL-13
WG1710045-4 MS		**L1327470-1**						
Ammonia, Total (as N)			96.0		%		75-125	18-JUL-13
PH-PCT-VA	**Water**							
Batch R2645814								
WG1702499-25 CRM		**VA-PH7-BUF**						
pH			7.02		pH		6.9-7.1	08-JUL-13
PO4-DO-COL-VA	**Water**							
Batch R2644322								
WG1701979-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			90.7		%		80-120	05-JUL-13
WG1701979-6 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			90.3		%		80-120	05-JUL-13
WG1701979-3 DUP		**L1327470-1**						
Orthophosphate-Dissolved (as P)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	05-JUL-13
WG1701979-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	05-JUL-13
WG1701979-5 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	05-JUL-13
WG1701979-4 MS		**L1327471-2**						
Orthophosphate-Dissolved (as P)			93.9		%		70-130	05-JUL-13
S-DIS-ICP-VA	**Water**							
Batch R2648300								
WG1705565-2 CRM		**VA-HIGH-WATRM**						
Sulfur (S)-Dissolved			100.3		%		80-120	11-JUL-13
WG1705565-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	11-JUL-13
WG1705565-5 MS		**L1327470-1**						
Sulfur (S)-Dissolved			N/A	MS-B	%		-	11-JUL-13
TDS-VA	**Water**							

Quality Control Report

Workorder: L1327470 Report Date: 19-JUL-13

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TDS-VA	**Water**							
Batch R2648330								
WG1705424-3 DUP		**L1327470-1**						
Total Dissolved Solids		1560	1450		mg/L	7.1	20	11-JUL-13
WG1705424-2 LCS								
Total Dissolved Solids			101.4		%		85-115	11-JUL-13
WG1705424-1 MB								
Total Dissolved Solids			<10		mg/L		10	11-JUL-13
TSS-LOW-VA	**Water**							
Batch R2645821								
WG1702856-2 LCS								
Total Suspended Solids			96.2		%		85-115	08-JUL-13
WG1702856-4 LCS								
Total Suspended Solids			95.0		%		85-115	08-JUL-13
WG1702856-1 MB								
Total Suspended Solids			<1.0		mg/L		1	08-JUL-13
WG1702856-3 MB								
Total Suspended Solids			<1.0		mg/L		1	08-JUL-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	04-JUL-13 12:00	08-JUL-13 23:00	0.25	107	hours	EHTR-FM

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 L1327470 were received on 04-JUL-13 22:00.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

7/4/2013 1:33:33 PM

Project Name Faro Mine
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-014
Project WASTE ROCK DUMP MW 2013 SW-014B
Turnaround Time 3 Days
Shipping Date: 7/4/2013
COC Number: ALS07041302

	DATE	TIME	Matrix	(Ferrozine Method) Field Filtered Ferrous Iron	(SM2310) Acidity - Run Hot H2O2 if Fe > 15ppm	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered Metals Analyte List Table 1	Ammonia (JEM/SM4500NH3) Ammonia	ASTM 7237 Free Cyanide	E245.7-Diss Field Filtered Dissolved Hg	SM4110B CL F NO2 NO3 and SO4	SM4500P ortho-Phosphate		Number of Containers	COMMENTS
Container:				125ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	250ml Glass	250ml Poly	250ml glass	125mL Poly	250ml Poly	500ml Poly	500ml Poly			
Preservatives:				HCl, 4°C	4C	4C	4°C	4°C	H2SO4, pH<2, 4°C	HNO3, 4°C	H2SO4, pH<2, 4C	NaOH, 4°C	HNO3, 4°C	4°C	4°C			
Filtered:				Field	NA	NA	NA	NA	Field	Field	NA	NA	Field	NA	NA			
Holding Time:				180	14	14	7	7	28	180/28	28	14	180/28	3	3			
CH12-014-MW012_GW0613	7/4/2013		Water	X	X	X	X	X	X	X	X	X	X	X	X		8	
																TOTAL NUMBER OF CONTAINERS	8	



L1327470-COFC

Signatures	Date/Time
Approved by	
Sampled by	07041/2013
Relinquished by	
Received by	15:30
Relinquished by	04-Jul-13
Received by	22:00

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Perform Lab Dup/MS on these samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 04-JUL-13
Report Date: 19-JUL-13 12:15 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1327471

Project P.O. #: 472645.06.AD.01.04.13, PO=604564
Job Reference: FARO MINE SEEP SAMPLING 2013 SW-015
C of C Numbers: ALS07041301
Legal Site Desc:

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1327471-1	L1327471-2			
	Description	Water	Water			
	Sampled Date	03-JUL-13	03-JUL-13			
	Sampled Time	16:45	15:30			
	Client ID	CH-RCTA-07_SESP13	SRK-FD49_SESP13			
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	1330	2630			
	pH (pH)	5.20	7.49			
	Total Suspended Solids (mg/L)	2200	254			
	Total Dissolved Solids (mg/L)	6790	3960			
Anions and Nutrients	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)	2070	<25			
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	18.9	34.7			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0	<2.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0	<2.0			
	Alkalinity, Total (as CaCO3) (mg/L)	18.9	34.7			
	Ammonia, Total (as N) (mg/L)	0.716	<0.0050			
	Chloride (Cl) (mg/L)	<10 DLA	<10 DLA			
	Fluoride (F) (mg/L)	<0.40 DLA	<0.40 DLA			
	Nitrate (as N) (mg/L)	0.20	<0.10 DLA			
	Nitrite (as N) (mg/L)	<0.020 DLA	<0.020 DLA			
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010			
	Sulfate (SO4) (mg/L)	4420	2450			
Cyanides	Cyanide, Free (mg/L)	<0.020 DLM	<0.0050			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	3.25	2.29			
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	0.198	0.0485			
	Antimony (Sb)-Dissolved (mg/L)	<0.0010 DLA	<0.00020 DLA			
	Arsenic (As)-Dissolved (mg/L)	0.0015	<0.00020 DLA			
	Barium (Ba)-Dissolved (mg/L)	0.0211	0.0186			
	Beryllium (Be)-Dissolved (mg/L)	<0.0010 DLA	<0.00020 DLA			
	Boron (B)-Dissolved (mg/L)	<0.10 DLA	<0.020 DLA			
	Cadmium (Cd)-Dissolved (mg/L)	0.00127	0.00256			
	Calcium (Ca)-Dissolved (mg/L)	380	229			
	Chromium (Cr)-Dissolved (mg/L)	<0.0010 DLA	<0.00020 DLA			
	Cobalt (Co)-Dissolved (mg/L)	0.0924	0.0187			
	Copper (Cu)-Dissolved (mg/L)	<0.0020 DLA	0.00090			
	Iron (Fe)-Dissolved (mg/L)	1370	<0.030			
	Ferrous Iron, Dissolved (mg/L)	210 DLM	0.212			
	Lead (Pb)-Dissolved (mg/L)	0.00096	0.00085			
	Lithium (Li)-Dissolved (mg/L)	0.0270	0.156			
	Magnesium (Mg)-Dissolved (mg/L)	92.2	500			
	Manganese (Mn)-Dissolved (mg/L)	39.4	1.25			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1327471-1	L1327471-2			
	Description	Water	Water			
	Sampled Date	03-JUL-13	03-JUL-13			
	Sampled Time	16:45	15:30			
	Client ID	CH-RCTA-07_SESP13	SRK-FD49_SESP13			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Dissolved (mg/L)	<0.00050 DLA	<0.00010 DLA			
	Nickel (Ni)-Dissolved (mg/L)	0.0766	0.131			
	Phosphorus (P)-Dissolved (mg/L)	<0.60 DLA	<0.30			
	Potassium (K)-Dissolved (mg/L)	6.30	10.1			
	Selenium (Se)-Dissolved (mg/L)	<0.0010 DLA	0.00178			
	Silicon (Si)-Dissolved (mg/L)	8.77	1.75			
	Silicon (as SiO2)-Dissolved (mg/L)	18.8	3.74			
	Silver (Ag)-Dissolved (mg/L)	<0.00010 DLA	<0.000020 DLA			
	Sodium (Na)-Dissolved (mg/L)	17.4	7.42			
	Strontium (Sr)-Dissolved (mg/L)	1.16	0.615			
	Sulfur (S)-Dissolved (mg/L)	1290	828			
	Thallium (Tl)-Dissolved (mg/L)	0.00036	0.000246			
	Titanium (Ti)-Dissolved (mg/L)	<0.10 DLA	<0.020 DLA			
	Uranium (U)-Dissolved (mg/L)	0.00567	0.000036			
	Vanadium (V)-Dissolved (mg/L)	<0.010 DLA	<0.0020 DLA			
	Zinc (Zn)-Dissolved (mg/L)	41.9	1.81			

* 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	Phosphorus (P)-Dissolved	DLA	L1327471-1, -2
Duplicate	Antimony (Sb)-Dissolved	DLA	L1327471-1, -2
Duplicate	Beryllium (Be)-Dissolved	DLA	L1327471-1, -2
Duplicate	Boron (B)-Dissolved	DLA	L1327471-1, -2
Duplicate	Chromium (Cr)-Dissolved	DLA	L1327471-1, -2
Duplicate	Copper (Cu)-Dissolved	DLA	L1327471-1, -2
Duplicate	Molybdenum (Mo)-Dissolved	DLA	L1327471-1, -2
Duplicate	Selenium (Se)-Dissolved	DLA	L1327471-1, -2
Duplicate	Silver (Ag)-Dissolved	DLA	L1327471-1, -2
Duplicate	Titanium (Ti)-Dissolved	DLA	L1327471-1, -2
Duplicate	Vanadium (V)-Dissolved	DLA	L1327471-1, -2
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1327471-1, -2
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1327471-1, -2
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1327471-1, -2
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1327471-1, -2
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1327471-1, -2
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1327471-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1327471-1, -2
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1327471-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
DLM	Detection Limit Adjusted For 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**
ACY-H2O2-MAN-VA	Water	Acidity by Hot Peroxide Manual Titration	APHA - ACIDITY (2310)

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". The procedure involves preliminary sample treatment by the hot peroxide procedure, and Acidity is subsequently determined by potentiometric titration to a specified endpoint (i.e. pH = 8.3).

ALK-SCR-VA	Water	Alkalinity by colour or titration	EPA 310.2 OR APHA 2320

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
OR
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

Reference Information

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-DOC-VA Water Dissolved 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)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

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.

FE2-D-COL-VA Water Diss. Ferrous Iron in Water by Colour James W. Ball et al (1999)

This analysis is carried out using procedures adapted from "A New Method for the Direct Determination of Dissolved Iron Concentration in Acid Mine Waters" published by James W. Ball et al (1999). The procedures involves preliminary sample filtration (0.1um filter) and Ferrous Iron is determined using the "FerroZine" colorimteric method.

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).

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).

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.

PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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.

SIO2-D-CALC-VA Water Dissolved Silicon (reported as Silica) CALCULATION

Reference Information

Dissolved Silicon (as SiO2) is a calculated parameter. Dissolved Silicon (as SiO2 mg/L) = 2.139 x Dissolved Silicon (mg/L).

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-LOW-VA	Water	Total Suspended Solids by Grav. (1 mg/L)	APHA 2540 Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** 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:

ALS07041301

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-H2O2-MAN-VA	**Water**							
Batch R2647857								
WG1705492-2 CRM		**VA-ACY-M-CONTROL**						
Acidity-Hot Peroxide Treated (as CaCO3)			97.9		%		85-115	11-JUL-13
WG1705492-3 DUP		**L1327471-2**						
Acidity-Hot Peroxide Treated (as CaCO3)		<25	<25	RPD-NA	mg/L	N/A	20	11-JUL-13
WG1705492-1 MB								
Acidity-Hot Peroxide Treated (as CaCO3)			<25		mg/L		25	11-JUL-13
Batch R2650280								
WG1708072-2 CRM		**VA-ACY-M-CONTROL**						
Acidity-Hot Peroxide Treated (as CaCO3)			97.9		%		85-115	16-JUL-13
WG1708072-3 DUP		**L1327471-1**						
Acidity-Hot Peroxide Treated (as CaCO3)		2070	2090		mg/L	1.0	20	16-JUL-13
WG1708072-1 MB								
Acidity-Hot Peroxide Treated (as CaCO3)			<25		mg/L		25	16-JUL-13
ALK-SCR-VA	**Water**							
Batch R2644521								
WG1702152-2 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			97.7		%		85-115	06-JUL-13
WG1702152-5 CRM		**VA-ALKM-CONTROL**						
Alkalinity, Total (as CaCO3)			96.2		%		85-115	06-JUL-13
WG1702152-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	06-JUL-13
WG1702152-4 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	06-JUL-13
WG1702152-6 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	06-JUL-13
ANIONS-CL-IC-WR	**Water**							
Batch R2647486								
WG1705229-2 LCS								
Chloride (Cl)			95.1		%		85-115	05-JUL-13
WG1705229-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	05-JUL-13
ANIONS-F-IC-WR	**Water**							
Batch R2647486								
WG1705229-2 LCS								
Fluoride (F)			96.2		%		85-115	05-JUL-13
WG1705229-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	05-JUL-13
ANIONS-NO2-IC-WR	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-NO2-IC-WR	**Water**							
Batch R2647486								
WG1705229-2 LCS								
Nitrite (as N)			95.7		%		85-115	05-JUL-13
WG1705229-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	05-JUL-13
ANIONS-NO3-IC-WR	**Water**							
Batch R2647486								
WG1705229-2 LCS								
Nitrate (as N)			96.4		%		85-115	05-JUL-13
WG1705229-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	05-JUL-13
ANIONS-SO4-IC-WR	**Water**							
Batch R2647486								
WG1705229-2 LCS								
Sulfate (SO4)			98.2		%		85-115	05-JUL-13
WG1705229-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	05-JUL-13
CARBONS-DOC-VA	**Water**							
Batch R2650868								
WG1708518-1 DUP		**L1327471-1**						
Dissolved Organic Carbon		3.25	3.12		mg/L	4.0	20	16-JUL-13
WG1708518-4 LCS								
Dissolved Organic Carbon			96.0		%		80-120	16-JUL-13
WG1708518-3 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	16-JUL-13
WG1708518-2 MS		**L1327472-1**						
Dissolved Organic Carbon			99.2		%		70-130	16-JUL-13
CN-FREE-CFA-VA	**Water**							
Batch R2651871								
WG1708856-3 DUP		**L1327471-2**						
Cyanide, Free		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	17-JUL-13
WG1708856-2 LCS								
Cyanide, Free			101.2		%		80-120	17-JUL-13
WG1708856-1 MB								
Cyanide, Free			<0.0050		mg/L		0.005	17-JUL-13
WG1708856-4 MS		**L1327471-2**						
Cyanide, Free			107.0		%		70-130	17-JUL-13
FE2-D-COL-VA	**Water**							

Quality Control Report

Workorder: L1327471 Report Date: 19-JUL-13

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FE2-D-COL-VA	**Water**							
Batch R2646464								
WG1702636-2 LCS								
Ferrous Iron, Dissolved			102.8		%		80-120	08-JUL-13
WG1702636-1 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	08-JUL-13
WG1702636-4 MS		**L1327472-1**						
Ferrous Iron, Dissolved			101.7		%		70-130	08-JUL-13
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2648707								
WG1705565-4 DUP		**L1327471-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	12-JUL-13
WG1705565-3 LCS								
Mercury (Hg)-Dissolved			84.8		%		80-120	12-JUL-13
WG1705565-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	12-JUL-13
WG1705565-5 MS		**L1327470-1**						
Mercury (Hg)-Dissolved			85.9		%		70-130	12-JUL-13
MET-D-CCMS-VA	**Water**							
Batch R2648701								
WG1705565-2 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Dissolved			102.6		%		80-120	12-JUL-13
Antimony (Sb)-Dissolved			102.2		%		80-120	12-JUL-13
Arsenic (As)-Dissolved			102.3		%		80-120	12-JUL-13
Barium (Ba)-Dissolved			100.4		%		80-120	12-JUL-13
Beryllium (Be)-Dissolved			95.5		%		80-120	12-JUL-13
Boron (B)-Dissolved			92.4		%		80-120	12-JUL-13
Cadmium (Cd)-Dissolved			102.8		%		80-120	12-JUL-13
Chromium (Cr)-Dissolved			103.8		%		80-120	12-JUL-13
Cobalt (Co)-Dissolved			99.9		%		80-120	12-JUL-13
Copper (Cu)-Dissolved			98.8		%		80-120	12-JUL-13
Lead (Pb)-Dissolved			100.6		%		80-120	12-JUL-13
Lithium (Li)-Dissolved			95.9		%		80-120	12-JUL-13
Manganese (Mn)-Dissolved			100.3		%		80-120	12-JUL-13
Molybdenum (Mo)-Dissolved			98.1		%		80-120	12-JUL-13
Nickel (Ni)-Dissolved			98.8		%		80-120	12-JUL-13
Potassium (K)-Dissolved			105.2		%		80-120	12-JUL-13
Selenium (Se)-Dissolved			99.4		%		80-120	12-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2648701								
WG1705565-2 CRM		**VA-HIGH-WATRM**						
Silver (Ag)-Dissolved			99.1		%		80-120	12-JUL-13
Sodium (Na)-Dissolved			103.5		%		80-120	12-JUL-13
Strontium (Sr)-Dissolved			95.9		%		80-120	12-JUL-13
Thallium (Tl)-Dissolved			99.6		%		80-120	12-JUL-13
Titanium (Ti)-Dissolved			92.6		%		80-120	12-JUL-13
Uranium (U)-Dissolved			101.5		%		80-120	12-JUL-13
Vanadium (V)-Dissolved			102.7		%		80-120	12-JUL-13
Zinc (Zn)-Dissolved			97.0		%		80-120	12-JUL-13
WG1705565-4 DUP		**L1327471-1**						
Aluminum (Al)-Dissolved		0.198	0.201		mg/L	1.5	20	15-JUL-13
Antimony (Sb)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	15-JUL-13
Arsenic (As)-Dissolved		0.0015	0.0014		mg/L	4.0	20	15-JUL-13
Barium (Ba)-Dissolved		0.0211	0.0211		mg/L	0.3	20	15-JUL-13
Beryllium (Be)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	15-JUL-13
Boron (B)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	15-JUL-13
Cadmium (Cd)-Dissolved		0.00127	0.00127		mg/L	0.2	20	15-JUL-13
Chromium (Cr)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	15-JUL-13
Cobalt (Co)-Dissolved		0.0924	0.0937		mg/L	1.4	20	15-JUL-13
Copper (Cu)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	15-JUL-13
Lead (Pb)-Dissolved		0.00096	0.00096		mg/L	0.2	20	15-JUL-13
Lithium (Li)-Dissolved		0.0270	0.0196	J	mg/L	0.0074	0.01	15-JUL-13
Manganese (Mn)-Dissolved		39.4	38.8		mg/L	1.5	20	15-JUL-13
Molybdenum (Mo)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	15-JUL-13
Nickel (Ni)-Dissolved		0.0766	0.0777		mg/L	1.4	20	15-JUL-13
Potassium (K)-Dissolved		6.30	6.17		mg/L	2.1	20	15-JUL-13
Selenium (Se)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	15-JUL-13
Silver (Ag)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	15-JUL-13
Sodium (Na)-Dissolved		17.4	17.2		mg/L	1.0	20	15-JUL-13
Strontium (Sr)-Dissolved		1.16	1.17		mg/L	1.2	20	15-JUL-13
Thallium (Tl)-Dissolved		0.00036	0.00038		mg/L	4.6	20	15-JUL-13
Titanium (Ti)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	15-JUL-13
Uranium (U)-Dissolved		0.00567	0.00575		mg/L	1.4	20	15-JUL-13
Vanadium (V)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	15-JUL-13
Zinc (Zn)-Dissolved		41.9	42.2		mg/L	0.6	20	15-JUL-13
WG1705565-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2648701								
WG1705565-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	12-JUL-13
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	12-JUL-13
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	12-JUL-13
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	12-JUL-13
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	12-JUL-13
Boron (B)-Dissolved			<0.010		mg/L		0.01	12-JUL-13
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	12-JUL-13
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	12-JUL-13
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	12-JUL-13
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	12-JUL-13
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	12-JUL-13
Lithium (Li)-Dissolved			<0.00050		mg/L		0.0005	12-JUL-13
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	12-JUL-13
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	12-JUL-13
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	12-JUL-13
Potassium (K)-Dissolved			<0.050		mg/L		0.05	12-JUL-13
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	12-JUL-13
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	12-JUL-13
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	12-JUL-13
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	12-JUL-13
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	12-JUL-13
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	12-JUL-13
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	12-JUL-13
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	12-JUL-13
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	12-JUL-13
WG1705565-5 MS		**L1327470-1**						
Aluminum (Al)-Dissolved			115.3		%		70-130	15-JUL-13
Antimony (Sb)-Dissolved			105.8		%		70-130	15-JUL-13
Arsenic (As)-Dissolved			109.2		%		70-130	15-JUL-13
Barium (Ba)-Dissolved			N/A	MS-B	%		-	15-JUL-13
Beryllium (Be)-Dissolved			95.5		%		70-130	15-JUL-13
Boron (B)-Dissolved			101.4		%		70-130	15-JUL-13
Cadmium (Cd)-Dissolved			95.4		%		70-130	15-JUL-13
Chromium (Cr)-Dissolved			94.4		%		70-130	15-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2648701								
WG1705565-5 MS		**L1327470-1**						
Cobalt (Co)-Dissolved			92.7		%		70-130	15-JUL-13
Copper (Cu)-Dissolved			86.5		%		70-130	15-JUL-13
Lead (Pb)-Dissolved			90.1		%		70-130	15-JUL-13
Lithium (Li)-Dissolved			92.5		%		70-130	15-JUL-13
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	15-JUL-13
Molybdenum (Mo)-Dissolved			104.5		%		70-130	15-JUL-13
Nickel (Ni)-Dissolved			88.2		%		70-130	15-JUL-13
Potassium (K)-Dissolved			99.9		%		70-130	15-JUL-13
Selenium (Se)-Dissolved			108.7		%		70-130	15-JUL-13
Silver (Ag)-Dissolved			96.0		%		70-130	15-JUL-13
Sodium (Na)-Dissolved			N/A	MS-B	%		-	15-JUL-13
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	15-JUL-13
Thallium (Tl)-Dissolved			92.5		%		70-130	15-JUL-13
Titanium (Ti)-Dissolved			116.1		%		70-130	15-JUL-13
Uranium (U)-Dissolved			N/A	MS-B	%		-	15-JUL-13
Vanadium (V)-Dissolved			101.9		%		70-130	15-JUL-13
Zinc (Zn)-Dissolved			86.1		%		70-130	15-JUL-13
MET-DIS-ICP-VA	**Water**							
Batch R2648300								
WG1705565-2 CRM		**VA-HIGH-WATRM**						
Calcium (Ca)-Dissolved			101.3		%		80-120	11-JUL-13
Iron (Fe)-Dissolved			98.6		%		80-120	11-JUL-13
Magnesium (Mg)-Dissolved			101.8		%		80-120	11-JUL-13
Phosphorus (P)-Dissolved			100.3		%		80-120	11-JUL-13
Silicon (Si)-Dissolved			102.7		%		80-120	11-JUL-13
WG1705565-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	11-JUL-13
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	11-JUL-13
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	11-JUL-13
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	11-JUL-13
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	11-JUL-13
WG1705565-5 MS		**L1327470-1**						
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	11-JUL-13
Iron (Fe)-Dissolved			90.4		%		70-130	11-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA	**Water**							
Batch R2648300								
WG1705565-5 MS		**L1327470-1**						
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	11-JUL-13
Batch R2648635								
WG1705565-4 DUP		**L1327471-1**						
Calcium (Ca)-Dissolved		380	378		mg/L	0.6	20	12-JUL-13
Iron (Fe)-Dissolved		1370	1360		mg/L	0.7	20	12-JUL-13
Magnesium (Mg)-Dissolved		92.2	91.6		mg/L	0.7	20	12-JUL-13
Phosphorus (P)-Dissolved		<0.60	<0.60	RPD-NA	mg/L	N/A	20	12-JUL-13
Silicon (Si)-Dissolved		8.77	8.72		mg/L	0.6	20	12-JUL-13
NH3-F-VA	**Water**							
Batch R2652280								
WG1710045-2 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			100.5		%		85-115	18-JUL-13
WG1710045-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	18-JUL-13
WG1710045-4 MS		**L1327470-1**						
Ammonia, Total (as N)			96.0		%		75-125	18-JUL-13
PH-PCT-VA	**Water**							
Batch R2645814								
WG1702499-25 CRM		**VA-PH7-BUF**						
pH			7.02		pH		6.9-7.1	08-JUL-13
WG1702499-33 DUP		**L1327471-1**						
pH		5.20	5.16	J	pH	0.04	0.3	08-JUL-13
PO4-DO-COL-VA	**Water**							
Batch R2644322								
WG1701979-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			90.7		%		80-120	05-JUL-13
WG1701979-6 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			90.3		%		80-120	05-JUL-13
WG1701979-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	05-JUL-13
WG1701979-5 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	05-JUL-13
WG1701979-4 MS		**L1327471-2**						
Orthophosphate-Dissolved (as P)			93.9		%		70-130	05-JUL-13
S-DIS-ICP-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-DIS-ICP-VA	**Water**							
Batch R2648300								
WG1705565-2 CRM		**VA-HIGH-WATRM**						
Sulfur (S)-Dissolved			100.3		%		80-120	11-JUL-13
WG1705565-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	11-JUL-13
WG1705565-5 MS		**L1327470-1**						
Sulfur (S)-Dissolved			N/A	MS-B	%		-	11-JUL-13
Batch R2648635								
WG1705565-4 DUP		**L1327471-1**						
Sulfur (S)-Dissolved		1290	1280		mg/L	1.1	20	12-JUL-13
TDS-VA	**Water**							
Batch R2646769								
WG1703818-3 DUP		**L1327471-2**						
Total Dissolved Solids		3960	3840		mg/L	3.3	20	09-JUL-13
WG1703818-2 LCS								
Total Dissolved Solids			86.5		%		85-115	09-JUL-13
WG1703818-1 MB								
Total Dissolved Solids			<10		mg/L		10	09-JUL-13
TSS-LOW-VA	**Water**							
Batch R2645862								
WG1701996-2 LCS								
Total Suspended Solids			113.3		%		85-115	06-JUL-13
WG1701996-1 MB								
Total Suspended Solids			<1.0		mg/L		1	06-JUL-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 (Automated)							
	1	03-JUL-13 16:45	08-JUL-13 23:00	0.25	126	hours	EHTR-FM
	2	03-JUL-13 15:30	08-JUL-13 23:00	0.25	127	hours	EHTR-FM

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 L1327471 were received on 04-JUL-13 22:00.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

7/4/2013 1:27:15 PM

Project Name Faro Mine
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-015
Project FARO MINE SEEP SAMPLING 2013
Turnaround Time 10 Days
Shipping Date: 7/1/2013
COC Number: ALS07041301

	DATE	TIME	Matrix	(Ferrozine Method) Field Filtered Ferrous Iron	(SM2310) Acidity - Run Hot H2O2 if Fe >15ppm	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered For Metals Analyte List see Table 1	Ammonia (JEM/SM4500NH3) Ammonia	ASTM 7237 Free Cyanide	E245.7-Diss Field Filtered Dissolved Hg	SM2310_HP Acidity - Run Hot H2O2	SM4110B CL F NO2 NO3 and SO4	SM4500P ortho-Phosphate		Number of Containers	COMMENTS
Container:				125ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	250ml Glass	250ml Poly	250ml glass	125mL Poly	250ml Poly	500ml Poly	500ml Poly	500ml Poly			
Preservatives:				HCl, 4'C	4C	4C	4'C	4'C	H2SO4, pH<2, 4'C	HNO3, 4'C	H2SO4, pH<2, 4C	NaOH, 4'C	HNO3, 4'C	4C	4'C	4'C			
Filtered:				Field	NA	NA	NA	NA	Field	Field	NA	NA	Field	NA	NA	NA			
Holding Time:				180	14	14	7	7	28	180/28	28	14	180/28	14	3	3			
CH-RCTA-07_SESP13	7/3/2013	16:45	Water	X	X	X	X	X	X	X	X	X	X		X	X		8	
SRK-FD49_SESP13	7/3/2013	15:30	Water	X		X	X	X	X	X	X	X	X	X	X	X		8	
																	TOTAL NUMBER OF CONTAINERS	16	



L1327471-COFC

	Signatures	Date/Time
Approved by		
Sampled by		07/04/2013
Relinquished by		15:30
Received by		
Relinquished by		22:00 04-JUL-13
Received by		

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
PO: 604564 on Invoice Perform Lab Dup/MS on these samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 04-JUL-13
Report Date: 19-JUL-13 12:24 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1327472

Project P.O. #: 472645.06.AD.01.04.13 PO=604564
Job Reference: WASTE ROCK DUMP MW 2013 SW-014B
C of C Numbers: ALS07031301
Legal Site Desc:

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1327472-1				
	Description	Water				
	Sampled Date	02-JUL-13				
	Sampled Time	18:00				
	Client ID	CH12-014-MW011_GW0613				
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	2780				
	pH (pH)	7.46				
	Total Suspended Solids (mg/L)	3.9				
	Total Dissolved Solids (mg/L)	3930				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	49.2				
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	646				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<20				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<20				
	Alkalinity, Total (as CaCO3) (mg/L)	646				
	Ammonia, Total (as N) (mg/L)	0.0601				
	Chloride (Cl) (mg/L)	1.04				
	Fluoride (F) (mg/L)	0.113				
	Nitrate (as N) (mg/L)	7.58				
	Nitrite (as N) (mg/L)	<0.020 DLM				
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010				
	Sulfate (SO4) (mg/L)	2270				
Cyanides	Cyanide, Free (mg/L)	<0.0050				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	2.97				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	<0.0020 DLA				
	Antimony (Sb)-Dissolved (mg/L)	0.00055				
	Arsenic (As)-Dissolved (mg/L)	0.00028				
	Barium (Ba)-Dissolved (mg/L)	0.0187				
	Beryllium (Be)-Dissolved (mg/L)	<0.00020 DLA				
	Boron (B)-Dissolved (mg/L)	<0.020 DLA				
	Cadmium (Cd)-Dissolved (mg/L)	0.000127				
	Calcium (Ca)-Dissolved (mg/L)	472				
	Chromium (Cr)-Dissolved (mg/L)	0.00046				
	Cobalt (Co)-Dissolved (mg/L)	0.0197				
	Copper (Cu)-Dissolved (mg/L)	0.00130				
	Iron (Fe)-Dissolved (mg/L)	0.070				
	Ferrous Iron, Dissolved (mg/L)	0.076				
	Lead (Pb)-Dissolved (mg/L)	0.00016				
	Lithium (Li)-Dissolved (mg/L)	0.0356				
	Magnesium (Mg)-Dissolved (mg/L)	388				
	Manganese (Mn)-Dissolved (mg/L)	0.909				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1327472-1				
	Description	Water				
	Sampled Date	02-JUL-13				
	Sampled Time	18:00				
	Client ID	CH12-014-MW011_GW0613				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Mercury (Hg)-Dissolved (mg/L)	<0.000010				
	Molybdenum (Mo)-Dissolved (mg/L)	0.00062				
	Nickel (Ni)-Dissolved (mg/L)	0.171				
	Phosphorus (P)-Dissolved (mg/L)	<0.30				
	Potassium (K)-Dissolved (mg/L)	6.98				
	Selenium (Se)-Dissolved (mg/L)	0.00027				
	Silicon (Si)-Dissolved (mg/L)	4.30				
	Silicon (as SiO2)-Dissolved (mg/L)	9.20				
	Silver (Ag)-Dissolved (mg/L)	<0.000020 DLA				
	Sodium (Na)-Dissolved (mg/L)	10.5				
	Strontium (Sr)-Dissolved (mg/L)	1.18				
	Sulfur (S)-Dissolved (mg/L)	673				
	Thallium (Tl)-Dissolved (mg/L)	<0.000020 DLA				
	Titanium (Ti)-Dissolved (mg/L)	<0.020 DLA				
	Uranium (U)-Dissolved (mg/L)	0.0519				
	Vanadium (V)-Dissolved (mg/L)	<0.0020 DLA				
	Zinc (Zn)-Dissolved (mg/L)	1.75				

* 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	Phosphorus (P)-Dissolved	DLA	L1327472-1
Duplicate	Antimony (Sb)-Dissolved	DLA	L1327472-1
Duplicate	Beryllium (Be)-Dissolved	DLA	L1327472-1
Duplicate	Boron (B)-Dissolved	DLA	L1327472-1
Duplicate	Chromium (Cr)-Dissolved	DLA	L1327472-1
Duplicate	Copper (Cu)-Dissolved	DLA	L1327472-1
Duplicate	Molybdenum (Mo)-Dissolved	DLA	L1327472-1
Duplicate	Selenium (Se)-Dissolved	DLA	L1327472-1
Duplicate	Silver (Ag)-Dissolved	DLA	L1327472-1
Duplicate	Titanium (Ti)-Dissolved	DLA	L1327472-1
Duplicate	Vanadium (V)-Dissolved	DLA	L1327472-1
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1327472-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1327472-1
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1327472-1
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1327472-1
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1327472-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1327472-1
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1327472-1
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1327472-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
DLM	Detection Limit Adjusted For 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**
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-SCR-VA	Water	Alkalinity by colour or titration	EPA 310.2 OR APHA 2320

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
OR
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,

Reference Information

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-DOC-VA Water Dissolved 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)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

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.

FE2-D-COL-VA Water Diss. Ferrous Iron in Water by Colour James W. Ball et al (1999)

This analysis is carried out using procedures adapted from "A New Method for the Direct Determination of Dissolved Iron Concentration in Acid Mine Waters" published by James W. Ball et al (1999). The procedures involves preliminary sample filtration (0.1um filter) and Ferrous Iron is determined using the "FerroZine" colorimteric method.

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).

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).

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.

PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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.

SIO2-D-CALC-VA Water Dissolved Silicon (reported as Silica) CALCULATION

Dissolved Silicon (as SiO2) is a calculated parameter. Dissolved Silicon (as SiO2 mg/L) = 2.139 x Dissolved Silicon (mg/L).

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-LOW-VA Water Total Suspended Solids by Grav. (1 mg/L) APHA 2540 Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** 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:

ALS07031301

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

Workorder: L1327472 Report Date: 19-JUL-13

Client: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-PCT-VA	**Water**							
Batch R2645814								
WG1702499-9 CRM		**VA-ACY-CONTROL**						
Acidity (as CaCO3)			101.2		%		85-115	08-JUL-13
WG1702499-34 DUP		**L1327472-1**						
Acidity (as CaCO3)		49.2	47.9		mg/L	2.6	20	08-JUL-13
ALK-SCR-VA	**Water**							
Batch R2644521								
WG1702152-2 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			97.7		%		85-115	06-JUL-13
WG1702152-5 CRM		**VA-ALKM-CONTROL**						
Alkalinity, Total (as CaCO3)			96.2		%		85-115	06-JUL-13
WG1702152-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	06-JUL-13
WG1702152-4 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	06-JUL-13
WG1702152-6 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	06-JUL-13
ANIONS-CL-IC-WR	**Water**							
Batch R2647486								
WG1705229-2 LCS								
Chloride (Cl)			95.1		%		85-115	05-JUL-13
WG1705229-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	05-JUL-13
ANIONS-F-IC-WR	**Water**							
Batch R2647486								
WG1705229-2 LCS								
Fluoride (F)			96.2		%		85-115	05-JUL-13
WG1705229-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	05-JUL-13
ANIONS-NO2-IC-WR	**Water**							
Batch R2647486								
WG1705229-2 LCS								
Nitrite (as N)			95.7		%		85-115	05-JUL-13
WG1705229-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	05-JUL-13
ANIONS-NO3-IC-WR	**Water**							

Quality Control Report

Workorder: L1327472 Report Date: 19-JUL-13

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-NO3-IC-WR	**Water**							
Batch R2647486								
WG1705229-2 LCS								
Nitrate (as N)			96.4		%		85-115	05-JUL-13
WG1705229-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	05-JUL-13
ANIONS-SO4-IC-WR	**Water**							
Batch R2647486								
WG1705229-2 LCS								
Sulfate (SO4)			98.2		%		85-115	05-JUL-13
WG1705229-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	05-JUL-13
CARBONS-DOC-VA	**Water**							
Batch R2650868								
WG1708518-4 LCS								
Dissolved Organic Carbon			96.0		%		80-120	16-JUL-13
WG1708518-3 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	16-JUL-13
WG1708518-2 MS		**L1327472-1**						
Dissolved Organic Carbon			99.2		%		70-130	16-JUL-13
CN-FREE-CFA-VA	**Water**							
Batch R2650974								
WG1707954-3 DUP		**L1327472-1**						
Cyanide, Free		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	16-JUL-13
WG1707954-2 LCS								
Cyanide, Free			100.2		%		80-120	16-JUL-13
WG1707954-1 MB								
Cyanide, Free			<0.0050		mg/L		0.005	16-JUL-13
WG1707954-4 MS		**L1327472-1**						
Cyanide, Free			98.7		%		70-130	16-JUL-13
FE2-D-COL-VA	**Water**							
Batch R2646464								
WG1702636-3 DUP		**L1327472-1**						
Ferrous Iron, Dissolved		0.076	0.074		mg/L	2.4	20	08-JUL-13
WG1702636-2 LCS								
Ferrous Iron, Dissolved			102.8		%		80-120	08-JUL-13
WG1702636-1 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	08-JUL-13
WG1702636-4 MS		**L1327472-1**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FE2-D-COL-VA	**Water**							
Batch R2646464								
WG1702636-4 MS		**L1327472-1**						
Ferrous Iron, Dissolved			101.7		%		70-130	08-JUL-13
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2648707								
WG1705565-3 LCS								
Mercury (Hg)-Dissolved			84.8		%		80-120	12-JUL-13
WG1705565-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	12-JUL-13
WG1705565-5 MS		**L1327470-1**						
Mercury (Hg)-Dissolved			85.9		%		70-130	12-JUL-13
MET-D-CCMS-VA	**Water**							
Batch R2648701								
WG1705565-2 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Dissolved			102.6		%		80-120	12-JUL-13
Antimony (Sb)-Dissolved			102.2		%		80-120	12-JUL-13
Arsenic (As)-Dissolved			102.3		%		80-120	12-JUL-13
Barium (Ba)-Dissolved			100.4		%		80-120	12-JUL-13
Beryllium (Be)-Dissolved			95.5		%		80-120	12-JUL-13
Boron (B)-Dissolved			92.4		%		80-120	12-JUL-13
Cadmium (Cd)-Dissolved			102.8		%		80-120	12-JUL-13
Chromium (Cr)-Dissolved			103.8		%		80-120	12-JUL-13
Cobalt (Co)-Dissolved			99.9		%		80-120	12-JUL-13
Copper (Cu)-Dissolved			98.8		%		80-120	12-JUL-13
Lead (Pb)-Dissolved			100.6		%		80-120	12-JUL-13
Lithium (Li)-Dissolved			95.9		%		80-120	12-JUL-13
Manganese (Mn)-Dissolved			100.3		%		80-120	12-JUL-13
Molybdenum (Mo)-Dissolved			98.1		%		80-120	12-JUL-13
Nickel (Ni)-Dissolved			98.8		%		80-120	12-JUL-13
Potassium (K)-Dissolved			105.2		%		80-120	12-JUL-13
Selenium (Se)-Dissolved			99.4		%		80-120	12-JUL-13
Silver (Ag)-Dissolved			99.1		%		80-120	12-JUL-13
Sodium (Na)-Dissolved			103.5		%		80-120	12-JUL-13
Strontium (Sr)-Dissolved			95.9		%		80-120	12-JUL-13
Thallium (Tl)-Dissolved			99.6		%		80-120	12-JUL-13
Titanium (Ti)-Dissolved			92.6		%		80-120	12-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2648701								
WG1705565-2 CRM		**VA-HIGH-WATRM**						
Uranium (U)-Dissolved			101.5		%		80-120	12-JUL-13
Vanadium (V)-Dissolved			102.7		%		80-120	12-JUL-13
Zinc (Zn)-Dissolved			97.0		%		80-120	12-JUL-13
WG1705565-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	12-JUL-13
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	12-JUL-13
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	12-JUL-13
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	12-JUL-13
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	12-JUL-13
Boron (B)-Dissolved			<0.010		mg/L		0.01	12-JUL-13
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	12-JUL-13
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	12-JUL-13
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	12-JUL-13
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	12-JUL-13
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	12-JUL-13
Lithium (Li)-Dissolved			<0.00050		mg/L		0.0005	12-JUL-13
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	12-JUL-13
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	12-JUL-13
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	12-JUL-13
Potassium (K)-Dissolved			<0.050		mg/L		0.05	12-JUL-13
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	12-JUL-13
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	12-JUL-13
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	12-JUL-13
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	12-JUL-13
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	12-JUL-13
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	12-JUL-13
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	12-JUL-13
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	12-JUL-13
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	12-JUL-13
WG1705565-5 MS		**L1327470-1**						
Aluminum (Al)-Dissolved			115.3		%		70-130	15-JUL-13
Antimony (Sb)-Dissolved			105.8		%		70-130	15-JUL-13
Arsenic (As)-Dissolved			109.2		%		70-130	15-JUL-13
Barium (Ba)-Dissolved			N/A	MS-B	%		-	15-JUL-13
Beryllium (Be)-Dissolved			95.5		%		70-130	15-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2648701								
WG1705565-5 MS		**L1327470-1**						
Boron (B)-Dissolved			101.4		%		70-130	15-JUL-13
Cadmium (Cd)-Dissolved			95.4		%		70-130	15-JUL-13
Chromium (Cr)-Dissolved			94.4		%		70-130	15-JUL-13
Cobalt (Co)-Dissolved			92.7		%		70-130	15-JUL-13
Copper (Cu)-Dissolved			86.5		%		70-130	15-JUL-13
Lead (Pb)-Dissolved			90.1		%		70-130	15-JUL-13
Lithium (Li)-Dissolved			92.5		%		70-130	15-JUL-13
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	15-JUL-13
Molybdenum (Mo)-Dissolved			104.5		%		70-130	15-JUL-13
Nickel (Ni)-Dissolved			88.2		%		70-130	15-JUL-13
Potassium (K)-Dissolved			99.9		%		70-130	15-JUL-13
Selenium (Se)-Dissolved			108.7		%		70-130	15-JUL-13
Silver (Ag)-Dissolved			96.0		%		70-130	15-JUL-13
Sodium (Na)-Dissolved			N/A	MS-B	%		-	15-JUL-13
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	15-JUL-13
Thallium (Tl)-Dissolved			92.5		%		70-130	15-JUL-13
Titanium (Ti)-Dissolved			116.1		%		70-130	15-JUL-13
Uranium (U)-Dissolved			N/A	MS-B	%		-	15-JUL-13
Vanadium (V)-Dissolved			101.9		%		70-130	15-JUL-13
Zinc (Zn)-Dissolved			86.1		%		70-130	15-JUL-13
MET-DIS-ICP-VA	**Water**							
Batch R2648300								
WG1705565-2 CRM		**VA-HIGH-WATRM**						
Calcium (Ca)-Dissolved			101.3		%		80-120	11-JUL-13
Iron (Fe)-Dissolved			98.6		%		80-120	11-JUL-13
Magnesium (Mg)-Dissolved			101.8		%		80-120	11-JUL-13
Phosphorus (P)-Dissolved			100.3		%		80-120	11-JUL-13
Silicon (Si)-Dissolved			102.7		%		80-120	11-JUL-13
WG1705565-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	11-JUL-13
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	11-JUL-13
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	11-JUL-13
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	11-JUL-13
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	11-JUL-13
WG1705565-5 MS		**L1327470-1**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA	**Water**							
Batch R2648300								
WG1705565-5 MS		**L1327470-1**						
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	11-JUL-13
Iron (Fe)-Dissolved			90.4		%		70-130	11-JUL-13
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	11-JUL-13
NH3-F-VA	**Water**							
Batch R2652280								
WG1710045-2 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			100.5		%		85-115	18-JUL-13
WG1710045-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	18-JUL-13
WG1710045-4 MS		**L1327470-1**						
Ammonia, Total (as N)			96.0		%		75-125	18-JUL-13
PH-PCT-VA	**Water**							
Batch R2645814								
WG1702499-25 CRM		**VA-PH7-BUF**						
pH			7.02		pH		6.9-7.1	08-JUL-13
WG1702499-34 DUP		**L1327472-1**						
pH		7.46	7.48	J	pH	0.02	0.3	08-JUL-13
PO4-DO-COL-VA	**Water**							
Batch R2644322								
WG1701979-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			90.7		%		80-120	05-JUL-13
WG1701979-6 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			90.3		%		80-120	05-JUL-13
WG1701979-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	05-JUL-13
WG1701979-5 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	05-JUL-13
WG1701979-4 MS		**L1327471-2**						
Orthophosphate-Dissolved (as P)			93.9		%		70-130	05-JUL-13
S-DIS-ICP-VA	**Water**							
Batch R2648300								
WG1705565-2 CRM		**VA-HIGH-WATRM**						
Sulfur (S)-Dissolved			100.3		%		80-120	11-JUL-13
WG1705565-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	11-JUL-13
WG1705565-5 MS		**L1327470-1**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-DIS-ICP-VA	**Water**							
Batch R2648300								
WG1705565-5 MS		**L1327470-1**						
Sulfur (S)-Dissolved			N/A	MS-B	%		-	11-JUL-13
TDS-VA	**Water**							
Batch R2646766								
WG1703834-3 DUP		**L1327472-1**						
Total Dissolved Solids		3930	4060		mg/L	3.3	20	09-JUL-13
WG1703834-2 LCS								
Total Dissolved Solids			91.3		%		85-115	09-JUL-13
WG1703834-1 MB								
Total Dissolved Solids			<10		mg/L		10	09-JUL-13
TSS-LOW-VA	**Water**							
Batch R2645101								
WG1701998-2 LCS								
Total Suspended Solids			111.9		%		85-115	06-JUL-13
WG1701998-1 MB								
Total Suspended Solids			<1.0		mg/L		1	06-JUL-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	02-JUL-13 18:00	08-JUL-13 23:00	0.25	149	hours	EHTR-FM

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 L1327472 were received on 04-JUL-13 22:00.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

7/3/2013 1:34:28 PM

Project Name Faro Mine
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-014
Project WASTE ROCK DUMP MW 2013 SW-014B
Turnaround Time 10 Days
Shipping Date: 7/3/2013
COC Number: ALS07031301

	DATE	TIME	Matrix	Container:	125ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	250ml Glass	250ml Poly	250ml glass	125mL Poly	250ml Poly	500ml Poly	500ml Poly		Number of Containers	COMMENTS
				Preservatives:	HCl, 4'C	4C	4C	4'C	4'C	H2SO4, pH<2, 4'C	HNO3, 4'C	H2SO4, pH<2, 4C	NaOH, 4'C	HNO3, 4'C	4'C	4'C			
				Filtered:	Field	NA	NA	NA	NA	Field	Field	NA	NA	Field	NA	NA			
				Holding Time:	180	14	14	7	7	28	180/28	28	14	180/28	3	3			
					(Ferrozine Method) Field Filtered Ferrous Iron	(SM2310) Acidity - Run Hot H2O2 if Fe >15ppm	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered For Metals Analyte List see Table 1	Ammonia (JEM/SM4500NH3) Ammonia	ASTM 7237 Free Cyanide	E245.7-Diss Field Filtered Dissolved Hg	SM4110B CL F NO2 NO3 and SO4	SM4500P ortho-Phosphate			
CH12-014-MW011_GW0613	7/2/2013	18:00	Water		X	X	X	X	X	X	X	X	X	X	X	X		8	
																	TOTAL NUMBER OF CONTAINERS	8	

L1327472-COFC

Signatures	Date/Time
Approved by	
Sampled by	07/03/2013
Relinquished by	13:44
Received by	
Relinquished by	1.1
Received by	22:00 04-Jul-13

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Perform Lab Dup/MS on these samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 10-JUL-13
Report Date: 24-JUL-13 17:09 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1330009

Project P.O. #: 472645.06.AD.01.04.13, PO=604564
Job Reference: WASTE ROCK DUMP MW 2013 SW-014B
C of C Numbers: ALS07081301
Legal Site Desc:

Amber Springer
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1330009-1				
	Description	Water				
	Sampled Date	08-JUL-13				
	Sampled Time	17:25				
	Client ID	CH12-014-MW013_GW0613				
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	4220				
	pH (pH)	7.08				
	Total Suspended Solids (mg/L)	31.0				
	Total Dissolved Solids (mg/L)	6530				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	181				
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	1190				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<20				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<20				
	Alkalinity, Total (as CaCO3) (mg/L)	1190				
	Ammonia, Total (as N) (mg/L)	0.0701				
	Chloride (Cl) (mg/L)	<10 DLA				
	Fluoride (F) (mg/L)	<0.40 DLA				
	Nitrate (as N) (mg/L)	<0.10 DLA				
	Nitrite (as N) (mg/L)	<0.020 DLA				
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010				
	Sulfate (SO4) (mg/L)	3560				
Cyanides	Cyanide, Free (mg/L)	<0.0050				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	12.4				
Dissolved Metals	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	0.0123				
	Antimony (Sb)-Dissolved (mg/L)	<0.00050 DLA				
	Arsenic (As)-Dissolved (mg/L)	0.00122				
	Barium (Ba)-Dissolved (mg/L)	0.0168				
	Beryllium (Be)-Dissolved (mg/L)	<0.00050 DLA				
	Boron (B)-Dissolved (mg/L)	<0.050 DLA				
	Cadmium (Cd)-Dissolved (mg/L)	0.00592				
	Calcium (Ca)-Dissolved (mg/L)	703				
	Chromium (Cr)-Dissolved (mg/L)	<0.00050 DLA				
	Cobalt (Co)-Dissolved (mg/L)	0.0420				
	Copper (Cu)-Dissolved (mg/L)	0.0058				
	Iron (Fe)-Dissolved (mg/L)	6.64				
	Ferrous Iron, Dissolved (mg/L)	7.33				
	Lead (Pb)-Dissolved (mg/L)	0.0105				
	Lithium (Li)-Dissolved (mg/L)	0.0330				
	Magnesium (Mg)-Dissolved (mg/L)	599				
	Manganese (Mn)-Dissolved (mg/L)	11.3				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1330009-1				
	Description	Water				
	Sampled Date	08-JUL-13				
	Sampled Time	17:25				
	Client ID	CH12-014-MW013_GW0613				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Mercury (Hg)-Dissolved (mg/L)	<0.000010				
	Molybdenum (Mo)-Dissolved (mg/L)	0.00156				
	Nickel (Ni)-Dissolved (mg/L)	0.113				
	Phosphorus (P)-Dissolved (mg/L)	<0.30				
	Potassium (K)-Dissolved (mg/L)	3.40				
	Selenium (Se)-Dissolved (mg/L)	<0.00050 DLA				
	Silicon (Si)-Dissolved (mg/L)	11.5				
	Silicon (as SiO2)-Dissolved (mg/L)	24.7				
	Silver (Ag)-Dissolved (mg/L)	<0.000050 DLA				
	Sodium (Na)-Dissolved (mg/L)	16.2				
	Strontium (Sr)-Dissolved (mg/L)	2.07				
	Sulfur (S)-Dissolved (mg/L)	972				
	Thallium (Tl)-Dissolved (mg/L)	0.000175				
	Titanium (Ti)-Dissolved (mg/L)	<0.050 DLA				
	Uranium (U)-Dissolved (mg/L)	0.0824				
	Vanadium (V)-Dissolved (mg/L)	<0.0050 DLA				
	Zinc (Zn)-Dissolved (mg/L)	8.15				

* 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	L1330009-1
Duplicate	Beryllium (Be)-Dissolved	DLA	L1330009-1
Duplicate	Boron (B)-Dissolved	DLA	L1330009-1
Duplicate	Chromium (Cr)-Dissolved	DLA	L1330009-1
Duplicate	Selenium (Se)-Dissolved	DLA	L1330009-1
Duplicate	Silver (Ag)-Dissolved	DLA	L1330009-1
Duplicate	Titanium (Ti)-Dissolved	DLA	L1330009-1
Duplicate	Vanadium (V)-Dissolved	DLA	L1330009-1
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1330009-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1330009-1
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1330009-1
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1330009-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1330009-1
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1330009-1
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1330009-1
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1330009-1

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.

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-SCR-VA	Water	Alkalinity by colour or titration	EPA 310.2 OR APHA 2320

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
OR
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.

Reference Information

CARBONS-DOC-VA Water Dissolved 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)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

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.

FE2-D-COL-VA Water Diss. Ferrous Iron in Water by Colour James W. Ball et al (1999)

This analysis is carried out using procedures adapted from "A New Method for the Direct Determination of Dissolved Iron Concentration in Acid Mine Waters" published by James W. Ball et al (1999). The procedures involves preliminary sample filtration (0.1um filter) and Ferrous Iron is determined using the "FerroZine" colorimteric method.

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).

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).

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.

PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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.

SIO2-D-CALC-VA Water Dissolved Silicon (reported as Silica) CALCULATION

Dissolved Silicon (as SiO2) is a calculated parameter. Dissolved Silicon (as SiO2 mg/L) = 2.139 x Dissolved Silicon (mg/L).

Reference Information

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-LOW-VA	Water	Total Suspended Solids by Grav. (1 mg/L)	APHA 2540 Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** 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:

ALS07081301

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-PCT-VA	**Water**							
Batch R2649419								
WG1705761-9 CRM		**VA-ACY-CONTROL**						
Acidity (as CaCO3)			96.2		%		85-115	12-JUL-13
WG1705761-33 DUP		**L1330009-1**						
Acidity (as CaCO3)		181	158		mg/L	14	20	12-JUL-13
WG1705761-34 MB								
Acidity (as CaCO3)			<1.0		mg/L		1	12-JUL-13
ALK-SCR-VA	**Water**							
Batch R2648735								
WG1705938-2 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			95.3		%		85-115	12-JUL-13
WG1705938-5 CRM		**VA-ALKM-CONTROL**						
Alkalinity, Total (as CaCO3)			98.5		%		85-115	12-JUL-13
WG1705938-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	12-JUL-13
WG1705938-4 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	12-JUL-13
WG1705938-7 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	12-JUL-13
ANIONS-CL-IC-WR	**Water**							
Batch R2650132								
WG1707934-2 LCS								
Chloride (Cl)			99.7		%		85-115	11-JUL-13
WG1707934-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	11-JUL-13
ANIONS-F-IC-WR	**Water**							
Batch R2650132								
WG1707934-2 LCS								
Fluoride (F)			99.8		%		85-115	11-JUL-13
WG1707934-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	11-JUL-13
ANIONS-NO2-IC-WR	**Water**							
Batch R2650132								
WG1707934-2 LCS								
Nitrite (as N)			100.2		%		85-115	11-JUL-13
WG1707934-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	11-JUL-13
ANIONS-NO3-IC-WR	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-NO3-IC-WR	**Water**							
Batch R2650132								
WG1707934-2 LCS								
Nitrate (as N)			100.8		%		85-115	11-JUL-13
WG1707934-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	11-JUL-13
ANIONS-SO4-IC-WR	**Water**							
Batch R2650132								
WG1707934-2 LCS								
Sulfate (SO4)			103.1		%		85-115	11-JUL-13
WG1707934-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	11-JUL-13
CARBONS-DOC-VA	**Water**							
Batch R2655630								
WG1713624-2 LCS								
Dissolved Organic Carbon			98.2		%		80-120	19-JUL-13
WG1713624-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	19-JUL-13
CN-FREE-CFA-VA	**Water**							
Batch R2654512								
WG1711937-3 DUP		**L1330009-1**						
Cyanide, Free		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	22-JUL-13
WG1711937-2 LCS								
Cyanide, Free			105.5		%		80-120	22-JUL-13
WG1711937-1 MB								
Cyanide, Free			<0.0050		mg/L		0.005	22-JUL-13
WG1711937-4 MS		**L1330009-1**						
Cyanide, Free			106.2		%		70-130	22-JUL-13
FE2-D-COL-VA	**Water**							
Batch R2650252								
WG1707118-3 DUP		**L1330009-1**						
Ferrous Iron, Dissolved		7.33	7.23		mg/L	1.3	20	15-JUL-13
WG1707118-2 LCS								
Ferrous Iron, Dissolved			103.7		%		80-120	15-JUL-13
WG1707118-1 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	15-JUL-13
WG1707118-4 MS		**L1330009-1**						
Ferrous Iron, Dissolved			102.8		%		70-130	15-JUL-13
HG-DIS-LOW-CVAFS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2649671								
WG1707283-3 LCS								
Mercury (Hg)-Dissolved			101.0		%		80-120	15-JUL-13
Batch R2650372								
WG1707283-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	16-JUL-13
Batch R2651235								
WG1707283-4 DUP		**L1330009-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	17-JUL-13
WG1707283-5 MS		**L1330009-1**						
Mercury (Hg)-Dissolved			73.8		%		70-130	17-JUL-13
MET-D-CCMS-VA	**Water**							
Batch R2650471								
WG1707283-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	16-JUL-13
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	16-JUL-13
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	16-JUL-13
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	16-JUL-13
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	16-JUL-13
Boron (B)-Dissolved			<0.010		mg/L		0.01	16-JUL-13
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	16-JUL-13
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	16-JUL-13
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	16-JUL-13
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	16-JUL-13
Lithium (Li)-Dissolved			<0.00050		mg/L		0.0005	16-JUL-13
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	16-JUL-13
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	16-JUL-13
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	16-JUL-13
Potassium (K)-Dissolved			<0.050		mg/L		0.05	16-JUL-13
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	16-JUL-13
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	16-JUL-13
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	16-JUL-13
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	16-JUL-13
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	16-JUL-13
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	16-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2650471								
WG1707283-1 MB								
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	16-JUL-13
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	16-JUL-13
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	16-JUL-13
Batch R2650990								
WG1707283-1 MB								
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	16-JUL-13
Batch R2651198								
WG1707283-2 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Dissolved			96.6		%		80-120	16-JUL-13
Antimony (Sb)-Dissolved			101.7		%		80-120	16-JUL-13
Arsenic (As)-Dissolved			96.9		%		80-120	16-JUL-13
Barium (Ba)-Dissolved			96.2		%		80-120	16-JUL-13
Beryllium (Be)-Dissolved			98.1		%		80-120	16-JUL-13
Boron (B)-Dissolved			91.7		%		80-120	16-JUL-13
Cadmium (Cd)-Dissolved			99.5		%		80-120	16-JUL-13
Chromium (Cr)-Dissolved			95.0		%		80-120	16-JUL-13
Cobalt (Co)-Dissolved			93.9		%		80-120	16-JUL-13
Copper (Cu)-Dissolved			96.9		%		80-120	16-JUL-13
Lead (Pb)-Dissolved			101.2		%		80-120	16-JUL-13
Lithium (Li)-Dissolved			101.7		%		80-120	16-JUL-13
Manganese (Mn)-Dissolved			96.1		%		80-120	16-JUL-13
Molybdenum (Mo)-Dissolved			99.3		%		80-120	16-JUL-13
Nickel (Ni)-Dissolved			89.2		%		80-120	16-JUL-13
Potassium (K)-Dissolved			96.2		%		80-120	16-JUL-13
Selenium (Se)-Dissolved			94.7		%		80-120	16-JUL-13
Silver (Ag)-Dissolved			101.9		%		80-120	16-JUL-13
Sodium (Na)-Dissolved			98.9		%		80-120	16-JUL-13
Strontium (Sr)-Dissolved			98.2		%		80-120	16-JUL-13
Thallium (Tl)-Dissolved			101.2		%		80-120	16-JUL-13
Titanium (Ti)-Dissolved			99.3		%		80-120	16-JUL-13
Uranium (U)-Dissolved			100.5		%		80-120	16-JUL-13
Vanadium (V)-Dissolved			96.2		%		80-120	16-JUL-13
Zinc (Zn)-Dissolved			94.0		%		80-120	16-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2652670								
WG1707283-4 DUP		**L1330009-1**						
Aluminum (Al)-Dissolved		0.0123	0.0112		mg/L	9.5	20	18-JUL-13
Antimony (Sb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	18-JUL-13
Arsenic (As)-Dissolved		0.00122	0.00113		mg/L	7.4	20	18-JUL-13
Barium (Ba)-Dissolved		0.0168	0.0166		mg/L	1.2	20	18-JUL-13
Beryllium (Be)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	18-JUL-13
Boron (B)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	18-JUL-13
Cadmium (Cd)-Dissolved		0.00592	0.00599		mg/L	1.1	20	18-JUL-13
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	18-JUL-13
Cobalt (Co)-Dissolved		0.0420	0.0426		mg/L	1.4	20	18-JUL-13
Copper (Cu)-Dissolved		0.0058	0.0057		mg/L	1.3	20	18-JUL-13
Lead (Pb)-Dissolved		0.0105	0.0105		mg/L	0.2	20	18-JUL-13
Lithium (Li)-Dissolved		0.0330	0.0322		mg/L	2.3	20	18-JUL-13
Manganese (Mn)-Dissolved		11.3	11.4		mg/L	0.4	20	18-JUL-13
Molybdenum (Mo)-Dissolved		0.00156	0.00155		mg/L	1.0	20	18-JUL-13
Nickel (Ni)-Dissolved		0.113	0.113		mg/L	0.2	20	18-JUL-13
Potassium (K)-Dissolved		3.40	3.37		mg/L	1.0	20	18-JUL-13
Selenium (Se)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	18-JUL-13
Silver (Ag)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	18-JUL-13
Sodium (Na)-Dissolved		16.2	16.6		mg/L	2.0	20	18-JUL-13
Strontium (Sr)-Dissolved		2.07	2.03		mg/L	1.8	20	18-JUL-13
Thallium (Tl)-Dissolved		0.000175	0.000175		mg/L	0.1	20	18-JUL-13
Titanium (Ti)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	18-JUL-13
Uranium (U)-Dissolved		0.0824	0.0804		mg/L	2.5	20	18-JUL-13
Vanadium (V)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	18-JUL-13
Zinc (Zn)-Dissolved		8.15	8.39		mg/L	2.9	20	18-JUL-13
WG1707283-5 MS		**L1330009-1**						
Aluminum (Al)-Dissolved			95.6		%		70-130	18-JUL-13
Antimony (Sb)-Dissolved			107.5		%		70-130	18-JUL-13
Arsenic (As)-Dissolved			108.1		%		70-130	18-JUL-13
Barium (Ba)-Dissolved			98.4		%		70-130	18-JUL-13
Beryllium (Be)-Dissolved			93.0		%		70-130	18-JUL-13
Boron (B)-Dissolved			94.5		%		70-130	18-JUL-13
Cadmium (Cd)-Dissolved			95.8		%		70-130	18-JUL-13
Chromium (Cr)-Dissolved			95.7		%		70-130	18-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2652670								
WG1707283-5 MS		**L1330009-1**						
Cobalt (Co)-Dissolved			89.8		%		70-130	18-JUL-13
Copper (Cu)-Dissolved			87.9		%		70-130	18-JUL-13
Lead (Pb)-Dissolved			90.5		%		70-130	18-JUL-13
Lithium (Li)-Dissolved			96.0		%		70-130	18-JUL-13
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	18-JUL-13
Molybdenum (Mo)-Dissolved			109.3		%		70-130	18-JUL-13
Nickel (Ni)-Dissolved			87.1		%		70-130	18-JUL-13
Potassium (K)-Dissolved			91.8		%		70-130	18-JUL-13
Selenium (Se)-Dissolved			111.8		%		70-130	18-JUL-13
Silver (Ag)-Dissolved			95.0		%		70-130	18-JUL-13
Sodium (Na)-Dissolved			N/A	MS-B	%		-	18-JUL-13
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	18-JUL-13
Thallium (Tl)-Dissolved			92.1		%		70-130	18-JUL-13
Titanium (Ti)-Dissolved			116.8		%		70-130	18-JUL-13
Uranium (U)-Dissolved			N/A	MS-B	%		-	18-JUL-13
Vanadium (V)-Dissolved			98.6		%		70-130	18-JUL-13
Zinc (Zn)-Dissolved			N/A	MS-B	%		-	18-JUL-13
MET-DIS-ICP-VA	**Water**							
Batch R2650127								
WG1707283-2 CRM		**VA-HIGH-WATRM**						
Calcium (Ca)-Dissolved			100.9		%		80-120	15-JUL-13
Iron (Fe)-Dissolved			96.8		%		80-120	15-JUL-13
Magnesium (Mg)-Dissolved			97.8		%		80-120	15-JUL-13
Phosphorus (P)-Dissolved			100.3		%		80-120	15-JUL-13
Silicon (Si)-Dissolved			101.8		%		80-120	15-JUL-13
WG1707283-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	15-JUL-13
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	15-JUL-13
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	15-JUL-13
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	15-JUL-13
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	15-JUL-13
Batch R2650458								
WG1707283-4 DUP		**L1330009-1**						
Calcium (Ca)-Dissolved		703	705		mg/L	0.3	20	16-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA	**Water**							
Batch R2650458								
WG1707283-4 DUP		**L1330009-1**						
Iron (Fe)-Dissolved		6.64	6.64		mg/L	0.0	20	16-JUL-13
Magnesium (Mg)-Dissolved		599	599		mg/L	0.0	20	16-JUL-13
Phosphorus (P)-Dissolved		<0.30	<0.30	RPD-NA	mg/L	N/A	20	16-JUL-13
Silicon (Si)-Dissolved		11.5	11.6		mg/L	0.4	20	16-JUL-13
WG1707283-5 MS		**L1330009-1**						
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	16-JUL-13
Iron (Fe)-Dissolved			94.9		%		70-130	16-JUL-13
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	16-JUL-13
NH3-F-VA	**Water**							
Batch R2654661								
WG1712352-2 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			97.0		%		85-115	23-JUL-13
WG1712352-3 DUP		**L1330009-1**						
Ammonia, Total (as N)		0.0701	0.0669		mg/L	4.6	20	23-JUL-13
WG1712352-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	23-JUL-13
WG1712352-4 MS		**L1330009-1**						
Ammonia, Total (as N)			95.1		%		75-125	23-JUL-13
PH-PCT-VA	**Water**							
Batch R2649419								
WG1705761-31 CRM		**VA-PH7-BUF**						
pH			7.04		pH		6.9-7.1	12-JUL-13
WG1705761-33 DUP		**L1330009-1**						
pH		7.08	7.15	J	pH	0.07	0.3	12-JUL-13
PO4-DO-COL-VA	**Water**							
Batch R2648015								
WG1705606-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			87.4		%		80-120	11-JUL-13
WG1705606-6 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			85.2		%		80-120	11-JUL-13
WG1705606-3 DUP		**L1330009-1**						
Orthophosphate-Dissolved (as P)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	11-JUL-13
WG1705606-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	11-JUL-13
WG1705606-5 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	11-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4-DO-COL-VA	**Water**							
Batch R2648015								
WG1705606-4 MS		**L1330009-1**						
Orthophosphate-Dissolved (as P)			89.3		%		70-130	11-JUL-13
S-DIS-ICP-VA	**Water**							
Batch R2650127								
WG1707283-2 CRM		**VA-HIGH-WATRM**						
Sulfur (S)-Dissolved			106.3		%		80-120	15-JUL-13
WG1707283-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	15-JUL-13
Batch R2650458								
WG1707283-4 DUP		**L1330009-1**						
Sulfur (S)-Dissolved		972	972		mg/L	0.0	20	16-JUL-13
WG1707283-5 MS		**L1330009-1**						
Sulfur (S)-Dissolved			N/A	MS-B	%		-	16-JUL-13
TDS-VA	**Water**							
Batch R2650351								
WG1707436-3 DUP		**L1330009-1**						
Total Dissolved Solids		6530	5660		mg/L	14	20	15-JUL-13
WG1707436-2 LCS								
Total Dissolved Solids			104.0		%		85-115	15-JUL-13
WG1707436-1 MB								
Total Dissolved Solids			<10		mg/L		10	15-JUL-13
TSS-LOW-VA	**Water**							
Batch R2650385								
WG1707513-2 LCS								
Total Suspended Solids			86.7		%		85-115	15-JUL-13
WG1707513-1 MB								
Total Suspended Solids			<1.0		mg/L		1	15-JUL-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	08-JUL-13 17:25	12-JUL-13 23:00	0.25	102	hours	EHTR-FM

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 L1330009 were received on 10-JUL-13 09:55.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

7/9/2013 9:32:45 AM

Project Name Faro Mine
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-014
Project WASTE ROCK DUMP MW 2013 SW-014B
Turnaround Time 3 Days
Shipping Date: 7/9/2013
COC Number: ALS07081301

				Container:	500ml Poly	125mL Poly	500ml Poly	250ml Poly	125ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	250ml Glass	250ml Poly	250ml glass			
				Preservatives:	4'C	NaOH, 4'C	4'C	HNO3, 4'C	HCl, 4'C	4C	4C	4'C	4'C	H2SO4, pH<2, 4'C	HNO3, 4'C	H2SO4, pH<2, 4C			
				Filtered:	NA	NA	NA	Field	Field	NA	NA	NA	NA	Field	Field	NA			
				Holding Time:	3	14	3	180/28	180	14	14	7	7	28	180/28	28		Number of Containers	COMMENTS
	DATE	TIME	Matrix		CL F NO2 NO3 and SO4	Free Cyanide	ortho-Phosphate	Field Filtered Dissolved Hg	(Ferrozine Method) Field Filtered Ferrous Iron	(SM2310) Acidity – Run Hot H2O2 if Fe >15ppm	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered For Metals Analyte List see Table 1	Ammonia (JEM/SM4500NH3) Ammonia			
CH12-014-MW013_GW0613	7/8/2013	17:25	Water		X	X	X	X	X	X	X	X	X	X	X	X		8	
																	TOTAL NUMBER OF CONTAINERS	8	


L1330009-COFC

	Signatures	Date/Time
Approved by		
Sampled by		7/9/13 1400
Relinquished by		
Received by		7/10/13
Relinquished by		
Received by		5.0°C 9:15

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody and Amber Springer

Special Instructions:
Perform Lab Dup/MS on these samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 15-JUL-13
Report Date: 23-OCT-13 15:38 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1332105

Project P.O. #: 472645.06.AD.01.04.13, PO=604564
Job Reference: BSI GRUM OVERBURDEN DUMP 2013 311.5B.
C of C Numbers: ALS07141301, ALS07141301H
Legal Site Desc:

Comments:

23-OCT-13: Additional QC data has been added.

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1332105-1	L1332105-2	L1332105-3		
	Description	Soil	Soil	Soil		
	Sampled Date	12-JUL-13	12-JUL-13	12-JUL-13		
	Sampled Time	13:50	16:21	16:50		
	Client ID	CH13-311-SS023_SOA	CH13-311-SS024_SOA	CH13-311-SS025_SOA		
Grouping	**Analyte**					
SOIL						
Physical Tests	Grain Size Curve	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED		
	Moisture (%)	8.17	7.49	9.83		
	pH (1:2 soil:water) (pH)	8.14	8.56	8.39		
Organic / Inorganic Carbon	Inorganic Carbon (%)	0.16	0.28	0.12		
	Inorganic Carbon (as CaCO3 Equivalent) (%)	1.34	2.31	1.01		
	Organic Carbon (%)	0.40	<0.40	<0.40		
	Organic Matter (%)	<0.70	<0.70	<0.70		
Saturated Paste Extractables	Paste pH (pH)	7.23	6.80	7.54		
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	21.0	22.0	12.0		
Metals	Aluminum (Al) (mg/kg)	17900	16200	12900		
	Antimony (Sb) (mg/kg)	0.55	1.02	0.56		
	Arsenic (As) (mg/kg)	17.0	12.2	6.52		
	Barium (Ba) (mg/kg)	204	218	163		
	Beryllium (Be) (mg/kg)	0.55	0.58	0.66		
	Bismuth (Bi) (mg/kg)	0.29	0.29	0.39		
	Boron (B) (mg/kg)	<10	<10	<10		
	Cadmium (Cd) (mg/kg)	0.339	0.373	0.248		
	Calcium (Ca) (mg/kg)	6960	7880	4850		
	Chromium (Cr) (mg/kg)	37.7	42.9	19.2		
	Cobalt (Co) (mg/kg)	15.5	10.3	6.08		
	Copper (Cu) (mg/kg)	33.6	18.2	12.3		
	Iron (Fe) (mg/kg)	30800	24900	16600		
	Lead (Pb) (mg/kg)	19.9	15.7	10.7		
	Lithium (Li) (mg/kg)	29.6	26.1	25.0		
	Magnesium (Mg) (mg/kg)	8160	7990	4330		
	Manganese (Mn) (mg/kg)	471	385	286		
	Mercury (Hg) (mg/kg)	<0.050	<0.050	<0.050		
	Molybdenum (Mo) (mg/kg)	0.66	0.78	<0.50		
	Nickel (Ni) (mg/kg)	40.4	35.9	15.9		
	Phosphorus (P) (mg/kg)	618	568	529		
	Potassium (K) (mg/kg)	1630	2190	2230		
	Selenium (Se) (mg/kg)	<0.20	0.26	0.21		
	Silver (Ag) (mg/kg)	0.14	0.12	0.11		
	Sodium (Na) (mg/kg)	200	200	170		
	Strontium (Sr) (mg/kg)	35.7	36.7	25.9		

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1332105-1	L1332105-2	L1332105-3		
	Description	Soil	Soil	Soil		
	Sampled Date	12-JUL-13	12-JUL-13	12-JUL-13		
	Sampled Time	13:50	16:21	16:50		
	Client ID	CH13-311-SS023_SOA	CH13-311-SS024_SOA	CH13-311-SS025_SOA		
Grouping	**Analyte**					
SOIL						
Metals	Sulfur (S)-Total (mg/kg)	500	500	<500		
	Thallium (Tl) (mg/kg)	0.149	0.185	0.209		
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0		
	Titanium (Ti) (mg/kg)	369	545	485		
	Uranium (U) (mg/kg)	0.991	1.83	1.79		
	Vanadium (V) (mg/kg)	32.9	36.7	27.7		
	Zinc (Zn) (mg/kg)	93.6	83.0	56.4		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
B-200.2-CCMS-VA	Soil	Boron 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."

C-INORG-SK	Soil	Inorganic Carbon / Calcium Carbonate	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-ORG-WB-SK	Soil	Total Organic Carbon - Walkley Black	CSSS (1993) method 21.2

The soil sample is treated with excess potassium dichromate and sulfuric acid to oxidize organic carbon. Oxidized organic carbon is determined by back-titration with ferrous ammonium sulfate. Organic matter is estimated from the organic carbon result using the Van Bemmelon factor.

GRAIN SIZE-SK	Soil	Grain Size Analysis	SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

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.

IC-CACO3-CALC-SK	Soil	Inorganic Carbon as CaCO3 Equivalent	Calculation
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

Reference Information

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

NP-TU	Soil	Neutralization Potential (NP)	Sobek 3.2.3, MOD
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.

PH-PASTE-VA	Soil	pH in Soil (Paste) by Meter	Carter-CSSS / APHA 4500 H

A soil extract produced by the saturated paste extraction procedure is analyzed by pH meter.

S-TOT-LECO-SK	Soil	Total Sulphur by combustion method	ISO 15178:2000

The sample is ignited in a combustion analyzer where sulfur in the reduced SO2 gas is determined using a thermal conductivity detector.

** 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
TU	ALS ENVIRONMENTAL - TUCSON, ARIZONA, USA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

ALS07141301 ALS07141301H

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-200.2-CCMS-VA	**Soil**							
Batch R2660150								
WG1714539-6 CRM		**VA-CANMET-TILL1**						
Boron (B)			3		mg/kg		0-13	29-JUL-13
WG1714539-2 DUP		**L1332105-3**						
Boron (B)		<10	<10	RPD-NA	mg/kg	N/A	30	29-JUL-13
WG1714539-1 MB								
Boron (B)			<10		mg/kg		10	29-JUL-13
C-INORG-SK	**Soil**							
Batch R2655400								
WG1709105-32 IRM		**0.1%IC**						
Inorganic Carbon			134.3		%		60-140	20-JUL-13
WG1709105-33 IRM		**0.4%IC**						
Inorganic Carbon			109.3		%		80-120	20-JUL-13
WG1709105-48 IRM		**0.1%IC**						
Inorganic Carbon			133.9		%		60-140	20-JUL-13
WG1709105-49 IRM		**0.4%IC**						
Inorganic Carbon			110.1		%		80-120	20-JUL-13
WG1709105-52 IRM		**0.1%IC**						
Inorganic Carbon			124.1		%		60-140	20-JUL-13
WG1709105-53 IRM		**0.4%IC**						
Inorganic Carbon			109.3		%		80-120	20-JUL-13
WG1709105-34 MB								
Inorganic Carbon			<0.10		%		0.1	20-JUL-13
WG1709105-50 MB								
Inorganic Carbon			<0.10		%		0.1	20-JUL-13
WG1709105-54 MB								
Inorganic Carbon			<0.10		%		0.1	20-JUL-13
C-TOT-ORG-WB-SK	**Soil**							
Batch R2652110								
WG1708920-1 DUP		**L1332105-3**						
Organic Carbon		<0.40	<0.40	RPD-NA	%	N/A	30	18-JUL-13
Organic Matter		<0.70	<0.70	RPD-NA	%	N/A	20	18-JUL-13
WG1708920-3 IRM		**FARM2009**						
Organic Carbon			103.4		%		80-120	18-JUL-13
Organic Matter			101.9		%		80-120	18-JUL-13
WG1708920-2 MB								
Organic Carbon			<0.40		%		0.4	18-JUL-13
Organic Matter			<0.70		%		0.7	18-JUL-13
HG-200.2-CVAF-VA	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-200.2-CVAF-VA	**Soil**							
Batch R2660098								
WG1714539-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			96.9		%		70-130	29-JUL-13
WG1714539-2 DUP		**L1332105-3**						
Mercury (Hg)		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	29-JUL-13
WG1714539-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	29-JUL-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2660150								
WG1714539-3 CRM		**VA-CANMET-TILL1**						
Aluminum (Al)			106.1		%		70-130	29-JUL-13
Antimony (Sb)			109.2		%		70-130	29-JUL-13
Arsenic (As)			110.2		%		70-130	29-JUL-13
Barium (Ba)			103.7		%		70-130	29-JUL-13
Beryllium (Be)			0.53		mg/kg		0.34-0.74	29-JUL-13
Bismuth (Bi)			104.6		%		70-130	29-JUL-13
Cadmium (Cd)			91.9		%		70-130	29-JUL-13
Calcium (Ca)			108.9		%		70-130	29-JUL-13
Chromium (Cr)			111.1		%		70-130	29-JUL-13
Cobalt (Co)			103.7		%		70-130	29-JUL-13
Copper (Cu)			101.4		%		70-130	29-JUL-13
Iron (Fe)			98.4		%		70-130	29-JUL-13
Lead (Pb)			95.0		%		70-130	29-JUL-13
Lithium (Li)			102.8		%		70-130	29-JUL-13
Magnesium (Mg)			102.4		%		70-130	29-JUL-13
Manganese (Mn)			105.0		%		70-130	29-JUL-13
Molybdenum (Mo)			0.72		mg/kg		0.24-1.24	29-JUL-13
Nickel (Ni)			107.0		%		70-130	29-JUL-13
Phosphorus (P)			106.1		%		70-130	29-JUL-13
Potassium (K)			103.3		%		70-130	29-JUL-13
Selenium (Se)			0.34		mg/kg		0.12-0.52	29-JUL-13
Silver (Ag)			0.23		mg/kg		0.12-0.32	29-JUL-13
Sodium (Na)			111.9		%		70-130	29-JUL-13
Strontium (Sr)			105.1		%		70-130	29-JUL-13
Thallium (Tl)			0.120		mg/kg		0.075-0.175	29-JUL-13
Tin (Sn)			1.0		mg/kg		0-3	29-JUL-13
Titanium (Ti)			106.4		%		70-130	29-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2660150								
WG1714539-3 CRM		**VA-CANMET-TILL1**						
Uranium (U)			109.2		%		70-130	29-JUL-13
Vanadium (V)			110.1		%		70-130	29-JUL-13
Zinc (Zn)			105.3		%		70-130	29-JUL-13
WG1714539-2 DUP		**L1332105-3**						
Aluminum (Al)		12900	15100		mg/kg	16	40	29-JUL-13
Antimony (Sb)		0.56	0.63		mg/kg	11	30	29-JUL-13
Arsenic (As)		6.52	7.46		mg/kg	13	30	29-JUL-13
Barium (Ba)		163	213		mg/kg	26	40	29-JUL-13
Beryllium (Be)		0.66	0.80		mg/kg	20	30	29-JUL-13
Bismuth (Bi)		0.39	0.45		mg/kg	14	30	29-JUL-13
Cadmium (Cd)		0.248	0.282		mg/kg	13	30	29-JUL-13
Calcium (Ca)		4850	5980		mg/kg	21	30	29-JUL-13
Chromium (Cr)		19.2	22.0		mg/kg	14	30	29-JUL-13
Cobalt (Co)		6.08	7.27		mg/kg	18	30	29-JUL-13
Copper (Cu)		12.3	15.2		mg/kg	21	30	29-JUL-13
Iron (Fe)		16600	19100		mg/kg	14	30	29-JUL-13
Lead (Pb)		10.7	12.7		mg/kg	18	40	29-JUL-13
Lithium (Li)		25.0	28.5		mg/kg	13	30	29-JUL-13
Magnesium (Mg)		4330	5090		mg/kg	16	30	29-JUL-13
Manganese (Mn)		286	333		mg/kg	15	30	29-JUL-13
Molybdenum (Mo)		<0.50	<0.50	RPD-NA	mg/kg	N/A	40	29-JUL-13
Nickel (Ni)		15.9	18.6		mg/kg	16	30	29-JUL-13
Phosphorus (P)		529	646		mg/kg	20	30	29-JUL-13
Potassium (K)		2230	2690		mg/kg	19	40	29-JUL-13
Selenium (Se)		0.21	0.29	J	mg/kg	0.08	0.4	29-JUL-13
Silver (Ag)		0.11	0.12		mg/kg	6.8	40	29-JUL-13
Sodium (Na)		170	200		mg/kg	17	40	29-JUL-13
Strontium (Sr)		25.9	31.9		mg/kg	21	40	29-JUL-13
Thallium (Tl)		0.209	0.233		mg/kg	11	30	29-JUL-13
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	29-JUL-13
Titanium (Ti)		485	570		mg/kg	16	40	29-JUL-13
Uranium (U)		1.79	2.06		mg/kg	14	30	29-JUL-13
Vanadium (V)		27.7	33.2		mg/kg	18	30	29-JUL-13
Zinc (Zn)		56.4	66.6		mg/kg	17	30	29-JUL-13
WG1714539-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2660150								
WG1714539-1 MB								
Aluminum (Al)			<50		mg/kg		50	29-JUL-13
Antimony (Sb)			<0.10		mg/kg		0.1	29-JUL-13
Arsenic (As)			<0.050		mg/kg		0.05	29-JUL-13
Barium (Ba)			<0.50		mg/kg		0.5	29-JUL-13
Beryllium (Be)			<0.20		mg/kg		0.2	29-JUL-13
Bismuth (Bi)			<0.20		mg/kg		0.2	29-JUL-13
Cadmium (Cd)			<0.050		mg/kg		0.05	29-JUL-13
Calcium (Ca)			<50		mg/kg		50	29-JUL-13
Chromium (Cr)			<0.50		mg/kg		0.5	29-JUL-13
Cobalt (Co)			<0.10		mg/kg		0.1	29-JUL-13
Copper (Cu)			<0.50		mg/kg		0.5	29-JUL-13
Iron (Fe)			<50		mg/kg		50	29-JUL-13
Lead (Pb)			<0.50		mg/kg		0.5	29-JUL-13
Lithium (Li)			<5.0		mg/kg		5	29-JUL-13
Magnesium (Mg)			<20		mg/kg		20	29-JUL-13
Manganese (Mn)			<1.0		mg/kg		1	29-JUL-13
Molybdenum (Mo)			<0.50		mg/kg		0.5	29-JUL-13
Nickel (Ni)			<0.50		mg/kg		0.5	29-JUL-13
Phosphorus (P)			<50		mg/kg		50	29-JUL-13
Potassium (K)			<100		mg/kg		100	29-JUL-13
Selenium (Se)			<0.20		mg/kg		0.2	29-JUL-13
Silver (Ag)			<0.10		mg/kg		0.1	29-JUL-13
Sodium (Na)			<100		mg/kg		100	29-JUL-13
Strontium (Sr)			<0.50		mg/kg		0.5	29-JUL-13
Thallium (Tl)			<0.050		mg/kg		0.05	29-JUL-13
Tin (Sn)			<2.0		mg/kg		2	29-JUL-13
Titanium (Ti)			<1.0		mg/kg		1	29-JUL-13
Uranium (U)			<0.050		mg/kg		0.05	29-JUL-13
Vanadium (V)			<0.20		mg/kg		0.2	29-JUL-13
Zinc (Zn)			<1.0		mg/kg		1	29-JUL-13
MOISTURE-VA	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-VA	**Soil**							
Batch R2656983								
WG1714543-3 DUP		**L1332105-3**						
Moisture		9.83	10.2		%	3.5	20	25-JUL-13
WG1714543-2 LCS								
Moisture			99.8		%		70-130	25-JUL-13
WG1714543-1 MB								
Moisture			<0.25		%		0.25	25-JUL-13
PH-1:2-VA	**Soil**							
Batch R2658421								
WG1714539-5 DUP		**L1332105-3**						
pH (1:2 soil:water)		8.39	8.38	J	pH	0.01	0.3	29-JUL-13
PH-PASTE-VA	**Soil**							
Batch R2660214								
WG1713639-2 DUP		**L1332105-1**						
Paste pH		7.23	7.24	J	pH	0.01	0.3	29-JUL-13
S-TOT-LECO-SK	**Soil**							
Batch R2652090								
WG1709086-1 DUP		**L1332105-1**						
Sulfur (S)-Total		500	600		mg/kg	12	30	18-JUL-13
WG1709086-2 IRM		**1646A_SOIL**						
Sulfur (S)-Total			3000		mg/kg		2500-4600	18-JUL-13
WG1709086-3 MB								
Sulfur (S)-Total			<500		mg/kg		500	18-JUL-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.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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.

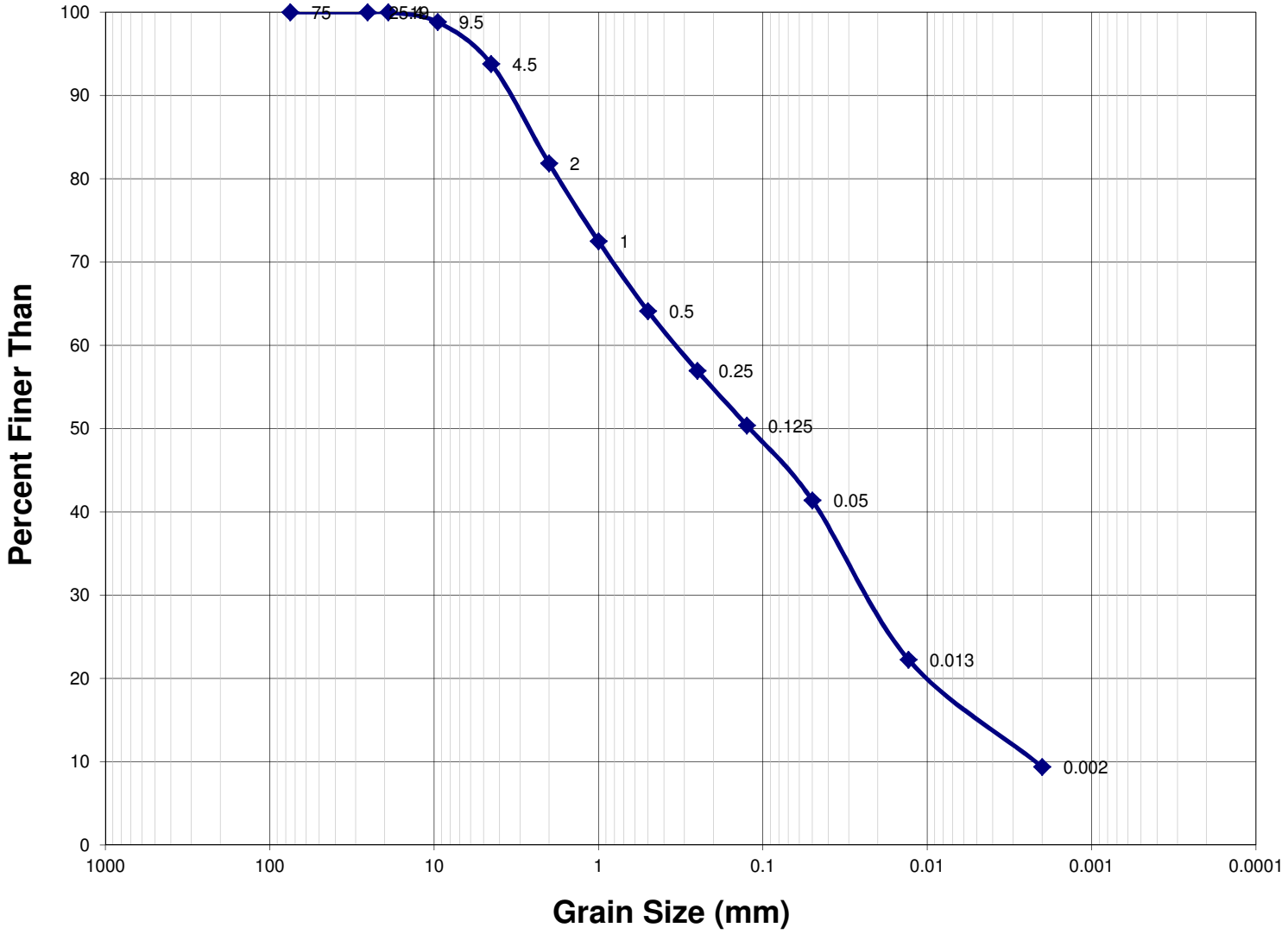
Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-SS023_SOA
Lab ID: L1332105-1

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	6
Coarse Sand	2.0mm - 4.75mm	12
Medium Sand	0.425mm - 2.0mm	18
Fine Sand	0.075mm - 0.425mm	20
Fines	< 0.075mm	44

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	18
Sand	0.05mm - 2mm	40
Silt	0.002mm - 0.05mm	32
Clay	< 0.002mm	9

Texture Loam

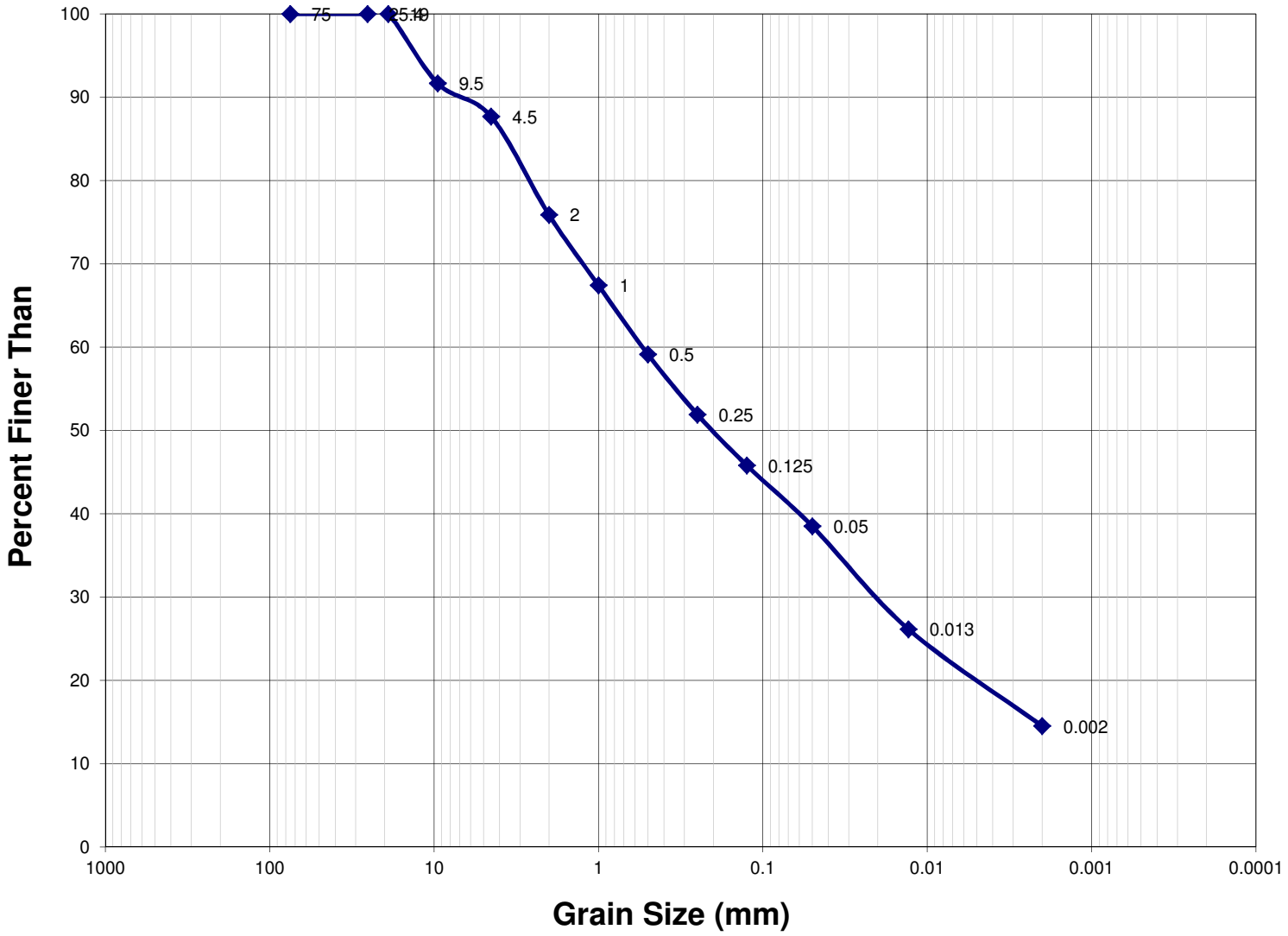
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-SS024_SOA
Lab ID: L1332105-2

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	12
Coarse Sand	2.0mm - 4.75mm	12
Medium Sand	0.425mm - 2.0mm	17
Fine Sand	0.075mm - 0.425mm	18
Fines	< 0.075mm	41

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	24
Sand	0.05mm - 2mm	37
Silt	0.002mm - 0.05mm	24
Clay	< 0.002mm	14

Texture Loam

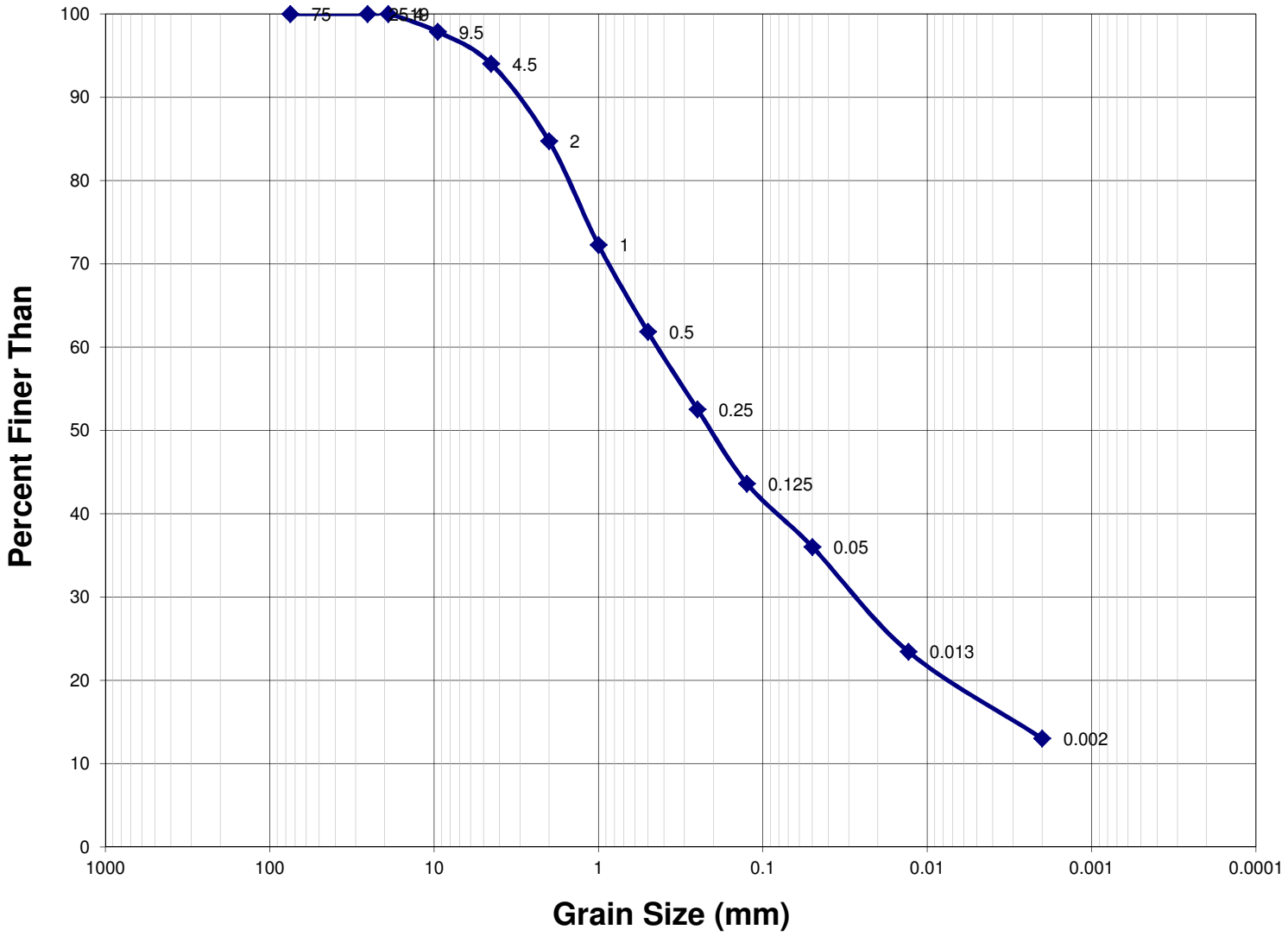
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-SS025_SOA
Lab ID: L1332105-3

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	6
Coarse Sand	2.0mm - 4.75mm	9
Medium Sand	0.425mm - 2.0mm	23
Fine Sand	0.075mm - 0.425mm	23
Fines	< 0.075mm	39

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	15
Sand	0.05mm - 2mm	49
Silt	0.002mm - 0.05mm	23
Clay	< 0.002mm	13

Texture Sandy loam

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

August 20, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1332105 **Date Received:** July 23, 2013

Certificate of Analysis

Client ID:	Sample Date:	Lab #:		Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $CaCO_3$/1,000t
L1332105- 1	7/14/2013	T1301034- 001		7.58	21
L1332105- 2	7/14/2013	T1301034- 002		6.92	22
L1332105- 3	7/14/2013	T1301034- 003		9.14	12

Notes:
Samples were air dried then ground to < 60 mesh.

W. Hyatt
Digitally signed by Wendy Hyatt
Date: 2013.08.20 14:12:53 -07'00'

Wendy Hyatt, Project Chemist

August 20, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1332105 **Date Received:** July 23, 2013

Quality Control

				Moisture, Total	Neutralization Potential
				3.1	Sobek 3.2.3, MOD
				wt%	$CaCO_3$/1,000t
Prep Blank				<0.01	< 1
Laboratory Control Sample (LCS) - Rice Flour CN 3451			Observed Value	9.61	n/a
			True Value	9.50	
			%R	**101**	
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	998
			True Value		1,000
			%R		**100**
Duplicate Results			*T1301036-001	1.10 **	
			Duplicate	1.10 **	
			%R	**0**	
Duplicate Results				*T1301032-001	5
				Duplicate	5
				%RPD	**0**

* Sample from the same batch, but a different project.

**Residual moisture - does not include air dry moisture.

CH2MHILL

CHAIN OF CUSTODY RECORD

7/14/2013 9:19:59 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 7/13/2013
COC Number: ALS07141301

	Container:	4oz jar	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon			
	Preservatives:	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C			
	Filtered:	NA	NA	NA	NA	NA	NA	NA	NA			
	Holding Time:	14	28	14	180	180	28	28	NA			
		(ASTM 2216) Moisture	(CSSS/APHA4500H) Paste pH	(EPA200.0/245.7/SW6020A) Total Metals Table 1	(ISO 15178-2000) Total Sulphur	(ModifiedSobek) Mod Neutralization Potential	(SSSA (1996) P455-456) TIC	(SSSA (1996) P995-996) TCC	(ASTM D422) Gradation		Number of Containers	COMMENTS
CH13-311-SS023_SOa	7/12/2013 13:50 Soil	X	X	X	X	X	X	X	X		6	
CH13-311-SS024_SOa	7/12/2013 16:21 Soil	X	X	X	X	X	X	X	X		6	
CH13-311-SS025_SOa	7/12/2013 16:50 Soil	X	X	X	X	X	X	X	X		6	
										TOTAL NUMBER OF CONTAINERS	18	

L1332103-COFC

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		7/14/13 1200
Received by		
Relinquished by		15-Jul-13 5.4°C, 7.9°C
Received by		9:25

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

7/14/2013 9:20:18 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 7/13/2013
COC Number: ALS07141301H

	DATE	TIME	Matrix	Container:	Preservatives:	Filtered:	Holding Time:	(DI/APHA2510) DI Conductivity	(DI/APHA4500H) DI pH	(CI/ASTMD1498) DI ORP	(DI/E245.7) DI Diss Mercury	(DI/E300) DI Sulphate	(DI/EPA600/2-78-054) Acid Soluable Sulfate	(DI/SM2310) DI Acidity	(DI/SM2320) DI Alkalinity	(DI/SW6020A) DI Diss Metals	(SW6020A) Bat(Li) Metaborate	(ASTM 4318) Atterberg limits		Number of Containers	COMMENTS
CH13-311-SS023_SOa	7/12/2013	13:50	Soil	1 Gallon	4°C	NA	14	X	X	X	X	X	X	X	X	X	X	X		5	HOLD
CH13-311-SS024_SOa	7/12/2013	16:21	Soil	1 Gallon	4°C	NA	14	X	X	X	X	X	X	X	X	X	X	X		5	HOLD
CH13-311-SS025_SOa	7/12/2013	16:50	Soil	1 Gallon	4°C	NA	14	X	X	X	X	X	X	X	X	X	X	X		5	HOLD
																			TOTAL NUMBER OF CONTAINERS	15	



	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		7/13/13 1200
Received by		
Relinquished by		
Received by		

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 15-JUL-13
Report Date: 06-SEP-13 11:54 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1332147

Project P.O. #: 472645.06.AD.01.04.13, PO=604564
Job Reference: BSI GRUM OVERBURDEN DUMP 2013 311.5B.
C of C Numbers: ALS07141302, ALS07141302H
Legal Site Desc:

Comments:

Amber Springer
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1332147-2				
	Description	Soil				
	Sampled Date	12-JUL-13				
	Sampled Time	16:21				
	Client ID	CH13-311-SS024_SOA				
Grouping	**Analyte**					
SOIL						
Anions and Nutrients	Total Nitrogen by LECO (%)	0.029				
Plant Available Nutrients	Available Ammonium-N (mg/kg)	1.6				
	Calcium (Ca) (meq/100g)	13.5				
	Cation Exchange Capacity (meq/100g)	5.10				
	Magnesium (Mg) (meq/100g)	1.22				
	Available Nitrate-N (mg/kg)	<2.0				
	Potassium (K) (meq/100g)	<0.50				
	Sodium (Na) (meq/100g)	<0.50				
Saturated Paste Extractables	ESP (%)	N/A; Na<DL				
Metals	Phosphorus (P) (mg/kg)	590				

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CAT-XTR-SK	Soil	Ammonium Acetate Extractable Cations	CSSS 19.4 - 1M NH4OAc Extraction @ pH 7

Exchangeable Ca, Mg, Na, and K are extracted from the soil using neutral 1N ammonium acetate, then determined by ICP-OES. This method does not correct for calcium or magnesium extracted from carbonates or free gypsum.

CEC-SK	Soil	Cation Exchange Capacity (NH4OAC Extn)	CSSS(1978) 3.321/Comm Soil Sci 17(7)

Soil exchange sites are saturated with ammonium, then displaced with sodium. Ammonium in the extract is determined colorimetrically.

ETL-ESP-SK	Soil	Exchangeable Sodium Percentage - Calc	Calculation
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.

N-TOT-LECO-SK	Soil	Total Nitrogen by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.

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.

NO3-AVAIL-KCL-SK	Soil	Available Nitrate-N (2N KCl)	CSSS (1993) 4.2, 4.3

Available Nitrate and Nitrite are extracted from the soil using a 2N KCl 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) methods 4.2, 4.3

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

Chain of Custody Numbers:

ALS07141302 ALS07141302H

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CAT-XTR-SK	**Soil**							
Batch R2680312								
WG1732337-1 DUP		**L1332147-2**						
Sodium (Na)		<0.50	<0.50	RPD-NA	meq/100g	N/A	25	26-AUG-13
Potassium (K)		<0.50	<0.50	RPD-NA	meq/100g	N/A	25	26-AUG-13
Calcium (Ca)		13.5	13.3		meq/100g	1.5	30	26-AUG-13
Magnesium (Mg)		1.22	1.17		meq/100g	3.8	30	26-AUG-13
WG1732337-3 IRM		**SAL814**						
Sodium (Na)			99.1		%		70-130	26-AUG-13
Potassium (K)			101.4		%		70-130	26-AUG-13
Calcium (Ca)			105.0		%		70-130	26-AUG-13
Magnesium (Mg)			97.5		%		70-130	26-AUG-13
WG1732337-2 MB								
Sodium (Na)			<0.50		meq/100g		0.5	26-AUG-13
Potassium (K)			<0.50		meq/100g		0.5	26-AUG-13
Calcium (Ca)			<0.50		meq/100g		0.5	26-AUG-13
Magnesium (Mg)			<0.50		meq/100g		0.5	26-AUG-13
CEC-SK	**Soil**							
Batch R2680091								
WG1732340-1 DUP		**L1332147-2**						
Cation Exchange Capacity		5.10	4.64		meq/100g	9.4	20	26-AUG-13
WG1732340-3 IRM		**SAL814**						
Cation Exchange Capacity			97.0		%		70-130	26-AUG-13
WG1732340-2 MB								
Cation Exchange Capacity			<0.80		meq/100g		0.8	26-AUG-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2687615								
WG1739522-3 CRM		**VA-CANMET-TILL1**						
Phosphorus (P)			99.8		%		70-130	05-SEP-13
WG1739522-2 DUP		**L1332147-2**						
Phosphorus (P)		590	628		mg/kg	6.3	30	05-SEP-13
WG1739522-1 MB								
Phosphorus (P)			<50		mg/kg		50	05-SEP-13
N-TOT-LECO-SK	**Soil**							
Batch R2687496								
WG1736223-2 IRM		**08-109_SOIL**						
Total Nitrogen by LECO			0.106		%		0.085-0.135	04-SEP-13
WG1736223-4 MB								
Total Nitrogen by LECO			<0.020		%		0.02	04-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH4-AVAIL-SK	**Soil**							
Batch R2687245								
WG1740472-1 DUP		**L1332147-2**						
Available Ammonium-N		1.6	1.5		mg/kg	2.1	20	05-SEP-13
WG1740472-3 IRM		**SAL814**						
Available Ammonium-N			107.3		%		70-130	05-SEP-13
WG1740472-2 MB								
Available Ammonium-N			<1.0		mg/kg		1	05-SEP-13
NO3-AVAIL-KCL-SK	**Soil**							
Batch R2687358								
WG1740473-1 DUP		**L1332147-2**						
Available Nitrate-N		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	05-SEP-13
WG1740473-3 IRM		**SAL814**						
Available Nitrate-N			89.8		%		70-130	05-SEP-13
WG1740473-2 MB								
Available Nitrate-N			<2.0		mg/kg		2	05-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
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
Leachable Anions & Nutrients							
Total Nitrogen by combustion method							
	2	12-JUL-13 16:21	04-SEP-13 00:00	28	53	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 L1332147 were received on 15-JUL-13 09:25.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

7/14/2013 9:34:02 AM

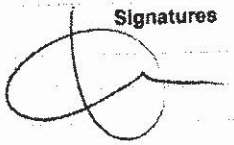
Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 7/13/2013
COC Number: ALS07141302

Containers:	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon							
Preservatives:	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C							
Filtered:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA							
Holding Time:	180	28	28	28	28	180	28	180	180	180	180							
	(CSSS (2008) 11.3 and 11.4) Ext Micro Nut (ZnFeCuMn)	(CSSS (2008) 12.2) SMP Buffer pH (for pH<6.0)	(CSSS (2008) 15.2.1 or 14.4.4) Sodium Adsorption Ratio	(CSSS (2008) 15.2.1) ECe (sat paste)	(CSSS (2008) 15.3) Soluable Salts	(CSSS (2008) 18.4) 1N. pH7 NH4OAc ext CaMgKNa incl CEC	(CSSS (2008) 20.3) CaCO3 equivalent	(CSSS (2008) 7.2 and 7.3.1 if pH>7.2) Available P (pH>7.2)	(CSSS 16.3 (2008)) pH (1:2 CaCL2) CP17	(S-11.10 in Gaviak et al. (2005)) Ca(H2PO4)2.H2O ext SO4-S	(SSSA (1996) p894-895 if pH<7.2) Available P (pH<7.2)		Number of Containers	COMMENTS
DATE / TIME / Matrix																		
CH13-311-SS023_SOa 7/12/2013 13:50 Soil	X	X	X	X	X	X	X	X	X	X	X						2	
CH13-311-SS024_SOa 7/12/2013 16:21 Soil	X	X	X	X	X	X	X	X	X	X	X						2	
CH13-311-SS025_SOa 7/12/2013 16:50 Soil	X	X	X	X	X	X	X	X	X	X	X						2	
													TOTAL NUMBER OF CONTAINERS				6	



L1332147-COFC

	Signatures	Date/Time
Approved by		
Sampled by		7/14/13 1200
Relinquished by		
Received by		15-Jul-13 5.4°C, 7.9°C 9:25
Relinquished by		
Received by		

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

7/14/2013 9:36:40 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 7/14/2013
COC Number: ALS07141302H

	DATE	TIME	Matrix	(CSSS (2008) 6.2) NH4-N and NO3-N (2N KCL)	(EPA200.2/SW6020A) Total P	(SSSA (1996) P973-974) Total N	(ASTM D7503) Cation Exchange Capacity	Number of Containers	COMMENTS
Container:				1 Gallon	1 Gallon	1 Gallon	1 Gallon		
Preservatives:				4°C	4°C	4°C	4°C		
Filtered:				NA	NA	NA	NA		
Holding Time:				28	28	28	NA		
CH13-311-SS023_SOa	7/12/2013	13:50	Soil	X	X	X	X	4	HOLD
CH13-311-SS024_SOa	7/12/2013	16:21	Soil	X	X	X	X	4	HOLD
CH13-311-SS025_SOa	7/12/2013	16:50	Soil	X	X	X	X	4	HOLD
							TOTAL NUMBER OF CONTAINERS	12	

L1332147-COFC

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		7/14/13 1200
Received by		
Relinquished by		
Received by		

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 17-JUL-13
Report Date: 25-OCT-13 10:26 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1333599

Project P.O. #: 472645.06.AD.01.04.13, PO=604564
Job Reference: BSI NE AREA OF GRUM PIT 2013 311.5C
C of C Numbers: ALS07161302, ALS07161302H, ALS07161302R
Legal Site Desc:

Comments:

25-OCT-13: Additional QC data has been included.

Amber Springer
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1333599-1 Soil 15-JUL-13 11:00 CH13-311-SS027_SOA	L1333599-2 Soil 15-JUL-13 11:25 CH13-311-SS028_SOA	L1333599-3 Soil 15-JUL-13 12:05 CH13-311-SS029_SOA	L1333599-4 Soil 15-JUL-13 11:48 CH13-311-SS030_SOA	L1333599-5 Soil 15-JUL-13 12:00 CH13-311-SS031_SOA
SOIL						
Physical Tests	Moisture (%)	9.69	10.5	10.4	7.79	8.38
	pH (1:2 soil:water) (pH)	8.08	8.39	8.17	8.43	8.59
Organic / Inorganic Carbon	Inorganic Carbon (%)	0.27	0.17	0.24	0.18	0.22
	Inorganic Carbon (as CaCO3 Equivalent) (%)	2.22	1.40	1.98	1.47	1.87
Saturated Paste Extractables	Paste pH (pH)	7.45	7.48	7.43	7.51	7.79
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	23.0	67.0	20.0	19.0	18.0
Metals	Aluminum (Al) (mg/kg)	16000	12900	17300	18600	18000
	Antimony (Sb) (mg/kg)	0.87	0.85	0.84	0.47	0.81
	Arsenic (As) (mg/kg)	11.4	12.4	14.9	10.5	19.3
	Barium (Ba) (mg/kg)	250	237	283	142	161
	Beryllium (Be) (mg/kg)	0.58	0.56	0.62	0.83	0.80
	Bismuth (Bi) (mg/kg)	0.28	0.35	0.26	0.53	0.46
	Boron (B) (mg/kg)	<10	<10	<10	<10	<10
	Cadmium (Cd) (mg/kg)	0.426	0.325	0.408	0.186	0.287
	Calcium (Ca) (mg/kg)	10100	5710	11500	7260	9860
	Chromium (Cr) (mg/kg)	30.9	31.4	31.0	53.8	52.1
	Cobalt (Co) (mg/kg)	10.7	10.8	11.5	12.8	13.8
	Copper (Cu) (mg/kg)	23.4	24.2	26.0	24.1	26.8
	Iron (Fe) (mg/kg)	25900	23600	28100	29700	29400
	Lead (Pb) (mg/kg)	13.5	28.3	15.4	21.4	18.7
	Lithium (Li) (mg/kg)	26.5	23.7	27.4	42.2	41.3
	Magnesium (Mg) (mg/kg)	7120	6560	7750	9620	9470
	Manganese (Mn) (mg/kg)	417	292	475	393	399
	Mercury (Hg) (mg/kg)	0.0290	0.0409	0.0289	0.0138	0.0190
	Molybdenum (Mo) (mg/kg)	0.95	0.74	1.00	<0.50	<0.50
	Nickel (Ni) (mg/kg)	28.1	31.8	28.6	40.9	44.3
	Phosphorus (P) (mg/kg)	691	566	648	593	558
	Potassium (K) (mg/kg)	1980	1470	2170	2940	3010
	Selenium (Se) (mg/kg)	0.41	0.53	0.52	<0.20	0.22
	Silver (Ag) (mg/kg)	0.15	0.14	0.35	0.12	0.12
	Sodium (Na) (mg/kg)	290	130	330	190	140
	Strontium (Sr) (mg/kg)	49.0	34.6	51.3	38.0	44.6
	Sulfur (S)-Total (mg/kg)	600	<500	700	<500	500
	Thallium (Tl) (mg/kg)	0.147	0.160	0.157	0.242	0.259
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1333599-6 Soil 15-JUL-13 12:15 CH13-311-SS032_SOA	L1333599-7 Soil 15-JUL-13 12:59 CH13-311-SS033_SOA	L1333599-8 Soil 15-JUL-13 12:50 CH13-311-SS034_SOA	L1333599-9 Soil 15-JUL-13 13:20 CH13-311-SS035_SOA	L1333599-10 Soil 15-JUL-13 13:30 CH13-311-SS036_SOA
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
SOIL						
Physical Tests	Moisture (%)	8.07	4.85	9.43	10.2	6.26
	pH (1:2 soil:water) (pH)	8.25	8.25	8.17	8.58	8.35
Organic / Inorganic Carbon	Inorganic Carbon (%)	0.23	0.15	0.18	0.14	0.29
	Inorganic Carbon (as CaCO3 Equivalent) (%)	1.92	1.28	1.52	1.19	2.41
Saturated Paste Extractables	Paste pH (pH)	7.36	7.58	7.43	7.69	7.59
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	23.0	12.0	17.0	14.0	24.0
Metals	Aluminum (Al) (mg/kg)	15400	15000	16500	19000	14300
	Antimony (Sb) (mg/kg)	0.59	0.35	0.52	0.38	0.67
	Arsenic (As) (mg/kg)	11.7	8.79	15.2	11.7	10.3
	Barium (Ba) (mg/kg)	189	111	176	156	230
	Beryllium (Be) (mg/kg)	0.55	0.56	0.57	0.65	0.54
	Bismuth (Bi) (mg/kg)	0.31	0.34	0.33	0.38	0.28
	Boron (B) (mg/kg)	<10	<10	<10	<10	<10
	Cadmium (Cd) (mg/kg)	0.351	0.202	0.273	0.294	0.404
	Calcium (Ca) (mg/kg)	11300	5820	7110	4710	9900
	Chromium (Cr) (mg/kg)	38.1	47.8	50.1	45.1	29.3
	Cobalt (Co) (mg/kg)	11.8	11.9	13.8	17.2	10.2
	Copper (Cu) (mg/kg)	21.2	23.2	35.1	31.1	21.7
	Iron (Fe) (mg/kg)	25300	26000	29500	33600	24000
	Lead (Pb) (mg/kg)	16.4	15.4	37.5	22.9	11.6
	Lithium (Li) (mg/kg)	27.8	29.8	30.1	33.8	26.8
	Magnesium (Mg) (mg/kg)	8430	8040	8980	9590	7220
	Manganese (Mn) (mg/kg)	432	354	406	424	360
	Mercury (Hg) (mg/kg)	0.0197	0.0127	0.0220	0.0138	0.0363
	Molybdenum (Mo) (mg/kg)	0.66	<0.50	0.72	<0.50	0.74
	Nickel (Ni) (mg/kg)	36.5	37.8	41.9	43.0	28.1
	Phosphorus (P) (mg/kg)	886	514	624	524	609
	Potassium (K) (mg/kg)	1940	1970	1700	2130	1930
	Selenium (Se) (mg/kg)	0.24	0.21	0.26	<0.20	0.48
	Silver (Ag) (mg/kg)	0.11	<0.10	0.13	<0.10	0.15
	Sodium (Na) (mg/kg)	210	160	160	220	180
	Strontium (Sr) (mg/kg)	50.8	29.1	33.2	30.1	45.5
	Sulfur (S)-Total (mg/kg)	700	700	<500	<500	1000
	Thallium (Tl) (mg/kg)	0.144	0.174	0.146	0.164	0.145
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1333599-11				
	Description	Soil				
	Sampled Date	15-JUL-13				
	Sampled Time	13:45				
	Client ID	CH13-311-SS037_SOA				
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	8.35				
	pH (1:2 soil:water) (pH)	8.37				
Organic / Inorganic Carbon	Inorganic Carbon (%)	0.25				
	Inorganic Carbon (as CaCO3 Equivalent) (%)	2.12				
Saturated Paste Extractables	Paste pH (pH)	7.59				
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	24.0				
Metals	Aluminum (Al) (mg/kg)	16900				
	Antimony (Sb) (mg/kg)	0.90				
	Arsenic (As) (mg/kg)	11.2				
	Barium (Ba) (mg/kg)	312				
	Beryllium (Be) (mg/kg)	0.59				
	Bismuth (Bi) (mg/kg)	0.28				
	Boron (B) (mg/kg)	<10				
	Cadmium (Cd) (mg/kg)	0.427				
	Calcium (Ca) (mg/kg)	9830				
	Chromium (Cr) (mg/kg)	27.7				
	Cobalt (Co) (mg/kg)	10.4				
	Copper (Cu) (mg/kg)	21.3				
	Iron (Fe) (mg/kg)	26200				
	Lead (Pb) (mg/kg)	12.5				
	Lithium (Li) (mg/kg)	26.7				
	Magnesium (Mg) (mg/kg)	6790				
	Manganese (Mn) (mg/kg)	458				
	Mercury (Hg) (mg/kg)	0.0317				
	Molybdenum (Mo) (mg/kg)	1.55				
	Nickel (Ni) (mg/kg)	26.0				
	Phosphorus (P) (mg/kg)	647				
	Potassium (K) (mg/kg)	2330				
	Selenium (Se) (mg/kg)	0.49				
	Silver (Ag) (mg/kg)	0.20				
	Sodium (Na) (mg/kg)	300				
	Strontium (Sr) (mg/kg)	48.4				
	Sulfur (S)-Total (mg/kg)	700				
	Thallium (Tl) (mg/kg)	0.174				
	Tin (Sn) (mg/kg)	<2.0				

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1333599-1	L1333599-2	L1333599-3	L1333599-4	L1333599-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	15-JUL-13	15-JUL-13	15-JUL-13	15-JUL-13	15-JUL-13
	Sampled Time	11:00	11:25	12:05	11:48	12:00
	Client ID	CH13-311-SS027_SOA	CH13-311-SS028_SOA	CH13-311-SS029_SOA	CH13-311-SS030_SOA	CH13-311-SS031_SOA
Grouping	**Analyte**					
SOIL						
Metals	Titanium (Ti) (mg/kg)	518	487	568	537	532
	Uranium (U) (mg/kg)	1.59	2.11	1.74	2.11	4.69
	Vanadium (V) (mg/kg)	38.9	31.1	42.2	32.3	35.1
	Zinc (Zn) (mg/kg)	75.0	86.5	79.7	92.2	88.7
	Acid Soluble Sulphate Sulphur (%)	<0.01	<0.01	<0.01	<0.01	<0.01

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1333599-6	L1333599-7	L1333599-8	L1333599-9	L1333599-10
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	15-JUL-13	15-JUL-13	15-JUL-13	15-JUL-13	15-JUL-13
	Sampled Time	12:15	12:59	12:50	13:20	13:30
	Client ID	CH13-311-SS032_SOA	CH13-311-SS033_SOA	CH13-311-SS034_SOA	CH13-311-SS035_SOA	CH13-311-SS036_SOA
Grouping	**Analyte**					
SOIL						
Metals	Titanium (Ti) (mg/kg)	448	409	433	454	362
	Uranium (U) (mg/kg)	1.80	1.40	1.40	1.44	1.69
	Vanadium (V) (mg/kg)	32.8	25.3	30.0	30.8	32.0
	Zinc (Zn) (mg/kg)	120	89.2	102	146	76.5
	Acid Soluble Sulphate Sulphur (%)	<0.01	<0.01	<0.01	<0.01	<0.01

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1333599-11				
		Description	Soil				
		Sampled Date	15-JUL-13				
		Sampled Time	13:45				
		Client ID	CH13-311-SS037_SOA				
Grouping	**Analyte**						
SOIL							
Metals	Titanium (Ti) (mg/kg)		545				
	Uranium (U) (mg/kg)		2.36				
	Vanadium (V) (mg/kg)		42.5				
	Zinc (Zn) (mg/kg)		76.9				
	Acid Soluble Sulphate Sulphur (%)		<0.01				

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
B-200.2-CCMS-VA	Soil	Boron 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."

C-INORG-SK	Soil	Inorganic Carbon / Calcium Carbonate	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

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.

IC-CACO3-CALC-SK	Soil	Inorganic Carbon as CaCO3 Equivalent	Calculation
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.

NP-TU	Soil	Neutralization Potential (NP)	Sobek 3.2.3, MOD
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.

PH-PASTE-VA	Soil	pH in Soil (Paste) by Meter	Carter-CSSS / APHA 4500 H

A soil extract produced by the saturated paste extraction procedure is analyzed by pH meter.

S-TOT-LECO-SK	Soil	Total Sulphur by combustion method	ISO 15178:2000

The sample is ignited in a combustion analyzer where sulfur in the reduced SO2 gas is determined using a thermal conductivity detector.

Reference Information

SULPHUR-S-GRA06A-AX	Soil	Sulphur (S)	S-GRA06a
WEIGHT-WEI-21-AX	Soil	Weight in kg	WEI-21

** 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
TU	ALS ENVIRONMENTAL - TUCSON, ARIZONA, USA
AX	ALS MINERALS - VANCOUVER, B.C., CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

ALS07161302 ALS07161302H ALS07161302R

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-200.2-CCMS-VA	**Soil**							
Batch R2663563								
WG1716415-4 CRM		**VA-CANMET-TILL1**						
Boron (B)			3		mg/kg		0-13	31-JUL-13
WG1716415-2 DUP		**L1333599-3**						
Boron (B)		<10	<10	RPD-NA	mg/kg	N/A	30	31-JUL-13
WG1716415-1 MB								
Boron (B)			<10		mg/kg		10	31-JUL-13
C-INORG-SK	**Soil**							
Batch R2653160								
WG1710665-2 DUP		**L1333599-6**						
Inorganic Carbon		0.23	0.26		%	12	20	20-JUL-13
WG1710665-3 IRM		**0.1%IC**						
Inorganic Carbon			119.6		%		60-140	20-JUL-13
WG1710665-4 IRM		**0.4%IC**						
Inorganic Carbon			109.2		%		80-120	20-JUL-13
WG1710665-5 MB								
Inorganic Carbon			<0.10		%		0.1	20-JUL-13
HG-200.2-CVAF-VA	**Soil**							
Batch R2663085								
WG1716415-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			104.2		%		70-130	31-JUL-13
WG1716415-2 DUP		**L1333599-3**						
Mercury (Hg)		0.0289	0.0294		mg/kg	1.7	40	31-JUL-13
WG1716415-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	31-JUL-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2663563								
WG1716415-3 CRM		**VA-CANMET-TILL1**						
Aluminum (Al)			98.6		%		70-130	31-JUL-13
Antimony (Sb)			105.2		%		70-130	31-JUL-13
Arsenic (As)			107.5		%		70-130	31-JUL-13
Barium (Ba)			99.8		%		70-130	31-JUL-13
Beryllium (Be)			0.53		mg/kg		0.34-0.74	31-JUL-13
Bismuth (Bi)			100.0		%		70-130	31-JUL-13
Cadmium (Cd)			84.5		%		70-130	31-JUL-13
Calcium (Ca)			103.8		%		70-130	31-JUL-13
Chromium (Cr)			105.7		%		70-130	31-JUL-13
Cobalt (Co)			103.3		%		70-130	31-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2663563								
WG1716415-3 CRM		**VA-CANMET-TILL1**						
Copper (Cu)			99.8		%		70-130	31-JUL-13
Iron (Fe)			98.0		%		70-130	31-JUL-13
Lead (Pb)			92.7		%		70-130	31-JUL-13
Lithium (Li)			103.6		%		70-130	31-JUL-13
Magnesium (Mg)			100.9		%		70-130	31-JUL-13
Manganese (Mn)			99.2		%		70-130	31-JUL-13
Molybdenum (Mo)			0.71		mg/kg		0.24-1.24	31-JUL-13
Nickel (Ni)			104.2		%		70-130	31-JUL-13
Phosphorus (P)			109.4		%		70-130	31-JUL-13
Potassium (K)			105.7		%		70-130	31-JUL-13
Selenium (Se)			0.33		mg/kg		0.12-0.52	31-JUL-13
Silver (Ag)			0.22		mg/kg		0.12-0.32	31-JUL-13
Sodium (Na)			106.1		%		70-130	31-JUL-13
Strontium (Sr)			102.9		%		70-130	31-JUL-13
Thallium (Tl)			0.116		mg/kg		0.075-0.175	31-JUL-13
Tin (Sn)			1.0		mg/kg		0-3	31-JUL-13
Titanium (Ti)			105.6		%		70-130	31-JUL-13
Uranium (U)			119.3		%		70-130	31-JUL-13
Vanadium (V)			106.8		%		70-130	31-JUL-13
Zinc (Zn)			100.9		%		70-130	31-JUL-13
WG1716415-2 DUP		**L1333599-3**						
Aluminum (Al)		17300	17500		mg/kg	1.4	40	31-JUL-13
Antimony (Sb)		0.84	0.88		mg/kg	4.5	30	31-JUL-13
Arsenic (As)		14.9	12.3		mg/kg	19	30	31-JUL-13
Barium (Ba)		283	276		mg/kg	2.3	40	31-JUL-13
Beryllium (Be)		0.62	0.63		mg/kg	2.1	30	31-JUL-13
Bismuth (Bi)		0.26	0.30		mg/kg	14	30	31-JUL-13
Cadmium (Cd)		0.408	0.402		mg/kg	1.5	30	31-JUL-13
Calcium (Ca)		11500	10300		mg/kg	11	30	31-JUL-13
Chromium (Cr)		31.0	32.3		mg/kg	4.0	30	31-JUL-13
Cobalt (Co)		11.5	11.7		mg/kg	1.8	30	31-JUL-13
Copper (Cu)		26.0	25.8		mg/kg	0.7	30	31-JUL-13
Iron (Fe)		28100	28100		mg/kg	0.0	30	31-JUL-13
Lead (Pb)		15.4	15.4		mg/kg	0.1	40	31-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2663563								
WG1716415-2 DUP		**L1333599-3**						
Lithium (Li)		27.4	27.3		mg/kg	0.5	30	31-JUL-13
Magnesium (Mg)		7750	7710		mg/kg	0.6	30	31-JUL-13
Manganese (Mn)		475	478		mg/kg	0.6	30	31-JUL-13
Molybdenum (Mo)		1.00	1.00		mg/kg	0.2	40	31-JUL-13
Nickel (Ni)		28.6	29.6		mg/kg	3.6	30	31-JUL-13
Phosphorus (P)		648	637		mg/kg	1.6	30	31-JUL-13
Potassium (K)		2170	2240		mg/kg	3.0	40	31-JUL-13
Selenium (Se)		0.52	0.45		mg/kg	14	30	31-JUL-13
Silver (Ag)		0.35	0.16	J	mg/kg	0.19	0.2	31-JUL-13
Sodium (Na)		330	340		mg/kg	5.0	40	31-JUL-13
Strontium (Sr)		51.3	47.8		mg/kg	7.0	40	31-JUL-13
Thallium (Tl)		0.157	0.153		mg/kg	2.4	30	31-JUL-13
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	31-JUL-13
Titanium (Ti)		568	565		mg/kg	0.6	40	31-JUL-13
Uranium (U)		1.74	1.73		mg/kg	0.7	30	31-JUL-13
Vanadium (V)		42.2	42.1		mg/kg	0.3	30	31-JUL-13
Zinc (Zn)		79.7	82.0		mg/kg	2.9	30	31-JUL-13
WG1716415-1 MB								
Aluminum (Al)			<50		mg/kg		50	31-JUL-13
Antimony (Sb)			<0.10		mg/kg		0.1	31-JUL-13
Arsenic (As)			<0.050		mg/kg		0.05	31-JUL-13
Barium (Ba)			<0.50		mg/kg		0.5	31-JUL-13
Beryllium (Be)			<0.20		mg/kg		0.2	31-JUL-13
Bismuth (Bi)			<0.20		mg/kg		0.2	31-JUL-13
Cadmium (Cd)			<0.050		mg/kg		0.05	31-JUL-13
Calcium (Ca)			<50		mg/kg		50	31-JUL-13
Chromium (Cr)			<0.50		mg/kg		0.5	31-JUL-13
Cobalt (Co)			<0.10		mg/kg		0.1	31-JUL-13
Copper (Cu)			<0.50		mg/kg		0.5	31-JUL-13
Iron (Fe)			<50		mg/kg		50	31-JUL-13
Lead (Pb)			<0.50		mg/kg		0.5	31-JUL-13
Lithium (Li)			<5.0		mg/kg		5	31-JUL-13
Magnesium (Mg)			<20		mg/kg		20	31-JUL-13
Manganese (Mn)			<1.0		mg/kg		1	31-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2663563								
WG1716415-1 MB								
Molybdenum (Mo)			<0.50		mg/kg		0.5	31-JUL-13
Nickel (Ni)			<0.50		mg/kg		0.5	31-JUL-13
Phosphorus (P)			<50		mg/kg		50	31-JUL-13
Potassium (K)			<100		mg/kg		100	31-JUL-13
Selenium (Se)			<0.20		mg/kg		0.2	31-JUL-13
Silver (Ag)			<0.10		mg/kg		0.1	31-JUL-13
Sodium (Na)			<100		mg/kg		100	31-JUL-13
Strontium (Sr)			<0.50		mg/kg		0.5	31-JUL-13
Thallium (Tl)			<0.050		mg/kg		0.05	31-JUL-13
Tin (Sn)			<2.0		mg/kg		2	31-JUL-13
Titanium (Ti)			<1.0		mg/kg		1	31-JUL-13
Uranium (U)			<0.050		mg/kg		0.05	31-JUL-13
Vanadium (V)			<0.20		mg/kg		0.2	31-JUL-13
Zinc (Zn)			<1.0		mg/kg		1	31-JUL-13
MOISTURE-VA	**Soil**							
Batch R2660401								
WG1716410-3 DUP		**L1333599-3**						
Moisture		10.4	10.2		%	2.4	20	29-JUL-13
WG1716410-2 LCS								
Moisture			99.8		%		70-130	29-JUL-13
WG1716410-1 MB								
Moisture			<0.25		%		0.25	29-JUL-13
PH-1:2-VA	**Soil**							
Batch R2662691								
WG1716415-2 DUP		**L1333599-3**						
pH (1:2 soil:water)		8.17	8.15	J	pH	0.02	0.3	31-JUL-13
S-TOT-LECO-SK	**Soil**							
Batch R2653163								
WG1710656-1 DUP		**L1333599-6**						
Sulfur (S)-Total		700	700		mg/kg	3.3	30	20-JUL-13
WG1710656-2 IRM		**1646A_SOIL**						
Sulfur (S)-Total			3400		mg/kg		2500-4600	20-JUL-13
WG1710656-3 MB								
Sulfur (S)-Total			<500		mg/kg		500	20-JUL-13

Quality Control Report

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.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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.

August 21, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1333599 **Date Received:** July 23, 2013

Certificate of Analysis

Client ID:	Sample Date:	Lab #:		Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $CaCO_3$/1,000t
L1333599- 1	7/15/13	T1301031- 001		9.26	23
L1333599- 2	7/15/13	T1301031- 002		10.67	67
L1333599- 3	7/15/13	T1301031- 003		9.56	20
L1333599- 4	7/15/13	T1301031- 004		7.92	19
L1333599- 5	7/15/13	T1301031- 005		7.44	18
L1333599- 6	7/15/13	T1301031- 006		7.13	23
L1333599- 7	7/15/13	T1301031- 007		5.02	12
L1333599- 8	7/15/13	T1301031- 008		8.51	17
L1333599- 9	7/15/13	T1301031- 009		7.25	14
L1333599- 10	7/15/13	T1301031- 010		7.44	24
L1333599- 11	7/15/13	T1301031- 011		7.22	24

Notes:
Samples were air dried then ground to < 60 mesh.

W. Hyatt
Digitally signed by Wendy Hyatt
Date: 2013.08.21 16:54:18 -07'00'

Wendy Hyatt, Project Chemist

August 21, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1333599 **Date Received:** July 23, 2013

Quality Control

				Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $CaCO_3$/1,000t
Prep Blank				<0.01	< 1
Laboratory Control Sample (LCS) - Rice Flour CN 3451			Observed Value	9.53	n/a
			True Value	9.50	
			%R	**100**	
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	972
			True Value		1,000
			%R		**97**
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	992
			True Value		1,000
			%R		**99**
Duplicate Results			T1301031-011	0.65 **	
			Duplicate	0.60 **	
			%R	**8**	
Duplicate Results				T1301031-011	24
				Duplicate	22
				%RPD	**10**

**Residual moisture - does not include air dry moisture.

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 29- JUL- 2013
Account: APN

CERTIFICATE VA13129316

Project: L1333599

P.O. No.: L1333599

This report is for 11 Rock samples submitted to our lab in Vancouver, BC, Canada on 19- JUL- 2013.

The following have access to data associated with this certificate:

ALSE VANCOUVER WEBTRIEVE	A. SPRINGER	AMBER SPRINGER

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI- 21	Received Sample Weight
LOG- 22	Sample login - Rcd w/o BarCode
CRU- 31	Fine crushing - 70% <2mm
PUL- 31	Pulverize split to 85% <75 um
CRU- QC	Crushing QC Test
PUL- QC	Pulverizing QC Test

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
S- GRA06a	Sulfate Sulfur (HCl leachable)	WST- SEQ

To: ALS ENVIRONMENTAL
ATTN: A. SPRINGER
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

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

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

Signature:
Colin Ramshaw, Vancouver Laboratory Manager

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 29- JUL- 2013
Account: APN

Project: L1333599

CERTIFICATE OF ANALYSIS VA13129316

Sample Description	Method / Analyte / Units / LOR	WEI-21 Recvd Wt. kg 0.02	S-GRA06a S % 0.01
L1333599-1		0.22	<0.01
L1333599-2		0.26	<0.01
L1333599-3		0.22	<0.01
L1333599-4		0.24	<0.01
L1333599-5		0.22	<0.01
L1333599-6		0.20	<0.01
L1333599-7		0.22	<0.01
L1333599-8		0.24	<0.01
L1333599-9		0.26	<0.01
L1333599-10		0.26	<0.01
L1333599-11		0.26	<0.01

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

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 29- JUL- 2013
Account: APN

Project: L1333599

CERTIFICATE OF ANALYSIS VA13129316

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

Applies to Method:				
	CRU- 31	CRU- QC	LOG- 22	PUL- 31
	PUL- QC	S- GRA06a	WEI- 21	

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

ALS Minerals

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 29- JUL- 2013
Account: APN

QC CERTIFICATE VA13129316

Project: L1333599

P.O. No.: L1333599

This report is for 11 Rock samples submitted to our lab in Vancouver, BC, Canada on 19- JUL- 2013.

The following have access to data associated with this certificate:

ALSE VANCOUVER WEBTRIEVE	A. SPRINGER	AMBER SPRINGER

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI- 21	Received Sample Weight
LOG- 22	Sample login - Rcd w/o BarCode
CRU- 31	Fine crushing - 70% < 2mm
PUL- 31	Pulverize split to 85% < 75 um
CRU- QC	Crushing QC Test
PUL- QC	Pulverizing QC Test

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
S- GRA06a	Sulfate Sulfur (HCl leachable)	WST- SEQ

To: ALS ENVIRONMENTAL
ATTN: AMBER SPRINGER
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

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

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

Signature:

Colin Ramshaw, Vancouver Laboratory Manager

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 29-JUL-2013
Account: APN

Project: L1333599

QC CERTIFICATE OF ANALYSIS VA13129316

Sample Description	Method Analyte Units LOR	S-GRA06a S % 0.01
STANDARDS		
HV-2		0.16
Target Range - Lower Bound		0.15
Upper Bound		0.20
RTS-1		1.27
Target Range - Lower Bound		1.14
Upper Bound		1.34
BLANKS		
BLANK		<0.01
Target Range - Lower Bound		<0.01
Upper Bound		0.02
DUPLICATES		
L1333599-7		<0.01
DUP		<0.01
Target Range - Lower Bound		<0.01
Upper Bound		0.02

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

ALS Canada Ltd.
2133 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 29- JUL- 2013
Account: APN

Project: LI333599

QC CERTIFICATE OF ANALYSIS VA13129316

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

Applies to Method:				
	CRU- 31	CRU- QC	LOG- 22	PUL- 31
	PUL- QC	S- GRA06a	WEI- 21	

CH2MHILL

CHAIN OF CUSTODY RECORD

7/16/2013 1:14:54 PM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 3 Days
Shipping Date: 7/16/2013
COC Number: ALS07161302R

	DATE	TIME	Matrix	Container: 1 Gallon; Preservatives: 4°C; Filtered: NA; Holding Time: 180; (ISO 15178-2000) Total Sulphur	Number of Containers	COMMENTS
CH13-311-SS027_SOa	7/15/2013	11:00	Soil	X	1	
CH13-311-SS028_SOa	7/15/2013	11:25	Soil	X	1	
CH13-311-SS029_SOa	7/15/2013	12:05	Soil	X	1	
CH13-311-SS030_SOa	7/15/2013	11:48	Soil	X	1	
CH13-311-SS031_SOa	7/15/2013	12:00	Soil	X	1	
CH13-311-SS032_SOa	7/15/2013	12:15	Soil	X	1	
CH13-311-SS033_SOa	7/15/2013	12:59	Soil	X	1	
CH13-311-SS034_SOa	7/15/2013	12:50	Soil	X	1	
CH13-311-SS035_SOa	7/15/2013	13:20	Soil	X	1	
CH13-311-SS036_SOa	7/15/2013	13:30	Soil	X	1	
CH13-311-SS037_SOa	7/15/2013	13:45	Soil	X	1	
				TOTAL NUMBER OF CONTAINERS	11	

L1333599-COFC

Signatures	Date/Time
Approved by	
Sampled by	7/16/13 1500
Relinquished by	
Received by	
Relinquished by	17-Jul-13 9:42
Received by	6.5°C, 4.3°C

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

7/16/2013 1:14:30 PM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 10 Days
Shipping Date: 7/16/2013
COC Number: ALS07161302

	Container:	4oz jar	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon		
	Preservatives:	4'C	4'C	4'C	4'C	4'C	4'C		
	Filtered:	NA	NA	NA	NA	NA	NA		
	Holding Time:	14	28	180	14	28	28		
		(ASTM 2216) Moisture	(CSSS/APHA4500H) Paste pH	(DI/EPA600/2-78-054) Acid Soluable Sulfate	(EPA200.0/245.7/SW6020A) Total Metals Table 1	(ModifiedSobek) Mod Neutralization Potential	(SSSA (1996) P455-456) TIC	Number of Containers	COMMENTS
CH13-311-SS027_SOa	7/15/2013 11:00 Soil	x	x	x	x	x	x	4	
CH13-311-SS028_SOa	7/15/2013 11:25 Soil	x	x	x	x	x	x	4	
CH13-311-SS029_SOa	7/15/2013 12:05 Soil	x	x	x	x	x	x	4	
CH13-311-SS030_SOa	7/15/2013 11:48 Soil	x	x	x	x	x	x	4	
CH13-311-SS031_SOa	7/15/2013 12:00 Soil	x	x	x	x	x	x	4	
CH13-311-SS032_SOa	7/15/2013 12:15 Soil	x	x	x	x	x	x	4	
CH13-311-SS033_SOa	7/15/2013 12:59 Soil	x	x	x	x	x	x	4	
CH13-311-SS034_SOa	7/15/2013 12:50 Soil	x	x	x	x	x	x	4	
CH13-311-SS035_SOa	7/15/2013 13:20 Soil	x	x	x	x	x	x	4	
CH13-311-SS036_SOa	7/15/2013 13:30 Soil	x	x	x	x	x	x	4	
CH13-311-SS037_SOa	7/15/2013 13:45 Soil	x	x	x	x	x	x	4	
							TOTAL NUMBER OF CONTAINERS	44	



Signatures	Date/Time
Approved by	
Sampled by	
Relinquished by	7/16/13 1700
Received by	
Relinquished by	
Received by	

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

7/16/2013 1:14:41 PM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 10 Days
Shipping Date: 7/16/2013
COC Number: ALS07161302H

Container:	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon			
Preservatives:	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C			
Filtered:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
Holding Time:	14	14	14	14	180	14	14	14	28	14			
	(DI/APHA2510) DI Conductivity	(DI/APHA4500H) DI pH	(DI/ASTMD1498) DI ORP	(DI/E245.7) DI Diss Mercury	(DI/E300) DI Sulphate	(DI/SM2310) DI Acidity	(DI/SM2320) DI Alkalinity	(DI/SW6020A) DI Diss Metals	(SSSA (1996) P995-996) TOC	(SW6020A) Ba(Li) Metaborate	Number of Containers	COMMENTS
DATE / TIME / Matrix												
CH13-311-SS027_SOa 7/15/2013 11:00 Soil	x	x	x	x	x	x	x	x	x	x	4	HOLD
CH13-311-SS028_SOa 7/15/2013 11:25 Soil	x	x	x	x	x	x	x	x	x	x	4	
CH13-311-SS029_SOa 7/15/2013 12:05 Soil	x	x	x	x	x	x	x	x	x	x	4	
CH13-311-SS030_SOa 7/15/2013 11:48 Soil	x	x	x	x	x	x	x	x	x	x	4	
CH13-311-SS031_SOa 7/15/2013 12:00 Soil	x	x	x	x	x	x	x	x	x	x	4	
CH13-311-SS032_SOa 7/15/2013 12:15 Soil	x	x	x	x	x	x	x	x	x	x	4	
CH13-311-SS033_SOa 7/15/2013 12:59 Soil	x	x	x	x	x	x	x	x	x	x	4	
CH13-311-SS034_SOa 7/15/2013 12:50 Soil	x	x	x	x	x	x	x	x	x	x	4	
CH13-311-SS035_SOa 7/15/2013 13:20 Soil	x	x	x	x	x	x	x	x	x	x	4	
CH13-311-SS036_SOa 7/15/2013 13:30 Soil	x	x	x	x	x	x	x	x	x	x	4	HOLD
CH13-311-SS037_SOa 7/15/2013 13:45 Soil	x	x	x	x	x	x	x	x	x	x	4	
										TOTAL NUMBER OF CONTAINERS	44	

L1333599-COFC

Signatures	Date/Time
Approved by	
Sampled by	
Relinquished by	7/16/13 1700
Received by	
Relinquished by	
Received by	

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 17-JUL-13
Report Date: 24-OCT-13 11:54 (MT)
Version: FINAL REV. 3

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1333750

Project P.O. #: 472645.06.AD.01.04.13, PO=604564
Job Reference: BSI NE AREA OF GRUM PIT 2013 311.5C
C of C Numbers: ALS07161303
Legal Site Desc:

Comments:

09-AUG-13: Available PO4 reporting has been adjusted.

Additional QC data has been included.

Amber Springer
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1333750-1	L1333750-2	L1333750-3		
	Description	Soil	Soil	Soil		
	Sampled Date	15-JUL-13	15-JUL-13	15-JUL-13		
	Sampled Time	11:48	12:59	13:45		
	Client ID	CH13-311-SS030_SOA	CH13-311-SS033_SOA	CH13-311-SS037_SOA		
Grouping	**Analyte**					
SOIL						
Physical Tests	Grain Size Curve	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED		
	Liquid Limit (LL) (%)	24	21	22		
	pH (1:2 CaCl2) (pH)	7.96	7.83	7.83		
	Plasticity Index (PI) (%)	9	6	5		
Organic / Inorganic Carbon	CaCO3 Equivalent (%)	1.63	1.76	2.18		
	Inorganic Carbon (%)	0.20	0.21	0.26		
	Total Carbon by Combustion (%)	0.3	0.3	0.6		
	Total Organic Carbon (%)	<0.10	<0.10	0.30		
Plant Available Nutrients	Calcium (Ca) (meq/100g)	12.3	10.8	17.0		
	Cation Exchange Capacity (meq/100g)	6.12	5.25	7.91		
	Copper (Cu) (mg/kg)	1.76	2.14	3.02		
	Iron (Fe) (mg/kg)	21.7	35.6	109		
	Magnesium (Mg) (meq/100g)	0.99	0.95	1.39		
	Manganese (Mn) (mg/kg)	6.56	9.19	5.55		
	Available Phosphate-P (mg/kg)	4.8	3.0	7.0		
	Potassium (K) (meq/100g)	<0.50	<0.50	<0.50		
	Sodium (Na) (meq/100g)	<0.50	<0.50	<0.50		
	Available Sulfate-S (mg/kg)	46.2	79.6	25.2		
	Zinc (Zn) (mg/kg)	1.08	4.95	1.53		
Saturated Paste Extractables	SAR (SAR)	0.60	0.25	0.41		
	Calcium (Ca) (mg/L)	146	305	111		
	Chloride (Cl) (mg/L)	<2.0	4.5	14.4		
	Conductivity Sat. Paste (dS m-1)	0.97	1.65	0.78		
	ESP (%)	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL		
	Magnesium (Mg) (mg/L)	19.0	46.1	17.4		
	pH in Saturated Paste (pH)	8.19	7.94	8.11		
	Potassium (K) (mg/L)	9.5	15.0	7.0		
	% Saturation (%)	34.1	30.4	32.4		
	Sodium (Na) (mg/L)	28.9	17.6	17.7		
	Sulfur (as SO4) (mg/L)	424	884	307		
Miscellaneous	SMP Buffer pH (pH)	7.61	7.62	7.59		

* 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	Calcium (Ca)	DLA	L1333750-1, -2, -3
Duplicate	Magnesium (Mg)	DLA	L1333750-1, -2, -3
Duplicate	Potassium (K)	DLA	L1333750-1, -2, -3
Duplicate	Sodium (Na)	DLA	L1333750-1, -2, -3
Duplicate	Sulfur (as SO4)	DLA	L1333750-1, -2, -3
Duplicate	Chloride (Cl)	DLA	L1333750-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ATTERBERG-SK	Soil	Atterberg limits	CARTER CSSS 58

The liquid limit (or upper plastic limit) is the point at which the soil becomes semifluid, like softened butter. In operational terms, the liquid limit is defined as the water content at which a trapezoidal groove cut in moist soil is closed after 25 taps on a hard rubber plate (ASTM D-18, 1958).

The plastic limit (or lower plastic limit) is defined as the water content at which soil begins to crumble on being rolled into a thread 1/8 inch (or 3 mm) in diameter. It represents the lowest water content at which soil can be deformed readily without cracking.

The plastic index (which is the difference between the liquid and plastic limits) gives an indication of the "clayeyness" or plasticity of a clay and is employed in engineering classification systems for soils.

References: McKeague, J.A. 1978. Atterberg Limits pp 50 - 55 In: Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci. p. 50 - 55

C-INORG-ORG-SK	Soil	Inorganic and Organic Carbon	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-LECO-SK	Soil	Total Carbon by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.

CAT-XTR-SK	Soil	Ammonium Acetate Extractable Cations	CSSS 19.4 - 1M NH4OAc Extraction @ pH 7

Exchangeable Ca, Mg, Na, and K are extracted from the soil using neutral 1N ammonium acetate, then determined by ICP-OES. This method does not correct for calcium or magnesium extracted from carbonates or free gypsum.

CEC-SK	Soil	Cation Exchange Capacity (NH4OAC Extn)	CSSS(1978) 3.321/Comm Soil Sci 17(7)

Soil exchange sites are saturated with ammonium, then displaced with sodium. Ammonium in the extract is determined colorimetrically.

CL-SAR-SK	Soil	Chloride (Cl) (Saturated Paste)	CSSS(1993) 18.2.2/APHA 4500-CL E

Chloride in a saturated soil extract is determined colorimetrically by auto-analyzer.

ETL-ESP-SK	Soil	Exchangeable Sodium Percentage - Calc	Calculation
GRAIN SIZE-SK	Soil	Grain Size Analysis	SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

METAL-DTPA-SK	Soil	Available Micronutrients (Cu,Fe,Zn,Mn)	CSSS 1993 (11.3 AND 11.4)

Plant available micronutrients are extracted from soil using 0.005 M DTPA. Cu, Fe, Mn and Zn in the extract are determined by ICP-OES.

Reference Information

PH-1:2CACL2-SK	Soil	pH (1:2 Soil:CaCl2 Extraction)	CSSC 3.11

1 part dry soil and 2 parts de-ionized 0.01M CaCl2 (by volume) is mixed. The slurry is allowed to stand with occasional stirring for 30 - 60 minutes. pH of the soil slurry is then measured using a pH meter.

PH-BUFFER-SMP-SK	Soil	Buffer pH (SMP)	CSSS (1993) method 14.2

After equilibration with SMP buffer solution, pH of the soil solution is measured with a pH meter. Lime requirement must be determined by the client using location-specific regression equations.

PO4-AVAIL-OLSEN-SK	Soil	Available Phosphate-P by Olsen	CSSS (1993) 7.2,7.3.1

Plant available phosphorus is extracted from the sample with sodium bicarbonate. PO4-P in the filtered extract is determined colorimetrically at 880 nm.

SALINITY-INTCHECK-SK	Soil		CSSS 18.4-Calculation
SAR-CALC-SK	Soil	SAR and Cations in saturated soil	CSSS 18.4-Calculation
SAR-CALC-SO4-SK	Soil	SAR, Cations and SO4 in saturated soil	APHA 3120B

Ca, Mg, Na, K and SO4 in a saturated soil extract are determined by ICP-OES.

SAT/PH/EC-SK	Soil	pH and EC (Saturated Paste)	CSSS 18.2.2/CSSC 3.14/CSSS 18.3.1

pH of a saturated soil paste is measured using a pH meter. After equilibration, an extract is obtained by vacuum filtration with conductivity of the extract measured by a conductivity meter.

SO4-AVAIL-CALPHOS-SK	Soil	Plant Available Sulfate - Ca(H2PO4)2	NCR (1998) p. 36/APHA 3120B

Plant available sulfate is extracted from the sample using dilute calcium phosphate. SO4-S in the filtered extract is determined by ICP-OES.

** 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:

ALS07161303

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-INORG-ORG-SK	**Soil**							
Batch R2661480								
WG1715241-1 DUP		**L1333750-1**						
Inorganic Carbon		0.20	0.21		%	8.8	20	30-JUL-13
CaCO3 Equivalent		1.63	1.78		%	8.8	25	30-JUL-13
WG1715241-2 IRM		**0.1%IC**						
Inorganic Carbon			131.8		%		60-140	30-JUL-13
CaCO3 Equivalent			132.4		%		60-140	30-JUL-13
WG1715241-3 IRM		**0.4%IC**						
Inorganic Carbon			111.0		%		80-120	30-JUL-13
CaCO3 Equivalent			111.1		%		80-120	30-JUL-13
WG1715241-4 MB								
Inorganic Carbon			<0.10		%		0.1	30-JUL-13
CaCO3 Equivalent			<0.80		%		0.8	30-JUL-13
C-TOT-LECO-SK	**Soil**							
Batch R2660400								
WG1715237-2 DUP		**L1333750-1**						
Total Carbon by Combustion		0.3	0.3		%	0.5	20	29-JUL-13
WG1715237-3 IRM		**08-109_SOIL**						
Total Carbon by Combustion			100.2		%		80-120	29-JUL-13
WG1715237-5 MB								
Total Carbon by Combustion			<0.1		%		0.1	29-JUL-13
CAT-XTR-SK	**Soil**							
Batch R2662461								
WG1715179-3 IRM		**SAL814**						
Sodium (Na)			86.6		%		70-130	31-JUL-13
Potassium (K)			89.4		%		70-130	31-JUL-13
Calcium (Ca)			93.5		%		70-130	31-JUL-13
Magnesium (Mg)			86.4		%		70-130	31-JUL-13
WG1715179-2 MB								
Sodium (Na)			<0.50		meq/100g		0.5	31-JUL-13
Potassium (K)			<0.50		meq/100g		0.5	31-JUL-13
Calcium (Ca)			<0.50		meq/100g		0.5	31-JUL-13
Magnesium (Mg)			<0.50		meq/100g		0.5	31-JUL-13
CEC-SK	**Soil**							
Batch R2663275								
WG1715180-3 IRM		**SAL814**						
Cation Exchange Capacity			121.7		%		70-130	31-JUL-13
WG1715180-2 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CEC-SK	**Soil**							
Batch R2663275								
WG1715180-2 MB								
Cation Exchange Capacity			<0.80		meq/100g		0.8	31-JUL-13
CL-SAR-SK	**Soil**							
Batch R2661621								
WG1715214-2 MB								
Chloride (Cl)			<2.0		mg/L		2	30-JUL-13
METAL-DTPA-SK	**Soil**							
Batch R2662107								
WG1715136-3 IRM		**11-119**						
Copper (Cu)			104.3		%		70-130	30-JUL-13
Iron (Fe)			112.5		%		70-130	30-JUL-13
Manganese (Mn)			102.1		%		70-130	30-JUL-13
Zinc (Zn)			103.3		%		70-130	30-JUL-13
WG1715136-2 MB								
Copper (Cu)			<0.10		mg/kg		0.1	30-JUL-13
Iron (Fe)			<2.0		mg/kg		2	30-JUL-13
Manganese (Mn)			<0.050		mg/kg		0.05	30-JUL-13
Zinc (Zn)			<0.20		mg/kg		0.2	30-JUL-13
PH-1:2CACL2-SK	**Soil**							
Batch R2658600								
WG1715145-1 DUP		**L1333750-3**						
pH (1:2 CaCl2)		7.83	7.81	J	pH	0.02	0.3	29-JUL-13
WG1715145-2 IRM		**SAL814**						
pH (1:2 CaCl2)			7.78		pH		7.55-8.15	29-JUL-13
PH-BUFFER-SMP-SK	**Soil**							
Batch R2663878								
WG1715172-1 DUP		**L1333750-1**						
SMP Buffer pH		7.61	7.62	J	pH	0.01	0.2	01-AUG-13
WG1715172-3 IRM		**SAL814**						
SMP Buffer pH			7.57		pH		7.44-7.64	01-AUG-13
PO4-AVAIL-OLSEN-SK	**Soil**							
Batch R2660655								
WG1715140-1 DUP		**L1333750-2**						
Available Phosphate-P		3.0	2.6		mg/kg	14	30	30-JUL-13
WG1715140-3 IRM		**FARM2005**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4-AVAIL-OLSEN-SK	**Soil**							
Batch R2660655								
WG1715140-3 IRM		**FARM2005**						
Available Phosphate-P			85.7		%		70-130	30-JUL-13
WG1715140-2 MB								
Available Phosphate-P			<1.0		mg/kg		1	30-JUL-13
SAR-CALC-SO4-SK	**Soil**							
Batch R2660725								
WG1715214-2 MB								
Calcium (Ca)			<2.0		mg/L		2	30-JUL-13
Potassium (K)			<1.0		mg/L		1	30-JUL-13
Magnesium (Mg)			<2.0		mg/L		2	30-JUL-13
Sodium (Na)			<4.0		mg/L		4	30-JUL-13
Sulfur (as SO4)			<5.0		mg/L		5	30-JUL-13
SAT/PH/EC-SK	**Soil**							
Batch R2661160								
WG1715214-3 IRM		**ED-SAL_NAT1**						
% Saturation			45.0		%		38-48	30-JUL-13
pH in Saturated Paste			6.84		pH		6.5-7.1	30-JUL-13
Conductivity Sat. Paste			104.2		%		80-120	30-JUL-13
WG1715214-2 MB								
Conductivity Sat. Paste			<0.10		dS m-1		0.1	30-JUL-13
SO4-AVAIL-CALPHOS-SK	**Soil**							
Batch R2660723								
WG1715151-1 DUP		**L1333750-3**						
Available Sulfate-S		25.2	25.9		mg/kg	2.7	40	30-JUL-13
WG1715151-3 IRM		**SAL814**						
Available Sulfate-S			96.4		%		60-140	30-JUL-13
WG1715151-2 MB								
Available Sulfate-S			<3.0		mg/kg		3	30-JUL-13

Quality Control Report

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.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Organic / Inorganic Carbon							
Inorganic and Organic Carbon							
	1	15-JUL-13 11:48	30-JUL-13 00:00	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 L1333750 were received on 17-JUL-13 09:42.

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.

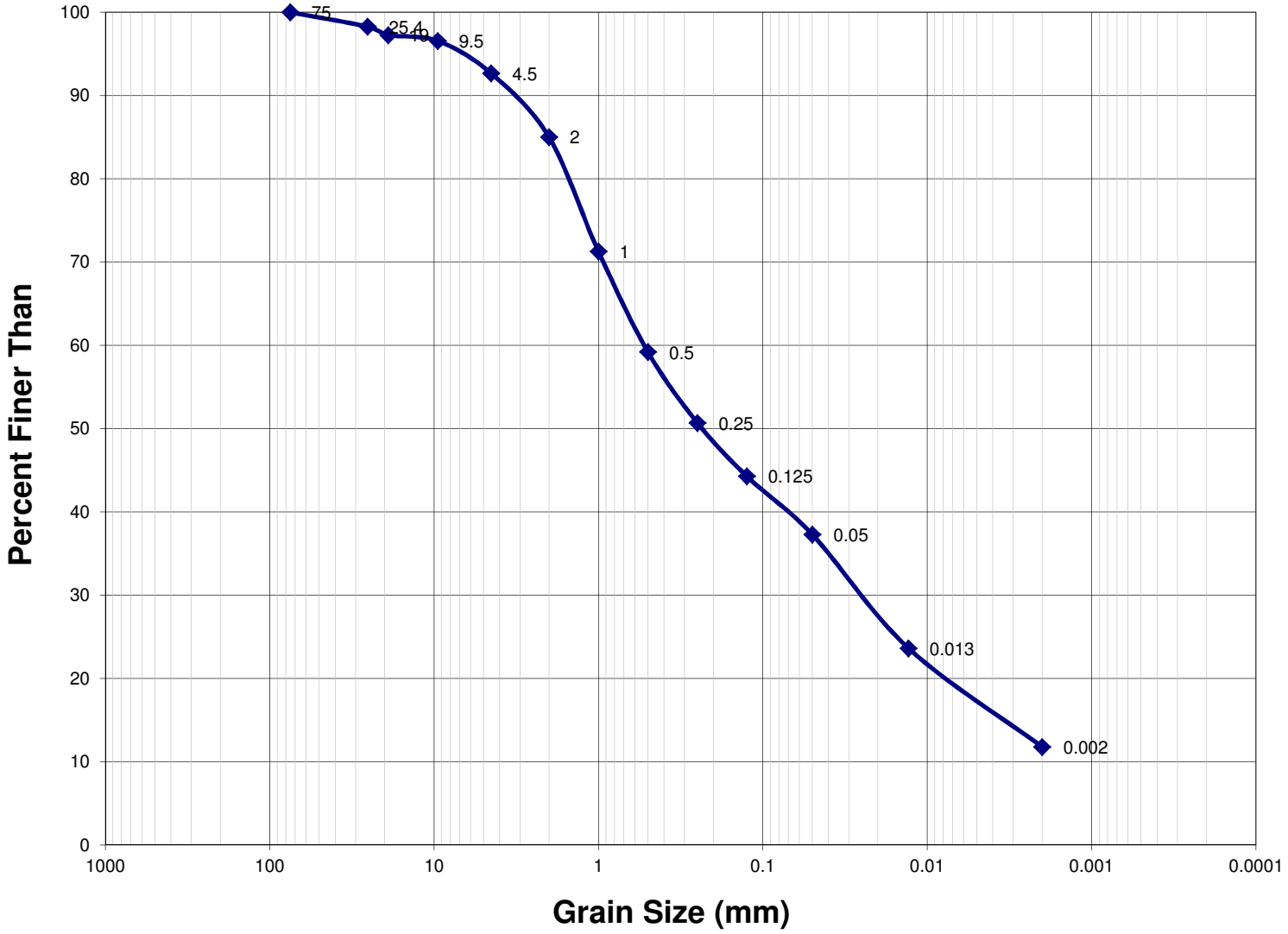
Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-SS030_SOA
Lab ID: L1333750-1

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	7
Coarse Sand	2.0mm - 4.75mm	8
Medium Sand	0.425mm - 2.0mm	26
Fine Sand	0.075mm - 0.425mm	20
Fines	< 0.075mm	40

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	15
Sand	0.05mm - 2mm	48
Silt	0.002mm - 0.05mm	25
Clay	< 0.002mm	12
Texture	Sandy loam	

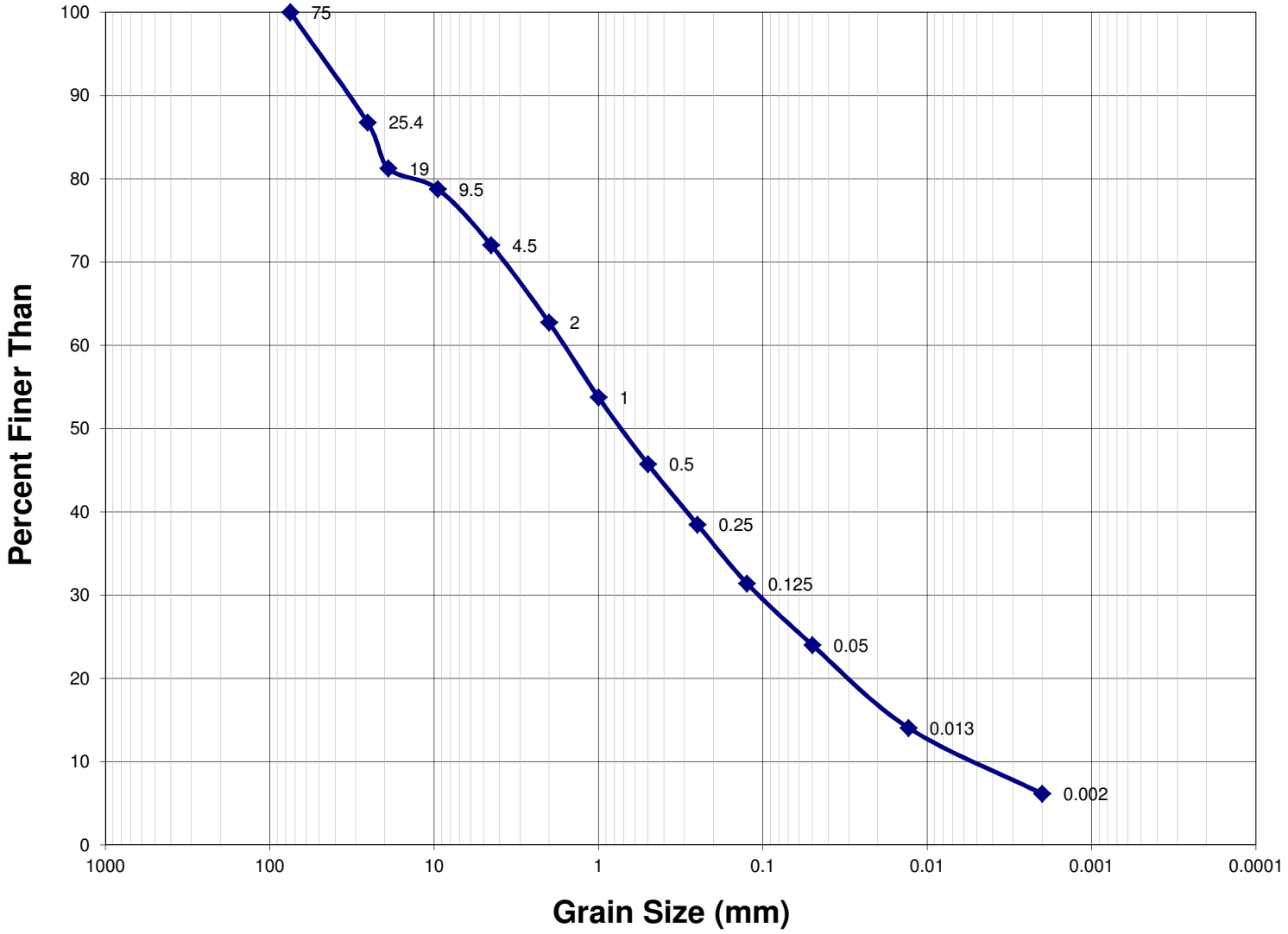
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-SS033_SOA
Lab ID: L1333750-2

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	28
Coarse Sand	2.0mm - 4.75mm	10
Medium Sand	0.425mm - 2.0mm	17
Fine Sand	0.075mm - 0.425mm	19
Fines	< 0.075mm	26

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	37
Sand	0.05mm - 2mm	39
Silt	0.002mm - 0.05mm	18
Clay	< 0.002mm	6
Texture	Sandy loam	

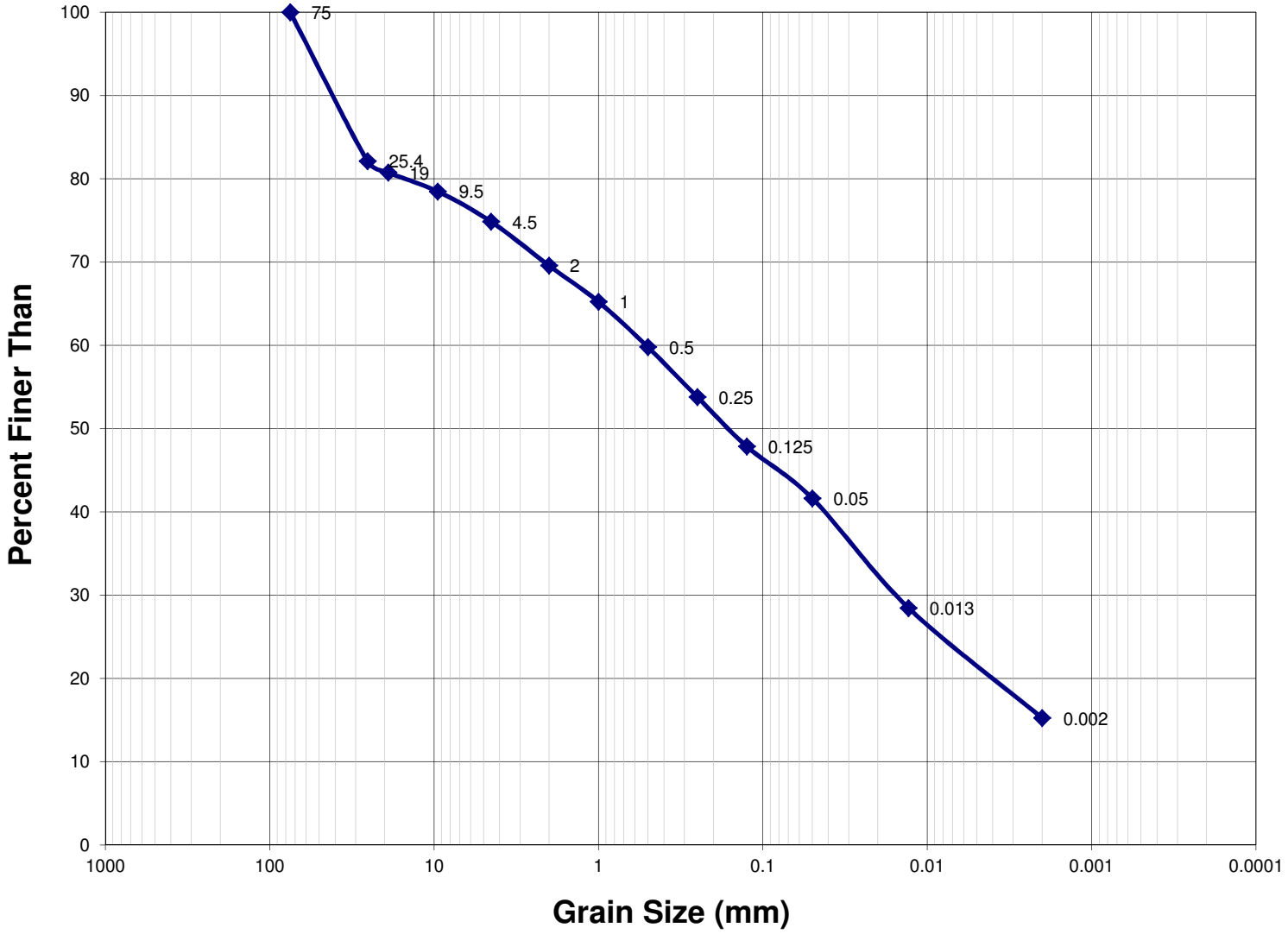
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-SS037_SOA
Lab ID: L1333750-3

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	25
Coarse Sand	2.0mm - 4.75mm	5
Medium Sand	0.425mm - 2.0mm	10
Fine Sand	0.075mm - 0.425mm	16
Fines	< 0.075mm	44

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	30
Sand	0.05mm - 2mm	28
Silt	0.002mm - 0.05mm	26
Clay	< 0.002mm	15

Texture Loam

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

CH2MHILL

CHAIN OF CUSTODY RECORD

7/16/2013 1:15:04 PM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 10 Days
Shipping Date: 7/16/2013
COC Number: ALS07161303

				Container:	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon			
				Preservatives:	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C			
				Filtered:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
				Holding Time:	180	28	28	28	28	180	28	180	180	180	180	NA	NA			
	DATE	TIME	Matrix		(CSSS (2008) 11.3 and 11.4) Ext Micro Nut (ZnFeCuMn)	(CSSS (2008) 12.2) SMP Buffer pH (for pH<6.0)	(CSSS (2008) 15.2.1 or 14.4.4) Sodium Adsorption Ratio	(CSSS (2008) 15.2.1) ECe (sat paste)	(CSSS (2008) 15.3) Soluable Salts	(CSSS (2008) 18.4) 1N, pH7 NH4OAc ext CaMgKNa incl CEC	(CSSS (2008) 20.3) CaCO3 equivalent	(CSSS (2008) 7.2 and 7.3.1 if pH>7.2) Available P (pH>7.2)	(CSSS 16.3 (2008)) pH (1:2 CaCL2) CP17	(S-11.10 in Gavlak et al. (2005)) Ca(H2PO4)2.H2O ext SO4-S	(SSSA (1996) p894-895 if pH<7.2) Available P (pH<7.2)	(ASTM 4318) Atterberg limits	(ASTM D422) Gradation		Number of Containers	COMMENTS
CH13-311-SS030_SOa	7/15/2013	11:48	Soil		X	X	X	X	X	X	X	X	X	X	X	X	X		4	
CH13-311-SS033_SOa	7/15/2013	12:59	Soil		X	X	X	X	X	X	X	X	X	X	X	X	X		4	
CH13-311-SS037_SOa	7/15/2013	13:45	Soil		X	X	X	X	X	X	X	X	X	X	X	X	X		5	
																	TOTAL NUMBER OF CONTAINERS		13	



L1333750-COFC

	Signatures	Date/Time
Approved by		
Sampled by		7/16/13
Relinquished by		1500
Received by		
Relinquished by		17-Jul-13
Received by		9:42

6.5°C 4.3°C

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA

Date Received: 17-JUL-13
Report Date: 01-AUG-13 13:25 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1333856

Project P.O. #: 472645.06.AD.01.04.13, PO=604564
Job Reference: BSI NE AREA OF GRUM PIT 2013 311.5C
C of C Numbers: ALS07161304
Legal Site Desc:

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1333856-1				
	Description	Soil				
	Sampled Date	15-JUL-13				
	Sampled Time	13:45				
	Client ID	CH13-311-SS037_SOA				
Grouping	**Analyte**					
SOIL						
Anions and Nutrients	Total Nitrogen by LECO (%)	0.029				
Plant Available Nutrients	Available Ammonium-N (mg/kg)	1.7				
	Calcium (Ca) (meq/100g)	17.6				
	Cation Exchange Capacity (meq/100g)	6.24				
	Magnesium (Mg) (meq/100g)	1.62				
	Available Nitrate-N (mg/kg)	<2.0				
	Potassium (K) (meq/100g)	<0.50				
	Sodium (Na) (meq/100g)	<0.50				
Saturated Paste Extractables	ESP (%)	N/A; Na<DL				
Metals	Phosphorus (P) (mg/kg)	641				

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CAT-XTR-SK	Soil	Ammonium Acetate Extractable Cations	CSSS 19.4 - 1M NH4OAc Extraction @ pH 7

Exchangeable Ca, Mg, Na, and K are extracted from the soil using neutral 1N ammonium acetate, then determined by ICP-OES. This method does not correct for calcium or magnesium extracted from carbonates or free gypsum.

CEC-SK	Soil	Cation Exchange Capacity (NH4OAC Extn)	CSSS(1978) 3.321/Comm Soil Sci 17(7)

Soil exchange sites are saturated with ammonium, then displaced with sodium. Ammonium in the extract is determined colorimetrically.

ETL-ESP-SK	Soil	Exchangeable Sodium Percentage - Calc	Calculation
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.

N-TOT-LECO-SK	Soil	Total Nitrogen by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.

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.

NO3-AVAIL-KCL-SK	Soil	Available Nitrate-N (2N KCl)	CSSS (1993) 4.2, 4.3

Available Nitrate and Nitrite are extracted from the soil using a 2N KCl 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) methods 4.2, 4.3

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

Chain of Custody Numbers:

ALS07161304

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CAT-XTR-SK	**Soil**							
Batch R2657227								
WG1712781-1 DUP		**L1333856-1**						
Sodium (Na)		<0.50	<0.50	RPD-NA	meq/100g	N/A	25	26-JUL-13
Potassium (K)		<0.50	<0.50	RPD-NA	meq/100g	N/A	25	26-JUL-13
Calcium (Ca)		17.6	17.4		meq/100g	1.0	30	26-JUL-13
Magnesium (Mg)		1.62	1.62		meq/100g	0.2	30	26-JUL-13
WG1712781-3 IRM		**SAL814**						
Sodium (Na)			95.0		%		70-130	26-JUL-13
Potassium (K)			95.5		%		70-130	26-JUL-13
Calcium (Ca)			97.3		%		70-130	26-JUL-13
Magnesium (Mg)			93.6		%		70-130	26-JUL-13
WG1712781-2 MB								
Sodium (Na)			<0.50		meq/100g		0.5	26-JUL-13
Potassium (K)			<0.50		meq/100g		0.5	26-JUL-13
Calcium (Ca)			<0.50		meq/100g		0.5	26-JUL-13
Magnesium (Mg)			<0.50		meq/100g		0.5	26-JUL-13
CEC-SK	**Soil**							
Batch R2657123								
WG1712780-1 DUP		**L1333856-1**						
Cation Exchange Capacity		6.24	6.35		meq/100g	1.9	20	26-JUL-13
WG1712780-3 IRM		**SAL814**						
Cation Exchange Capacity			89.6		%		70-130	26-JUL-13
WG1712780-2 MB								
Cation Exchange Capacity			<0.80		meq/100g		0.8	26-JUL-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2663563								
WG1716415-3 CRM		**VA-CANMET-TILL1**						
Phosphorus (P)			109.4		%		70-130	31-JUL-13
WG1716415-1 MB								
Phosphorus (P)			<50		mg/kg		50	31-JUL-13
N-TOT-LECO-SK	**Soil**							
Batch R2657334								
WG1712785-2 IRM		**08-109_SOIL**						
Total Nitrogen by LECO			0.098		%		0.085-0.135	24-JUL-13
WG1712785-4 MB								
Total Nitrogen by LECO			<0.020		%		0.02	24-JUL-13
NH4-AVAIL-SK	**Soil**							

Quality Control Report

Workorder: L1333856 Report Date: 01-AUG-13

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH4-AVAIL-SK	**Soil**							
Batch R2656337								
WG1712755-3 IRM		**SAL814**						
Available Ammonium-N			110.8		%		70-130	25-JUL-13
WG1712755-2 MB								
Available Ammonium-N			<1.0		mg/kg		1	25-JUL-13
NO3-AVAIL-KCL-SK	**Soil**							
Batch R2656277								
WG1712760-1 DUP		**L1333856-1**						
Available Nitrate-N		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	25-JUL-13
WG1712760-3 IRM		**SAL814**						
Available Nitrate-N			97.1		%		70-130	25-JUL-13
WG1712760-2 MB								
Available Nitrate-N			<2.0		mg/kg		2	25-JUL-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
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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.

CH2MHILL **CHAIN OF CUSTODY RECORD** *7/16/2013 1:15:15 PM* Page 1 OF 1

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 10 Days
Shipping Date: 7/16/2013
COC Number: ALS07161304

	Container:	1 Gallon	1 Gallon	1 Gallon	1 Gallon			
	Preservatives:	4'C	4'C	4'C	4'C			
	Filtered:	NA	NA	NA	NA			
	Holding Time:	28	28	28	NA			
		(CSSS (2008) 6.2) Nh4-N and NO3-N (2N KCL)	(EPA200.2/SW6020A) Total P	(SSSA (1996) P973-974) Total N	(ASTM D7503) Cation Exchange Capacity		Number of Containers	COMMENTS
CH13-311-SS037_SOa	7/15/2013 13:45 Soil	X	X	X	X		4	
						TOTAL NUMBER OF CONTAINERS	4	

L1333856-COFC

Signatures	Date/Time
Approved by	
Sampled by	7/16/13 1500
Relinquished by	
Received by	
Relinquished by	17-Jul-13 9:42
Received by	

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

6.5% 4.3%

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 22-JUL-13
Report Date: 25-OCT-13 10:28 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1336037

Project P.O. #: 472645.06.AD.01.04.13, PO=604564
Job Reference: BSI NE AREA OF GRUM PIT 2013 311.5C
C of C Numbers: ALS07211305, ALS07211305H, ALS07211305R
Legal Site Desc:

Comments:

25-OCT-13: Additional QC data has been included.

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1336037-1	L1336037-2	L1336037-3	L1336037-4	
	Description	Soil	Soil	Soil	Soil	
	Sampled Date	18-JUL-13	18-JUL-13	18-JUL-13	18-JUL-13	
	Sampled Time	08:57	09:33	10:44	10:58	
	Client ID	CH13-311-BH010_SOA	CH13-311-BH010_SOB	CH13-311-BH010_SOC	CH13-311-BH010_SOD	
Grouping	**Analyte**					
SOIL						
Physical Tests	Grain Size Curve	SEE ATTACHED	SEE ATTACHED		SEE ATTACHED	
	Moisture (%)	8.98	7.44	12.3	4.71	
	Liquid Limit (LL) (%)	27				
	pH (1:2 soil:water) (pH)	8.07	5.65	8.34	8.62	
	Plasticity Index (PI) (%)	6				
Organic / Inorganic Carbon	Inorganic Carbon (%)	0.13	<0.10	0.52	0.41	
	Inorganic Carbon (as CaCO3 Equivalent) (%)	1.12	<0.80	4.34	3.44	
	Organic Carbon (%)	<0.40	0.50	0.40	0.60	
	Organic Matter (%)	<0.70	0.80	<0.70	1.01	
Saturated Paste Extractables	Paste pH (pH)	7.51	6.10	7.41	7.73	
	% Saturation (%)	31.2	26.7	31.8	32.4	
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	10.0	3.0	35.0	16.0	
Metals	Aluminum (Al) (mg/kg)	21300	21800	15300	22600	
	Antimony (Sb) (mg/kg)	0.64	0.32	0.66	0.10	
	Arsenic (As) (mg/kg)	15.8	19.1	11.3	1.62	
	Barium (Ba) (mg/kg)	271	88.3	240	30.5	
	Beryllium (Be) (mg/kg)	0.74	0.76	0.74	0.78	
	Bismuth (Bi) (mg/kg)	1.18	0.31	0.30	0.24	
	Boron (B) (mg/kg)	<10	<10	<10	<10	
	Cadmium (Cd) (mg/kg)	0.441	0.234	0.425	0.052	
	Calcium (Ca) (mg/kg)	5700	1630	8580	4950	
	Chromium (Cr) (mg/kg)	46.6	31.1	35.6	31.6	
	Cobalt (Co) (mg/kg)	17.3	22.3	16.3	18.5	
	Copper (Cu) (mg/kg)	36.6	34.7	31.0	24.3	
	Iron (Fe) (mg/kg)	37100	39300	36200	52500	
	Lead (Pb) (mg/kg)	15.4	15.5	24.0	7.89	
	Lithium (Li) (mg/kg)	35.0	40.5	25.7	49.8	
	Magnesium (Mg) (mg/kg)	9430	8160	9340	13400	
	Manganese (Mn) (mg/kg)	513	375	472	526	
	Mercury (Hg) (mg/kg)	0.0344	0.0113	0.0391	<0.0050	
	Molybdenum (Mo) (mg/kg)	0.85	0.75	2.00	<0.50	
	Nickel (Ni) (mg/kg)	46.6	46.0	44.3	38.4	
	Phosphorus (P) (mg/kg)	653	481	644	566	
	Potassium (K) (mg/kg)	2260	1520	1860	620	
	Selenium (Se) (mg/kg)	0.24	0.33	0.51	<0.20	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1336037-1	L1336037-2	L1336037-3	L1336037-4	
	Description	Soil	Soil	Soil	Soil	
	Sampled Date	18-JUL-13	18-JUL-13	18-JUL-13	18-JUL-13	
	Sampled Time	08:57	09:33	10:44	10:58	
	Client ID	CH13-311-BH010_SOA	CH13-311-BH010_SOB	CH13-311-BH010_SOC	CH13-311-BH010_SOD	
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.17	<0.10	0.17	<0.10	
	Sodium (Na) (mg/kg)	280	180	180	130	
	Strontium (Sr) (mg/kg)	32.3	14.1	41.1	25.6	
	Sulfur (S)-Total (mg/kg)	<500	<500	1400	3200	
	Thallium (Tl) (mg/kg)	0.184	0.148	0.131	<0.050	
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	
	Titanium (Ti) (mg/kg)	426	368	295	43.5	
	Uranium (U) (mg/kg)	1.08	1.19	1.61	1.43	
	Vanadium (V) (mg/kg)	42.7	27.5	36.8	19.3	
	Zinc (Zn) (mg/kg)	102	97.1	104	106	

* 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	Phosphorus (P)	DUP-H	L1336037-1, -2, -3, -4

Qualifiers for Individual Parameters Listed:

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

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ATTERBERG-SK	Soil	Atterberg limits	CARTER CSSS 58

The liquid limit (or upper plastic limit) is the point at which the soil becomes semifluid, like softened butter. In operational terms, the liquid limit is defined as the water content at which a trapezoidal groove cut in moist soil is closed after 25 taps on a hard rubber plate (ASTM D-18, 1958).

The plastic limit (or lower plastic limit) is defined as the water content at which soil begins to crumble on being rolled into a thread 1/8 inch (or 3 mm) in diameter. It represents the lowest water content at which soil can be deformed readily without cracking.

The plastic index (which is the difference between the liquid and plastic limits) gives an indication of the "clayeyness" or plasticity of a clay and is employed in engineering classification systems for soils.

References: McKeague, J.A. 1978. Atterberg Limits pp 50 - 55 In: Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci. p. 50 - 55

B-200.2-CCMS-VA	Soil	Boron 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."

C-INORG-SK	Soil	Inorganic Carbon / Calcium Carbonate	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-ORG-WB-SK	Soil	Total Organic Carbon - Walkley Black	CSSS (1993) method 21.2

The soil sample is treated with excess potassium dichromate and sulfuric acid to oxidize organic carbon. Oxidized organic carbon is determined by back-titration with ferrous ammonium sulfate. Organic matter is estimated from the organic carbon result using the Van Bemmelon factor.

GRAIN SIZE-SK	Soil	Grain Size Analysis	SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

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

Reference Information

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.

IC-CACO3-CALC-SK	Soil	Inorganic Carbon as CaCO3 Equivalent	Calculation
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.

NP-TU	Soil	Neutralization Potential (NP)	Sobek 3.2.3, MOD
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.

PH-PASTE-VA	Soil	pH in Soil (Paste) by Meter	Carter-CSSS / APHA 4500 H

A soil extract produced by the saturated paste extraction procedure is analyzed by pH meter.

S-TOT-LECO-SK	Soil	Total Sulphur by combustion method	ISO 15178:2000

The sample is ignited in a combustion analyzer where sulfur in the reduced SO2 gas is determined using a thermal conductivity detector.

SAT-PCNT-VA	Soil	Saturation Percentage	Carter-CSSS

Saturation Percentage (SP) is the total volume of water present in a saturated paste (in mL) divided by the dry weight of the sample (in grams), expressed as a percentage, as described in "Soil Sampling and Methods of Analysis" by M. Carter.

** 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
TU	ALS ENVIRONMENTAL - TUCSON, ARIZONA, USA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

ALS07211305 ALS07211305H ALS07211305R

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-200.2-CCMS-VA	**Soil**							
Batch R2667648								
WG1721107-1 MB								
Boron (B)			<10		mg/kg		10	07-AUG-13
Batch R2667991								
WG1721107-4 CRM		**VA-CANMET-TILL1**						
Boron (B)			3		mg/kg		0-13	07-AUG-13
C-INORG-SK	**Soil**							
Batch R2657169								
WG1714458-1 DUP		**L1336037-2**						
Inorganic Carbon		<0.10	<0.10	RPD-NA	%	N/A	20	26-JUL-13
WG1714458-2 IRM		**0.1%IC**						
Inorganic Carbon			123.9		%		60-140	26-JUL-13
WG1714458-3 IRM		**0.4%IC**						
Inorganic Carbon			109.0		%		80-120	26-JUL-13
WG1714458-6 IRM		**0.1%IC**						
Inorganic Carbon			127.3		%		60-140	26-JUL-13
WG1714458-7 IRM		**0.4%IC**						
Inorganic Carbon			112.7		%		80-120	26-JUL-13
WG1714458-4 MB								
Inorganic Carbon			<0.10		%		0.1	26-JUL-13
WG1714458-8 MB								
Inorganic Carbon			<0.10		%		0.1	26-JUL-13
C-TOT-ORG-WB-SK	**Soil**							
Batch R2667987								
WG1720072-3 IRM		**FARM2009**						
Organic Carbon			107.8		%		80-120	07-AUG-13
Organic Matter			107.4		%		80-120	07-AUG-13
WG1720072-2 MB								
Organic Carbon			<0.40		%		0.4	07-AUG-13
Organic Matter			<0.70		%		0.7	07-AUG-13
HG-200.2-CVAF-VA	**Soil**							
Batch R2667594								
WG1721107-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			99.7		%		70-130	07-AUG-13
WG1721107-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	07-AUG-13
MET-200.2-CCMS-VA	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2667648								
WG1721107-1 MB								
Aluminum (Al)			<50		mg/kg		50	07-AUG-13
Antimony (Sb)			<0.10		mg/kg		0.1	07-AUG-13
Arsenic (As)			<0.050		mg/kg		0.05	07-AUG-13
Barium (Ba)			<0.50		mg/kg		0.5	07-AUG-13
Beryllium (Be)			<0.20		mg/kg		0.2	07-AUG-13
Bismuth (Bi)			<0.20		mg/kg		0.2	07-AUG-13
Cadmium (Cd)			<0.050		mg/kg		0.05	07-AUG-13
Calcium (Ca)			<50		mg/kg		50	07-AUG-13
Chromium (Cr)			<0.50		mg/kg		0.5	07-AUG-13
Cobalt (Co)			<0.10		mg/kg		0.1	07-AUG-13
Copper (Cu)			<0.50		mg/kg		0.5	07-AUG-13
Iron (Fe)			<50		mg/kg		50	07-AUG-13
Lead (Pb)			<0.50		mg/kg		0.5	07-AUG-13
Lithium (Li)			<5.0		mg/kg		5	07-AUG-13
Magnesium (Mg)			<20		mg/kg		20	07-AUG-13
Manganese (Mn)			<1.0		mg/kg		1	07-AUG-13
Molybdenum (Mo)			<0.50		mg/kg		0.5	07-AUG-13
Nickel (Ni)			<0.50		mg/kg		0.5	07-AUG-13
Phosphorus (P)			<50		mg/kg		50	07-AUG-13
Potassium (K)			<100		mg/kg		100	07-AUG-13
Selenium (Se)			<0.20		mg/kg		0.2	07-AUG-13
Silver (Ag)			<0.10		mg/kg		0.1	07-AUG-13
Sodium (Na)			<100		mg/kg		100	07-AUG-13
Strontium (Sr)			<0.50		mg/kg		0.5	07-AUG-13
Thallium (Tl)			<0.050		mg/kg		0.05	07-AUG-13
Tin (Sn)			<2.0		mg/kg		2	07-AUG-13
Titanium (Ti)			<1.0		mg/kg		1	07-AUG-13
Uranium (U)			<0.050		mg/kg		0.05	07-AUG-13
Vanadium (V)			<0.20		mg/kg		0.2	07-AUG-13
Zinc (Zn)			<1.0		mg/kg		1	07-AUG-13
Batch R2667991								
WG1721107-3 CRM		**VA-CANMET-TILL1**						
Aluminum (Al)			107.1		%		70-130	07-AUG-13
Antimony (Sb)			105.6		%		70-130	07-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2667991								
WG1721107-3 CRM		**VA-CANMET-TILL1**						
Arsenic (As)			112.6		%		70-130	07-AUG-13
Barium (Ba)			108.1		%		70-130	07-AUG-13
Beryllium (Be)			0.52		mg/kg		0.34-0.74	07-AUG-13
Bismuth (Bi)			109.6		%		70-130	07-AUG-13
Cadmium (Cd)			95.6		%		70-130	07-AUG-13
Calcium (Ca)			105.4		%		70-130	07-AUG-13
Chromium (Cr)			112.9		%		70-130	07-AUG-13
Cobalt (Co)			108.9		%		70-130	07-AUG-13
Copper (Cu)			106.4		%		70-130	07-AUG-13
Iron (Fe)			100.3		%		70-130	07-AUG-13
Lead (Pb)			97.0		%		70-130	07-AUG-13
Lithium (Li)			104.3		%		70-130	07-AUG-13
Magnesium (Mg)			104.2		%		70-130	07-AUG-13
Manganese (Mn)			102.3		%		70-130	07-AUG-13
Molybdenum (Mo)			0.72		mg/kg		0.24-1.24	07-AUG-13
Nickel (Ni)			111.2		%		70-130	07-AUG-13
Phosphorus (P)			103.5		%		70-130	07-AUG-13
Potassium (K)			118.2		%		70-130	07-AUG-13
Selenium (Se)			0.33		mg/kg		0.12-0.52	07-AUG-13
Silver (Ag)			0.25		mg/kg		0.12-0.32	07-AUG-13
Sodium (Na)			118.9		%		70-130	07-AUG-13
Strontium (Sr)			106.4		%		70-130	07-AUG-13
Thallium (Tl)			0.124		mg/kg		0.075-0.175	07-AUG-13
Tin (Sn)			1.0		mg/kg		0-3	07-AUG-13
Titanium (Ti)			106.8		%		70-130	07-AUG-13
Uranium (U)			106.5		%		70-130	07-AUG-13
Vanadium (V)			111.6		%		70-130	07-AUG-13
Zinc (Zn)			106.9		%		70-130	07-AUG-13
MOISTURE-VA	**Soil**							
Batch R2663705								
WG1718294-2 LCS								
Moisture			99.7		%		70-130	31-JUL-13
WG1718294-1 MB								
Moisture			<0.25		%		0.25	31-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-VA	**Soil**							
Batch R2664903								
WG1719998-2 LCS								
Moisture			99.5		%		70-130	02-AUG-13
WG1719998-1 MB								
Moisture			<0.25		%		0.25	02-AUG-13
S-TOT-LECO-SK	**Soil**							
Batch R2657165								
WG1714158-15 DUP		**L1336037-1**						
Sulfur (S)-Total		<500	<500	RPD-NA	mg/kg	N/A	30	26-JUL-13
WG1714158-16 IRM		**1646A_SOIL**						
Sulfur (S)-Total			3500		mg/kg		2500-4600	26-JUL-13
WG1714158-17 MB								
Sulfur (S)-Total			<500		mg/kg		500	26-JUL-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
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
J	Duplicate results and limits are expressed in terms of absolute difference.
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							
Moisture content							
	3	18-JUL-13 10:44	02-AUG-13 08:32	14	15	days	EHT
	4	18-JUL-13 10:58	02-AUG-13 08:32	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 L1336037 were received on 22-JUL-13 10:22.

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.

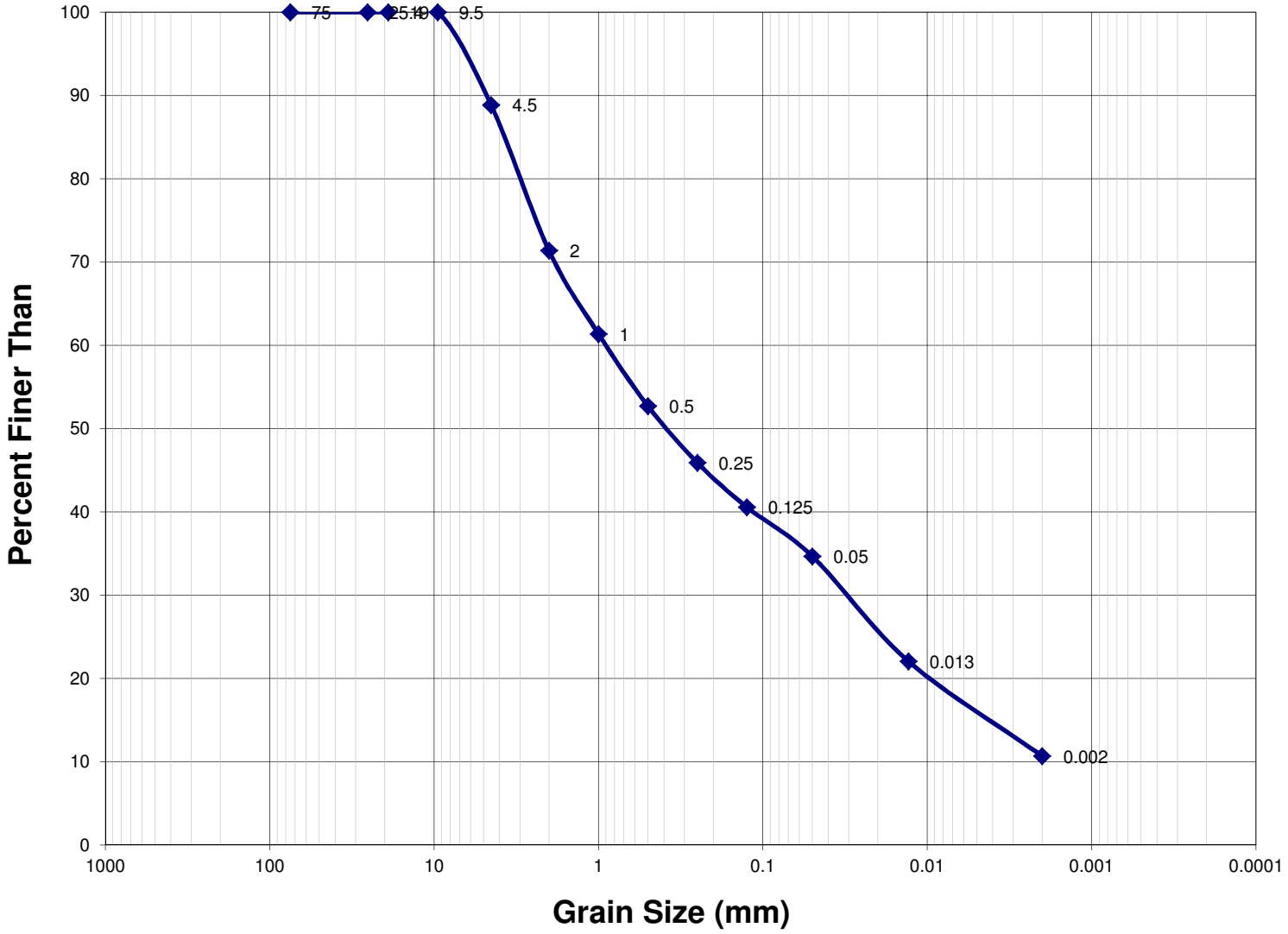
Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH010_SOA
Lab ID: L1336037-1

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	11
Coarse Sand	2.0mm - 4.75mm	18
Medium Sand	0.425mm - 2.0mm	19
Fine Sand	0.075mm - 0.425mm	16
Fines	< 0.075mm	37

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	29
Sand	0.05mm - 2mm	37
Silt	0.002mm - 0.05mm	24
Clay	< 0.002mm	11
Texture	Loam	

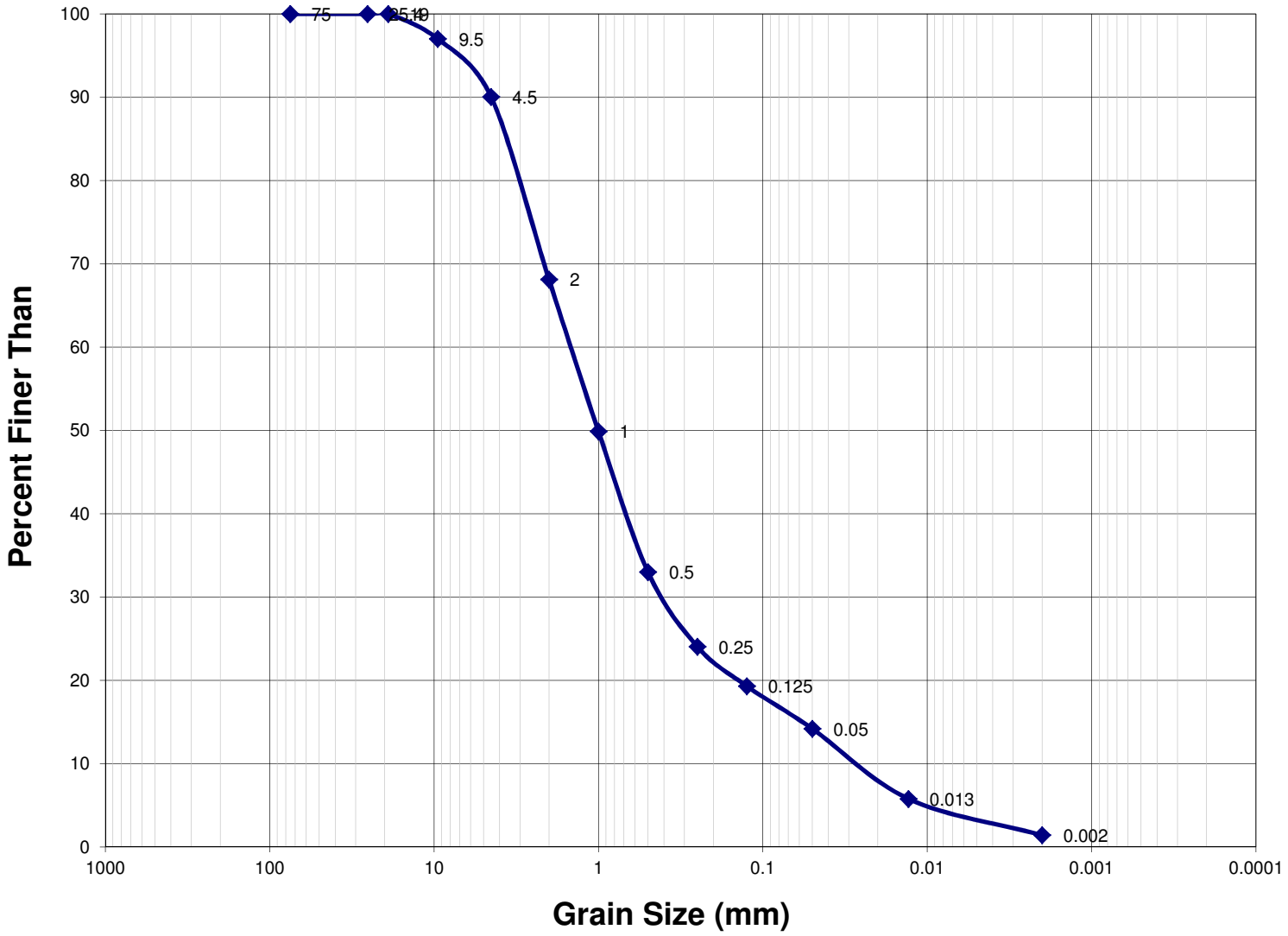
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH010_SOB
Lab ID: L1336037-2

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	10
Coarse Sand	2.0mm - 4.75mm	22
Medium Sand	0.425mm - 2.0mm	35
Fine Sand	0.075mm - 0.425mm	17
Fines	< 0.075mm	16

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	32
Sand	0.05mm - 2mm	54
Silt	0.002mm - 0.05mm	13
Clay	< 0.002mm	1
Texture	Loamy sand	

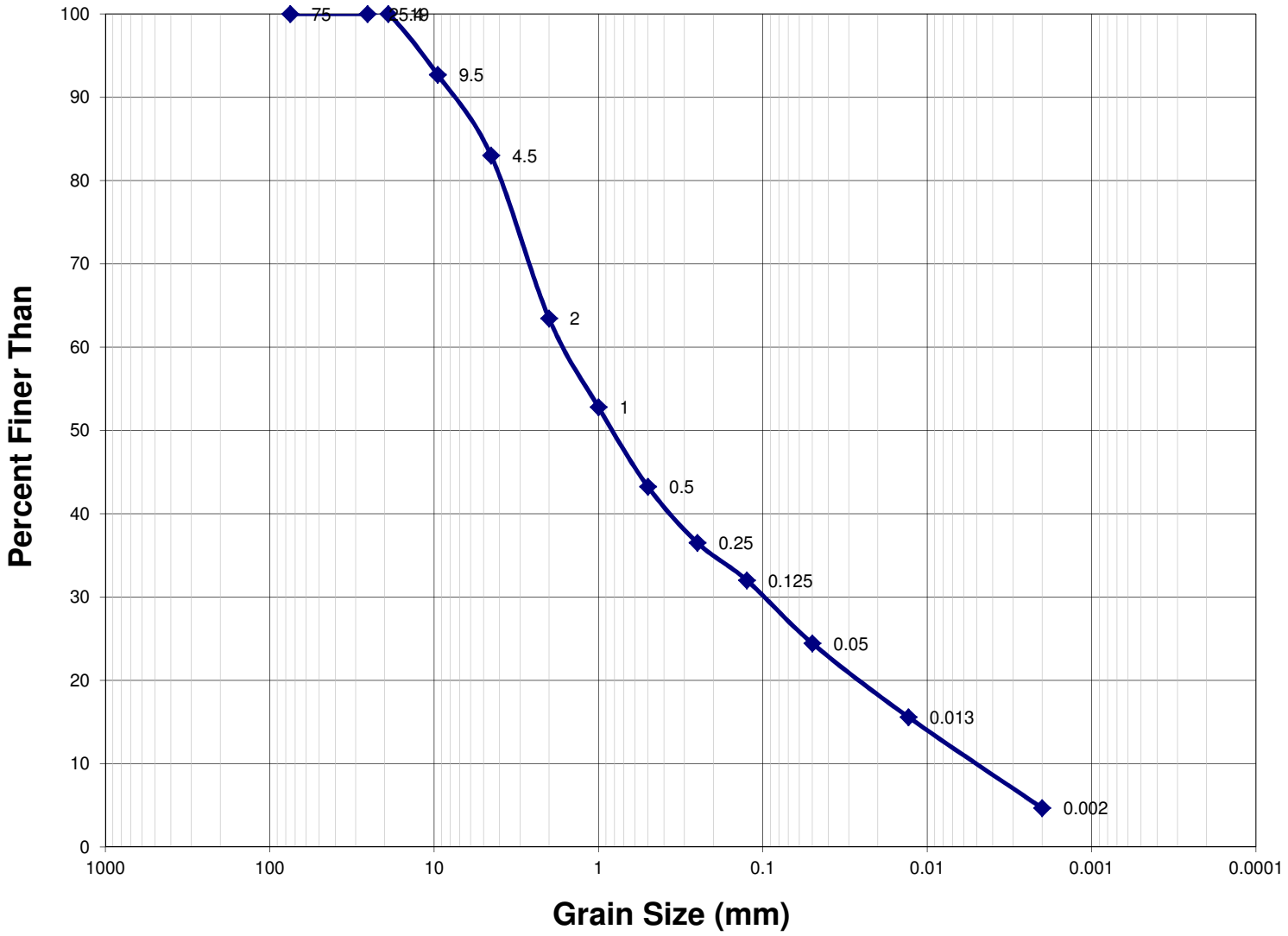
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH010_SOD
Lab ID: L1336037-4

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	17
Coarse Sand	2.0mm - 4.75mm	20
Medium Sand	0.425mm - 2.0mm	20
Fine Sand	0.075mm - 0.425mm	16
Fines	< 0.075mm	27

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	37
Sand	0.05mm - 2mm	39
Silt	0.002mm - 0.05mm	20
Clay	< 0.002mm	5

Texture Sandy loam

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Environmental

August 31, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1336037 **Date Received:** August 8, 2013

Certificate of Analysis

Client ID:	Sample Date:		Lab #:		Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3/1,000t$
L1336037-2	7/18/13	0000	T1301155-001		3.05	3
L1336037-3	7/18/13	0000	T1301155-002		9.75	35
L1336037-4	7/18/13	0000	T1301155-003		4.38	16

Notes:
Samples were air dried then ground to < 60 mesh.

W. Hyatt
Digitally signed by Wendy Hyatt
Date: 2013.08.31 11:23:59 -07'00'

Wendy Hyatt, Project Chemist

ALS Environmental

August 31, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1336037 **Date Received:** August 8, 2013

Quality Control

				Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3$/1,000t
Prep Blank				<0.01	< 1
Laboratory Control Sample (LCS) - Rice Flour CN 3451			Observed Value	9.83	n/a
			True Value	9.50	
			%R	**103**	
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	1,038
			True Value		1,000
			%R		**104**
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	975
			True Value		1,000
			%R		**98**
Duplicate Results			*T1301153-001	0.22 **	
			Duplicate	0.23 **	
			%R	**4**	
Duplicate Results			*T1301153-001		59
			Duplicate		55
			%RPD		**7**
Duplicate Results			*T1301153-002		22
			Duplicate		21
			%RPD		**5**

* Sample from the same batch, but a different project.

August 31, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1336037 **Date Received:** August 8, 2013

Quality Control

				Moisture, Total	Neutralization Potential
				3.1	Sobek 3.2.3, MOD
				wt%	$tCaCO_3$/1,000t

**Residual moisture - does not include air dry moisture.

ALS Environmental

September 18, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA

Attn: Amber Springer

Project: L1336037 **Date Received:** September 9, 2013

Certificate of Analysis

Client ID:	Sample Date:	Lab #:		Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3/1,000t$
L1336037- 1	7/18/2013 0000	T1301338- 001		7.88	10

Notes:
Samples were air dried then ground to < 60 mesh.

Digitally signed by Wendy Hyatt
Date: 2013.09.18 08:09:12 -07'00'

Wendy Hyatt, Project Chemist

ADDRESS 3860 S. Palo Verde Road, Suite 302, Tucson, AZ 85714
PHONE +1 520 573 1061
FAX +1 520 573 1063

ALS Environmental

September 18, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1336037 **Date Received:** September 9, 2013

Quality Control

				Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3$/1,000t
Prep Blank				<0.01	< 1
Laboratory Control Sample (LCS) - Rice Flour CN 3451			Observed Value	9.42	n/a
			True Value	9.50	
			%R	**99**	
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	966
			True Value		1,000
			%R		**97**
Duplicate Results			T1301338-001	0.60 **	
			Duplicate	0.59 **	
			%R	**2**	
Duplicate Results			*T1301301245-002		7
			Duplicate		6
			%RPD		**15**

* Sample from the same batch, but a different project.

**Residual moisture - does not include air dry moisture.

CH2MHILL

CHAIN OF CUSTODY RECORD

7/21/2013 10:09:34 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 3 Days
Shipping Date: 7/20/2013
COC Number: ALS07211305R

	Container:	1 Gallon
	Preservatives:	4°C
	Filtered:	NA
	Holding Time:	180

L1336037-COFC

	DATE	TIME	Matrix	(ISO 15178-2000) Total Sulphur	Number of Containers	COMMENTS
CH13-311-BH010_SOa	7/18/2013	8:57	Soil	X	1	RUSH
CH13-311-BH010_SOb	7/18/2013	9:33	Soil	X	1	
CH13-311-BH010_SOc	7/18/2013	10:44	Soil	X	1	
CH13-311-BH010_SOd	7/18/2013	10:58	Soil	X	1	
				TOTAL NUMBER OF CONTAINERS	4	

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		7/21/13 13:00
Received by		
Relinquished by		
Received by		

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

7/21/2013 10:09:13 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 10 Days
Shipping Date: 7/20/2013
COC Number: ALS07211305

				Container:	4oz jar	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon		
				Preservatives:	4°C	4°C	4°C	4°C	4°C	4°C	4°C		
				Filtered:	NA	NA	NA	NA	NA	NA	NA		
				Holding Time:	14	28	14	28	28	NA	NA		
	DATE	TIME	Matrix		(ASTM 2216) Moisture	(CSSS/APHA4500H) Paste pH	(EPA200.0/245.7/SW6020A) Total Metals Table 1	(ModifiedSobek) Mod Neutralization Potential	(SSSA (1996) P455-456) TIC	(ASTM 4318) Atterberg limits	(ASTM D422) Gradation	Number of Containers	COMMENTS
CH13-311-BH010_SOa	7/18/2013	8:57	Soil		X	X	X	X	X	X	X	5	
CH13-311-BH010_SOb	7/18/2013	9:33	Soil		X	X	X	X	X		X	4	
CH13-311-BH010_SOc	7/18/2013	10:44	Soil		X	X	X	X	X			3	
CH13-311-BH010_SOd	7/18/2013	10:58	Soil		X	X	X	X	X		X	4	
											TOTAL NUMBER OF CONTAINERS	16	

L1336037-COFC

Approved by
Sampled by
Relinquished by
Received by
Relinquished by
Received by

Signatures

Date/Time 7/21/13 1300

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:

Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

7/21/2013 10:09:24 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 10 Days
Shipping Date: 7/20/2013
COC Number: ALS07211305H

				Container:	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon			
				Preservatives:	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C			
				Filtered:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
				Holding Time:	14	14	180	180	14	14	14	14	14	28	14			
					(DI/AS7MD1498) DI ORP	(DI/E245.7) DI Mercury	(DI/E300) DI Sulphate	(DI/EPA600/2-78-054) Acid Soluable Sulfate	(DI/SM2310) DI Acidity	(DI/SM2320) DI Alkalinity	(DI/SM2510) DI Conductivity	(DI/SM4500H) DI pH	(DI/SW6020A) DI Diss Metals	(SSSA (1996) P995-996) TOC	(SW6020A) Bat(L) Metaborate		Number of Containers	COMMENTS
	DATE	TIME	Matrix															
CH13-311-BH010_SOa	7/18/2013	8:57	Soil		X	X	X	X	X	X	X	X	X	X	X		4	HOLD
CH13-311-BH010_SOb	7/18/2013	9:33	Soil		X	X	X	X	X	X	X	X	X	X	X		4	
CH13-311-BH010_SOc	7/18/2013	10:44	Soil		X	X	X	X	X	X	X	X	X	X	X		4	
CH13-311-BH010_SOd	7/18/2013	10:58	Soil		X	X	X	X	X	X	X	X	X	X	X		4	
																TOTAL NUMBER OF CONTAINERS	16	

L1336037-COFC

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		7/20/13 1300
Received by		
Relinquished by		
Received by		

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Ta
on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 22-JUL-13
Report Date: 24-OCT-13 11:56 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1336049

Project P.O. #:	472645.06.AD.01.04.13, PO=604564
Job Reference:	BSI NE AREA OF GRUM PIT 2013 311.5C
C of C Numbers:	ALS07211306
Legal Site Desc:	

Comments:

24-OCT-13: Additional QC data has been included.

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1336049-1	L1336049-2	L1336049-3		
	Description	Soil	Soil	Soil		
	Sampled Date	18-JUL-13	18-JUL-13	18-JUL-13		
	Sampled Time	08:57	09:33	10:58		
	Client ID	CH13-311-BH010_SOA	CH13-311-BH010_SOB	CH13-311-BH010_SOD		
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 CaCl2) (pH)	7.32	5.07	7.80		
Anions and Nutrients	Total Nitrogen by LECO (%)	0.036				
Organic / Inorganic Carbon	CaCO3 Equivalent (%)	<0.80	<0.80	2.50		
	Inorganic Carbon (%)	<0.10	<0.10	0.30		
	Total Carbon by Combustion (%)	0.2	0.7	0.7		
	Total Organic Carbon (%)	0.23	0.69	0.36		
Plant Available Nutrients	Available Ammonium-N (mg/kg)	1.1				
	Calcium (Ca) (meq/100g)	6.89	0.67	3.53		
	Cation Exchange Capacity (meq/100g)	7.41	6.48	2.72		
	Copper (Cu) (mg/kg)	0.78	0.84	0.42		
	Iron (Fe) (mg/kg)	30.4	54.8	60.9		
	Magnesium (Mg) (meq/100g)	0.68	<0.50	1.34		
	Manganese (Mn) (mg/kg)	5.82	4.38	6.52		
	Available Nitrate-N (mg/kg)	<2.0				
	Available Phosphate-P (mg/kg)	5.0	2.3	<1.0		
	Potassium (K) (meq/100g)	<0.50	<0.50	<0.50		
	Sodium (Na) (meq/100g)	<0.50	<0.50	<0.50		
	Available Sulfate-S (mg/kg)	9.0	37.0	26.0		
	Zinc (Zn) (mg/kg)	0.61	0.43	0.45		
Saturated Paste Extractables	SAR (SAR)	0.25	1.35	1.78		
	Calcium (Ca) (mg/L)	50.5	20.9	26.9		
	Chloride (Cl) (mg/L)	6.7	37.4	47.6		
	Conductivity Sat. Paste (dS m-1)	0.33	0.39	0.44		
	ESP (%)	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL		
	Magnesium (Mg) (mg/L)	5.1	8.1	6.9		
	pH in Saturated Paste (pH)	7.63	5.52	8.16		
	Potassium (K) (mg/L)	4.0	8.6	22.7		
	% Saturation (%)	41.1	29.4	37.1		
	Sodium (Na) (mg/L)	7.1	28.6	40.1		
	Sulfur (as SO4) (mg/L)	66.0	66.4	178		
Metals	Phosphorus (P) (mg/kg)	761				
Miscellaneous	SMP Buffer pH (pH)	7.50	7.61	7.59		

* 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)
Internal Reference Material	Calcium (Ca)	DLA	L1336049-1, -2, -3
Internal Reference Material	Magnesium (Mg)	DLA	L1336049-1, -2, -3
Internal Reference Material	Potassium (K)	DLA	L1336049-1, -2, -3
Internal Reference Material	Sodium (Na)	DLA	L1336049-1, -2, -3
Internal Reference Material	Sulfur (as SO4)	DLA	L1336049-1, -2, -3
Internal Reference Material	Calcium (Ca)	DLA	L1336049-1, -2, -3
Internal Reference Material	Magnesium (Mg)	DLA	L1336049-1, -2, -3
Internal Reference Material	Potassium (K)	DLA	L1336049-1, -2, -3
Internal Reference Material	Sodium (Na)	DLA	L1336049-1, -2, -3
Internal Reference Material	Chloride (Cl)	DLA	L1336049-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-INORG-ORG-SK	Soil	Inorganic and Organic Carbon	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-LECO-SK	Soil	Total Carbon by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.

CAT-XTR-SK	Soil	Ammonium Acetate Extractable Cations	CSSS 19.4 - 1M NH4OAc Extraction @ pH 7

Exchangeable Ca, Mg, Na, and K are extracted from the soil using neutral 1N ammonium acetate, then determined by ICP-OES. This method does not correct for calcium or magnesium extracted from carbonates or free gypsum.

CEC-SK	Soil	Cation Exchange Capacity (NH4OAC Extn)	CSSS(1978) 3.321/Comm Soil Sci 17(7)

Soil exchange sites are saturated with ammonium, then displaced with sodium. Ammonium in the extract is determined colorimetrically.

CL-SAR-SK	Soil	Chloride (Cl) (Saturated Paste)	CSSS(1993) 18.2.2/APHA 4500-CL E

Chloride in a saturated soil extract is determined colorimetrically by auto-analyzer.

ETL-ESP-SK	Soil	Exchangeable Sodium Percentage - Calc	Calculation
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.

METAL-DTPA-SK	Soil	Available Micronutrients (Cu,Fe,Zn,Mn)	CSSS 1993 (11.3 AND 11.4)

Plant available micronutrients are extracted from soil using 0.005 M DTPA. Cu, Fe, Mn and Zn in the extract are determined by ICP-OES.

N-TOT-LECO-SK	Soil	Total Nitrogen by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.

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.

Reference Information

NO3-AVAIL-KCL-SK	Soil	Available Nitrate-N (2N KCl)	CSSS (1993) 4.2, 4.3

Available Nitrate and Nitrite are extracted from the soil using a 2N KCl 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) methods 4.2, 4.3

PH-1:2CACL2-SK	Soil	pH (1:2 Soil:CaCl2 Extraction)	CSSC 3.11

1 part dry soil and 2 parts de-ionized 0.01M CaCl2 (by volume) is mixed. The slurry is allowed to stand with occasional stirring for 30 - 60 minutes. pH of the soil slurry is then measured using a pH meter.

PH-BUFFER-SMP-SK	Soil	Buffer pH (SMP)	CSSS (1993) method 14.2

After equilibration with SMP buffer solution, pH of the soil solution is measured with a pH meter. Lime requirement must be determined by the client using location-specific regression equations.

PO4-AVAIL-BRAY-SK	Soil	Plant Available Phosphate-P (Bray)	SSSA (1996) p. 894-895

Plant available phosphorus is extracted from the sample using Bray-1 solution (0.025M HCl and 0.03M NH4F). PO4-P in the filtered extract is determined colorimetrically at 880 nm

PO4-AVAIL-OLSEN-SK	Soil	Available Phosphate-P by Olsen	CSSS (1993) 7.2,7.3.1

Plant available phosphorus is extracted from the sample with sodium bicarbonate. PO4-P in the filtered extract is determined colorimetrically at 880 nm.

SAR-CALC-SK	Soil	SAR and Cations in saturated soil	CSSS 18.4-Calculation
SAR-CALC-SO4-SK	Soil	SAR, Cations and SO4 in saturated soil	APHA 3120B

Ca, Mg, Na, K and SO4 in a saturated soil extract are determined by ICP-OES.

SAT/PH/EC-SK	Soil	pH and EC (Saturated Paste)	CSSS 18.2.2/CSSC 3.14/CSSS 18.3.1

pH of a saturated soil paste is measured using a pH meter. After equilibration, an extract is obtained by vacuum filtration with conductivity of the extract measured by a conductivity meter.

SO4-AVAIL-CALPHOS-SK	Soil	Plant Available Sulfate - Ca(H2PO4)2	NCR (1998) p. 36/APHA 3120B

Plant available sulfate is extracted from the sample using dilute calcium phosphate. SO4-S in the filtered extract is determined by ICP-OES.

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

Chain of Custody Numbers:

ALS07211306

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

Workorder: L1336049 Report Date: 24-OCT-13

Client: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-INORG-ORG-SK	**Soil**							
Batch R2664605								
WG1717325-2 IRM		**0.1%IC**						
Inorganic Carbon			130.2		%		60-140	02-AUG-13
CaCO3 Equivalent			130.8		%		60-140	02-AUG-13
WG1717325-3 IRM		**0.4%IC**						
Inorganic Carbon			104.7		%		80-120	02-AUG-13
CaCO3 Equivalent			104.8		%		80-120	02-AUG-13
WG1717325-6 IRM		**0.1%IC**						
Inorganic Carbon			88.0		%		60-140	02-AUG-13
CaCO3 Equivalent			88.4		%		60-140	02-AUG-13
WG1717325-7 IRM		**0.4%IC**						
Inorganic Carbon			98.6		%		80-120	02-AUG-13
CaCO3 Equivalent			98.8		%		80-120	02-AUG-13
WG1717325-4 MB								
Inorganic Carbon			<0.10		%		0.1	02-AUG-13
CaCO3 Equivalent			<0.80		%		0.8	02-AUG-13
WG1717325-8 MB								
Inorganic Carbon			<0.10		%		0.1	02-AUG-13
CaCO3 Equivalent			<0.80		%		0.8	02-AUG-13
C-TOT-LECO-SK	**Soil**							
Batch R2664632								
WG1717318-18 IRM		**08-109_SOIL**						
Total Carbon by Combustion			99.7		%		80-120	31-JUL-13
WG1717318-22 IRM		**08-109_SOIL**						
Total Carbon by Combustion			103.1		%		80-120	31-JUL-13
WG1717318-20 MB								
Total Carbon by Combustion			<0.1		%		0.1	31-JUL-13
WG1717318-24 MB								
Total Carbon by Combustion			<0.1		%		0.1	31-JUL-13
CAT-XTR-SK	**Soil**							
Batch R2664576								
WG1717287-3 IRM		**SAL814**						
Sodium (Na)			104.0		%		70-130	02-AUG-13
Potassium (K)			109.8		%		70-130	02-AUG-13
Calcium (Ca)			108.5		%		70-130	02-AUG-13
Magnesium (Mg)			99.6		%		70-130	02-AUG-13
WG1717287-2 MB								
Sodium (Na)			<0.50		meq/100g		0.5	02-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CAT-XTR-SK	**Soil**							
Batch R2664576								
WG1717287-2 MB								
Potassium (K)			<0.50		meq/100g		0.5	02-AUG-13
Calcium (Ca)			<0.50		meq/100g		0.5	02-AUG-13
Magnesium (Mg)			<0.50		meq/100g		0.5	02-AUG-13
CEC-SK	**Soil**							
Batch R2664677								
WG1717289-3 IRM		**SAL814**						
Cation Exchange Capacity			122.5		%		70-130	02-AUG-13
WG1717289-2 MB								
Cation Exchange Capacity			<0.80		meq/100g		0.8	02-AUG-13
CL-SAR-SK	**Soil**							
Batch R2663849								
WG1717507-1 DUP		**L1336049-1**						
Chloride (Cl)		6.7	5.8		mg/L	15	30	01-AUG-13
WG1717507-3 IRM		**ED-SAL_NAT1**						
Chloride (Cl)			87.0		%		70-130	01-AUG-13
WG1717507-2 MB								
Chloride (Cl)			<2.0		mg/L		2	01-AUG-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2672374								
WG1723968-3 CRM		**VA-CANMET-TILL1**						
Phosphorus (P)			101.5		%		70-130	13-AUG-13
WG1723968-1 MB								
Phosphorus (P)			<50		mg/kg		50	13-AUG-13
METAL-DTPA-SK	**Soil**							
Batch R2663671								
WG1717234-3 IRM		**11-119**						
Copper (Cu)			102.5		%		70-130	01-AUG-13
Iron (Fe)			118.6		%		70-130	01-AUG-13
Manganese (Mn)			100.1		%		70-130	01-AUG-13
Zinc (Zn)			103.8		%		70-130	01-AUG-13
WG1717234-2 MB								
Copper (Cu)			<0.10		mg/kg		0.1	01-AUG-13
Iron (Fe)			<2.0		mg/kg		2	01-AUG-13
Manganese (Mn)			<0.050		mg/kg		0.05	01-AUG-13
Zinc (Zn)			<0.20		mg/kg		0.2	01-AUG-13
	Soil							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
N-TOT-LECO-SK	**Soil**							
Batch R2664632								
WG1717318-18 IRM		**08-109_SOIL**						
Total Nitrogen by LECO			0.102		%		0.085-0.135	31-JUL-13
WG1717318-22 IRM		**08-109_SOIL**						
Total Nitrogen by LECO			0.091		%		0.085-0.135	31-JUL-13
WG1717318-20 MB								
Total Nitrogen by LECO			<0.020		%		0.02	31-JUL-13
WG1717318-24 MB								
Total Nitrogen by LECO			<0.020		%		0.02	31-JUL-13
NH4-AVAIL-SK	**Soil**							
Batch R2663266								
WG1717258-3 IRM		**SAL814**						
Available Ammonium-N			107.3		%		70-130	31-JUL-13
WG1717258-2 MB								
Available Ammonium-N			<1.0		mg/kg		1	31-JUL-13
NO3-AVAIL-KCL-SK	**Soil**							
Batch R2663259								
WG1717235-3 IRM		**SAL814**						
Available Nitrate-N			88.9		%		70-130	31-JUL-13
WG1717235-2 MB								
Available Nitrate-N			<2.0		mg/kg		2	31-JUL-13
PH-1:2CACL2-SK	**Soil**							
Batch R2663600								
WG1717238-3 IRM		**SAL814**						
pH (1:2 CaCl2)			7.88		pH		7.55-8.15	01-AUG-13
PH-BUFFER-SMP-SK	**Soil**							
Batch R2663886								
WG1717297-3 IRM		**SAL814**						
SMP Buffer pH			7.62		pH		7.44-7.64	01-AUG-13
PO4-AVAIL-BRAY-SK	**Soil**							
Batch R2663904								
WG1717245-3 IRM		**SAL814**						
Available Phosphate-P			104.6		%		70-130	01-AUG-13
WG1717245-2 MB								
Available Phosphate-P			<2.0		mg/kg		2	01-AUG-13
PO4-AVAIL-OLSEN-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4-AVAIL-OLSEN-SK	**Soil**							
Batch R2663248								
WG1717248-3 IRM		**FARM2005**						
Available Phosphate-P			91.4		%		70-130	31-JUL-13
WG1717248-2 MB								
Available Phosphate-P			<1.0		mg/kg		1	31-JUL-13
SAR-CALC-SK	**Soil**							
Batch R2663766								
WG1717507-1 DUP		**L1336049-1**						
Calcium (Ca)		50.5	49.7		mg/L	1.6	30	01-AUG-13
Potassium (K)		4.0	3.5		mg/L	14	30	01-AUG-13
Magnesium (Mg)		5.1	4.5		mg/L	14	30	01-AUG-13
Sodium (Na)		7.1	6.1		mg/L	15	30	01-AUG-13
WG1717507-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			98.1		%		70-130	01-AUG-13
Potassium (K)			97.3		%		70-130	01-AUG-13
Magnesium (Mg)			93.5		%		70-130	01-AUG-13
Sodium (Na)			109.6		%		70-130	01-AUG-13
WG1717507-2 MB								
Calcium (Ca)			<2.0		mg/L		2	01-AUG-13
Potassium (K)			<1.0		mg/L		1	01-AUG-13
Magnesium (Mg)			<2.0		mg/L		2	01-AUG-13
Sodium (Na)			<4.0		mg/L		4	01-AUG-13
SAR-CALC-SO4-SK	**Soil**							
Batch R2663766								
WG1717507-1 DUP		**L1336049-1**						
Calcium (Ca)		50.5	49.7		mg/L	1.6	30	01-AUG-13
Potassium (K)		4.0	3.5		mg/L	14	30	01-AUG-13
Magnesium (Mg)		5.1	4.5		mg/L	14	30	01-AUG-13
Sodium (Na)		7.1	6.1		mg/L	15	30	01-AUG-13
Sulfur (as SO4)		66.0	66.5		mg/L	0.9	30	01-AUG-13
WG1717507-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			98.1		%		70-130	01-AUG-13
Potassium (K)			97.3		%		70-130	01-AUG-13
Magnesium (Mg)			93.5		%		70-130	01-AUG-13
Sodium (Na)			109.6		%		70-130	01-AUG-13
Sulfur (as SO4)			96.1		%		70-130	01-AUG-13
WG1717507-2 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAR-CALC-SO4-SK	**Soil**							
Batch R2663766								
WG1717507-2 MB								
Calcium (Ca)			<2.0		mg/L		2	01-AUG-13
Potassium (K)			<1.0		mg/L		1	01-AUG-13
Magnesium (Mg)			<2.0		mg/L		2	01-AUG-13
Sodium (Na)			<4.0		mg/L		4	01-AUG-13
Sulfur (as SO4)			<5.0		mg/L		5	01-AUG-13
SAT/PH/EC-SK	**Soil**							
Batch R2663588								
WG1717507-1 DUP		**L1336049-1**						
% Saturation		41.1	40.6	J	%	0.5	5	01-AUG-13
pH in Saturated Paste		7.63	7.70	J	pH	0.07	0.3	01-AUG-13
Conductivity Sat. Paste		0.33	0.32		dS m-1	3.7	20	01-AUG-13
WG1717507-3 IRM		**ED-SAL_NAT1**						
% Saturation			43.5		%		38-48	01-AUG-13
pH in Saturated Paste			6.80		pH		6.5-7.1	01-AUG-13
Conductivity Sat. Paste			95.8		%		80-120	01-AUG-13
WG1717507-2 MB								
Conductivity Sat. Paste			<0.10		dS m-1		0.1	01-AUG-13
SO4-AVAIL-CALPHOS-SK	**Soil**							
Batch R2663190								
WG1717254-3 IRM		**SAL814**						
Available Sulfate-S			93.5		%		60-140	31-JUL-13
WG1717254-2 MB								
Available Sulfate-S			<3.0		mg/kg		3	31-JUL-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.
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
Organic / Inorganic Carbon							
Inorganic and Organic Carbon							
	1	18-JUL-13 08:57	02-AUG-13 00:00	14	15	days	EHT
	2	18-JUL-13 09:33	02-AUG-13 00:00	14	15	days	EHT
	3	18-JUL-13 10:58	02-AUG-13 00:00	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 L1336049 were received on 22-JUL-13 10:22.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

7/21/2013 10:09:45 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 10 Days
Shipping Date: 7/20/2013
COC Number: ALS07211306

	DATE	TIME	Matrix	Container	Preservatives	Filtered	Holding Time	(CSSS (2008) 11.3 and 11.4) Ext Micro Nut (ZnFeCuBin)	(CSSS (2008) 12.2) SMP Buffer pH (for pH<6.0)	(CSSS (2008) 15.2.1 or 14.4.4) Sodium Adsorption Ratio	(CSSS (2008) 15.2.11) ECe (sat paste)	(CSSS (2008) 15.3) Soluble Salts	(CSSS (2008) 18.4) IN, pH7 NH4OAc ext Ca/Mg/Na	(CSSS (2008) 18.4 OEC) Cation Exchange Capacity	(CSSS (2008) 20.3) CaCO3 equivalent	(CSSS (2008) 6.2) NH4-N and NO3-N (2N KCl)	(CSSS (2008) 7.2 and 7.3.1 if pH>7.2) Available P (pH>7.2)	(CSSS (2008) pH 1:2 CaCl2) CP17	(EPA200.2/SW6020A) Total P	(S-11.10 in Gaviak et al. (2005)) Ca(H2PO4)2.H2O ext SO4-S	(SSSA (1996) p894-895 if pH<7.2) Available P (pH<7.2)	(SSSA (1995) P973-974) Total N	Number of Containers	COMMENTS
				1 Gallon	4°C	NA	180																	
				1 Gallon	4°C	NA	28																	
				1 Gallon	4°C	NA	28																	
				1 Gallon	4°C	NA	28																	
				1 Gallon	4°C	NA	28																	
				1 Gallon	4°C	NA	180																	
				1 Gallon	4°C	NA	180																	
				1 Gallon	4°C	NA	28																	
				1 Gallon	4°C	NA	28																	
				1 Gallon	4°C	NA	180																	
				1 Gallon	4°C	NA	180																	
				1 Gallon	4°C	NA	28																	
				1 Gallon	4°C	NA	180																	
				1 Gallon	4°C	NA	180																	
				1 Gallon	4°C	NA	28																	
CH13-311-BH010_SOa	7/18/2013	8:57	Soil					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3	
CH13-311-BH010_SOb	7/18/2013	9:33	Soil					X	X	X	X	X	X		X		X	X		X	X		2	
CH13-311-BH010_SOd	7/18/2013	10:58	Soil					X	X	X	X	X	X		X		X	X		X	X		2	
																						TOTAL NUMBER OF CONTAINERS	7	

TN July 29 13:55 9°

L1336049-COFC

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		7/21/13 1300
Received by		
Relinquished by		
Received by		

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:

Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Tat on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 22-JUL-13
Report Date: 24-OCT-13 09:47 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1336054

Project P.O. #: 472645.06.AD.01.04.13, PO=604564
Job Reference: BSI GRUM OVERBURDEN DUMP 2013 311.5B.
C of C Numbers: ALS07211307, ALS07211307H, ALS07211307R
Legal Site Desc:

Comments:

24-OCT-13: Additional QC data has been added.

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1336054-1 Soil 18-JUL-13 14:44 CH13-311-BH013_SOA	L1336054-2 Soil 18-JUL-13 16:28 CH13-311-BH013_SOB	L1336054-3 Soil 18-JUL-13 17:30 CH13-311-BH013_SOC	L1336054-4 Soil 18-JUL-13 16:35 CH13-311-BH913_SOB	L1336054-5 Soil 19-JUL-13 09:30 CH13-311-BH013_SOD
SOIL						
Physical Tests	Grain Size Curve	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED
	Moisture (%)	9.04	4.66	10.3	4.10	8.41
	Liquid Limit (LL) (%)	22		24		
	pH (1:2 soil:water) (pH)	8.39	8.07	8.42	7.92	8.36
	Plasticity Index (PI) (%)	6		8		
Organic / Inorganic Carbon	Inorganic Carbon (%)	0.27	0.97	0.22	1.41	0.43
	Inorganic Carbon (as CaCO3 Equivalent) (%)	2.23	8.05	1.80	11.7	3.61
	Organic Carbon (%)	0.40	0.70	<0.40	0.50	<0.40
	Organic Matter (%)	<0.70	1.19	<0.70	0.90	<0.70
Saturated Paste Extractables	Paste pH (pH)	7.51	7.70	7.51	7.76	7.44
	% Saturation (%)	31.3	29.3	35.5	29.9	34.6
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	26.0	59.0	21.0	32.0	46.0
Metals	Aluminum (Al) (mg/kg)	17200	7010	17300	7530	20400
	Antimony (Sb) (mg/kg)	0.81	6.99	0.62	5.70	0.98
	Arsenic (As) (mg/kg)	12.1	65.9	10.4	70.1	18.1
	Barium (Ba) (mg/kg)	280	91.5	202	78.0	207
	Beryllium (Be) (mg/kg)	0.59	0.43	0.72	0.43	0.60
	Bismuth (Bi) (mg/kg)	0.28	<0.20	0.39	<0.20	0.31
	Boron (B) (mg/kg)	<10	<10	<10	<10	<10
	Cadmium (Cd) (mg/kg)	0.403	3.02	0.261	2.28	0.436
	Calcium (Ca) (mg/kg)	9860	9980	8620	8580	14500
	Chromium (Cr) (mg/kg)	32.2	33.5	36.2	33.0	46.5
	Cobalt (Co) (mg/kg)	10.8	25.5	10.8	26.7	17.5
	Copper (Cu) (mg/kg)	76.7	36.1	21.8	57.6	35.2
	Iron (Fe) (mg/kg)	27000	48300	25700	51000	37000
	Lead (Pb) (mg/kg)	15.3	850	31.8	483	34.1
	Lithium (Li) (mg/kg)	27.9	11.6	32.9	12.7	34.8
	Magnesium (Mg) (mg/kg)	7250	11500	7810	11500	12000
	Manganese (Mn) (mg/kg)	434	1350	410	1470	577
	Mercury (Hg) (mg/kg)	0.0243	1.24	0.0212	0.790	0.0395
	Molybdenum (Mo) (mg/kg)	1.58	1.19	0.59	1.00	0.89
	Nickel (Ni) (mg/kg)	28.9	92.1	28.8	71.9	47.1
	Phosphorus (P) (mg/kg)	653	598	580	597	810
	Potassium (K) (mg/kg)	2650	930	2720	1150	2130
	Selenium (Se) (mg/kg)	0.37	<0.20	0.25	<0.20	0.46

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1336054-6 Soil 19-JUL-13 12:15 CH13-311-BH013_SOE	L1336054-7 Soil 20-JUL-13 09:15 CH13-311-BH014_SOA	L1336054-8 Soil 20-JUL-13 09:50 CH13-311-BH014_SOB	L1336054-9 Soil 20-JUL-13 12:00 CH13-311-BH014_SOC	L1336054-10 Soil 20-JUL-13 13:45 CH13-311-BH014_SOD
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
SOIL						
Physical Tests	Grain Size Curve	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED
	Moisture (%)	6.12	4.90	11.0	11.9	10.1
	Liquid Limit (LL) (%)			25		
	pH (1:2 soil:water) (pH)	8.46	7.80	8.32	8.02	8.13
	Plasticity Index (PI) (%)			7		
Organic / Inorganic Carbon	Inorganic Carbon (%)	0.34	0.21	0.22	0.39	0.28
	Inorganic Carbon (as CaCO3 Equivalent) (%)	2.79	1.72	1.83	3.22	2.32
	Organic Carbon (%)	<0.40	1.30	<0.40	0.40	<0.40
	Organic Matter (%)	<0.70	2.29	<0.70	0.74	<0.70
Saturated Paste Extractables	Paste pH (pH)	7.49	7.49	7.60	7.62	7.49
	% Saturation (%)	34.9	32.8	36.1	29.4	34.6
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	32.0	45.0	32.0	24.0	30.0
Metals	Aluminum (Al) (mg/kg)	21000	16800	15900	17400	21400
	Antimony (Sb) (mg/kg)	0.43	7.69	2.89	0.46	0.79
	Arsenic (As) (mg/kg)	13.1	52.7	78.7	15.6	17.0
	Barium (Ba) (mg/kg)	150	119	377	170	287
	Beryllium (Be) (mg/kg)	0.73	0.71	0.68	0.51	0.70
	Bismuth (Bi) (mg/kg)	0.65	0.24	0.38	0.25	0.41
	Boron (B) (mg/kg)	<10	<10	<10	<10	<10
	Cadmium (Cd) (mg/kg)	0.263	7.71	0.704	0.304	0.520
	Calcium (Ca) (mg/kg)	10800	7190	11400	9450	11600
	Chromium (Cr) (mg/kg)	56.5	25.4	54.0	44.3	54.9
	Cobalt (Co) (mg/kg)	15.1	16.9	15.2	14.2	18.5
	Copper (Cu) (mg/kg)	32.5	69.1	43.1	25.8	35.2
	Iron (Fe) (mg/kg)	34400	48500	32500	30900	36800
	Lead (Pb) (mg/kg)	17.4	2000	418	14.4	19.0
	Lithium (Li) (mg/kg)	40.0	33.7	28.3	30.6	35.7
	Magnesium (Mg) (mg/kg)	10200	10800	9780	9470	11000
	Manganese (Mn) (mg/kg)	459	420	459	507	542
	Mercury (Hg) (mg/kg)	0.0149	1.31	0.388	0.0257	0.0436
	Molybdenum (Mo) (mg/kg)	1.34	4.32	1.49	0.59	1.03
	Nickel (Ni) (mg/kg)	41.3	40.8	54.5	39.0	51.2
	Phosphorus (P) (mg/kg)	609	1350	789	623	774
	Potassium (K) (mg/kg)	3500	720	2010	1620	2620
	Selenium (Se) (mg/kg)	0.25	1.72	0.61	0.29	0.52

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1336054-11
	Description	Soil
	Sampled Date	20-JUL-13
	Sampled Time	14:45
	Client ID	CH13-311-BH014_SOE
Grouping	**Analyte**	
SOIL		
Physical Tests	Grain Size Curve	SEE ATTACHED
	Moisture (%)	11.8
	Liquid Limit (LL) (%)	
	pH (1:2 soil:water) (pH)	8.15
	Plasticity Index (PI) (%)	
Organic / Inorganic Carbon	Inorganic Carbon (%)	0.31
	Inorganic Carbon (as CaCO3 Equivalent) (%)	2.57
	Organic Carbon (%)	0.40
	Organic Matter (%)	<0.70
Saturated Paste Extractables	Paste pH (pH)	7.71
	% Saturation (%)	35.6
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	32.0
Metals	Aluminum (Al) (mg/kg)	21400
	Antimony (Sb) (mg/kg)	0.71
	Arsenic (As) (mg/kg)	15.3
	Barium (Ba) (mg/kg)	230
	Beryllium (Be) (mg/kg)	0.68
	Bismuth (Bi) (mg/kg)	0.96
	Boron (B) (mg/kg)	<10
	Cadmium (Cd) (mg/kg)	0.406
	Calcium (Ca) (mg/kg)	10500
	Chromium (Cr) (mg/kg)	55.9
	Cobalt (Co) (mg/kg)	18.4
	Copper (Cu) (mg/kg)	44.0
	Iron (Fe) (mg/kg)	38700
	Lead (Pb) (mg/kg)	19.9
	Lithium (Li) (mg/kg)	36.8
	Magnesium (Mg) (mg/kg)	11000
	Manganese (Mn) (mg/kg)	546
	Mercury (Hg) (mg/kg)	0.0308
	Molybdenum (Mo) (mg/kg)	1.10
	Nickel (Ni) (mg/kg)	51.0
	Phosphorus (P) (mg/kg)	676
	Potassium (K) (mg/kg)	2540
	Selenium (Se) (mg/kg)	0.50

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1336054-1	L1336054-2	L1336054-3	L1336054-4	L1336054-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	18-JUL-13	18-JUL-13	18-JUL-13	18-JUL-13	19-JUL-13
	Sampled Time	14:44	16:28	17:30	16:35	09:30
	Client ID	CH13-311-BH013_SOA	CH13-311-BH013_SOB	CH13-311-BH013_SOC	CH13-311-BH913_SOB	CH13-311-BH013_SOD
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.15	2.28	0.14	1.21	0.22
	Sodium (Na) (mg/kg)	340	<100	250	<100	230
	Strontium (Sr) (mg/kg)	46.0	35.1	40.1	27.8	60.9
	Sulfur (S)-Total (mg/kg)	900	4700	800	6000	1700
	Thallium (Tl) (mg/kg)	0.182	1.24	0.206	1.32	0.181
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	594	40.0	587	73.6	349
	Uranium (U) (mg/kg)	3.31	1.61	2.50	1.57	1.83
	Vanadium (V) (mg/kg)	40.9	19.0	35.4	19.7	41.1
	Zinc (Zn) (mg/kg)	84.8	4310	82.6	3770	445

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1336054-6 Soil 19-JUL-13 12:15 CH13-311-BH013_SOE	L1336054-7 Soil 20-JUL-13 09:15 CH13-311-BH014_SOA	L1336054-8 Soil 20-JUL-13 09:50 CH13-311-BH014_SOB	L1336054-9 Soil 20-JUL-13 12:00 CH13-311-BH014_SOC	L1336054-10 Soil 20-JUL-13 13:45 CH13-311-BH014_SOD
SOIL						
Metals	Silver (Ag) (mg/kg)	0.23	4.47	0.89	0.13	0.21
	Sodium (Na) (mg/kg)	320	<100	150	180	240
	Strontium (Sr) (mg/kg)	50.6	31.2	58.7	36.4	54.8
	Sulfur (S)-Total (mg/kg)	1400	5500	900	700	900
	Thallium (Tl) (mg/kg)	0.237	0.862	0.344	0.142	0.267
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	491	63.3	421	357	408
	Uranium (U) (mg/kg)	2.04	2.61	2.43	1.69	1.48
	Vanadium (V) (mg/kg)	34.0	21.6	44.3	33.5	46.6
	Zinc (Zn) (mg/kg)	99.8	6490	433	79.4	106

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1336054-11
	Description	Soil
	Sampled Date	20-JUL-13
	Sampled Time	14:45
	Client ID	CH13-311-BH014_SOE
Grouping	**Analyte**	
SOIL		
Metals	Silver (Ag) (mg/kg)	0.20
	Sodium (Na) (mg/kg)	260
	Strontium (Sr) (mg/kg)	46.6
	Sulfur (S)-Total (mg/kg)	900
	Thallium (Tl) (mg/kg)	0.184
	Tin (Sn) (mg/kg)	<2.0
	Titanium (Ti) (mg/kg)	393
	Uranium (U) (mg/kg)	1.62
	Vanadium (V) (mg/kg)	43.2
	Zinc (Zn) (mg/kg)	104

* 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	Bismuth (Bi)	DUP-H,J	L1336054-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H,J	Duplicate results outside ALS DQO, due to sample heterogeneity. Duplicate results and limits are expressed in terms of absolute difference.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ATTERBERG-SK	Soil	Atterberg limits	CARTER CSSS 58

The liquid limit (or upper plastic limit) is the point at which the soil becomes semifluid, like softened butter. In operational terms, the liquid limit is defined as the water content at which a trapezoidal groove cut in moist soil is closed after 25 taps on a hard rubber plate (ASTM D-18, 1958).

The plastic limit (or lower plastic limit) is defined as the water content at which soil begins to crumble on being rolled into a thread 1/8 inch (or 3 mm) in diameter. It represents the lowest water content at which soil can be deformed readily without cracking.

The plastic index (which is the difference between the liquid and plastic limits) gives an indication of the "clayeyness" or plasticity of a clay and is employed in engineering classification systems for soils.

References: McKeague, J.A. 1978. Atterberg Limits pp 50 - 55 In: Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci. p. 50 - 55

B-200.2-CCMS-VA	Soil	Boron 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."

C-INORG-SK	Soil	Inorganic Carbon / Calcium Carbonate	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-ORG-WB-SK	Soil	Total Organic Carbon - Walkley Black	CSSS (1993) method 21.2

The soil sample is treated with excess potassium dichromate and sulfuric acid to oxidize organic carbon. Oxidized organic carbon is determined by back-titration with ferrous ammonium sulfate. Organic matter is estimated from the organic carbon result using the Van Bemmelon factor.

GRAIN SIZE-SK	Soil	Grain Size Analysis	SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

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,

Reference Information

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.

IC-CACO3-CALC-SK	Soil	Inorganic Carbon as CaCO3 Equivalent	Calculation
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.

NP-TU	Soil	Neutralization Potential (NP)	Sobek 3.2.3, MOD
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.

PH-PASTE-VA	Soil	pH in Soil (Paste) by Meter	Carter-CSSS / APHA 4500 H

A soil extract produced by the saturated paste extraction procedure is analyzed by pH meter.

S-TOT-LECO-SK	Soil	Total Sulphur by combustion method	ISO 15178:2000

The sample is ignited in a combustion analyzer where sulfur in the reduced SO2 gas is determined using a thermal conductivity detector.

SAT-PCNT-VA	Soil	Saturation Percentage	Carter-CSSS

Saturation Percentage (SP) is the total volume of water present in a saturated paste (in mL) divided by the dry weight of the sample (in grams), expressed as a percentage, as described in "Soil Sampling and Methods of Analysis" by M. Carter.

** 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
TU	ALS ENVIRONMENTAL - TUCSON, ARIZONA, USA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

ALS07211307 ALS07211307H ALS07211307R

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-200.2-CCMS-VA	**Soil**							
Batch R2668550								
WG1721895-4 CRM		**VA-CANMET-TILL1**						
Boron (B)			3		mg/kg		0-13	08-AUG-13
WG1721895-2 DUP		**L1336054-11**						
Boron (B)		<10	<10	RPD-NA	mg/kg	N/A	30	08-AUG-13
WG1721895-1 MB								
Boron (B)			<10		mg/kg		10	08-AUG-13
C-INORG-SK	**Soil**							
Batch R2657169								
WG1714458-5 DUP		**L1336054-9**						
Inorganic Carbon		0.39	0.36		%	7.4	20	26-JUL-13
WG1714458-2 IRM		**0.1%IC**						
Inorganic Carbon			123.9		%		60-140	26-JUL-13
WG1714458-3 IRM		**0.4%IC**						
Inorganic Carbon			109.0		%		80-120	26-JUL-13
WG1714458-6 IRM		**0.1%IC**						
Inorganic Carbon			127.3		%		60-140	26-JUL-13
WG1714458-7 IRM		**0.4%IC**						
Inorganic Carbon			112.7		%		80-120	26-JUL-13
WG1714458-4 MB								
Inorganic Carbon			<0.10		%		0.1	26-JUL-13
WG1714458-8 MB								
Inorganic Carbon			<0.10		%		0.1	26-JUL-13
C-TOT-ORG-WB-SK	**Soil**							
Batch R2667987								
WG1720072-3 IRM		**FARM2009**						
Organic Carbon			107.8		%		80-120	07-AUG-13
Organic Matter			107.4		%		80-120	07-AUG-13
WG1720072-2 MB								
Organic Carbon			<0.40		%		0.4	07-AUG-13
Organic Matter			<0.70		%		0.7	07-AUG-13
Batch R2668428								
WG1722582-1 DUP		**L1336054-11**						
Organic Carbon		0.40	0.40		%	0.0	30	08-AUG-13
Organic Matter		<0.70	<0.70	RPD-NA	%	N/A	20	08-AUG-13
WG1722582-3 IRM		**FARM2009**						
Organic Carbon			107.8		%		80-120	08-AUG-13
Organic Matter			106.2		%		80-120	08-AUG-13
WG1722582-2 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-WB-SK	**Soil**							
Batch R2668428								
WG1722582-2 MB								
Organic Carbon			<0.40		%		0.4	08-AUG-13
Organic Matter			<0.70		%		0.7	08-AUG-13
HG-200.2-CVAF-VA	**Soil**							
Batch R2668391								
WG1721895-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			95.8		%		70-130	08-AUG-13
WG1721895-2 DUP		**L1336054-11**						
Mercury (Hg)		0.0308	0.0299		mg/kg	2.9	40	08-AUG-13
WG1721895-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	08-AUG-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2668550								
WG1721895-3 CRM		**VA-CANMET-TILL1**						
Aluminum (Al)			104.8		%		70-130	08-AUG-13
Antimony (Sb)			109.5		%		70-130	08-AUG-13
Arsenic (As)			117.5		%		70-130	08-AUG-13
Barium (Ba)			110.7		%		70-130	08-AUG-13
Beryllium (Be)			0.53		mg/kg		0.34-0.74	08-AUG-13
Bismuth (Bi)			109.0		%		70-130	08-AUG-13
Cadmium (Cd)			97.3		%		70-130	08-AUG-13
Calcium (Ca)			112.4		%		70-130	08-AUG-13
Chromium (Cr)			114.8		%		70-130	08-AUG-13
Cobalt (Co)			111.8		%		70-130	08-AUG-13
Copper (Cu)			107.7		%		70-130	08-AUG-13
Iron (Fe)			106.5		%		70-130	08-AUG-13
Lead (Pb)			101.1		%		70-130	08-AUG-13
Lithium (Li)			107.4		%		70-130	08-AUG-13
Magnesium (Mg)			107.8		%		70-130	08-AUG-13
Manganese (Mn)			109.0		%		70-130	08-AUG-13
Molybdenum (Mo)			0.77		mg/kg		0.24-1.24	08-AUG-13
Nickel (Ni)			112.5		%		70-130	08-AUG-13
Phosphorus (P)			116.9		%		70-130	08-AUG-13
Potassium (K)			127.8		%		70-130	08-AUG-13
Selenium (Se)			0.37		mg/kg		0.12-0.52	08-AUG-13
Silver (Ag)			0.24		mg/kg		0.12-0.32	08-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2668550								
WG1721895-3 CRM		**VA-CANMET-TILL1**						
Sodium (Na)			118.4		%		70-130	08-AUG-13
Strontium (Sr)			111.9		%		70-130	08-AUG-13
Thallium (Tl)			0.133		mg/kg		0.075-0.175	08-AUG-13
Tin (Sn)			1.1		mg/kg		0-3	08-AUG-13
Titanium (Ti)			110.5		%		70-130	08-AUG-13
Uranium (U)			113.8		%		70-130	08-AUG-13
Vanadium (V)			114.7		%		70-130	08-AUG-13
Zinc (Zn)			111.1		%		70-130	08-AUG-13
WG1721895-2 DUP		**L1336054-11**						
Aluminum (Al)		21400	18600		mg/kg	14	40	08-AUG-13
Antimony (Sb)		0.71	0.62		mg/kg	14	30	08-AUG-13
Arsenic (As)		15.3	14.7		mg/kg	3.9	30	08-AUG-13
Barium (Ba)		230	201		mg/kg	14	40	08-AUG-13
Beryllium (Be)		0.68	0.60		mg/kg	13	30	08-AUG-13
Bismuth (Bi)		0.96	0.44	DUP-H,J	mg/kg	0.52	0.4	08-AUG-13
Cadmium (Cd)		0.406	0.356		mg/kg	13	30	08-AUG-13
Calcium (Ca)		10500	9250		mg/kg	12	30	08-AUG-13
Chromium (Cr)		55.9	48.4		mg/kg	14	30	08-AUG-13
Cobalt (Co)		18.4	18.0		mg/kg	2.4	30	08-AUG-13
Copper (Cu)		44.0	43.9		mg/kg	0.2	30	08-AUG-13
Iron (Fe)		38700	35200		mg/kg	9.6	30	08-AUG-13
Lead (Pb)		19.9	17.6		mg/kg	13	40	08-AUG-13
Lithium (Li)		36.8	32.0		mg/kg	14	30	08-AUG-13
Magnesium (Mg)		11000	9490		mg/kg	15	30	08-AUG-13
Manganese (Mn)		546	485		mg/kg	12	30	08-AUG-13
Molybdenum (Mo)		1.10	0.99		mg/kg	10	40	08-AUG-13
Nickel (Ni)		51.0	48.1		mg/kg	5.7	30	08-AUG-13
Phosphorus (P)		676	709		mg/kg	4.8	30	08-AUG-13
Potassium (K)		2540	2240		mg/kg	13	40	08-AUG-13
Selenium (Se)		0.50	0.51		mg/kg	2.2	30	08-AUG-13
Silver (Ag)		0.20	0.19		mg/kg	6.2	40	08-AUG-13
Sodium (Na)		260	220		mg/kg	16	40	08-AUG-13
Strontium (Sr)		46.6	41.8		mg/kg	11	40	08-AUG-13
Thallium (Tl)		0.184	0.152		mg/kg	20	30	08-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2668550								
WG1721895-2 DUP		**L1336054-11**						
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	08-AUG-13
Titanium (Ti)		393	323		mg/kg	20	40	08-AUG-13
Uranium (U)		1.62	1.40		mg/kg	14	30	08-AUG-13
Vanadium (V)		43.2	36.2		mg/kg	18	30	08-AUG-13
Zinc (Zn)		104	92.4		mg/kg	12	30	08-AUG-13
WG1721895-1 MB								
Aluminum (Al)			<50		mg/kg		50	08-AUG-13
Antimony (Sb)			<0.10		mg/kg		0.1	08-AUG-13
Arsenic (As)			<0.050		mg/kg		0.05	08-AUG-13
Barium (Ba)			<0.50		mg/kg		0.5	08-AUG-13
Beryllium (Be)			<0.20		mg/kg		0.2	08-AUG-13
Bismuth (Bi)			<0.20		mg/kg		0.2	08-AUG-13
Cadmium (Cd)			<0.050		mg/kg		0.05	08-AUG-13
Calcium (Ca)			<50		mg/kg		50	08-AUG-13
Chromium (Cr)			<0.50		mg/kg		0.5	08-AUG-13
Cobalt (Co)			<0.10		mg/kg		0.1	08-AUG-13
Copper (Cu)			<0.50		mg/kg		0.5	08-AUG-13
Iron (Fe)			<50		mg/kg		50	08-AUG-13
Lead (Pb)			<0.50		mg/kg		0.5	08-AUG-13
Lithium (Li)			<5.0		mg/kg		5	08-AUG-13
Magnesium (Mg)			<20		mg/kg		20	08-AUG-13
Manganese (Mn)			<1.0		mg/kg		1	08-AUG-13
Molybdenum (Mo)			<0.50		mg/kg		0.5	08-AUG-13
Nickel (Ni)			<0.50		mg/kg		0.5	08-AUG-13
Phosphorus (P)			<50		mg/kg		50	08-AUG-13
Potassium (K)			<100		mg/kg		100	08-AUG-13
Selenium (Se)			<0.20		mg/kg		0.2	08-AUG-13
Silver (Ag)			<0.10		mg/kg		0.1	08-AUG-13
Sodium (Na)			<100		mg/kg		100	08-AUG-13
Strontium (Sr)			<0.50		mg/kg		0.5	08-AUG-13
Thallium (Tl)			<0.050		mg/kg		0.05	08-AUG-13
Tin (Sn)			<2.0		mg/kg		2	08-AUG-13
Titanium (Ti)			<1.0		mg/kg		1	08-AUG-13
Uranium (U)			<0.050		mg/kg		0.05	08-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2668550								
WG1721895-1 MB								
Vanadium (V)			<0.20		mg/kg		0.2	08-AUG-13
Zinc (Zn)			<1.0		mg/kg		1	08-AUG-13
MOISTURE-VA	**Soil**							
Batch R2664903								
WG1719998-2 LCS								
Moisture			99.5		%		70-130	02-AUG-13
WG1719998-1 MB								
Moisture			<0.25		%		0.25	02-AUG-13
Batch R2665466								
WG1720308-2 LCS								
Moisture			98.8		%		70-130	03-AUG-13
WG1720308-1 MB								
Moisture			<0.25		%		0.25	03-AUG-13
PH-1:2-VA	**Soil**							
Batch R2668134								
WG1721895-2 DUP		**L1336054-11**						
pH (1:2 soil:water)		8.15	8.19	J	pH	0.04	0.3	08-AUG-13
S-TOT-LECO-SK	**Soil**							
Batch R2657165								
WG1714158-18 DUP		**L1336054-10**						
Sulfur (S)-Total		900	800		mg/kg	18	30	26-JUL-13
WG1714158-16 IRM		**1646A_SOIL**						
Sulfur (S)-Total			3500		mg/kg		2500-4600	26-JUL-13
WG1714158-17 MB								
Sulfur (S)-Total			<500		mg/kg		500	26-JUL-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
DUP-H,J	Duplicate results outside ALS DQO, due to sample heterogeneity. Duplicate results and limits are expressed in terms of absolute difference.
J	Duplicate results and limits are expressed in terms of absolute difference.
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							
Moisture content							
	1	18-JUL-13 14:44	02-AUG-13 08:32	14	15	days	EHT
	2	18-JUL-13 16:28	02-AUG-13 08:32	14	15	days	EHT
	3	18-JUL-13 17:30	02-AUG-13 08:32	14	15	days	EHT
	4	18-JUL-13 16:35	02-AUG-13 08:32	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 L1336054 were received on 22-JUL-13 10:22.

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.

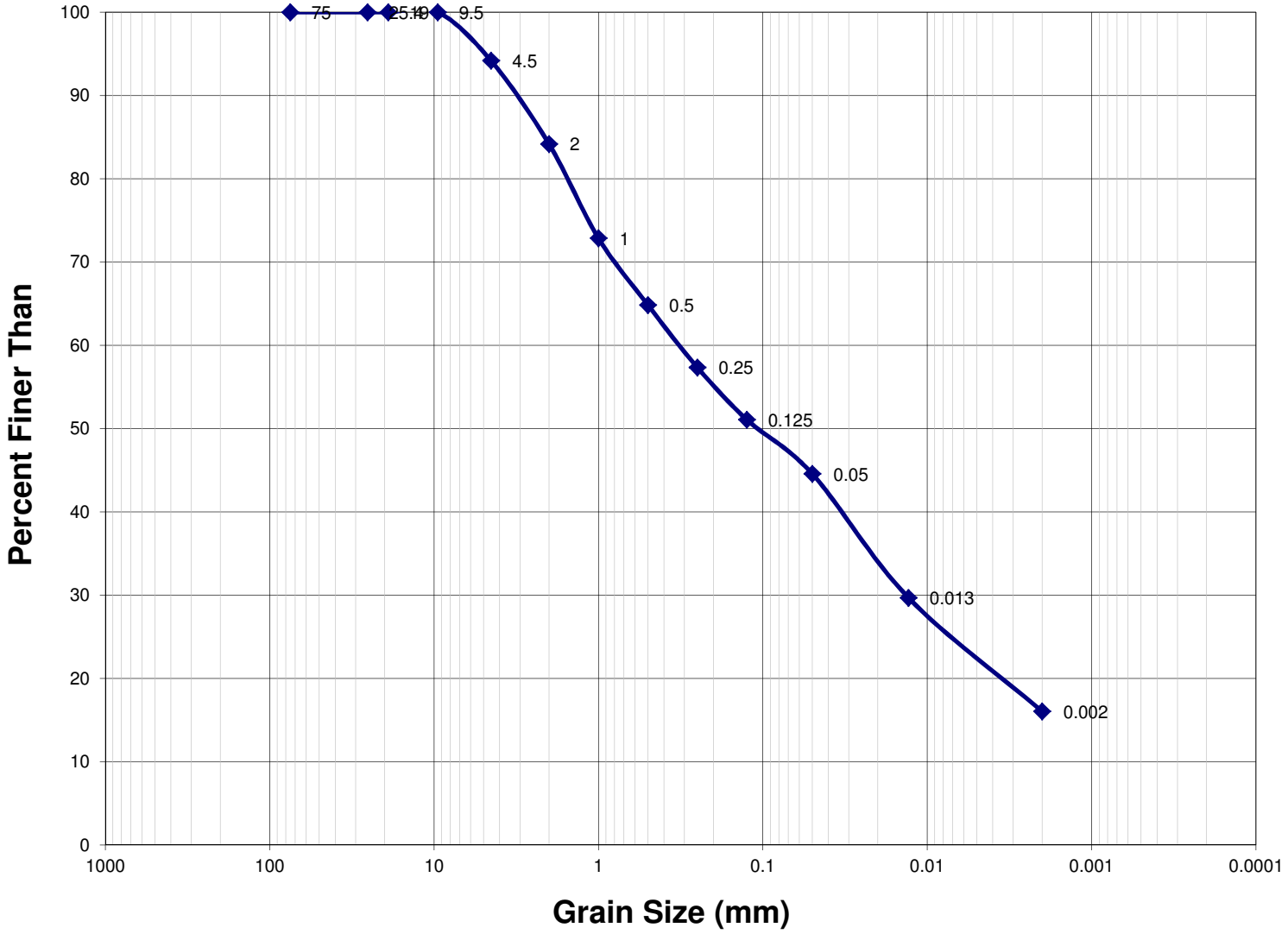
Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH013_SOA
Lab ID: L1336054-1

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	6
Coarse Sand	2.0mm - 4.75mm	10
Medium Sand	0.425mm - 2.0mm	19
Fine Sand	0.075mm - 0.425mm	18
Fines	< 0.075mm	47

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	16
Sand	0.05mm - 2mm	40
Silt	0.002mm - 0.05mm	29
Clay	< 0.002mm	16
Texture	Loam	

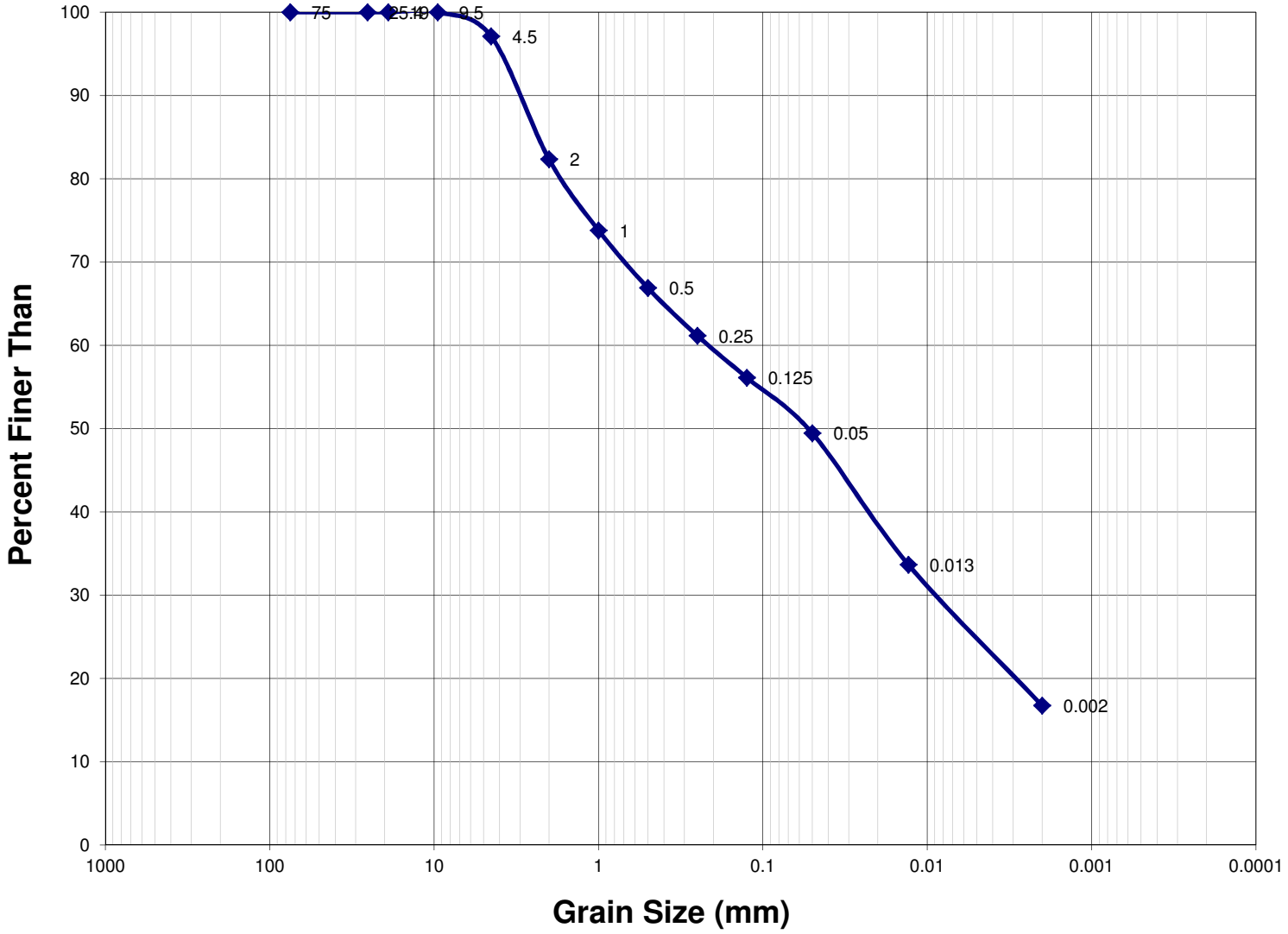
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH014_SOD
Lab ID: L1336054-10

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	3
Coarse Sand	2.0mm - 4.75mm	15
Medium Sand	0.425mm - 2.0mm	15
Fine Sand	0.075mm - 0.425mm	15
Fines	< 0.075mm	52

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	18
Sand	0.05mm - 2mm	33
Silt	0.002mm - 0.05mm	33
Clay	< 0.002mm	17
Texture	Loam	

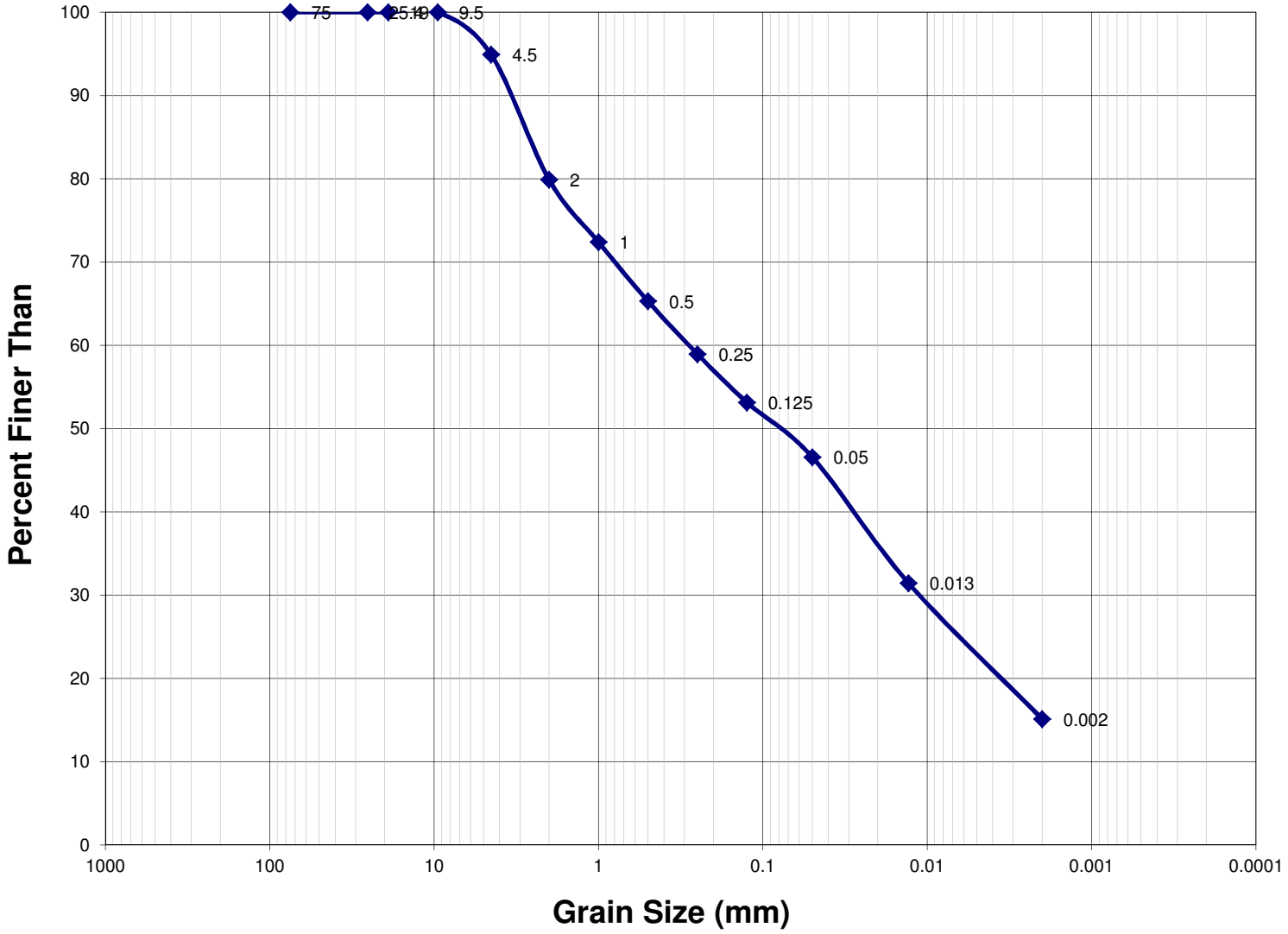
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH014_SOE
Lab ID: L1336054-11

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	5
Coarse Sand	2.0mm - 4.75mm	15
Medium Sand	0.425mm - 2.0mm	15
Fine Sand	0.075mm - 0.425mm	17
Fines	< 0.075mm	49

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	20
Sand	0.05mm - 2mm	33
Silt	0.002mm - 0.05mm	31
Clay	< 0.002mm	15

Texture Loam

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Environmental

August 31, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1336054 **Date Received:** August 8, 2013

Certificate of Analysis

Client ID:	Sample Date:		Lab #:		Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3$/1,000t
L1336054-2	7/18/2013	0000	T1301153-001		4.73	59
L1336054-3	7/18/2013	0000	T1301153-002		9.41	21
L1336054-4	7/18/2013	0000	T1301153-003		4.36	32
L1336054-6	7/19/2013	0000	T1301153-004		8.43	32
L1336054-7	7/20/2013	0000	T1301153-005		4.11	45
L1336054-8	7/20/2013	0000	T1301153-006		9.77	32
L1336054-11	7/20/2013	0000	T1301153-007		10.67	32

Notes:
Samples were air dried then ground to < 60 mesh.

W. Hyatt
Digitally signed by Wendy Hyatt
Date: 2013.08.31 11:15:08 -07'00'

Wendy Hyatt, Project Chemist

ADDRESS 3860 S. Palo Verde Road, Suite 302, Tucson, AZ 85714
PHONE +1 520 573 1061
FAX +1 520 573 1063

ALS Environmental

August 31, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1336054 **Date Received:** August 8, 2013

Quality Control

				Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3/1,000t$
Prep Blank				<0.01	< 1
Laboratory Control Sample (LCS) - Rice Flour CN 3451			Observed Value	9.82	n/a
			True Value	9.50	
			%R	**103**	
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	1,038
			True Value		1,000
			%R		**104**
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	975
			True Value		1,000
			%R		**98**
Duplicate Results			T1301153-001	0.22 **	
			Duplicate	0.23 **	
			%R	**4**	
Duplicate Results			T1301153-001		59
			Duplicate		55
			%RPD		**7**
Duplicate Results			T1301153-002		21
			Duplicate		22
			%RPD		**5**

**Residual moisture - does not include air dry moisture.

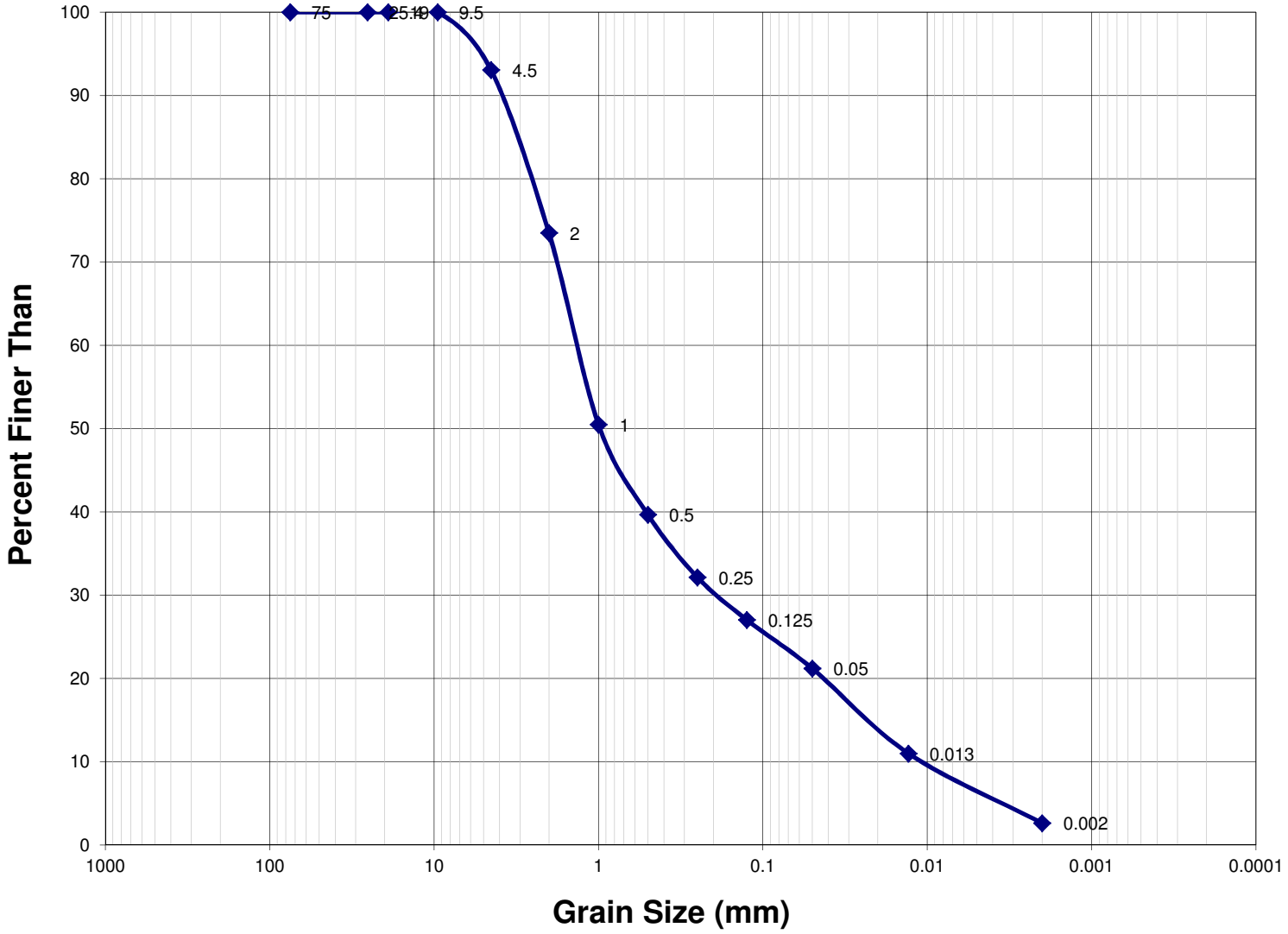
ADDRESS 3860 S. Palo Verde Road, Suite 302, Tucson, AZ 85714
PHONE +1 520 573 1061
FAX +1 520 573 1063

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH013_SOB
Lab ID: L1336054-2

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	7
Coarse Sand	2.0mm - 4.75mm	20
Medium Sand	0.425mm - 2.0mm	34
Fine Sand	0.075mm - 0.425mm	17
Fines	< 0.075mm	23

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	27
Sand	0.05mm - 2mm	52
Silt	0.002mm - 0.05mm	19
Clay	< 0.002mm	3

Texture Sandy loam

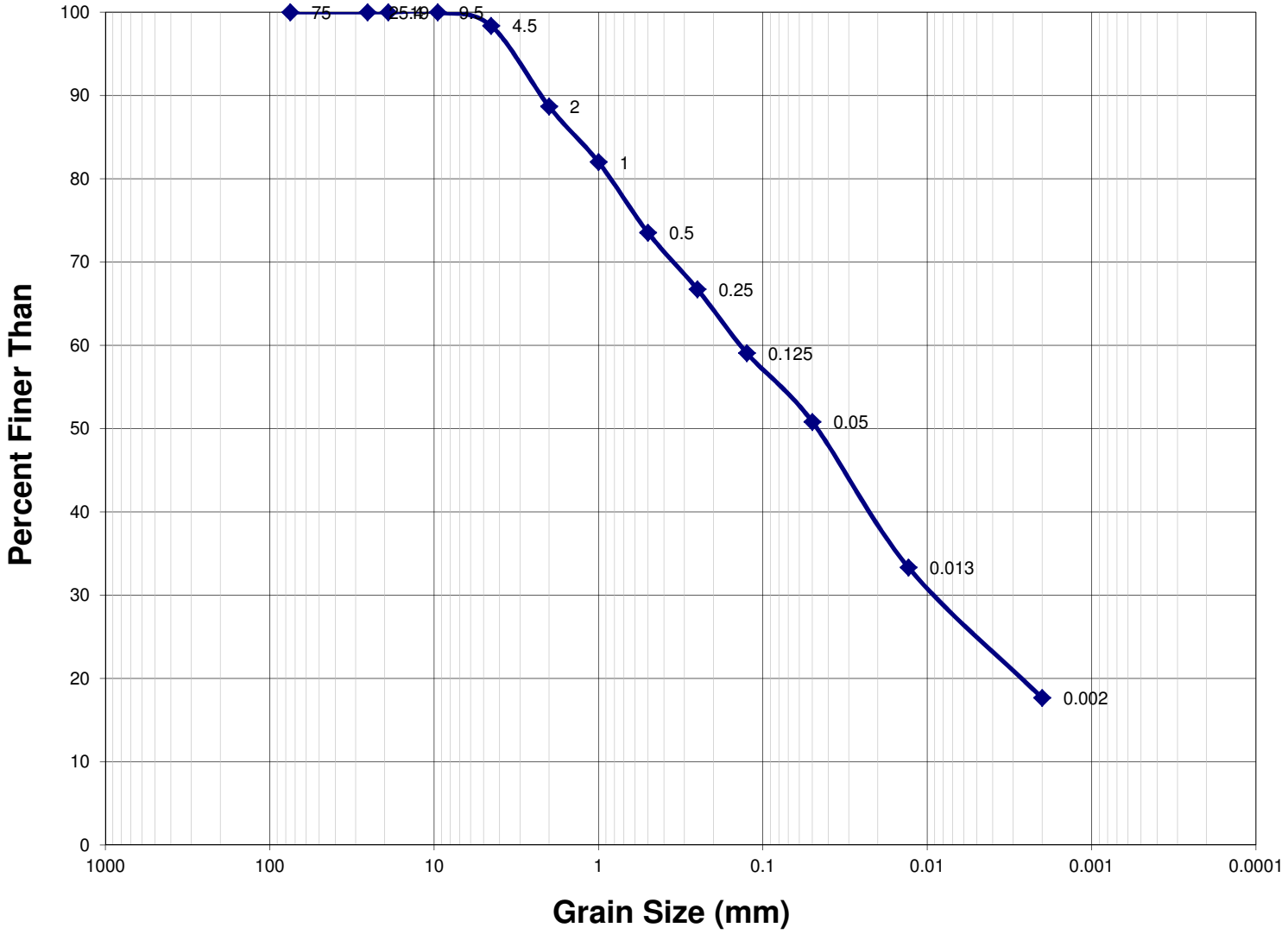
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH013_SOC
Lab ID: L1336054-3

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	2
Coarse Sand	2.0mm - 4.75mm	10
Medium Sand	0.425mm - 2.0mm	15
Fine Sand	0.075mm - 0.425mm	20
Fines	< 0.075mm	54

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	11
Sand	0.05mm - 2mm	38
Silt	0.002mm - 0.05mm	33
Clay	< 0.002mm	18
Texture	Loam	

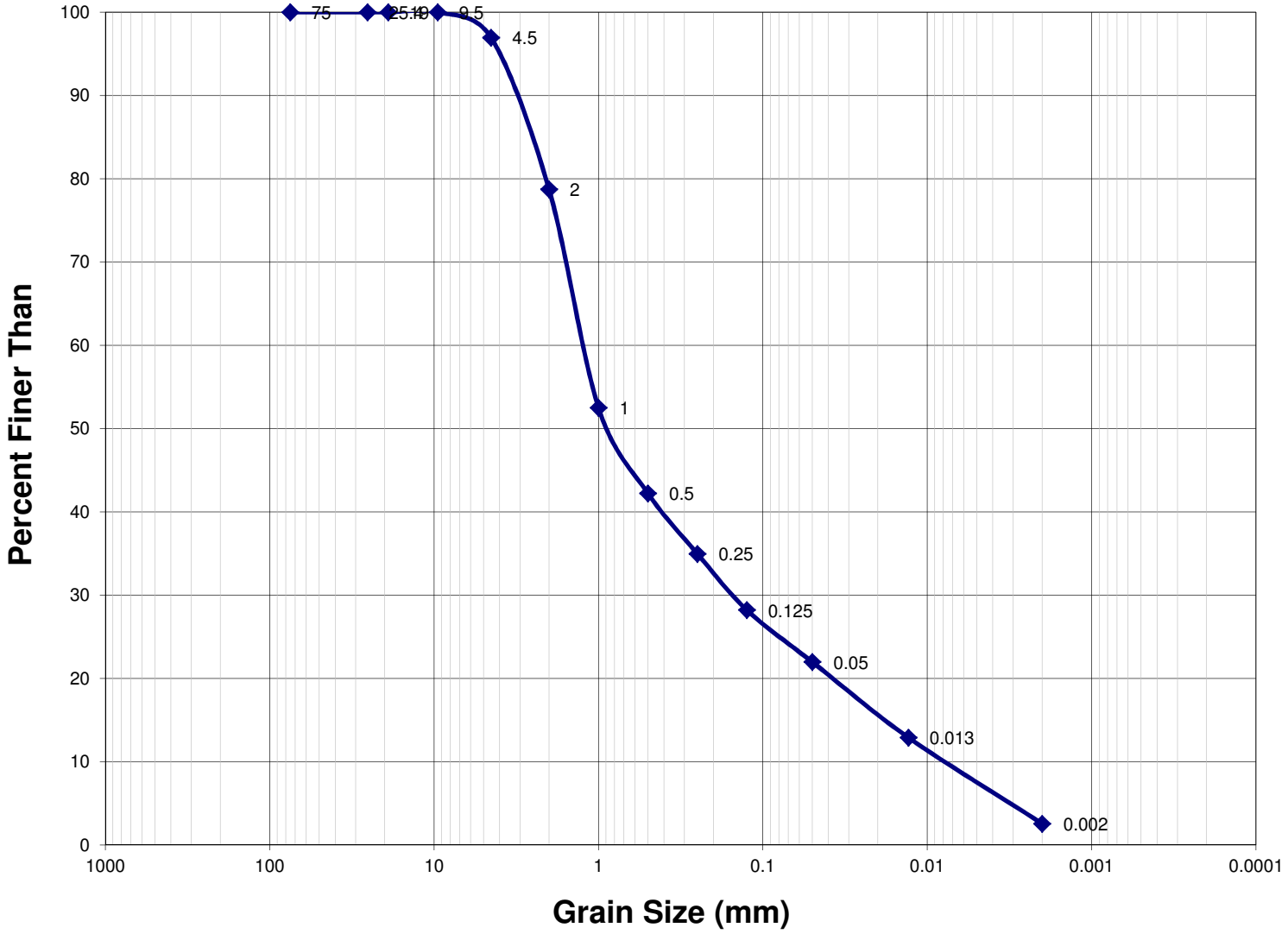
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH913_SOB
Lab ID: L1336054-4

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	3
Coarse Sand	2.0mm - 4.75mm	18
Medium Sand	0.425mm - 2.0mm	37
Fine Sand	0.075mm - 0.425mm	18
Fines	< 0.075mm	24

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	21
Sand	0.05mm - 2mm	57
Silt	0.002mm - 0.05mm	19
Clay	< 0.002mm	3

Texture Sandy loam

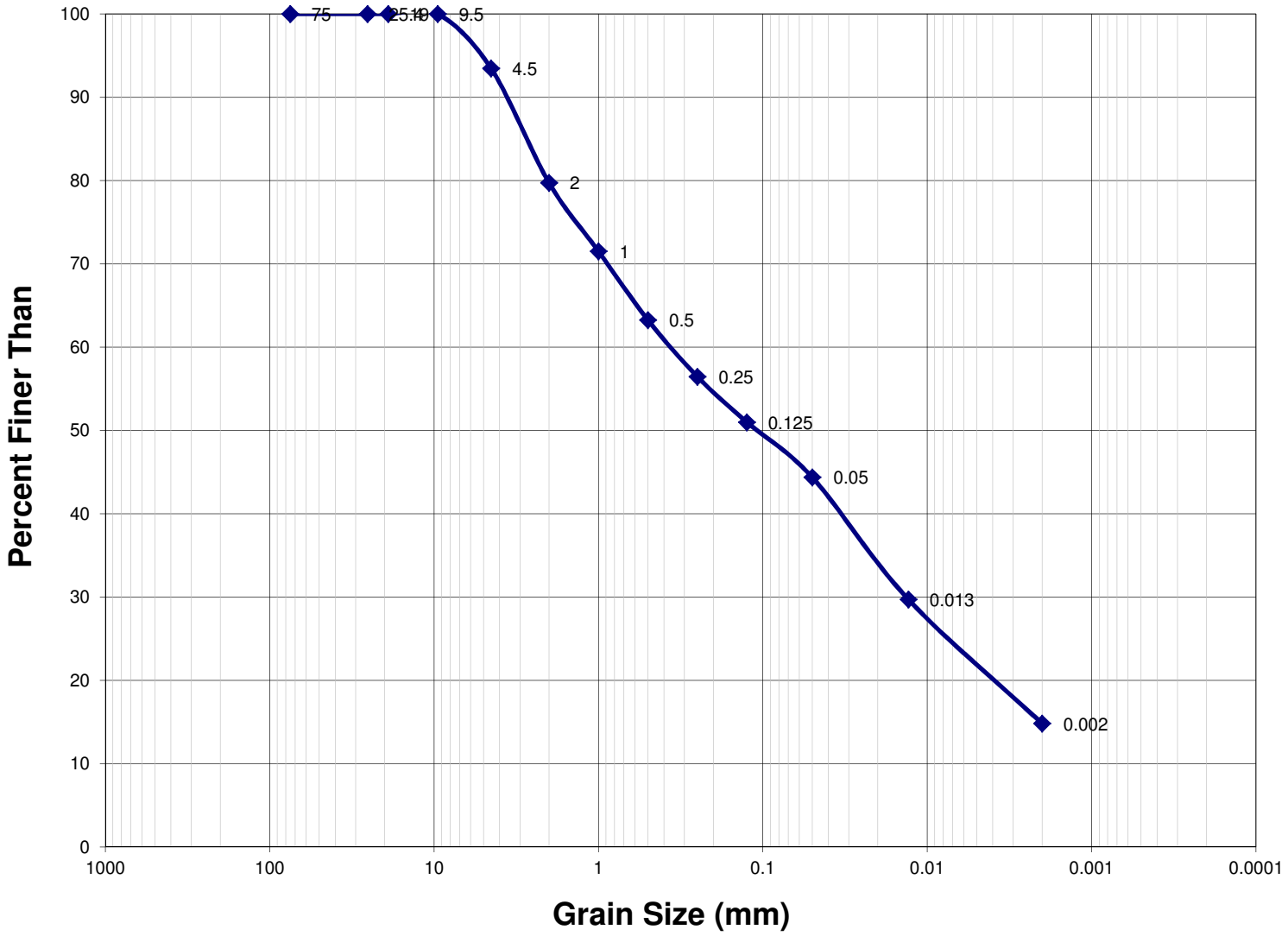
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH013_SOD
Lab ID: L1336054-5

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	6
Coarse Sand	2.0mm - 4.75mm	14
Medium Sand	0.425mm - 2.0mm	16
Fine Sand	0.075mm - 0.425mm	17
Fines	< 0.075mm	47

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	20
Sand	0.05mm - 2mm	35
Silt	0.002mm - 0.05mm	30
Clay	< 0.002mm	15
Texture	Loam	

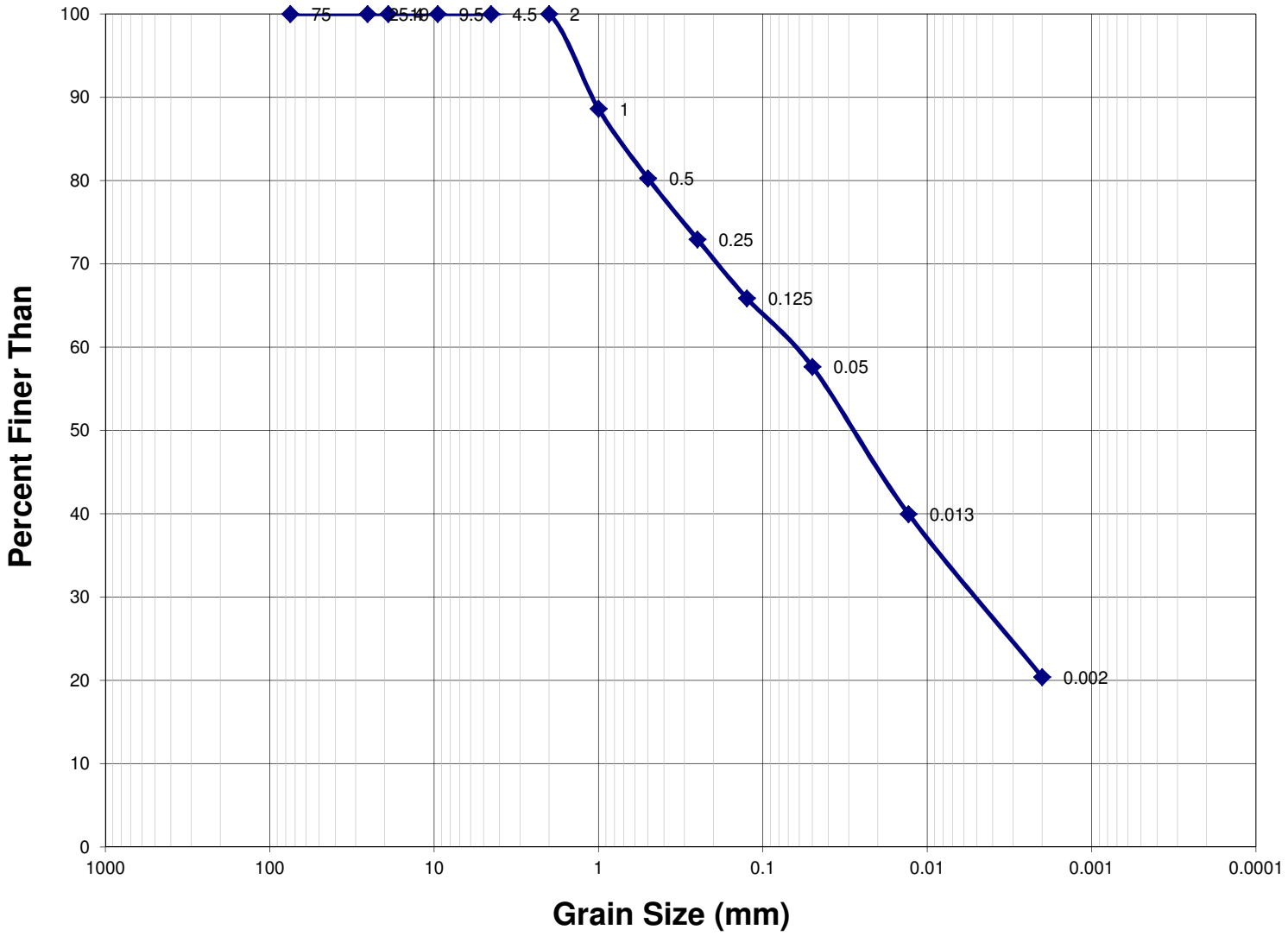
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH013_SOE
Lab ID: L1336054-6

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	0
Coarse Sand	2.0mm - 4.75mm	0
Medium Sand	0.425mm - 2.0mm	20
Fine Sand	0.075mm - 0.425mm	20
Fines	< 0.075mm	60

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	0
Sand	0.05mm - 2mm	42
Silt	0.002mm - 0.05mm	37
Clay	< 0.002mm	20

Texture Loam

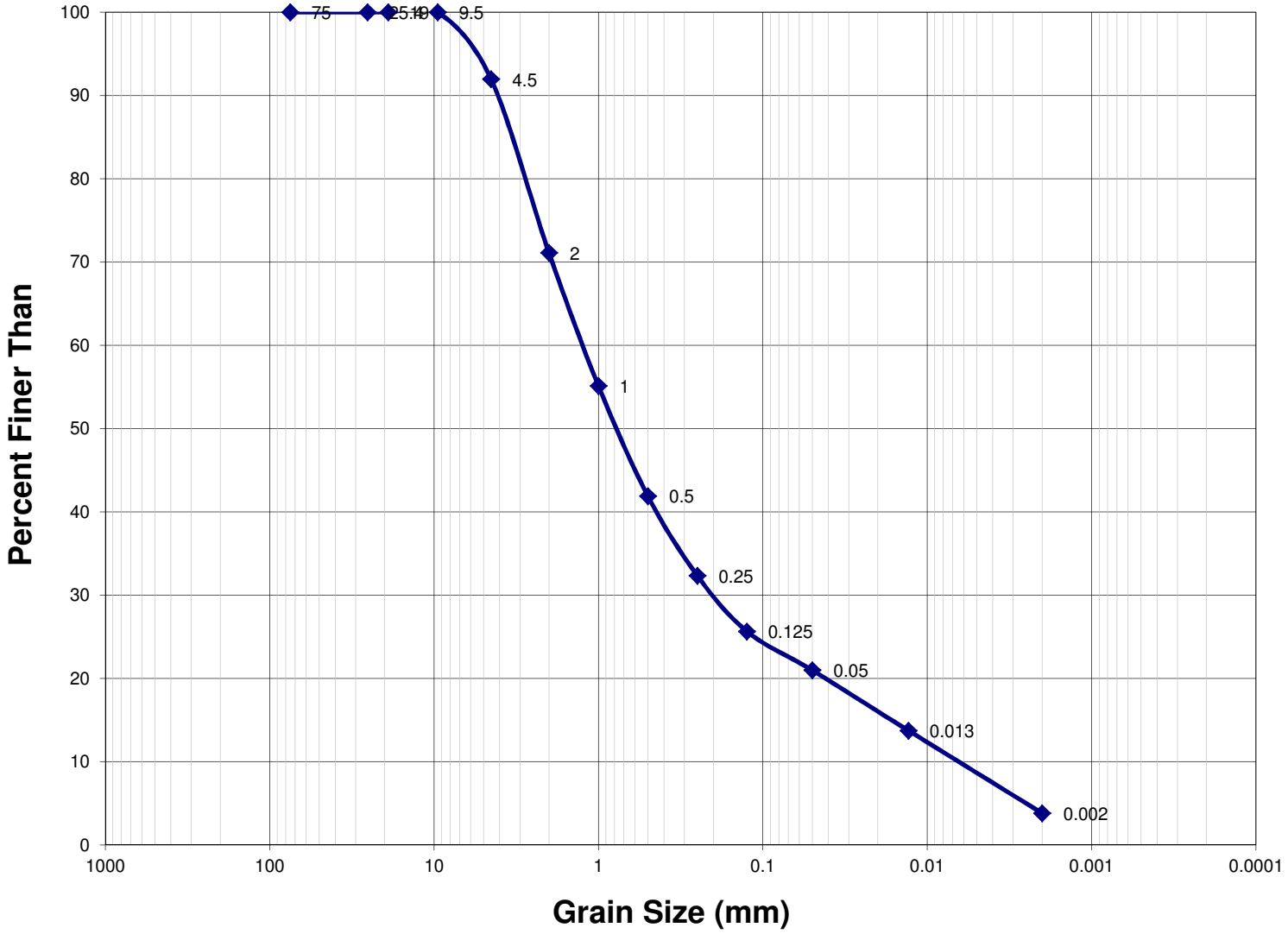
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH014_SOA
Lab ID: L1336054-7

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	8
Coarse Sand	2.0mm - 4.75mm	21
Medium Sand	0.425mm - 2.0mm	29
Fine Sand	0.075mm - 0.425mm	19
Fines	< 0.075mm	23

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	29
Sand	0.05mm - 2mm	50
Silt	0.002mm - 0.05mm	17
Clay	< 0.002mm	4
Texture	Sandy loam	

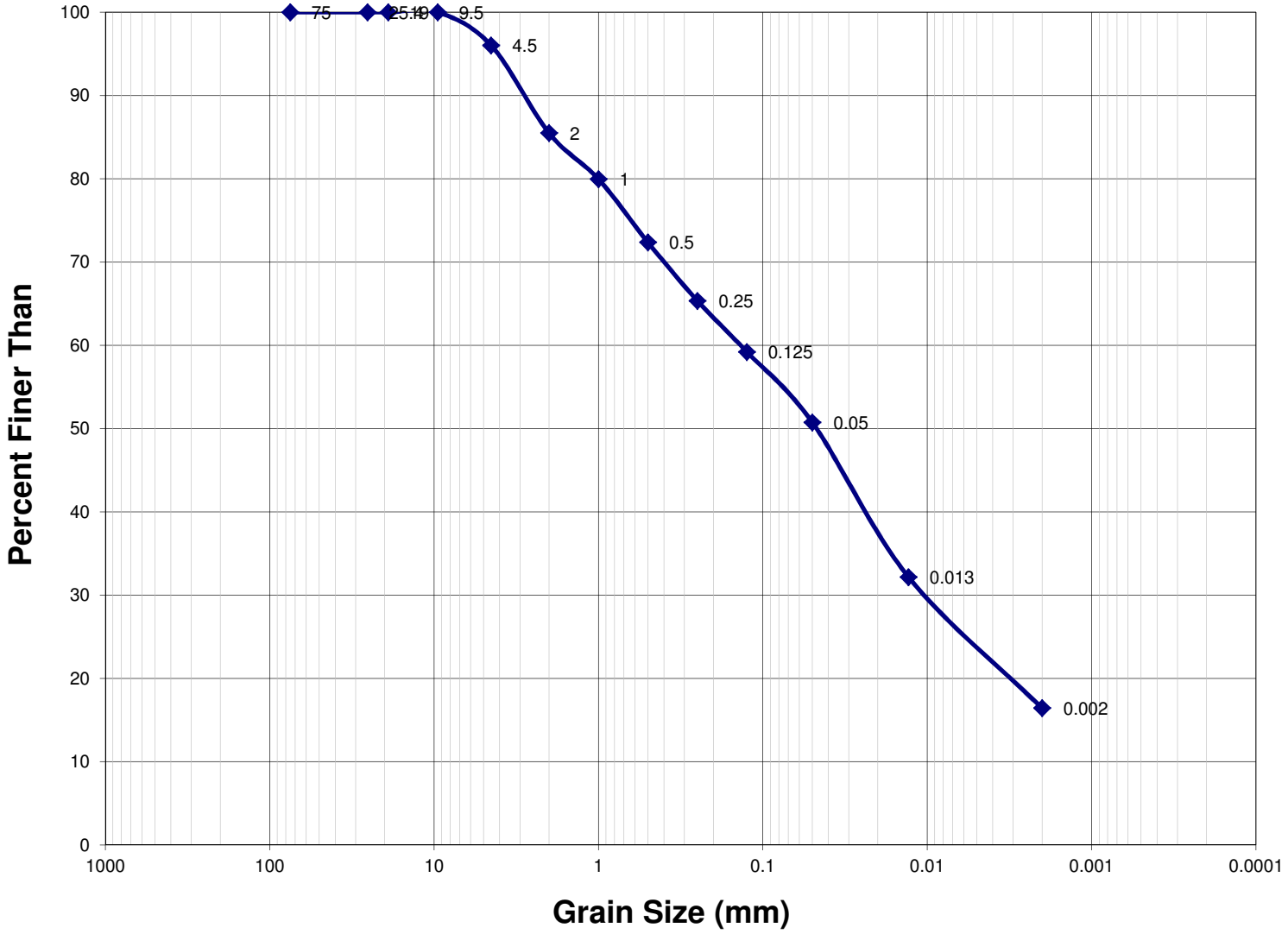
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH014_SOB
Lab ID: L1336054-8

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	4
Coarse Sand	2.0mm - 4.75mm	11
Medium Sand	0.425mm - 2.0mm	13
Fine Sand	0.075mm - 0.425mm	19
Fines	< 0.075mm	54

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	15
Sand	0.05mm - 2mm	35
Silt	0.002mm - 0.05mm	34
Clay	< 0.002mm	16

Texture Loam

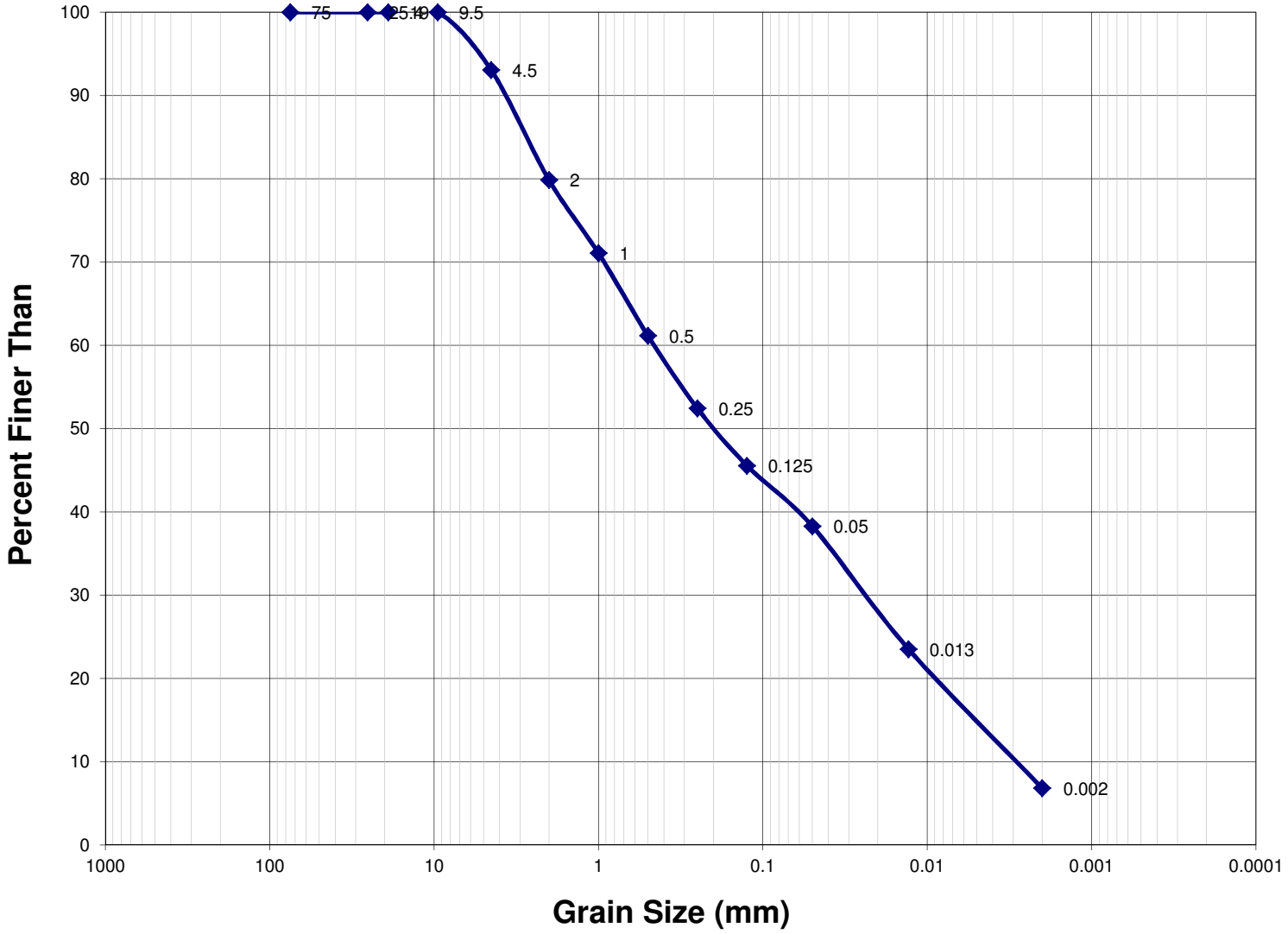
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH014_SOC
Lab ID: L1336054-9

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	7
Coarse Sand	2.0mm - 4.75mm	14
Medium Sand	0.425mm - 2.0mm	19
Fine Sand	0.075mm - 0.425mm	20
Fines	< 0.075mm	41

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	20
Sand	0.05mm - 2mm	42
Silt	0.002mm - 0.05mm	31
Clay	< 0.002mm	7

Texture: Loam / Sandy loam

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Environmental

September 17, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA

Attn: Amber Springer

Project: L1336054 **Date Received:** September 9, 2013

Certificate of Analysis

Client ID:	Sample Date:		Lab #:		Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3$/1,000t
L1336054- 1	7/18/2013	0000	T1301337- 001		7.69	26
L1336054- 5	7/19/2013	0000	T1301337- 002		8.66	46
L1336054- 9	7/20/2013	0000	T1301337- 003		10.37	24
L1336054- 10	7/20/2013	0000	T1301337- 004		9.58	30

Notes:
Samples were air dried then ground to < 60 mesh.

W. Hyatt
Digitally signed by Wendy Hyatt
Date: 2013.09.17 16:04:32 -07'00'

Wendy Hyatt, Project Chemist

ALS Environmental

September 17, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1336054 **Date Received:** September 9, 2013

Quality Control

				Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3$/1,000t
Prep Blank				<0.01	< 1
Laboratory Control Sample (LCS) - Rice Flour CN 3451			Observed Value	9.42	n/a
			True Value	9.50	
			%R	**99**	
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	998
			True Value		1,000
			%R		**100**
Duplicate Results			*T1301338-001	0.60 **	
			Duplicate	0.59 **	
			%R	**2**	
Duplicate Results				T1301337-001	26
				Duplicate	26
				%RPD	**0**

* Sample from the same batch, but a different project.

**Residual moisture - does not include air dry moisture.

CH2MHILL

CHAIN OF CUSTODY RECORD

7/21/2013 10:06:23 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472646.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 3 Days
Shipping Date: 7/20/2013
COC Number: ALS07211307R

	Container:	1 Gallon
	Preservatives:	4°C
	Filtered:	NA
	Holding Time:	180

L1336054-COFC

	DATE	TIME	Matrix	(ISO 15178-2000) Total Sulphur	Number of Containers	COMMENTS
CH13-311-BH013_SOa	7/18/2013	14:44	Soil	X	1	RUSH
CH13-311-BH013_SOb	7/18/2013	16:28	Soil	X	1	
CH13-311-BH013_SOc	7/18/2013	17:30	Soil	X	1	
CH13-311-BH913_SOb	7/18/2013	16:35	Soil	X	1	
CH13-311-BH013_SOd	7/19/2013	9:30	Soil	X	1	
CH13-311-BH013_SOe	7/19/2013	12:15	Soil	X	1	
CH13-311-BH014_SOa	7/20/2013	9:15	Soil	X	1	
CH13-311-BH014_SOb	7/20/2013	9:50	Soil	X	1	
CH13-311-BH014_SOc	7/20/2013	12:00	Soil	X	1	
CH13-311-BH014_SOd	7/20/2013	13:45	Soil	X	1	
CH13-311-BH014_SOe	7/20/2013	14:45	Soil	X	1	
					1	
				TOTAL NUMBER OF CONTAINERS	11	

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		7/21/13 1300
Received by		
Relinquished by		
Received by		

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

7/21/2013 10:06:01 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 7/20/2013
COC Number: ALS07211307

L1336054-COFC

	DATE	TIME	Matrix	(ASTM 2216) Moisture	(CSSS/APHA4500H) Paste pH	(EPA200.0/245.7/SW6020A) Total Metals Table 1	(ModifiedSobek) Mod Neutralization Potential	(SSSA (1996) P455-456) TIC	(ASTM 4318) Atterberg limits	(ASTM D422) Gradation	Number of Containers	COMMENTS
Container:				4oz jar	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon		
Preservatives:				4°C	4°C	4°C	4°C	4°C	4°C	4°C		
Filtered:				NA	NA	NA	NA	NA	NA	NA		
Holding Time:				14	28	14	28	28	NA	NA		
CH13-311-BH013_SOa	7/18/2013	14:44	Soil	x	x	x	x	x	x	x	5	
CH13-311-BH013_SOb	7/18/2013	16:28	Soil	x	x	x	x	x		x	4	
CH13-311-BH013_SOc	7/18/2013	17:30	Soil	x	x	x	x	x	x	x	5	
CH13-311-BH913_SOb	7/18/2013	16:35	Soil	x	x	x	x	x		x	4	
CH13-311-BH013_SOd	7/19/2013	9:30	Soil	x	x	x	x	x		x	4	
CH13-311-BH013_SOe	7/19/2013	12:15	Soil	x	x	x	x	x		x	4	
CH13-311-BH014_SOa	7/20/2013	9:15	Soil	x	x	x	x	x		x	4	
CH13-311-BH014_SOb	7/20/2013	9:50	Soil	x	x	x	x	x	x	x	5	
CH13-311-BH014_SOc	7/20/2013	12:00	Soil	x	x	x	x	x		x	4	
CH13-311-BH014_SOd	7/20/2013	13:45	Soil	x	x	x	x	x		x	4	
CH13-311-BH014_SOe	7/20/2013	14:45	Soil	x	x	x	x	x		x	4	
											4	
										TOTAL NUMBER OF CONTAINERS	47	

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		7/21/13 1300
Received by		
Relinquished by		
Received by		

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

7/21/2013 10:06:12 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 7/20/2013
COC Number: ALS07211307H

L1336054-COFC

	DATE	TIME	Matrix	Container:	Preservatives:	Filtered:	Holding Time:	(DI/ASTMD1498) DI ORP	(DI/E245.7) DI Mercury	(DI/E300) DI Suchate	(DI/EPA600/2--78--054) Acid Soluable Sulfate	(DI/SM2310) DI Acidity	(DI/SM2320) DI Alkalinity	(DI/SM2510) DI Conductivity	(DI/SM4500H) DI pH	(DI/SW6020A) DI Diss Metals	(SSSA (1996) P995--996) TOC	(SW6020A) BaLi Metaborate	Number of Containers	COMMENTS
				1 Gallon	4°C	NA	14													
				1 Gallon	4°C	NA	14													
				1 Gallon	4°C	NA	180													
				1 Gallon	4°C	NA	180													
				1 Gallon	4°C	NA	14													
				1 Gallon	4°C	NA	14													
				1 Gallon	4°C	NA	14													
				1 Gallon	4°C	NA	14													
				1 Gallon	4°C	NA	14													
				1 Gallon	4°C	NA	28													
				1 Gallon	4°C	NA	14													
CH13-311-BH013_SOa	7/18/2013	14:44	Soil					X	X	X	X	X	X	X	X	X	X	X	4	HOLD
CH13-311-BH013_SOb	7/18/2013	16:28	Soil					X	X	X	X	X	X	X	X	X	X	X	4	
CH13-311-BH013_SOc	7/18/2013	17:30	Soil					X	X	X	X	X	X	X	X	X	X	X	4	
CH13-311-BH913_SOb	7/18/2013	16:35	Soil					X	X	X	X	X	X	X	X	X	X	X	4	
CH13-311-BH013_SOd	7/19/2013	9:30	Soil					X	X	X	X	X	X	X	X	X	X	X	4	
CH13-311-BH013_SOe	7/19/2013	12:15	Soil					X	X	X	X	X	X	X	X	X	X	X	4	
CH13-311-BH014_SOa	7/20/2013	9:15	Soil					X	X	X	X	X	X	X	X	X	X	X	4	
CH13-311-BH014_SOb	7/20/2013	9:50	Soil					X	X	X	X	X	X	X	X	X	X	X	4	
CH13-311-BH014_SOc	7/20/2013	12:00	Soil					X	X	X	X	X	X	X	X	X	X	X	4	
CH13-311-BH014_SOd	7/20/2013	13:45	Soil					X	X	X	X	X	X	X	X	X	X	X	4	
CH13-311-BH014_SOe	7/20/2013	14:45	Soil					X	X	X	X	X	X	X	X	X	X	X	4	
																		TOTAL NUMBER OF CONTAINERS	44	

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		7/21/13 1300
Received by		
Relinquished by		
Received by		

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:

Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 22-JUL-13
Report Date: 24-OCT-13 11:57 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1336075

Project P.O. #: 472645.06.AD.01.04.13, PO=604564
Job Reference: BSI GRUM OVERBURDEN DUMP 2013 311.5B.
C of C Numbers: ALS07211308
Legal Site Desc:

Comments:

24-OCT-13: Additional QC data has been included.

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1336075-1	L1336075-2	L1336075-3	L1336075-4	L1336075-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	18-JUL-13	18-JUL-13	18-JUL-13	18-JUL-13	19-JUL-13
	Sampled Time	14:44	16:28	17:30	16:35	09:30
	Client ID	CH13-311-BH013_SOA	CH13-311-BH013_SOB	CH13-311-BH013_SOC	CH13-311-BH913_SOB	CH13-311-BH013_SOD
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 CaCl2) (pH)	7.89	7.62	7.95	7.69	7.84
Anions and Nutrients	Total Nitrogen by LECO (%)	0.038				
Organic / Inorganic Carbon	CaCO3 Equivalent (%)	1.65	9.60	2.72	8.73	3.79
	Inorganic Carbon (%)	0.20	1.15	0.33	1.05	0.45
	Total Carbon by Combustion (%)	0.5	2.0	0.6	1.9	0.8
	Total Organic Carbon (%)	0.30	0.80	0.25	0.81	0.31
Plant Available Nutrients	Available Ammonium-N (mg/kg)	2.4				
	Calcium (Ca) (meq/100g)	17.4	2.21	22.1	2.10	19.2
	Cation Exchange Capacity (meq/100g)	6.01				
	Copper (Cu) (mg/kg)	3.41	0.51	4.63	0.42	3.72
	Iron (Fe) (mg/kg)	125	65.9	70.9	56.1	50.8
	Magnesium (Mg) (meq/100g)	1.24	1.19	1.52	1.08	1.51
	Manganese (Mn) (mg/kg)	4.50	20.6	20.1	15.4	22.7
	Available Nitrate-N (mg/kg)	<2.0				
	Available Phosphate-P (mg/kg)	9.0	1.4	6.8	<1.0	3.2
	Potassium (K) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
	Sodium (Na) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
	Available Sulfate-S (mg/kg)	23.2	49.0	28.9	45.4	31.0
	Zinc (Zn) (mg/kg)	1.91	92.6	2.16	67.6	1.20
Saturated Paste Extractables	SAR (SAR)	0.49	2.12	1.28	0.65	0.49
	Calcium (Ca) (mg/L)	85.4	134	82.8	101	91.8
	Chloride (Cl) (mg/L)	5.1	196	10.8	15.1	15.7
	Conductivity Sat. Paste (dS m-1)	0.60	1.72	0.77	1.04	0.71
	ESP (%)	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL
	Magnesium (Mg) (mg/L)	12.9	51.7	16.0	38.1	22.7
	pH in Saturated Paste (pH)	8.05	7.67	8.09	7.67	7.95
	Potassium (K) (mg/L)	11.1	47.0	11.5	44.8	10.8
	% Saturation (%)	35.3	36.1	39.7	35.4	38.3
	Sodium (Na) (mg/L)	18.4	114	48.7	30.4	20.3
	Sulfur (as SO4) (mg/L)	224	540	303	468	288
Metals	Phosphorus (P) (mg/kg)	614				
Miscellaneous	SMP Buffer pH (pH)	7.50	7.56	7.55	7.58	7.56

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1336075-6	L1336075-7	L1336075-8	L1336075-9	L1336075-10
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	19-JUL-13	20-JUL-13	20-JUL-13	20-JUL-13	20-JUL-13
	Sampled Time	12:15	09:15	09:50	12:00	13:45
	Client ID	CH13-311-BH013_SOE	CH13-311-BH014_SOA	CH13-311-BH014_SOB	CH13-311-BH014_SOC	CH13-311-BH014_SOD
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 CaCl2) (pH)	7.95	7.82	7.88	7.73	7.88
Anions and Nutrients	Total Nitrogen by LECO (%)			0.041		
Organic / Inorganic Carbon	CaCO3 Equivalent (%)	1.95	0.99	1.70	2.26	2.50
	Inorganic Carbon (%)	0.23	0.12	0.20	0.27	0.30
	Total Carbon by Combustion (%)	0.5	0.5	0.5	0.7	0.5
	Total Organic Carbon (%)	0.22	0.34	0.28	0.46	0.22
Plant Available Nutrients	Available Ammonium-N (mg/kg)			4.5 DLM		
	Calcium (Ca) (meq/100g)	18.9	5.60	11.5	15.8	18.9
	Cation Exchange Capacity (meq/100g)			5.34		
	Copper (Cu) (mg/kg)	4.95	0.48	5.44	2.15	6.19
	Iron (Fe) (mg/kg)	44.5	33.3	55.1	34.3	55.8
	Magnesium (Mg) (meq/100g)	1.66	1.16	1.60	0.98	1.54
	Manganese (Mn) (mg/kg)	20.9	2.47	16.9	46.5	29.5
	Available Nitrate-N (mg/kg)			<4.0 DLM		
	Available Phosphate-P (mg/kg)	6.0	1.8	6.2	2.0	3.8
	Potassium (K) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
	Sodium (Na) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
	Available Sulfate-S (mg/kg)	37.3	140	18.7	13.7	29.6
	Zinc (Zn) (mg/kg)	0.82	18.0	5.43	0.68	0.97
Saturated Paste Extractables	SAR (SAR)	1.43	1.36	0.63	0.26	0.72
	Calcium (Ca) (mg/L)	66.3	359 DLA	61.2	65.2	67.3
	Chloride (Cl) (mg/L)	21.8	150 DLA	37.0	10.1	53.4
	Conductivity Sat. Paste (dS m-1)	0.67	2.70	0.53	0.46	0.58
	ESP (%)	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL
	Magnesium (Mg) (mg/L)	14.5	96.8 DLA	15.6	11.3	13.3
	pH in Saturated Paste (pH)	8.14	7.63	8.02	8.00	8.09
	Potassium (K) (mg/L)	13.0	46.7 DLA	9.6	3.6	8.3
	% Saturation (%)	43.2	42.9	34.6	34.7	44.6
	Sodium (Na) (mg/L)	49.2	113 DLA	21.3	8.6	24.8
	Sulfur (as SO4) (mg/L)	268	1330 DLA	207	148	212
Metals	Phosphorus (P) (mg/kg)			596		
Miscellaneous	SMP Buffer pH (pH)	7.58	7.60	7.59	7.54	7.59

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1336075-11				
	Description	Soil				
	Sampled Date	20-JUL-13				
	Sampled Time	14:45				
	Client ID	CH13-311-BH014_SOE				
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 CaCl2) (pH)	7.86				
Anions and Nutrients	Total Nitrogen by LECO (%)					
Organic / Inorganic Carbon	CaCO3 Equivalent (%)	2.07				
	Inorganic Carbon (%)	0.25				
	Total Carbon by Combustion (%)	0.8				
	Total Organic Carbon (%)	0.56				
Plant Available Nutrients	Available Ammonium-N (mg/kg)					
	Calcium (Ca) (meq/100g)	18.3				
	Cation Exchange Capacity (meq/100g)					
	Copper (Cu) (mg/kg)	4.46				
	Iron (Fe) (mg/kg)	53.5				
	Magnesium (Mg) (meq/100g)	1.43				
	Manganese (Mn) (mg/kg)	42.2				
	Available Nitrate-N (mg/kg)					
	Available Phosphate-P (mg/kg)	2.4				
	Potassium (K) (meq/100g)	<0.50				
	Sodium (Na) (meq/100g)	<0.50				
	Available Sulfate-S (mg/kg)	23.0				
	Zinc (Zn) (mg/kg)	0.93				
Saturated Paste Extractables	SAR (SAR)	0.69				
	Calcium (Ca) (mg/L)	64.6				
	Chloride (Cl) (mg/L)	46.7				
	Conductivity Sat. Paste (dS m-1)	0.54				
	ESP (%)	N/A; Na<DL				
	Magnesium (Mg) (mg/L)	12.9				
	pH in Saturated Paste (pH)	8.12				
	Potassium (K) (mg/L)	6.5				
	% Saturation (%)	41.5				
	Sodium (Na) (mg/L)	23.2				
	Sulfur (as SO4) (mg/L)	228				
Metals	Phosphorus (P) (mg/kg)					
Miscellaneous	SMP Buffer pH (pH)	7.55				

* 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)
Internal Reference Material	Calcium (Ca)	DLA	L1336075-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Internal Reference Material	Magnesium (Mg)	DLA	L1336075-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Internal Reference Material	Potassium (K)	DLA	L1336075-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Internal Reference Material	Sodium (Na)	DLA	L1336075-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Internal Reference Material	Sulfur (as SO4)	DLA	L1336075-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Internal Reference Material	Calcium (Ca)	DLA	L1336075-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Internal Reference Material	Magnesium (Mg)	DLA	L1336075-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Internal Reference Material	Potassium (K)	DLA	L1336075-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Internal Reference Material	Sodium (Na)	DLA	L1336075-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Internal Reference Material	Chloride (Cl)	DLA	L1336075-1, -10, -11, -2, -3, -4, -5, -6, -7, -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.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-INORG-ORG-SK	Soil	Inorganic and Organic Carbon	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-LECO-SK	Soil	Total Carbon by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.

CAT-XTR-SK	Soil	Ammonium Acetate Extractable Cations	CSSS 19.4 - 1M NH4OAc Extraction @ pH 7

Exchangeable Ca, Mg, Na, and K are extracted from the soil using neutral 1N ammonium acetate, then determined by ICP-OES. This method does not correct for calcium or magnesium extracted from carbonates or free gypsum.

CEC-SK	Soil	Cation Exchange Capacity (NH4OAC Extn)	CSSS(1978) 3.321/Comm Soil Sci 17(7)

Soil exchange sites are saturated with ammonium, then displaced with sodium. Ammonium in the extract is determined colorimetrically.

CL-SAR-SK	Soil	Chloride (Cl) (Saturated Paste)	CSSS(1993) 18.2.2/APHA 4500-CL E

Chloride in a saturated soil extract is determined colorimetrically by auto-analyzer.

ETL-ESP-SK	Soil	Exchangeable Sodium Percentage - Calc	Calculation
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.

METAL-DTPA-SK	Soil	Available Micronutrients (Cu,Fe,Zn,Mn)	CSSS 1993 (11.3 AND 11.4)

Plant available micronutrients are extracted from soil using 0.005 M DTPA. Cu, Fe, Mn and Zn in the extract are determined by ICP-OES.

N-TOT-LECO-SK	Soil	Total Nitrogen by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.

NH4-AVAIL-SK	Soil	Available Ammonium-N	CSSS(1993) 4.2/COMM SOIL SCI 19(6)

Reference Information

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.

NO3-AVAIL-KCL-SK Soil Available Nitrate-N (2N KCl) CSSS (1993) 4.2, 4.3

Available Nitrate and Nitrite are extracted from the soil using a 2N KCl 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) methods 4.2, 4.3

PH-1:2CACL2-SK Soil pH (1:2 Soil:CaCl2 Extraction) CSSC 3.11

1 part dry soil and 2 parts de-ionized 0.01M CaCl2 (by volume) is mixed. The slurry is allowed to stand with occasional stirring for 30 - 60 minutes. pH of the soil slurry is then measured using a pH meter.

PH-BUFFER-SMP-SK Soil Buffer pH (SMP) CSSS (1993) method 14.2

After equilibration with SMP buffer solution, pH of the soil solution is measured with a pH meter. Lime requirement must be determined by the client using location-specific regression equations.

PO4-AVAIL-OLSEN-SK Soil Available Phosphate-P by Olsen CSSS (1993) 7.2,7.3.1

Plant available phosphorus is extracted from the sample with sodium bicarbonate. PO4-P in the filtered extract is determined colorimetrically at 880 nm.

SAR-CALC-SK Soil SAR and Cations in saturated soil CSSS 18.4-Calculation

SAR-CALC-SO4-SK Soil SAR, Cations and SO4 in saturated soil APHA 3120B

Ca, Mg, Na, K and SO4 in a saturated soil extract are determined by ICP-OES.

SAT/PH/EC-SK Soil pH and EC (Saturated Paste) CSSS 18.2.2/CSSC 3.14/CSSS 18.3.1

pH of a saturated soil paste is measured using a pH meter. After equilibration, an extract is obtained by vacuum filtration with conductivity of the extract measured by a conductivity meter.

SO4-AVAIL-CALPHOS-SK Soil Plant Available Sulfate - Ca(H2PO4)2 NCR (1998) p. 36/APHA 3120B

Plant available sulfate is extracted from the sample using dilute calcium phosphate. SO4-S in the filtered extract is determined by ICP-OES.

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

Chain of Custody Numbers:

ALS07211308

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

Workorder: L1336075 Report Date: 24-OCT-13

Client: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-INORG-ORG-SK	**Soil**							
Batch R2664605								
WG1717325-1 DUP		**L1336075-3**						
Inorganic Carbon		0.33	0.31		%	5.6	20	02-AUG-13
CaCO3 Equivalent		2.72	2.58		%	5.6	25	02-AUG-13
WG1717325-2 IRM		**0.1%IC**						
Inorganic Carbon			130.2		%		60-140	02-AUG-13
CaCO3 Equivalent			130.8		%		60-140	02-AUG-13
WG1717325-3 IRM		**0.4%IC**						
Inorganic Carbon			104.7		%		80-120	02-AUG-13
CaCO3 Equivalent			104.8		%		80-120	02-AUG-13
WG1717325-6 IRM		**0.1%IC**						
Inorganic Carbon			88.0		%		60-140	02-AUG-13
CaCO3 Equivalent			88.4		%		60-140	02-AUG-13
WG1717325-7 IRM		**0.4%IC**						
Inorganic Carbon			98.6		%		80-120	02-AUG-13
CaCO3 Equivalent			98.8		%		80-120	02-AUG-13
WG1717325-4 MB								
Inorganic Carbon			<0.10		%		0.1	02-AUG-13
CaCO3 Equivalent			<0.80		%		0.8	02-AUG-13
WG1717325-8 MB								
Inorganic Carbon			<0.10		%		0.1	02-AUG-13
CaCO3 Equivalent			<0.80		%		0.8	02-AUG-13
C-TOT-LECO-SK	**Soil**							
Batch R2664632								
WG1717318-18 IRM		**08-109_SOIL**						
Total Carbon by Combustion			99.7		%		80-120	31-JUL-13
WG1717318-22 IRM		**08-109_SOIL**						
Total Carbon by Combustion			103.1		%		80-120	31-JUL-13
WG1717318-20 MB								
Total Carbon by Combustion			<0.1		%		0.1	31-JUL-13
WG1717318-24 MB								
Total Carbon by Combustion			<0.1		%		0.1	31-JUL-13
CAT-XTR-SK	**Soil**							
Batch R2664575								
WG1717282-1 DUP		**L1336075-3**						
Sodium (Na)		<0.50	<0.50	RPD-NA	meq/100g	N/A	25	02-AUG-13
Potassium (K)		<0.50	<0.50	RPD-NA	meq/100g	N/A	25	02-AUG-13
Calcium (Ca)		22.1	22.0		meq/100g	0.4	30	02-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CAT-XTR-SK	**Soil**							
Batch R2664575								
WG1717282-1 DUP		**L1336075-3**						
Magnesium (Mg)		1.52	1.48		meq/100g	2.6	30	02-AUG-13
WG1717282-3 IRM		**SAL814**						
Sodium (Na)			100.6		%		70-130	02-AUG-13
Potassium (K)			104.5		%		70-130	02-AUG-13
Calcium (Ca)			101.8		%		70-130	02-AUG-13
Magnesium (Mg)			94.3		%		70-130	02-AUG-13
WG1717282-2 MB								
Sodium (Na)			<0.50		meq/100g		0.5	02-AUG-13
Potassium (K)			<0.50		meq/100g		0.5	02-AUG-13
Calcium (Ca)			<0.50		meq/100g		0.5	02-AUG-13
Magnesium (Mg)			<0.50		meq/100g		0.5	02-AUG-13
CEC-SK	**Soil**							
Batch R2664747								
WG1717284-3 IRM		**SAL814**						
Cation Exchange Capacity			113.2		%		70-130	02-AUG-13
WG1717284-2 MB								
Cation Exchange Capacity			<0.80		meq/100g		0.8	02-AUG-13
CL-SAR-SK	**Soil**							
Batch R2663849								
WG1717499-3 IRM		**ED-SAL_NAT1**						
Chloride (Cl)			81.0		%		70-130	01-AUG-13
WG1717499-2 MB								
Chloride (Cl)			<2.0		mg/L		2	01-AUG-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2671062								
WG1723908-3 CRM		**VA-CANMET-TILL1**						
Phosphorus (P)			103.7		%		70-130	12-AUG-13
WG1724011-3 CRM		**VA-CANMET-TILL1**						
Phosphorus (P)			107.2		%		70-130	12-AUG-13
WG1723908-1 MB								
Phosphorus (P)			<50		mg/kg		50	12-AUG-13
WG1724011-1 MB								
Phosphorus (P)			<50		mg/kg		50	12-AUG-13
METAL-DTPA-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
METAL-DTPA-SK	**Soil**							
Batch R2663672								
WG1717233-1 DUP		**L1336075-5**						
Copper (Cu)		3.72	3.96		mg/kg	6.3	30	01-AUG-13
Iron (Fe)		50.8	54.4		mg/kg	6.8	30	01-AUG-13
Manganese (Mn)		22.7	23.5		mg/kg	3.7	30	01-AUG-13
Zinc (Zn)		1.20	1.32		mg/kg	9.8	30	01-AUG-13
WG1717233-3 IRM		**11-119**						
Copper (Cu)			103.9		%		70-130	01-AUG-13
Iron (Fe)			111.7		%		70-130	01-AUG-13
Manganese (Mn)			100.6		%		70-130	01-AUG-13
Zinc (Zn)			104.2		%		70-130	01-AUG-13
WG1717233-2 MB								
Copper (Cu)			<0.10		mg/kg		0.1	01-AUG-13
Iron (Fe)			<2.0		mg/kg		2	01-AUG-13
Manganese (Mn)			<0.050		mg/kg		0.05	01-AUG-13
Zinc (Zn)			<0.20		mg/kg		0.2	01-AUG-13
N-TOT-LECO-SK	**Soil**							
Batch R2664632								
WG1717318-18 IRM		**08-109_SOIL**						
Total Nitrogen by LECO			0.102		%		0.085-0.135	31-JUL-13
WG1717318-22 IRM		**08-109_SOIL**						
Total Nitrogen by LECO			0.091		%		0.085-0.135	31-JUL-13
WG1717318-20 MB								
Total Nitrogen by LECO			<0.020		%		0.02	31-JUL-13
WG1717318-24 MB								
Total Nitrogen by LECO			<0.020		%		0.02	31-JUL-13
NH4-AVAIL-SK	**Soil**							
Batch R2663266								
WG1717258-3 IRM		**SAL814**						
Available Ammonium-N			107.3		%		70-130	31-JUL-13
WG1717258-2 MB								
Available Ammonium-N			<1.0		mg/kg		1	31-JUL-13
NO3-AVAIL-KCL-SK	**Soil**							
Batch R2663259								
WG1717235-3 IRM		**SAL814**						
Available Nitrate-N			88.9		%		70-130	31-JUL-13
WG1717235-2 MB								
Available Nitrate-N			<2.0		mg/kg		2	31-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-1:2CACL2-SK	**Soil**							
Batch R2663605								
WG1717236-1 DUP		**L1336075-7**						
pH (1:2 CaCl2)		7.82	7.78	J	pH	0.04	0.3	01-AUG-13
WG1717236-2 IRM		**SAL814**						
pH (1:2 CaCl2)			7.80		pH		7.55-8.15	01-AUG-13
PH-BUFFER-SMP-SK	**Soil**							
Batch R2663881								
WG1717292-1 DUP		**L1336075-7**						
SMP Buffer pH		7.60	7.60	J	pH	0.00	0.2	01-AUG-13
WG1717292-3 IRM		**SAL814**						
SMP Buffer pH			7.60		pH		7.44-7.64	01-AUG-13
PO4-AVAIL-OLSEN-SK	**Soil**							
Batch R2663246								
WG1717247-1 DUP		**L1336075-2**						
Available Phosphate-P		1.4	1.4		mg/kg	0.0	30	31-JUL-13
WG1717247-3 IRM		**FARM2005**						
Available Phosphate-P			91.4		%		70-130	31-JUL-13
WG1717247-2 MB								
Available Phosphate-P			<1.0		mg/kg		1	31-JUL-13
SAR-CALC-SK	**Soil**							
Batch R2663766								
WG1717499-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			101.5		%		70-130	01-AUG-13
Potassium (K)			104.8		%		70-130	01-AUG-13
Magnesium (Mg)			99.5		%		70-130	01-AUG-13
Sodium (Na)			104.2		%		70-130	01-AUG-13
WG1717499-2 MB								
Calcium (Ca)			<2.0		mg/L		2	01-AUG-13
Potassium (K)			<1.0		mg/L		1	01-AUG-13
Magnesium (Mg)			<2.0		mg/L		2	01-AUG-13
Sodium (Na)			<4.0		mg/L		4	01-AUG-13
SAR-CALC-SO4-SK	**Soil**							
Batch R2663766								
WG1717499-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			101.5		%		70-130	01-AUG-13
Potassium (K)			104.8		%		70-130	01-AUG-13
Magnesium (Mg)			99.5		%		70-130	01-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAR-CALC-SO4-SK	**Soil**							
Batch R2663766								
WG1717499-3 IRM		**ED-SAL_NAT1**						
Sodium (Na)			104.2		%		70-130	01-AUG-13
Sulfur (as SO4)			111.0		%		70-130	01-AUG-13
WG1717499-2 MB								
Calcium (Ca)			<2.0		mg/L		2	01-AUG-13
Potassium (K)			<1.0		mg/L		1	01-AUG-13
Magnesium (Mg)			<2.0		mg/L		2	01-AUG-13
Sodium (Na)			<4.0		mg/L		4	01-AUG-13
Sulfur (as SO4)			<5.0		mg/L		5	01-AUG-13
SAT/PH/EC-SK	**Soil**							
Batch R2663607								
WG1717499-3 IRM		**ED-SAL_NAT1**						
% Saturation			46.2		%		38-48	01-AUG-13
pH in Saturated Paste			6.87		pH		6.5-7.1	01-AUG-13
Conductivity Sat. Paste			99.3		%		80-120	01-AUG-13
WG1717499-2 MB								
Conductivity Sat. Paste			<0.10		dS m-1		0.1	01-AUG-13
SO4-AVAIL-CALPHOS-SK	**Soil**							
Batch R2663191								
WG1717252-1 DUP		**L1336075-3**						
Available Sulfate-S		28.9	29.9		mg/kg	3.4	40	31-JUL-13
WG1717252-3 IRM		**SAL814**						
Available Sulfate-S			90.6		%		60-140	31-JUL-13
WG1717252-2 MB								
Available Sulfate-S			<3.0		mg/kg		3	31-JUL-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.
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

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 L1336075 were received on 22-JUL-13 10:22.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

7/21/2013 10:06:42 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 7/20/2013
COC Number: ALS07211308

				Container:	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon		
				Preservatives:	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C		
				Filtered:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
				Holding Time:	180	28	28	28	28	180	180	28	28	180	180	28	180	180	28		
					(CSSS (2006) 11.3 and 11.4) Ext Micro Nut (Zn,Fe,Cu,Mn)	(CSSS (2008) 12.2) SMP Buffer pH (for pH<6.0)	(CSSS (2008) 15.2.4 at 14.4.4) Sodium Adsorption Ratio	(CSSS (2008) 15.2.1) ECe (sat paste)	(CSSS (2008) 15.3) Soluble Salts	(CSSS (2008) 18.4) 1N, pH7 NH4OAc ext CaMgNAa	(CSSS (2008) 18.4_CEC) Cation Exchange Capacity	(CSSS (2008) 20.3) CaCO3 equivalent	(CSSS (2008) 6.2) NH4-N and NO3-N (2N KCL)	(CSSS (2008) 7.2 and 7.3.1 if pH>7.2) Available P (pH>7.2)	(CSSS (2008) 7.2 and 7.3.1 if pH<7.2) Available P (pH<7.2)	(CSSS 16.3 (2008)) pH (1:2 CaCL2) CP17	(EPA200.2/SW6020A) Total P	(S-11.10 in Gaviak et al. (2005)) Ca(H2PO4)2.H2O ext SO4-S	(SSSA (1996) p894-895 il pH<7.2) Available P (pH<7.2)	(SSSA (1996) P973-974) Total N	Number of Containers	COMMENTS
	DATE	TIME	Matrix																		
CH13-311-BH013_SOa	7/18/2013	14:44	Soil		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	3	
CH13-311-BH013_SOb	7/18/2013	16:28	Soil		x	x	x	x	x	x		x		x	x		x	x		2	
CH13-311-BH013_SOc	7/18/2013	17:30	Soil		x	x	x	x	x	x		x		x	x		x	x		2	
CH13-311-BH913_SOb	7/18/2013	16:35	Soil		x	x	x	x	x	x		x		x	x		x	x		2	
CH13-311-BH013_SOd	7/19/2013	9:30	Soil		x	x	x	x	x	x		x		x	x		x	x		2	
CH13-311-BH013_SOe	7/19/2013	12:15	Soil		x	x	x	x	x	x		x		x	x		x	x		2	
CH13-311-BH014_SOa	7/20/2013	9:15	Soil		x	x	x	x	x	x		x		x	x		x	x		2	
CH13-311-BH014_SOb	7/20/2013	9:50	Soil		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	3	
CH13-311-BH014_SOc	7/20/2013	12:00	Soil		x	x	x	x	x	x		x		x	x		x	x		2	
CH13-311-BH014_SOd	7/20/2013	13:45	Soil		x	x	x	x	x	x		x		x	x		x	x		2	
CH13-311-BH014_SOe	7/20/2013	14:45	Soil		x	x	x	x	x	x		x		x	x		x	x		2	

TOTAL NUMBER OF CONTAINER

TN July 24 13:55 90

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		7/21/13 1300
Received by		
Relinquished by		
Received by		

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:

Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table on samples

Report Copy to
Bernice Kidd
(530) 229-3203

L1336075-COFC

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 22-JUL-13
Report Date: 03-AUG-13 11:01 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1336353

Project P.O. #: 472645.06.AD.01.04.13 "PO=604564"
Job Reference: BSI GRUM OVERBURDEN DUMP 2013 311.5B
C of C Numbers: ALS07211309
Legal Site Desc:

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1336353-1				
	Description	Water				
	Sampled Date	21-JUL-13				
	Sampled Time	10:10				
	Client ID	EB_311_13_001				
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	<0.50				
Anions and Nutrients	Sulfate (SO4) (mg/L)	<0.50				
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)	<0.50				
	Total Organic Carbon (mg/L)	<0.50				
Total Metals	Aluminum (Al)-Total (mg/L)	0.0072				
	Antimony (Sb)-Total (mg/L)	<0.00010				
	Arsenic (As)-Total (mg/L)	<0.00010				
	Barium (Ba)-Total (mg/L)	0.000180				
	Beryllium (Be)-Total (mg/L)	<0.00010				
	Boron (B)-Total (mg/L)	<0.010				
	Cadmium (Cd)-Total (mg/L)	<0.000010				
	Calcium (Ca)-Total (mg/L)	<0.050				
	Chromium (Cr)-Total (mg/L)	0.00014				
	Cobalt (Co)-Total (mg/L)	0.00036				
	Copper (Cu)-Total (mg/L)	<0.00050				
	Iron (Fe)-Total (mg/L)	<0.030				
	Lead (Pb)-Total (mg/L)	0.000088				
	Lithium (Li)-Total (mg/L)	<0.00050				
	Magnesium (Mg)-Total (mg/L)	<0.10				
	Manganese (Mn)-Total (mg/L)	0.000402				
	Mercury (Hg)-Total (mg/L)	<0.000010				
	Molybdenum (Mo)-Total (mg/L)	0.000093				
	Nickel (Ni)-Total (mg/L)	<0.00050				
	Phosphorus (P)-Total (mg/L)	<0.30				
	Potassium (K)-Total (mg/L)	<0.050				
	Selenium (Se)-Total (mg/L)	<0.00010				
	Silicon (Si)-Total (mg/L)	<0.050				
	Silicon (as SiO2)-Total (mg/L)	<0.20				
	Silver (Ag)-Total (mg/L)	0.000012				
	Sodium (Na)-Total (mg/L)	<0.050				
	Strontium (Sr)-Total (mg/L)	<0.00020				
	Sulfur (S)-Total (mg/L)	<0.50				
	Thallium (Tl)-Total (mg/L)	<0.000010				
	Titanium (Ti)-Total (mg/L)	<0.010				
	Uranium (U)-Total (mg/L)	<0.000010				
	Vanadium (V)-Total (mg/L)	<0.0010				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1336353-1				
	Description	Water				
	Sampled Date	21-JUL-13				
	Sampled Time	10:10				
	Client ID	EB_311_13_001				
Grouping	**Analyte**					
WATER						
Total Metals	Zinc (Zn)-Total (mg/L)	<0.0030				

* 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	Sulfate (SO4)	MS-B	L1336353-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
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**
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)".

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-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).

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).

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.

SIO2-T-CALC-VA	Water	Total Silicon (reported as Silica)	CALCULATION

Total Silicon (as SiO2) is a calculated parameter. Total Silicon (as SiO2 mg/L) = 2.139 x Total Silicon (mg/L).

** 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

Reference Information

Chain of Custody Numbers:

ALS07211309

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

Workorder: L1336353 Report Date: 03-AUG-13

Client: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-SO4-IC-WR	**Water**							
Batch R2655659								
WG1713650-2 LCS								
Sulfate (SO4)			101.4		%		85-115	23-JUL-13
WG1713650-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	23-JUL-13
WG1713650-4 MS		**L1334524-32**						
Sulfate (SO4)			N/A	MS-B	%		-	23-JUL-13
WG1713650-6 MS		**L1337250-2**						
Sulfate (SO4)			96.7		%		75-125	24-JUL-13
CARBONS-TIC-VA	**Water**							
Batch R2658783								
WG1716066-1 DUP		**L1336353-1**						
Total Inorganic Carbon		<0.50	<0.50	RPD-NA	mg/L	N/A	20	28-JUL-13
WG1716066-3 LCS								
Total Inorganic Carbon			109.9		%		80-120	28-JUL-13
WG1716066-2 MB								
Total Inorganic Carbon			<0.50		mg/L		0.5	28-JUL-13
CARBONS-TOC-VA	**Water**							
Batch R2656952								
WG1714149-1 DUP		**L1336353-1**						
Total Organic Carbon		<0.50	<0.50	RPD-NA	mg/L	N/A	20	25-JUL-13
WG1714149-4 LCS								
Total Organic Carbon			106.0		%		80-120	25-JUL-13
WG1714149-3 MB								
Total Organic Carbon			<0.50		mg/L		0.5	25-JUL-13
WG1714149-2 MS		**L1336365-1**						
Total Organic Carbon			113.4		%		70-130	25-JUL-13
HG-TOT-LOW-CVAFS-VA	**Water**							
Batch R2658086								
WG1714818-3 DUP		**L1336353-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	25-JUL-13
WG1714818-2 LCS								
Mercury (Hg)-Total			101.0		%		80-120	27-JUL-13
WG1714818-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	27-JUL-13
WG1714818-4 MS		**L1336353-1**						
Mercury (Hg)-Total			103.6		%		70-130	25-JUL-13
MET-T-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R2662597								
WG1716327-2 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Total			104.8		%		80-120	30-JUL-13
Antimony (Sb)-Total			106.2		%		80-120	30-JUL-13
Arsenic (As)-Total			100.6		%		80-120	30-JUL-13
Barium (Ba)-Total			98.1		%		80-120	30-JUL-13
Beryllium (Be)-Total			90.1		%		80-120	30-JUL-13
Boron (B)-Total			86.8		%		80-120	30-JUL-13
Cadmium (Cd)-Total			103.2		%		80-120	30-JUL-13
Chromium (Cr)-Total			102.7		%		80-120	30-JUL-13
Cobalt (Co)-Total			99.0		%		80-120	30-JUL-13
Copper (Cu)-Total			97.6		%		80-120	30-JUL-13
Lead (Pb)-Total			97.8		%		80-120	30-JUL-13
Lithium (Li)-Total			92.5		%		80-120	30-JUL-13
Manganese (Mn)-Total			101.6		%		80-120	30-JUL-13
Molybdenum (Mo)-Total			94.2		%		80-120	30-JUL-13
Nickel (Ni)-Total			99.4		%		80-120	30-JUL-13
Potassium (K)-Total			103.8		%		80-120	30-JUL-13
Selenium (Se)-Total			93.0		%		80-120	30-JUL-13
Silver (Ag)-Total			106.0		%		80-120	30-JUL-13
Sodium (Na)-Total			102.7		%		80-120	30-JUL-13
Strontium (Sr)-Total			91.1		%		80-120	30-JUL-13
Thallium (Tl)-Total			96.1		%		80-120	30-JUL-13
Titanium (Ti)-Total			90.3		%		80-120	30-JUL-13
Uranium (U)-Total			96.5		%		80-120	30-JUL-13
Vanadium (V)-Total			101.3		%		80-120	30-JUL-13
Zinc (Zn)-Total			95.5		%		80-120	30-JUL-13
WG1716327-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	30-JUL-13
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	30-JUL-13
Arsenic (As)-Total			<0.00010		mg/L		0.0001	30-JUL-13
Barium (Ba)-Total			<0.000050		mg/L		0.00005	30-JUL-13
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	30-JUL-13
Boron (B)-Total			<0.010		mg/L		0.01	30-JUL-13
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	30-JUL-13
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	30-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R2662597								
WG1716327-1 MB								
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	30-JUL-13
Copper (Cu)-Total			<0.00050		mg/L		0.0005	30-JUL-13
Lead (Pb)-Total			<0.000050		mg/L		0.00005	30-JUL-13
Lithium (Li)-Total			<0.00050		mg/L		0.0005	30-JUL-13
Manganese (Mn)-Total			<0.000050		mg/L		0.00005	30-JUL-13
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	30-JUL-13
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	30-JUL-13
Potassium (K)-Total			<0.050		mg/L		0.05	30-JUL-13
Selenium (Se)-Total			<0.00010		mg/L		0.0001	30-JUL-13
Silver (Ag)-Total			<0.000010		mg/L		0.00001	30-JUL-13
Sodium (Na)-Total			<0.050		mg/L		0.05	30-JUL-13
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	30-JUL-13
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	30-JUL-13
Titanium (Ti)-Total			<0.010		mg/L		0.01	30-JUL-13
Uranium (U)-Total			<0.000010		mg/L		0.00001	30-JUL-13
Vanadium (V)-Total			<0.0010		mg/L		0.001	30-JUL-13
Zinc (Zn)-Total			<0.0030		mg/L		0.003	30-JUL-13
MET-TOT-ICP-VA	**Water**							
Batch R2661340								
WG1716327-2 CRM		**VA-HIGH-WATRM**						
Calcium (Ca)-Total			101.3		%		80-120	30-JUL-13
Iron (Fe)-Total			100.8		%		80-120	30-JUL-13
Magnesium (Mg)-Total			101.8		%		80-120	30-JUL-13
Phosphorus (P)-Total			96.6		%		80-120	30-JUL-13
Silicon (Si)-Total			102.9		%		80-120	30-JUL-13
WG1716327-1 MB								
Calcium (Ca)-Total			<0.050		mg/L		0.05	30-JUL-13
Iron (Fe)-Total			<0.030		mg/L		0.03	30-JUL-13
Magnesium (Mg)-Total			<0.10		mg/L		0.1	30-JUL-13
Phosphorus (P)-Total			<0.30		mg/L		0.3	30-JUL-13
Silicon (Si)-Total			<0.050		mg/L		0.05	30-JUL-13
S-TOT-ICP-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-TOT-ICP-VA	**Water**							
Batch R2661340								
WG1716327-2 CRM		**VA-HIGH-WATRM**						
Sulfur (S)-Total			101.5		%		80-120	30-JUL-13
WG1716327-1 MB								
Sulfur (S)-Total			<0.50		mg/L		0.5	30-JUL-13

Quality Control Report

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
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:

All test results reported with this submission were conducted within ALS recommended hold times.

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.

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 22-JUL-13
Report Date: 03-AUG-13 11:04 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1336365

Project P.O. #: 472645.06.AD.01.04.13 "PO=604564"
Job Reference: BSI NE AREA OF GRUM PIT 2013 311.5C
C of C Numbers: ALS07211310
Legal Site Desc:

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1336365-1				
	Description	Water				
	Sampled Date	21-JUL-13				
	Sampled Time	10:10				
	Client ID	EB_311_13_002				
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	<0.50				
Anions and Nutrients	Sulfate (SO4) (mg/L)	<0.50				
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)	<0.50				
	Total Organic Carbon (mg/L)	<0.50				
Total Metals	Aluminum (Al)-Total (mg/L)	0.0090				
	Antimony (Sb)-Total (mg/L)	<0.00010				
	Arsenic (As)-Total (mg/L)	<0.00010				
	Barium (Ba)-Total (mg/L)	0.000190				
	Beryllium (Be)-Total (mg/L)	<0.00010				
	Boron (B)-Total (mg/L)	<0.010				
	Cadmium (Cd)-Total (mg/L)	<0.000010				
	Calcium (Ca)-Total (mg/L)	<0.050				
	Chromium (Cr)-Total (mg/L)	<0.00010				
	Cobalt (Co)-Total (mg/L)	0.00044				
	Copper (Cu)-Total (mg/L)	0.00079				
	Iron (Fe)-Total (mg/L)	<0.030				
	Lead (Pb)-Total (mg/L)	0.000092				
	Lithium (Li)-Total (mg/L)	0.00081				
	Magnesium (Mg)-Total (mg/L)	<0.10				
	Manganese (Mn)-Total (mg/L)	0.000404				
	Mercury (Hg)-Total (mg/L)	<0.000010				
	Molybdenum (Mo)-Total (mg/L)	0.000057				
	Nickel (Ni)-Total (mg/L)	<0.00050				
	Phosphorus (P)-Total (mg/L)	<0.30				
	Potassium (K)-Total (mg/L)	<0.050				
	Selenium (Se)-Total (mg/L)	<0.00010				
	Silicon (Si)-Total (mg/L)	<0.050				
	Silicon (as SiO2)-Total (mg/L)	<0.20				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	0.138				
	Strontium (Sr)-Total (mg/L)	<0.00020				
	Sulfur (S)-Total (mg/L)	<0.50				
	Thallium (Tl)-Total (mg/L)	<0.000010				
	Titanium (Ti)-Total (mg/L)	<0.010				
	Uranium (U)-Total (mg/L)	<0.000010				
	Vanadium (V)-Total (mg/L)	<0.0010				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1336365-1				
	Description	Water				
	Sampled Date	21-JUL-13				
	Sampled Time	10:10				
	Client ID	EB_311_13_002				
Grouping	**Analyte**					
WATER						
Total Metals	Zinc (Zn)-Total (mg/L)	<0.0030				

* 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	Sulfate (SO4)	MS-B	L1336365-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
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**
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)".

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-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).

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).

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.

SIO2-T-CALC-VA Water Total Silicon (reported as Silica) CALCULATION

Total Silicon (as SiO2) is a calculated parameter. Total Silicon (as SiO2 mg/L) = 2.139 x Total Silicon (mg/L).

** 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

Reference Information

Chain of Custody Numbers:

ALS07211310

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-SO4-IC-WR	**Water**							
Batch R2655659								
WG1713650-2 LCS								
Sulfate (SO4)			101.4		%		85-115	23-JUL-13
WG1713650-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	23-JUL-13
WG1713650-4 MS		**L1334524-32**						
Sulfate (SO4)			N/A	MS-B	%		-	23-JUL-13
WG1713650-6 MS		**L1337250-2**						
Sulfate (SO4)			96.7		%		75-125	24-JUL-13
CARBONS-TIC-VA	**Water**							
Batch R2658783								
WG1716066-3 LCS								
Total Inorganic Carbon			109.9		%		80-120	28-JUL-13
WG1716066-2 MB								
Total Inorganic Carbon			<0.50		mg/L		0.5	28-JUL-13
CARBONS-TOC-VA	**Water**							
Batch R2656952								
WG1714149-4 LCS								
Total Organic Carbon			106.0		%		80-120	25-JUL-13
WG1714149-3 MB								
Total Organic Carbon			<0.50		mg/L		0.5	25-JUL-13
WG1714149-2 MS		**L1336365-1**						
Total Organic Carbon			113.4		%		70-130	25-JUL-13
HG-TOT-LOW-CVAFS-VA	**Water**							
Batch R2658102								
WG1714821-3 DUP		**L1336365-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	25-JUL-13
WG1714821-2 LCS								
Mercury (Hg)-Total			99.1		%		80-120	27-JUL-13
WG1714821-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	27-JUL-13
WG1714821-4 MS		**L1336365-1**						
Mercury (Hg)-Total			103.1		%		70-130	25-JUL-13
MET-T-CCMS-VA	**Water**							
Batch R2660710								
WG1716330-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	30-JUL-13
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	30-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R2660710								
WG1716330-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	30-JUL-13
Barium (Ba)-Total			<0.000050		mg/L		0.00005	30-JUL-13
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	30-JUL-13
Boron (B)-Total			<0.010		mg/L		0.01	30-JUL-13
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	30-JUL-13
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	30-JUL-13
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	30-JUL-13
Copper (Cu)-Total			<0.00050		mg/L		0.0005	30-JUL-13
Lead (Pb)-Total			<0.000050		mg/L		0.00005	30-JUL-13
Lithium (Li)-Total			<0.00050		mg/L		0.0005	30-JUL-13
Manganese (Mn)-Total			<0.000050		mg/L		0.00005	30-JUL-13
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	30-JUL-13
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	30-JUL-13
Potassium (K)-Total			<0.050		mg/L		0.05	30-JUL-13
Selenium (Se)-Total			<0.00010		mg/L		0.0001	30-JUL-13
Silver (Ag)-Total			<0.000010		mg/L		0.00001	30-JUL-13
Sodium (Na)-Total			<0.050		mg/L		0.05	30-JUL-13
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	30-JUL-13
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	30-JUL-13
Titanium (Ti)-Total			<0.010		mg/L		0.01	30-JUL-13
Uranium (U)-Total			<0.000010		mg/L		0.00001	30-JUL-13
Vanadium (V)-Total			<0.0010		mg/L		0.001	30-JUL-13
Zinc (Zn)-Total			<0.0030		mg/L		0.003	30-JUL-13
Batch R2662597								
WG1716330-2 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Total			104.0		%		80-120	30-JUL-13
Antimony (Sb)-Total			104.4		%		80-120	30-JUL-13
Arsenic (As)-Total			100.2		%		80-120	30-JUL-13
Barium (Ba)-Total			96.1		%		80-120	30-JUL-13
Beryllium (Be)-Total			90.4		%		80-120	30-JUL-13
Boron (B)-Total			88.0		%		80-120	30-JUL-13
Cadmium (Cd)-Total			102.1		%		80-120	30-JUL-13
Chromium (Cr)-Total			104.5		%		80-120	30-JUL-13
Cobalt (Co)-Total			98.7		%		80-120	30-JUL-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R2662597								
WG1716330-2 CRM		**VA-HIGH-WATRM**						
Copper (Cu)-Total			96.2		%		80-120	30-JUL-13
Lead (Pb)-Total			96.4		%		80-120	30-JUL-13
Lithium (Li)-Total			91.8		%		80-120	30-JUL-13
Manganese (Mn)-Total			101.6		%		80-120	30-JUL-13
Molybdenum (Mo)-Total			93.4		%		80-120	30-JUL-13
Nickel (Ni)-Total			99.2		%		80-120	30-JUL-13
Potassium (K)-Total			101.3		%		80-120	30-JUL-13
Selenium (Se)-Total			92.2		%		80-120	30-JUL-13
Silver (Ag)-Total			103.1		%		80-120	30-JUL-13
Sodium (Na)-Total			104.4		%		80-120	30-JUL-13
Strontium (Sr)-Total			90.7		%		80-120	30-JUL-13
Thallium (Tl)-Total			95.2		%		80-120	30-JUL-13
Titanium (Ti)-Total			101.6		%		80-120	30-JUL-13
Uranium (U)-Total			97.7		%		80-120	30-JUL-13
Vanadium (V)-Total			100.0		%		80-120	30-JUL-13
Zinc (Zn)-Total			95.9		%		80-120	30-JUL-13
MET-TOT-ICP-VA	**Water**							
Batch R2661340								
WG1716330-2 CRM		**VA-HIGH-WATRM**						
Calcium (Ca)-Total			100.9		%		80-120	30-JUL-13
Iron (Fe)-Total			99.7		%		80-120	30-JUL-13
Magnesium (Mg)-Total			101.6		%		80-120	30-JUL-13
Phosphorus (P)-Total			95.7		%		80-120	30-JUL-13
Silicon (Si)-Total			101.6		%		80-120	30-JUL-13
WG1716330-1 MB								
Calcium (Ca)-Total			<0.050		mg/L		0.05	30-JUL-13
Iron (Fe)-Total			<0.030		mg/L		0.03	30-JUL-13
Magnesium (Mg)-Total			<0.10		mg/L		0.1	30-JUL-13
Phosphorus (P)-Total			<0.30		mg/L		0.3	30-JUL-13
Silicon (Si)-Total			<0.050		mg/L		0.05	30-JUL-13
S-TOT-ICP-VA	**Water**							
Batch R2661340								
WG1716330-2 CRM		**VA-HIGH-WATRM**						
Sulfur (S)-Total			100.1		%		80-120	30-JUL-13
WG1716330-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-TOT-ICP-VA	**Water**							
Batch R2661340								
WG1716330-1 MB								
Sulfur (S)-Total			<0.50		mg/L		0.5	30-JUL-13

Quality Control Report

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
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:

All test results reported with this submission were conducted within ALS recommended hold times.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

7/21/2013 11:20:48 AM

Project Name Faro
Location Faro Mine Complex -Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 10 Days
Shipping Date: 7/21/2013
COC Number: ALS07211310

	Container:	500ml Poly	125 ml glass	250ml Poly	250ml Poly			
	Preservatives:	4'C	4'C	HNO3, 4'C	HNO3, 4'C			
	Filtered:	NA	NA	NA	NA			
	Holding Time:	3	14	180/28	180/28			
		(E300/SM4110B) Sulfate/SO4	(SM5310C) TIC/TOC	(SW6010B/SW6020A/E245.7) For Metals Analyte List see Table 1	METALS (6020) Barium (LI Metaborate)		Number of Containers	COMMENTS
DATE	TIME	Matrix						
EB_311_13_002	7/21/2013	10:10	Water	X	X	X	X	5
						TOTAL NUMBER OF CONTAINERS	5	

L1336365-COFC

Signatures	Date/Time
Approved by	
Sampled by	7/21/13 1300
Relinquished by	
Received by	7/22/13 10:22
Relinquished by	
Received by	15°C

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:

Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 26-JUL-13
Report Date: 24-OCT-13 09:48 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1338656

Project P.O. #: 472645.06.AD.01.04.13 "PO=604564"
Job Reference: BSI GRUM OVERBURDEN DUMP 2013 311.5B
C of C Numbers: ALS07251301, ALS07251301H, ALS07251301R
Legal Site Desc:

Comments:

24-OCT-13: Additional QC data has been included.

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1338656-1	L1338656-2	L1338656-3	L1338656-4	L1338656-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	23-JUL-13	23-JUL-13	23-JUL-13	23-JUL-13	24-JUL-13
	Sampled Time	14:25	14:55	16:40	17:45	09:30
	Client ID	CH13-311-BH011_SOA	CH13-311-BH011_SOB	CH13-311-BH011_SOC	CH13-311-BH011_SOD	CH13-311-BH011_SOE
Grouping	**Analyte**					
SOIL						
Physical Tests	Grain Size Curve	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED
	Moisture (%)	7.53	11.9	10.4	9.74	10.6
	Liquid Limit (LL) (%)			25		
	pH (1:2 soil:water) (pH)	8.23	8.29	8.25	8.50	8.36
	Plasticity Index (PI) (%)			8		
Organic / Inorganic Carbon	Inorganic Carbon (%)	0.39	0.36	0.31	0.52	0.47
	Inorganic Carbon (as CaCO3 Equivalent) (%)	3.27	3.02	2.60	4.37	3.91
	Organic Carbon (%)	<0.40	<0.40	<0.40	<0.40	0.40
	Organic Matter (%)	<0.70	<0.70	<0.70	<0.70	<0.70
Saturated Paste Extractables	Paste pH (pH)	7.11	7.23	7.30	7.73	7.83
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	50.0	38.0	36.0	41.0	50.0
Metals	Aluminum (Al) (mg/kg)	20000	16900	19200	20700	19600
	Antimony (Sb) (mg/kg)	0.62	3.20	0.69	0.51	1.02
	Arsenic (As) (mg/kg)	11.2	50.8	15.3	16.4	26.3
	Barium (Ba) (mg/kg)	202	290	265	227	383
	Beryllium (Be) (mg/kg)	0.68	0.67	0.60	0.63	0.68
	Bismuth (Bi) (mg/kg)	0.35	0.32	0.31	0.29	0.31
	Boron (B) (mg/kg)	<10	<10	<10	<10	<10
	Cadmium (Cd) (mg/kg)	0.265	0.871	0.411	0.328	0.558
	Calcium (Ca) (mg/kg)	13600	11100	11600	19600	17800
	Chromium (Cr) (mg/kg)	44.8	48.7	45.9	61.5	45.7
	Cobalt (Co) (mg/kg)	12.7	14.3	14.1	15.4	12.6
	Copper (Cu) (mg/kg)	26.9	46.5	33.4	29.7	31.9
	Iron (Fe) (mg/kg)	29100	31000	31500	32200	29700
	Lead (Pb) (mg/kg)	18.9	485	15.4	16.0	19.4
	Lithium (Li) (mg/kg)	32.3	28.4	29.8	34.6	33.6
	Magnesium (Mg) (mg/kg)	9390	9400	9970	12800	10700
	Manganese (Mn) (mg/kg)	456	400	465	574	476
	Mercury (Hg) (mg/kg)	0.0253	0.336	0.0378	0.0239	0.0578
	Molybdenum (Mo) (mg/kg)	0.70	1.22	0.85	0.61	1.57
	Nickel (Ni) (mg/kg)	39.0	48.2	42.5	49.1	40.9
	Phosphorus (P) (mg/kg)	608	608	649	704	1290
	Potassium (K) (mg/kg)	2580	2110	2380	2200	3040
	Selenium (Se) (mg/kg)	0.38	0.50	0.54	0.33	0.86
	Silver (Ag) (mg/kg)	0.15	0.99	0.16	0.12	0.22

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1338656-6				
		Description	Soil				
		Sampled Date	24-JUL-13				
		Sampled Time	09:30				
		Client ID	CH13-311-BH911_SOE				
Grouping	**Analyte**						
SOIL							
Physical Tests	Grain Size Curve		SEE ATTACHED				
	Moisture (%)		10.4				
	Liquid Limit (LL) (%)						
	pH (1:2 soil:water) (pH)		8.33				
	Plasticity Index (PI) (%)						
Organic / Inorganic Carbon	Inorganic Carbon (%)		0.36				
	Inorganic Carbon (as CaCO3 Equivalent) (%)		2.99				
	Organic Carbon (%)		0.50				
	Organic Matter (%)		0.85				
Saturated Paste Extractables	Paste pH (pH)		6.64				
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)		46.0				
Metals	Aluminum (Al) (mg/kg)		19100				
	Antimony (Sb) (mg/kg)		0.97				
	Arsenic (As) (mg/kg)		15.0				
	Barium (Ba) (mg/kg)		353				
	Beryllium (Be) (mg/kg)		0.68				
	Bismuth (Bi) (mg/kg)		0.34				
	Boron (B) (mg/kg)		<10				
	Cadmium (Cd) (mg/kg)		0.539				
	Calcium (Ca) (mg/kg)		14100				
	Chromium (Cr) (mg/kg)		43.0				
	Cobalt (Co) (mg/kg)		12.7				
	Copper (Cu) (mg/kg)		29.6				
	Iron (Fe) (mg/kg)		29100				
	Lead (Pb) (mg/kg)		21.0				
	Lithium (Li) (mg/kg)		33.5				
	Magnesium (Mg) (mg/kg)		10500				
	Manganese (Mn) (mg/kg)		462				
	Mercury (Hg) (mg/kg)		0.0531				
	Molybdenum (Mo) (mg/kg)		1.13				
	Nickel (Ni) (mg/kg)		41.1				
	Phosphorus (P) (mg/kg)		727				
	Potassium (K) (mg/kg)		2720				
	Selenium (Se) (mg/kg)		0.82				
	Silver (Ag) (mg/kg)		0.21				

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1338656-1	L1338656-2	L1338656-3	L1338656-4	L1338656-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	23-JUL-13	23-JUL-13	23-JUL-13	23-JUL-13	24-JUL-13
	Sampled Time	14:25	14:55	16:40	17:45	09:30
	Client ID	CH13-311-BH011_SOA	CH13-311-BH011_SOB	CH13-311-BH011_SOC	CH13-311-BH011_SOD	CH13-311-BH011_SOE
Grouping	**Analyte**					
SOIL						
Metals	Sodium (Na) (mg/kg)	230	180	250	190	230
	Strontium (Sr) (mg/kg)	58.0	49.4	52.3	71.9	93.0
	Sulfur (S)-Total (mg/kg)	1200	4300	2000	1700	1500
	Thallium (Tl) (mg/kg)	0.184	0.291	0.184	0.171	0.203
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	545	424	460	491	423
	Uranium (U) (mg/kg)	2.23	1.95	1.49	1.49	1.82
	Vanadium (V) (mg/kg)	36.8	37.7	39.6	41.3	47.3
	Zinc (Zn) (mg/kg)	79.1	602	87.1	85.5	98.1

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1338656-6				
	Description	Soil				
	Sampled Date	24-JUL-13				
	Sampled Time	09:30				
	Client ID	CH13-311-BH911_SOE				
Grouping	**Analyte**					
SOIL						
Metals	Sodium (Na) (mg/kg)	170				
	Strontium (Sr) (mg/kg)	65.8				
	Sulfur (S)-Total (mg/kg)	1500				
	Thallium (Tl) (mg/kg)	0.194				
	Tin (Sn) (mg/kg)	<2.0				
	Titanium (Ti) (mg/kg)	362				
	Uranium (U) (mg/kg)	1.76				
	Vanadium (V) (mg/kg)	43.3				
	Zinc (Zn) (mg/kg)	98.2				

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ATTERBERG-SK	Soil	Atterberg limits	CARTER CSSS 58

The liquid limit (or upper plastic limit) is the point at which the soil becomes semifluid, like softened butter. In operational terms, the liquid limit is defined as the water content at which a trapezoidal groove cut in moist soil is closed after 25 taps on a hard rubber plate (ASTM D-18, 1958).

The plastic limit (or lower plastic limit) is defined as the water content at which soil begins to crumble on being rolled into a thread 1/8 inch (or 3 mm) in diameter. It represents the lowest water content at which soil can be deformed readily without cracking.

The plastic index (which is the difference between the liquid and plastic limits) gives an indication of the "clayeyness" or plasticity of a clay and is employed in engineering classification systems for soils.

References: McKeague, J.A. 1978. Atterberg Limits pp 50 - 55 In: Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci. p. 50 - 55

B-200.2-CCMS-VA	Soil	Boron 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."

C-INORG-SK	Soil	Inorganic Carbon / Calcium Carbonate	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-ORG-WB-SK	Soil	Total Organic Carbon - Walkley Black	CSSS (1993) method 21.2

The soil sample is treated with excess potassium dichromate and sulfuric acid to oxidize organic carbon. Oxidized organic carbon is determined by back-titration with ferrous ammonium sulfate. Organic matter is estimated from the organic carbon result using the Van Bemmelon factor.

GRAIN SIZE-SK	Soil	Grain Size Analysis	SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

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.

IC-CACO3-CALC-SK	Soil	Inorganic Carbon as CaCO3 Equivalent	Calculation
MET-200.2-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A

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 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.

NP-TU	Soil	Neutralization Potential (NP)	Sobek 3.2.3, MOD
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.

PH-PASTE-VA	Soil	pH in Soil (Paste) by Meter	Carter-CSSS / APHA 4500 H

A soil extract produced by the saturated paste extraction procedure is analyzed by pH meter.

S-TOT-LECO-SK	Soil	Total Sulphur by combustion method	ISO 15178:2000

The sample is ignited in a combustion analyzer where sulfur in the reduced SO2 gas is determined using a thermal conductivity detector.

SAT-PCNT-VA	Soil	Saturation Percentage	Carter-CSSS

Saturation Percentage (SP) is the total volume of water present in a saturated paste (in mL) divided by the dry weight of the sample (in grams), expressed as a percentage, as described in "Soil Sampling and Methods of Analysis" by M. Carter.

** 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
TU	ALS ENVIRONMENTAL - TUCSON, ARIZONA, USA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

ALS07251301 ALS07251301H ALS07251301R

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-200.2-CCMS-VA	**Soil**							
Batch R2671062								
WG1723908-4 CRM		**VA-CANMET-TILL1**						
Boron (B)			2		mg/kg		0-13	12-AUG-13
WG1723908-2 DUP		**L1338656-1**						
Boron (B)		<10	<10	RPD-NA	mg/kg	N/A	30	12-AUG-13
WG1723908-1 MB								
Boron (B)			<10		mg/kg		10	12-AUG-13
C-INORG-SK	**Soil**							
Batch R2664598								
WG1718190-1 DUP		**L1338656-3**						
Inorganic Carbon		0.31	0.31		%	0.3	20	02-AUG-13
WG1718190-3 IRM		**0.1%IC**						
Inorganic Carbon			115.0		%		60-140	02-AUG-13
WG1718190-4 IRM		**0.4%IC**						
Inorganic Carbon			108.1		%		80-120	02-AUG-13
WG1718190-5 MB								
Inorganic Carbon			<0.10		%		0.1	02-AUG-13
C-TOT-ORG-WB-SK	**Soil**							
Batch R2667851								
WG1720360-1 DUP		**L1338656-3**						
Organic Carbon		<0.40	<0.40	RPD-NA	%	N/A	30	07-AUG-13
Organic Matter		<0.70	<0.70	RPD-NA	%	N/A	20	07-AUG-13
WG1720360-3 IRM		**FARM2009**						
Organic Carbon			107.8		%		80-120	07-AUG-13
Organic Matter			107.5		%		80-120	07-AUG-13
WG1720360-2 MB								
Organic Carbon			<0.40		%		0.4	07-AUG-13
Organic Matter			<0.70		%		0.7	07-AUG-13
HG-200.2-CVAF-VA	**Soil**							
Batch R2670980								
WG1723908-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			104.8		%		70-130	13-AUG-13
WG1723908-2 DUP		**L1338656-1**						
Mercury (Hg)		0.0253	0.0221		mg/kg	14	40	13-AUG-13
WG1723908-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	13-AUG-13
MET-200.2-CCMS-VA	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2671062								
WG1723908-3 CRM		**VA-CANMET-TILL1**						
Aluminum (Al)			103.0		%		70-130	12-AUG-13
Antimony (Sb)			102.3		%		70-130	12-AUG-13
Arsenic (As)			105.7		%		70-130	12-AUG-13
Barium (Ba)			95.3		%		70-130	12-AUG-13
Beryllium (Be)			0.52		mg/kg		0.34-0.74	12-AUG-13
Bismuth (Bi)			97.8		%		70-130	12-AUG-13
Cadmium (Cd)			89.9		%		70-130	12-AUG-13
Calcium (Ca)			110.1		%		70-130	12-AUG-13
Chromium (Cr)			103.8		%		70-130	12-AUG-13
Cobalt (Co)			99.8		%		70-130	12-AUG-13
Copper (Cu)			95.8		%		70-130	12-AUG-13
Iron (Fe)			97.8		%		70-130	12-AUG-13
Lead (Pb)			90.9		%		70-130	12-AUG-13
Lithium (Li)			101.3		%		70-130	12-AUG-13
Magnesium (Mg)			102.8		%		70-130	12-AUG-13
Manganese (Mn)			100.4		%		70-130	12-AUG-13
Molybdenum (Mo)			0.70		mg/kg		0.24-1.24	12-AUG-13
Nickel (Ni)			103.7		%		70-130	12-AUG-13
Phosphorus (P)			103.7		%		70-130	12-AUG-13
Potassium (K)			109.5		%		70-130	12-AUG-13
Selenium (Se)			0.35		mg/kg		0.12-0.52	12-AUG-13
Silver (Ag)			0.21		mg/kg		0.12-0.32	12-AUG-13
Sodium (Na)			128.4		%		70-130	12-AUG-13
Strontium (Sr)			108.2		%		70-130	12-AUG-13
Thallium (Tl)			0.128		mg/kg		0.075-0.175	12-AUG-13
Tin (Sn)			1.0		mg/kg		0-3	12-AUG-13
Titanium (Ti)			116.8		%		70-130	12-AUG-13
Uranium (U)			105.0		%		70-130	12-AUG-13
Vanadium (V)			107.0		%		70-130	12-AUG-13
Zinc (Zn)			100.4		%		70-130	12-AUG-13
WG1723908-2 DUP		**L1338656-1**						
Aluminum (Al)		20000	19600		mg/kg	2.0	40	12-AUG-13
Antimony (Sb)		0.62	0.65		mg/kg	4.5	30	12-AUG-13
Arsenic (As)		11.2	12.1		mg/kg	7.8	30	12-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2671062								
WG1723908-2 DUP		**L1338656-1**						
Barium (Ba)		202	204		mg/kg	0.7	40	12-AUG-13
Beryllium (Be)		0.68	0.68		mg/kg	0.3	30	12-AUG-13
Bismuth (Bi)		0.35	0.30		mg/kg	18	30	12-AUG-13
Cadmium (Cd)		0.265	0.249		mg/kg	6.1	30	12-AUG-13
Calcium (Ca)		13600	14200		mg/kg	4.4	30	12-AUG-13
Chromium (Cr)		44.8	47.0		mg/kg	4.9	30	12-AUG-13
Cobalt (Co)		12.7	13.5		mg/kg	5.9	30	12-AUG-13
Copper (Cu)		26.9	22.8		mg/kg	17	30	12-AUG-13
Iron (Fe)		29100	30100		mg/kg	3.4	30	12-AUG-13
Lead (Pb)		18.9	16.9		mg/kg	11	40	12-AUG-13
Lithium (Li)		32.3	32.7		mg/kg	1.3	30	12-AUG-13
Magnesium (Mg)		9390	9760		mg/kg	3.9	30	12-AUG-13
Manganese (Mn)		456	459		mg/kg	0.7	30	12-AUG-13
Molybdenum (Mo)		0.70	0.68		mg/kg	3.2	40	12-AUG-13
Nickel (Ni)		39.0	40.1		mg/kg	2.7	30	12-AUG-13
Phosphorus (P)		608	589		mg/kg	3.3	30	12-AUG-13
Potassium (K)		2580	2490		mg/kg	3.5	40	12-AUG-13
Selenium (Se)		0.38	0.34		mg/kg	10	30	12-AUG-13
Silver (Ag)		0.15	0.12		mg/kg	23	40	12-AUG-13
Sodium (Na)		230	210		mg/kg	9.8	40	12-AUG-13
Strontium (Sr)		58.0	59.0		mg/kg	1.7	40	12-AUG-13
Thallium (Tl)		0.184	0.160		mg/kg	14	30	12-AUG-13
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	12-AUG-13
Titanium (Ti)		545	538		mg/kg	1.4	40	12-AUG-13
Uranium (U)		2.23	2.15		mg/kg	3.3	30	12-AUG-13
Vanadium (V)		36.8	38.0		mg/kg	3.3	30	12-AUG-13
Zinc (Zn)		79.1	84.4		mg/kg	6.4	30	12-AUG-13
WG1723908-1 MB								
Aluminum (Al)			<50		mg/kg		50	12-AUG-13
Antimony (Sb)			<0.10		mg/kg		0.1	12-AUG-13
Arsenic (As)			<0.050		mg/kg		0.05	12-AUG-13
Barium (Ba)			<0.50		mg/kg		0.5	12-AUG-13
Beryllium (Be)			<0.20		mg/kg		0.2	12-AUG-13
Bismuth (Bi)			<0.20		mg/kg		0.2	12-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2671062								
WG1723908-1 MB								
Cadmium (Cd)			<0.050		mg/kg		0.05	12-AUG-13
Calcium (Ca)			<50		mg/kg		50	12-AUG-13
Chromium (Cr)			<0.50		mg/kg		0.5	12-AUG-13
Cobalt (Co)			<0.10		mg/kg		0.1	12-AUG-13
Copper (Cu)			<0.50		mg/kg		0.5	12-AUG-13
Iron (Fe)			<50		mg/kg		50	12-AUG-13
Lead (Pb)			<0.50		mg/kg		0.5	12-AUG-13
Lithium (Li)			<5.0		mg/kg		5	12-AUG-13
Magnesium (Mg)			<20		mg/kg		20	12-AUG-13
Manganese (Mn)			<1.0		mg/kg		1	12-AUG-13
Molybdenum (Mo)			<0.50		mg/kg		0.5	12-AUG-13
Nickel (Ni)			<0.50		mg/kg		0.5	12-AUG-13
Phosphorus (P)			<50		mg/kg		50	12-AUG-13
Potassium (K)			<100		mg/kg		100	12-AUG-13
Selenium (Se)			<0.20		mg/kg		0.2	12-AUG-13
Silver (Ag)			<0.10		mg/kg		0.1	12-AUG-13
Sodium (Na)			<100		mg/kg		100	12-AUG-13
Strontium (Sr)			<0.50		mg/kg		0.5	12-AUG-13
Thallium (Tl)			<0.050		mg/kg		0.05	12-AUG-13
Tin (Sn)			<2.0		mg/kg		2	12-AUG-13
Titanium (Ti)			<1.0		mg/kg		1	12-AUG-13
Uranium (U)			<0.050		mg/kg		0.05	12-AUG-13
Vanadium (V)			<0.20		mg/kg		0.2	12-AUG-13
Zinc (Zn)			<1.0		mg/kg		1	12-AUG-13
MOISTURE-VA	**Soil**							
Batch R2667154								
WG1721367-2 LCS								
Moisture			99.7		%		70-130	07-AUG-13
WG1721367-1 MB								
Moisture			<0.25		%		0.25	07-AUG-13
PH-1:2-VA	**Soil**							
Batch R2671386								
WG1723908-2 DUP		**L1338656-1**						
pH (1:2 soil:water)		8.23	8.21	J	pH	0.02	0.3	13-AUG-13

Quality Control Report

Workorder: L1338656 Report Date: 24-OCT-13

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-TOT-LECO-SK	**Soil**							
Batch R2663725								
WG1718182-1 DUP		**L1338656-3**						
Sulfur (S)-Total		2000	2100		mg/kg	4.9	30	01-AUG-13
WG1718182-2 IRM		**1646A_SOIL**						
Sulfur (S)-Total			4100		mg/kg		2500-4600	01-AUG-13
WG1718182-3 MB								
Sulfur (S)-Total			<500		mg/kg		500	01-AUG-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.
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							
Moisture content							
	1	23-JUL-13 14:25	07-AUG-13 08:49	14	15	days	EHT
	2	23-JUL-13 14:55	07-AUG-13 08:49	14	15	days	EHT
	3	23-JUL-13 16:40	07-AUG-13 08:49	14	15	days	EHT
	4	23-JUL-13 17:45	07-AUG-13 08:49	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 L1338656 were received on 26-JUL-13 10:30.

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.

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.

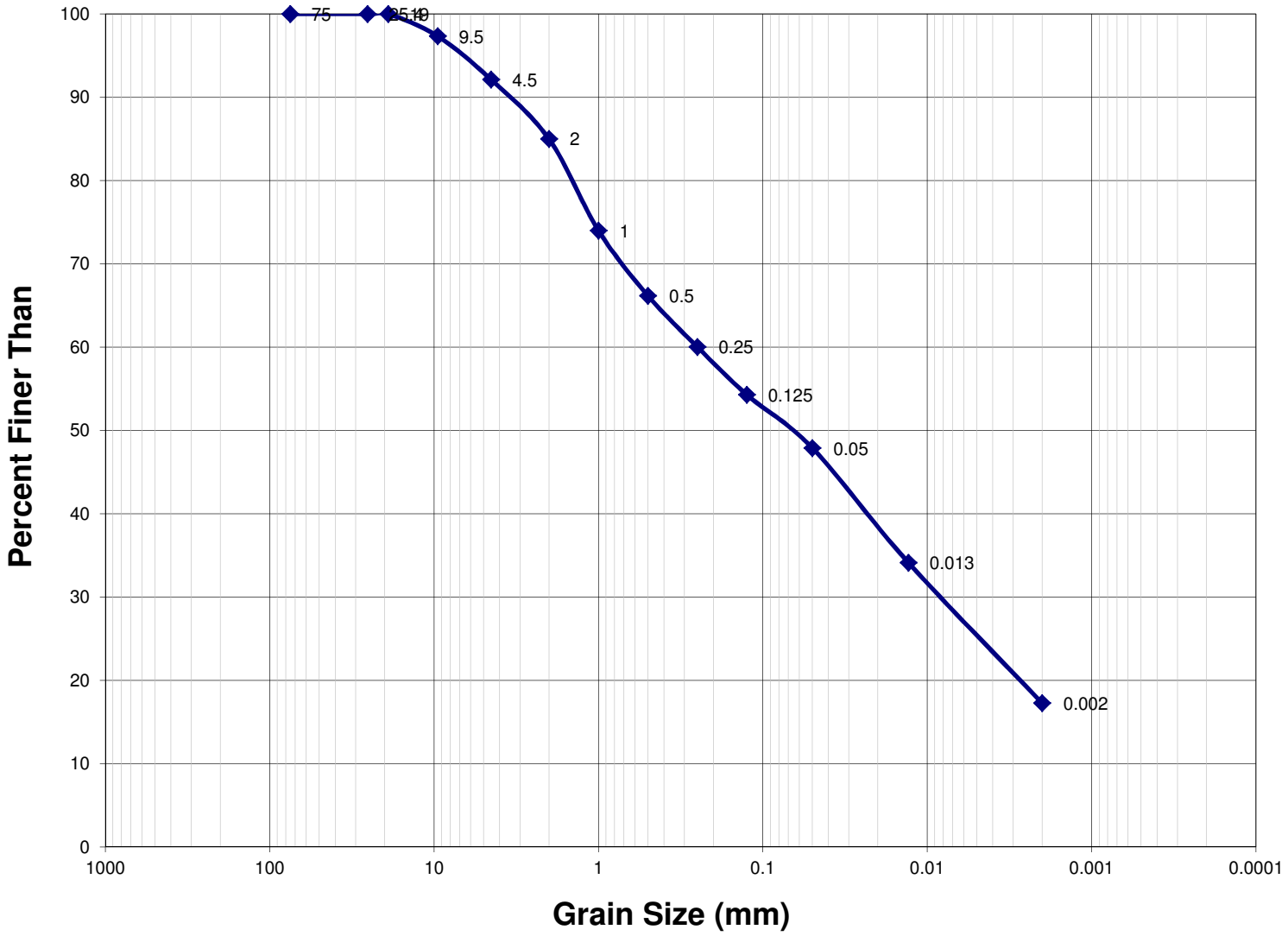
Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH011_SOA
Lab ID: L1338656-1

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	8
Coarse Sand	2.0mm - 4.75mm	7
Medium Sand	0.425mm - 2.0mm	19
Fine Sand	0.075mm - 0.425mm	16
Fines	< 0.075mm	50

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	15
Sand	0.05mm - 2mm	37
Silt	0.002mm - 0.05mm	31
Clay	< 0.002mm	17

Texture Loam

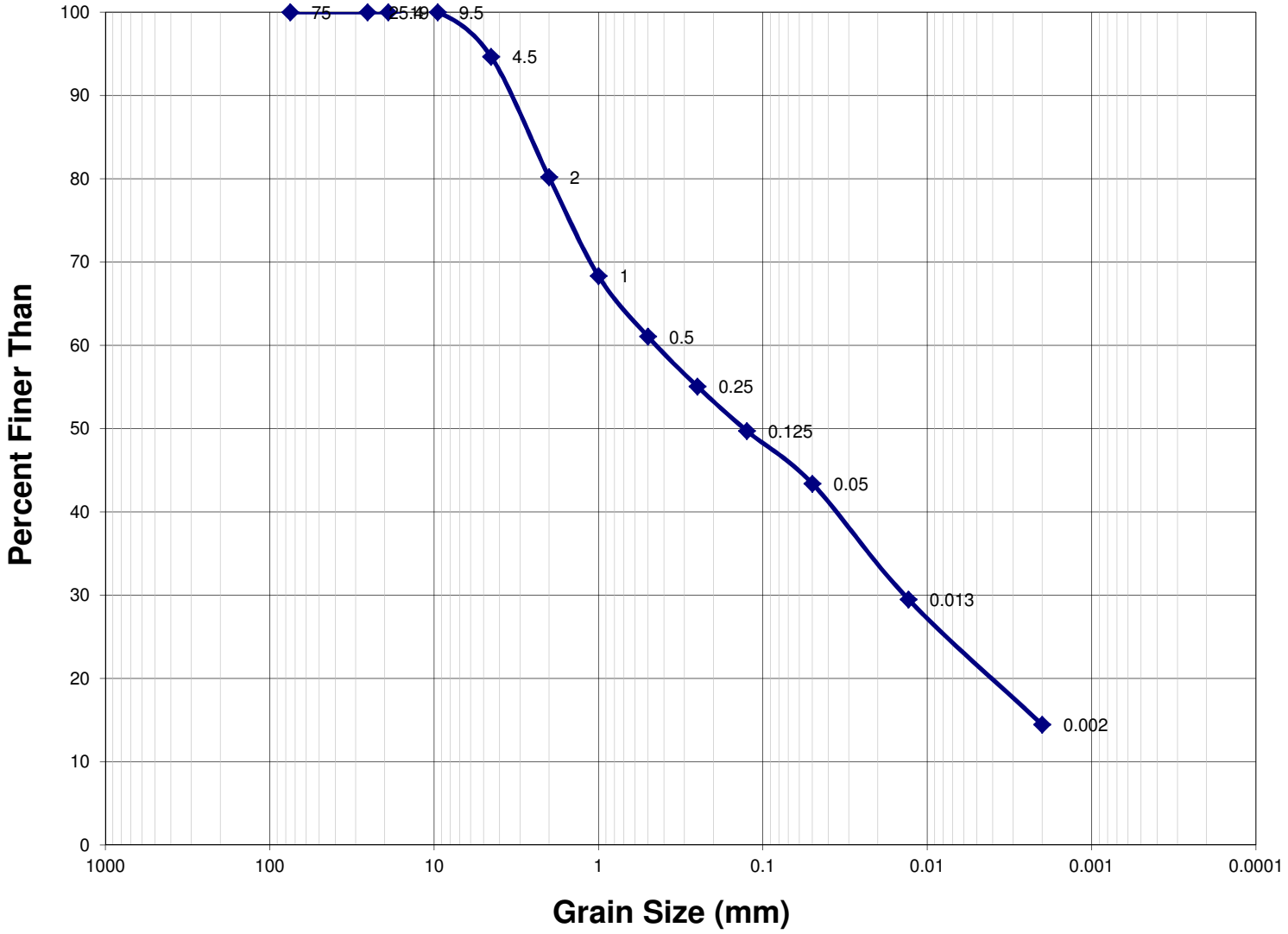
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH011_SOB
Lab ID: L1338656-2

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	5
Coarse Sand	2.0mm - 4.75mm	15
Medium Sand	0.425mm - 2.0mm	19
Fine Sand	0.075mm - 0.425mm	16
Fines	< 0.075mm	45

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	20
Sand	0.05mm - 2mm	37
Silt	0.002mm - 0.05mm	29
Clay	< 0.002mm	14
Texture	Loam	

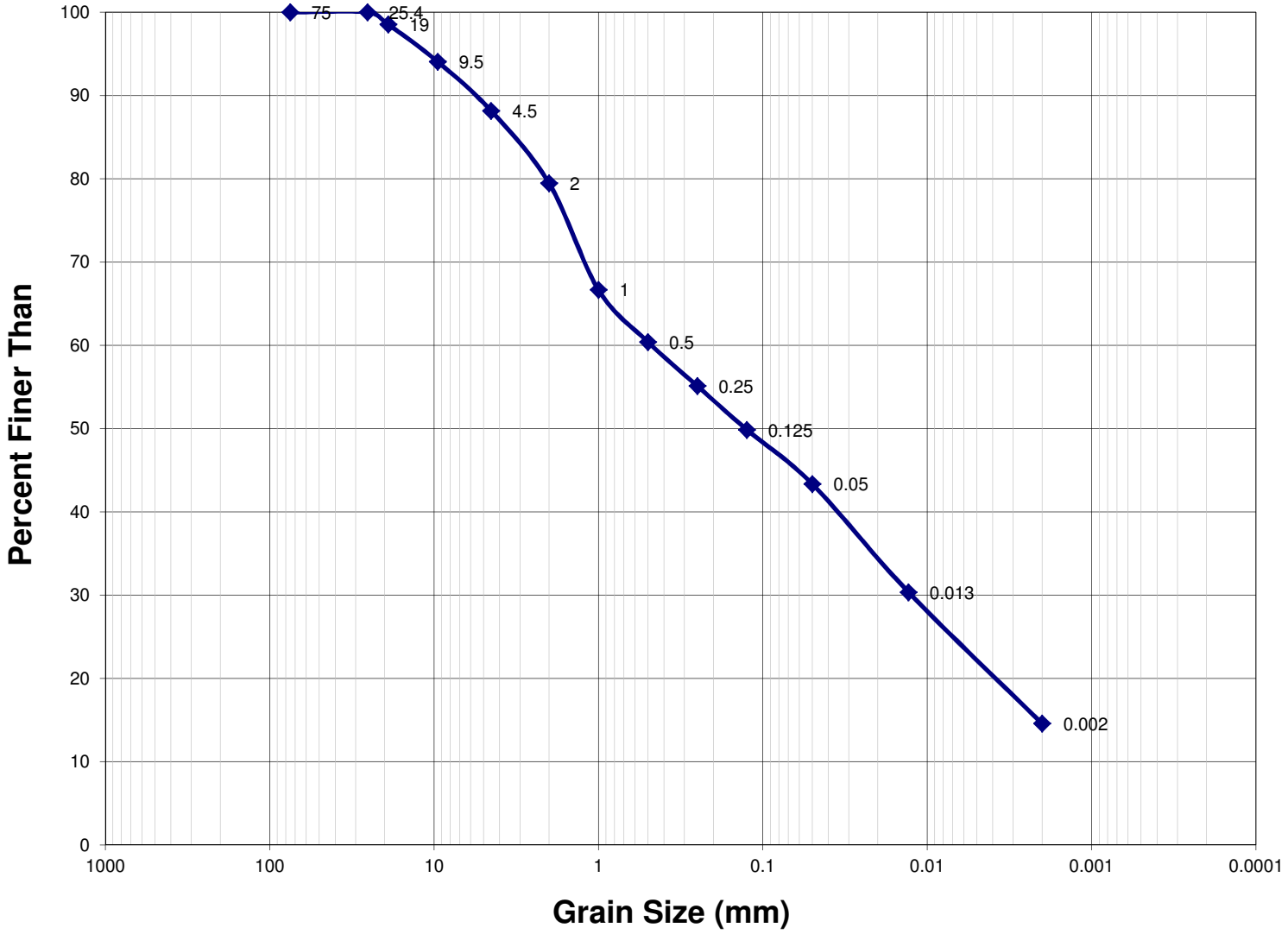
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH011_SOC
Lab ID: L1338656-3

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	12
Coarse Sand	2.0mm - 4.75mm	9
Medium Sand	0.425mm - 2.0mm	19
Fine Sand	0.075mm - 0.425mm	15
Fines	< 0.075mm	46

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	21
Sand	0.05mm - 2mm	36
Silt	0.002mm - 0.05mm	29
Clay	< 0.002mm	15
Texture	Loam	

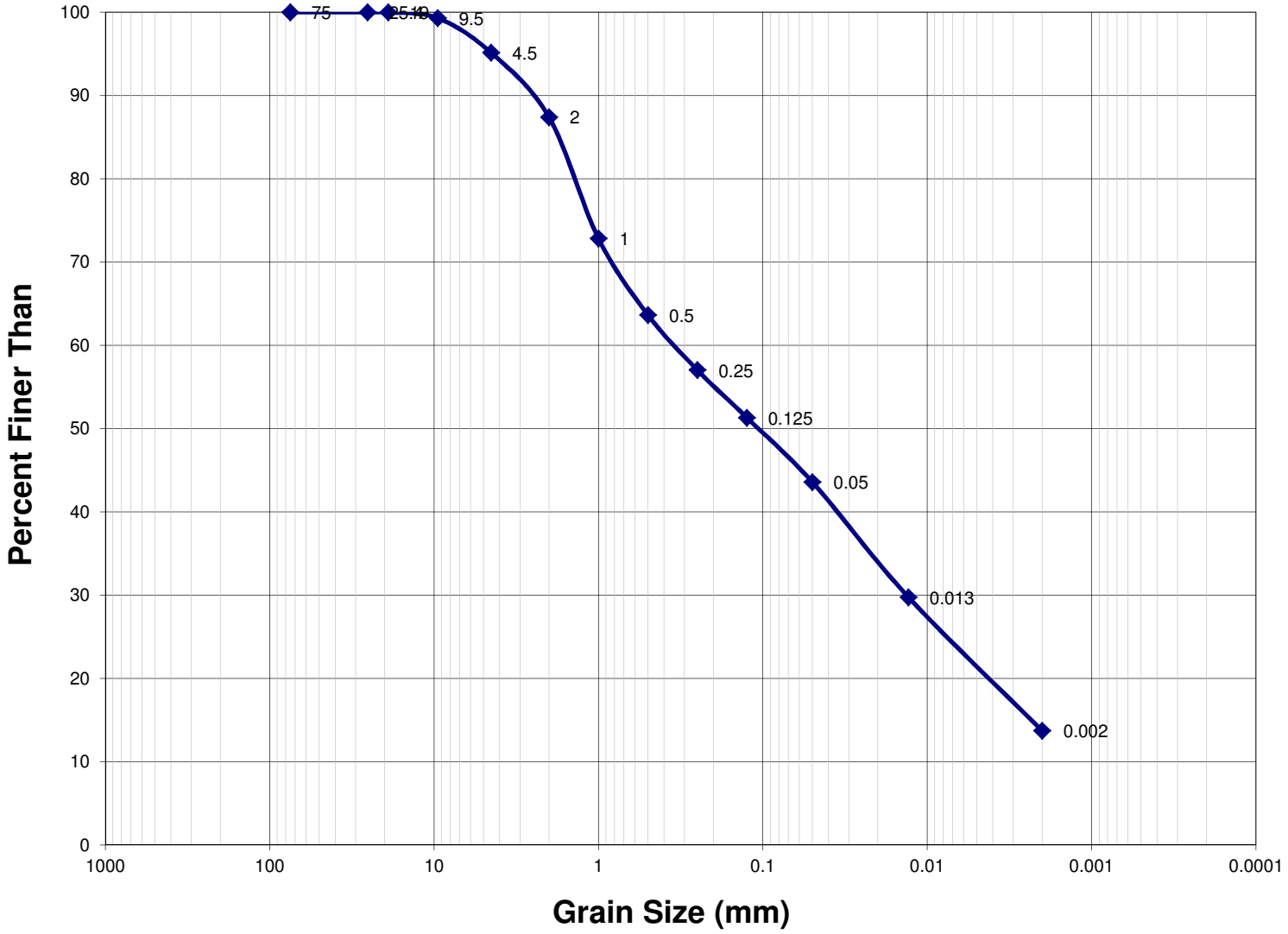
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH011_SOD
Lab ID: L1338656-4

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	5
Coarse Sand	2.0mm - 4.75mm	8
Medium Sand	0.425mm - 2.0mm	24
Fine Sand	0.075mm - 0.425mm	18
Fines	< 0.075mm	46

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	13
Sand	0.05mm - 2mm	44
Silt	0.002mm - 0.05mm	30
Clay	< 0.002mm	14
Texture	Loam	

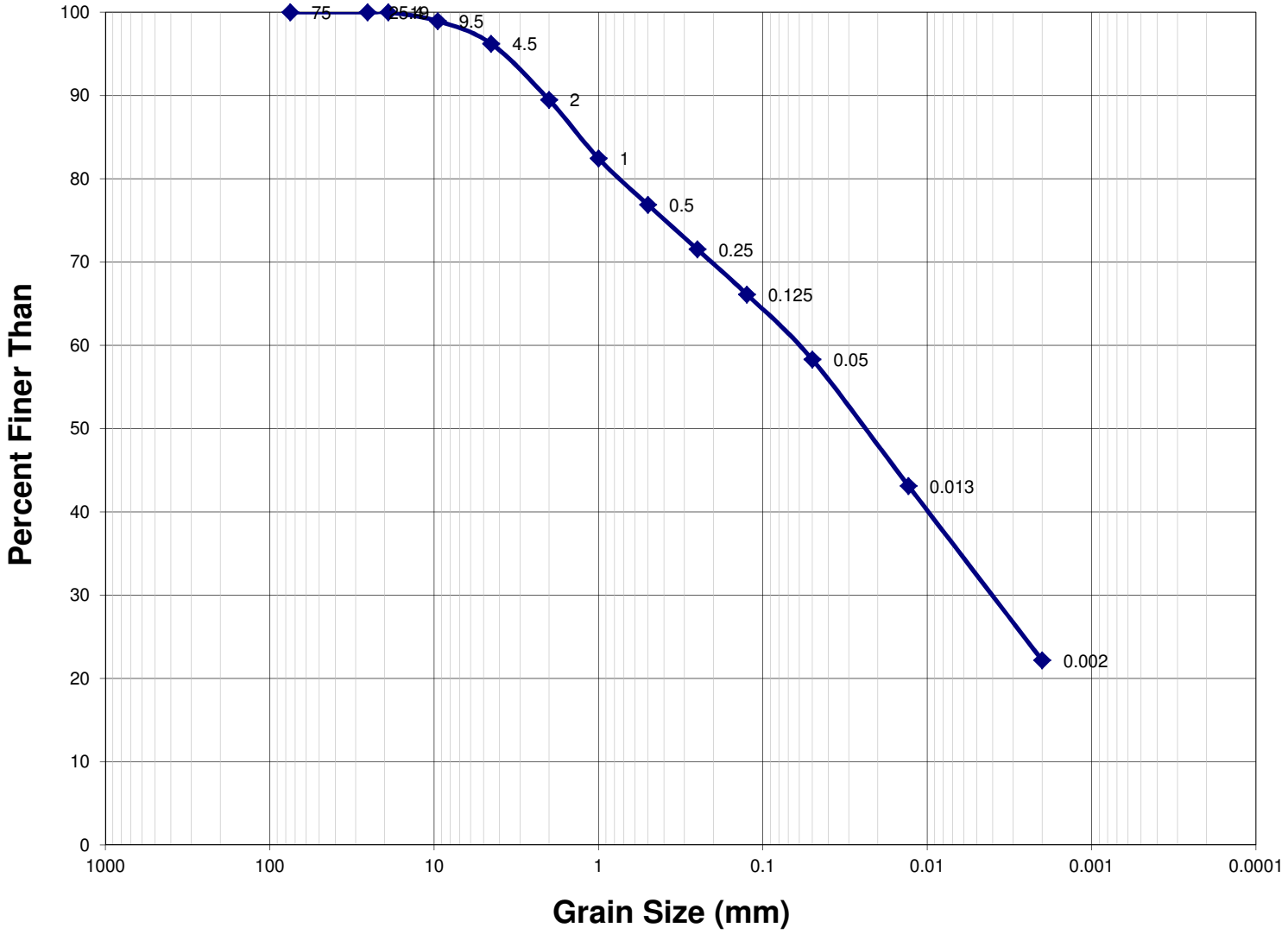
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ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH011_SOE
Lab ID: L1338656-5

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	4
Coarse Sand	2.0mm - 4.75mm	7
Medium Sand	0.425mm - 2.0mm	13
Fine Sand	0.075mm - 0.425mm	16
Fines	< 0.075mm	61

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	11
Sand	0.05mm - 2mm	31
Silt	0.002mm - 0.05mm	36
Clay	< 0.002mm	22
Texture	Loam	

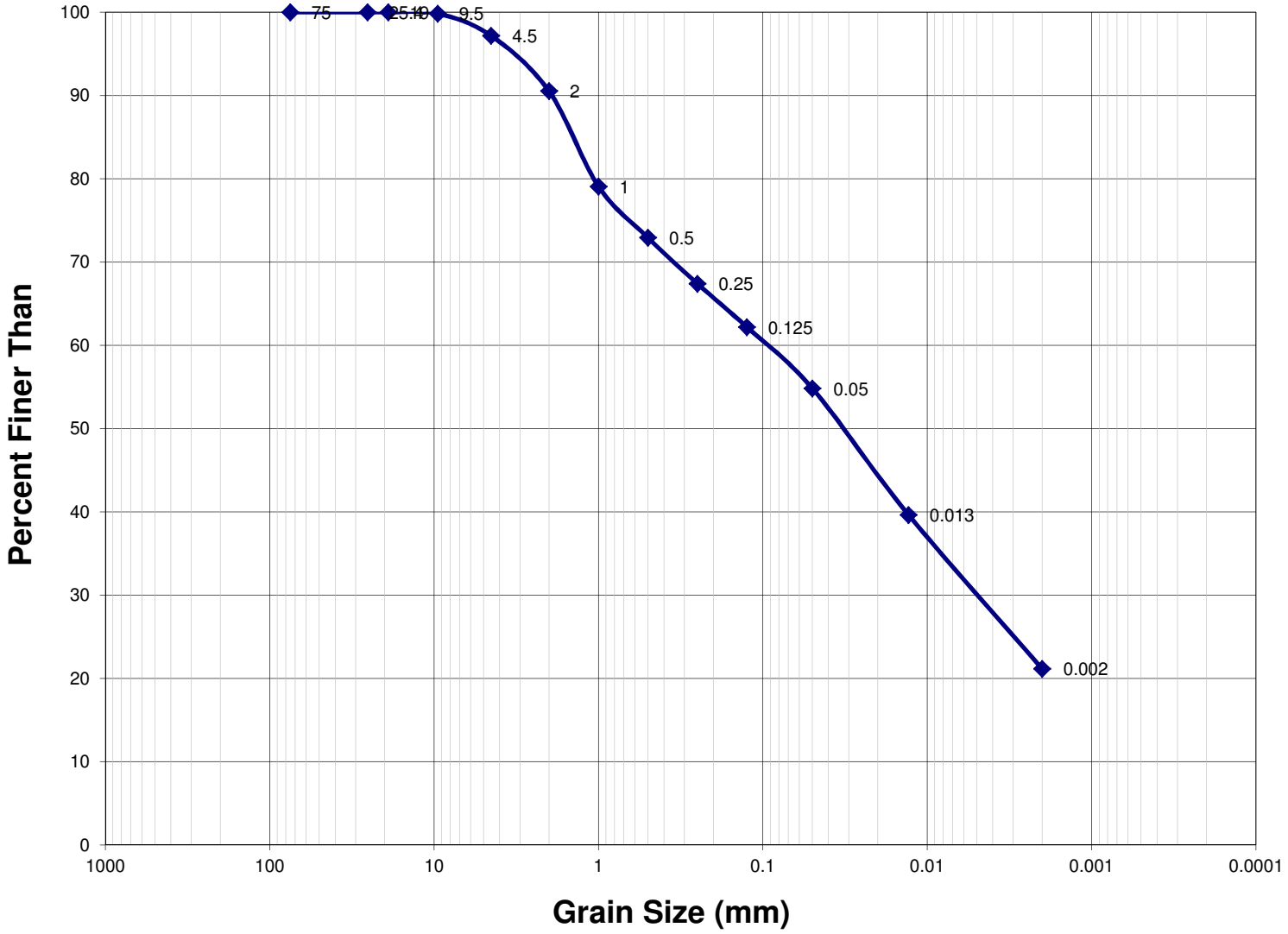
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH911_SOE
Lab ID: L1338656-6

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	3
Coarse Sand	2.0mm - 4.75mm	7
Medium Sand	0.425mm - 2.0mm	18
Fine Sand	0.075mm - 0.425mm	16
Fines	< 0.075mm	57

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	9
Sand	0.05mm - 2mm	36
Silt	0.002mm - 0.05mm	34
Clay	< 0.002mm	21

Texture Loam

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

August 28, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1338656 **Date Received:** August 6, 2013

Certificate of Analysis

Client ID:	Sample Date:	Lab #:		Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $CaCO_3$/1,000t
L1338656-1	7/23/2013	T1301136-001		8.45	50
L1338656-2	7/23/2013	T1301136-002		10.40	38
L1338656-3	7/23/2013	T1301136-003		9.73	36
L1338656-4	7/23/2013	T1301136-004		7.55	41
L1338656-5	7/24/2013	T1301136-005		10.47	50
L1338656-6	7/24/2013	T1301136-006		10.03	46

Notes:
Samples were air dried then ground to < 60 mesh.

W. Hyatt
Digitally signed by Wendy Hyatt
Date: 2013.08.28 16:02:52 -07'00'

Wendy Hyatt, Project Chemist

August 28, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1338656 **Date Received:** August 6, 2013

Quality Control

				Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $CaCO_3$/1,000t
Prep Blank				<0.01	< 1
Laboratory Control Sample (LCS) - Rice Flour CN 3451			Observed Value	9.52	n/a
			True Value	9.50	
			%R	**100**	
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	981
			True Value		1,000
			%R		**98**
Duplicate Results			T1301136-001	0.62 **	
			Duplicate	0.62 **	
			%R	**0**	
Duplicate Results			*T1301135-001		40
			Duplicate		39
			%RPD		**3**

* Sample from the same batch, but a different project.

**Residual moisture - does not include air dry moisture.

CHAIN OF CUSTODY RECORD

7/25/2013 11:20:39 AM

CH2MHILL

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 3 Days
Shipping Date: 7/25/2013
COC Number: ALS07251301R

	Container:	1 Gallon
	Preservatives:	4°C
	Filtered:	NA
	Holding Time:	180

	DATE	TIME	Matrix	(ISO 15178-2000) Total Sulphur	Number of Containers	COMMENTS
CH13-311-BH011_SOa	7/23/2013	14:25	Soil	X	1	
CH13-311-BH011_SOb	7/23/2013	14:55	Soil	X	1	
CH13-311-BH011_SOc	7/23/2013	16:40	Soil	X	1	
CH13-311-BH011_SOd	7/23/2013	17:45	Soil	X	1	
CH13-311-BH011_SOe	7/24/2013	9:30	Soil	X	1	MS/LabDup
CH13-311-BH911_SOe	7/24/2013	9:30	Soil	X	1	
					TOTAL NUMBER OF CONTAINERS	6



L1338656-COFC

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		7/25/13 1130
Received by	26-JUL-13 6.1, 5.8	10:30
Relinquished by		

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table1 Perform Lab Dup/M on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

7/25/2013 11:24:52 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 7/25/2013
COC Number: ALS07251301

	Container:	4oz jar	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon
	Preservatives:	4'C	4'C	4'C	4'C	4'C	4'C	4'C
	Filtered:	NA	NA	NA	NA	NA	NA	NA
	Holding Time:	14	28	14	28	28	NA	NA
		(ASTM 2216) Moisture	(CSSS/APHA4500H) Paste pH	(EPA200.0/245.7/SW6020A) Total Metals Table 1	(ModifiedSobek) Mod Neutralization Potential	(SSSA (1996) P455-456) TIC	(ASTM 4318) Atterberg limits	(ASTM D422) Gradation
	DATE / TIME / Matrix							
CH13-311-BH011_SOa	7/23/2013 14:25 Soil	X	X	X	X	X		X
CH13-311-BH011_SOb	7/23/2013 14:55 Soil	X	X	X	X	X		X
CH13-311-BH011_SOc	7/23/2013 16:40 Soil	X	X	X	X	X	X	X
CH13-311-BH011_SOd	7/23/2013 17:45 Soil	X	X	X	X	X		X
CH13-311-BH011_SOe	7/24/2013 9:30 Soil	X	X	X	X	X		X
CH13-311-BH911_SOe	7/24/2013 9:30 Soil	X	X	X	X	X		X

L1338656-COFC

	Number of Containers	COMMENTS
	4	
	4	
	5	
	4	
	4	MS/LAB DUP
	4	
TOTAL NUMBER OF CONTAINERS	25	

	Signatures	Date/Time
Approved by		
Sampled by	Travis Stowell	7/23/13 1130
Relinquished by		
Received by		
Relinquished by		
Received by		

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/M on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

7/25/2013 11:26:37 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 7/25/2013
COC Number: ALS07251301H

				Container:	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon			
				Preservatives:	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C			
				Filtered:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
				Holding Time:	14	14	180	180	14	14	14	14	14	28	14			
	DATE	TIME	Matrix		(DI/ASTMD1498) DI ORP	(DI/E245.7) DI Mercury	(DI/E300) DI Sulphate	(DI/EPA600/2-78-054) Acid Soluable Sulfate	(DI/SM2310) DI Acidity	(DI/SM2320) DI Alkalinity	(DI/SM2510) DI Conductivity	(DI/SM4500H) DI pH	(DI/SW6020A) DI Diss Metals	(SSSA (1996) P995-996) TOC	(SW6020A) Ba(Li) Metaborate		Number of Containers	COMMENTS
CH13-311-BH011_SOa	7/23/2013	14:25	Soil		X	X	X	X	X	X	X	X	X	X	X		4	
CH13-311-BH011_SOb	7/23/2013	14:55	Soil		X	X	X	X	X	X	X	X	X	X	X		4	
CH13-311-BH011_SOc	7/23/2013	16:40	Soil		X	X	X	X	X	X	X	X	X	X	X		4	
CH13-311-BH011_SOd	7/23/2013	17:45	Soil		X	X	X	X	X	X	X	X	X	X	X		4	
CH13-311-BH011_SOe	7/24/2013	9:30	Soil		X	X	X	X	X	X	X	X	X	X	X		4	MS/LAB DUP
CH13-311-BH911_SOe	7/24/2013	9:30	Soil		X	X	X	X	X	X	X	X	X	X	X		4	
															TOTAL NUMBER OF CONTAINERS		24	



L1338656-COFC

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by	Travis Howard	7/25/13 1130
Received by		
Relinquished by		
Received by		

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/M on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 25-JUL-13
Report Date: 24-OCT-13 11:59 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1338713

Project P.O. #: 472645.06.AD.01.04.13 PO=604564
Job Reference: BIS GRUM OVERBURDEN DUMP 2013 311.5B
C of C Numbers: ALS07231305
Legal Site Desc:

Comments:

24-OCT-13: Additional QC data has been included.

Amber Springer
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1338713-1	L1338713-2	L1338713-3	L1338713-4	L1338713-5
	Description	soil	soil	soil	soil	soil
	Sampled Date	22-JUL-13	22-JUL-13	22-JUL-13	22-JUL-13	22-JUL-13
	Sampled Time	10:24	10:44	13:30	14:10	16:00
	Client ID	CH13-311-BH015_SOA	CH13-311-BH015_SOB	CH13-311-BH015_SOC	CH13-311-BH015_SOD	CH13-311-BH015_SOE
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 CaCl2) (pH)	7.86	7.85	7.94	7.83	7.97
Anions and Nutrients	Total Nitrogen by LECO (%)					0.025
Organic / Inorganic Carbon	CaCO3 Equivalent (%)	2.57	3.42	1.66	3.38	1.43
	Inorganic Carbon (%)	0.31	0.41	0.20	0.41	0.17
	Total Carbon by Combustion (%)	0.6	0.7	0.4	0.8	0.3
	Total Organic Carbon (%)	0.32	0.31	0.22	0.39	0.15
Plant Available Nutrients	Available Ammonium-N (mg/kg)					3.2 DLM
	Calcium (Ca) (meq/100g)	14.8	12.8	18.7	7.29	17.8
	Cation Exchange Capacity (meq/100g)					6.17
	Copper (Cu) (mg/kg)	4.68	6.06	4.02	5.86	4.26
	Iron (Fe) (mg/kg)	80.4	54.6	97.1	36.0	29.3
	Magnesium (Mg) (meq/100g)	1.57	1.59	1.45	1.34	1.58
	Manganese (Mn) (mg/kg)	38.5	25.9	34.4	29.2	20.8
	Available Nitrate-N (mg/kg)					<4.0 DLM
	Available Phosphate-P (mg/kg)	6.4	4.8	7.6	5.2	5.6
	Potassium (K) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
	Sodium (Na) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
	Available Sulfate-S (mg/kg)	101	78.2	51.3	65.4	38.8
	Zinc (Zn) (mg/kg)	15.7	35.2	2.65	169	1.38
Saturated Paste Extractables	SAR (SAR)	0.52	0.39	1.40	0.32	1.87
	Calcium (Ca) (mg/L)	291	257	143	186	64.3
	Chloride (Cl) (mg/L)	16.0	15.7	<2.0	13.1	16.3
	Conductivity Sat. Paste (dS m-1)	1.79	1.57	1.07	1.17	0.72
	ESP (%)	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL
	Magnesium (Mg) (mg/L)	69.6	69.7	21.8	48.7	13.0
	pH in Saturated Paste (pH)	7.82	7.87	8.10	7.98	8.18
	Potassium (K) (mg/L)	14.6	15.6	9.1	13.6	7.5
	% Saturation (%)	36.8	32.7	36.2	37.9	41.6
	Sodium (Na) (mg/L)	38.0	27.2	67.7	18.7	62.8
	Sulfur (as SO4) (mg/L)	1050	891	502	588	302
Metals	Phosphorus (P) (mg/kg)					548
Miscellaneous	SMP Buffer pH (pH)	7.61	7.62	7.62	7.59	7.62

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1338713-6				
	Description	soil				
	Sampled Date	22-JUL-13				
	Sampled Time	13:40				
	Client ID	CH13-311-BH915_SOC				
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 CaCl2) (pH)	8.00				
Anions and Nutrients	Total Nitrogen by LECO (%)					
Organic / Inorganic Carbon	CaCO3 Equivalent (%)	1.23				
	Inorganic Carbon (%)	0.15				
	Total Carbon by Combustion (%)	0.4				
	Total Organic Carbon (%)	0.26				
Plant Available Nutrients	Available Ammonium-N (mg/kg)					
	Calcium (Ca) (meq/100g)	17.2				
	Cation Exchange Capacity (meq/100g)					
	Copper (Cu) (mg/kg)	3.81				
	Iron (Fe) (mg/kg)	92.1				
	Magnesium (Mg) (meq/100g)	1.37				
	Manganese (Mn) (mg/kg)	34.0				
	Available Nitrate-N (mg/kg)					
	Available Phosphate-P (mg/kg)	7.4				
	Potassium (K) (meq/100g)	<0.50				
	Sodium (Na) (meq/100g)	<0.50				
	Available Sulfate-S (mg/kg)	48.6				
	Zinc (Zn) (mg/kg)	2.57				
Saturated Paste Extractables	SAR (SAR)	1.28				
	Calcium (Ca) (mg/L)	126				
	Chloride (Cl) (mg/L)	2.4				
	Conductivity Sat. Paste (dS m-1)	0.99				
	ESP (%)	N/A; Na<DL				
	Magnesium (Mg) (mg/L)	18.5				
	pH in Saturated Paste (pH)	8.12				
	Potassium (K) (mg/L)	9.4				
	% Saturation (%)	38.8				
	Sodium (Na) (mg/L)	58.4				
	Sulfur (as SO4) (mg/L)	443				
Metals	Phosphorus (P) (mg/kg)					
Miscellaneous	SMP Buffer pH (pH)	7.50				

* 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)
Internal Reference Material	Calcium (Ca)	DLA	L1338713-1, -2, -3, -4, -5, -6
Internal Reference Material	Magnesium (Mg)	DLA	L1338713-1, -2, -3, -4, -5, -6
Internal Reference Material	Potassium (K)	DLA	L1338713-1, -2, -3, -4, -5, -6
Internal Reference Material	Sodium (Na)	DLA	L1338713-1, -2, -3, -4, -5, -6
Internal Reference Material	Sulfur (as SO4)	DLA	L1338713-1, -2, -3, -4, -5, -6
Internal Reference Material	Calcium (Ca)	DLA	L1338713-1, -2, -3, -4, -5, -6
Internal Reference Material	Magnesium (Mg)	DLA	L1338713-1, -2, -3, -4, -5, -6
Internal Reference Material	Potassium (K)	DLA	L1338713-1, -2, -3, -4, -5, -6
Internal Reference Material	Sodium (Na)	DLA	L1338713-1, -2, -3, -4, -5, -6
Internal Reference Material	Chloride (Cl)	DLA	L1338713-1, -2, -3, -4, -5, -6

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
DLM	Detection Limit Adjusted due to sample matrix effects.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-INORG-ORG-SK	Soil	Inorganic and Organic Carbon	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-LECO-SK	Soil	Total Carbon by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.

CAT-XTR-SK	Soil	Ammonium Acetate Extractable Cations	CSSS 19.4 - 1M NH4OAc Extraction @ pH 7

Exchangeable Ca, Mg, Na, and K are extracted from the soil using neutral 1N ammonium acetate, then determined by ICP-OES. This method does not correct for calcium or magnesium extracted from carbonates or free gypsum.

CEC-SK	Soil	Cation Exchange Capacity (NH4OAC Extn)	CSSS(1978) 3.321/Comm Soil Sci 17(7)

Soil exchange sites are saturated with ammonium, then displaced with sodium. Ammonium in the extract is determined colorimetrically.

CL-SAR-SK	Soil	Chloride (Cl) (Saturated Paste)	CSSS(1993) 18.2.2/APHA 4500-CL E

Chloride in a saturated soil extract is determined colorimetrically by auto-analyzer.

ETL-ESP-SK	Soil	Exchangeable Sodium Percentage - Calc	Calculation
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.

METAL-DTPA-SK	Soil	Available Micronutrients (Cu,Fe,Zn,Mn)	CSSS 1993 (11.3 AND 11.4)

Plant available micronutrients are extracted from soil using 0.005 M DTPA. Cu, Fe, Mn and Zn in the extract are determined by ICP-OES.

N-TOT-LECO-SK	Soil	Total Nitrogen by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.

NH4-AVAIL-SK	Soil	Available Ammonium-N	CSSS(1993) 4.2/COMM SOIL SCI 19(6)

Reference Information

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.

NO3-AVAIL-KCL-SK Soil Available Nitrate-N (2N KCl) CSSS (1993) 4.2, 4.3

Available Nitrate and Nitrite are extracted from the soil using a 2N KCl 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) methods 4.2, 4.3

PH-1:2CACL2-SK Soil pH (1:2 Soil:CaCl2 Extraction) CSSC 3.11

1 part dry soil and 2 parts de-ionized 0.01M CaCl2 (by volume) is mixed. The slurry is allowed to stand with occasional stirring for 30 - 60 minutes. pH of the soil slurry is then measured using a pH meter.

PH-BUFFER-SMP-SK Soil Buffer pH (SMP) CSSS (1993) method 14.2

After equilibration with SMP buffer solution, pH of the soil solution is measured with a pH meter. Lime requirement must be determined by the client using location-specific regression equations.

PO4-AVAIL-OLSEN-SK Soil Available Phosphate-P by Olsen CSSS (1993) 7.2,7.3.1

Plant available phosphorus is extracted from the sample with sodium bicarbonate. PO4-P in the filtered extract is determined colorimetrically at 880 nm.

SAR-CALC-SK Soil SAR and Cations in saturated soil CSSS 18.4-Calculation

SAR-CALC-SO4-SK Soil SAR, Cations and SO4 in saturated soil APHA 3120B

Ca, Mg, Na, K and SO4 in a saturated soil extract are determined by ICP-OES.

SAT/PH/EC-SK Soil pH and EC (Saturated Paste) CSSS 18.2.2/CSSC 3.14/CSSS 18.3.1

pH of a saturated soil paste is measured using a pH meter. After equilibration, an extract is obtained by vacuum filtration with conductivity of the extract measured by a conductivity meter.

SO4-AVAIL-CALPHOS-SK Soil Plant Available Sulfate - Ca(H2PO4)2 NCR (1998) p. 36/APHA 3120B

Plant available sulfate is extracted from the sample using dilute calcium phosphate. SO4-S in the filtered extract is determined by ICP-OES.

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

Chain of Custody Numbers:

ALS07231305

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

Workorder: L1338713 Report Date: 24-OCT-13

Client: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-INORG-ORG-SK	**Soil**							
Batch R2664605								
WG1717325-5 DUP		**L1338713-4**						
Inorganic Carbon		0.41	0.44		%	9.2	20	02-AUG-13
CaCO3 Equivalent		3.38	3.71		%	9.2	25	02-AUG-13
WG1717325-2 IRM		**0.1%IC**						
Inorganic Carbon			130.2		%		60-140	02-AUG-13
CaCO3 Equivalent			130.8		%		60-140	02-AUG-13
WG1717325-3 IRM		**0.4%IC**						
Inorganic Carbon			104.7		%		80-120	02-AUG-13
CaCO3 Equivalent			104.8		%		80-120	02-AUG-13
WG1717325-6 IRM		**0.1%IC**						
Inorganic Carbon			88.0		%		60-140	02-AUG-13
CaCO3 Equivalent			88.4		%		60-140	02-AUG-13
WG1717325-7 IRM		**0.4%IC**						
Inorganic Carbon			98.6		%		80-120	02-AUG-13
CaCO3 Equivalent			98.8		%		80-120	02-AUG-13
WG1717325-4 MB								
Inorganic Carbon			<0.10		%		0.1	02-AUG-13
CaCO3 Equivalent			<0.80		%		0.8	02-AUG-13
WG1717325-8 MB								
Inorganic Carbon			<0.10		%		0.1	02-AUG-13
CaCO3 Equivalent			<0.80		%		0.8	02-AUG-13
C-TOT-LECO-SK	**Soil**							
Batch R2664632								
WG1717318-21 DUP		**L1338713-1**						
Total Carbon by Combustion		0.6	0.6		%	7.3	20	31-JUL-13
WG1717318-18 IRM		**08-109_SOIL**						
Total Carbon by Combustion			99.7		%		80-120	31-JUL-13
WG1717318-22 IRM		**08-109_SOIL**						
Total Carbon by Combustion			103.1		%		80-120	31-JUL-13
WG1717318-20 MB								
Total Carbon by Combustion			<0.1		%		0.1	31-JUL-13
WG1717318-24 MB								
Total Carbon by Combustion			<0.1		%		0.1	31-JUL-13
CAT-XTR-SK	**Soil**							
Batch R2664576								
WG1717287-3 IRM		**SAL814**						
Sodium (Na)			104.0		%		70-130	02-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CAT-XTR-SK	**Soil**							
Batch R2664576								
WG1717287-3 IRM		**SAL814**						
Potassium (K)			109.8		%		70-130	02-AUG-13
Calcium (Ca)			108.5		%		70-130	02-AUG-13
Magnesium (Mg)			99.6		%		70-130	02-AUG-13
WG1717287-2 MB								
Sodium (Na)			<0.50		meq/100g		0.5	02-AUG-13
Potassium (K)			<0.50		meq/100g		0.5	02-AUG-13
Calcium (Ca)			<0.50		meq/100g		0.5	02-AUG-13
Magnesium (Mg)			<0.50		meq/100g		0.5	02-AUG-13
CEC-SK	**Soil**							
Batch R2664677								
WG1717289-3 IRM		**SAL814**						
Cation Exchange Capacity			122.5		%		70-130	02-AUG-13
WG1717289-2 MB								
Cation Exchange Capacity			<0.80		meq/100g		0.8	02-AUG-13
CL-SAR-SK	**Soil**							
Batch R2663849								
WG1717499-3 IRM		**ED-SAL_NAT1**						
Chloride (Cl)			81.0		%		70-130	01-AUG-13
WG1717499-2 MB								
Chloride (Cl)			<2.0		mg/L		2	01-AUG-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2672070								
WG1723856-3 CRM		**VA-CANMET-TILL1**						
Phosphorus (P)			104.6		%		70-130	13-AUG-13
WG1723856-2 DUP		**L1338713-5**						
Phosphorus (P)		548	557		mg/kg	1.6	30	13-AUG-13
WG1723856-1 MB								
Phosphorus (P)			<50		mg/kg		50	13-AUG-13
WG1723856-5 MS		**L1338713-5**						
Phosphorus (P)			103.3		%		70-130	13-AUG-13
METAL-DTPA-SK	**Soil**							
Batch R2663671								
WG1717234-3 IRM		**11-119**						
Copper (Cu)			102.5		%		70-130	01-AUG-13
Iron (Fe)			118.6		%		70-130	01-AUG-13
Manganese (Mn)			100.1		%		70-130	01-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
METAL-DTPA-SK	**Soil**							
Batch R2663671								
WG1717234-3 IRM		**11-119**						
Zinc (Zn)			103.8		%		70-130	01-AUG-13
WG1717234-2 MB								
Copper (Cu)			<0.10		mg/kg		0.1	01-AUG-13
Iron (Fe)			<2.0		mg/kg		2	01-AUG-13
Manganese (Mn)			<0.050		mg/kg		0.05	01-AUG-13
Zinc (Zn)			<0.20		mg/kg		0.2	01-AUG-13
N-TOT-LECO-SK	**Soil**							
Batch R2664632								
WG1717318-18 IRM		**08-109_SOIL**						
Total Nitrogen by LECO			0.102		%		0.085-0.135	31-JUL-13
WG1717318-22 IRM		**08-109_SOIL**						
Total Nitrogen by LECO			0.091		%		0.085-0.135	31-JUL-13
WG1717318-20 MB								
Total Nitrogen by LECO			<0.020		%		0.02	31-JUL-13
WG1717318-24 MB								
Total Nitrogen by LECO			<0.020		%		0.02	31-JUL-13
NH4-AVAIL-SK	**Soil**							
Batch R2663266								
WG1717258-3 IRM		**SAL814**						
Available Ammonium-N			107.3		%		70-130	31-JUL-13
WG1717258-2 MB								
Available Ammonium-N			<1.0		mg/kg		1	31-JUL-13
NO3-AVAIL-KCL-SK	**Soil**							
Batch R2663259								
WG1717235-3 IRM		**SAL814**						
Available Nitrate-N			88.9		%		70-130	31-JUL-13
WG1717235-2 MB								
Available Nitrate-N			<2.0		mg/kg		2	31-JUL-13
PH-1:2CACL2-SK	**Soil**							
Batch R2663600								
WG1717238-3 IRM		**SAL814**						
pH (1:2 CaCl2)			7.88		pH		7.55-8.15	01-AUG-13
PH-BUFFER-SMP-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-BUFFER-SMP-SK	**Soil**							
Batch R2663886								
WG1717297-1 DUP		**L1338713-2**						
SMP Buffer pH		7.62	7.61	J	pH	0.01	0.2	01-AUG-13
WG1717297-3 IRM		**SAL814**						
SMP Buffer pH			7.62		pH		7.44-7.64	01-AUG-13
PO4-AVAIL-OLSEN-SK	**Soil**							
Batch R2663248								
WG1717248-1 DUP		**L1338713-4**						
Available Phosphate-P		5.2	5.4		mg/kg	3.8	30	31-JUL-13
WG1717248-3 IRM		**FARM2005**						
Available Phosphate-P			91.4		%		70-130	31-JUL-13
WG1717248-2 MB								
Available Phosphate-P			<1.0		mg/kg		1	31-JUL-13
SAR-CALC-SK	**Soil**							
Batch R2663766								
WG1717499-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			101.5		%		70-130	01-AUG-13
Potassium (K)			104.8		%		70-130	01-AUG-13
Magnesium (Mg)			99.5		%		70-130	01-AUG-13
Sodium (Na)			104.2		%		70-130	01-AUG-13
WG1717499-2 MB								
Calcium (Ca)			<2.0		mg/L		2	01-AUG-13
Potassium (K)			<1.0		mg/L		1	01-AUG-13
Magnesium (Mg)			<2.0		mg/L		2	01-AUG-13
Sodium (Na)			<4.0		mg/L		4	01-AUG-13
SAR-CALC-SO4-SK	**Soil**							
Batch R2663766								
WG1717499-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			101.5		%		70-130	01-AUG-13
Potassium (K)			104.8		%		70-130	01-AUG-13
Magnesium (Mg)			99.5		%		70-130	01-AUG-13
Sodium (Na)			104.2		%		70-130	01-AUG-13
Sulfur (as SO4)			111.0		%		70-130	01-AUG-13
WG1717499-2 MB								
Calcium (Ca)			<2.0		mg/L		2	01-AUG-13
Potassium (K)			<1.0		mg/L		1	01-AUG-13
Magnesium (Mg)			<2.0		mg/L		2	01-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAR-CALC-SO4-SK	**Soil**							
Batch R2663766								
WG1717499-2 MB								
Sodium (Na)			<4.0		mg/L		4	01-AUG-13
Sulfur (as SO4)			<5.0		mg/L		5	01-AUG-13
SAT/PH/EC-SK	**Soil**							
Batch R2663607								
WG1717499-3 IRM		**ED-SAL_NAT1**						
% Saturation			46.2		%		38-48	01-AUG-13
pH in Saturated Paste			6.87		pH		6.5-7.1	01-AUG-13
Conductivity Sat. Paste			99.3		%		80-120	01-AUG-13
WG1717499-2 MB								
Conductivity Sat. Paste			<0.10		dS m-1		0.1	01-AUG-13
SO4-AVAIL-CALPHOS-SK	**Soil**							
Batch R2663190								
WG1717254-1 DUP		**L1338713-6**						
Available Sulfate-S		48.6	49.1		mg/kg	1.0	40	31-JUL-13
WG1717254-3 IRM		**SAL814**						
Available Sulfate-S			93.5		%		60-140	31-JUL-13
WG1717254-2 MB								
Available Sulfate-S			<3.0		mg/kg		3	31-JUL-13

Quality Control Report

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.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

7/23/2013 11:00:31 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 7/23/2013
COC Number: ALS07231305

Container:	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon							
Preservatives:	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C							
Filtered:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA							
Holding Time:	180	28	28	28	28	180	180	28	28	180	180	28	180	180	28							
	(CSSS (2008) 11.3 and 11.4) Ext Micro Nut (ZnFeCuMn)	(CSSS (2008) 12.2) SMP Buffer pH (for pH<6.0)	(CSSS (2008) 15.2.1 or 14.4.4) Sodium Adsorption Ratio	(CSSS (2008) 15.2.1) ECe (sat paste)	(CSSS (2008) 15.3) Soluable Salts	(CSSS (2008) 18.4) 1N, pH7 NH4OAc ext CaMgKNa	(CSSS (2008) 18.4_CEC) Cation Exchange Capacity	(CSSS (2008) 20.3) CaCO3 equivalent	(CSSS (2008) 6.2) Nh4-N and NO3-N (2N KCL)	(CSSS (2008) 7.2 and 7.3.1 if pH>7.2) Available P (pH>7.2)	(CSSS 16.3 (2008)) pH (1:2 CaCL2) CP17	(EPA200.2/SW6020A) Total P	(S-11.10 in Gavlak et al (2005)) Ca(H2PO4)2.H2O ext SO4-S	(SSSA (1996) p894-895 if pH<7.2) Available P (pH<7.2)	(SSSA (1996) P973-974) Total N	Number of Containers	COMMENTS
CH13-311-BH015_SOa	7/22/2013	10:24	Soil	x	x	x	x	x	x		x		x	x		x	x		2	
CH13-311-BH015_SOb	7/22/2013	10:44	Soil	x	x	x	x	x	x		x		x	x		x	x		2	
CH13-311-BH015_SOc	7/22/2013	13:30	Soil	x	x	x	x	x	x		x		x	x		x	x		2	
CH13-311-BH015_SOd	7/22/2013	14:10	Soil	x	x	x	x	x	x		x		x	x		x	x		2	
CH13-311-BH015_SOe	7/22/2013	16:00	Soil	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	3	
CH13-311-BH915_SOc	7/22/2013	13:40	Soil	x	x	x	x	x	x		x		x	x		x	x		2	
																		TOTAL NUMBER OF CONTAINERS	13	

TN July 25 14:45 14/15/18/12

L1338713-COFC

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		7/23/13 1700
Received by		23-Jul-13
Relinquished by		5:05
Received by	Craig	7.3.6.4

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 26-JUL-13
Report Date: 20-AUG-13 14:00 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1338747

Project P.O. #: 472645.06.AD.01.04.13 "PO=604564"
Job Reference: BSI GRUM OVERBURDEN DUMP 2013 311.5B
C of C Numbers: ALS07251302
Legal Site Desc:

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1338747-1	L1338747-2	L1338747-3	L1338747-4	L1338747-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	23-JUL-13	23-JUL-13	23-JUL-13	23-JUL-13	24-JUL-13
	Sampled Time	14:25	14:55	16:40	17:45	09:30
	Client ID	CH13-311-BH011_SOA	CH13-311-BH011_SOB	CH13-311-BH011_SOC	CH13-311-BH011_SOD	CH13-311-BH011_SOE
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 CaCl2) (pH)	7.88	7.88	7.88	7.94	7.93
Anions and Nutrients	Total Nitrogen by LECO (%)			0.044		
Organic / Inorganic Carbon	CaCO3 Equivalent (%)	3.25	3.57	2.92	3.62	3.45
	Inorganic Carbon (%)	0.39	0.43	0.35	0.43	0.41
	Total Carbon by Combustion (%)	0.5	0.6	0.6	0.6	0.9
	Total Organic Carbon (%)	0.13	0.18	0.27	0.20	0.44
Plant Available Nutrients	Available Ammonium-N (mg/kg)			5.0		
	Calcium (Ca) (meq/100g)	28.3	27.1	22.6	26.2	27.0
	Cation Exchange Capacity (meq/100g)	5.59	5.97	4.91	3.97	5.76
	Copper (Cu) (mg/kg)	5.12	3.16	4.85	3.97	6.77
	Iron (Fe) (mg/kg)	63.6	47.8	37.4	33.5	51.0
	Magnesium (Mg) (meq/100g)	1.66	1.77	1.67	1.04	2.06
	Manganese (Mn) (mg/kg)	21.3	26.5	19.3	19.8	23.7
	Available Nitrate-N (mg/kg)			<2.0		
	Available Phosphate-P (mg/kg)	3.8	2.2	3.2	2.2	5.0
	Potassium (K) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
	Sodium (Na) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
	Available Sulfate-S (mg/kg)	73.3	56.5	77.4	15.8	30.0
	Zinc (Zn) (mg/kg)	2.37	1.79	1.23	0.52	2.05
Saturated Paste Extractables	SAR (SAR)	0.83	1.28	1.04	0.53	0.61
	Calcium (Ca) (mg/L)	176	108	135	45.3	49.1
	Chloride (Cl) (mg/L)	5.4	4.7	27.3	28.7	47.6
	Conductivity Sat. Paste (dS m-1)	1.21	0.98	1.17	0.40	0.51
	ESP (%)	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL
	Magnesium (Mg) (mg/L)	30.6	24.7	34.4	7.8	14.5
	pH in Saturated Paste (pH)	7.96	8.10	8.01	8.23	8.15
	Potassium (K) (mg/L)	12.0	10.9	17.5	8.4	11.1
	% Saturation (%)	36.7	39.6	39.1	35.5	38.3
	Sodium (Na) (mg/L)	45.2	56.6	52.1	14.6	19.0
	Sulfur (as SO4) (mg/L)	649	462	624	165	241
Metals	Phosphorus (P) (mg/kg)			783		
Miscellaneous	SMP Buffer pH (pH)	7.54	7.57	7.56	7.56	7.60

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1338747-6
	Description	Soil
	Sampled Date	24-JUL-13
	Sampled Time	09:30
	Client ID	CH13-311-BH911_SOE
Grouping	**Analyte**	
SOIL		
Physical Tests	pH (1:2 CaCl2) (pH)	7.95
Anions and Nutrients	Total Nitrogen by LECO (%)	
Organic / Inorganic Carbon	CaCO3 Equivalent (%)	3.51
	Inorganic Carbon (%)	0.42
	Total Carbon by Combustion (%)	0.8
	Total Organic Carbon (%)	0.38
Plant Available Nutrients	Available Ammonium-N (mg/kg)	
	Calcium (Ca) (meq/100g)	25.9
	Cation Exchange Capacity (meq/100g)	5.75
	Copper (Cu) (mg/kg)	6.49
	Iron (Fe) (mg/kg)	51.3
	Magnesium (Mg) (meq/100g)	2.01
	Manganese (Mn) (mg/kg)	23.1
	Available Nitrate-N (mg/kg)	
	Available Phosphate-P (mg/kg)	4.4
	Potassium (K) (meq/100g)	<0.50
	Sodium (Na) (meq/100g)	<0.50
	Available Sulfate-S (mg/kg)	33.4
	Zinc (Zn) (mg/kg)	1.94
Saturated Paste Extractables	SAR (SAR)	0.62
	Calcium (Ca) (mg/L)	53.8
	Chloride (Cl) (mg/L)	60.7
	Conductivity Sat. Paste (dS m-1)	0.56
	ESP (%)	N/A; Na<DL
	Magnesium (Mg) (mg/L)	15.0
	pH in Saturated Paste (pH)	8.14
	Potassium (K) (mg/L)	13.1
	% Saturation (%)	36.5
	Sodium (Na) (mg/L)	19.8
	Sulfur (as SO4) (mg/L)	284
Metals	Phosphorus (P) (mg/kg)	
Miscellaneous	SMP Buffer pH (pH)	7.61

* 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)
Internal Reference Material	Calcium (Ca)	DLA	L1338747-1, -2, -3, -4, -5, -6
Internal Reference Material	Magnesium (Mg)	DLA	L1338747-1, -2, -3, -4, -5, -6
Internal Reference Material	Potassium (K)	DLA	L1338747-1, -2, -3, -4, -5, -6
Internal Reference Material	Sodium (Na)	DLA	L1338747-1, -2, -3, -4, -5, -6
Internal Reference Material	Sulfur (as SO4)	DLA	L1338747-1, -2, -3, -4, -5, -6
Internal Reference Material	Calcium (Ca)	DLA	L1338747-1, -2, -3, -4, -5, -6
Internal Reference Material	Magnesium (Mg)	DLA	L1338747-1, -2, -3, -4, -5, -6
Internal Reference Material	Potassium (K)	DLA	L1338747-1, -2, -3, -4, -5, -6
Internal Reference Material	Sodium (Na)	DLA	L1338747-1, -2, -3, -4, -5, -6
Internal Reference Material	Chloride (Cl)	DLA	L1338747-1, -2, -3, -4, -5, -6

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-INORG-ORG-SK	Soil	Inorganic and Organic Carbon	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-LECO-SK	Soil	Total Carbon by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.

CAT-XTR-SK	Soil	Ammonium Acetate Extractable Cations	CSSS 19.4 - 1M NH4OAc Extraction @ pH 7

Exchangeable Ca, Mg, Na, and K are extracted from the soil using neutral 1N ammonium acetate, then determined by ICP-OES. This method does not correct for calcium or magnesium extracted from carbonates or free gypsum.

CEC-SK	Soil	Cation Exchange Capacity (NH4OAC Extn)	CSSS(1978) 3.321/Comm Soil Sci 17(7)

Soil exchange sites are saturated with ammonium, then displaced with sodium. Ammonium in the extract is determined colorimetrically.

CL-SAR-SK	Soil	Chloride (Cl) (Saturated Paste)	CSSS(1993) 18.2.2/APHA 4500-CL E

Chloride in a saturated soil extract is determined colorimetrically by auto-analyzer.

ETL-ESP-SK	Soil	Exchangeable Sodium Percentage - Calc	Calculation
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.

METAL-DTPA-SK	Soil	Available Micronutrients (Cu,Fe,Zn,Mn)	CSSS 1993 (11.3 AND 11.4)

Plant available micronutrients are extracted from soil using 0.005 M DTPA. Cu, Fe, Mn and Zn in the extract are determined by ICP-OES.

N-TOT-LECO-SK	Soil	Total Nitrogen by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.

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.

Reference Information

NO3-AVAIL-KCL-SK	Soil	Available Nitrate-N (2N KCl)	CSSS (1993) 4.2, 4.3

Available Nitrate and Nitrite are extracted from the soil using a 2N KCl 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) methods 4.2, 4.3

PH-1:2CACL2-SK	Soil	pH (1:2 Soil:CaCl2 Extraction)	CSSC 3.11

1 part dry soil and 2 parts de-ionized 0.01M CaCl2 (by volume) is mixed. The slurry is allowed to stand with occasional stirring for 30 - 60 minutes. pH of the soil slurry is then measured using a pH meter.

PH-BUFFER-SMP-SK	Soil	Buffer pH (SMP)	CSSS (1993) method 14.2

After equilibration with SMP buffer solution, pH of the soil solution is measured with a pH meter. Lime requirement must be determined by the client using location-specific regression equations.

PO4-AVAIL-OLSEN-SK	Soil	Available Phosphate-P by Olsen	CSSS (1993) 7.2,7.3.1

Plant available phosphorus is extracted from the sample with sodium bicarbonate. PO4-P in the filtered extract is determined colorimetrically at 880 nm.

SAR-CALC-SK	Soil	SAR and Cations in saturated soil	CSSS 18.4-Calculation
SAR-CALC-SO4-SK	Soil	SAR, Cations and SO4 in saturated soil	APHA 3120B

Ca, Mg, Na, K and SO4 in a saturated soil extract are determined by ICP-OES.

SAT/PH/EC-SK	Soil	pH and EC (Saturated Paste)	CSSS 18.2.2/CSSC 3.14/CSSS 18.3.1

pH of a saturated soil paste is measured using a pH meter. After equilibration, an extract is obtained by vacuum filtration with conductivity of the extract measured by a conductivity meter.

SO4-AVAIL-CALPHOS-SK	Soil	Plant Available Sulfate - Ca(H2PO4)2	NCR (1998) p. 36/APHA 3120B

Plant available sulfate is extracted from the sample using dilute calcium phosphate. SO4-S in the filtered extract is determined by ICP-OES.

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

Chain of Custody Numbers:

ALS07251302

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-INORG-ORG-SK	**Soil**							
Batch R2664598								
WG1718190-2 DUP		**L1338747-3**						
Inorganic Carbon		0.35	0.33		%	5.9	20	02-AUG-13
CaCO3 Equivalent		2.92	2.76		%	5.9	25	02-AUG-13
WG1718190-3 IRM		**0.1%IC**						
Inorganic Carbon			115.0		%		60-140	02-AUG-13
CaCO3 Equivalent			115.4		%		60-140	02-AUG-13
WG1718190-4 IRM		**0.4%IC**						
Inorganic Carbon			108.1		%		80-120	02-AUG-13
CaCO3 Equivalent			108.2		%		80-120	02-AUG-13
WG1718190-5 MB								
Inorganic Carbon			<0.10		%		0.1	02-AUG-13
CaCO3 Equivalent			<0.80		%		0.8	02-AUG-13
C-TOT-LECO-SK	**Soil**							
Batch R2664706								
WG1718193-1 DUP		**L1338747-3**						
Total Carbon by Combustion		0.6	0.6		%	3.9	20	01-AUG-13
WG1718193-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			108.6		%		80-120	01-AUG-13
WG1718193-3 MB								
Total Carbon by Combustion			<0.1		%		0.1	01-AUG-13
CAT-XTR-SK	**Soil**							
Batch R2667434								
WG1718222-1 DUP		**L1338747-1**						
Sodium (Na)		<0.50	<0.50	RPD-NA	meq/100g	N/A	25	06-AUG-13
Potassium (K)		<0.50	<0.50	RPD-NA	meq/100g	N/A	25	06-AUG-13
Calcium (Ca)		28.3	27.2		meq/100g	3.8	30	06-AUG-13
Magnesium (Mg)		1.66	1.59		meq/100g	4.1	30	06-AUG-13
WG1718222-3 IRM		**SAL814**						
Sodium (Na)			104.0		%		70-130	06-AUG-13
Potassium (K)			107.7		%		70-130	06-AUG-13
Calcium (Ca)			114.0		%		70-130	06-AUG-13
Magnesium (Mg)			103.2		%		70-130	06-AUG-13
WG1718222-2 MB								
Sodium (Na)			<0.50		meq/100g		0.5	06-AUG-13
Potassium (K)			<0.50		meq/100g		0.5	06-AUG-13
Calcium (Ca)			<0.50		meq/100g		0.5	06-AUG-13
Magnesium (Mg)			<0.50		meq/100g		0.5	06-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CEC-SK	**Soil**							
Batch R2667265								
WG1718224-1 DUP		**L1338747-1**						
Cation Exchange Capacity		5.59	5.73		meq/100g	2.3	20	06-AUG-13
WG1718224-3 IRM		**SAL814**						
Cation Exchange Capacity			115.0		%		70-130	06-AUG-13
WG1718224-2 MB								
Cation Exchange Capacity			<0.80		meq/100g		0.8	06-AUG-13
CL-SAR-SK	**Soil**							
Batch R2664738								
WG1718233-3 IRM		**ED-SAL_NAT1**						
Chloride (Cl)			85.8		%		70-130	02-AUG-13
WG1718233-2 MB								
Chloride (Cl)			<2.0		mg/L		2	02-AUG-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2672374								
WG1723968-3 CRM		**VA-CANMET-TILL1**						
Phosphorus (P)			101.5		%		70-130	13-AUG-13
WG1723968-1 MB								
Phosphorus (P)			<50		mg/kg		50	13-AUG-13
METAL-DTPA-SK	**Soil**							
Batch R2667699								
WG1718191-1 DUP		**L1338747-2**						
Copper (Cu)		3.16	2.88		mg/kg	9.1	30	07-AUG-13
Iron (Fe)		47.8	41.9		mg/kg	13	30	07-AUG-13
Manganese (Mn)		26.5	25.9		mg/kg	2.1	30	07-AUG-13
Zinc (Zn)		1.79	1.64		mg/kg	8.8	30	07-AUG-13
WG1718191-3 IRM		**11-119**						
Copper (Cu)			94.6		%		70-130	07-AUG-13
Iron (Fe)			97.6		%		70-130	07-AUG-13
Manganese (Mn)			99.0		%		70-130	07-AUG-13
Zinc (Zn)			92.0		%		70-130	07-AUG-13
WG1718191-2 MB								
Copper (Cu)			<0.10		mg/kg		0.1	07-AUG-13
Iron (Fe)			<2.0		mg/kg		2	07-AUG-13
Manganese (Mn)			<0.050		mg/kg		0.05	07-AUG-13
Zinc (Zn)			<0.20		mg/kg		0.2	07-AUG-13
N-TOT-LECO-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
N-TOT-LECO-SK	**Soil**							
Batch R2664706								
WG1718193-1 DUP		**L1338747-3**						
Total Nitrogen by LECO		0.044	0.039		%	11	20	01-AUG-13
WG1718193-2 IRM		**08-109_SOIL**						
Total Nitrogen by LECO			0.120		%		0.085-0.135	01-AUG-13
WG1718193-3 MB								
Total Nitrogen by LECO			<0.020		%		0.02	01-AUG-13
NH4-AVAIL-SK	**Soil**							
Batch R2664685								
WG1719147-1 DUP		**L1338747-3**						
Available Ammonium-N		5.0	5.0		mg/kg	1.0	20	02-AUG-13
WG1719147-3 IRM		**SAL814**						
Available Ammonium-N			115.0		%		70-130	02-AUG-13
WG1719147-2 MB								
Available Ammonium-N			<1.0		mg/kg		1	02-AUG-13
NO3-AVAIL-KCL-SK	**Soil**							
Batch R2664759								
WG1719149-1 DUP		**L1338747-3**						
Available Nitrate-N		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	02-AUG-13
WG1719149-3 IRM		**SAL814**						
Available Nitrate-N			90.5		%		70-130	02-AUG-13
WG1719149-2 MB								
Available Nitrate-N			<2.0		mg/kg		2	02-AUG-13
PH-1:2CACL2-SK	**Soil**							
Batch R2663997								
WG1718192-1 DUP		**L1338747-1**						
pH (1:2 CaCl2)		7.88	7.94	J	pH	0.06	0.3	01-AUG-13
WG1718192-2 IRM		**SAL814**						
pH (1:2 CaCl2)			7.87		pH		7.55-8.15	01-AUG-13
PH-BUFFER-SMP-SK	**Soil**							
Batch R2664716								
WG1718226-1 DUP		**L1338747-2**						
SMP Buffer pH		7.57	7.59	J	pH	0.02	0.2	02-AUG-13
WG1718226-3 IRM		**SAL814**						
SMP Buffer pH			7.58		pH		7.44-7.64	02-AUG-13
PO4-AVAIL-OLSEN-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4-AVAIL-OLSEN-SK	**Soil**							
Batch R2665123								
WG1718202-1 DUP		**L1338747-6**						
Available Phosphate-P		4.4	4.6		mg/kg	4.4	30	03-AUG-13
WG1718202-3 IRM		**FARM2005**						
Available Phosphate-P			85.7		%		70-130	03-AUG-13
WG1718202-2 MB								
Available Phosphate-P			<1.0		mg/kg		1	03-AUG-13
SAR-CALC-SK	**Soil**							
Batch R2664581								
WG1718233-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			100.9		%		70-130	02-AUG-13
Potassium (K)			114.0		%		70-130	02-AUG-13
Magnesium (Mg)			95.8		%		70-130	02-AUG-13
Sodium (Na)			98.8		%		70-130	02-AUG-13
WG1718233-2 MB								
Calcium (Ca)			<2.0		mg/L		2	02-AUG-13
Potassium (K)			<1.0		mg/L		1	02-AUG-13
Magnesium (Mg)			<2.0		mg/L		2	02-AUG-13
Sodium (Na)			<4.0		mg/L		4	02-AUG-13
SAR-CALC-SO4-SK	**Soil**							
Batch R2664581								
WG1718233-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			100.9		%		70-130	02-AUG-13
Potassium (K)			114.0		%		70-130	02-AUG-13
Magnesium (Mg)			95.8		%		70-130	02-AUG-13
Sodium (Na)			98.8		%		70-130	02-AUG-13
Sulfur (as SO4)			112.2		%		70-130	02-AUG-13
WG1718233-2 MB								
Calcium (Ca)			<2.0		mg/L		2	02-AUG-13
Potassium (K)			<1.0		mg/L		1	02-AUG-13
Magnesium (Mg)			<2.0		mg/L		2	02-AUG-13
Sodium (Na)			<4.0		mg/L		4	02-AUG-13
Sulfur (as SO4)			<5.0		mg/L		5	02-AUG-13
SAT/PH/EC-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAT/PH/EC-SK	**Soil**							
Batch R2664503								
WG1718233-3 IRM		**ED-SAL_NAT1**						
% Saturation			46.4		%		38-48	02-AUG-13
pH in Saturated Paste			6.82		pH		6.5-7.1	02-AUG-13
Conductivity Sat. Paste			98.5		%		80-120	02-AUG-13
WG1718233-2 MB								
Conductivity Sat. Paste			<0.10		dS m-1		0.1	02-AUG-13
SO4-AVAIL-CALPHOS-SK	**Soil**							
Batch R2667424								
WG1718198-1 DUP		**L1338747-4**						
Available Sulfate-S		15.8	17.3		mg/kg	9.3	40	06-AUG-13
WG1718198-3 IRM		**10-114_SOIL**						
Available Sulfate-S			105.3		%		60-140	06-AUG-13
WG1718198-2 MB								
Available Sulfate-S			<3.0		mg/kg		3	06-AUG-13

Quality Control Report

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.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

7/25/2013 11:28:00 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 7/25/2013
COC Number: ALS07251302

	DATE	TIME	Matrix	Container:	Preservatives:	Filtered:	Holding Time:	(CSSS (2008) 11.3 and 11.4) Ext Micro Nut (ZnFeCuMn)	(CSSS (2008) 12.2) SMP Buffer pH (for pH<6.0)	(CSSS (2008) 15.2.1 or 14.4.4) Sodium Adsorption Ratio	(CSSS (2008) 15.2.1) ECe (sat paste)	(CSSS (2008) 15.3) Soluable Salts	(CSSS (2008) 18.4) 1N, pH7 NH40Ac ext CaMgKNa	(CSSS (2008) 18.4_CEC) Cation Exchange Capacity	(CSSS (2008) 20.3) CaCO3 equivalent	(CSSS (2008) 6.2) NH4-N and NO3-N (2N KCL)	(CSSS (2008) 7.2 and 7.3.1 if pH>7.2) Available P (pH>7.2)	(CSSS 16.3 (2008)) pH (1:2 CaCL2) CP17	(EPA200.2/SW6020A) Total P	(S-11.10 in Gaviak et al. (2005)) Ca(H2PO4)2.H2O ext SO4-S	(SSSA (1996) p894-895 if pH<7.2) Available P (pH<7.2)	(SSSA (1996) P973-974) Total N	Number of Containers	COMMENTS
				1 Gallon	4'C	NA	180																	
CH13-311-BH011_SOa	7/23/2013	14:25	Soil		4'C	NA	28	X	X	X	X	X	X		X		X	X		X	X		2	
CH13-311-BH011_SOb	7/23/2013	14:55	Soil		4'C	NA	28	X	X	X	X	X	X		X		X	X		X	X		2	
CH13-311-BH011_SOc	7/23/2013	16:40	Soil		4'C	NA	28	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3	
CH13-311-BH011_SOd	7/23/2013	17:45	Soil		4'C	NA	28	X	X	X	X	X	X		X		X	X		X	X		2	
CH13-311-BH011_SOe	7/24/2013	9:30	Soil		4'C	NA	28	X	X	X	X	X	X		X		X	X		X	X		2	MS/LAB DUP
CH13-311-BH911_SOe	7/24/2013	9:30	Soil		4'C	NA	28	X	X	X	X	X	X		X		X	X		X	X		2	
																						TOTAL NUMBER OF CONTAINERS		13	

L1338747



L1338747-COFC

	Signatures	Date/Time
Approved by		
Sampled by		7/25/13 1130
Relinquished by		
Received by	26-Jul-13	
Relinquished by	0.1, 5.8	10:30
Received by		

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/M on samples

Report Copy to
Bernice Kidd
(530) 229-3205

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 25-JUL-13
Report Date: 23-OCT-13 15:40 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1338766

Project P.O. #: 472645.06.AD.01.04.13 PO=604564
Job Reference: BSI GRUM OVERBURDEN DUMP 2013 311.5B.
C of C Numbers: ALS07231304, ALS07231304H, ALS07231304R
Legal Site Desc:

Comments:

23-OCT-13: Additional QC data has been added.

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID	L1338766-1	L1338766-2	L1338766-3	L1338766-4	L1338766-5
		Description	soil	soil	soil	soil	soil
		Sampled Date	22-JUL-13	22-JUL-13	22-JUL-13	22-JUL-13	22-JUL-13
		Sampled Time	10:24	10:44	13:30	14:10	16:00
		Client ID	CH13-311-BH015_SOA	CH13-311-BH015_SOB	CH13-311-BH015_SOC	CH13-311-BH015_SOD	CH13-311-BH015_SOE
SOIL							
Physical Tests	Grain Size Curve		SEE ATTACHED	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED
	Moisture (%)		10.8	13.7	8.14	8.62	9.51
	Liquid Limit (LL) (%)						28
	pH (1:2 soil:water) (pH)		8.13	8.03	8.33	8.02	8.37
	Plasticity Index (PI) (%)						8
Organic / Inorganic Carbon	Inorganic Carbon (%)		0.36	0.44	0.20	0.41	0.30
	Inorganic Carbon (as CaCO3 Equivalent) (%)		2.96	3.69	1.66	3.41	2.46
	Organic Carbon (%)		0.40	0.60	<0.40	<0.40	<0.40
	Organic Matter (%)		<0.70	1.05	<0.70	<0.70	<0.70
Saturated Paste Extractables	Paste pH (pH)		6.81	6.90	7.13	7.15	7.29
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)		40.0	151	20.0	29.0	26.0
Metals	Aluminum (Al) (mg/kg)		14500	14900	15700	10400	21400
	Antimony (Sb) (mg/kg)		4.92	9.60	0.75	4.83	0.39
	Arsenic (As) (mg/kg)		72.9	153	9.31	260	12.1
	Barium (Ba) (mg/kg)		476	372	253	258	140
	Beryllium (Be) (mg/kg)		0.54	0.40	0.62	0.46	0.85
	Bismuth (Bi) (mg/kg)		0.60	0.23	0.43	<0.20	0.53
	Boron (B) (mg/kg)		<10	<10	<10	<10	<10
	Cadmium (Cd) (mg/kg)		1.95	4.46	0.322	8.43	0.290
	Calcium (Ca) (mg/kg)		11600	13000	7490	15900	8040
	Chromium (Cr) (mg/kg)		43.4	122	26.3	256	46.2
	Cobalt (Co) (mg/kg)		14.1	22.1	8.71	29.0	14.1
	Copper (Cu) (mg/kg)		46.9	77.8	17.0	65.3	30.0
	Iron (Fe) (mg/kg)		33500	39800	22900	46100	33000
	Lead (Pb) (mg/kg)		497	986	13.8	658	22.1
	Lithium (Li) (mg/kg)		21.4	22.4	27.8	11.8	43.7
	Magnesium (Mg) (mg/kg)		9430	13500	6110	15500	9280
	Manganese (Mn) (mg/kg)		545	619	357	662	451
	Mercury (Hg) (mg/kg)		0.590	1.20	0.0277	1.45	0.0155
	Molybdenum (Mo) (mg/kg)		1.37	1.74	0.73	2.51	0.56
	Nickel (Ni) (mg/kg)		47.8	91.2	22.5	202	37.5
	Phosphorus (P) (mg/kg)		728	671	585	859	594
	Potassium (K) (mg/kg)		1630	1020	2510	680	3540
	Selenium (Se) (mg/kg)		0.59	0.62	0.34	0.63	0.22
	Silver (Ag) (mg/kg)		0.89	1.86	0.13	1.77	0.12

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1338766-6				
		Description	soil				
		Sampled Date	22-JUL-13				
		Sampled Time	13:40				
		Client ID	CH13-311-BH915_SOC				
Grouping	**Analyte**						
SOIL							
Physical Tests	Grain Size Curve		SEE ATTACHED				
	Moisture (%)		9.40				
	Liquid Limit (LL) (%)						
	pH (1:2 soil:water) (pH)		8.32				
	Plasticity Index (PI) (%)						
Organic / Inorganic Carbon	Inorganic Carbon (%)		0.24				
	Inorganic Carbon (as CaCO3 Equivalent) (%)		1.98				
	Organic Carbon (%)		<0.40				
	Organic Matter (%)		<0.70				
Saturated Paste Extractables	Paste pH (pH)		7.12				
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)		22.0				
Metals	Aluminum (Al) (mg/kg)		16300				
	Antimony (Sb) (mg/kg)		0.75				
	Arsenic (As) (mg/kg)		9.34				
	Barium (Ba) (mg/kg)		270				
	Beryllium (Be) (mg/kg)		0.62				
	Bismuth (Bi) (mg/kg)		0.28				
	Boron (B) (mg/kg)		<10				
	Cadmium (Cd) (mg/kg)		0.312				
	Calcium (Ca) (mg/kg)		8460				
	Chromium (Cr) (mg/kg)		26.9				
	Cobalt (Co) (mg/kg)		8.50				
	Copper (Cu) (mg/kg)		18.4				
	Iron (Fe) (mg/kg)		23600				
	Lead (Pb) (mg/kg)		12.4				
	Lithium (Li) (mg/kg)		27.7				
	Magnesium (Mg) (mg/kg)		6320				
	Manganese (Mn) (mg/kg)		371				
	Mercury (Hg) (mg/kg)		0.0258				
	Molybdenum (Mo) (mg/kg)		0.82				
	Nickel (Ni) (mg/kg)		22.7				
	Phosphorus (P) (mg/kg)		554				
	Potassium (K) (mg/kg)		2630				
	Selenium (Se) (mg/kg)		0.33				
	Silver (Ag) (mg/kg)		0.12				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1338766-1	L1338766-2	L1338766-3	L1338766-4	L1338766-5
	Description	soil	soil	soil	soil	soil
	Sampled Date	22-JUL-13	22-JUL-13	22-JUL-13	22-JUL-13	22-JUL-13
	Sampled Time	10:24	10:44	13:30	14:10	16:00
	Client ID	CH13-311-BH015_SOA	CH13-311-BH015_SOB	CH13-311-BH015_SOC	CH13-311-BH015_SOD	CH13-311-BH015_SOE
Grouping	**Analyte**					
SOIL						
Metals	Sodium (Na) (mg/kg)	200	<100	290	<100	320
	Strontium (Sr) (mg/kg)	53.8	60.9	36.9	61.8	43.6
	Sulfur (S)-Total (mg/kg)	2500	3400	800	1300	900
	Thallium (Tl) (mg/kg)	0.359	0.626	0.183	0.300	0.244
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	407	381	584	160	589
	Uranium (U) (mg/kg)	1.70	2.16	1.93	2.53	2.43
	Vanadium (V) (mg/kg)	37.6	40.8	35.1	45.8	34.8
	Zinc (Zn) (mg/kg)	1070	2700	70.4	5190	99.5

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1338766-6
	Description	soil
	Sampled Date	22-JUL-13
	Sampled Time	13:40
	Client ID	CH13-311-BH915_SOC
Grouping	**Analyte**	
SOIL		
Metals	Sodium (Na) (mg/kg)	350
	Strontium (Sr) (mg/kg)	41.1
	Sulfur (S)-Total (mg/kg)	1000
	Thallium (Tl) (mg/kg)	0.172
	Tin (Sn) (mg/kg)	<2.0
	Titanium (Ti) (mg/kg)	609
	Uranium (U) (mg/kg)	1.98
	Vanadium (V) (mg/kg)	37.2
	Zinc (Zn) (mg/kg)	69.3

* 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	Mercury (Hg)	DUP-H	L1338766-1, -2, -3, -4, -5, -6
Duplicate	Antimony (Sb)	DUP-H	L1338766-1, -2, -3, -4, -5, -6
Duplicate	Barium (Ba)	DUP-H	L1338766-1, -2, -3, -4, -5, -6
Duplicate	Cadmium (Cd)	DUP-H	L1338766-1, -2, -3, -4, -5, -6
Duplicate	Lead (Pb)	DUP-H	L1338766-1, -2, -3, -4, -5, -6
Duplicate	Silver (Ag)	DUP-H	L1338766-1, -2, -3, -4, -5, -6
Duplicate	Zinc (Zn)	DUP-H	L1338766-1, -2, -3, -4, -5, -6
Matrix Spike	Aluminum (Al)	MS-B	L1338766-1, -2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)	MS-B	L1338766-1, -2, -3, -4, -5, -6
Matrix Spike	Iron (Fe)	MS-B	L1338766-1, -2, -3, -4, -5, -6
Matrix Spike	Magnesium (Mg)	MS-B	L1338766-1, -2, -3, -4, -5, -6
Matrix Spike	Titanium (Ti)	MS-B	L1338766-1, -2, -3, -4, -5, -6

Qualifiers for Individual Parameters Listed:

Qualifier	Description
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**
ATTERBERG-SK	Soil	Atterberg limits	CARTER CSSS 58

The liquid limit (or upper plastic limit) is the point at which the soil becomes semifluid, like softened butter. In operational terms, the liquid limit is defined as the water content at which a trapezoidal groove cut in moist soil is closed after 25 taps on a hard rubber plate (ASTM D-18, 1958).

The plastic limit (or lower plastic limit) is defined as the water content at which soil begins to crumble on being rolled into a thread 1/8 inch (or 3 mm) in diameter. It represents the lowest water content at which soil can be deformed readily without cracking.

The plastic index (which is the difference between the liquid and plastic limits) gives an indication of the "clayeyness" or plasticity of a clay and is employed in engineering classification systems for soils.

References: McKeague, J.A. 1978. Atterberg Limits pp 50 - 55 In: Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci. p. 50 - 55

B-200.2-CCMS-VA	Soil	Boron 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."

C-INORG-SK	Soil	Inorganic Carbon / Calcium Carbonate	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-ORG-WB-SK	Soil	Total Organic Carbon - Walkley Black	CSSS (1993) method 21.2

The soil sample is treated with excess potassium dichromate and sulfuric acid to oxidize organic carbon. Oxidized organic carbon is determined by back-titration with ferrous ammonium sulfate. Organic matter is estimated from the organic carbon result using the Van Bemmelon factor.

Reference Information

GRAIN SIZE-SK	Soil	Grain Size Analysis	SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

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.

IC-CACO3-CALC-SK	Soil	Inorganic Carbon as CaCO3 Equivalent	Calculation
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.

NP-TU	Soil	Neutralization Potential (NP)	Sobek 3.2.3, MOD
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.

PH-PASTE-VA	Soil	pH in Soil (Paste) by Meter	Carter-CSSS / APHA 4500 H

A soil extract produced by the saturated paste extraction procedure is analyzed by pH meter.

S-TOT-LECO-SK	Soil	Total Sulphur by combustion method	ISO 15178:2000

The sample is ignited in a combustion analyzer where sulfur in the reduced SO2 gas is determined using a thermal conductivity detector.

SAT-PCNT-VA	Soil	Saturation Percentage	Carter-CSSS

Saturation Percentage (SP) is the total volume of water present in a saturated paste (in mL) divided by the dry weight of the sample (in grams), expressed as a percentage, as described in "Soil Sampling and Methods of Analysis" by M. Carter.

** 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
TU	ALS ENVIRONMENTAL - TUCSON, ARIZONA, USA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Reference Information

Chain of Custody Numbers:

ALS07231304	ALS07231304H	ALS07231304R

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-200.2-CCMS-VA	**Soil**							
Batch R2672070								
WG1723858-6 CRM		**VA-NRC-TILL1**						
Boron (B)			3		mg/kg		0-13	13-AUG-13
WG1723858-1 MB								
Boron (B)			<10		mg/kg		10	13-AUG-13
Batch R2673623								
WG1723858-2 DUP		**L1338766-1**						
Boron (B)		<10	<10	RPD-NA	mg/kg	N/A	30	15-AUG-13
C-INORG-SK	**Soil**							
Batch R2661480								
WG1715241-5 DUP		**L1338766-4**						
Inorganic Carbon		0.41	0.39		%	3.9	20	30-JUL-13
WG1715241-2 IRM		**0.1%IC**						
Inorganic Carbon			131.8		%		60-140	30-JUL-13
WG1715241-3 IRM		**0.4%IC**						
Inorganic Carbon			111.0		%		80-120	30-JUL-13
WG1715241-4 MB								
Inorganic Carbon			<0.10		%		0.1	30-JUL-13
C-TOT-ORG-WB-SK	**Soil**							
Batch R2662001								
WG1716273-1 DUP		**L1338766-5**						
Organic Carbon		<0.40	<0.40	RPD-NA	%	N/A	30	30-JUL-13
Organic Matter		<0.70	<0.70	RPD-NA	%	N/A	20	30-JUL-13
WG1716273-3 IRM		**FARM2009**						
Organic Carbon			99.1		%		80-120	30-JUL-13
Organic Matter			101.2		%		80-120	30-JUL-13
WG1716273-2 MB								
Organic Carbon			<0.40		%		0.4	30-JUL-13
Organic Matter			<0.70		%		0.7	30-JUL-13
HG-200.2-CVAF-VA	**Soil**							
Batch R2671700								
WG1723858-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			93.6		%		70-130	14-AUG-13
WG1723858-2 DUP		**L1338766-1**						
Mercury (Hg)		0.590	0.196	DUP-H	mg/kg	100	40	14-AUG-13
WG1723858-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	14-AUG-13
WG1723858-5 MS		**L1338766-6**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-200.2-CVAF-VA	**Soil**							
Batch R2671700								
WG1723858-5 MS		**L1338766-6**						
Mercury (Hg)			101.1		%		70-130	14-AUG-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2672070								
WG1723858-3 CRM		**VA-CANMET-TILL1**						
Aluminum (Al)			97.7		%		70-130	13-AUG-13
Antimony (Sb)			100.3		%		70-130	13-AUG-13
Arsenic (As)			105.3		%		70-130	13-AUG-13
Barium (Ba)			101.5		%		70-130	13-AUG-13
Beryllium (Be)			0.48		mg/kg		0.34-0.74	13-AUG-13
Bismuth (Bi)			96.1		%		70-130	13-AUG-13
Cadmium (Cd)			96.8		%		70-130	13-AUG-13
Calcium (Ca)			109.3		%		70-130	13-AUG-13
Chromium (Cr)			106.0		%		70-130	13-AUG-13
Cobalt (Co)			97.7		%		70-130	13-AUG-13
Copper (Cu)			98.2		%		70-130	13-AUG-13
Iron (Fe)			97.6		%		70-130	13-AUG-13
Lead (Pb)			89.2		%		70-130	13-AUG-13
Lithium (Li)			102.8		%		70-130	13-AUG-13
Magnesium (Mg)			98.5		%		70-130	13-AUG-13
Manganese (Mn)			97.4		%		70-130	13-AUG-13
Molybdenum (Mo)			0.69		mg/kg		0.24-1.24	13-AUG-13
Nickel (Ni)			101.2		%		70-130	13-AUG-13
Phosphorus (P)			105.2		%		70-130	13-AUG-13
Potassium (K)			107.6		%		70-130	13-AUG-13
Selenium (Se)			0.34		mg/kg		0.12-0.52	13-AUG-13
Silver (Ag)			0.22		mg/kg		0.12-0.32	13-AUG-13
Sodium (Na)			111.5		%		70-130	13-AUG-13
Strontium (Sr)			105.3		%		70-130	13-AUG-13
Thallium (Tl)			0.123		mg/kg		0.075-0.175	13-AUG-13
Tin (Sn)			1.0		mg/kg		0-3	13-AUG-13
Titanium (Ti)			119.8		%		70-130	13-AUG-13
Uranium (U)			103.9		%		70-130	13-AUG-13
Vanadium (V)			105.4		%		70-130	13-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2672070								
WG1723858-3 CRM		**VA-CANMET-TILL1**						
Zinc (Zn)			100.7		%		70-130	13-AUG-13
WG1723858-1 MB								
Aluminum (Al)			<50		mg/kg		50	13-AUG-13
Antimony (Sb)			<0.10		mg/kg		0.1	13-AUG-13
Arsenic (As)			<0.050		mg/kg		0.05	13-AUG-13
Barium (Ba)			<0.50		mg/kg		0.5	13-AUG-13
Beryllium (Be)			<0.20		mg/kg		0.2	13-AUG-13
Bismuth (Bi)			<0.20		mg/kg		0.2	13-AUG-13
Cadmium (Cd)			<0.050		mg/kg		0.05	13-AUG-13
Calcium (Ca)			<50		mg/kg		50	13-AUG-13
Chromium (Cr)			<0.50		mg/kg		0.5	13-AUG-13
Cobalt (Co)			<0.10		mg/kg		0.1	13-AUG-13
Copper (Cu)			<0.50		mg/kg		0.5	13-AUG-13
Iron (Fe)			<50		mg/kg		50	13-AUG-13
Lead (Pb)			<0.50		mg/kg		0.5	13-AUG-13
Lithium (Li)			<5.0		mg/kg		5	13-AUG-13
Magnesium (Mg)			<20		mg/kg		20	13-AUG-13
Manganese (Mn)			<1.0		mg/kg		1	13-AUG-13
Molybdenum (Mo)			<0.50		mg/kg		0.5	13-AUG-13
Nickel (Ni)			<0.50		mg/kg		0.5	13-AUG-13
Phosphorus (P)			<50		mg/kg		50	13-AUG-13
Potassium (K)			<100		mg/kg		100	13-AUG-13
Selenium (Se)			<0.20		mg/kg		0.2	13-AUG-13
Silver (Ag)			<0.10		mg/kg		0.1	13-AUG-13
Sodium (Na)			<100		mg/kg		100	13-AUG-13
Strontium (Sr)			<0.50		mg/kg		0.5	13-AUG-13
Thallium (Tl)			<0.050		mg/kg		0.05	13-AUG-13
Tin (Sn)			<2.0		mg/kg		2	13-AUG-13
Titanium (Ti)			<1.0		mg/kg		1	13-AUG-13
Uranium (U)			<0.050		mg/kg		0.05	13-AUG-13
Vanadium (V)			<0.20		mg/kg		0.2	13-AUG-13
Zinc (Zn)			<1.0		mg/kg		1	13-AUG-13
WG1723858-5 MS		**L1338766-6**						
Aluminum (Al)			N/A	MS-B	%		-	13-AUG-13
Antimony (Sb)			104.6		%		70-130	13-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2672070								
WG1723858-5 MS		**L1338766-6**						
Arsenic (As)			97.7		%		70-130	13-AUG-13
Barium (Ba)			101.3		%		70-130	13-AUG-13
Beryllium (Be)			93.2		%		70-130	13-AUG-13
Bismuth (Bi)			96.1		%		70-130	13-AUG-13
Cadmium (Cd)			100.5		%		70-130	13-AUG-13
Calcium (Ca)			N/A	MS-B	%		-	13-AUG-13
Chromium (Cr)			97.4		%		70-130	13-AUG-13
Cobalt (Co)			96.6		%		70-130	13-AUG-13
Copper (Cu)			95.7		%		70-130	13-AUG-13
Iron (Fe)			N/A	MS-B	%		-	13-AUG-13
Lead (Pb)			96.4		%		70-130	13-AUG-13
Lithium (Li)			90.7		%		70-130	13-AUG-13
Magnesium (Mg)			N/A	MS-B	%		-	13-AUG-13
Manganese (Mn)			92.3		%		70-130	13-AUG-13
Molybdenum (Mo)			94.0		%		70-130	13-AUG-13
Nickel (Ni)			93.9		%		70-130	13-AUG-13
Phosphorus (P)			98.5		%		70-130	13-AUG-13
Potassium (K)			95.9		%		70-130	13-AUG-13
Selenium (Se)			94.0		%		70-130	13-AUG-13
Silver (Ag)			82.0		%		70-130	13-AUG-13
Sodium (Na)			97.2		%		70-130	13-AUG-13
Strontium (Sr)			90.3		%		70-130	13-AUG-13
Thallium (Tl)			95.0		%		70-130	13-AUG-13
Titanium (Ti)			N/A	MS-B	%		-	13-AUG-13
Vanadium (V)			98.0		%		70-130	13-AUG-13
Zinc (Zn)			96.7		%		70-130	13-AUG-13
Batch R2673623								
WG1723858-2 DUP		**L1338766-1**						
Aluminum (Al)		14500	16400		mg/kg	12	40	15-AUG-13
Antimony (Sb)		4.92	2.99	DUP-H	mg/kg	49	30	15-AUG-13
Arsenic (As)		72.9	56.9		mg/kg	25	30	15-AUG-13
Barium (Ba)		476	311	DUP-H	mg/kg	42	40	15-AUG-13
Beryllium (Be)		0.54	0.56		mg/kg	3.6	30	15-AUG-13
Bismuth (Bi)		0.60	0.31	J	mg/kg	0.28	0.4	15-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2673623								
WG1723858-2 DUP		**L1338766-1**						
Cadmium (Cd)		1.95	0.842	DUP-H	mg/kg	80	30	15-AUG-13
Calcium (Ca)		11600	9680		mg/kg	18	30	15-AUG-13
Chromium (Cr)		43.4	44.5		mg/kg	2.6	30	15-AUG-13
Cobalt (Co)		14.1	12.9		mg/kg	9.3	30	15-AUG-13
Copper (Cu)		46.9	37.5		mg/kg	22	30	15-AUG-13
Iron (Fe)		33500	30900		mg/kg	8.1	30	15-AUG-13
Lead (Pb)		497	179	DUP-H	mg/kg	94	40	15-AUG-13
Lithium (Li)		21.4	25.0		mg/kg	15	30	15-AUG-13
Magnesium (Mg)		9430	9310		mg/kg	1.3	30	15-AUG-13
Manganese (Mn)		545	489		mg/kg	11	30	15-AUG-13
Molybdenum (Mo)		1.37	1.17		mg/kg	16	40	15-AUG-13
Nickel (Ni)		47.8	45.4		mg/kg	5.2	30	15-AUG-13
Phosphorus (P)		728	625		mg/kg	15	30	15-AUG-13
Potassium (K)		1630	1960		mg/kg	18	40	15-AUG-13
Selenium (Se)		0.59	0.50		mg/kg	15	30	15-AUG-13
Silver (Ag)		0.89	0.40	DUP-H	mg/kg	75	40	15-AUG-13
Sodium (Na)		200	240		mg/kg	20	40	15-AUG-13
Strontium (Sr)		53.8	45.4		mg/kg	17	40	15-AUG-13
Thallium (Tl)		0.359	0.280		mg/kg	25	30	15-AUG-13
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	15-AUG-13
Titanium (Ti)		407	463		mg/kg	13	40	15-AUG-13
Uranium (U)		1.70	1.67		mg/kg	1.4	30	15-AUG-13
Vanadium (V)		37.6	39.1		mg/kg	3.8	30	15-AUG-13
Zinc (Zn)		1070	438	DUP-H	mg/kg	84	30	15-AUG-13
MOISTURE-VA	**Soil**							
Batch R2669547								
WG1723850-3 DUP		**L1338766-1**						
Moisture		10.8	10.1		%	6.2	20	10-AUG-13
WG1723850-2 LCS								
Moisture			99.7		%		70-130	10-AUG-13
WG1723850-1 MB								
Moisture			<0.25		%		0.25	10-AUG-13
PH-1:2-VA	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-1:2-VA	**Soil**							
Batch R2672012								
WG1723858-2 DUP		**L1338766-1**						
pH (1:2 soil:water)		8.13	8.27	J	pH	0.14	0.3	14-AUG-13
S-TOT-LECO-SK	**Soil**							
Batch R2660400								
WG1715237-8 DUP		**L1338766-2**						
Sulfur (S)-Total		3400	3700		mg/kg	7.7	30	29-JUL-13
WG1715237-4 IRM		**1646A_SOIL**						
Sulfur (S)-Total			3300		mg/kg		2500-4600	29-JUL-13
WG1715237-5 MB								
Sulfur (S)-Total			<500		mg/kg		500	29-JUL-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
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
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							
Moisture content							
	1	22-JUL-13 10:24	10-AUG-13 10:15	14	19	days	EHT
	2	22-JUL-13 10:44	10-AUG-13 10:15	14	19	days	EHT
	3	22-JUL-13 13:30	10-AUG-13 10:15	14	19	days	EHT
	4	22-JUL-13 14:10	10-AUG-13 10:15	14	19	days	EHT
	5	22-JUL-13 16:00	10-AUG-13 10:15	14	19	days	EHT
	6	22-JUL-13 13:40	10-AUG-13 10:15	14	19	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 L1338766 were received on 25-JUL-13 14:40.

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.

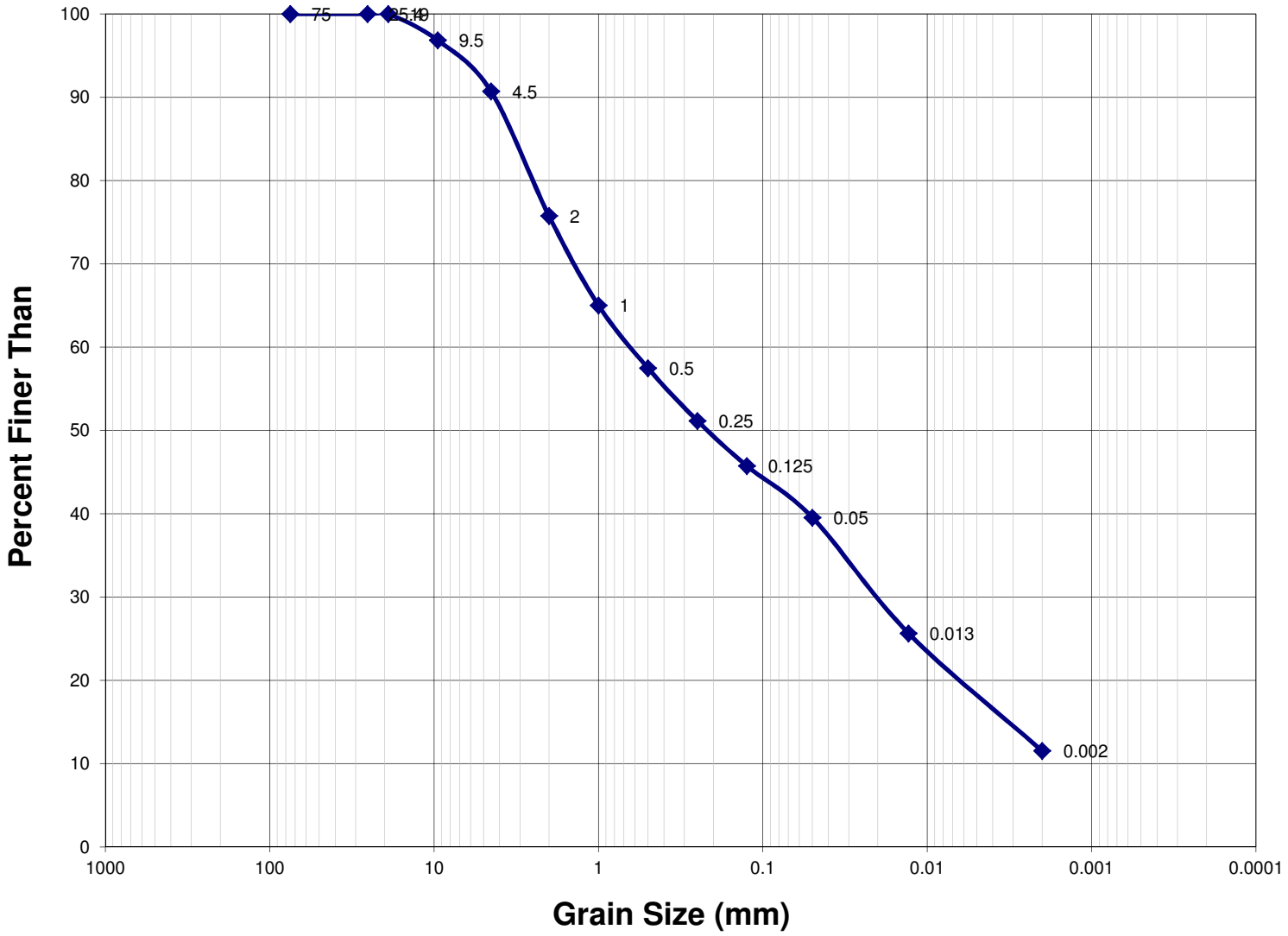
Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH015_SOA
Lab ID: L1338766-1

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	9
Coarse Sand	2.0mm - 4.75mm	15
Medium Sand	0.425mm - 2.0mm	18
Fine Sand	0.075mm - 0.425mm	16
Fines	< 0.075mm	42

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	24
Sand	0.05mm - 2mm	36
Silt	0.002mm - 0.05mm	28
Clay	< 0.002mm	12

Texture Loam

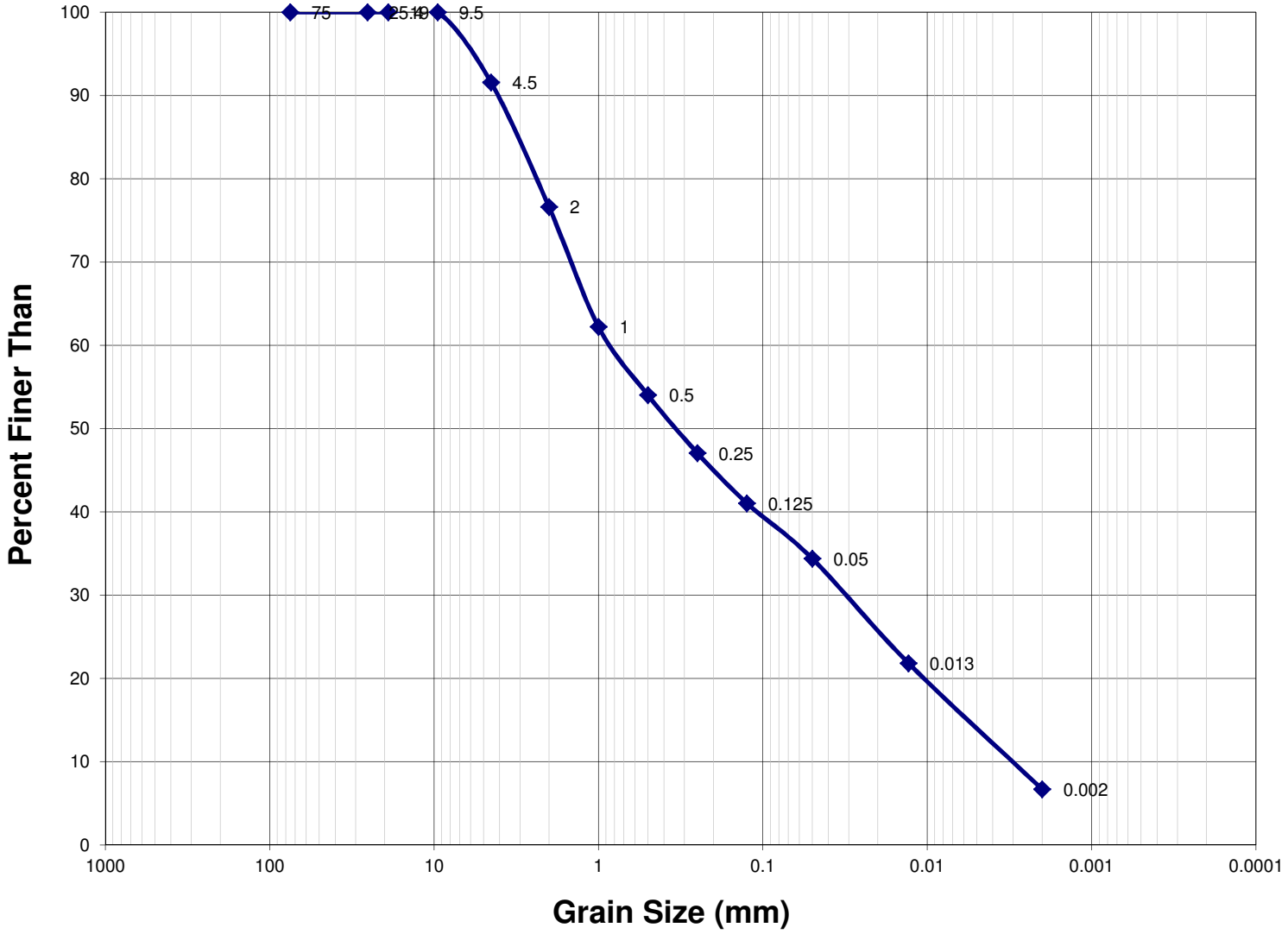
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH015_SOB
Lab ID: L1338766-2

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	8
Coarse Sand	2.0mm - 4.75mm	15
Medium Sand	0.425mm - 2.0mm	23
Fine Sand	0.075mm - 0.425mm	17
Fines	< 0.075mm	37

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	23
Sand	0.05mm - 2mm	42
Silt	0.002mm - 0.05mm	28
Clay	< 0.002mm	7

Texture Sandy loam

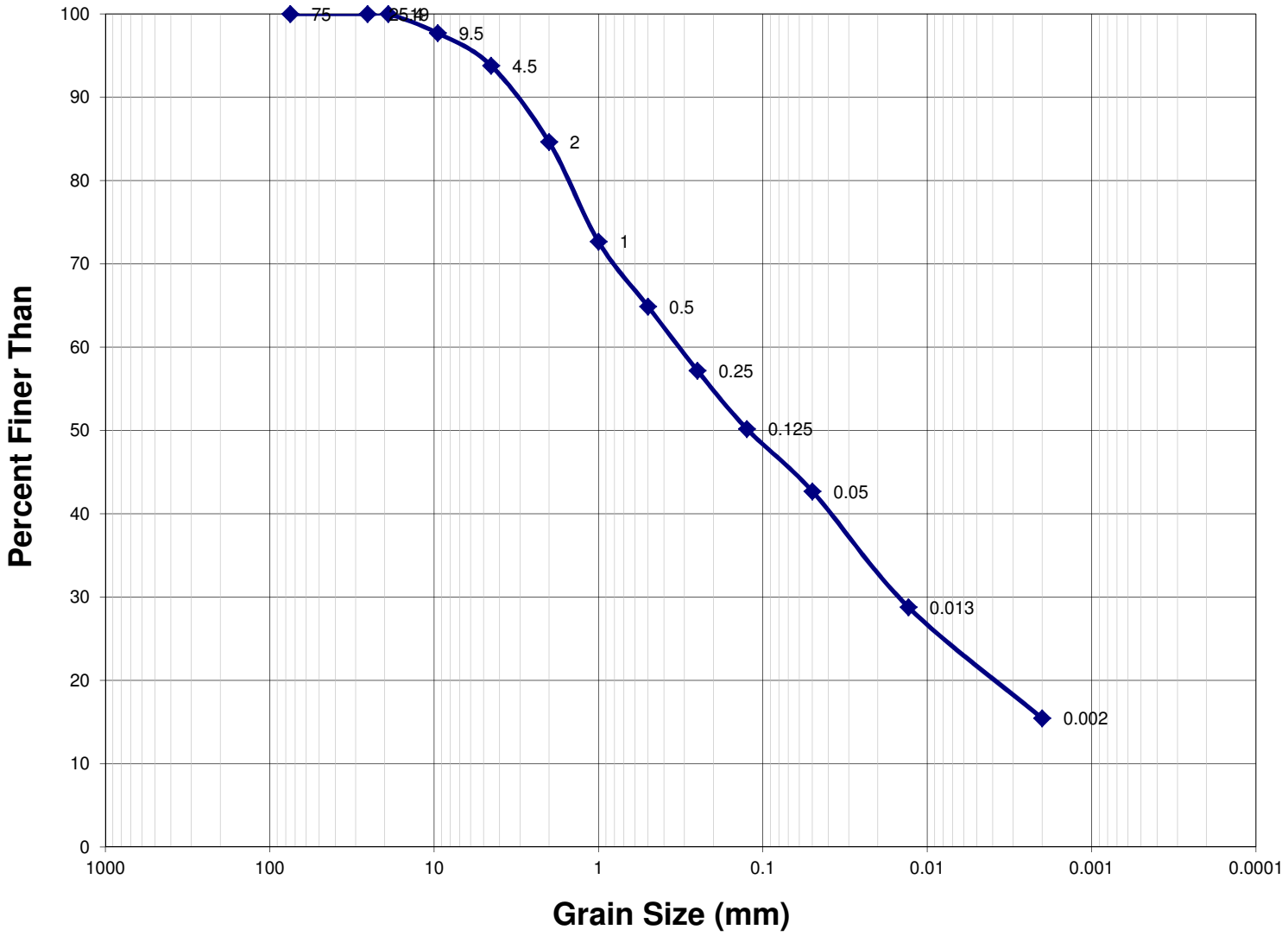
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH015_SOC
Lab ID: L1338766-3

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	6
Coarse Sand	2.0mm - 4.75mm	9
Medium Sand	0.425mm - 2.0mm	20
Fine Sand	0.075mm - 0.425mm	20
Fines	< 0.075mm	45

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	15
Sand	0.05mm - 2mm	42
Silt	0.002mm - 0.05mm	27
Clay	< 0.002mm	15

Texture Loam

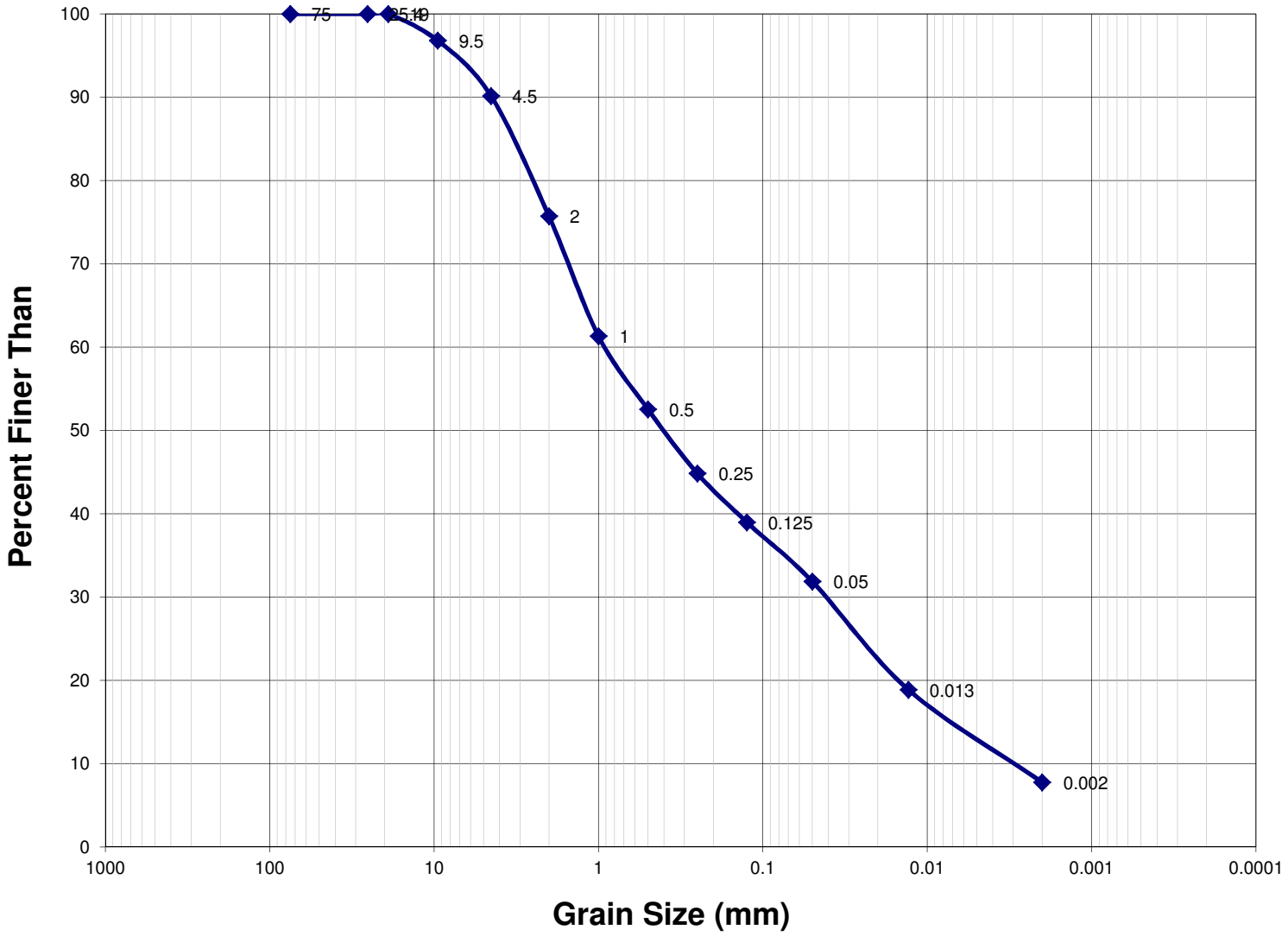
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH015_SOD
Lab ID: L1338766-4

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	10
Coarse Sand	2.0mm - 4.75mm	15
Medium Sand	0.425mm - 2.0mm	23
Fine Sand	0.075mm - 0.425mm	18
Fines	< 0.075mm	34

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	24
Sand	0.05mm - 2mm	44
Silt	0.002mm - 0.05mm	24
Clay	< 0.002mm	8
Texture	Sandy loam	

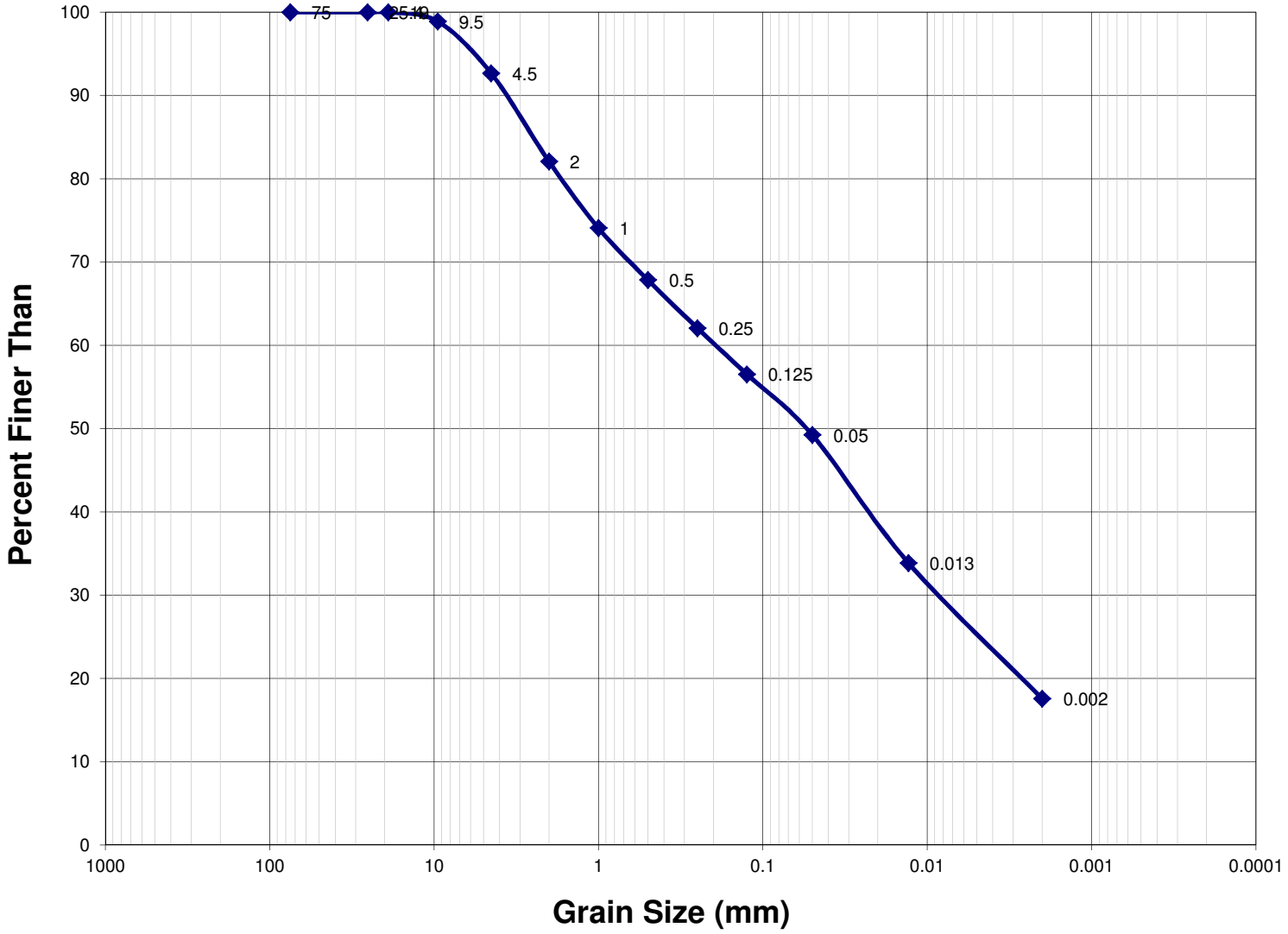
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ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH015_SOE
Lab ID: L1338766-5

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	7
Coarse Sand	2.0mm - 4.75mm	11
Medium Sand	0.425mm - 2.0mm	14
Fine Sand	0.075mm - 0.425mm	16
Fines	< 0.075mm	52

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	18
Sand	0.05mm - 2mm	33
Silt	0.002mm - 0.05mm	32
Clay	< 0.002mm	18

Texture Loam

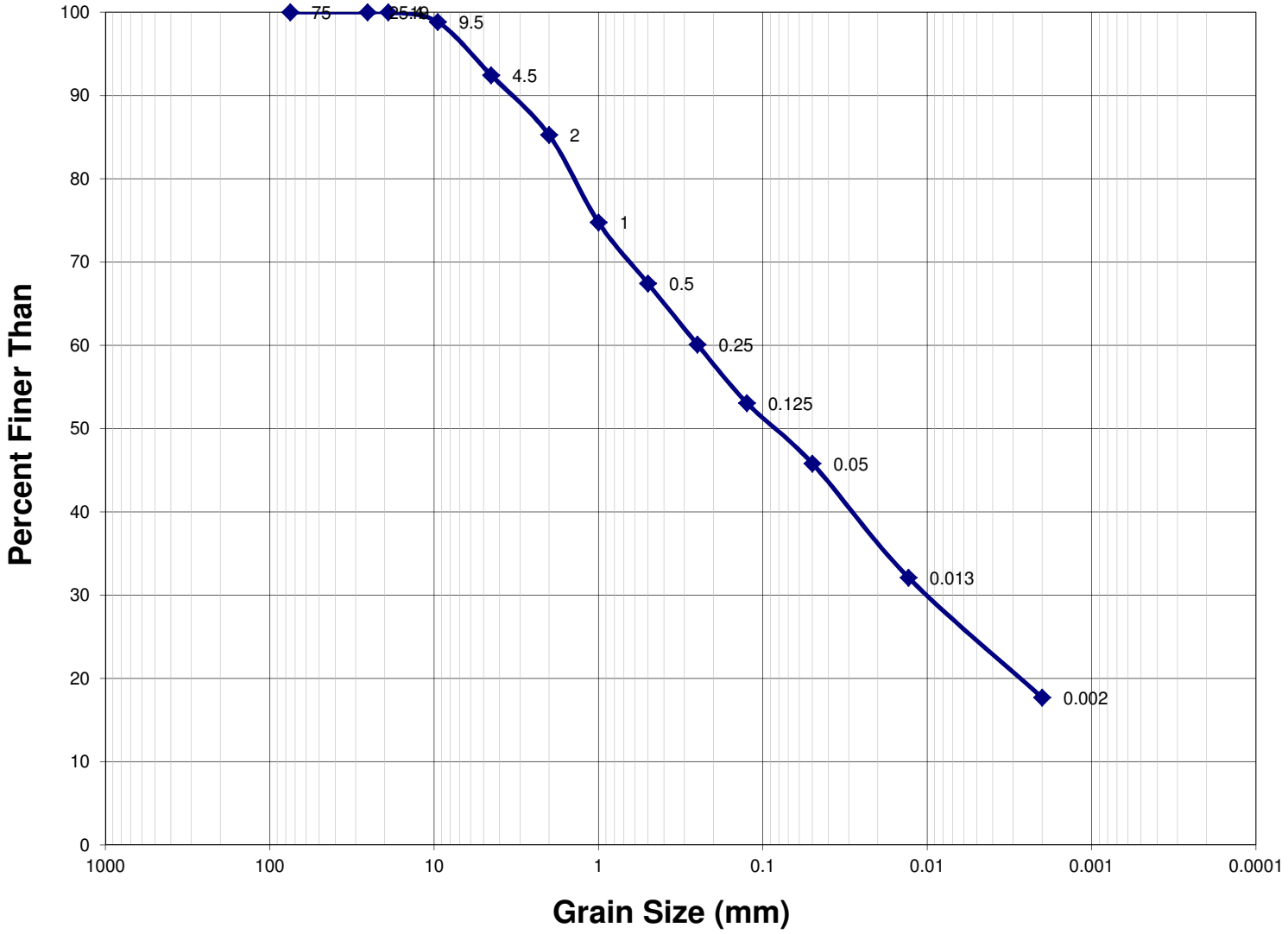
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH915_SOC
Lab ID: L1338766-6

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	7
Coarse Sand	2.0mm - 4.75mm	8
Medium Sand	0.425mm - 2.0mm	18
Fine Sand	0.075mm - 0.425mm	19
Fines	< 0.075mm	48

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	15
Sand	0.05mm - 2mm	39
Silt	0.002mm - 0.05mm	28
Clay	< 0.002mm	18
Texture	Loam	

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

August 28, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1338766 **Date Received:** August 6, 2013

Certificate of Analysis

Client ID:	Sample Date:	Lab #:		Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3/1,000t$
L1338766-1	7/22/2013	T1301135-001		9.94	40
L1338766-2	7/22/2013	T1301135-002		8.40	151
L1338766-3	7/22/2013	T1301135-003		9.98	20
L1338766-4	7/22/2013	T1301135-004		7.97	29
L1338766-5	7/22/2013	T1301135-005		9.85	26
L1338766-6	7/22/2013	T1301135-006		9.29	22

Notes:
Samples were air dried then ground to < 60 mesh.

W. Hyatt
Digitally signed by Wendy Hyatt
Date: 2013.08.28 15:59:29 -07'00'

Wendy Hyatt, Project Chemist

August 28, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1338766 **Date Received:** August 6, 2013

Quality Control

				Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $CaCO_3$/1,000t
Prep Blank				<0.01	< 1
Laboratory Control Sample (LCS) - Rice Flour CN 3451			Observed Value	9.52	n/a
			True Value	9.50	
			%R	**100**	
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	981
			True Value		1,000
			%R		**98**
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	976
			True Value		1,000
			%R		**98**
Duplicate Results			*T1301136-001	0.62 **	
			Duplicate	0.62 **	
			%R	**0**	
Duplicate Results				T1301135-001	40
				Duplicate	39
				%RPD	**3**

* Sample from the same batch, but a different project.

**Residual moisture - does not include air dry moisture.

CH2MHILL

CHAIN OF CUSTODY RECORD

7/23/2013 11:00:00 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 7/23/2013
COC Number: ALS07231304H

	DATE	TIME	Matrix	(DI/ASTMD1498) DI ORP	(DI/E245.7) DI Mercury	(DI/E300) DI Sulphate	(DI/EPA600/2-78-054) Acid Soluable Sulfate	(DI/SM2310) DI Acidity	(DI/SM2320) DI Alkalinity	(DI/SM2510) DI Conductivity	(DI/SM4500H) DI pH	(DI/SW6020A) DI Diss Metals	(SW6020A) Ba(Li) Metaborate	Number of Containers	COMMENTS
Container:				1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon		
Preservatives:				4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C		
Filtered:				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Holding Time:				14	14	180	180	14	14	14	14	14	14		
CH13-311-BH015_SOa	7/22/2013	10:24	Soil	x	x	x	x	x	x	x	x	x	x	3	HOLD
CH13-311-BH015_SOb	7/22/2013	10:44	Soil	x	x	x	x	x	x	x	x	x	x	3	
CH13-311-BH015_SOc	7/22/2013	13:30	Soil	x	x	x	x	x	x	x	x	x	x	3	
CH13-311-BH015_SOd	7/22/2013	14:10	Soil	x	x	x	x	x	x	x	x	x	x	3	
CH13-311-BH015_SOe	7/22/2013	16:00	Soil	x	x	x	x	x	x	x	x	x	x	3	
CH13-311-BH915_SOc	7/22/2013	13:40	Soil	x	x	x	x	x	x	x	x	x	x	3	
													TOTAL NUMBER OF CONTAINERS	18	

TN July 25 14:45 14/15/18/12

L1338766-COFC

Signatures / Date/Time

Approved by
Sampled by
Relinquished by
Received by
Relinquished by
Received by

1/23/13 1700

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:

Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL **CHAIN OF CUSTODY RECORD** *7/23/2013 10:59:41 AM* Page 1 OF 1

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 7/23/2013
COC Number: ALS07231304

	Container:	4oz jar	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon		
	Preservatives:	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C		
	Filtered:	NA	NA	NA	NA	NA	NA	NA	NA		
	Holding Time:	14	28	14	28	28	28	NA	NA		
		(ASTM 2216) Moisture	(CSSS/APHA4500H) Paste pH	(EPA200.0/245.7/SW6020A) Total Metals Table 1	(ModifiedSobek) Mod Neutralization Potential	(SSSA (1996) P455-456) TIC	(SSSA (1996) P995-996) TOC	(ASTM 4318) Atterberg limits	(ASTM D422) Gradation		
	DATE	TIME	Matrix							Number of Containers	COMMENTS
CH13-311-BH015_SOa	7/22/2013	10:24	Soil	x	x	x	x	x	x	4	
CH13-311-BH015_SOb	7/22/2013	10:44	Soil	x	x	x	x	x	x	4	
CH13-311-BH015_SOc	7/22/2013	13:30	Soil	x	x	x	x	x	x	4	
CH13-311-BH015_SOd	7/22/2013	14:10	Soil	x	x	x	x	x	x	4	
CH13-311-BH015_SOe	7/22/2013	16:00	Soil	x	x	x	x	x	x	5	
CH13-311-BH915_SOc	7/22/2013	13:40	Soil	x	x	x	x	x	x	4	
									TOTAL NUMBER OF CONTAINERS	25	

TN July25 14:40 14/15/18/12


L1338766-COFC

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		7/23/13 1700
Received by		
Relinquished by		
Received by		

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody and Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL **CHAIN OF CUSTODY RECORD** *7/23/2013 11:00:13 AM* Page 1 OF 1

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 3 Days
Shipping Date: 7/23/2013
COC Number: ALS07231304R

	DATE	TIME	Matrix	Container: 1 Gallon; Preservatives: 4°C; Filtered: NA; Holding Time: 180; (ISO 15178-2000) Total Sulphur		Number of Containers	COMMENTS
CH13-311-BH015_SOa	7/22/2013	10:24	Soil	x		1	RUSH
CH13-311-BH015_SOb	7/22/2013	10:44	Soil	x		1	
CH13-311-BH015_SOc	7/22/2013	13:30	Soil	x		1	
CH13-311-BH015_SOd	7/22/2013	14:10	Soil	x		1	
CH13-311-BH015_SOe	7/22/2013	16:00	Soil	x		1	
CH13-311-BH915_SOc	7/22/2013	13:40	Soil	x		1	
					TOTAL NUMBER OF CONTAINERS	6	

TM July 25 14:30 14/15/18/12

RUSH

Priority processing

L1338766-COFC

Approved by
Sampled by
Relinquished by
Received by
Relinquished by
Received by

Signatures

Date/Time
7/23/13 1700
23-Jul-13 5:05
7.3.6.4

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 29-JUL-13
Report Date: 25-OCT-13 10:31 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1339332

Project P.O. #: 472645.06.AD.01.04.13 PO 604564
Job Reference: BSI GRUM OVERBURDEN DUMP 2013 311.5B
C of C Numbers: ALS07271301, ALS07271301H, ALS07271301R
Legal Site Desc:

Comments:

25-OCT-13: Additional QC data has been included.

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1339332-1	L1339332-2	L1339332-3	L1339332-4	
	Description	Soil	Soil	Soil	Soil	
	Sampled Date	24-JUL-13	24-JUL-13	24-JUL-13	25-JUL-13	
	Sampled Time	15:00	15:35	16:50	10:45	
	Client ID	CH13-311-BH012_SOA	CH13-311-BH012_SOB	CH13-311-BH012_SOC	CH13-311-BH012_SOD	
Grouping	**Analyte**					
SOIL						
Physical Tests	Grain Size Curve	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED	
	Moisture (%)	11.7	9.75	10.3	11.1	
	Liquid Limit (LL) (%)				29	
	pH (1:2 soil:water) (pH)	8.29	8.07	8.23	8.22	
	Plasticity Index (PI) (%)				10	
Organic / Inorganic Carbon	Inorganic Carbon (%)	0.15	0.30	0.18	0.12	
	Inorganic Carbon (as CaCO3 Equivalent) (%)	1.28	2.50	1.52	1.02	
	Organic Carbon (%)	<0.40	<0.40	<0.40	<0.40	
	Organic Matter (%)	<0.70	<0.70	<0.70	<0.70	
Saturated Paste Extractables	Paste pH (pH)	7.57	7.51	7.52	7.62	
	% Saturation (%)		38.8	29.3	42.1	
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	27.0	40.0	7.0	28.0	
Metals	Aluminum (Al) (mg/kg)	17200	17200	16600	21000	
	Antimony (Sb) (mg/kg)	0.76	0.98	1.05	0.63	
	Arsenic (As) (mg/kg)	10.0	212	16.8	19.7	
	Barium (Ba) (mg/kg)	340	326	216	246	
	Beryllium (Be) (mg/kg)	0.67	0.63	0.79	0.99	
	Bismuth (Bi) (mg/kg)	0.32	0.26	0.54	0.39	
	Boron (B) (mg/kg)	<10	<10	<10	<10	
	Cadmium (Cd) (mg/kg)	0.369	0.394	0.567	0.411	
	Calcium (Ca) (mg/kg)	8530	10300	4840	14700	
	Chromium (Cr) (mg/kg)	27.8	28.9	34.2	52.9	
	Cobalt (Co) (mg/kg)	9.86	10.7	11.0	16.6	
	Copper (Cu) (mg/kg)	23.8	25.0	24.4	38.3	
	Iron (Fe) (mg/kg)	25800	27200	26600	35800	
	Lead (Pb) (mg/kg)	14.6	18.0	168	16.9	
	Lithium (Li) (mg/kg)	29.5	25.2	33.2	36.0	
	Magnesium (Mg) (mg/kg)	6950	7620	7390	10600	
	Manganese (Mn) (mg/kg)	393	400	371	522	
	Mercury (Hg) (mg/kg)	0.0291	0.0351	0.229	0.0362	
	Molybdenum (Mo) (mg/kg)	0.90	1.17	0.71	0.86	
	Nickel (Ni) (mg/kg)	25.5	27.9	29.8	48.1	
	Phosphorus (P) (mg/kg)	654	754	623	874	
	Potassium (K) (mg/kg)	2550	2280	2310	2360	
	Selenium (Se) (mg/kg)	0.43	0.53	0.27	0.41	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1339332-1	L1339332-2	L1339332-3	L1339332-4	
	Description	Soil	Soil	Soil	Soil	
	Sampled Date	24-JUL-13	24-JUL-13	24-JUL-13	25-JUL-13	
	Sampled Time	15:00	15:35	16:50	10:45	
	Client ID	CH13-311-BH012_SOA	CH13-311-BH012_SOB	CH13-311-BH012_SOC	CH13-311-BH012_SOD	
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.15	0.16	0.42	0.16	
	Sodium (Na) (mg/kg)	280	350	170	220	
	Strontium (Sr) (mg/kg)	44.9	49.4	26.3	67.4	
	Sulfur (S)-Total (mg/kg)	700	900	800	600	
	Thallium (Tl) (mg/kg)	0.192	0.159	0.250	0.171	
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	
	Titanium (Ti) (mg/kg)	592	549	530	363	
	Uranium (U) (mg/kg)	2.04	1.70	2.01	1.37	
	Vanadium (V) (mg/kg)	40.6	42.0	32.3	40.8	
	Zinc (Zn) (mg/kg)	77.6	81.7	217	98.1	

* 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	Bismuth (Bi)	DUP-H,J	L1339332-1, -2, -3, -4

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H,J	Duplicate results outside ALS DQO, due to sample heterogeneity. Duplicate results and limits are expressed in terms of absolute difference.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ATTERBERG-SK	Soil	Atterberg limits	CARTER CSSS 58

The liquid limit (or upper plastic limit) is the point at which the soil becomes semifluid, like softened butter. In operational terms, the liquid limit is defined as the water content at which a trapezoidal groove cut in moist soil is closed after 25 taps on a hard rubber plate (ASTM D-18, 1958).

The plastic limit (or lower plastic limit) is defined as the water content at which soil begins to crumble on being rolled into a thread 1/8 inch (or 3 mm) in diameter. It represents the lowest water content at which soil can be deformed readily without cracking.

The plastic index (which is the difference between the liquid and plastic limits) gives an indication of the "clayeyness" or plasticity of a clay and is employed in engineering classification systems for soils.

References: McKeague, J.A. 1978. Atterberg Limits pp 50 - 55 In: Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci. p. 50 - 55

B-200.2-CCMS-VA	Soil	Boron 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."

C-INORG-SK	Soil	Inorganic Carbon / Calcium Carbonate	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-ORG-WB-SK	Soil	Total Organic Carbon - Walkley Black	CSSS (1993) method 21.2

The soil sample is treated with excess potassium dichromate and sulfuric acid to oxidize organic carbon. Oxidized organic carbon is determined by back-titration with ferrous ammonium sulfate. Organic matter is estimated from the organic carbon result using the Van Bemmelon factor.

GRAIN SIZE-SK	Soil	Grain Size Analysis	SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

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,

Reference Information

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.

IC-CACO3-CALC-SK	Soil	Inorganic Carbon as CaCO3 Equivalent	Calculation
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.

NP-TU	Soil	Neutralization Potential (NP)	Sobek 3.2.3, MOD
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.

PH-PASTE-VA	Soil	pH in Soil (Paste) by Meter	Carter-CSSS / APHA 4500 H

A soil extract produced by the saturated paste extraction procedure is analyzed by pH meter.

S-TOT-LECO-SK	Soil	Total Sulphur by combustion method	ISO 15178:2000

The sample is ignited in a combustion analyzer where sulfur in the reduced SO2 gas is determined using a thermal conductivity detector.

SAT-PCNT-VA	Soil	Saturation Percentage	Carter-CSSS

Saturation Percentage (SP) is the total volume of water present in a saturated paste (in mL) divided by the dry weight of the sample (in grams), expressed as a percentage, as described in "Soil Sampling and Methods of Analysis" by M. Carter.

** 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
TU	ALS ENVIRONMENTAL - TUCSON, ARIZONA, USA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

ALS07271301 ALS07271301H ALS07271301R

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-200.2-CCMS-VA	**Soil**							
Batch R2672374								
WG1723968-4 CRM		**VA-CANMET-TILL1**						
Boron (B)			3		mg/kg		0-13	13-AUG-13
WG1723968-1 MB								
Boron (B)			<10		mg/kg		10	13-AUG-13
C-INORG-SK	**Soil**							
Batch R2665014								
WG1719172-10 IRM		**0.1%IC**						
Inorganic Carbon			129.3		%		60-140	03-AUG-13
WG1719172-11 IRM		**0.4%IC**						
Inorganic Carbon			97.3		%		80-120	03-AUG-13
WG1719172-14 IRM		**0.1%IC**						
Inorganic Carbon			122.5		%		60-140	03-AUG-13
WG1719172-15 IRM		**0.4%IC**						
Inorganic Carbon			94.1		%		80-120	03-AUG-13
WG1719172-2 IRM		**0.1%IC**						
Inorganic Carbon			130.9		%		60-140	03-AUG-13
WG1719172-3 IRM		**0.4%IC**						
Inorganic Carbon			94.1		%		80-120	03-AUG-13
WG1719172-6 IRM		**0.1%IC**						
Inorganic Carbon			132.2		%		60-140	03-AUG-13
WG1719172-7 IRM		**0.4%IC**						
Inorganic Carbon			104.6		%		80-120	03-AUG-13
WG1719172-12 MB								
Inorganic Carbon			<0.10		%		0.1	03-AUG-13
WG1719172-16 MB								
Inorganic Carbon			<0.10		%		0.1	03-AUG-13
WG1719172-4 MB								
Inorganic Carbon			<0.10		%		0.1	03-AUG-13
WG1719172-8 MB								
Inorganic Carbon			<0.10		%		0.1	03-AUG-13
C-TOT-ORG-WB-SK	**Soil**							
Batch R2667851								
WG1720360-3 IRM		**FARM2009**						
Organic Carbon			107.8		%		80-120	07-AUG-13
Organic Matter			107.5		%		80-120	07-AUG-13
WG1720360-2 MB								
Organic Carbon			<0.40		%		0.4	07-AUG-13
Organic Matter			<0.70		%		0.7	07-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-200.2-CVAF-VA	**Soil**							
Batch R2670980								
WG1723968-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			105.3		%		70-130	13-AUG-13
WG1723968-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	13-AUG-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2672374								
WG1723968-3 CRM		**VA-CANMET-TILL1**						
Aluminum (Al)			101.7		%		70-130	13-AUG-13
Antimony (Sb)			99.4		%		70-130	13-AUG-13
Arsenic (As)			104.8		%		70-130	13-AUG-13
Barium (Ba)			107.0		%		70-130	13-AUG-13
Beryllium (Be)			0.54		mg/kg		0.34-0.74	13-AUG-13
Bismuth (Bi)			99.8		%		70-130	13-AUG-13
Cadmium (Cd)			88.1		%		70-130	13-AUG-13
Calcium (Ca)			111.0		%		70-130	13-AUG-13
Chromium (Cr)			103.9		%		70-130	13-AUG-13
Cobalt (Co)			101.5		%		70-130	13-AUG-13
Copper (Cu)			95.4		%		70-130	13-AUG-13
Iron (Fe)			96.6		%		70-130	13-AUG-13
Lead (Pb)			92.2		%		70-130	13-AUG-13
Lithium (Li)			108.0		%		70-130	13-AUG-13
Magnesium (Mg)			101.9		%		70-130	13-AUG-13
Manganese (Mn)			100.4		%		70-130	13-AUG-13
Molybdenum (Mo)			0.72		mg/kg		0.24-1.24	13-AUG-13
Nickel (Ni)			101.8		%		70-130	13-AUG-13
Phosphorus (P)			101.5		%		70-130	13-AUG-13
Potassium (K)			112.8		%		70-130	13-AUG-13
Selenium (Se)			0.37		mg/kg		0.12-0.52	13-AUG-13
Silver (Ag)			0.23		mg/kg		0.12-0.32	13-AUG-13
Sodium (Na)			108.4		%		70-130	13-AUG-13
Strontium (Sr)			104.8		%		70-130	13-AUG-13
Thallium (Tl)			0.124		mg/kg		0.075-0.175	13-AUG-13
Tin (Sn)			1.0		mg/kg		0-3	13-AUG-13
Titanium (Ti)			111.4		%		70-130	13-AUG-13
Uranium (U)			111.9		%		70-130	13-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2672374								
WG1723968-3 CRM		**VA-CANMET-TILL1**						
Vanadium (V)			105.6		%		70-130	13-AUG-13
Zinc (Zn)			101.6		%		70-130	13-AUG-13
WG1723968-1 MB								
Aluminum (Al)			<50		mg/kg		50	13-AUG-13
Antimony (Sb)			<0.10		mg/kg		0.1	13-AUG-13
Arsenic (As)			<0.050		mg/kg		0.05	13-AUG-13
Barium (Ba)			<0.50		mg/kg		0.5	13-AUG-13
Beryllium (Be)			<0.20		mg/kg		0.2	13-AUG-13
Bismuth (Bi)			<0.20		mg/kg		0.2	13-AUG-13
Cadmium (Cd)			<0.050		mg/kg		0.05	13-AUG-13
Calcium (Ca)			<50		mg/kg		50	13-AUG-13
Chromium (Cr)			<0.50		mg/kg		0.5	13-AUG-13
Cobalt (Co)			<0.10		mg/kg		0.1	13-AUG-13
Copper (Cu)			<0.50		mg/kg		0.5	13-AUG-13
Iron (Fe)			<50		mg/kg		50	13-AUG-13
Lead (Pb)			<0.50		mg/kg		0.5	13-AUG-13
Lithium (Li)			<5.0		mg/kg		5	13-AUG-13
Magnesium (Mg)			<20		mg/kg		20	13-AUG-13
Manganese (Mn)			<1.0		mg/kg		1	13-AUG-13
Molybdenum (Mo)			<0.50		mg/kg		0.5	13-AUG-13
Nickel (Ni)			<0.50		mg/kg		0.5	13-AUG-13
Phosphorus (P)			<50		mg/kg		50	13-AUG-13
Potassium (K)			<100		mg/kg		100	13-AUG-13
Selenium (Se)			<0.20		mg/kg		0.2	13-AUG-13
Silver (Ag)			<0.10		mg/kg		0.1	13-AUG-13
Sodium (Na)			<100		mg/kg		100	13-AUG-13
Strontium (Sr)			<0.50		mg/kg		0.5	13-AUG-13
Thallium (Tl)			<0.050		mg/kg		0.05	13-AUG-13
Tin (Sn)			<2.0		mg/kg		2	13-AUG-13
Titanium (Ti)			<1.0		mg/kg		1	13-AUG-13
Uranium (U)			<0.050		mg/kg		0.05	13-AUG-13
Vanadium (V)			<0.20		mg/kg		0.2	13-AUG-13
Zinc (Zn)			<1.0		mg/kg		1	13-AUG-13
MOISTURE-VA	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-VA	**Soil**							
Batch R2667979								
WG1722279-2 LCS								
Moisture			100.0		%		70-130	07-AUG-13
WG1722279-1 MB								
Moisture			<0.25		%		0.25	07-AUG-13
Batch R2674627								
WG1728967-3 DUP		**L1339332-4**						
Moisture		11.1	9.94		%	11	20	18-AUG-13
WG1728967-2 LCS								
Moisture			99.1		%		70-130	18-AUG-13
WG1728967-1 MB								
Moisture			<0.25		%		0.25	18-AUG-13
S-TOT-LECO-SK	**Soil**							
Batch R2664678								
WG1719013-2 IRM		**1646A_SOIL**						
Sulfur (S)-Total			3500		mg/kg		2500-4600	02-AUG-13
WG1719013-3 MB								
Sulfur (S)-Total			<500		mg/kg		500	02-AUG-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
DUP-H,J	Duplicate results outside ALS DQO, due to sample heterogeneity. Duplicate results and limits are expressed in terms of absolute difference.
J	Duplicate results and limits are expressed in terms of absolute difference.
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							
Moisture content							
	4	25-JUL-13 10:45	18-AUG-13 07:45	14	24	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 L1339332 were received on 29-JUL-13 23:00.

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.

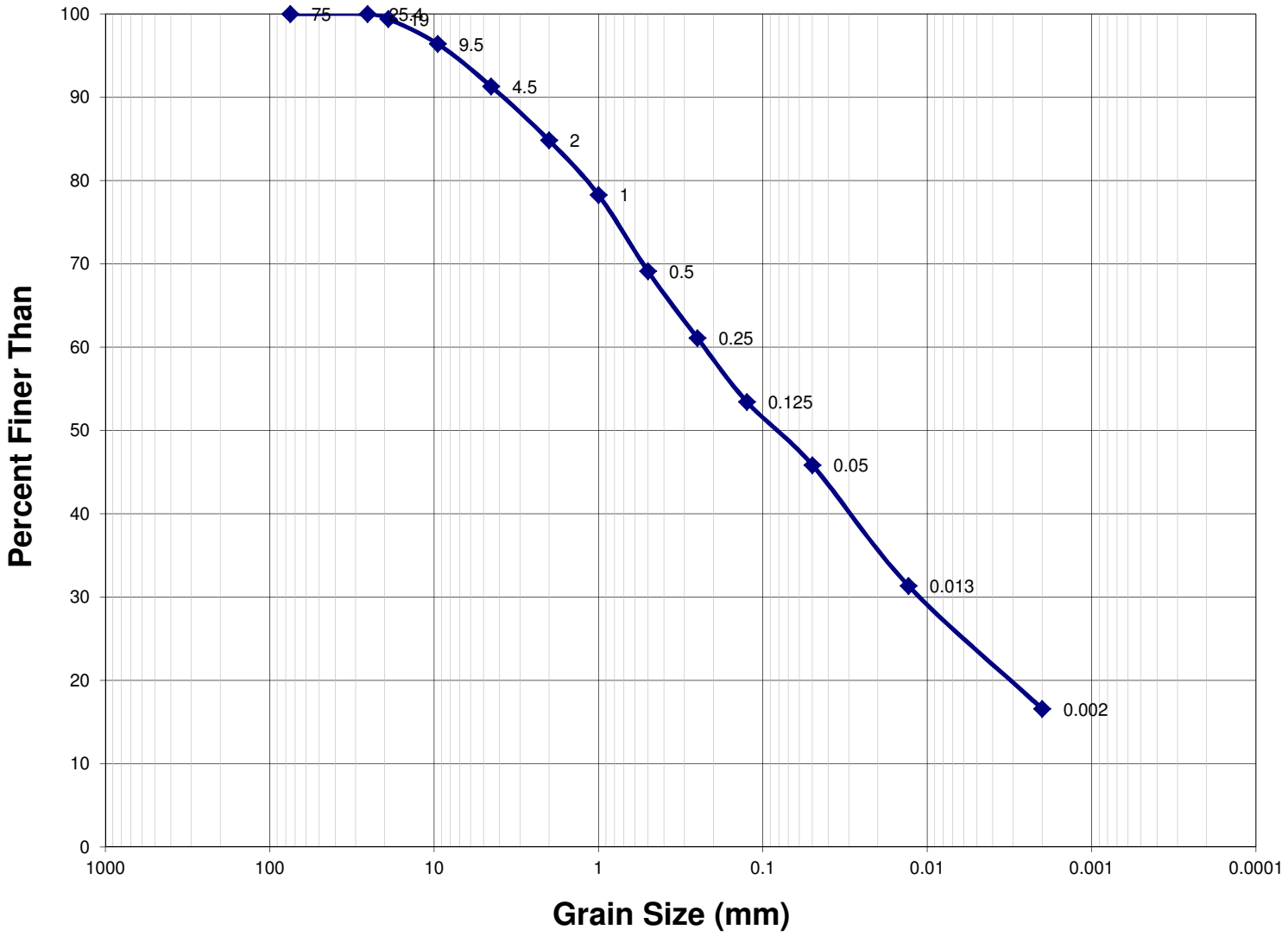
Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH012_SOA
Lab ID: L1339332-1

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	8
Coarse Sand	2.0mm - 4.75mm	7
Medium Sand	0.425mm - 2.0mm	16
Fine Sand	0.075mm - 0.425mm	21
Fines	< 0.075mm	48

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	15
Sand	0.05mm - 2mm	39
Silt	0.002mm - 0.05mm	29
Clay	< 0.002mm	17

Texture Loam

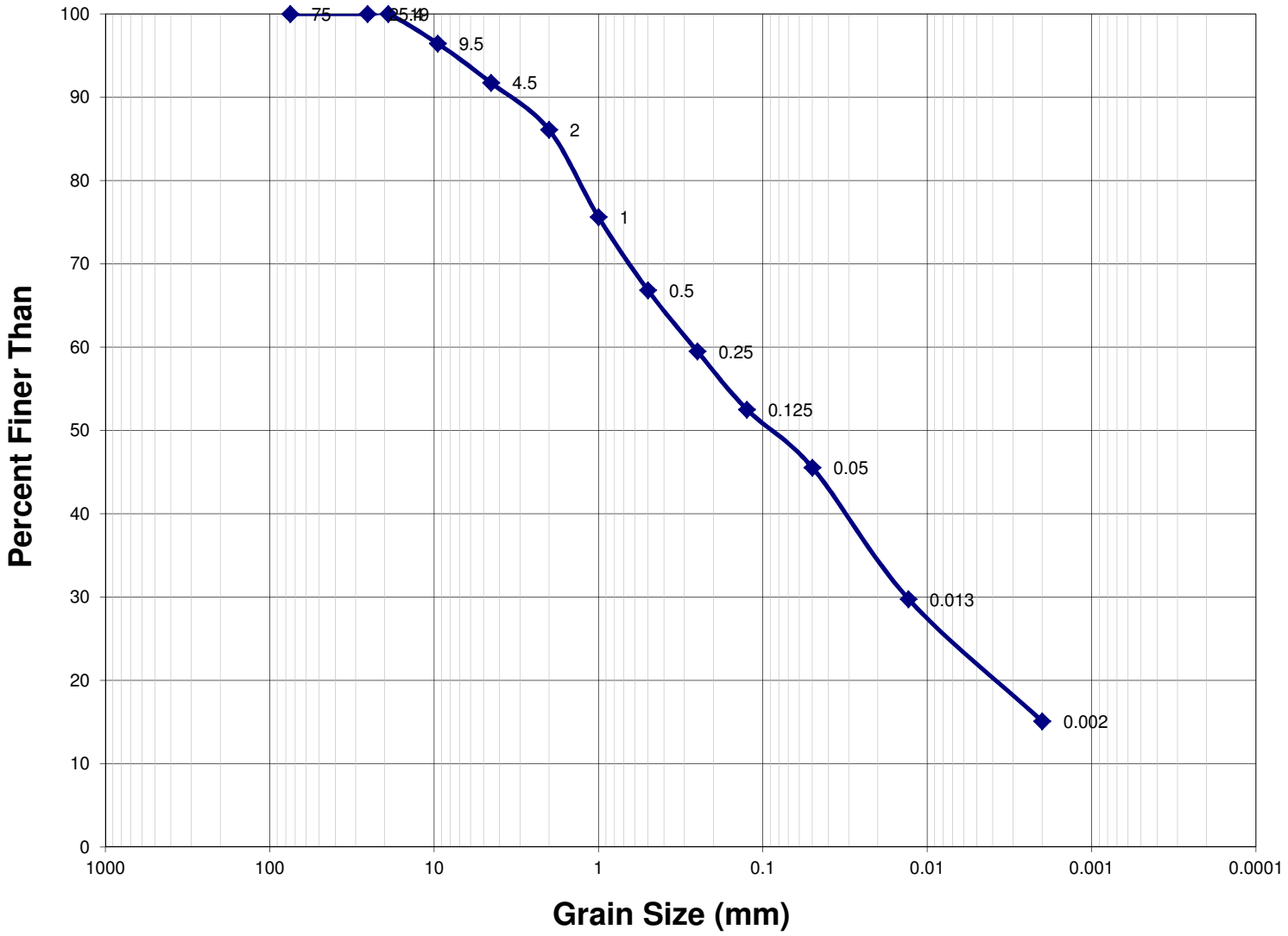
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH012_SOB
Lab ID: L1339332-2

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	8
Coarse Sand	2.0mm - 4.75mm	6
Medium Sand	0.425mm - 2.0mm	19
Fine Sand	0.075mm - 0.425mm	19
Fines	< 0.075mm	48

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	14
Sand	0.05mm - 2mm	41
Silt	0.002mm - 0.05mm	30
Clay	< 0.002mm	15

Texture Loam

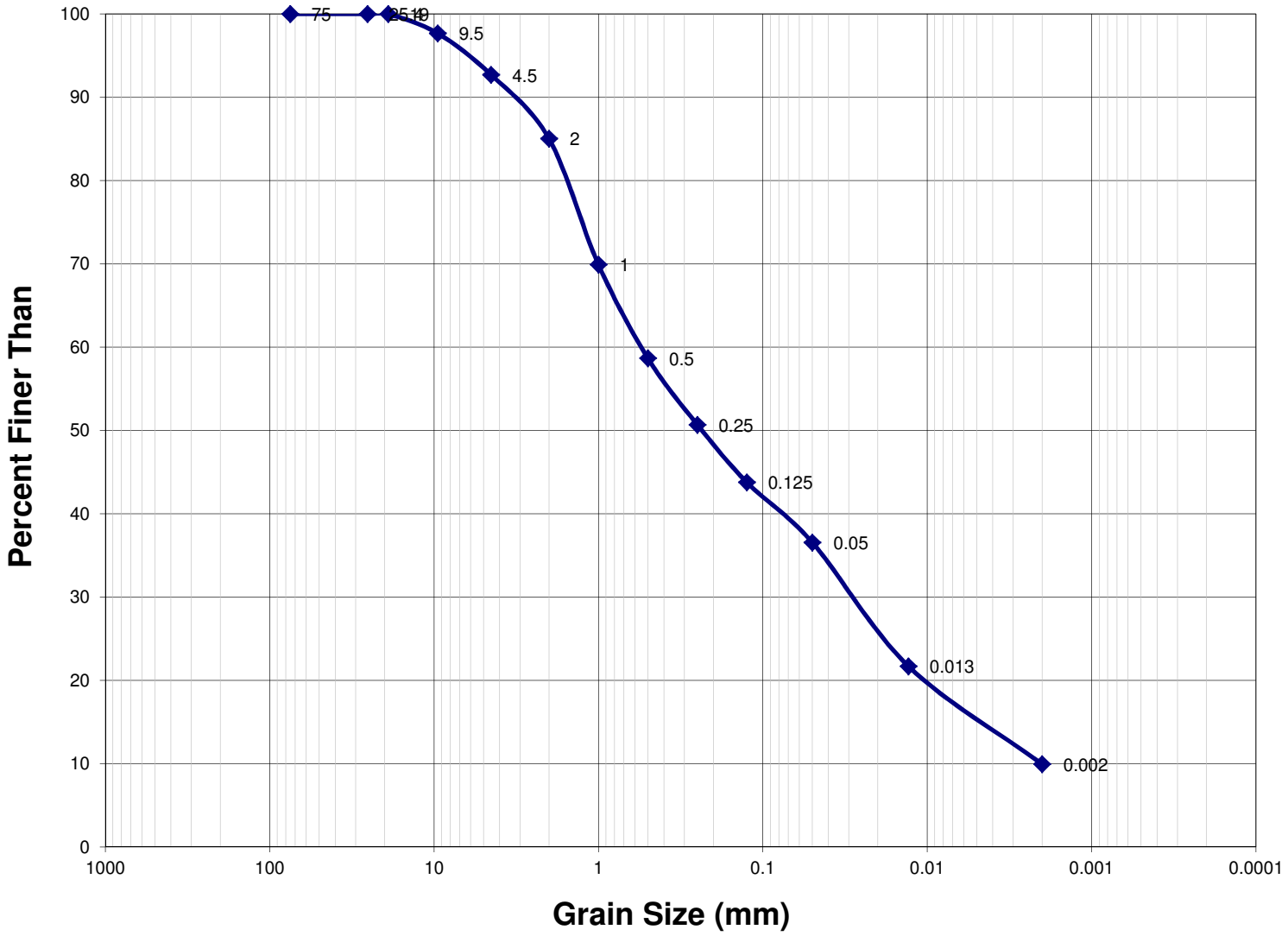
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH012_SOC
Lab ID: L1339332-3

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	7
Coarse Sand	2.0mm - 4.75mm	8
Medium Sand	0.425mm - 2.0mm	26
Fine Sand	0.075mm - 0.425mm	20
Fines	< 0.075mm	39

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	15
Sand	0.05mm - 2mm	48
Silt	0.002mm - 0.05mm	27
Clay	< 0.002mm	10
Texture	Sandy loam	

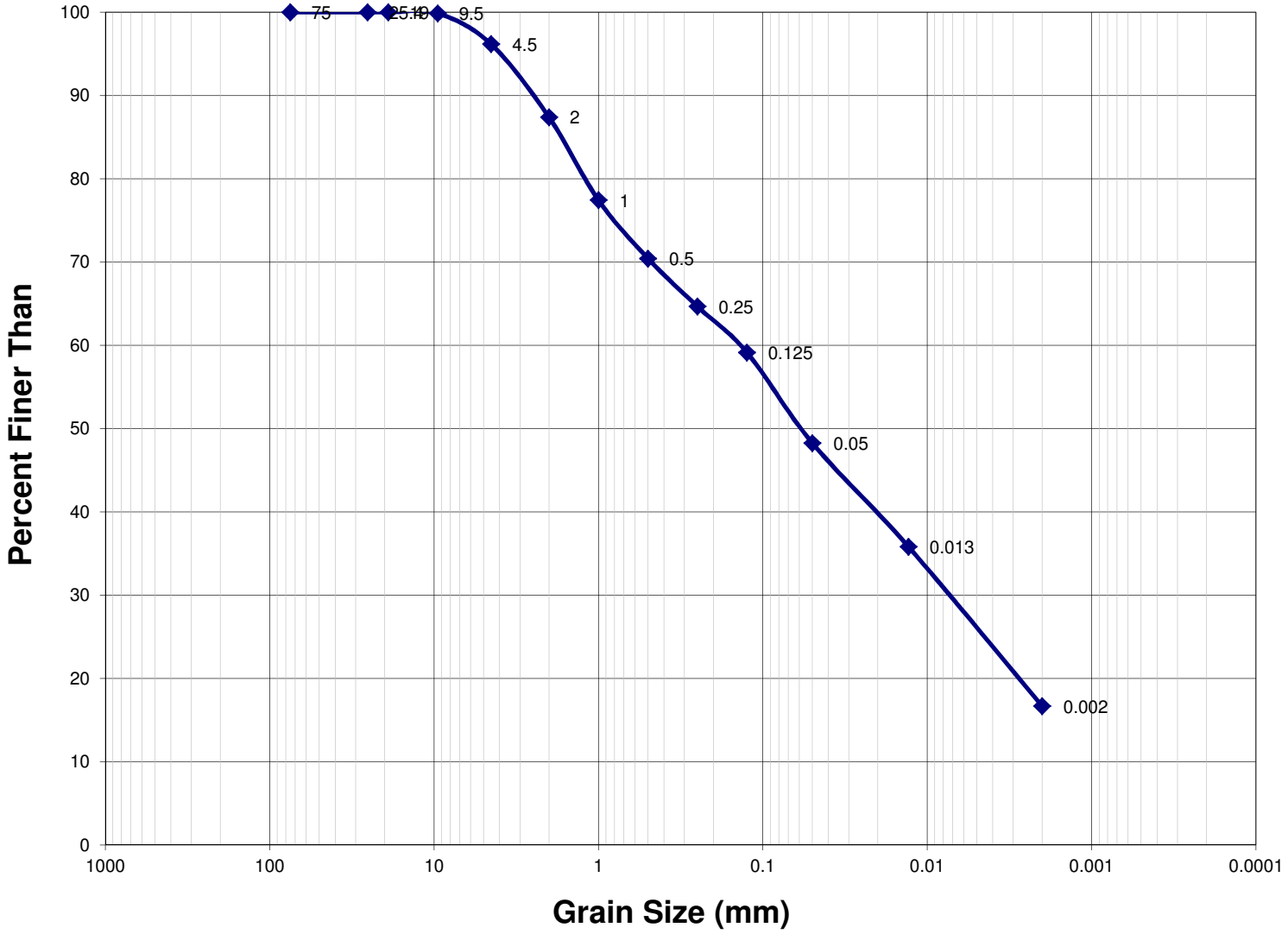
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH012_SOD
Lab ID: L1339332-4

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	4
Coarse Sand	2.0mm - 4.75mm	9
Medium Sand	0.425mm - 2.0mm	17
Fine Sand	0.075mm - 0.425mm	19
Fines	< 0.075mm	52

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	13
Sand	0.05mm - 2mm	39
Silt	0.002mm - 0.05mm	32
Clay	< 0.002mm	17

Texture Loam

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

August 23, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1339332 **Date Received:** August 1, 2013

Certificate of Analysis

Client ID:	Sample Date:	Lab #:		Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $CaCO_3$/1,000t
L1339332- 1	7/24/2013	T1301102- 001		11.22	27
L1339332- 2	7/18/2013	T1301102- 002		10.36	40
L1339332- 3	7/18/2013	T1301102- 003		9.13	7
L1339332- 4	7/18/2013	T1301102- 004		9.97	28

Notes:
Samples were air dried then ground to < 60 mesh.

W. Hyatt
Digitally signed by Wendy Hyatt
Date: 2013.08.23 10:52:33 -07'00'

Wendy Hyatt, Project Chemist

August 23, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1339332 **Date Received:** August 1, 2013

Quality Control

				Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $CaCO_3$/1,000t
Prep Blank				<0.01	< 1
Laboratory Control Sample (LCS) - Rice Flour CN 3451			Observed Value	9.45	n/a
			True Value	9.50	
			%R	**99**	
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	1,000
			True Value		1,000
			%R		**100**
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	973
			True Value		1,000
			%R		**97**
Duplicate Results			*T1301104-001	0.59 **	
			Duplicate	0.57 **	
			%R	**3**	
Duplicate Results				T1301102-001	27
				Duplicate	27
				%RPD	**0**

* Sample from the same batch, but a different project.

**Residual moisture - does not include air dry moisture.

CH2MHILL

CHAIN OF CUSTODY RECORD

7/27/2013 10:02:50 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 3 Days
Shipping Date: 7/28/2013
COC Number: ALS07271301R

	Container:	1 Gallon
	Preservatives:	4°C
	Filtered:	NA
	Holding Time:	180

	DATE	TIME	Matrix	(ISO 15178-2000) Total Sulphur	Number of Containers	COMMENTS
CH13-311-BH012_SOa	7/24/2013	15:00	Soil	X	1	
CH13-311-BH012_SOb	7/24/2013	15:35	Soil	X	1	
CH13-311-BH012_SOc	7/24/2013	16:50	Soil	X	1	
CH13-311-BH012_SOd	7/25/2013	10:45	Soil	X	1	
				TOTAL NUMBER OF CONTAINERS	4	

L1339332

L1339332-COFC

	Date/Time
Approved by	
Sampled by	
Relinquished by	7/28/13 1020
Received by	
Relinquished by	29-Jul-13
Received by	11:00 5.5 C

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/M on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

7/27/2013 9:58:10 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 7/28/2013
COC Number: ALS07271301

	Container:	4oz jar	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon		
	Preservatives:	4'C	4'C	4'C	4'C	4'C	4'C	4'C		
	Filtered:	NA	NA	NA	NA	NA	NA	NA		
	Holding Time:	14	28	14	28	28	NA	NA		
		(ASTM 2216) Moisture	(CSSS/APHA4500H) Paste pH	(EPA200.0/245.7/SW6020A) Total Metals Table 1	(ModifiedSobek) Mod Neutralization Potential	(SSSA (1996) P455-456) TIC	(ASTM 4318) Atterberg limits	(ASTM D422) Gradation		Number of Containers	COMMENTS
	DATE	TIME	Matrix								
CH13-311-BH012_SOa	7/24/2013	15:00	Soil	X	X	X	X	X		X	4	
CH13-311-BH012_SOb	7/24/2013	15:35	Soil	X	X	X	X	X		X	4	
CH13-311-BH012_SOc	7/24/2013	16:50	Soil	X	X	X	X	X		X	4	
CH13-311-BH012_SOd	7/25/2013	10:45	Soil	X	X	X	X	X	X	X	5	
									TOTAL NUMBER OF CONTAINERS		17	

L1339332-COFC

Signatures	Date/Time
Approved by	
Sampled by	
Relinquished by Travis Howard	10/28/13 1820
Received by	
Relinquished by	
Received by	

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:

Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table1 Perform Lab Dup/M on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

7/27/2013 10:00:53 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 7/28/2013
COC Number: ALS07271301H

	Container:	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon		Number of Containers	COMMENTS
	Preservatives:	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C			
	Filtered:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
	Holding Time:	14	14	180	180	14	14	14	14	14	28	14			
		(DI/ASTMD1498) DI ORP	(DI/E245.7) DI Mercury	(DI/E300) DI Sulphate	(DI/EPA600/2-78-054) Acid Soluable Sulfate	(DI/SM2310) DI Acidity	(DI/SM2320) DI Alkalinity	(DI/SM2510) DI Conductivity	(DI/SM4500H) DI pH	(DI/SW6020A) DI Diss Metals	(SSSA (1996) P995-996) TOC	(SW6020A) Ba(i) Metaborate			
DATE / TIME / Matrix															
CH13-311-BH012_SOa	7/24/2013 15:00 Soil	X	X	X	X	X	X	X	X	X	X	X		4	HOLD
CH13-311-BH012_SOb	7/24/2013 15:35 Soil	X	X	X	X	X	X	X	X	X	X	X		4	↓
CH13-311-BH012_SOc	7/24/2013 16:50 Soil	X	X	X	X	X	X	X	X	X	X	X		4	↓
CH13-311-BH012_SOd	7/25/2013 10:45 Soil	X	X	X	X	X	X	X	X	X	X	X		4	↓
													TOTAL NUMBER OF CONTAINERS	16	

L1339332-COFC

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by	Travis Howell	7/25/13 1020
Received by		
Relinquished by		
Received by		

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:

Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table1 Perform Lab Dup/M on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 29-JUL-13
Report Date: 24-OCT-13 11:52 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1339346

Project P.O. #:	472645.06.AD.01.04.13 "PO=604564"
Job Reference:	BSI GRUM OVERBURDEN DUMP 2013 311.5B
C of C Numbers:	ALS07271302
Legal Site Desc:	

Comments:

24-OCT-13: Additional QC data has been included.

Amber Springer
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L1339346-1 Description: Soil Sampled Date: 24-JUL-13 Sampled Time: 15:00 Client ID: CH13-311-BH012_SOA	Sample ID: L1339346-2 Description: Soil Sampled Date: 24-JUL-13 Sampled Time: 15:35 Client ID: CH13-311-BH012_SOB	Sample ID: L1339346-3 Description: Soil Sampled Date: 24-JUL-13 Sampled Time: 16:50 Client ID: CH13-311-BH012_SOC	Sample ID: L1339346-4 Description: Soil Sampled Date: 25-JUL-13 Sampled Time: 10:45 Client ID: CH13-311-BH012_SOD	
SOIL						
Physical Tests	pH (1:2 CaCl2) (pH)	7.80	7.94	7.89	7.88	
Anions and Nutrients	Total Nitrogen by LECO (%)				0.045	
Organic / Inorganic Carbon	CaCO3 Equivalent (%)	1.34	1.95	0.95	2.01	
	Inorganic Carbon (%)	0.16	0.23	0.11	0.24	
	Total Carbon by Combustion (%)	0.4	0.5	0.3	0.5	
	Total Organic Carbon (%)	0.26	0.29	0.18	0.26	
Plant Available Nutrients	Available Ammonium-N (mg/kg)				1.6	
	Calcium (Ca) (meq/100g)	15.4	18.9	8.87	21.0	
	Cation Exchange Capacity (meq/100g)	6.03	6.13	5.59	6.03	
	Copper (Cu) (mg/kg)	2.47	4.96	2.93	4.47	
	Iron (Fe) (mg/kg)	82.1	146	31.6	28.9	
	Magnesium (Mg) (meq/100g)	1.18	1.48	1.43	1.51	
	Manganese (Mn) (mg/kg)	3.77	46.4	30.1	30.5	
	Available Nitrate-N (mg/kg)				<2.0	
	Available Phosphate-P (mg/kg)	7.2	7.2	6.2	4.2	
	Potassium (K) (meq/100g)	<0.50	<0.50	<0.50	<0.50	
	Sodium (Na) (meq/100g)	<0.50	<0.50	<0.50	<0.50	
	Available Sulfate-S (mg/kg)	16.0	96.2	20.4	32.4	
	Zinc (Zn) (mg/kg)	2.19	3.22	2.28	0.81	
Saturated Paste Extractables	SAR (SAR)	0.39	0.91	0.80	0.43	
	Calcium (Ca) (mg/L)	60.9	199	69.1	75.6	
	Chloride (Cl) (mg/L)	6.7	3.3	8.8	27.1	
	Conductivity Sat. Paste (dS m-1)	0.47	1.42	0.66	0.60	
	ESP (%)	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL	
	Magnesium (Mg) (mg/L)	9.9	35.1	18.2	16.6	
	pH in Saturated Paste (pH)	7.86	7.81	7.91	7.97	
	Potassium (K) (mg/L)	8.1	11.1	6.9	6.5	
	% Saturation (%)	40.0	41.0	33.1	47.4	
	Sodium (Na) (mg/L)	12.5	52.8	28.9	15.8	
	Sulfur (as SO4) (mg/L)	166	779	276	291	
Metals	Phosphorus (P) (mg/kg)				708	
Miscellaneous	SMP Buffer pH (pH)	7.56	7.62	7.61	7.59	

* 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)
Internal Reference Material	Calcium (Ca)	DLA	L1339346-1, -2, -3, -4
Internal Reference Material	Magnesium (Mg)	DLA	L1339346-1, -2, -3, -4
Internal Reference Material	Potassium (K)	DLA	L1339346-1, -2, -3, -4
Internal Reference Material	Sodium (Na)	DLA	L1339346-1, -2, -3, -4
Internal Reference Material	Sulfur (as SO4)	DLA	L1339346-1, -2, -3, -4
Internal Reference Material	Calcium (Ca)	DLA	L1339346-1, -2, -3, -4
Internal Reference Material	Magnesium (Mg)	DLA	L1339346-1, -2, -3, -4
Internal Reference Material	Potassium (K)	DLA	L1339346-1, -2, -3, -4
Internal Reference Material	Sodium (Na)	DLA	L1339346-1, -2, -3, -4
Internal Reference Material	Chloride (Cl)	DLA	L1339346-1, -2, -3, -4

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-INORG-ORG-SK	Soil	Inorganic and Organic Carbon	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-LECO-SK	Soil	Total Carbon by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.

CAT-XTR-SK	Soil	Ammonium Acetate Extractable Cations	CSSS 19.4 - 1M NH4OAc Extraction @ pH 7

Exchangeable Ca, Mg, Na, and K are extracted from the soil using neutral 1N ammonium acetate, then determined by ICP-OES. This method does not correct for calcium or magnesium extracted from carbonates or free gypsum.

CEC-SK	Soil	Cation Exchange Capacity (NH4OAC Extn)	CSSS(1978) 3.321/Comm Soil Sci 17(7)

Soil exchange sites are saturated with ammonium, then displaced with sodium. Ammonium in the extract is determined colorimetrically.

CL-SAR-SK	Soil	Chloride (Cl) (Saturated Paste)	CSSS(1993) 18.2.2/APHA 4500-CL E

Chloride in a saturated soil extract is determined colorimetrically by auto-analyzer.

ETL-ESP-SK	Soil	Exchangeable Sodium Percentage - Calc	Calculation
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.

METAL-DTPA-SK	Soil	Available Micronutrients (Cu,Fe,Zn,Mn)	CSSS 1993 (11.3 AND 11.4)

Plant available micronutrients are extracted from soil using 0.005 M DTPA. Cu, Fe, Mn and Zn in the extract are determined by ICP-OES.

N-TOT-LECO-SK	Soil	Total Nitrogen by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.

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.

Reference Information

NO3-AVAIL-KCL-SK	Soil	Available Nitrate-N (2N KCl)	CSSS (1993) 4.2, 4.3

Available Nitrate and Nitrite are extracted from the soil using a 2N KCl 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) methods 4.2, 4.3

PH-1:2CACL2-SK	Soil	pH (1:2 Soil:CaCl2 Extraction)	CSSC 3.11

1 part dry soil and 2 parts de-ionized 0.01M CaCl2 (by volume) is mixed. The slurry is allowed to stand with occasional stirring for 30 - 60 minutes. pH of the soil slurry is then measured using a pH meter.

PH-BUFFER-SMP-SK	Soil	Buffer pH (SMP)	CSSS (1993) method 14.2

After equilibration with SMP buffer solution, pH of the soil solution is measured with a pH meter. Lime requirement must be determined by the client using location-specific regression equations.

PO4-AVAIL-OLSEN-SK	Soil	Available Phosphate-P by Olsen	CSSS (1993) 7.2,7.3.1

Plant available phosphorus is extracted from the sample with sodium bicarbonate. PO4-P in the filtered extract is determined colorimetrically at 880 nm.

SAR-CALC-SK	Soil	SAR and Cations in saturated soil	CSSS 18.4-Calculation
SAR-CALC-SO4-SK	Soil	SAR, Cations and SO4 in saturated soil	APHA 3120B

Ca, Mg, Na, K and SO4 in a saturated soil extract are determined by ICP-OES.

SAT/PH/EC-SK	Soil	pH and EC (Saturated Paste)	CSSS 18.2.2/CSSC 3.14/CSSS 18.3.1

pH of a saturated soil paste is measured using a pH meter. After equilibration, an extract is obtained by vacuum filtration with conductivity of the extract measured by a conductivity meter.

SO4-AVAIL-CALPHOS-SK	Soil	Plant Available Sulfate - Ca(H2PO4)2	NCR (1998) p. 36/APHA 3120B

Plant available sulfate is extracted from the sample using dilute calcium phosphate. SO4-S in the filtered extract is determined by ICP-OES.

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

Chain of Custody Numbers:

ALS07271302

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-INORG-ORG-SK	**Soil**							
Batch R2665014								
WG1719172-1 DUP		**L1339346-1**						
Inorganic Carbon		0.16	0.15		%	3.6	20	03-AUG-13
CaCO3 Equivalent		1.34	1.29		%	3.6	25	03-AUG-13
WG1719172-2 IRM		**0.1%IC**						
Inorganic Carbon			130.9		%		60-140	03-AUG-13
CaCO3 Equivalent			131.4		%		60-140	03-AUG-13
WG1719172-3 IRM		**0.4%IC**						
Inorganic Carbon			94.1		%		80-120	03-AUG-13
CaCO3 Equivalent			94.2		%		80-120	03-AUG-13
WG1719172-4 MB								
Inorganic Carbon			<0.10		%		0.1	03-AUG-13
CaCO3 Equivalent			<0.80		%		0.8	03-AUG-13
C-TOT-LECO-SK	**Soil**							
Batch R2664678								
WG1719013-7 IRM		**08-109_SOIL**						
Total Carbon by Combustion			99.5		%		80-120	02-AUG-13
WG1719013-3 MB								
Total Carbon by Combustion			<0.1		%		0.1	02-AUG-13
CAT-XTR-SK	**Soil**							
Batch R2668960								
WG1719187-3 IRM		**SAL814**						
Sodium (Na)			92.1		%		70-130	09-AUG-13
Potassium (K)			102.9		%		70-130	09-AUG-13
Calcium (Ca)			105.0		%		70-130	09-AUG-13
Magnesium (Mg)			94.9		%		70-130	09-AUG-13
WG1719187-2 MB								
Sodium (Na)			<0.50		meq/100g		0.5	09-AUG-13
Potassium (K)			<0.50		meq/100g		0.5	09-AUG-13
Calcium (Ca)			<0.50		meq/100g		0.5	09-AUG-13
Magnesium (Mg)			<0.50		meq/100g		0.5	09-AUG-13
CEC-SK	**Soil**							
Batch R2669214								
WG1719189-3 IRM		**SAL814**						
Cation Exchange Capacity			79.8		%		70-130	09-AUG-13
WG1719189-2 MB								
Cation Exchange Capacity			<0.80		meq/100g		0.8	09-AUG-13
CL-SAR-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-SAR-SK	**Soil**							
Batch R2667910								
WG1719144-3 IRM		**ED-SAL_NAT1**						
Chloride (Cl)			95.4		%		70-130	07-AUG-13
WG1719144-2 MB								
Chloride (Cl)			<2.0		mg/L		2	07-AUG-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2672374								
WG1723968-3 CRM		**VA-CANMET-TILL1**						
Phosphorus (P)			101.5		%		70-130	13-AUG-13
WG1723968-1 MB								
Phosphorus (P)			<50		mg/kg		50	13-AUG-13
METAL-DTPA-SK	**Soil**							
Batch R2667700								
WG1719150-3 IRM		**11-119**						
Copper (Cu)			98.2		%		70-130	07-AUG-13
Iron (Fe)			105.0		%		70-130	07-AUG-13
Manganese (Mn)			95.7		%		70-130	07-AUG-13
Zinc (Zn)			98.9		%		70-130	07-AUG-13
WG1719150-2 MB								
Copper (Cu)			<0.10		mg/kg		0.1	07-AUG-13
Iron (Fe)			<2.0		mg/kg		2	07-AUG-13
Manganese (Mn)			<0.050		mg/kg		0.05	07-AUG-13
Zinc (Zn)			<0.20		mg/kg		0.2	07-AUG-13
N-TOT-LECO-SK	**Soil**							
Batch R2664678								
WG1719013-10 IRM		**08-109_SOIL**						
Total Nitrogen by LECO			0.108		%		0.085-0.135	02-AUG-13
WG1719013-3 MB								
Total Nitrogen by LECO			<0.020		%		0.02	02-AUG-13
NH4-AVAIL-SK	**Soil**							
Batch R2664685								
WG1719147-3 IRM		**SAL814**						
Available Ammonium-N			115.0		%		70-130	02-AUG-13
WG1719147-2 MB								
Available Ammonium-N			<1.0		mg/kg		1	02-AUG-13
NO3-AVAIL-KCL-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-AVAIL-KCL-SK	**Soil**							
Batch R2664759								
WG1719149-3 IRM		**SAL814**						
Available Nitrate-N			90.5		%		70-130	02-AUG-13
WG1719149-2 MB								
Available Nitrate-N			<2.0		mg/kg		2	02-AUG-13
PH-1:2CACL2-SK	**Soil**							
Batch R2664549								
WG1719151-1 DUP		**L1339346-3**						
pH (1:2 CaCl2)		7.89	7.86	J	pH	0.03	0.3	02-AUG-13
WG1719151-3 IRM		**SAL814**						
pH (1:2 CaCl2)			7.91		pH		7.55-8.15	02-AUG-13
PH-BUFFER-SMP-SK	**Soil**							
Batch R2664719								
WG1719190-1 DUP		**L1339346-3**						
SMP Buffer pH		7.61	7.63	J	pH	0.02	0.2	02-AUG-13
WG1719190-3 IRM		**SAL814**						
SMP Buffer pH			7.60		pH		7.44-7.64	02-AUG-13
PO4-AVAIL-OLSEN-SK	**Soil**							
Batch R2668683								
WG1719156-1 DUP		**L1339346-2**						
Available Phosphate-P		7.2	7.6		mg/kg	5.4	30	08-AUG-13
WG1719156-3 IRM		**FARM2005**						
Available Phosphate-P			91.4		%		70-130	08-AUG-13
WG1719156-2 MB								
Available Phosphate-P			<1.0		mg/kg		1	08-AUG-13
SAR-CALC-SK	**Soil**							
Batch R2667683								
WG1719144-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			101.9		%		70-130	07-AUG-13
Potassium (K)			91.5		%		70-130	07-AUG-13
Magnesium (Mg)			103.9		%		70-130	07-AUG-13
Sodium (Na)			94.9		%		70-130	07-AUG-13
WG1719144-2 MB								
Calcium (Ca)			<2.0		mg/L		2	07-AUG-13
Potassium (K)			<1.0		mg/L		1	07-AUG-13
Magnesium (Mg)			<2.0		mg/L		2	07-AUG-13
Sodium (Na)			<4.0		mg/L		4	07-AUG-13
SAR-CALC-SO4-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAR-CALC-SO4-SK	**Soil**							
Batch R2667683								
WG1719144-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			101.9		%		70-130	07-AUG-13
Potassium (K)			91.5		%		70-130	07-AUG-13
Magnesium (Mg)			103.9		%		70-130	07-AUG-13
Sodium (Na)			94.9		%		70-130	07-AUG-13
Sulfur (as SO4)			112.2		%		70-130	07-AUG-13
WG1719144-2 MB								
Calcium (Ca)			<2.0		mg/L		2	07-AUG-13
Potassium (K)			<1.0		mg/L		1	07-AUG-13
Magnesium (Mg)			<2.0		mg/L		2	07-AUG-13
Sodium (Na)			<4.0		mg/L		4	07-AUG-13
Sulfur (as SO4)			<5.0		mg/L		5	07-AUG-13
SAT/PH/EC-SK	**Soil**							
Batch R2667350								
WG1719144-3 IRM		**ED-SAL_NAT1**						
% Saturation			41.7		%		38-48	07-AUG-13
pH in Saturated Paste			6.80		pH		6.5-7.1	07-AUG-13
Conductivity Sat. Paste			99.8		%		80-120	07-AUG-13
WG1719144-2 MB								
Conductivity Sat. Paste			<0.10		dS m-1		0.1	07-AUG-13
SO4-AVAIL-CALPHOS-SK	**Soil**							
Batch R2667425								
WG1719153-1 DUP		**L1339346-3**						
Available Sulfate-S		20.4	18.2		mg/kg	11	40	06-AUG-13
WG1719153-3 IRM		**10-114_SOIL**						
Available Sulfate-S			100.9		%		60-140	06-AUG-13
WG1719153-2 MB								
Available Sulfate-S			<3.0		mg/kg		3	06-AUG-13

Quality Control Report

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.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

7/27/2013 10:04:33 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 7/28/2013
COC Number: ALS07271302

	DATE	TIME	Matrix	(CSSS (2008) 11.3 and 11.4) Ext Micro Nut (ZnFeCuMn)	(CSSS (2008) 12.2) SMP Buffer pH (for pH<6.0)	(CSSS (2008) 15.2.1 or 14.4.4) Sodium Adsorption Ratio	(CSSS (2008) 15.2.1) ECe (sat paste)	(CSSS (2008) 15.3) Soluable Salts	(CSSS (2008) 18.4) 1N, pH7 NH4OAc ext CaMgKNa	(CSSS (2008) 18.4_CEC) Cation Exchange Capacity	(CSSS (2008) 20.3) CaCO3 equivalent	(CSSS (2008) 6.2) Nh4-N and NO3-N (2N KCL)	(CSSS (2008) 7.2 and 7.3.1 if pH>7.2) Available P (pH>7.2)	(CSSS (2008)) pH (1:2 CaCL2) CP17	(EPA200.2/SW6020A) Total P	(S-11.10 in Gavlak et al. (2005)) Ca(H2PO4)2.H2O ext SO4-S	(SSSA (1996) p894-895 if pH<7.2) Available P (pH<7.2)	(SSSA (1996) P973-974) Total N	Number of Containers	COMMENTS
Container:				1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	
Preservatives:				4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	
Filtered:				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Holding Time:				180	28	28	28	28	180	180	28	28	180	180	28	180	180	28		
CH13-311-BH012_SOa	7/24/2013	15:00	Soil	X	X	X	X	X	X		X		X	X		X	X		2	
CH13-311-BH012_SOb	7/24/2013	15:35	Soil	X	X	X	X	X	X		X		X	X		X	X		2	
CH13-311-BH012_SOc	7/24/2013	16:50	Soil	X	X	X	X	X	X		X		X	X		X	X		2	
CH13-311-BH012_SOd	7/25/2013	10:45	Soil	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3	
															TOTAL NUMBER OF CONTAINERS				9	

L1339346



L1339346-COFC

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by	Travis Howard	7/28/13 1630
Received by		11:00 29-Jul-13
Relinquished by		
Received by		

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/M on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 01-AUG-13
Report Date: 24-OCT-13 12:20 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1341898

Project P.O. #: 472645.06.AD.01.04.13 PO = 604564
Job Reference: BSI NE AREA OF GRUM PIT 2013 311.5C
C of C Numbers:
Legal Site Desc:

Comments:

24-OCT-13: Additional QC data has been included.

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1341898-1	L1341898-2	L1341898-3	L1341898-4	L1341898-5
Sample ID		L1341898-1	L1341898-2	L1341898-3	L1341898-4	L1341898-5
Description		soil	soil	soil	soil	soil
Sampled Date		15-JUL-13	15-JUL-13	15-JUL-13	15-JUL-13	15-JUL-13
Sampled Time		11:00	12:05	12:15	12:59	13:30
Client ID		CH13-311-SS027_SOA	CH13-311-SS029_SOA	CH13-311-SS032_SOA	CH13-311-SS033_SOA	CH13-311-SS036_SOA
SOIL						
Physical Tests	Moisture (%)		10.1	7.97	5.19	12.2
Leachable Anions & Nutrients	Acidity (as CaCO3) (mg/L)		8.7	3.8	2.9	2.5
	Alkalinity, Total (as CaCO3) (mg/L)		60.0	53.5	45.1	66.8
	Conductivity (uS/cm)		489	422	352	298
	pH (pH)		8.03	8.21	8.21	8.17
	Oxidation-Reduction Potential (ORP) (mV)		386	395	380	395
	Sulfate (SO4) (mg/L)		192	146	122	80.8
Organic / Inorganic Carbon	Organic Carbon (%)		0.40	<0.40	<0.40	<0.40
	Organic Matter (%)		0.70	<0.70	<0.70	<0.70
Total Metals	Barium by borate-fusion (ppm)	1135	1100	959	548	1090
Leachable Metals	Aluminum (Al)-Leachable (mg/L)		0.0237	0.0335	0.0504	0.0165
	Antimony (Sb)-Leachable (mg/L)		0.00235	0.00237	0.00120	0.00253
	Arsenic (As)-Leachable (mg/L)		0.0011	0.0027	0.0021	0.0012
	Barium (Ba)-Leachable (mg/L)		0.0690	0.0704	0.0761	0.120
	Beryllium (Be)-Leachable (mg/L)		<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Leachable (mg/L)		0.017	0.017	0.011	0.021
	Cadmium (Cd)-Leachable (mg/L)		0.000122	<0.000050	<0.000050	<0.000050
	Calcium (Ca)-Leachable (mg/L)		71.8	63.1	50.9	42.7
	Chromium (Cr)-Leachable (mg/L)		<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)-Leachable (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Leachable (mg/L)		0.0132	0.0013	0.0010	0.0013
	Iron (Fe)-Leachable (mg/L)		<0.030	<0.030	<0.030	<0.030
	Lead (Pb)-Leachable (mg/L)		0.00023	<0.00010	<0.00010	<0.00010
	Lithium (Li)-Leachable (mg/L)		<0.0050	<0.0050	<0.0050	0.0062
	Magnesium (Mg)-Leachable (mg/L)		11.0	9.36	6.85	7.50
	Manganese (Mn)-Leachable (mg/L)		0.0355	0.00864	0.0170	0.00487
	Mercury (Hg)-Leachable (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050
	Molybdenum (Mo)-Leachable (mg/L)		0.0405	0.0179	0.00698	0.0214
	Nickel (Ni)-Leachable (mg/L)		0.00086	0.00096	0.00056	0.00072
	Potassium (K)-Leachable (mg/L)		9.9	7.9	10.2	6.9
	Selenium (Se)-Leachable (mg/L)		0.00131	0.00160	0.00434	0.00261
	Silicon (Si)-Leachable (mg/L)		2.62	3.72	4.26	2.98
	Silver (Ag)-Leachable (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050
	Sodium (Na)-Leachable (mg/L)		9.9	5.7	4.5	3.6
	Strontium (Sr)-Leachable (mg/L)		0.304	0.257	0.248	0.230
	Sulfur (S)-Leachable (mg/L)		62.0	51.2	40.1	25.6

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1341898-6				
		Description	soil				
		Sampled Date	15-JUL-13				
		Sampled Time	13:45				
		Client ID	CH13-311-SS037_SOA				
Grouping	**Analyte**						
SOIL							
Physical Tests	Moisture (%)		9.33				
Leachable Anions & Nutrients	Acidity (as CaCO3) (mg/L)		2.3				
	Alkalinity, Total (as CaCO3) (mg/L)		59.4				
	Conductivity (uS/cm)		263				
	pH (pH)		8.27				
	Oxidation-Reduction Potential (ORP) (mV)		394				
	Sulfate (SO4) (mg/L)		69.0				
Organic / Inorganic Carbon	Organic Carbon (%)		<0.40				
	Organic Matter (%)		<0.70				
Total Metals	Barium by borate-fusion (ppm)		1200				
Leachable Metals	Aluminum (Al)-Leachable (mg/L)		0.0268				
	Antimony (Sb)-Leachable (mg/L)		0.00299				
	Arsenic (As)-Leachable (mg/L)		0.0017				
	Barium (Ba)-Leachable (mg/L)		0.105				
	Beryllium (Be)-Leachable (mg/L)		<0.00050				
	Boron (B)-Leachable (mg/L)		0.015				
	Cadmium (Cd)-Leachable (mg/L)		0.000061				
	Calcium (Ca)-Leachable (mg/L)		38.4				
	Chromium (Cr)-Leachable (mg/L)		<0.00050				
	Cobalt (Co)-Leachable (mg/L)		<0.00010				
	Copper (Cu)-Leachable (mg/L)		0.0016				
	Iron (Fe)-Leachable (mg/L)		<0.030				
	Lead (Pb)-Leachable (mg/L)		<0.00010				
	Lithium (Li)-Leachable (mg/L)		<0.0050				
	Magnesium (Mg)-Leachable (mg/L)		5.26				
	Manganese (Mn)-Leachable (mg/L)		0.00150				
	Mercury (Hg)-Leachable (mg/L)		<0.000050				
	Molybdenum (Mo)-Leachable (mg/L)		0.0659				
	Nickel (Ni)-Leachable (mg/L)		<0.00050				
	Potassium (K)-Leachable (mg/L)		5.2				
	Selenium (Se)-Leachable (mg/L)		0.00371				
	Silicon (Si)-Leachable (mg/L)		2.54				
	Silver (Ag)-Leachable (mg/L)		<0.000050				
	Sodium (Na)-Leachable (mg/L)		5.1				
	Strontium (Sr)-Leachable (mg/L)		0.229				
	Sulfur (S)-Leachable (mg/L)		22.6				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1341898-1	L1341898-2	L1341898-3	L1341898-4	L1341898-5
	Description	soil	soil	soil	soil	soil
	Sampled Date	15-JUL-13	15-JUL-13	15-JUL-13	15-JUL-13	15-JUL-13
	Sampled Time	11:00	12:05	12:15	12:59	13:30
	Client ID	CH13-311-SS027_SOA	CH13-311-SS029_SOA	CH13-311-SS032_SOA	CH13-311-SS033_SOA	CH13-311-SS036_SOA
Grouping	**Analyte**					
SOIL						
Leachable Metals	Thallium (Tl)-Leachable (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Leachable (mg/L)		<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Leachable (mg/L)		0.00839	0.0105	0.00353	0.00951
	Vanadium (V)-Leachable (mg/L)		<0.0010	0.0017	0.0017	<0.0010
	Zinc (Zn)-Leachable (mg/L)		<0.010	<0.010	<0.010	<0.010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1341898-6				
	Description	soil				
	Sampled Date	15-JUL-13				
	Sampled Time	13:45				
	Client ID	CH13-311-SS037_SOA				
Grouping	**Analyte**					
SOIL						
Leachable Metals	Thallium (Tl)-Leachable (mg/L)	<0.00010				
	Titanium (Ti)-Leachable (mg/L)	<0.010				
	Uranium (U)-Leachable (mg/L)	0.00669				
	Vanadium (V)-Leachable (mg/L)	0.0012				
	Zinc (Zn)-Leachable (mg/L)	<0.010				

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Leachable	MS-B	L1341898-2, -3, -4, -5, -6
Matrix Spike	Magnesium (Mg)-Leachable	MS-B	L1341898-2, -3, -4, -5, -6
Matrix Spike	Silicon (Si)-Leachable	MS-B	L1341898-2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Leachable	MS-B	L1341898-2, -3, -4, -5, -6

Qualifiers for Individual Parameters Listed:

Qualifier	Description
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**
ACY-SHKFL96-PCT-VA	Soil	Acidity by PCT (96 hour SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES

"This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines, (Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures adapted from APHA Method 2310 "Acidity".

ALK-SHKFL96-PCT-VA	Soil	Alkalinity by PCT (96 hour SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES

"This analysis is based upon the extraction procedure outlined in ""Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia"" BC Ministry of Energy and Mines, (Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures adapted from APHA Method 2320 "Alkalinity"

C-TOT-ORG-WB-SK	Soil	Total Organic Carbon - Walkley Black	CSSS (1993) method 21.2

The soil sample is treated with excess potassium dichromate and sulfuric acid to oxidize organic carbon. Oxidized organic carbon is determined by back-titration with ferrous ammonium sulfate. Organic matter is estimated from the organic carbon result using the Van Bemmelon factor.

EC-SHKFL96-PCT-VA	Soil	EC by PCT (96 hour SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES

"This analysis is based upon the extraction procedure outlined in ""Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines, (Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures adapted from APHA Method 2510 "Conductivity".

HG-SHKFL96-CVAFS-VA	Soil	Mercury by CVAFS (96 hour SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines,
(Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

ME-MS81-AX	Soil		ME-MS81
MET-SHKFL96-CCMS-VA	Soil	Metals by CCMS (SHAKEFLASK - 96hours)	BC MINISTRY OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines,
(Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using inductively coupled plasma - mass spectrophotometry (EPA Method 6020A).

MET-SHKFL96-ICP-VA	Soil	Metals by ICPOES (SHAKEFLASK - 96Hours)	BC MINISTRY OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines,
(Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane 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.

ORP-SHKFL96-VA	Soil	ORP by Electrode (96 hour SHAKEFLASK)	BC MIN. OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines, (Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures carried out in accordance "ASTM" method D1498-00 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM), May 2000. Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

PH-SHKFL96-MAN-VA	Soil	pH by Manual Meter (96 HOUR SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES

Reference Information

This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines, (Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently analysed using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode.

SO4-SHKFL96-TURB-VA Soil SO4 by Turbidimetric(96 hour SHAKEFLASK) BC MINISTRY OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines, (Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures adapted from APHA Method 4500-SO4 "Sulfate". Sulfate is determined using the turbidimetric method."

** 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
AX	ALS MINERALS - VANCOUVER, B.C., 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.

Quality Control Report

Client: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-SHKFL96-PCT-VA	**Soil**							
Batch R2673799								
WG1724348-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	16-AUG-13
WG1727870-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	16-AUG-13
C-TOT-ORG-WB-SK	**Soil**							
Batch R2670101								
WG1723473-1 DUP		**L1341898-2**						
Organic Carbon		0.40	0.40		%	0.0	30	10-AUG-13
Organic Matter		0.70	0.71		%	1.7	20	10-AUG-13
WG1723473-3 IRM		**FARM2009**						
Organic Carbon			103.4		%		80-120	10-AUG-13
Organic Matter			105.2		%		80-120	10-AUG-13
WG1723473-2 MB								
Organic Carbon			<0.40		%		0.4	10-AUG-13
Organic Matter			<0.70		%		0.7	10-AUG-13
EC-SHKFL96-PCT-VA	**Soil**							
Batch R2673799								
WG1724348-1 MB								
Conductivity			<2.0		uS/cm		2	16-AUG-13
WG1727870-1 MB								
Conductivity			<2.0		uS/cm		2	16-AUG-13
HG-SHKFL96-CVAFS-VA	**Soil**							
Batch R2673889								
WG1724348-1 MB								
Mercury (Hg)-Leachable			<0.000050		mg/L		0.00005	16-AUG-13
WG1728348-1 MB								
Mercury (Hg)-Leachable			<0.000050		mg/L		0.00005	16-AUG-13
WG1724348-3 MS		**L1341898-4**						
Mercury (Hg)-Leachable			98.5		%		70-130	16-AUG-13
MET-SHKFL96-CCMS-VA	**Soil**							
Batch R2675059								
WG1724348-1 MB								
Aluminum (Al)-Leachable			<0.0050		mg/L		0.005	18-AUG-13
Antimony (Sb)-Leachable			<0.00010		mg/L		0.0001	18-AUG-13
Arsenic (As)-Leachable			<0.0010		mg/L		0.001	18-AUG-13
Barium (Ba)-Leachable			<0.0010		mg/L		0.001	18-AUG-13
Beryllium (Be)-Leachable			<0.00050		mg/L		0.0005	18-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-SHKFL96-CCMS-VA	**Soil**							
Batch R2675059								
WG1724348-1 MB								
Boron (B)-Leachable			<0.010		mg/L		0.01	18-AUG-13
Cadmium (Cd)-Leachable			<0.000050		mg/L		0.00005	18-AUG-13
Chromium (Cr)-Leachable			<0.00050		mg/L		0.0005	18-AUG-13
Cobalt (Co)-Leachable			<0.00010		mg/L		0.0001	18-AUG-13
Copper (Cu)-Leachable			<0.0010		mg/L		0.001	18-AUG-13
Lead (Pb)-Leachable			<0.00010		mg/L		0.0001	18-AUG-13
Lithium (Li)-Leachable			<0.0050		mg/L		0.005	18-AUG-13
Manganese (Mn)-Leachable			<0.00050		mg/L		0.0005	18-AUG-13
Molybdenum (Mo)-Leachable			<0.00010		mg/L		0.0001	18-AUG-13
Nickel (Ni)-Leachable			<0.00050		mg/L		0.0005	18-AUG-13
Selenium (Se)-Leachable			<0.00050		mg/L		0.0005	18-AUG-13
Silver (Ag)-Leachable			<0.000050		mg/L		0.00005	18-AUG-13
Strontium (Sr)-Leachable			<0.00050		mg/L		0.0005	18-AUG-13
Thallium (Tl)-Leachable			<0.00010		mg/L		0.0001	18-AUG-13
Uranium (U)-Leachable			<0.000010		mg/L		0.00001	18-AUG-13
Vanadium (V)-Leachable			<0.0010		mg/L		0.001	18-AUG-13
Zinc (Zn)-Leachable			<0.010		mg/L		0.01	18-AUG-13
Batch R2675866								
WG1724348-3 MS		**L1341898-4**						
Aluminum (Al)-Leachable			91.2		%		70-130	19-AUG-13
Antimony (Sb)-Leachable			99.4		%		70-130	19-AUG-13
Arsenic (As)-Leachable			99.9		%		70-130	19-AUG-13
Barium (Ba)-Leachable			105.4		%		70-130	19-AUG-13
Beryllium (Be)-Leachable			95.7		%		70-130	19-AUG-13
Boron (B)-Leachable			85.0		%		70-130	19-AUG-13
Cadmium (Cd)-Leachable			99.8		%		70-130	19-AUG-13
Chromium (Cr)-Leachable			97.6		%		70-130	19-AUG-13
Cobalt (Co)-Leachable			97.6		%		70-130	19-AUG-13
Copper (Cu)-Leachable			91.2		%		70-130	19-AUG-13
Lead (Pb)-Leachable			95.2		%		70-130	19-AUG-13
Lithium (Li)-Leachable			87.6		%		70-130	19-AUG-13
Manganese (Mn)-Leachable			97.3		%		70-130	19-AUG-13
Molybdenum (Mo)-Leachable			93.3		%		70-130	19-AUG-13
Nickel (Ni)-Leachable			92.9		%		70-130	19-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-SHKFL96-CCMS-VA	**Soil**							
Batch **R2675866**								
WG1724348-3 **MS**		**L1341898-4**						
Selenium (Se)-Leachable			96.0		%		70-130	19-AUG-13
Silver (Ag)-Leachable			96.6		%		70-130	19-AUG-13
Strontium (Sr)-Leachable			N/A	MS-B	%		-	19-AUG-13
Thallium (Tl)-Leachable			96.3		%		70-130	19-AUG-13
Vanadium (V)-Leachable			96.3		%		70-130	19-AUG-13
Zinc (Zn)-Leachable			100.4		%		70-130	19-AUG-13
MET-SHKFL96-ICP-VA	**Soil**							
Batch **R2673699**								
WG1724348-1 **MB**								
Calcium (Ca)-Leachable			<0.050		mg/L		0.05	15-AUG-13
Iron (Fe)-Leachable			<0.030		mg/L		0.03	15-AUG-13
Magnesium (Mg)-Leachable			<0.10		mg/L		0.1	15-AUG-13
Potassium (K)-Leachable			<2.0		mg/L		2	15-AUG-13
Silicon (Si)-Leachable			<0.050		mg/L		0.05	15-AUG-13
Sodium (Na)-Leachable			<2.0		mg/L		2	15-AUG-13
Sulfur (S)-Leachable			<0.50		mg/L		0.5	15-AUG-13
Titanium (Ti)-Leachable			<0.010		mg/L		0.01	15-AUG-13
WG1724348-3 **MS**		**L1341898-4**						
Calcium (Ca)-Leachable			N/A	MS-B	%		-	15-AUG-13
Iron (Fe)-Leachable			105.2		%		70-130	15-AUG-13
Magnesium (Mg)-Leachable			N/A	MS-B	%		-	15-AUG-13
Potassium (K)-Leachable			104.4		%		70-130	15-AUG-13
Silicon (Si)-Leachable			N/A	MS-B	%		-	15-AUG-13
Sodium (Na)-Leachable			101.4		%		70-130	15-AUG-13
Titanium (Ti)-Leachable			102.6		%		70-130	15-AUG-13
SO4-SHKFL96-TURB-VA	**Soil**							
Batch **R2674164**								
WG1724348-1 **MB**								
Sulfate (SO4)			<0.50		mg/L		0.5	16-AUG-13
WG1727982-1 **MB**								
Sulfate (SO4)			<0.50		mg/L		0.5	16-AUG-13
WG1727982-5 **MB**								
Sulfate (SO4)			<0.50		mg/L		0.5	16-AUG-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							
Moisture content							
	2	15-JUL-13 12:05	11-AUG-13 14:03	14	27	days	EHTR
	3	15-JUL-13 12:15	11-AUG-13 14:03	14	27	days	EHTR
	4	15-JUL-13 12:59	11-AUG-13 14:03	14	27	days	EHTR
	5	15-JUL-13 13:30	11-AUG-13 14:03	14	27	days	EHTR
	6	15-JUL-13 13:45	11-AUG-13 14:03	14	27	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 L1341898 were received on 01-AUG-13 16:36.

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 Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 14- AUG- 2013
Account: APN

CERTIFICATE VA13137953

Project: L1341898

P.O. No.: L1341898

This report is for 6 Other samples submitted to our lab in Vancouver, BC, Canada on 6- AUG- 2013.

The following have access to data associated with this certificate:

ALSE VANCOUVER WEBTRIEVE	AMBER SPRINGER	

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI- 21	Received Sample Weight
LOG- 22	Sample login - Rcd w/o BarCode
PUL- 31	Pulverize split to 85% < 75 um
PUL- QC	Pulverizing QC Test

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME- MS81	Lithium Borate Fusion ICP- MS	ICP- MS

To: ALS ENVIRONMENTAL
ATTN: AMBER SPRINGER
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

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

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

Signature:

Colin Ramshaw, Vancouver Laboratory Manager

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 14- AUG- 2013
Account: APN

Project: L1341898

CERTIFICATE OF ANALYSIS VA13137953

Sample Description	Method / Analyte / Units / LOR	WEI-21 Recvd Wt. kg 0.02	ME-MS81 Ba ppm 0.5
L1341898-1		0.26	1135
L1341898-2		0.22	1100
L1341898-3		0.26	959
L1341898-4		0.26	548
L1341898-5		0.26	1090
L1341898-6		0.28	1200

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

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 14- AUG- 2013
Account: APN

Project: L1341898

CERTIFICATE OF ANALYSIS VA13137953

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

Applies to Method:			
LOG- 22	ME- MS81	PUL- 31	PUL- QC
WEI- 21			

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 14- AUG- 2013
Account: APN

QC CERTIFICATE VA13137953

Project: L1341898

P.O. No.: L1341898

This report is for 6 Other samples submitted to our lab in Vancouver, BC, Canada on 6- AUG- 2013.

The following have access to data associated with this certificate:

ALSE VANCOUVER WEBTRIEVE	AMBER SPRINGER	

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI- 21	Received Sample Weight
LOG- 22	Sample login - Rcd w/o BarCode
PUL- 31	Pulverize split to 85% < 75 um
PUL- QC	Pulverizing QC Test

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME- MS81	Lithium Borate Fusion ICP- MS	ICP- MS

To: ALS ENVIRONMENTAL
ATTN: AMBER SPRINGER
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

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

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

Signature:

Colin Ramshaw, Vancouver Laboratory Manager

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 14- AUG- 2013
Account: APN

Project: L1341898

QC CERTIFICATE OF ANALYSIS VA13137953

Sample Description	Method Analyte Units LOR	ME-MS81 Ba ppm 0.5
STANDARDS		
OREAS 146		>10000
Target Range - Lower Bound		11450
Upper Bound		>10000
SY-4		345
Target Range - Lower Bound		306
Upper Bound		375
BLANKS		
BLANK		<0.5
Target Range - Lower Bound		<0.5
Upper Bound		1.0
DUPLICATES		
ORIGINAL		556
DUP		554
Target Range - Lower Bound		527
Upper Bound		583

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

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 14- AUG- 2013
Account: APN

Project: L1341898

QC CERTIFICATE OF ANALYSIS VA13137953

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Applies to Method:	Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.
LOG- 22	ME- MS81
PUL- 31	PUL- QC
WEI- 21	

L1341898

		Old ALS ID	CH2M Sample ID	Analysis Required	Notes
50g	1	**New File #1**	L1333599-1	CH13-311-SS027_SOa — Barium (ALS Minerals)	50g to Minerals. Sublet COC request = "Barium by ME-MS81)
300g	2	(Job = 472645.06.AD.01.04.13)	L1333599-3	CH13-311-SS029_SOa	TOC = C-TOT-ORG-WB-SK
	3		L1333599-6	CH13-311-SS032_SOa	
	4		L1333599-7	CH13-311-SS033_SOa — Each sample: TOC, Barium	50g to Minerals. 50g to SK. ~200g for VA.
	5		L1333599-10	CH13-311-SS036_SOa (ALS Minerals), 96-hr	
	6		L1333599-11	CH13-311-SS037_SOa Shakeflask Tests *	
100g	1	**New File #2**	L1332158-1	CH13-108-TP002_SOa — Each sample: Barium (ALS Minerals), Acid Soluble SO4	→ See below
100g	2	(Job = 472645.16.DV.DM.01)	L1332158-3	CH13-108-TP009_SOa (ALS Minerals)	100g to Minerals.
300+g	3		L1333673-1	CH13-108-TP015_SOa — Barium, Acid-Soluble SO4, 96-hr Shakeflask Tests	100g to Minerals. ~200g required for VA.

* ACY-SHKFL96-PCT-VA
ALK-SHKFL96-PCT-VA
EC-SHKFL96-PCT-VA
MET-SHKF96-FULL-VA
ORP-SHKFL96-VA
PH-SHKFL96-MAN-VA
PREP-SHKFL96-VA
SO4-SHKFL96-TURB-VA

Minerals sublet: - SULPHUR-S-GRAΦ6A-AX
- WEIGHT-WEI-21-AX

"Data is required in an EDD output designed for upload into our LIMS" on sublet form.

L1341898-COFC

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 16-AUG-13
Report Date: 24-OCT-13 12:22 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1348930

Project P.O. #: 472645.06.AD.01.04.13 "PO=604564"
Job Reference: BSI GRUM OVERBURDEN DUMP 2013 311.5B.
C of C Numbers: ALS08151301, ALS08151301H, ALS08151301R
Legal Site Desc:

Comments:

24-OCT-13: Additional QC data has been included.

Amber Springer
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1348930-1	L1348930-2	L1348930-3	L1348930-4	L1348930-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	13-AUG-13	13-AUG-13	14-AUG-13	14-AUG-13	14-AUG-13
	Sampled Time	17:13	17:23	13:55	12:39	11:24
	Client ID	CH13-311-TP006_SOA	CH13-311-TP906_SOA	CH13-311-TP002_SOA	CH13-311-TP003_SOA	CH13-311-TP004_SOA
Grouping	**Analyte**					
SOIL						
Physical Tests	Grain Size Curve	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED
	Moisture (%)	6.88	9.68	8.60	8.98	7.94
	Liquid Limit (LL) (%)	24	27	25	25	27
	pH (1:2 soil:water) (pH)	8.30	8.11	7.99	8.09	8.18
	Plasticity Index (PI) (%)	7	9	8	9	6
	Acid Soluble Sulphate Sulphur (%)	<0.01	0.01	0.02	<0.01	0.02
Leachable Anions & Nutrients	Acidity (as CaCO3) (mg/L)	11.7	6.2			6.4
	Alkalinity, Total (as CaCO3) (mg/L)	67.3	82.4			155
	Conductivity (uS/cm)	418	376			619
	pH (pH)	8.18	8.15			7.68
	Oxidation-Reduction Potential (ORP) (mV)	339	330			277
	Sulfate (SO4) (mg/L)	142	111			191
Organic / Inorganic Carbon	Inorganic Carbon (%)	0.24	0.21	0.18	0.20	0.75
	Inorganic Carbon (as CaCO3 Equivalent) (%)	2.03	1.74	1.49	1.70	6.27
	Organic Carbon (%)	<0.40	0.40	0.50	<0.40	0.60
	Organic Matter (%)	<0.70	0.77	0.78	<0.70	0.99
Saturated Paste Extractables	Paste pH (pH)	7.59	7.45	7.45	7.35	7.42
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	22.0	23.0	21.0	31.0	75.0
Metals	Aluminum (Al) (mg/kg)	17900	17200	18200	16100	12800
	Antimony (Sb) (mg/kg)	0.79	0.72	0.58	1.77	6.44
	Arsenic (As) (mg/kg)	12.2	11.6	12.8	11.2	86.2
	Barium (Ba) (mg/kg)	202	192	198	177	281
	Beryllium (Be) (mg/kg)	0.81	0.70	0.67	0.64	0.57
	Bismuth (Bi) (mg/kg)	0.42	0.47	0.38	0.43	0.56
	Boron (B) (mg/kg)	<10	<10	<10	<10	<10
	Cadmium (Cd) (mg/kg)	0.287	0.277	0.372	0.271	1.06
	Calcium (Ca) (mg/kg)	9780	9210	6860	8160	10600
	Chromium (Cr) (mg/kg)	43.3	41.0	46.1	40.4	37.8
	Cobalt (Co) (mg/kg)	12.4	11.7	15.6	12.6	18.0
	Copper (Cu) (mg/kg)	25.4	26.3	36.5	24.8	64.0
	Iron (Fe) (mg/kg)	28900	28800	32500	28600	42000
	Lead (Pb) (mg/kg)	18.9	19.2	19.2	22.4	996
	Lithium (Li) (mg/kg)	38.1	36.6	36.1	33.1	25.3
	Magnesium (Mg) (mg/kg)	8390	8200	8560	8400	10300

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1348930-6	L1348930-7	L1348930-8	L1348930-9	L1348930-10
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	14-AUG-13	14-AUG-13	14-AUG-13	14-AUG-13	14-AUG-13
	Sampled Time	10:03	14:05	12:49	11:34	10:13
	Client ID	CH13-311-TP005_SOA	CH13-311-TP902_SOA	CH13-311-TP903_SOA	CH13-311-TP904_SOA	CH13-311-TP905_SOA
Grouping	**Analyte**					
SOIL						
Physical Tests	Grain Size Curve	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED	SEE ATTACHED
	Moisture (%)	9.44	9.51	7.68	5.31	8.90
	Liquid Limit (LL) (%)	25	26	26	29	23
	pH (1:2 soil:water) (pH)	8.39	7.99	8.27	8.32	8.38
	Plasticity Index (PI) (%)	11	9	11	8	7
	Acid Soluble Sulphate Sulphur (%)	<0.01	<0.01	<0.01	0.02	<0.01
Leachable Anions & Nutrients	Acidity (as CaCO3) (mg/L)				6.5	
	Alkalinity, Total (as CaCO3) (mg/L)				207	
	Conductivity (uS/cm)				808	
	pH (pH)				7.59	
	Oxidation-Reduction Potential (ORP) (mV)				294	
	Sulfate (SO4) (mg/L)				271	
Organic / Inorganic Carbon	Inorganic Carbon (%)	0.21	0.13	0.16	0.60	0.25
	Inorganic Carbon (as CaCO3 Equivalent) (%)	1.76	1.12	1.32	4.99	2.11
	Organic Carbon (%)	0.40	0.40	<0.40	0.60	<0.40
	Organic Matter (%)	<0.70	<0.70	<0.70	1.07	<0.70
Saturated Paste Extractables	Paste pH (pH)	7.59	7.29	7.44	7.36	7.56
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	22.0	20.0	19.0	66.0	19.0
Metals	Aluminum (Al) (mg/kg)	16600	20000	15600	11900	16100
	Antimony (Sb) (mg/kg)	0.87	0.50	0.58	3.01	0.77
	Arsenic (As) (mg/kg)	10.2	12.0	8.08	77.9	10.0
	Barium (Ba) (mg/kg)	266	190	192	371	253
	Beryllium (Be) (mg/kg)	0.69	0.67	0.71	0.49	0.74
	Bismuth (Bi) (mg/kg)	0.39	0.62	0.39	<0.20	0.37
	Boron (B) (mg/kg)	<10	<10	<10	<10	<10
	Cadmium (Cd) (mg/kg)	0.374	0.310	0.261	0.864	0.338
	Calcium (Ca) (mg/kg)	8210	7260	8080	10100	8040
	Chromium (Cr) (mg/kg)	29.0	43.8	35.5	77.5	27.6
	Cobalt (Co) (mg/kg)	10.6	15.0	9.74	24.9	9.82
	Copper (Cu) (mg/kg)	22.6	35.6	19.4	36.8	21.0
	Iron (Fe) (mg/kg)	26400	33400	23900	50500	25600
	Lead (Pb) (mg/kg)	17.7	17.4	14.8	378	14.7
	Lithium (Li) (mg/kg)	31.6	39.3	32.1	20.7	32.2
	Magnesium (Mg) (mg/kg)	6900	9080	6850	14900	6750

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1348930-1	L1348930-2	L1348930-3	L1348930-4	L1348930-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	13-AUG-13	13-AUG-13	14-AUG-13	14-AUG-13	14-AUG-13
	Sampled Time	17:13	17:23	13:55	12:39	11:24
	Client ID	CH13-311-TP006_SOA	CH13-311-TP906_SOA	CH13-311-TP002_SOA	CH13-311-TP003_SOA	CH13-311-TP004_SOA
Grouping	**Analyte**					
SOIL						
Metals	Manganese (Mn) (mg/kg)	422	398	449	407	461
	Mercury (Hg) (mg/kg)	0.0194	0.0231	0.0316	0.0270	0.735
	Molybdenum (Mo) (mg/kg)	0.64	0.71	0.84	0.69	1.22
	Nickel (Ni) (mg/kg)	36.4	34.2	41.8	37.1	44.7
	Phosphorus (P) (mg/kg)	591	607	691	550	627
	Potassium (K) (mg/kg)	2860	2500	2130	2190	1390
	Selenium (Se) (mg/kg)	0.31	0.32	0.24	0.24	0.33
	Silver (Ag) (mg/kg)	0.15	0.15	0.15	0.15	2.08
	Sodium (Na) (mg/kg)	230	220	250	180	110
	Strontium (Sr) (mg/kg)	45.1	45.3	36.8	38.1	49.7
	Sulfur (S)-Total (mg/kg)	1600	1600	900	800	4600
	Thallium (Tl) (mg/kg)	0.236	0.213	0.178	0.220	0.560
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	625	530	374	448	226
	Uranium (U) (mg/kg)	3.25	2.98	1.76	2.12	1.98
	Vanadium (V) (mg/kg)	37.9	35.0	36.4	31.9	26.1
	Zinc (Zn) (mg/kg)	81.2	81.6	95.3	88.8	812
Total Metals	Barium by borate-fusion (ppm)	1075	1100	1185	1090	3200
Leachable Metals	Aluminum (Al)-Leachable (mg/L)	0.0211	0.0244			0.0097
	Antimony (Sb)-Leachable (mg/L)	0.00268	0.00223			0.00977
	Arsenic (As)-Leachable (mg/L)	0.0013	0.0015			0.0034
	Barium (Ba)-Leachable (mg/L)	0.0861	0.103			0.0667
	Beryllium (Be)-Leachable (mg/L)	<0.00050	<0.00050			<0.00050
	Boron (B)-Leachable (mg/L)	0.014	0.015			0.016
	Cadmium (Cd)-Leachable (mg/L)	0.000062	<0.000050			0.000645
	Calcium (Ca)-Leachable (mg/L)	64.1	55.1			79.9
	Chromium (Cr)-Leachable (mg/L)	<0.00050	<0.00050			<0.00050
	Cobalt (Co)-Leachable (mg/L)	0.00015	0.00011			0.00158
	Copper (Cu)-Leachable (mg/L)	0.0013	0.0012			0.0014
	Iron (Fe)-Leachable (mg/L)	<0.030	<0.030			<0.030
	Lead (Pb)-Leachable (mg/L)	<0.00010	<0.00010			0.0699
	Lithium (Li)-Leachable (mg/L)	<0.0050	<0.0050			0.0320
	Magnesium (Mg)-Leachable (mg/L)	9.84	9.12			30.4
	Manganese (Mn)-Leachable (mg/L)	0.0633	0.0453			0.226
	Mercury (Hg)-Leachable (mg/L)	<0.000050	<0.000050			<0.000050
	Molybdenum (Mo)-Leachable (mg/L)	0.0211	0.0197			0.00428
	Nickel (Ni)-Leachable (mg/L)	0.00117	0.00101			0.00437

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1348930-6	L1348930-7	L1348930-8	L1348930-9	L1348930-10
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	14-AUG-13	14-AUG-13	14-AUG-13	14-AUG-13	14-AUG-13
	Sampled Time	10:03	14:05	12:49	11:34	10:13
	Client ID	CH13-311-TP005_SOA	CH13-311-TP902_SOA	CH13-311-TP903_SOA	CH13-311-TP904_SOA	CH13-311-TP905_SOA
Grouping	**Analyte**					
SOIL						
Metals	Manganese (Mn) (mg/kg)	403	418	366	606	390
	Mercury (Hg) (mg/kg)	0.126	0.0315	0.0226	0.349	0.0360
	Molybdenum (Mo) (mg/kg)	0.98	0.68	0.52	0.88	0.79
	Nickel (Ni) (mg/kg)	26.9	38.8	29.7	82.9	25.5
	Phosphorus (P) (mg/kg)	667	674	516	570	534
	Potassium (K) (mg/kg)	2600	2670	2580	950	2650
	Selenium (Se) (mg/kg)	0.40	0.29	0.25	0.31	0.44
	Silver (Ag) (mg/kg)	0.16	0.16	0.11	0.74	0.17
	Sodium (Na) (mg/kg)	280	320	220	<100	250
	Strontium (Sr) (mg/kg)	41.6	41.6	44.1	41.2	40.6
	Sulfur (S)-Total (mg/kg)	600	700	600	3900	1500
	Thallium (Tl) (mg/kg)	0.211	0.191	0.201	0.634	0.198
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	564	488	540	118	559
	Uranium (U) (mg/kg)	2.42	1.77	2.32	1.67	2.48
	Vanadium (V) (mg/kg)	38.1	35.4	32.8	24.2	36.7
	Zinc (Zn) (mg/kg)	82.5	94.3	93.1	572	77.2
Total Metals	Barium by borate-fusion (ppm)	1175	1180	1075	3360	1190
Leachable Metals	Aluminum (Al)-Leachable (mg/L)				0.0083	
	Antimony (Sb)-Leachable (mg/L)				0.00174	
	Arsenic (As)-Leachable (mg/L)				0.0012	
	Barium (Ba)-Leachable (mg/L)				0.0398	
	Beryllium (Be)-Leachable (mg/L)				<0.00050	
	Boron (B)-Leachable (mg/L)				0.016	
	Cadmium (Cd)-Leachable (mg/L)				0.000257	
	Calcium (Ca)-Leachable (mg/L)				78.4	
	Chromium (Cr)-Leachable (mg/L)				<0.00050	
	Cobalt (Co)-Leachable (mg/L)				0.00087	
	Copper (Cu)-Leachable (mg/L)				<0.0010	
	Iron (Fe)-Leachable (mg/L)				<0.030	
	Lead (Pb)-Leachable (mg/L)				0.00355	
	Lithium (Li)-Leachable (mg/L)				0.0347	
	Magnesium (Mg)-Leachable (mg/L)				61.6	
	Manganese (Mn)-Leachable (mg/L)				0.0856	
	Mercury (Hg)-Leachable (mg/L)				<0.000050	
	Molybdenum (Mo)-Leachable (mg/L)				0.00275	
	Nickel (Ni)-Leachable (mg/L)				0.00459	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1348930-1	L1348930-2	L1348930-3	L1348930-4	L1348930-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	13-AUG-13	13-AUG-13	14-AUG-13	14-AUG-13	14-AUG-13
	Sampled Time	17:13	17:23	13:55	12:39	11:24
	Client ID	CH13-311-TP006_SOA	CH13-311-TP906_SOA	CH13-311-TP002_SOA	CH13-311-TP003_SOA	CH13-311-TP004_SOA
Grouping	**Analyte**					
SOIL						
Leachable Metals	Potassium (K)-Leachable (mg/L)	9.3	9.1			15.0
	Selenium (Se)-Leachable (mg/L)	0.00217	0.00156			0.00148
	Silicon (Si)-Leachable (mg/L)	3.07	3.07			4.01
	Silver (Ag)-Leachable (mg/L)	<0.000050	<0.000050			<0.000050
	Sodium (Na)-Leachable (mg/L)	6.8	7.8			6.2
	Strontium (Sr)-Leachable (mg/L)	0.303	0.282			0.421
	Sulfur (S)-Leachable (mg/L)	48.3	38.1			64.1
	Thallium (Tl)-Leachable (mg/L)	<0.00010	<0.00010			0.00024
	Titanium (Ti)-Leachable (mg/L)	<0.010	<0.010			<0.010
	Uranium (U)-Leachable (mg/L)	0.0323	0.0214			0.0175
	Vanadium (V)-Leachable (mg/L)	<0.0010	<0.0010			<0.0010
	Zinc (Zn)-Leachable (mg/L)	<0.010	<0.010			0.034

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1348930-6 Soil 14-AUG-13 10:03 CH13-311-TP005_SOA	L1348930-7 Soil 14-AUG-13 14:05 CH13-311-TP902_SOA	L1348930-8 Soil 14-AUG-13 12:49 CH13-311-TP903_SOA	L1348930-9 Soil 14-AUG-13 11:34 CH13-311-TP904_SOA	L1348930-10 Soil 14-AUG-13 10:13 CH13-311-TP905_SOA
SOIL						
Leachable Metals	Potassium (K)-Leachable (mg/L)				24.2	
	Selenium (Se)-Leachable (mg/L)				0.00052	
	Silicon (Si)-Leachable (mg/L)				3.44	
	Silver (Ag)-Leachable (mg/L)				<0.000050	
	Sodium (Na)-Leachable (mg/L)				3.5	
	Strontium (Sr)-Leachable (mg/L)				0.243	
	Sulfur (S)-Leachable (mg/L)				90.8	
	Thallium (Tl)-Leachable (mg/L)				0.00032	
	Titanium (Ti)-Leachable (mg/L)				<0.010	
	Uranium (U)-Leachable (mg/L)				0.00614	
	Vanadium (V)-Leachable (mg/L)				<0.0010	
	Zinc (Zn)-Leachable (mg/L)				0.017	

* 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)	MS-B	L1348930-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Iron (Fe)	MS-B	L1348930-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Leachable	MS-B	L1348930-1, -2, -5, -9
Matrix Spike	Magnesium (Mg)-Leachable	MS-B	L1348930-1, -2, -5, -9
Matrix Spike	Silicon (Si)-Leachable	MS-B	L1348930-1, -2, -5, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
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**
ACY-SHKFL96-PCT-VA	Soil	Acidity by PCT (96 hour SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES

"This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines, (Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures adapted from APHA Method 2310 "Acidity".

ALK-SHKFL96-PCT-VA	Soil	Alkalinity by PCT (96 hour SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES

"This analysis is based upon the extraction procedure outlined in ""Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia"" BC Ministry of Energy and Mines, (Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures adapted from APHA Method 2320 "Alkalinity"

ATTERBERG-SK	Soil	Atterberg limits	CARTER CSSS 58

The liquid limit (or upper plastic limit) is the point at which the soil becomes semifluid, like softened butter. In operational terms, the liquid limit is defined as the water content at which a trapezoidal groove cut in moist soil is closed after 25 taps on a hard rubber plate (ASTM D-18, 1958).

The plastic limit (or lower plastic limit) is defined as the water content at which soil begins to crumble on being rolled into a thread 1/8 inch (or 3 mm) in diameter. It represents the lowest water content at which soil can be deformed readily without cracking.

The plastic index (which is the difference between the liquid and plastic limits) gives an indication of the "clayeyness" or plasticity of a clay and is employed in engineering classification systems for soils.

References: McKeague, J.A. 1978. Atterberg Limits pp 50 - 55 In: Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci. p. 50 - 55

B-200.2-CCMS-VA	Soil	Boron 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."

C-INORG-SK	Soil	Inorganic Carbon / Calcium Carbonate	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-ORG-WB-SK	Soil	Total Organic Carbon - Walkley Black	CSSS (1993) method 21.2

The soil sample is treated with excess potassium dichromate and sulfuric acid to oxidize organic carbon. Oxidized organic carbon is determined by back-titration with ferrous ammonium sulfate. Organic matter is estimated from the organic carbon result using the Van Bemmelon factor.

Reference Information

EC-SHKFL96-PCT-VA Soil EC by PCT (96 hour SHAKEFLASK) BC MINISTRY OF ENERGY AND MINES

"This analysis is based upon the extraction procedure outlined in ""Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines, (Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures adapted from APHA Method 2510 "Conductivity".

GRAIN SIZE-SK Soil Grain Size Analysis SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

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-SHKFL96-CVAFS-VA Soil Mercury by CVAFS (96 hour SHAKEFLASK) BC MINISTRY OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines,
(Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

IC-CACO3-CALC-SK Soil Inorganic Carbon as CaCO3 Equivalent Calculation

ME-MS81-AX Soil ME-MS81

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-SHKFL96-CCMS-VA Soil Metals by CCMS (SHAKEFLASK - 96hours) BC MINISTRY OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines,
(Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using inductively coupled plasma - mass spectrophotometry (EPA Method 6020A).

MET-SHKFL96-ICP-VA Soil Metals by ICPOES (SHAKEFLASK - 96Hours) BC MINISTRY OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines,
(Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane 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.

NP-TU Soil Neutralization Potential (NP) Sobek 3.2.3, MOD

ORP-SHKFL96-VA Soil ORP by Electrode (96 hour SHAKEFLASK) BC MIN. OF ENERGY AND MINES

Reference Information

This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines, (Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures carried out in accordance "ASTM" method D1498-00 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM), May 2000. Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

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.

PH-PASTE-VA Soil pH in Soil (Paste) by Meter Carter-CSSS / APHA 4500 H

A soil extract produced by the saturated paste extraction procedure is analyzed by pH meter.

PH-SHKFL96-MAN-VA Soil pH by Manual Meter (96 HOUR SHAKEFLASK) BC MINISTRY OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines, (Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently analysed using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode.

S-TOT-LECO-SK Soil Total Sulphur by combustion method ISO 15178:2000

The sample is ignited in a combustion analyzer where sulfur in the reduced SO2 gas is determined using a thermal conductivity detector.

SAT-PCNT-VA Soil Saturation Percentage Carter-CSSS

Saturation Percentage (SP) is the total volume of water present in a saturated paste (in mL) divided by the dry weight of the sample (in grams), expressed as a percentage, as described in "Soil Sampling and Methods of Analysis" by M. Carter.

SO4-SHKFL96-TURB-VA Soil SO4 by Turbidimetric(96 hour SHAKEFLASK) BC MINISTRY OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines, (Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures adapted from APHA Method 4500-SO4 "Sulfate". Sulfate is determined using the turbidimetric method."

SULPHUR-S-GRA06A-AX Soil Sulphur (S) S-GRA06a

** 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
TU	ALS ENVIRONMENTAL - TUCSON, ARIZONA, USA
AX	ALS MINERALS - VANCOUVER, B.C., CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

ALS08151301 ALS08151301H ALS08151301R

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

Workorder: L1348930 Report Date: 24-OCT-13

Client: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-SHKFL96-PCT-VA	**Soil**							
Batch R2691958								
WG1741597-2 DUP		**L1348930-9**						
Acidity (as CaCO3)		6.5	6.4		mg/L	2.4	25	11-SEP-13
ALK-SHKFL96-PCT-VA	**Soil**							
Batch R2691813								
WG1741597-2 DUP		**L1348930-9**						
Alkalinity, Total (as CaCO3)		207	206		mg/L	0.4	20	11-SEP-13
WG1741597-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	11-SEP-13
WG1744483-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	11-SEP-13
B-200.2-CCMS-VA	**Soil**							
Batch R2681368								
WG1732891-3 CRM		**VA-CANMET-TILL1**						
Boron (B)			3		mg/kg		0-13	27-AUG-13
WG1732891-5 CRM		**VA-CANMET-TILL1**						
Boron (B)			3		mg/kg		0-13	27-AUG-13
WG1732891-2 DUP		**L1348930-1**						
Boron (B)		<10	<10	RPD-NA	mg/kg	N/A	30	27-AUG-13
WG1732891-1 MB								
Boron (B)			<10		mg/kg		10	27-AUG-13
C-INORG-SK	**Soil**							
Batch R2678223								
WG1731220-10 IRM		**0.1%IC**						
Inorganic Carbon			104.9		%		60-140	22-AUG-13
WG1731220-11 IRM		**0.4%IC**						
Inorganic Carbon			107.5		%		80-120	22-AUG-13
WG1731220-14 IRM		**0.1%IC**						
Inorganic Carbon			131.5		%		60-140	22-AUG-13
WG1731220-15 IRM		**0.4%IC**						
Inorganic Carbon			100.5		%		80-120	22-AUG-13
WG1731220-18 IRM		**0.1%IC**						
Inorganic Carbon			127.2		%		60-140	22-AUG-13
WG1731220-19 IRM		**0.4%IC**						
Inorganic Carbon			108.3		%		80-120	22-AUG-13
WG1731220-2 IRM		**0.1%IC**						
Inorganic Carbon			120.9		%		60-140	22-AUG-13
WG1731220-22 IRM		**0.1%IC**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-INORG-SK	**Soil**							
Batch R2678223								
WG1731220-22 IRM		**0.1%IC**						
Inorganic Carbon			125.3		%		60-140	22-AUG-13
WG1731220-23 IRM		**0.4%IC**						
Inorganic Carbon			109.2		%		80-120	22-AUG-13
WG1731220-26 IRM		**0.1%IC**						
Inorganic Carbon			132.7		%		60-140	22-AUG-13
WG1731220-27 IRM		**0.4%IC**						
Inorganic Carbon			108.5		%		80-120	22-AUG-13
WG1731220-3 IRM		**0.4%IC**						
Inorganic Carbon			104.4		%		80-120	22-AUG-13
WG1731220-30 IRM		**0.1%IC**						
Inorganic Carbon			134.5		%		60-140	22-AUG-13
WG1731220-31 IRM		**0.4%IC**						
Inorganic Carbon			107.3		%		80-120	22-AUG-13
WG1731220-34 IRM		**0.1%IC**						
Inorganic Carbon			134.1		%		60-140	22-AUG-13
WG1731220-35 IRM		**0.4%IC**						
Inorganic Carbon			102.4		%		80-120	22-AUG-13
WG1731220-38 IRM		**0.1%IC**						
Inorganic Carbon			119.1		%		60-140	22-AUG-13
WG1731220-39 IRM		**0.4%IC**						
Inorganic Carbon			102.2		%		80-120	22-AUG-13
WG1731220-6 IRM		**0.1%IC**						
Inorganic Carbon			96.4		%		60-140	22-AUG-13
WG1731220-7 IRM		**0.4%IC**						
Inorganic Carbon			105.2		%		80-120	22-AUG-13
WG1731220-12 MB								
Inorganic Carbon			<0.10		%		0.1	22-AUG-13
WG1731220-16 MB								
Inorganic Carbon			<0.10		%		0.1	22-AUG-13
WG1731220-20 MB								
Inorganic Carbon			<0.10		%		0.1	22-AUG-13
WG1731220-24 MB								
Inorganic Carbon			<0.10		%		0.1	22-AUG-13
WG1731220-28 MB								
Inorganic Carbon			<0.10		%		0.1	22-AUG-13
WG1731220-32 MB								
Inorganic Carbon			<0.10		%		0.1	22-AUG-13
WG1731220-36 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-INORG-SK	**Soil**							
Batch R2678223								
WG1731220-36 MB								
Inorganic Carbon			<0.10		%		0.1	22-AUG-13
WG1731220-4 MB								
Inorganic Carbon			<0.10		%		0.1	22-AUG-13
WG1731220-40 MB								
Inorganic Carbon			<0.10		%		0.1	22-AUG-13
WG1731220-8 MB								
Inorganic Carbon			<0.10		%		0.1	22-AUG-13
Batch R2678731								
WG1730475-2 DUP		**L1348930-1**						
Inorganic Carbon		0.24	0.20	J	%	0.05	0.2	22-AUG-13
WG1730475-3 IRM		**0.1%IC**						
Inorganic Carbon			113.4		%		60-140	22-AUG-13
WG1730475-4 IRM		**0.4%IC**						
Inorganic Carbon			103.9		%		80-120	22-AUG-13
WG1730475-5 MB								
Inorganic Carbon			<0.10		%		0.1	22-AUG-13
C-TOT-ORG-WB-SK	**Soil**							
Batch R2677666								
WG1730539-1 DUP		**L1348930-9**						
Organic Carbon		0.60	0.60		%	0.0	30	21-AUG-13
Organic Matter		1.07	1.07		%	0.1	20	21-AUG-13
WG1730539-3 IRM		**FARM2009**						
Organic Carbon			107.8		%		80-120	21-AUG-13
Organic Matter			106.8		%		80-120	21-AUG-13
WG1730539-2 MB								
Organic Carbon			<0.40		%		0.4	21-AUG-13
Organic Matter			<0.70		%		0.7	21-AUG-13
Batch R2678559								
WG1731500-1 DUP		**L1348930-5**						
Organic Carbon		0.60	0.50		%	18	30	23-AUG-13
Organic Matter		0.99	0.84		%	15	20	23-AUG-13
WG1731500-3 IRM		**FARM2009**						
Organic Carbon			103.4		%		80-120	23-AUG-13
Organic Matter			102.1		%		80-120	23-AUG-13
WG1731500-2 MB								
Organic Carbon			<0.40		%		0.4	23-AUG-13
Organic Matter			<0.70		%		0.7	23-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-SHKFL96-PCT-VA	**Soil**							
Batch R2691813								
WG1741597-2 DUP		**L1348930-9**						
Conductivity		808	816		uS/cm	1.0	25	11-SEP-13
WG1741597-1 MB								
Conductivity			<2.0		uS/cm		2	11-SEP-13
WG1744483-1 MB								
Conductivity			<2.0		uS/cm		2	11-SEP-13
HG-200.2-CVAF-VA	**Soil**							
Batch R2680755								
WG1732891-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			102.6		%		70-130	27-AUG-13
WG1732891-2 DUP		**L1348930-1**						
Mercury (Hg)		0.0194	0.0186		mg/kg	4.5	40	27-AUG-13
WG1732891-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	27-AUG-13
HG-SHKFL96-CVAFS-VA	**Soil**							
Batch R2692699								
WG1741597-2 DUP		**L1348930-9**						
Mercury (Hg)-Leachable		<0.000050	<0.000050	RPD-NA	mg/L	N/A	40	12-SEP-13
WG1741597-1 MB								
Mercury (Hg)-Leachable			<0.000050		mg/L		0.00005	12-SEP-13
WG1746546-1 MB								
Mercury (Hg)-Leachable			<0.000050		mg/L		0.00005	12-SEP-13
WG1741597-3 MS		**L1349013-1**						
Mercury (Hg)-Leachable			98.2		%		70-130	12-SEP-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2681368								
WG1732891-3 CRM		**VA-CANMET-TILL1**						
Aluminum (Al)			96.1		%		70-130	27-AUG-13
Antimony (Sb)			112.1		%		70-130	27-AUG-13
Arsenic (As)			101.8		%		70-130	27-AUG-13
Barium (Ba)			98.7		%		70-130	27-AUG-13
Beryllium (Be)			0.55		mg/kg		0.34-0.74	27-AUG-13
Bismuth (Bi)			109.7		%		70-130	27-AUG-13
Cadmium (Cd)			87.9		%		70-130	27-AUG-13
Calcium (Ca)			115.9		%		70-130	27-AUG-13
Chromium (Cr)			105.5		%		70-130	27-AUG-13
Cobalt (Co)			101.1		%		70-130	27-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2681368								
WG1732891-3 CRM		**VA-CANMET-TILL1**						
Copper (Cu)			97.9		%		70-130	27-AUG-13
Iron (Fe)			97.7		%		70-130	27-AUG-13
Lead (Pb)			99.0		%		70-130	27-AUG-13
Lithium (Li)			114.0		%		70-130	27-AUG-13
Magnesium (Mg)			97.4		%		70-130	27-AUG-13
Manganese (Mn)			97.0		%		70-130	27-AUG-13
Molybdenum (Mo)			0.74		mg/kg		0.24-1.24	27-AUG-13
Nickel (Ni)			101.0		%		70-130	27-AUG-13
Phosphorus (P)			105.7		%		70-130	27-AUG-13
Potassium (K)			109.0		%		70-130	27-AUG-13
Selenium (Se)			0.33		mg/kg		0.12-0.52	27-AUG-13
Silver (Ag)			0.24		mg/kg		0.12-0.32	27-AUG-13
Sodium (Na)			112.9		%		70-130	27-AUG-13
Strontium (Sr)			120.0		%		70-130	27-AUG-13
Thallium (Tl)			0.132		mg/kg		0.075-0.175	27-AUG-13
Tin (Sn)			1.0		mg/kg		0-3	27-AUG-13
Titanium (Ti)			112.7		%		70-130	27-AUG-13
Uranium (U)			117.3		%		70-130	27-AUG-13
Vanadium (V)			105.8		%		70-130	27-AUG-13
Zinc (Zn)			100.5		%		70-130	27-AUG-13
WG1732891-2 DUP		**L1348930-1**						
Aluminum (Al)		17900	16900		mg/kg	6.1	40	27-AUG-13
Antimony (Sb)		0.79	0.66		mg/kg	19	30	27-AUG-13
Arsenic (As)		12.2	9.73		mg/kg	23	30	27-AUG-13
Barium (Ba)		202	183		mg/kg	9.8	40	27-AUG-13
Beryllium (Be)		0.81	0.75		mg/kg	7.5	30	27-AUG-13
Bismuth (Bi)		0.42	0.43		mg/kg	2.1	30	27-AUG-13
Cadmium (Cd)		0.287	0.264		mg/kg	8.4	30	27-AUG-13
Calcium (Ca)		9780	9440		mg/kg	3.5	30	27-AUG-13
Chromium (Cr)		43.3	36.3		mg/kg	17	30	27-AUG-13
Cobalt (Co)		12.4	10.5		mg/kg	16	30	27-AUG-13
Copper (Cu)		25.4	23.2		mg/kg	9.1	30	27-AUG-13
Iron (Fe)		28900	27100		mg/kg	6.3	30	27-AUG-13
Lead (Pb)		18.9	15.7		mg/kg	18	40	27-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2681368								
WG1732891-2 DUP		**L1348930-1**						
Lithium (Li)		38.1	38.6		mg/kg	1.2	30	27-AUG-13
Magnesium (Mg)		8390	7660		mg/kg	9.2	30	27-AUG-13
Manganese (Mn)		422	407		mg/kg	3.5	30	27-AUG-13
Molybdenum (Mo)		0.64	1.03	J	mg/kg	0.39	1	27-AUG-13
Nickel (Ni)		36.4	29.7		mg/kg	20	30	27-AUG-13
Phosphorus (P)		591	521		mg/kg	13	30	27-AUG-13
Potassium (K)		2860	2680		mg/kg	6.2	40	27-AUG-13
Selenium (Se)		0.31	0.26		mg/kg	17	30	27-AUG-13
Silver (Ag)		0.15	0.14		mg/kg	9.3	40	27-AUG-13
Sodium (Na)		230	200		mg/kg	12	40	27-AUG-13
Strontium (Sr)		45.1	41.0		mg/kg	9.4	40	27-AUG-13
Thallium (Tl)		0.236	0.220		mg/kg	7.3	30	27-AUG-13
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	27-AUG-13
Titanium (Ti)		625	540		mg/kg	15	40	27-AUG-13
Uranium (U)		3.25	3.78		mg/kg	15	30	27-AUG-13
Vanadium (V)		37.9	35.2		mg/kg	7.4	30	27-AUG-13
Zinc (Zn)		81.2	76.4		mg/kg	6.2	30	27-AUG-13
WG1732891-1 MB								
Aluminum (Al)			<50		mg/kg		50	27-AUG-13
Antimony (Sb)			<0.10		mg/kg		0.1	27-AUG-13
Arsenic (As)			<0.050		mg/kg		0.05	27-AUG-13
Barium (Ba)			<0.50		mg/kg		0.5	27-AUG-13
Beryllium (Be)			<0.20		mg/kg		0.2	27-AUG-13
Bismuth (Bi)			<0.20		mg/kg		0.2	27-AUG-13
Cadmium (Cd)			<0.050		mg/kg		0.05	27-AUG-13
Calcium (Ca)			<50		mg/kg		50	27-AUG-13
Chromium (Cr)			<0.50		mg/kg		0.5	27-AUG-13
Cobalt (Co)			<0.10		mg/kg		0.1	27-AUG-13
Copper (Cu)			<0.50		mg/kg		0.5	27-AUG-13
Iron (Fe)			<50		mg/kg		50	27-AUG-13
Lead (Pb)			<0.50		mg/kg		0.5	27-AUG-13
Lithium (Li)			<5.0		mg/kg		5	27-AUG-13
Magnesium (Mg)			<20		mg/kg		20	27-AUG-13
Manganese (Mn)			<1.0		mg/kg		1	27-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2681368								
WG1732891-1 MB								
Molybdenum (Mo)			<0.50		mg/kg		0.5	27-AUG-13
Nickel (Ni)			<0.50		mg/kg		0.5	27-AUG-13
Phosphorus (P)			<50		mg/kg		50	27-AUG-13
Potassium (K)			<100		mg/kg		100	27-AUG-13
Selenium (Se)			<0.20		mg/kg		0.2	27-AUG-13
Silver (Ag)			<0.10		mg/kg		0.1	27-AUG-13
Sodium (Na)			<100		mg/kg		100	27-AUG-13
Strontium (Sr)			<0.50		mg/kg		0.5	27-AUG-13
Thallium (Tl)			<0.050		mg/kg		0.05	27-AUG-13
Tin (Sn)			<2.0		mg/kg		2	27-AUG-13
Titanium (Ti)			<1.0		mg/kg		1	27-AUG-13
Uranium (U)			<0.050		mg/kg		0.05	27-AUG-13
Vanadium (V)			<0.20		mg/kg		0.2	27-AUG-13
Zinc (Zn)			<1.0		mg/kg		1	27-AUG-13
WG1732891-4 MS		**L1346114-6**						
Aluminum (Al)			95.1		%		70-130	27-AUG-13
Antimony (Sb)			105.0		%		70-130	27-AUG-13
Arsenic (As)			95.3		%		70-130	27-AUG-13
Barium (Ba)			98.8		%		70-130	27-AUG-13
Beryllium (Be)			100.3		%		70-130	27-AUG-13
Bismuth (Bi)			104.0		%		70-130	27-AUG-13
Cadmium (Cd)			98.1		%		70-130	27-AUG-13
Calcium (Ca)			N/A	MS-B	%		-	27-AUG-13
Chromium (Cr)			97.7		%		70-130	27-AUG-13
Cobalt (Co)			97.7		%		70-130	27-AUG-13
Copper (Cu)			91.4		%		70-130	27-AUG-13
Iron (Fe)			N/A	MS-B	%		-	27-AUG-13
Lead (Pb)			100.3		%		70-130	27-AUG-13
Lithium (Li)			100.0		%		70-130	27-AUG-13
Magnesium (Mg)			103.8		%		70-130	27-AUG-13
Manganese (Mn)			97.0		%		70-130	27-AUG-13
Molybdenum (Mo)			97.9		%		70-130	27-AUG-13
Nickel (Ni)			96.5		%		70-130	27-AUG-13
Phosphorus (P)			97.6		%		70-130	27-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2681368								
WG1732891-4 MS		**L1346114-6**						
Potassium (K)			98.8		%		70-130	27-AUG-13
Selenium (Se)			90.8		%		70-130	27-AUG-13
Silver (Ag)			89.3		%		70-130	27-AUG-13
Sodium (Na)			96.5		%		70-130	27-AUG-13
Strontium (Sr)			98.4		%		70-130	27-AUG-13
Thallium (Tl)			102.0		%		70-130	27-AUG-13
Titanium (Ti)			92.3		%		70-130	27-AUG-13
Vanadium (V)			98.3		%		70-130	27-AUG-13
Zinc (Zn)			96.4		%		70-130	27-AUG-13
MET-SHKFL96-CCMS-VA	**Soil**							
Batch R2695179								
WG1741597-2 DUP		**L1348930-9**						
Aluminum (Al)-Leachable		0.0083	0.0083		mg/L	0.3	40	16-SEP-13
Antimony (Sb)-Leachable		0.00174	0.00191		mg/L	9.0	40	16-SEP-13
Arsenic (As)-Leachable		0.0012	0.0013		mg/L	5.4	40	16-SEP-13
Barium (Ba)-Leachable		0.0398	0.0381		mg/L	4.3	40	16-SEP-13
Beryllium (Be)-Leachable		<0.00050	<0.00050	RPD-NA	mg/L	N/A	40	16-SEP-13
Boron (B)-Leachable		0.016	0.018		mg/L	10	40	16-SEP-13
Cadmium (Cd)-Leachable		0.000257	0.000279		mg/L	8.0	40	16-SEP-13
Chromium (Cr)-Leachable		<0.00050	<0.00050	RPD-NA	mg/L	N/A	40	16-SEP-13
Cobalt (Co)-Leachable		0.00087	0.00083		mg/L	4.4	40	16-SEP-13
Copper (Cu)-Leachable		<0.0010	<0.0010	RPD-NA	mg/L	N/A	40	16-SEP-13
Lead (Pb)-Leachable		0.00355	0.00396		mg/L	11	40	16-SEP-13
Lithium (Li)-Leachable		0.0347	0.0370		mg/L	6.4	40	16-SEP-13
Manganese (Mn)-Leachable		0.0856	0.0752		mg/L	13	40	16-SEP-13
Molybdenum (Mo)-Leachable		0.00275	0.00224		mg/L	20	40	16-SEP-13
Nickel (Ni)-Leachable		0.00459	0.00487		mg/L	6.0	40	16-SEP-13
Selenium (Se)-Leachable		0.00052	0.00054		mg/L	3.5	40	16-SEP-13
Silver (Ag)-Leachable		<0.000050	<0.000050	RPD-NA	mg/L	N/A	40	16-SEP-13
Strontium (Sr)-Leachable		0.243	0.237		mg/L	2.5	40	16-SEP-13
Thallium (Tl)-Leachable		0.00032	0.00029		mg/L	8.6	40	16-SEP-13
Uranium (U)-Leachable		0.00614	0.00589		mg/L	4.1	40	16-SEP-13
Vanadium (V)-Leachable		<0.0010	<0.0010	RPD-NA	mg/L	N/A	40	16-SEP-13
Zinc (Zn)-Leachable		0.017	0.019		mg/L	14	40	16-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-SHKFL96-CCMS-VA	**Soil**							
Batch R2695179								
WG1741597-1 MB								
Aluminum (Al)-Leachable			<0.0050		mg/L		0.005	16-SEP-13
Antimony (Sb)-Leachable			<0.00010		mg/L		0.0001	16-SEP-13
Arsenic (As)-Leachable			<0.0010		mg/L		0.001	16-SEP-13
Barium (Ba)-Leachable			<0.0010		mg/L		0.001	16-SEP-13
Beryllium (Be)-Leachable			<0.00050		mg/L		0.0005	16-SEP-13
Boron (B)-Leachable			<0.010		mg/L		0.01	16-SEP-13
Cadmium (Cd)-Leachable			<0.000050		mg/L		0.00005	16-SEP-13
Chromium (Cr)-Leachable			<0.00050		mg/L		0.0005	16-SEP-13
Cobalt (Co)-Leachable			<0.00010		mg/L		0.0001	16-SEP-13
Copper (Cu)-Leachable			<0.0010		mg/L		0.001	16-SEP-13
Lead (Pb)-Leachable			<0.00010		mg/L		0.0001	16-SEP-13
Lithium (Li)-Leachable			<0.0050		mg/L		0.005	16-SEP-13
Manganese (Mn)-Leachable			<0.00050		mg/L		0.0005	16-SEP-13
Molybdenum (Mo)-Leachable			<0.00010		mg/L		0.0001	16-SEP-13
Nickel (Ni)-Leachable			<0.00050		mg/L		0.0005	16-SEP-13
Selenium (Se)-Leachable			<0.00050		mg/L		0.0005	16-SEP-13
Silver (Ag)-Leachable			<0.000050		mg/L		0.00005	16-SEP-13
Strontium (Sr)-Leachable			<0.00050		mg/L		0.0005	16-SEP-13
Thallium (Tl)-Leachable			<0.00010		mg/L		0.0001	16-SEP-13
Uranium (U)-Leachable			<0.000010		mg/L		0.00001	16-SEP-13
Vanadium (V)-Leachable			<0.0010		mg/L		0.001	16-SEP-13
Zinc (Zn)-Leachable			<0.010		mg/L		0.01	16-SEP-13
WG1741597-3 MS		**L1349013-1**						
Aluminum (Al)-Leachable			100.6		%		70-130	16-SEP-13
Antimony (Sb)-Leachable			108.4		%		70-130	16-SEP-13
Arsenic (As)-Leachable			105.1		%		70-130	16-SEP-13
Barium (Ba)-Leachable			117.4		%		70-130	16-SEP-13
Beryllium (Be)-Leachable			101.0		%		70-130	16-SEP-13
Boron (B)-Leachable			93.6		%		70-130	16-SEP-13
Cadmium (Cd)-Leachable			103.0		%		70-130	16-SEP-13
Chromium (Cr)-Leachable			99.9		%		70-130	16-SEP-13
Cobalt (Co)-Leachable			100.2		%		70-130	16-SEP-13
Copper (Cu)-Leachable			98.6		%		70-130	16-SEP-13
Lead (Pb)-Leachable			107.6		%		70-130	16-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-SHKFL96-CCMS-VA	**Soil**							
Batch R2695179								
WG1741597-3 MS		**L1349013-1**						
Lithium (Li)-Leachable			95.2		%		70-130	16-SEP-13
Manganese (Mn)-Leachable			96.5		%		70-130	16-SEP-13
Molybdenum (Mo)-Leachable			97.2		%		70-130	16-SEP-13
Nickel (Ni)-Leachable			96.0		%		70-130	16-SEP-13
Selenium (Se)-Leachable			101.4		%		70-130	16-SEP-13
Silver (Ag)-Leachable			106.1		%		70-130	16-SEP-13
Strontium (Sr)-Leachable			93.5		%		70-130	16-SEP-13
Thallium (Tl)-Leachable			111.8		%		70-130	16-SEP-13
Vanadium (V)-Leachable			101.2		%		70-130	16-SEP-13
Zinc (Zn)-Leachable			101.0		%		70-130	16-SEP-13
MET-SHKFL96-ICP-VA	**Soil**							
Batch R2693009								
WG1741597-2 DUP		**L1348930-9**						
Calcium (Ca)-Leachable		78.4	75.3		mg/L	4.0	40	12-SEP-13
Iron (Fe)-Leachable		<0.030	<0.030	RPD-NA	mg/L	N/A	40	12-SEP-13
Magnesium (Mg)-Leachable		61.6	64.1		mg/L	4.0	40	12-SEP-13
Potassium (K)-Leachable		24.2	24.0		mg/L	1.0	40	12-SEP-13
Silicon (Si)-Leachable		3.44	3.40		mg/L	1.2	40	12-SEP-13
Sodium (Na)-Leachable		3.5	3.5		mg/L	1.0	40	12-SEP-13
Sulfur (S)-Leachable		90.8	90.7		mg/L	0.1	40	12-SEP-13
Titanium (Ti)-Leachable		<0.010	<0.010	RPD-NA	mg/L	N/A	40	12-SEP-13
WG1741597-1 MB								
Calcium (Ca)-Leachable			<0.050		mg/L		0.05	12-SEP-13
Iron (Fe)-Leachable			<0.030		mg/L		0.03	12-SEP-13
Magnesium (Mg)-Leachable			<0.10		mg/L		0.1	12-SEP-13
Potassium (K)-Leachable			<2.0		mg/L		2	12-SEP-13
Silicon (Si)-Leachable			<0.050		mg/L		0.05	12-SEP-13
Sodium (Na)-Leachable			<2.0		mg/L		2	12-SEP-13
Sulfur (S)-Leachable			<0.50		mg/L		0.5	12-SEP-13
Titanium (Ti)-Leachable			<0.010		mg/L		0.01	12-SEP-13
WG1741597-3 MS		**L1349013-1**						
Calcium (Ca)-Leachable			N/A	MS-B	%		-	12-SEP-13
Iron (Fe)-Leachable			123.8		%		70-130	12-SEP-13
Magnesium (Mg)-Leachable			N/A	MS-B	%		-	12-SEP-13
Potassium (K)-Leachable			104.8		%		70-130	12-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-SHKFL96-ICP-VA	**Soil**							
Batch R2693009								
WG1741597-3 MS		**L1349013-1**						
Silicon (Si)-Leachable			N/A	MS-B	%		-	12-SEP-13
Sodium (Na)-Leachable			96.2		%		70-130	12-SEP-13
Titanium (Ti)-Leachable			100.7		%		70-130	12-SEP-13
MOISTURE-VA	**Soil**							
Batch R2686351								
WG1739540-3 DUP		**L1348930-6**						
Moisture		9.44	10.1		%	6.4	20	03-SEP-13
WG1739540-2 LCS								
Moisture			99.9		%		70-130	03-SEP-13
WG1739540-1 MB								
Moisture			<0.25		%		0.25	03-SEP-13
ORP-SHKFL96-VA	**Soil**							
Batch R2694429								
WG1741597-2 DUP		**L1348930-9**						
Oxidation-Reduction Potential (ORP)		294	289		mV	1.6	25	16-SEP-13
PH-1:2-VA	**Soil**							
Batch R2681614								
WG1732891-2 DUP		**L1348930-1**						
pH (1:2 soil:water)		8.30	8.16	J	pH	0.14	0.3	28-AUG-13
PH-PASTE-VA	**Soil**							
Batch R2684941								
WG1736365-3 DUP		**L1348930-2**						
Paste pH		7.45	7.47	J	pH	0.02	0.3	03-SEP-13
PH-SHKFL96-MAN-VA	**Soil**							
Batch R2690406								
WG1741597-2 DUP		**L1348930-9**						
pH		7.59	7.58	J	pH	0.01	0.3	10-SEP-13
S-TOT-LECO-SK	**Soil**							
Batch R2676789								
WG1730215-1 DUP		**L1348930-10**						
Sulfur (S)-Total		1500	1300		mg/kg	16	30	21-AUG-13
WG1730215-2 IRM		**1646A_SOIL**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-TOT-LECO-SK	**Soil**							
Batch R2676789								
WG1730215-2 IRM		**1646A_SOIL**						
Sulfur (S)-Total			3700		mg/kg		2500-4600	21-AUG-13
WG1730215-3 MB								
Sulfur (S)-Total			<500		mg/kg		500	21-AUG-13
Batch R2677786								
WG1731206-1 DUP		**L1348930-6**						
Sulfur (S)-Total		600	500		mg/kg	9.8	30	22-AUG-13
WG1731206-2 IRM		**1646A_SOIL**						
Sulfur (S)-Total			3500		mg/kg		2500-4600	22-AUG-13
WG1731206-3 MB								
Sulfur (S)-Total			<500		mg/kg		500	22-AUG-13
SO4-SHKFL96-TURB-VA	**Soil**							
Batch R2691531								
WG1741597-2 DUP		**L1348930-9**						
Sulfate (SO4)		271	269		mg/L	0.7	30	11-SEP-13
WG1741597-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	11-SEP-13
WG1745162-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	11-SEP-13
WG1745162-4 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	11-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							
Moisture content							
	1	13-AUG-13 17:13	03-SEP-13 08:58	14	21	days	EHT
	2	13-AUG-13 17:23	03-SEP-13 08:58	14	21	days	EHT
	3	14-AUG-13 13:55	03-SEP-13 08:58	14	20	days	EHT
	4	14-AUG-13 12:39	03-SEP-13 08:58	14	20	days	EHT
	5	14-AUG-13 11:24	03-SEP-13 08:58	14	20	days	EHT
	6	14-AUG-13 10:03	03-SEP-13 08:58	14	20	days	EHT
	7	14-AUG-13 14:05	03-SEP-13 08:58	14	20	days	EHT
	8	14-AUG-13 12:49	03-SEP-13 08:58	14	20	days	EHT
	9	14-AUG-13 11:34	03-SEP-13 08:58	14	20	days	EHT
	10	14-AUG-13 10:13	03-SEP-13 08:58	14	20	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 L1348930 were received on 16-AUG-13 09:15.

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.

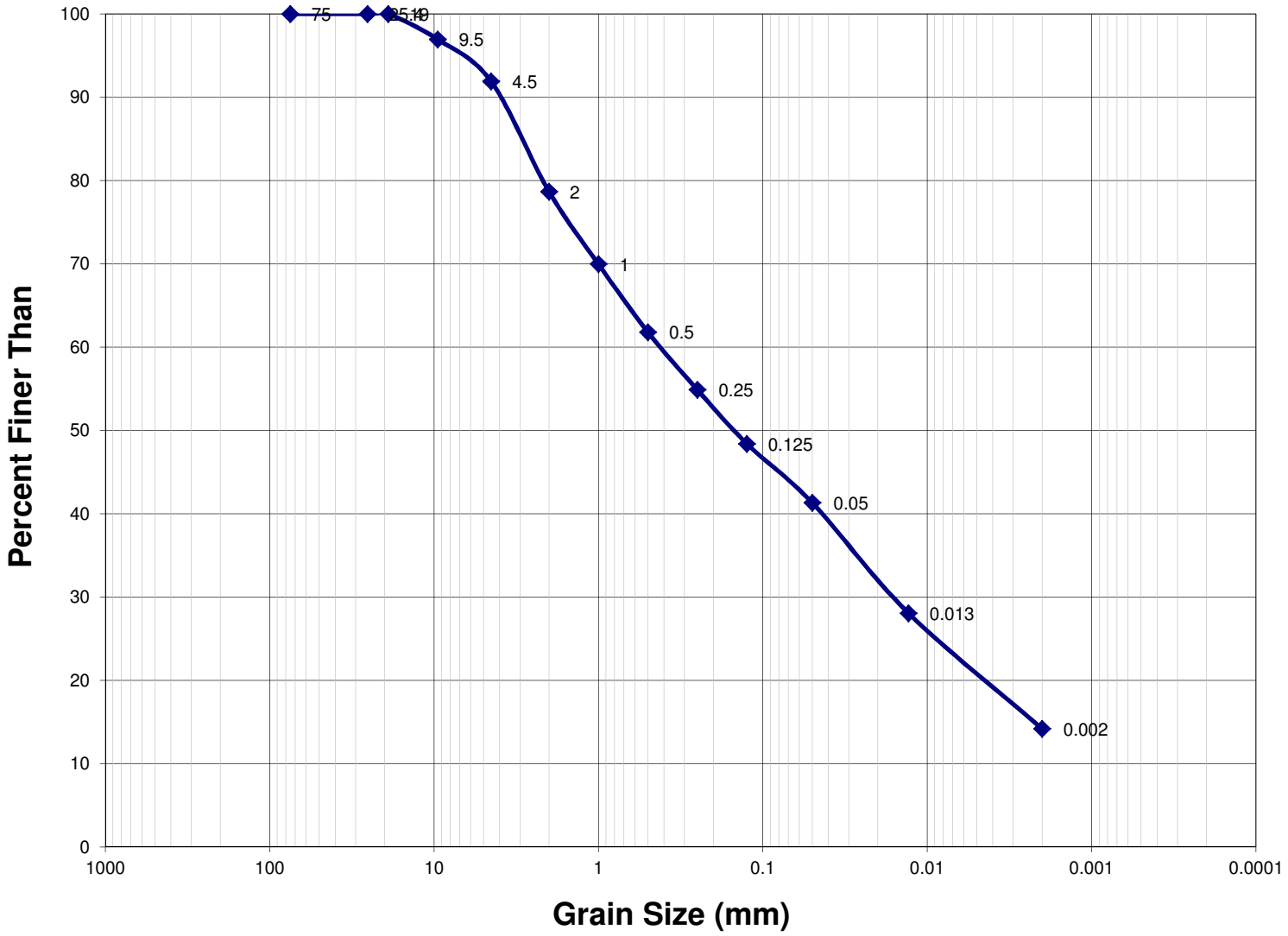
Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-TP006_SOA
Lab ID: L1348930-1

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	8
Coarse Sand	2.0mm - 4.75mm	13
Medium Sand	0.425mm - 2.0mm	17
Fine Sand	0.075mm - 0.425mm	18
Fines	< 0.075mm	44

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	21
Sand	0.05mm - 2mm	37
Silt	0.002mm - 0.05mm	27
Clay	< 0.002mm	14
Texture	Loam	

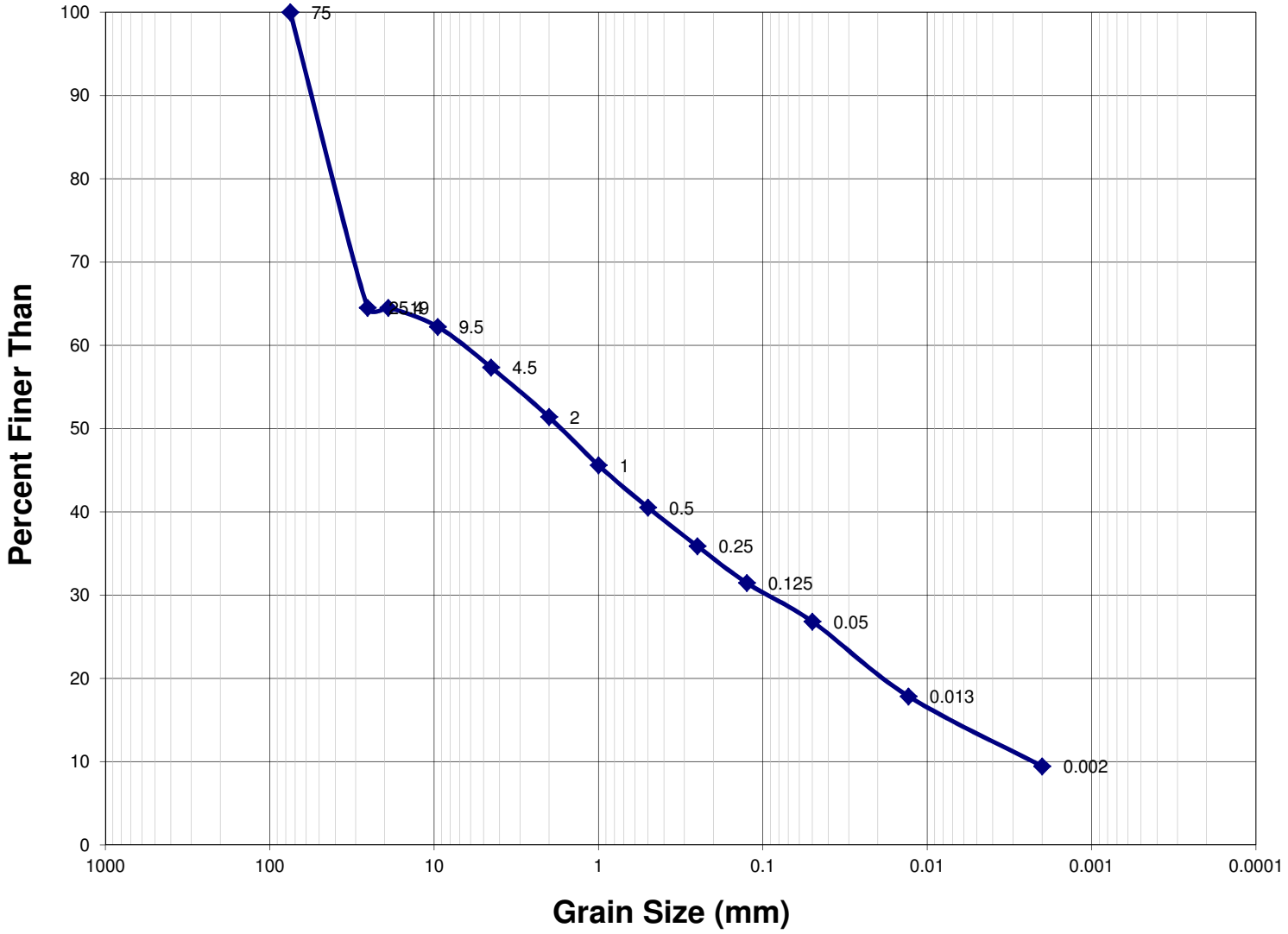
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-TP905_SOA
Lab ID: L1348930-10

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	42
Coarse Sand	2.0mm - 4.75mm	6
Medium Sand	0.425mm - 2.0mm	11
Fine Sand	0.075mm - 0.425mm	12
Fines	< 0.075mm	28

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	49
Sand	0.05mm - 2mm	25
Silt	0.002mm - 0.05mm	17
Clay	< 0.002mm	9

Texture Loam

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 1-SEP-2013
Account: APN

CERTIFICATE VA13151661

Project: L1348930
P.O. No.: L1348930
This report is for 10 Soil samples submitted to our lab in Vancouver, BC, Canada on 20-AUG-2013.
The following have access to data associated with this certificate:

ALSE VANCOUVER WEBTRIEVE	AMBER SPRINGER	

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
SCR-41	Screen to -180um and save both

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
S-GRA06a	Sulfate Sulfur (HCl leachable)	WST-SEQ
ME-MS81	Lithium Borate Fusion ICP-MS	ICP-MS

To: ALS ENVIRONMENTAL
ATTN: AMBER SPRINGER
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

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

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

Signature:
Colin Ramshaw, Vancouver Laboratory Manager

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Project: L1348930

CERTIFICATE OF ANALYSIS VA13151661

Sample Description	Method / Analyte / Units / LOR	WEI-21 Recvd Wt. kg 0.02	S-GRA06a S % 0.01	ME-MS81 Ba ppm 0.5
L1348930-1		0.24	<0.01	1075
L1348930-2		0.24	0.01	1100
L1348930-3		0.24	0.02	1165
L1348930-4		0.22	<0.01	1080
L1348930-5		0.24	0.02	3200
L1348930-6		0.20	<0.01	1175
L1348930-7		0.26	<0.01	1180
L1348930-8		0.22	<0.01	1075
L1348930-9		0.22	0.02	3360
L1348930-10		0.26	<0.01	1190

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

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Project: L1348930

CERTIFICATE OF ANALYSIS VA13151661

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

Applies to Method:			
LOG- 22	ME- MS81	SCR- 41	S- GRA06a
WEI- 21			

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 1- SEP- 2013
Account: APN

QC CERTIFICATE VA13151661

Project: L1348930

P.O. No.: L1348930

This report is for 10 Soil samples submitted to our lab in Vancouver, BC, Canada on 20- AUG- 2013.

The following have access to data associated with this certificate:

ALS ENVIRONMENTAL VANCOUVER WEBFILE	AMBER SPRINGER	

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI- 21	Received Sample Weight
LOG- 22	Sample login - Rcd w/o BarCode
SCR- 41	Screen to - 180um and save both

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
S- GRA06a	Sulfate Sulfur (HCl leachable)	WST- SEQ
ME- MS81	Lithium Borate Fusion ICP- MS	ICP- MS

To: ALS ENVIRONMENTAL
ATTN: AMBER SPRINGER
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

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

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

Signature:
Colin Ramshaw, Vancouver Laboratory Manager

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Project: L1348930

QC CERTIFICATE OF ANALYSIS VA13151661

Sample Description	Method / Analyte / Units / LOR	S- GRA08a S % 0.01	ME- MS81 Ba ppm 0.5
STANDARDS			
HV- 2		0.17	
Target Range - Lower Bound		0.16	
Target Range - Upper Bound		0.20	
OREAS 146			>10000
Target Range - Lower Bound			11460
Target Range - Upper Bound			>10000
SY- 4			367
Target Range - Lower Bound			306
Target Range - Upper Bound			376
UTS- 1		0.88	
Target Range - Lower Bound		0.81	
Target Range - Upper Bound		0.96	
BLANKS			
BLANK			<0.5
Target Range - Lower Bound			<0.5
Target Range - Upper Bound			1.0
BLANK		<0.01	
Target Range - Lower Bound		<0.01	
Target Range - Upper Bound		0.02	
DUPLICATES			
L1348930- 1			1075
DUP			1085
Target Range - Lower Bound			1025
Target Range - Upper Bound			1135
L1348930- 10		<0.01	
DUP		<0.01	
Target Range - Lower Bound		<0.01	
Target Range - Upper Bound		0.02	

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

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY,
BURNABY BC V5A 1W9

Finalized Date: 1- SEP- 2013
Account: APN

Project: L1348930

QC CERTIFICATE OF ANALYSIS VA13151661

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

Applies to Method:			
LOG- 22	ME- MS81	SCR- 41	S- GRA06a
WEI- 21			

ALS Environmental

September 19, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA

Attn: Amber Springer

Project: L1348930 **Date Received:** August 21, 2013

Certificate of Analysis

Client ID:	Sample Date:		Lab #:		Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $CaCO_3$/1,000t
L1348930- 1	8/13/13	0000	T1301229- 001		7.53	22
L1348930- 2	8/13/13	0000	T1301229- 002		8.32	23
L1348930- 3	8/14/13	0000	T1301229- 003		8.98	21
L1348930- 4	8/14/13	0000	T1301229- 004		8.70	31
L1348930- 5	8/14/13	0000	T1301229- 005		8.14	75
L1348930- 6	8/14/13	0000	T1301229- 006		8.60	22
L1348930- 7	8/14/13	0000	T1301229- 007		8.75	20
L1348930- 8	8/14/13	0000	T1301229- 008		8.17	19
L1348930- 9	8/14/13	0000	T1301229- 009		6.25	66
L1348930- 10	8/14/13	0000	T1301229- 010		9.35	19

Notes:
Samples were air dried then ground to < 60 mesh.

W. Hyatt
Digitally signed by Wendy Hyatt
Date: 2013.09.19 09:14:35 -07'00'

Wendy Hyatt, Project Chemist

ALS Environmental

September 19, 2013

Client: ALS Environmental- Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1348930 **Date Received:** August 21, 2013

Quality Control

				Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $CaCO_3$/1,000t
Prep Blank				<0.01	< 1
Laboratory Control Sample (LCS) - Rice Flour CN 3451			Observed Value	9.64	n/a
			True Value	9.50	
			%R	**101**	
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	998
			True Value		1,000
			%R		**100**
Duplicate Results			T1301229-001	0.38 **	
			Duplicate	0.30 **	
			%R	**24**	
Duplicate Results				T1301229-006	22
				Duplicate	23
				%RPD	**4**

**Residual moisture - does not include air dry moisture.

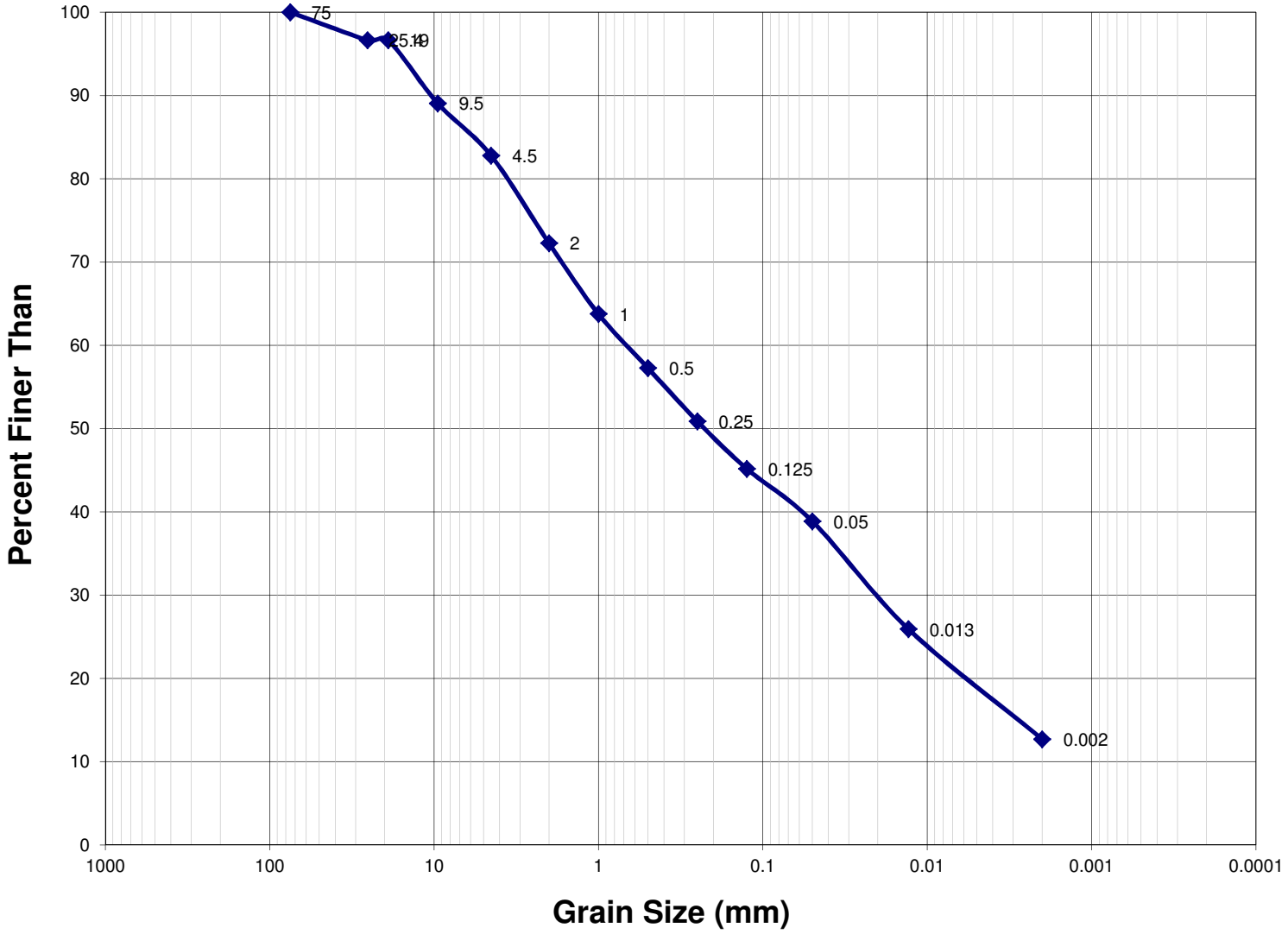
ADDRESS 3860 S. Palo Verde Road, Suite 302, Tucson, AZ 85714
PHONE +1 520 573 1061
FAX +1 520 573 1063

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-TP906_SOA
Lab ID: L1348930-2

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	17
Coarse Sand	2.0mm - 4.75mm	11
Medium Sand	0.425mm - 2.0mm	15
Fine Sand	0.075mm - 0.425mm	16
Fines	< 0.075mm	41

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	28
Sand	0.05mm - 2mm	33
Silt	0.002mm - 0.05mm	26
Clay	< 0.002mm	13

Texture Loam

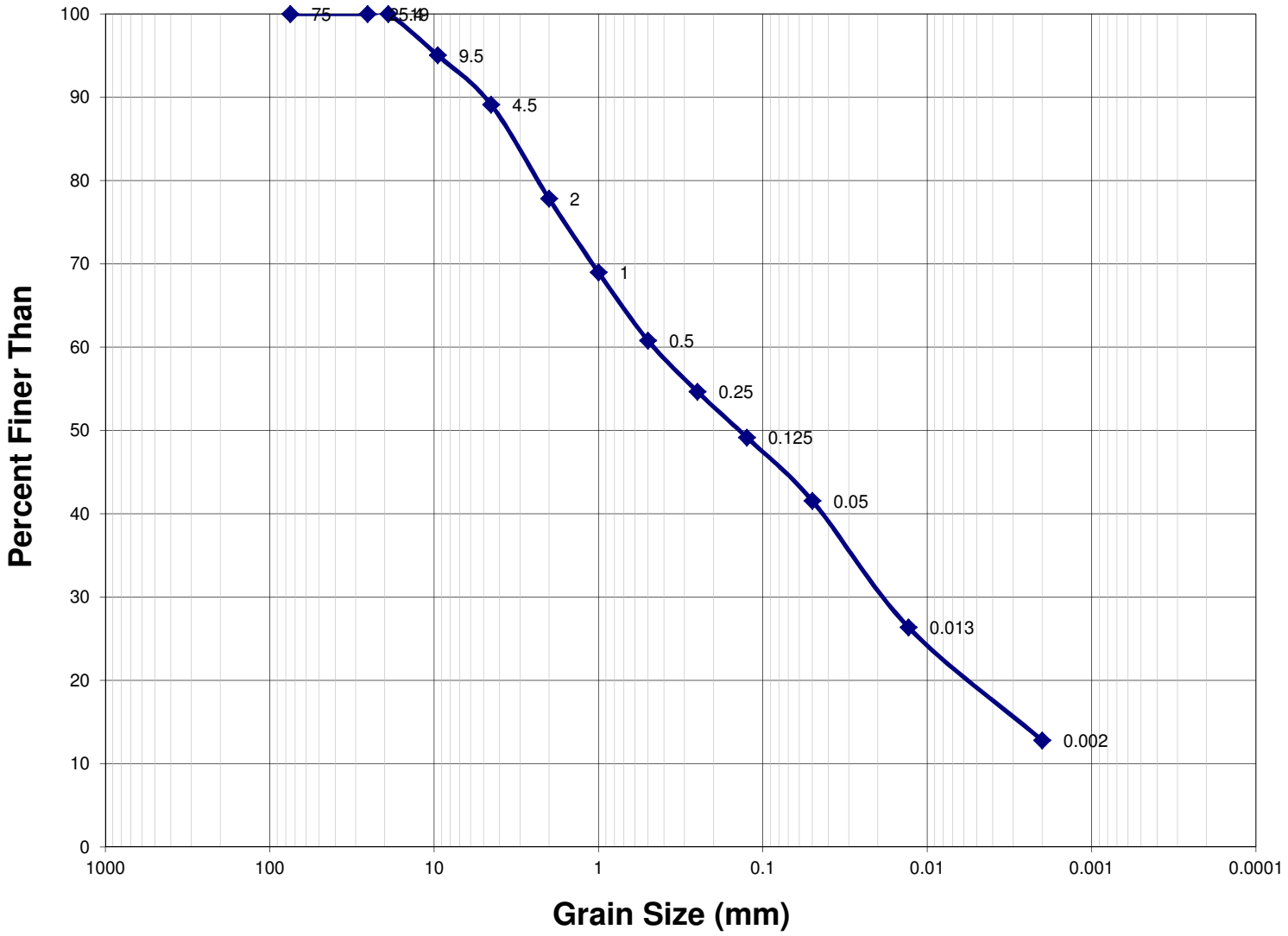
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-TP002_SOA
Lab ID: L1348930-3

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	11
Coarse Sand	2.0mm - 4.75mm	12
Medium Sand	0.425mm - 2.0mm	17
Fine Sand	0.075mm - 0.425mm	17
Fines	< 0.075mm	44

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	22
Sand	0.05mm - 2mm	36
Silt	0.002mm - 0.05mm	29
Clay	< 0.002mm	13
Texture	Loam	

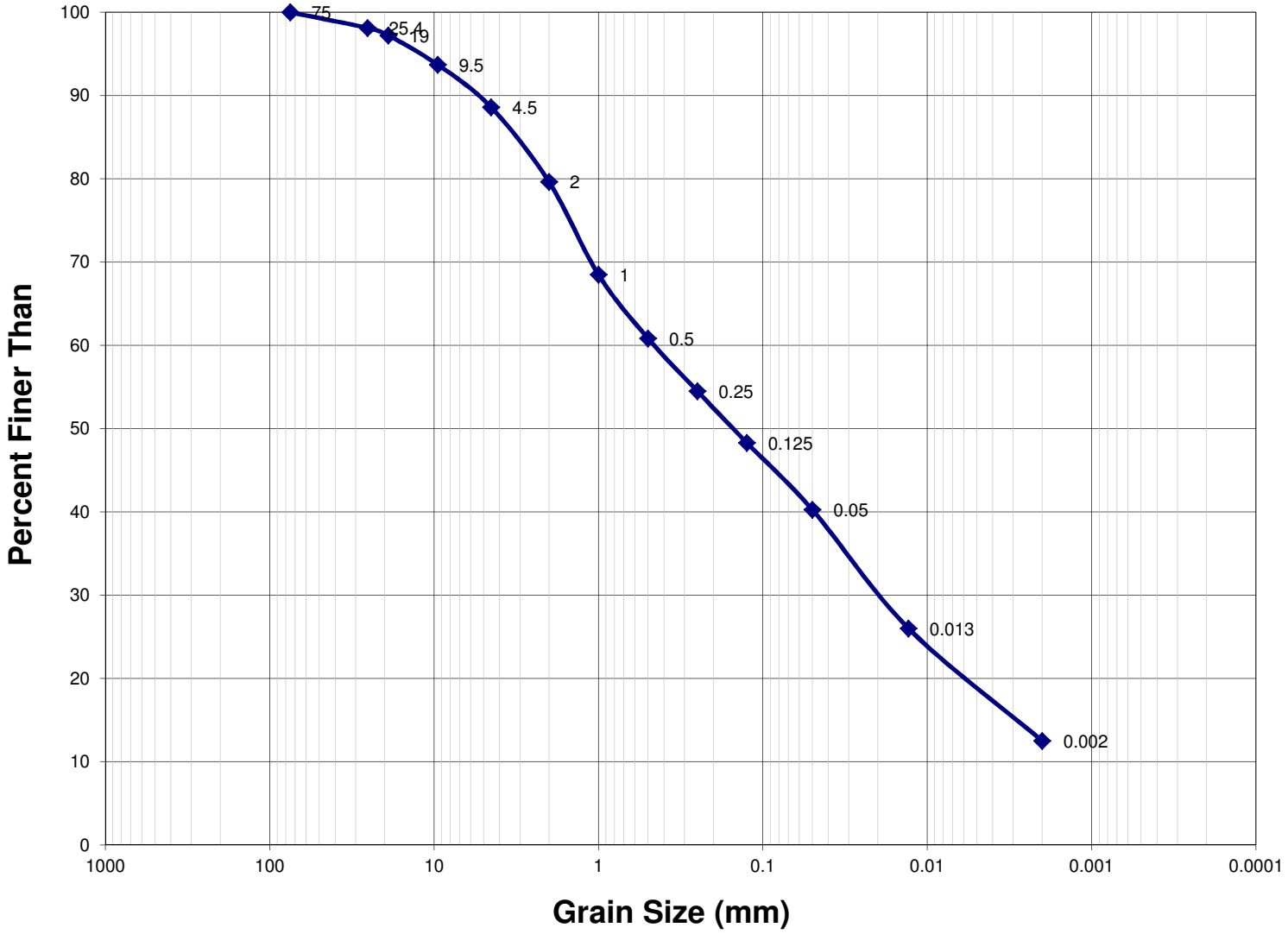
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-TP003_SOA
Lab ID: L1348930-4

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	11
Coarse Sand	2.0mm - 4.75mm	9
Medium Sand	0.425mm - 2.0mm	19
Fine Sand	0.075mm - 0.425mm	18
Fines	< 0.075mm	43

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	20
Sand	0.05mm - 2mm	39
Silt	0.002mm - 0.05mm	28
Clay	< 0.002mm	12

Texture Loam

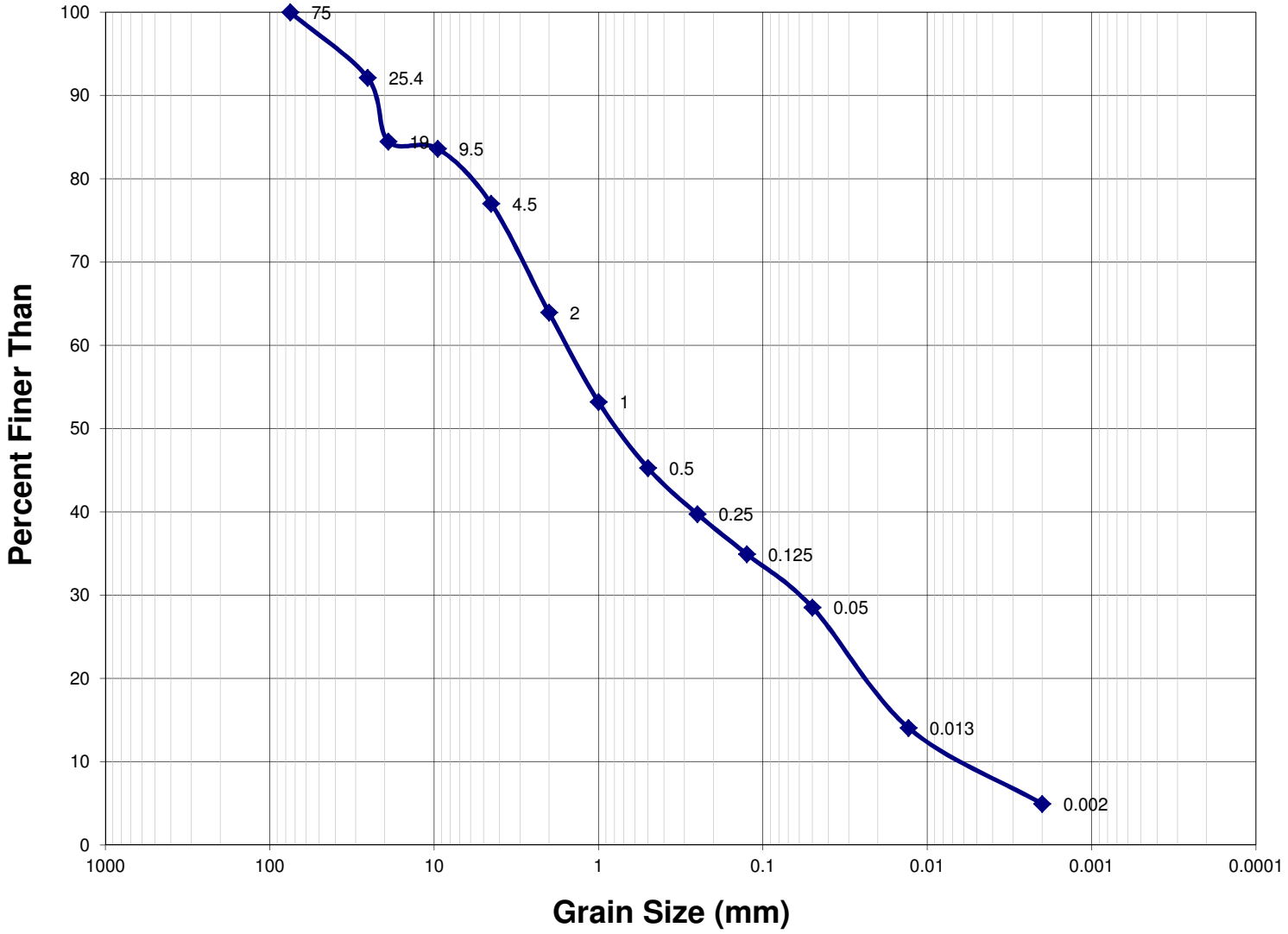
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-TP004_SOA
Lab ID: L1348930-5

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	23
Coarse Sand	2.0mm - 4.75mm	13
Medium Sand	0.425mm - 2.0mm	19
Fine Sand	0.075mm - 0.425mm	15
Fines	< 0.075mm	31

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	36
Sand	0.05mm - 2mm	35
Silt	0.002mm - 0.05mm	24
Clay	< 0.002mm	5
Texture	Sandy loam	

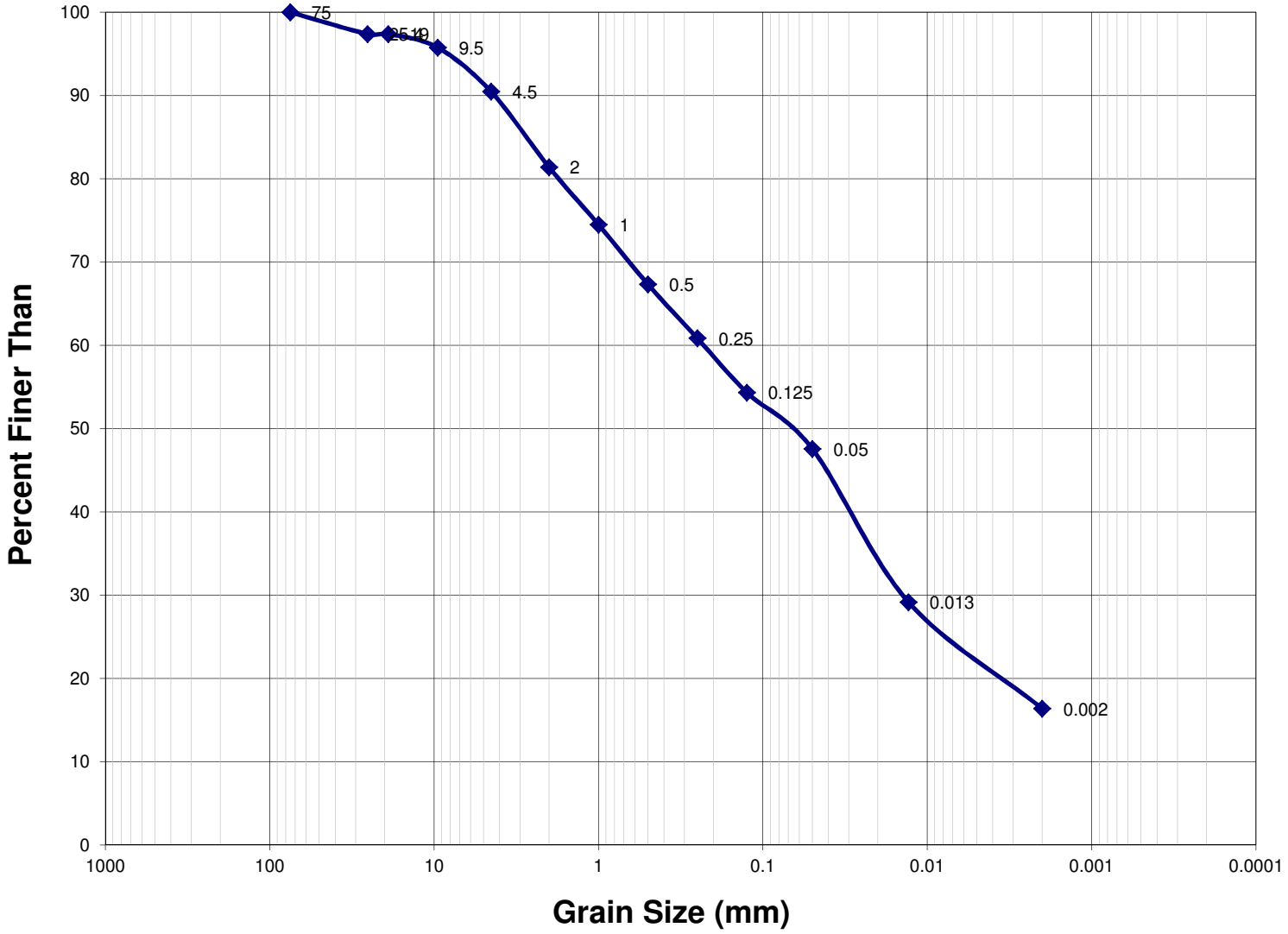
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-TP005_SOA
Lab ID: L1348930-6

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	9
Coarse Sand	2.0mm - 4.75mm	9
Medium Sand	0.425mm - 2.0mm	14
Fine Sand	0.075mm - 0.425mm	17
Fines	< 0.075mm	50

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	19
Sand	0.05mm - 2mm	34
Silt	0.002mm - 0.05mm	31
Clay	< 0.002mm	16

Texture Loam

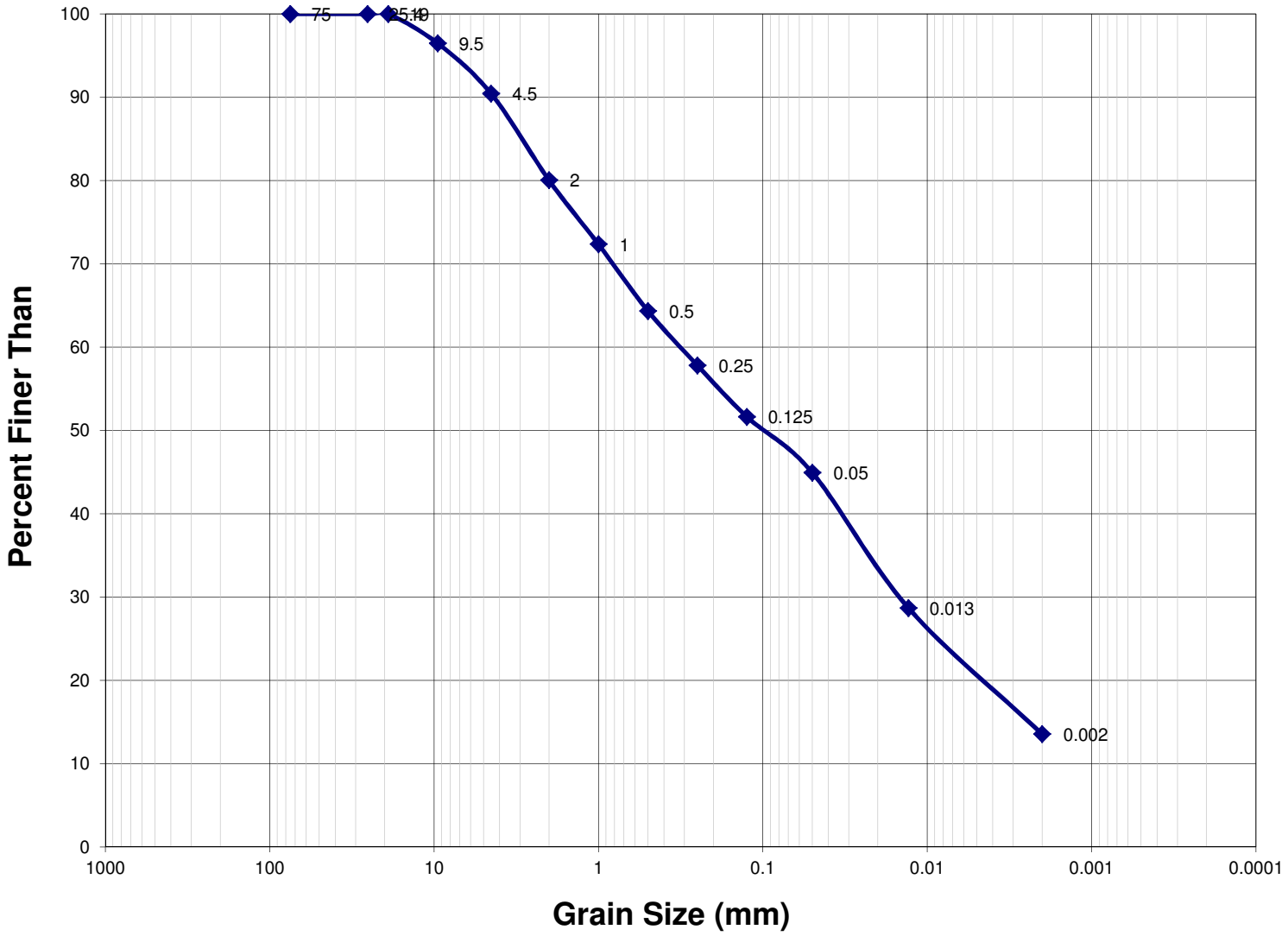
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-TP902_SOA
Lab ID: L1348930-7

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	9
Coarse Sand	2.0mm - 4.75mm	11
Medium Sand	0.425mm - 2.0mm	16
Fine Sand	0.075mm - 0.425mm	17
Fines	< 0.075mm	47

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	20
Sand	0.05mm - 2mm	35
Silt	0.002mm - 0.05mm	31
Clay	< 0.002mm	14

Texture Loam

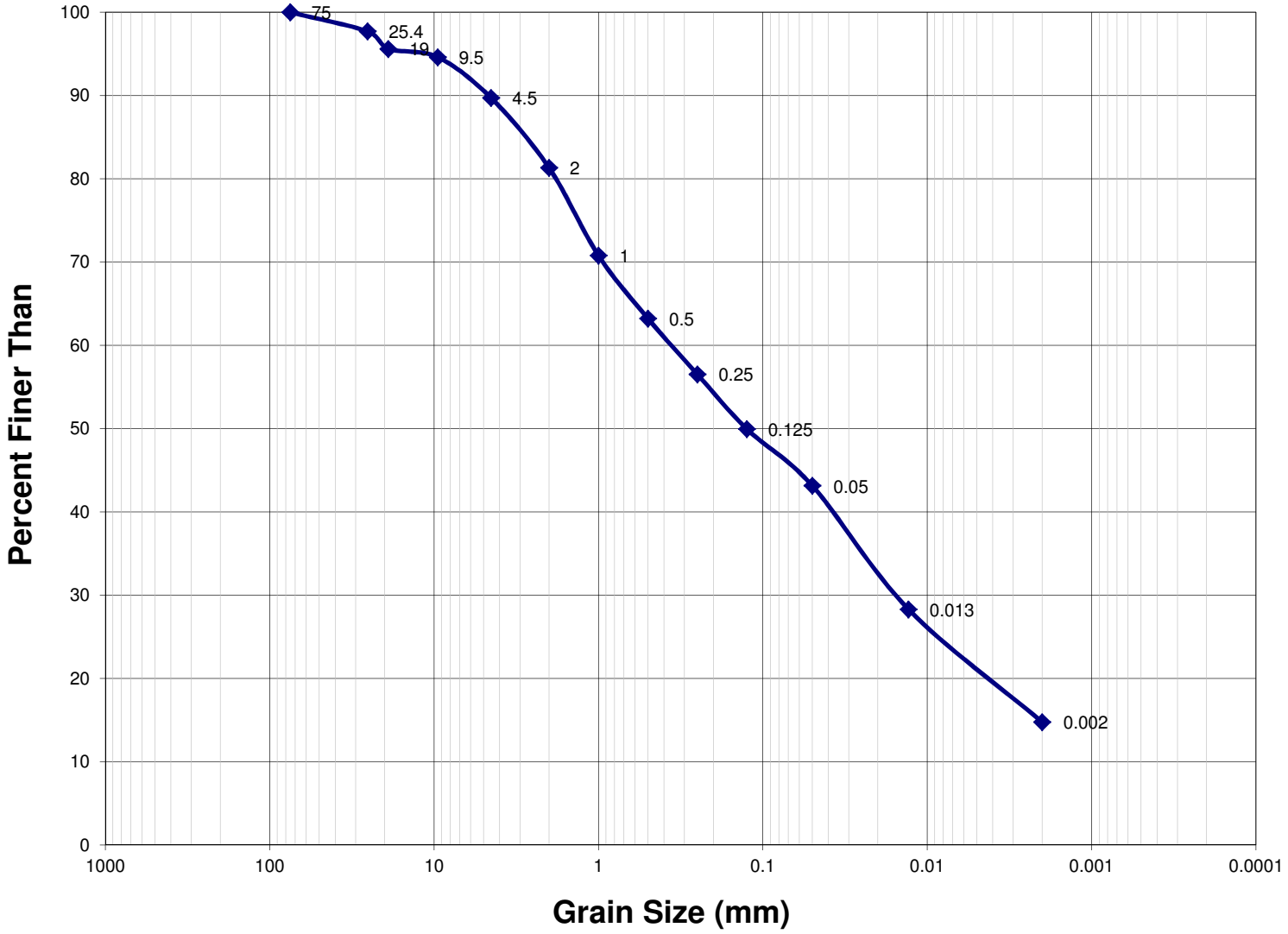
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ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-TP903_SOA
Lab ID: L1348930-8

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	10
Coarse Sand	2.0mm - 4.75mm	9
Medium Sand	0.425mm - 2.0mm	18
Fine Sand	0.075mm - 0.425mm	18
Fines	< 0.075mm	45

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	19
Sand	0.05mm - 2mm	38
Silt	0.002mm - 0.05mm	28
Clay	< 0.002mm	15
Texture	Loam	

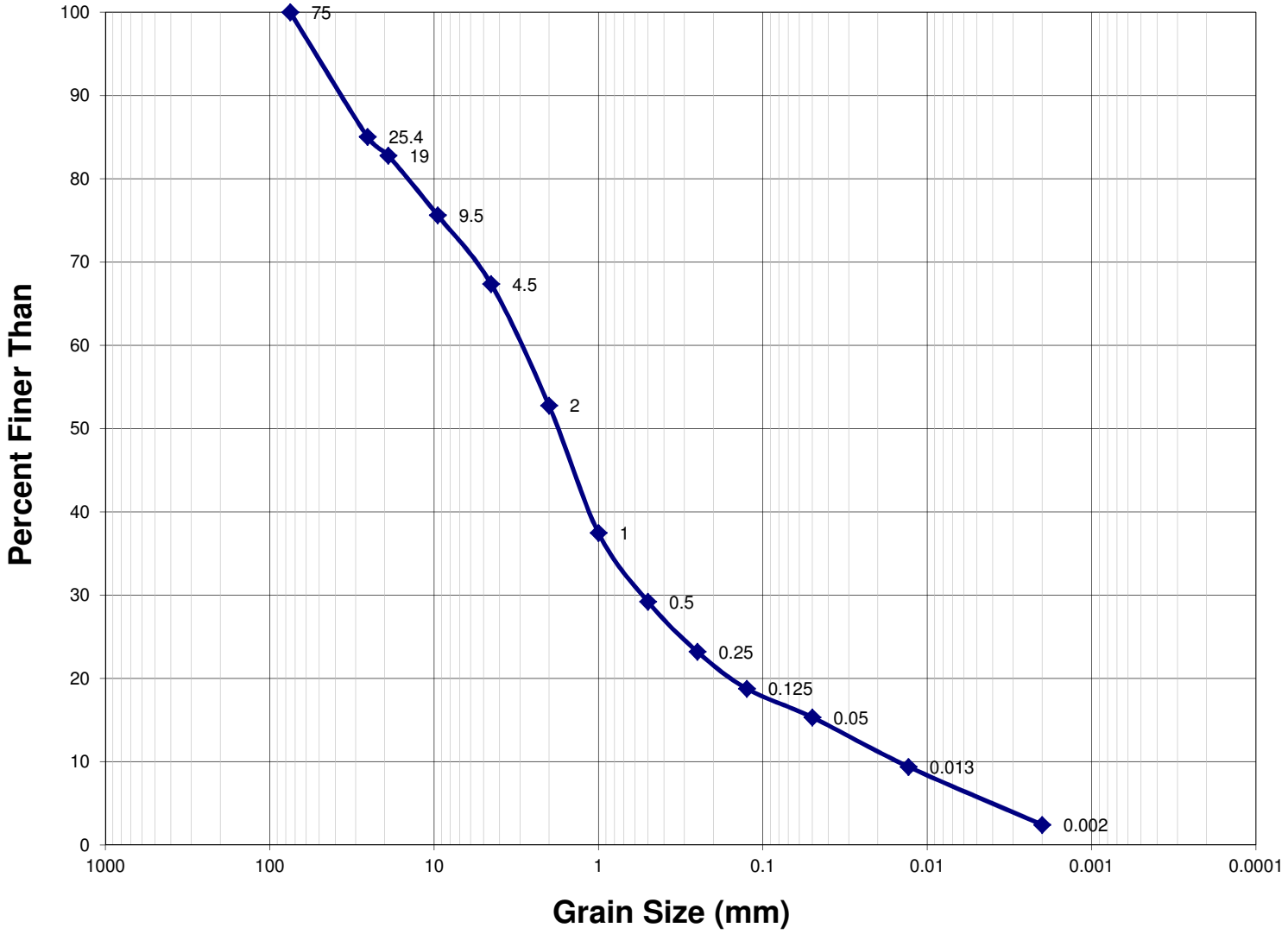
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-TP904_SOA
Lab ID: L1348930-9

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	32
Coarse Sand	2.0mm - 4.75mm	15
Medium Sand	0.425mm - 2.0mm	24
Fine Sand	0.075mm - 0.425mm	13
Fines	< 0.075mm	16

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	47
Sand	0.05mm - 2mm	37
Silt	0.002mm - 0.05mm	13
Clay	< 0.002mm	2
Texture	Sandy loam	

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

CH2MHILL

CHAIN OF CUSTODY RECORD

8/15/2013 10:34:59 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 8/15/2013
COC Number: ALS08151301

	Container:	4oz jar	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon
	Preservatives:	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C
	Filtered:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Holding Time:	14	28	180	14	28	28	28	14	NA	NA
		(ASTM 2216) Moisture	(CSSS/APHA4500H) Paste pH	(DI/EPA600/2-78-054) Acid Soluable Sulfate	(EPA200.0/245.7/SW6020A) Total Metals Table 1	(ModifiedSobek) Mod Neutralization Potential	(SSSA (1996) P455-456) TIC	(SSSA (1996) P995-996) TOC	(SW6020A) Ba(Li) Metaborate	(ASTM 4318) Atterberg limits	(ASTM D422) Gradation

L1348930-COFC

	DATE	TIME	Matrix										# of containers	COMMENTS
CH13-311-TP006_SOa	8/13/2013	17:13	Soil	x	x	x	x	x	x	x	x	x	x	6	
CH13-311-TP906_SOa	8/13/2013	17:23	Soil	x	x	x	x	x	x	x	x	x	x	6	
CH13-311-TP002_SOa	8/14/2013	13:55	Soil	x	x	x	x	x	x	x	x	x	x	6	
CH13-311-TP003_SOa	8/14/2013	12:39	Soil	x	x	x	x	x	x	x	x	x	x	6	
CH13-311-TP004_SOa	8/14/2013	11:24	Soil	x	x	x	x	x	x	x	x	x	x	6	
CH13-311-TP005_SOa	8/14/2013	10:03	Soil	x	x	x	x	x	x	x	x	x	x	6	
CH13-311-TP902_SOa	8/14/2013	14:05	Soil	x	x	x	x	x	x	x	x	x	x	6	
CH13-311-TP903_SOa	8/14/2013	12:49	Soil	x	x	x	x	x	x	x	x	x	x	6	
CH13-311-TP904_SOa	8/14/2013	11:34	Soil	x	x	x	x	x	x	x	x	x	x	6	
CH13-311-TP905_SOa	8/14/2013	10:13	Soil	x	x	x	x	x	x	x	x	x	x	6	
													TOTAL NUMBER OF CONTAINERS	60	

L1348930

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		8/15/13 1200
Received by		16-Aug-13. 9:15
Relinquished by		
Received by		6.8, 5.6, 6.2, 5.9

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

8/15/2013 10:35:30 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 8/15/2013
COC Number: ALS08151301H

	Container:	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon			
	Preservatives:	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C			
	Filtered:	NA	NA	NA	NA	NA	NA	NA	NA			
	Holding Time:	14	14	180	14	14	14	14	14			
		(DI/ASTMD1498) DI ORP	(DI/E245.7) DI Mercury	(DI/E300) DI Sulphate	(DI/SM2310) DI Acidity	(DI/SM2320) DI Alkalinity	(DI/SM2510) DI Conductivity	(DI/SM4500H) DI pH	(DI/SW6020A) DI Diss Metals		Number of Containers	COMMENTS
	DATE / TIME / Matrix											
CH13-311-TP006_SOa	8/13/2013 17:13 Soil	X	X	X	X	X	X	X	X		3	H047
CH13-311-TP906_SOa	8/13/2013 17:23 Soil	X	X	X	X	X	X	X	X		3	
CH13-311-TP002_SOa	8/14/2013 13:55 Soil	X	X	X	X	X	X	X	X		3	
CH13-311-TP003_SOa	8/14/2013 12:39 Soil	X	X	X	X	X	X	X	X		3	
CH13-311-TP004_SOa	8/14/2013 11:24 Soil	X	X	X	X	X	X	X	X		3	
CH13-311-TP005_SOa	8/14/2013 10:03 Soil	X	X	X	X	X	X	X	X		3	
CH13-311-TP902_SOa	8/14/2013 14:05 Soil	X	X	X	X	X	X	X	X		3	
CH13-311-TP903_SOa	8/14/2013 12:49 Soil	X	X	X	X	X	X	X	X		3	
CH13-311-TP904_SOa	8/14/2013 11:34 Soil	X	X	X	X	X	X	X	X		3	
CH13-311-TP905_SOa	8/14/2013 10:13 Soil	X	X	X	X	X	X	X	X		3	
										TOTAL NUMBER OF CONTAINERS	30	

L1348930-COFC

Signatures	Date/Time
Approved by	
Sampled by	
Relinquished by	8/15/13 1200
Received by	
Relinquished by	
Received by	

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:

Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

8/15/2013 10:35:58 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 3 Days
Shipping Date: 8/15/2013
COC Number: ALS08151301R

Container:	1 Gallon
Preservatives:	4'C
Filtered:	NA
Holding Time:	180

L1348930-COFC

	DATE	TIME	Matrix	(ISO 15178-2000) Total Sulphur	Number of Containers	COMMENTS
CH13-311-TP006_SOa	8/13/2013	17:13	Soil	X	1	RUSH
CH13-311-TP906_SOa	8/13/2013	17:23	Soil	X	1	
CH13-311-TP002_SOa	8/14/2013	13:55	Soil	X	1	
CH13-311-TP003_SOa	8/14/2013	12:39	Soil	X	1	
CH13-311-TP004_SOa	8/14/2013	11:24	Soil	X	1	
CH13-311-TP005_SOa	8/14/2013	10:03	Soil	X	1	
CH13-311-TP902_SOa	8/14/2013	14:05	Soil	X	1	
CH13-311-TP903_SOa	8/14/2013	12:49	Soil	X	1	
CH13-311-TP904_SOa	8/14/2013	11:34	Soil	X	1	
CH13-311-TP905_SOa	8/14/2013	10:13	Soil	X	1	
				TOTAL NUMBER OF CONTAINERS	10	

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		
Received by		
Relinquished by		
Received by		

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 16-AUG-13
Report Date: 09-SEP-13 15:37 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1348958

Project P.O. #: 472645.06.AD.01.04.13 "PO:604564"
Job Reference: BSI GRUM OVERBURDEN DUMP 2013 311.5B.
C of C Numbers: ALS08151302
Legal Site Desc:

Comments:

09-SEP-13: EC(1:2) data has been added.

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1348958-1	L1348958-2	L1348958-3	L1348958-4	L1348958-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	13-AUG-13	13-AUG-13	14-AUG-13	14-AUG-13	14-AUG-13
	Sampled Time	17:13	17:23	13:55	12:39	11:24
	Client ID	CH13-311-TP006_SOA	CH13-311-TP906_SOA	CH13-311-TP002_SOA	CH13-311-TP003_SOA	CH13-311-TP004_SOA
Grouping	**Analyte**					
SOIL						
Physical Tests	Conductivity (1:2) (dS m-1)	0.23	0.21	0.53	0.49	0.50
	pH (1:2 CaCl2) (pH)	7.84	7.86	7.81	7.86	7.85
Anions and Nutrients	Total Nitrogen by LECO (%)			0.032		
Organic / Inorganic Carbon	CaCO3 Equivalent (%)	2.34	1.99	1.06	1.09	4.35
	Inorganic Carbon (%)	0.28	0.24	0.13	0.13	0.52
	Total Carbon by Combustion (%)	0.5	0.5	0.6	0.3	0.9
	Total Organic Carbon (%)	0.18	0.22	0.47	0.21	0.38
Plant Available Nutrients	Available Ammonium-N (mg/kg)			1.5		
	Calcium (Ca) (meq/100g)	18.1	19.5	12.2	13.3	6.80
	Cation Exchange Capacity (meq/100g)	4.73	4.94	4.57	4.07	2.79
	Copper (Cu) (mg/kg)	3.20	3.11	2.41	2.46	9.10
	Iron (Fe) (mg/kg)	90.3	95.2	47.0	45.7	58.4
	Magnesium (Mg) (meq/100g)	1.37	1.52	1.48	1.48	1.64
	Manganese (Mn) (mg/kg)	7.15	6.13	6.95	4.04	19.4
	Available Nitrate-N (mg/kg)			<2.0		
	Available Phosphate-P (mg/kg)	4.6	5.6	2.8	3.0	4.4
	Potassium (K) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
	Sodium (Na) (meq/100g)	<0.50	<0.50	<0.50	0.65	<0.50
	Available Sulfate-S (mg/kg)	28.3	30.7	176	247	149
	Zinc (Zn) (mg/kg)	2.25	2.27	2.24	2.60	49.6
Saturated Paste Extractables	SAR (SAR)	0.39	0.30	0.33	0.47	0.34
	Calcium (Ca) (mg/L)	99.1	107	540 DLA	469 DLA	350 DLA
	Chloride (Cl) (mg/L)	2.7	3.6	2.2	<2.0	26.8 DLA
	Conductivity Sat. Paste (dS m-1)	0.69	0.73	2.67	2.60	2.49
	ESP (%)	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL	16.0	N/A; Na<DL
	Magnesium (Mg) (mg/L)	18.3	19.4	88.8 DLA	86.1 DLA	152 DLA
	pH in Saturated Paste (pH)	7.99	8.05	7.63	7.75	7.74
	Potassium (K) (mg/L)	11.0	10.9	17.8 DLA	29.7 DLA	26.7 DLA
	% Saturation (%)	35.8	37.6	38.1	37.5	37.6
	Sodium (Na) (mg/L)	16.3	12.7	31.5 DLA	41.8 DLA	29.9 DLA
	Sulfur (as SO4) (mg/L)	321	343	1860 DLA	1850 DLA	1830 DLA
Metals	Phosphorus (P) (mg/kg)			658		
Miscellaneous	SMP Buffer pH (pH)	7.42	7.44	7.53	7.55	7.49

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1348958-6	L1348958-7	L1348958-8	L1348958-9	L1348958-10
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	14-AUG-13	14-AUG-13	14-AUG-13	14-AUG-13	14-AUG-13
	Sampled Time	10:03	14:05	12:49	11:34	10:13
	Client ID	CH13-311-TP005_SOA	CH13-311-TP902_SOA	CH13-311-TP903_SOA	CH13-311-TP904_SOA	CH13-311-TP905_SOA
Grouping	**Analyte**					
SOIL						
Physical Tests	Conductivity (1:2) (dS m-1)	0.25	0.20	0.37	0.47	0.17
	pH (1:2 CaCl2) (pH)	7.88	7.86	7.88	7.73	7.87
Anions and Nutrients	Total Nitrogen by LECO (%)		0.027			
Organic / Inorganic Carbon	CaCO3 Equivalent (%)	1.41	1.09	1.80	6.03	1.77
	Inorganic Carbon (%)	0.17	0.13	0.22	0.72	0.21
	Total Carbon by Combustion (%)	0.3	0.3	0.4	1.0	0.4
	Total Organic Carbon (%)	0.16	0.19	0.16	0.31	0.24
Plant Available Nutrients	Available Ammonium-N (mg/kg)		2.6			
	Calcium (Ca) (meq/100g)	15.6	12.6	15.3	8.42	16.5
	Cation Exchange Capacity (meq/100g)	4.52	4.79	4.58	3.59	5.16
	Copper (Cu) (mg/kg)	3.71	2.18	3.51	14.9	3.24
	Iron (Fe) (mg/kg)	81.6	89.4	121	71.6	115
	Magnesium (Mg) (meq/100g)	1.29	1.29	1.42	2.12	1.37
	Manganese (Mn) (mg/kg)	16.1	6.58	6.40	11.1	6.67
	Available Nitrate-N (mg/kg)		<2.0			
	Available Phosphate-P (mg/kg)	4.6	5.2	5.4	8.4	9.2
	Potassium (K) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
	Sodium (Na) (meq/100g)	<0.50	<0.50	<0.50	<0.50	<0.50
	Available Sulfate-S (mg/kg)	53.3	25.7	99.2	155	19.3
	Zinc (Zn) (mg/kg)	2.91	14.6	5.23	119	2.72
Saturated Paste Extractables	SAR (SAR)	0.47	0.19	0.31	0.29	0.25
	Calcium (Ca) (mg/L)	138	78.5	354	326	60.4
	Chloride (Cl) (mg/L)	8.6	4.0	<2.0	130	8.7
	Conductivity Sat. Paste (dS m-1)	0.95	0.57	1.92	2.16	0.48
	ESP (%)	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL
	Magnesium (Mg) (mg/L)	23.8	14.1	61.7	125	10.7
	pH in Saturated Paste (pH)	7.95	8.05	7.82	7.69	8.08
	Potassium (K) (mg/L)	10.2	7.4	18.9	22.5	8.9
	% Saturation (%)	33.9	26.0	34.2	39.8	32.4
	Sodium (Na) (mg/L)	22.7	7.0	23.8	24.0	8.1
	Sulfur (as SO4) (mg/L)	514	253	1280	1540	197
Metals	Phosphorus (P) (mg/kg)		693			
Miscellaneous	SMP Buffer pH (pH)	7.47	7.47	7.48	7.53	7.48

* 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)
Internal Reference Material	Chloride (Cl)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Internal Reference Material	Calcium (Ca)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Internal Reference Material	Magnesium (Mg)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Internal Reference Material	Potassium (K)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Internal Reference Material	Sodium (Na)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Internal Reference Material	Sulfur (as SO4)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Internal Reference Material	Calcium (Ca)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Internal Reference Material	Magnesium (Mg)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Internal Reference Material	Potassium (K)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Internal Reference Material	Sodium (Na)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Calcium (Ca)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Magnesium (Mg)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Potassium (K)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Sodium (Na)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Sulfur (as SO4)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Calcium (Ca)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Magnesium (Mg)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Potassium (K)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Sodium (Na)	DLA	L1348958-1, -10, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-INORG-ORG-SK	Soil	Inorganic and Organic Carbon	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-LECO-SK	Soil	Total Carbon by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.

CAT-XTR-SK	Soil	Ammonium Acetate Extractable Cations	CSSS 19.4 - 1M NH4OAc Extraction @ pH 7

Exchangeable Ca, Mg, Na, and K are extracted from the soil using neutral 1N ammonium acetate, then determined by ICP-OES. This method does not correct for calcium or magnesium extracted from carbonates or free gypsum.

CEC-SK	Soil	Cation Exchange Capacity (NH4OAC Extn)	CSSS(1978) 3.321/Comm Soil Sci 17(7)

Soil exchange sites are saturated with ammonium, then displaced with sodium. Ammonium in the extract is determined colorimetrically.

CL-SAR-SK	Soil	Chloride (Cl) (Saturated Paste)	CSSS(1993) 18.2.2/APHA 4500-CL E

Chloride in a saturated soil extract is determined colorimetrically by auto-analyzer.

EC-1:2-SK	Soil	EC (1:2 Soil:Water Extraction)	CSSS 18.3.1

1 part dry soil and 2 parts de-ionized water (by volume) is mixed. The slurry is allowed to stand with occasional stirring for 30 - 60 minutes. After equilibration, the conductivity of the filtered extract is measured by a conductivity meter.

ETL-ESP-SK	Soil	Exchangeable Sodium Percentage - Calc	Calculation
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).

Reference Information

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.

METAL-DTPA-SK Soil Available Micronutrients (Cu,Fe,Zn,Mn) CSSS 1993 (11.3 AND 11.4)

Plant available micronutrients are extracted from soil using 0.005 M DTPA. Cu, Fe, Mn and Zn in the extract are determined by ICP-OES.

N-TOT-LECO-SK Soil Total Nitrogen by combustion method SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.

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.

NO3-AVAIL-KCL-SK Soil Available Nitrate-N (2N KCl) CSSS (1993) 4.2, 4.3

Available Nitrate and Nitrite are extracted from the soil using a 2N KCl 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) methods 4.2, 4.3

PH-1:2CACL2-SK Soil pH (1:2 Soil:CaCl2 Extraction) CSSC 3.11

1 part dry soil and 2 parts de-ionized 0.01M CaCl2 (by volume) is mixed. The slurry is allowed to stand with occasional stirring for 30 - 60 minutes. pH of the soil slurry is then measured using a pH meter.

PH-BUFFER-SMP-SK Soil Buffer pH (SMP) CSSS (1993) method 14.2

After equilibration with SMP buffer solution, pH of the soil solution is measured with a pH meter. Lime requirement must be determined by the client using location-specific regression equations.

PO4-AVAIL-OLSEN-SK Soil Available Phosphate-P by Olsen CSSS (1993) 7.2,7.3.1

Plant available phosphorus is extracted from the sample with sodium bicarbonate. PO4-P in the filtered extract is determined colorimetrically at 880 nm.

SAR-CALC-SK Soil SAR and Cations in saturated soil CSSS 18.4-Calculation

SAR-CALC-SO4-SK Soil SAR, Cations and SO4 in saturated soil APHA 3120B

Ca, Mg, Na, K and SO4 in a saturated soil extract are determined by ICP-OES.

SAT/PH/EC-SK Soil pH and EC (Saturated Paste) CSSS 18.2.2/CSSC 3.14/CSSS 18.3.1

pH of a saturated soil paste is measured using a pH meter. After equilibration, an extract is obtained by vacuum filtration with conductivity of the extract measured by a conductivity meter.

SO4-AVAIL-CALPHOS-SK Soil Plant Available Sulfate - Ca(H2PO4)2 NCR (1998) p. 36/APHA 3120B

Plant available sulfate is extracted from the sample using dilute calcium phosphate. SO4-S in the filtered extract is determined by ICP-OES.

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

Chain of Custody Numbers:

ALS08151302

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

Workorder: L1348958 Report Date: 09-SEP-13

Client: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-INORG-ORG-SK	**Soil**							
Batch R2678731								
WG1730475-1 DUP		**L1348958-1**						
Inorganic Carbon		0.28	0.24		%	17	20	22-AUG-13
CaCO3 Equivalent		2.34	1.98		%	17	25	22-AUG-13
WG1730475-3 IRM		**0.1%IC**						
Inorganic Carbon			113.4		%		60-140	22-AUG-13
CaCO3 Equivalent			113.8		%		60-140	22-AUG-13
WG1730475-4 IRM		**0.4%IC**						
Inorganic Carbon			103.9		%		80-120	22-AUG-13
CaCO3 Equivalent			104.1		%		80-120	22-AUG-13
WG1730475-5 MB								
Inorganic Carbon			<0.10		%		0.1	22-AUG-13
CaCO3 Equivalent			<0.80		%		0.8	22-AUG-13
Batch R2678737								
WG1731404-2 IRM		**0.1%IC**						
Inorganic Carbon			115.1		%		60-140	23-AUG-13
CaCO3 Equivalent			115.6		%		60-140	23-AUG-13
WG1731404-3 IRM		**0.4%IC**						
Inorganic Carbon			99.7		%		80-120	23-AUG-13
CaCO3 Equivalent			99.8		%		80-120	23-AUG-13
WG1731404-4 MB								
Inorganic Carbon			<0.10		%		0.1	23-AUG-13
CaCO3 Equivalent			<0.80		%		0.8	23-AUG-13
C-TOT-LECO-SK	**Soil**							
Batch R2678911								
WG1731331-16 IRM		**08-109_SOIL**						
Total Carbon by Combustion			101.5		%		80-120	22-AUG-13
WG1731331-19 IRM		**08-109_SOIL**						
Total Carbon by Combustion			102.7		%		80-120	22-AUG-13
WG1731331-17 MB								
Total Carbon by Combustion			<0.1		%		0.1	22-AUG-13
WG1731331-20 MB								
Total Carbon by Combustion			<0.1		%		0.1	22-AUG-13
Batch R2678914								
WG1730471-1 DUP		**L1348958-7**						
Total Carbon by Combustion		0.3	0.3		%	2.6	20	21-AUG-13
WG1730471-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			98.4		%		80-120	21-AUG-13
WG1730471-3 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-LECO-SK	**Soil**							
Batch R2678914								
WG1730471-3 MB								
Total Carbon by Combustion			<0.1		%		0.1	21-AUG-13
CAT-XTR-SK	**Soil**							
Batch R2680310								
WG1730271-1 DUP		**L1348958-9**						
Sodium (Na)		<0.50	<0.50	RPD-NA	meq/100g	N/A	25	26-AUG-13
Potassium (K)		<0.50	<0.50	RPD-NA	meq/100g	N/A	25	26-AUG-13
Calcium (Ca)		8.42	8.42		meq/100g	0.0	30	26-AUG-13
Magnesium (Mg)		2.12	2.07		meq/100g	2.3	30	26-AUG-13
WG1730271-3 IRM		**SAL814**						
Sodium (Na)			102.5		%		70-130	26-AUG-13
Potassium (K)			106.6		%		70-130	26-AUG-13
Calcium (Ca)			112.0		%		70-130	26-AUG-13
Magnesium (Mg)			101.9		%		70-130	26-AUG-13
WG1730271-2 MB								
Sodium (Na)			<0.50		meq/100g		0.5	26-AUG-13
Potassium (K)			<0.50		meq/100g		0.5	26-AUG-13
Calcium (Ca)			<0.50		meq/100g		0.5	26-AUG-13
Magnesium (Mg)			<0.50		meq/100g		0.5	26-AUG-13
Batch R2680311								
WG1731377-1 DUP		**L1348958-3**						
Sodium (Na)		<0.50	<0.50	RPD-NA	meq/100g	N/A	25	26-AUG-13
Potassium (K)		<0.50	<0.50	RPD-NA	meq/100g	N/A	25	26-AUG-13
Calcium (Ca)		12.2	12.3		meq/100g	1.4	30	26-AUG-13
Magnesium (Mg)		1.48	1.46		meq/100g	1.0	30	26-AUG-13
WG1731377-3 IRM		**SAL814**						
Sodium (Na)			99.8		%		70-130	26-AUG-13
Potassium (K)			104.5		%		70-130	26-AUG-13
Calcium (Ca)			110.4		%		70-130	26-AUG-13
Magnesium (Mg)			100.3		%		70-130	26-AUG-13
WG1731377-2 MB								
Sodium (Na)			<0.50		meq/100g		0.5	26-AUG-13
Potassium (K)			<0.50		meq/100g		0.5	26-AUG-13
Calcium (Ca)			<0.50		meq/100g		0.5	26-AUG-13
Magnesium (Mg)			<0.50		meq/100g		0.5	26-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CEC-SK	**Soil**							
Batch R2680094								
WG1731375-1 DUP		**L1348958-3**						
Cation Exchange Capacity		4.57	4.26		meq/100g	7.0	20	26-AUG-13
WG1731375-3 IRM		**SAL814**						
Cation Exchange Capacity			90.3		%		70-130	26-AUG-13
WG1731375-2 MB								
Cation Exchange Capacity			<0.80		meq/100g		0.8	26-AUG-13
Batch R2680095								
WG1730499-1 DUP		**L1348958-9**						
Cation Exchange Capacity		3.59	3.53		meq/100g	1.6	20	26-AUG-13
WG1730499-3 IRM		**SAL814**						
Cation Exchange Capacity			92.6		%		70-130	26-AUG-13
WG1730499-2 MB								
Cation Exchange Capacity			<0.80		meq/100g		0.8	26-AUG-13
CL-SAR-SK	**Soil**							
Batch R2678692								
WG1730129-1 DUP		**L1348958-4**						
Chloride (Cl)		<2.0	<2.0	RPD-NA	mg/L	N/A	30	23-AUG-13
WG1730129-3 IRM		**ED-SAL_NAT1**						
Chloride (Cl)			89.6		%		70-130	23-AUG-13
WG1730129-2 MB								
Chloride (Cl)			<2.0		mg/L		2	23-AUG-13
EC-1:2-SK	**Soil**							
Batch R2689656								
WG1742004-1 DUP		**L1348958-3**						
Conductivity (1:2)		0.53	0.53		dS m-1	0.8	20	09-SEP-13
WG1742004-3 IRM		**SAL814**						
Conductivity (1:2)			100.8		%		80-120	09-SEP-13
WG1742004-2 MB								
Conductivity (1:2)			<0.10		dS m-1		0.1	09-SEP-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2682552								
WG1734559-3 CRM		**VA-CANMET-TILL1**						
Phosphorus (P)			99.8		%		70-130	28-AUG-13
WG1734559-2 DUP		**L1348958-7**						
Phosphorus (P)		693	550		mg/kg	23	30	28-AUG-13
WG1734559-1 MB								
Phosphorus (P)			<50		mg/kg		50	28-AUG-13
METAL-DTPA-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
METAL-DTPA-SK	**Soil**							
Batch R2677712								
WG1730181-2 MB								
Copper (Cu)			<0.10		mg/kg		0.1	22-AUG-13
Iron (Fe)			<2.0		mg/kg		2	22-AUG-13
Manganese (Mn)			<0.050		mg/kg		0.05	22-AUG-13
Zinc (Zn)			<0.20		mg/kg		0.2	22-AUG-13
Batch R2679117								
WG1731422-3 IRM		**11-119**						
Copper (Cu)			96.8		%		70-130	23-AUG-13
Iron (Fe)			106.3		%		70-130	23-AUG-13
Manganese (Mn)			97.4		%		70-130	23-AUG-13
Zinc (Zn)			94.0		%		70-130	23-AUG-13
WG1731422-2 MB								
Copper (Cu)			<0.10		mg/kg		0.1	23-AUG-13
Iron (Fe)			<2.0		mg/kg		2	23-AUG-13
Manganese (Mn)			<0.050		mg/kg		0.05	23-AUG-13
Zinc (Zn)			<0.20		mg/kg		0.2	23-AUG-13
N-TOT-LECO-SK	**Soil**							
Batch R2678911								
WG1731331-16 IRM		**08-109_SOIL**						
Total Nitrogen by LECO			0.108		%		0.085-0.135	22-AUG-13
WG1731331-19 IRM		**08-109_SOIL**						
Total Nitrogen by LECO			0.107		%		0.085-0.135	22-AUG-13
WG1731331-17 MB								
Total Nitrogen by LECO			<0.020		%		0.02	22-AUG-13
WG1731331-20 MB								
Total Nitrogen by LECO			<0.020		%		0.02	22-AUG-13
Batch R2678914								
WG1730471-1 DUP		**L1348958-7**						
Total Nitrogen by LECO		0.027	0.026		%	3.8	20	21-AUG-13
WG1730471-2 IRM		**08-109_SOIL**						
Total Nitrogen by LECO			0.101		%		0.085-0.135	21-AUG-13
WG1730471-3 MB								
Total Nitrogen by LECO			<0.020		%		0.02	21-AUG-13
NH4-AVAIL-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH4-AVAIL-SK	**Soil**							
Batch R2680083								
WG1730491-1 DUP		**L1348958-7**						
Available Ammonium-N		2.6	2.5		mg/kg	3.8	20	26-AUG-13
WG1730491-3 IRM		**SAL814**						
Available Ammonium-N			108.8		%		70-130	26-AUG-13
WG1730491-2 MB								
Available Ammonium-N			<1.0		mg/kg		1	26-AUG-13
Batch R2680088								
WG1731423-3 IRM		**SAL814**						
Available Ammonium-N			107.0		%		70-130	26-AUG-13
WG1731423-2 MB								
Available Ammonium-N			<1.0		mg/kg		1	26-AUG-13
NO3-AVAIL-KCL-SK	**Soil**							
Batch R2679825								
WG1730492-1 DUP		**L1348958-7**						
Available Nitrate-N		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	26-AUG-13
WG1730492-3 IRM		**SAL814**						
Available Nitrate-N			87.6		%		70-130	26-AUG-13
WG1730492-2 MB								
Available Nitrate-N			<2.0		mg/kg		2	26-AUG-13
Batch R2679826								
WG1731428-3 IRM		**SAL814**						
Available Nitrate-N			85.5		%		70-130	26-AUG-13
WG1731428-2 MB								
Available Nitrate-N			<2.0		mg/kg		2	26-AUG-13
PH-1:2CACL2-SK	**Soil**							
Batch R2677888								
WG1730183-1 DUP		**L1348958-7**						
pH (1:2 CaCl2)		7.86	7.85	J	pH	0.01	0.3	22-AUG-13
WG1730183-2 IRM		**SAL814**						
pH (1:2 CaCl2)			7.90		pH		7.55-8.15	22-AUG-13
Batch R2677889								
WG1731431-1 DUP		**L1348958-3**						
pH (1:2 CaCl2)		7.81	7.78	J	pH	0.03	0.3	22-AUG-13
WG1731431-2 IRM		**SAL814**						
pH (1:2 CaCl2)			7.88		pH		7.55-8.15	22-AUG-13
PH-BUFFER-SMP-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-BUFFER-SMP-SK	**Soil**							
Batch R2678624								
WG1730278-1 DUP		**L1348958-7**						
SMP Buffer pH		7.47	7.48	J	pH	0.01	0.2	23-AUG-13
WG1730278-3 IRM		**SAL814**						
SMP Buffer pH			7.51		pH		7.44-7.64	23-AUG-13
Batch R2678678								
WG1731472-1 DUP		**L1348958-3**						
SMP Buffer pH		7.53	7.53	J	pH	0.00	0.2	23-AUG-13
WG1731472-3 IRM		**SAL814**						
SMP Buffer pH			7.57		pH		7.44-7.64	23-AUG-13
PO4-AVAIL-OLSEN-SK	**Soil**							
Batch R2679392								
WG1731449-3 IRM		**FARM2005**						
Available Phosphate-P			82.9		%		70-130	24-AUG-13
WG1731449-2 MB								
Available Phosphate-P			<1.0		mg/kg		1	24-AUG-13
Batch R2679395								
WG1730193-1 DUP		**L1348958-8**						
Available Phosphate-P		5.4	5.4		mg/kg	0.0	30	24-AUG-13
WG1730193-3 IRM		**FARM2005**						
Available Phosphate-P			85.7		%		70-130	24-AUG-13
WG1730193-2 MB								
Available Phosphate-P			<1.0		mg/kg		1	24-AUG-13
SAR-CALC-SK	**Soil**							
Batch R2678803								
WG1730129-1 DUP		**L1348958-4**						
Calcium (Ca)		469	524		mg/L	11	30	23-AUG-13
Potassium (K)		29.7	26.2		mg/L	12	30	23-AUG-13
Magnesium (Mg)		86.1	96.5		mg/L	11	30	23-AUG-13
Sodium (Na)		41.8	32.0		mg/L	26	30	23-AUG-13
WG1730129-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			111.0		%		70-130	23-AUG-13
Potassium (K)			108.6		%		70-130	23-AUG-13
Magnesium (Mg)			104.6		%		70-130	23-AUG-13
Sodium (Na)			107.3		%		70-130	23-AUG-13
WG1730129-2 MB								
Calcium (Ca)			<2.0		mg/L		2	23-AUG-13
Potassium (K)			<1.0		mg/L		1	23-AUG-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAR-CALC-SK	**Soil**							
Batch R2678803								
WG1730129-2 MB								
Magnesium (Mg)			<2.0		mg/L		2	23-AUG-13
Sodium (Na)			<4.0		mg/L		4	23-AUG-13
SAR-CALC-SO4-SK	**Soil**							
Batch R2678803								
WG1730129-1 DUP		**L1348958-4**						
Calcium (Ca)		469	524		mg/L	11	30	23-AUG-13
Potassium (K)		29.7	26.2		mg/L	12	30	23-AUG-13
Magnesium (Mg)		86.1	96.5		mg/L	11	30	23-AUG-13
Sodium (Na)		41.8	32.0		mg/L	26	30	23-AUG-13
Sulfur (as SO4)		1850	2040		mg/L	9.6	30	23-AUG-13
WG1730129-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			111.0		%		70-130	23-AUG-13
Potassium (K)			108.6		%		70-130	23-AUG-13
Magnesium (Mg)			104.6		%		70-130	23-AUG-13
Sodium (Na)			107.3		%		70-130	23-AUG-13
Sulfur (as SO4)			121.1		%		70-130	23-AUG-13
WG1730129-2 MB								
Calcium (Ca)			<2.0		mg/L		2	23-AUG-13
Potassium (K)			<1.0		mg/L		1	23-AUG-13
Magnesium (Mg)			<2.0		mg/L		2	23-AUG-13
Sodium (Na)			<4.0		mg/L		4	23-AUG-13
Sulfur (as SO4)			<5.0		mg/L		5	23-AUG-13
SAT/PH/EC-SK	**Soil**							
Batch R2678476								
WG1730129-1 DUP		**L1348958-4**						
% Saturation		37.5	37.9	J	%	0.3	5	23-AUG-13
pH in Saturated Paste		7.75	7.77	J	pH	0.02	0.3	23-AUG-13
Conductivity Sat. Paste		2.60	2.67		dS m-1	2.7	20	23-AUG-13
WG1730129-3 IRM		**ED-SAL_NAT1**						
% Saturation			43.8		%		38-48	23-AUG-13
pH in Saturated Paste			6.68		pH		6.5-7.1	23-AUG-13
Conductivity Sat. Paste			100.0		%		80-120	23-AUG-13
WG1730129-2 MB								
Conductivity Sat. Paste			<0.10		dS m-1		0.1	23-AUG-13
SO4-AVAIL-CALPHOS-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-AVAIL-CALPHOS-SK	**Soil**							
Batch R2679120								
WG1730192-1 DUP		**L1348958-2**						
Available Sulfate-S		30.7	27.8		mg/kg	10	40	23-AUG-13
Batch R2679121								
WG1731446-1 DUP		**L1348958-4**						
Available Sulfate-S		247	234		mg/kg	5.3	40	23-AUG-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.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

8/15/2013 10:36:34 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5B.
Project BSI GRUM OVERBURDEN DUMP 2013
Turnaround Time 10 Days
Shipping Date: 8/15/2013
COC Number: ALS08151302

	Container:	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon		
	Preservatives:	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C		
	Filtered:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
	Holding Time:	180	28	28	28	28	180	180	28	28	180	180	28	180	180	28	
		(CSSS (2008) 11.3 and 11.4) Ext Micro Nut (ZnFeCuMn)	(CSSS (2008) 12.2) SMP Buffer pH (for pH<6.0)	(CSSS (2008) 15.2.1 or 14.4.4) Sodium Adsorption Ratio	(CSSS (2008) 15.2.1) ECe (sat paste)	(CSSS (2008) 15.3) Soluable Salts	(CSSS (2008) 18.4) 1N, pH7 NH4OAc ext CaMgKNa	(CSSS (2008) 18.4_CEC) Cation Exchange Capacity	(CSSS (2008) 20.3) CaCO3 equivalent	(CSSS (2008) 6.2) Nh4-N and NO3-N (2N KCL)	(CSSS (2008) 7.2 and 7.3.1 if pH>7.2) Available P (pH>7.2)	(CSSS 16.3 (2008)) pH (1:2 CaCL2) CP17	(EPA200.2/SW6020A) Total P	(S-11.10 in Gaviak et al. (2005)) Ca(H2PO4)2.H2O ext SO4-S	(SSSA (1996) p894-895 if pH<7.2) Available P (pH<7.2)	(SSSA (1996) P973-974) Total N	Number of Containers	COMMENTS
CH13-311-TP006_SOa	8/13/2013	17:13	Soil	X	X	X	X	X	X		X		X	X		X	X		2	
CH13-311-TP906_SOa	8/13/2013	17:23	Soil	X	X	X	X	X	X		X		X	X		X	X		2	
CH13-311-TP002_SOa	8/14/2013	13:55	Soil	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3	
CH13-311-TP003_SOa	8/14/2013	12:39	Soil	X	X	X	X	X	X		X		X	X		X	X		2	
CH13-311-TP004_SOa	8/14/2013	11:24	Soil	X	X	X	X	X	X		X		X	X		X	X		2	
CH13-311-TP005_SOa	8/14/2013	10:03	Soil	X	X	X	X	X	X		X		X	X		X	X		2	
CH13-311-TP902_SOa	8/14/2013	14:05	Soil	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3	
CH13-311-TP903_SOa	8/14/2013	12:49	Soil	X	X	X	X	X	X		X		X	X		X	X		2	
CH13-311-TP904_SOa	8/14/2013	11:34	Soil	X	X	X	X	X	X		X		X	X		X	X		2	
CH13-311-TP905_SOa	8/14/2013	10:13	Soil	X	X	X	X	X	X		X		X	X		X	X		2	
																NUMBER OF CONTAINERS			22	

L1348958

Signatures | **Date/Time**

Approved by
Sampled by
Relinquished by — 8/15/13 1200
Received by — 16-Aug-13 9:15
Relinquished by
Received by — 6.8, 5.6, 6.2, 5.9

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

L1348958-COFC

and

Amber Springer

Instructions:

:604564 Metals Table1 Perform Lab Dup/MS
es

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA

Date Received: 26-AUG-13
Report Date: 27-SEP-13 14:33 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1353053

Project P.O. #: 472645.06.AD.01.04.13, PO=604564
Job Reference: WASTE ROCK DUMP MW 2012 SW-014B
C of C Numbers: ALS08251304
Legal Site Desc:



Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1353053-1	L1353053-2	L1353053-3	L1353053-4	L1353053-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	31-JUL-13	31-JUL-13	31-JUL-13	31-JUL-13	31-JUL-13
	Sampled Time	15:15	15:50	16:42	17:05	17:20
	Client ID	CH12-014-MW007_SOA	CH12-014-MW007_SOB	CH12-014-MW007_SOD	CH12-014-MW007_SOE	CH12-014-MW007_SOF
Grouping	**Analyte**					
SOIL						
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	66.0	12.0	14.0	17.0	34.0

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1353053-6	L1353053-7	L1353053-8	L1353053-9	L1353053-10
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	31-JUL-13	31-JUL-13	31-JUL-13	01-AUG-13	01-AUG-13
	Sampled Time	18:10	18:18	18:40	09:00	09:10
	Client ID	CH12-014-MW007_SOG	CH12-014-MW007_SOH	CH12-014-MW007_SOI	CH12-014-MW007_SOJ	CH12-014-MW007_SOK
Grouping	**Analyte**					
SOIL						
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	37.0	45.0	3.0	6.0	5.0

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1353053-11	L1353053-12	L1353053-13	L1353053-14	L1353053-15
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	01-AUG-13	03-AUG-13	03-AUG-13	03-AUG-13	03-AUG-13
	Sampled Time	10:50	10:55	11:05	11:15	11:38
	Client ID	CH12-014-MW007_SOL	CH12-014-MW011_SOA	CH12-014-MW011_SOB	CH12-014-MW011_SOC	CH12-014-MW011_SOD
Grouping	**Analyte**					
SOIL						
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	4.0	156	106	165	180

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1353053-16	L1353053-17	L1353053-18	L1353053-19	L1353053-20
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	03-AUG-13	04-AUG-13	04-AUG-13	04-AUG-13	04-AUG-13
	Sampled Time	13:15	14:00	14:25	14:55	15:35
	Client ID	CH12-014-MW011_SOF	CH12-014-MW012_SOA	CH12-014-MW012_SOB	CH12-014-MW012_SOD	CH12-014-MW012_SOE
Grouping	**Analyte**					
SOIL						
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	35.0	145	59.0	59.0	27.0

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1353053-21	L1353053-22	L1353053-23	L1353053-24	L1353053-25
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	04-AUG-13	05-AUG-13	05-AUG-13	06-AUG-13	06-AUG-13
	Sampled Time	16:40	15:10	18:25	16:00	16:40
	Client ID	CH12-014-MW012_SOF	CH12-014-MW013_SOB	CH12-014-MW013_SOC	CH12-014-MW013_SOD	CH12-014-MW013_SOE
Grouping	**Analyte**					
SOIL						
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	239	113	47.0	<1.0	14.0

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1353053-26	L1353053-27	L1353053-28		
	Description	Soil	Soil	Soil		
	Sampled Date	06-AUG-13	06-AUG-13	07-AUG-13		
	Sampled Time	17:15	17:55	08:55		
	Client ID	CH12-014-MW013_SOF	CH12-014-MW013_SOG	CH12-014-MW013_SOH		
Grouping	**Analyte**					
SOIL						
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	14.0	30.0	147		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
NP-TU	Soil	Neutralization Potential (NP)	Sobek 3.2.3, MOD

** 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
TU	ALS ENVIRONMENTAL - TUCSON, ARIZONA, USA

Chain of Custody Numbers:

ALS08251304

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed

Quality Control Report

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

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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

September 26, 2013

Client: ALS Environmental-Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1353053 Date Received: August 30, 2013

Certificate of Analysis

Client ID:	Sample Date:		Lab #:		Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3$/1,000t
L1353053-1	7/31/13	0000	T1301297-001		12.43	66
L1353053-2	7/31/13	0000	T1301297-002		3.50	12
L1353053-3	7/31/13	0000	T1301297-003		11.93	14
L1353053-4	7/31/13	0000	T1301297-004		10.62	17
L1353053-5	7/31/13	0000	T1301297-005		5.18	34
L1353053-6	7/31/13	0000	T1301297-006		0.75	37
L1353053-7	7/31/13	0000	T1301297-007		6.78	45
L1353053-8	7/31/13	0000	T1301297-008		0.26	3
L1353053-9	8/1/13	0000	T1301297-009		0.30	6
L1353053-10	8/1/13	0000	T1301297-010		0.25	5
L1353053-11	8/1/13	0000	T1301297-011		0.30	4
L1353053-12	8/3/13	0000	T1301297-012		5.00	156
L1353053-13	8/3/13	0000	T1301297-013		4.30	106
L1353053-14	8/3/13	0000	T1301297-014		0.24	165
L1353053-15	8/3/13	0000	T1301297-015		1.64	180
L1353053-16	8/3/13	0000	T1301297-016		10.30	35
L1353053-17	8/4/13	0000	T1301297-017		4.89	145
L1353053-18	8/4/13	0000	T1301297-018		10.78	59
L1353053-19	8/4/13	0000	T1301297-019		11.50	59
L1353053-20	8/4/13	0000	T1301297-020		5.85	27

ALS Environmental

September 26, 2013

Client: ALS Environmental-Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1353053 Date Received: August 30, 2013

Certificate of Analysis

Client ID:	Sample Date:		Lab #:		Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3$/1,000t
L1353053-21	8/4/13	0000	T1301297-021		0.22	239
L1353053-22	8/5/13	0000	T1301297-022		1.03	113
L1353053-23	8/5/13	0000	T1301297-023		4.38	47
L1353053-24	8/6/13	0000	T1301297-024		7.43	< 1
L1353053-25	8/6/13	0000	T1301297-025		5.80	14
L1353053-26	8/6/13	0000	T1301297-026		7.26	14
L1353053-27	8/6/13	0000	T1301297-027		1.69	30
L1353053-28	8/7/13	0000	T1301297-028		10.86	147

Notes:
Samples were air dried then ground to < 60 mesh.

W. Hyatt
Digitally signed by Wendy Hyatt
Date: 2013.09.26 15:13:59 -07'00'

Wendy Hyatt, Project Chemist

September 26, 2013

Client: ALS Environmental-Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1353053

Date Received: August 30, 2013

Quality Control

				Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3$/1,000t
Prep Blank				0.00	< 1
Laboratory Control Sample (LCS) - Rice Flour CN 3451			Observed Value	9.93	n/a
			True Value	9.50	
			%R	105	
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	1,002
			True Value		1,000
			%R		100
Duplicate Results			T1301297-001	0.30 **	
			Duplicate	0.27 **	
			%R	11	
Duplicate Results				T1301297-002	12
				Duplicate	11
				%RPD	9

* Sample from the same batch, but a different project.

**Residual moisture - does not include air dry moisture.

September 26, 2013

Client: ALS Environmental-Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1353053

Date Received: August 30, 2013

Quality Control

				Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3$/1,000t
Prep Blank				0.00	< 1
Laboratory Control Sample (LCS) - Rice Flour CN 3451			Observed Value	9.83	n/a
			True Value	9.50	
			%R	103	
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	974
			True Value		1,000
			%R		97
Duplicate Results			T1301297-020	0.13 **	
			Duplicate	0.15 **	
			%R	14	
Duplicate Results				T1301297-015	180
				Duplicate	176
				%RPD	2

* Sample from the same batch, but a different project.

**Residual moisture - does not include air dry moisture.

CH2MHILL **CHAIN OF CUSTODY RECORD** *8/25/2013 11:12:55 AM* Page 1 OF 3

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 436662.07.01.04.23
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-014
Project WASTE ROCK DUMP MW 2012 SW-014B
Turnaround Time 10 Days
Shipping Date: 8/24/2013
COC Number: ALS08251304

	Container:	Preservatives:	Filtered:	Holding Time:
	1 Gallon	4°C	NA	28



	DATE	TIME	Matrix	(ModifiedSobek) Mod Neutralization Potential	Number of Containers	COMMENTS
CH12-014-MW007_SOa	7/31/2012	15:15	Soil	X	1	
CH12-014-MW007_SOb	7/31/2012	15:50	Soil	X	1	
CH12-014-MW007_Sod	7/31/2012	16:42	Soil	X	1	
CH12-014-MW007_SOe	7/31/2012	17:05	Soil	X	1	
CH12-014-MW007_SOf	7/31/2012	17:20	Soil	X	1	
CH12-014-MW007_SOg	7/31/2012	18:10	Soil	X	1	
CH12-014-MW007_SOh	7/31/2012	18:18	Soil	X	1	
CH12-014-MW007_SOi	7/31/2012	18:40	Soil	X	1	
CH12-014-MW007_SOj	8/1/2012	9:00	Soil	X	1	
CH12-014-MW007_SOk	8/1/2012	9:10	Soil	X	1	
CH12-014-MW007_SOl	8/1/2012	10:50	Soil	X	1	
CH12-014-MW011_SOa	8/3/2012	10:55	Soil	X	1	
CH12-014-MW011_SOB	8/3/2012	11:05	Soil	X	1	
CH12-014-MW011_SOc	8/3/2012	11:15	Soil	X	1	

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		8/25/13 1200
Received by		
Relinquished by		26-Aug-13 10:30
Received by		6.7°C

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

Special Instructions:
ATTN:
Sample Custody and Amber Springer

Report Copy to
Bernice Kidd
(530) 229-3203

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 436662.07.01.04.23
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-014
Project WASTE ROCK DUMP MW 2012 SW-014B
Turnaround Time 10 Days
Shipping Date: 8/24/2013
COC Number: ALS08251304

	DATE	TIME	Matrix	Container: 1 Gallon; Preservatives: 4°C; Filtered: NA; Holding Time: 28; (ModifiedSobek) Mod Neutralization Potential	L1353053-COFC	Number of Containers	COMMENTS
CH12-014-MW011_SOd	8/3/2012	11:38	Soil	X		1	
CH12-014-MW011_SOf	8/3/2012	13:15	Soil	X		1	
CH12-014-MW012_SOa	8/4/2012	14:00	Soil	X		1	
CH12-014-MW012_SOb	8/4/2012	14:25	Soil	X		1	
CH12-014-MW012_SOd	8/4/2012	14:55	Soil	X		1	
CH12-014-MW012_SOe	8/4/2012	15:35	Soil	X		1	
CH12-014-MW012_SOf	8/4/2012	16:40	Soil	X		1	
CH12-014-MW013_SOb	8/5/2012	15:10	Soil	X		1	
CH12-014-MW013_SOc	8/5/2012	18:25	Soil	X		1	
CH12-014-MW013_SOd	8/6/2012	16:00	Soil	X		1	
CH12-014-MW013_SOe	8/6/2012	16:40	Soil	X		1	
CH12-014-MW013_SOf	8/6/2012	17:15	Soil	X		1	
CH12-014-MW013_SOG	8/6/2012	17:55	Soil	X		1	
CH12-014-MW013_SOH	8/7/2012	8:55	Soil	X		1	

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		8/25/13 1200
Received by		
Relinquished by		
Received by		

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

Special Instructions:

ATTN:

Sample Custody
and
Amber Springer

Report Copy to
Bernice Kidd
(530) 229-3203

CHAIN OF CUSTODY RECORD

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 436662.07.01.04.23
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-014
Project WASTE ROCK DUMP MW 2012 SW-014B
Turnaround Time 10 Days
Shipping Date: 8/24/2013
COC Number: ALS08251304

	Container:	Preservatives:	Filtered:	Holding Time:	(ModifiedSobek) Mod Neutralization Potential
	1 Gallon	4°C	NA	28	

L1353053-COFC

DATE	TIME	Matrix	Number of Containers	COMMENTS
		TOTAL NUMBER OF CONTAINERS	28	

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		8/25/13 1200
Received by		
Relinquished by		
Received by		

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 26-AUG-13
Report Date: 30-OCT-13 11:30 (MT)
Version: FINAL REV. 3

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1353073

Project P.O. #: 472645.06.AD.01.04.13 "PO=604564"
Job Reference: BSI NE AREA OF GRUM PIT 2003 311.5C
C of C Numbers: ALS08251301, ALS08251301H, ALS08251301R
Legal Site Desc:

Comments: 28-OCT-13: Additional QC data has been included.
30-OCT-13: Shakeflask Conductivity data has been added for L1353073 - 2, 3, 4 & 5.

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1353073-1	L1353073-2	L1353073-3	L1353073-4	L1353073-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	22-AUG-13	22-AUG-13	22-AUG-13	23-AUG-13	23-AUG-13
	Sampled Time	12:00	14:30	14:45	10:00	10:15
	Client ID	CH13-311-BH002_SOB	CH13-311-BH003_SOA	CH13-311-BH003_SOB	CH13-311-BH001_SOA	CH13-311-BH001_SOB
Grouping	**Analyte**					
SOIL						
Physical Tests	Grain Size Curve					SEE ATTACHED
	Moisture (%)	15.3	13.4	13.7	6.05	9.14
	Liquid Limit (LL) (%)					27
	pH (1:2 soil:water) (pH)	5.27	7.94	5.88	6.10	5.22
	Plasticity Index (PI) (%)					4
	Acid Soluble Sulphate Sulphur (%)	0.02	0.02	0.01	0.01	0.01
Leachable Anions & Nutrients	Acidity (as CaCO3) (mg/L)	6.7	2.8	2.4	2.9	6.4
	Alkalinity, Total (as CaCO3) (mg/L)	13.2	90.7	37.2	114	21.1
	Conductivity (uS/cm)	71.8	162	73.0	254	49.9
	pH (pH)	6.30	7.77	6.75	7.02	6.25
	Oxidation-Reduction Potential (ORP) (mV)	482	472	457	461	455
	Sulfate (SO4) (mg/L)	16.9	<0.50	2.52	20.6	8.2
Organic / Inorganic Carbon	Inorganic Carbon (%)	0.10	0.10	<0.10	<0.10	<0.10
	Inorganic Carbon (as CaCO3 Equivalent) (%)	0.84	0.83	<0.80	<0.80	<0.80
	Organic Carbon (%)	0.90	<0.40	<0.40	0.40	1.60
	Organic Matter (%)	1.49	<0.70	<0.70	<0.70	2.69
Saturated Paste Extractables	Paste pH (pH)	5.58	7.77	5.85	6.08	5.46
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	4.0	10.0	5.0	4.0	4.0
Metals	Aluminum (Al) (mg/kg)	13200	23200	18100	20200	20100
	Antimony (Sb) (mg/kg)	0.33	0.84	0.59	0.49	0.39
	Arsenic (As) (mg/kg)	12.1	22.1	12.9	16.3	18.1
	Barium (Ba) (mg/kg)	118	349	241	150	72.5
	Beryllium (Be) (mg/kg)	0.38	0.82	0.57	0.66	0.72
	Bismuth (Bi) (mg/kg)	0.25	0.37	0.24	0.31	0.26
	Boron (B) (mg/kg)	<10	<10	<10	<10	<10
	Cadmium (Cd) (mg/kg)	0.119	0.493	0.203	0.216	0.309
	Calcium (Ca) (mg/kg)	2550	5780	2540	1950	1660
	Chromium (Cr) (mg/kg)	24.3	62.6	44.1	41.2	28.9
	Cobalt (Co) (mg/kg)	9.22	18.5	14.5	18.3	14.6
	Copper (Cu) (mg/kg)	15.9	42.8	26.6	36.6	20.7
	Iron (Fe) (mg/kg)	23900	36900	28500	35500	30300
	Lead (Pb) (mg/kg)	9.19	17.1	13.8	15.4	14.9
	Lithium (Li) (mg/kg)	19.9	32.9	27.4	33.8	26.9
	Magnesium (Mg) (mg/kg)	5560	9720	7330	8100	5390

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1353073-6	L1353073-7	L1353073-8	L1353073-9	
	Description	Soil	Soil	Soil	Soil	
	Sampled Date	23-AUG-13	23-AUG-13	23-AUG-13	22-AUG-13	
	Sampled Time	13:00	15:00	15:15	14:45	
	Client ID	CH13-311-BH004_SOA	CH13-311-BH005_SOA	CH13-311-BH005_SOB	CH13-311-BH903_SOB	
Grouping	**Analyte**					
SOIL						
Physical Tests	Grain Size Curve					
	Moisture (%)	<0.25	17.8	25.7	14.0	
	Liquid Limit (LL) (%)	23				
	pH (1:2 soil:water) (pH)	5.57	6.50	4.83	6.35	
	Plasticity Index (PI) (%)	6				
	Acid Soluble Sulphate Sulphur (%)	0.01	0.01	0.01	<0.01	
Leachable Anions & Nutrients	Acidity (as CaCO3) (mg/L)					
	Alkalinity, Total (as CaCO3) (mg/L)					
	Conductivity (uS/cm)					
	pH (pH)					
	Oxidation-Reduction Potential (ORP) (mV)					
	Sulfate (SO4) (mg/L)					
Organic / Inorganic Carbon	Inorganic Carbon (%)	<0.10	<0.10	<0.10	<0.10	
	Inorganic Carbon (as CaCO3 Equivalent) (%)	<0.80	<0.80	<0.80	<0.80	
	Organic Carbon (%)	0.40	0.90	1.90	<0.40	
	Organic Matter (%)	<0.70	1.56	3.35	<0.70	
Saturated Paste Extractables	Paste pH (pH)	5.37	5.99	6.06	6.67	
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	5.0	7.0	4.0	6.0	
Metals	Aluminum (Al) (mg/kg)	20600	18400	15700	20000	
	Antimony (Sb) (mg/kg)	0.54	1.07	0.48	0.71	
	Arsenic (As) (mg/kg)	11.2	14.8	11.8	15.2	
	Barium (Ba) (mg/kg)	295	457	149	293	
	Beryllium (Be) (mg/kg)	0.70	0.73	0.40	0.63	
	Bismuth (Bi) (mg/kg)	0.38	0.29	0.23	0.29	
	Boron (B) (mg/kg)	<10	<10	<10	<10	
	Cadmium (Cd) (mg/kg)	0.443	0.460	0.157	0.252	
	Calcium (Ca) (mg/kg)	3550	4050	1440	2740	
	Chromium (Cr) (mg/kg)	74.9	33.5	34.2	52.6	
	Cobalt (Co) (mg/kg)	16.3	11.4	9.12	15.8	
	Copper (Cu) (mg/kg)	38.9	32.4	22.1	33.3	
	Iron (Fe) (mg/kg)	33300	27800	23600	31200	
	Lead (Pb) (mg/kg)	19.3	14.0	11.1	15.2	
	Lithium (Li) (mg/kg)	33.3	22.9	19.4	29.0	
	Magnesium (Mg) (mg/kg)	8540	5820	5970	7950	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1353073-1	L1353073-2	L1353073-3	L1353073-4	L1353073-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	22-AUG-13	22-AUG-13	22-AUG-13	23-AUG-13	23-AUG-13
	Sampled Time	12:00	14:30	14:45	10:00	10:15
	Client ID	CH13-311-BH002_SOB	CH13-311-BH003_SOA	CH13-311-BH003_SOB	CH13-311-BH001_SOA	CH13-311-BH001_SOB
Grouping	**Analyte**					
SOIL						
Metals	Manganese (Mn) (mg/kg)	262	632	461	524	335
	Mercury (Hg) (mg/kg)	0.0133	0.0449	0.0320	0.0189	0.0222
	Molybdenum (Mo) (mg/kg)	1.20	1.03	0.61	0.85	0.95
	Nickel (Ni) (mg/kg)	19.8	59.7	36.8	40.7	32.8
	Phosphorus (P) (mg/kg)	614	874	632	591	823
	Potassium (K) (mg/kg)	710	2920	1370	1500	770
	Selenium (Se) (mg/kg)	<0.20	0.29	0.25	0.21	0.25
	Silver (Ag) (mg/kg)	<0.10	0.16	<0.10	<0.10	0.11
	Sodium (Na) (mg/kg)	210	300	160	120	<100
	Strontium (Sr) (mg/kg)	17.2	30.6	18.8	15.1	16.5
	Sulfur (S)-Total (mg/kg)	1000	700	600	600	600
	Thallium (Tl) (mg/kg)	0.136	0.248	0.151	0.163	0.096
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	418	591	514	391	332
	Uranium (U) (mg/kg)	1.35	1.09	0.860	1.20	0.818
	Vanadium (V) (mg/kg)	36.6	53.2	38.9	32.3	29.7
	Zinc (Zn) (mg/kg)	59.5	108	71.0	87.2	71.5
Total Metals	Barium by borate-fusion (ppm)	837	1150	1070	815	854
Leachable Metals	Aluminum (Al)-Leachable (mg/L)	24.2	0.0086	1.15	0.0287	32.4
	Antimony (Sb)-Leachable (mg/L)	0.00121	0.00017	0.00067	0.00032	0.00074
	Arsenic (As)-Leachable (mg/L)	0.0579	<0.0010	0.0091	<0.0010	0.0271
	Barium (Ba)-Leachable (mg/L)	0.388	0.106	0.121	0.0995	0.218
	Beryllium (Be)-Leachable (mg/L)	0.00114	<0.00050	<0.00050	<0.00050	0.00108
	Boron (B)-Leachable (mg/L)	0.034	0.013	0.014	0.024	0.038
	Cadmium (Cd)-Leachable (mg/L)	0.000269	<0.000050	0.000123	<0.000050	0.000402
	Calcium (Ca)-Leachable (mg/L)	4.22	26.4	9.87	36.6	1.27
	Chromium (Cr)-Leachable (mg/L)	0.0359	<0.00050	0.00336	<0.00050	0.0300
	Cobalt (Co)-Leachable (mg/L)	0.0357	<0.00010	0.00394	0.00034	0.0190
	Copper (Cu)-Leachable (mg/L)	0.0455	<0.0010	0.0167	0.0027	0.0274
	Iron (Fe)-Leachable (mg/L)	48.4	<0.030	6.61	0.060	31.3
	Lead (Pb)-Leachable (mg/L)	0.0340	<0.00010	0.00666	0.00012	0.0256
	Lithium (Li)-Leachable (mg/L)	0.0153	0.0078	<0.0050	<0.0050	0.0127
	Magnesium (Mg)-Leachable (mg/L)	3.49	2.69	2.31	6.05	2.64
	Manganese (Mn)-Leachable (mg/L)	0.961	0.00055	0.167	0.00517	0.555
	Mercury (Hg)-Leachable (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Molybdenum (Mo)-Leachable (mg/L)	0.00512	0.00486	0.00064	0.00322	0.00123
	Nickel (Ni)-Leachable (mg/L)	0.0491	<0.00050	0.0115	0.00132	0.0301

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1353073-6	L1353073-7	L1353073-8	L1353073-9	
	Description	Soil	Soil	Soil	Soil	
	Sampled Date	23-AUG-13	23-AUG-13	23-AUG-13	22-AUG-13	
	Sampled Time	13:00	15:00	15:15	14:45	
	Client ID	CH13-311-BH004_SOA	CH13-311-BH005_SOA	CH13-311-BH005_SOB	CH13-311-BH903_SOB	
Grouping	**Analyte**					
SOIL						
Metals	Manganese (Mn) (mg/kg)	488	556	276	544	
	Mercury (Hg) (mg/kg)	0.0310	0.0661	0.0274	0.0412	
	Molybdenum (Mo) (mg/kg)	1.09	1.38	0.79	0.70	
	Nickel (Ni) (mg/kg)	51.5	34.7	28.2	44.0	
	Phosphorus (P) (mg/kg)	798	1030	463	635	
	Potassium (K) (mg/kg)	2020	1770	1220	1710	
	Selenium (Se) (mg/kg)	0.26	0.42	0.22	0.27	
	Silver (Ag) (mg/kg)	0.16	0.21	0.14	<0.10	
	Sodium (Na) (mg/kg)	290	190	220	180	
	Strontium (Sr) (mg/kg)	24.2	32.1	12.5	19.1	
	Sulfur (S)-Total (mg/kg)	<500	<500	<500	<500	
	Thallium (Tl) (mg/kg)	0.190	0.212	0.147	0.179	
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	
	Titanium (Ti) (mg/kg)	537	390	376	525	
	Uranium (U) (mg/kg)	1.60	1.27	0.664	0.930	
	Vanadium (V) (mg/kg)	42.0	51.3	37.3	43.9	
	Zinc (Zn) (mg/kg)	102	88.6	57.6	86.6	
Total Metals	Barium by borate-fusion (ppm)	1025	1050	752	1070	
Leachable Metals	Aluminum (Al)-Leachable (mg/L)					
	Antimony (Sb)-Leachable (mg/L)					
	Arsenic (As)-Leachable (mg/L)					
	Barium (Ba)-Leachable (mg/L)					
	Beryllium (Be)-Leachable (mg/L)					
	Boron (B)-Leachable (mg/L)					
	Cadmium (Cd)-Leachable (mg/L)					
	Calcium (Ca)-Leachable (mg/L)					
	Chromium (Cr)-Leachable (mg/L)					
	Cobalt (Co)-Leachable (mg/L)					
	Copper (Cu)-Leachable (mg/L)					
	Iron (Fe)-Leachable (mg/L)					
	Lead (Pb)-Leachable (mg/L)					
	Lithium (Li)-Leachable (mg/L)					
	Magnesium (Mg)-Leachable (mg/L)					
	Manganese (Mn)-Leachable (mg/L)					
	Mercury (Hg)-Leachable (mg/L)					
	Molybdenum (Mo)-Leachable (mg/L)					
	Nickel (Ni)-Leachable (mg/L)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1353073-1 Soil 22-AUG-13 12:00 CH13-311-BH002_SOB	L1353073-2 Soil 22-AUG-13 14:30 CH13-311-BH003_SOA	L1353073-3 Soil 22-AUG-13 14:45 CH13-311-BH003_SOB	L1353073-4 Soil 23-AUG-13 10:00 CH13-311-BH001_SOA	L1353073-5 Soil 23-AUG-13 10:15 CH13-311-BH001_SOB
SOIL						
Leachable Metals	Potassium (K)-Leachable (mg/L)	7.3	3.2	<2.0	8.1	11.7
	Selenium (Se)-Leachable (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	0.00054
	Silicon (Si)-Leachable (mg/L)	54.8	6.38	9.68	6.79	44.7
	Silver (Ag)-Leachable (mg/L)	0.000261	<0.000050	<0.000050	<0.000050	0.000175
	Sodium (Na)-Leachable (mg/L)	10.7	2.4	<2.0	5.2	6.9
	Strontium (Sr)-Leachable (mg/L)	0.0437	0.0878	0.0540	0.119	0.0241
	Sulfur (S)-Leachable (mg/L)	5.17	<0.50	0.72	6.85	1.24
	Thallium (Tl)-Leachable (mg/L)	0.00030	<0.00010	<0.00010	<0.00010	0.00019
	Titanium (Ti)-Leachable (mg/L)	1.49	<0.010	0.119	<0.010	0.725
	Uranium (U)-Leachable (mg/L)	0.00212	0.00116	0.000404	0.000436	0.00109
	Vanadium (V)-Leachable (mg/L)	0.0863	<0.0010	0.0079	<0.0010	0.0401
	Zinc (Zn)-Leachable (mg/L)	0.122	<0.010	0.022	<0.010	0.053

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1353073-6	L1353073-7	L1353073-8	L1353073-9	
	Description	Soil	Soil	Soil	Soil	
	Sampled Date	23-AUG-13	23-AUG-13	23-AUG-13	22-AUG-13	
	Sampled Time	13:00	15:00	15:15	14:45	
	Client ID	CH13-311-BH004_SOA	CH13-311-BH005_SOA	CH13-311-BH005_SOB	CH13-311-BH903_SOB	
Grouping	**Analyte**					
SOIL						
Leachable Metals	Potassium (K)-Leachable (mg/L)					
	Selenium (Se)-Leachable (mg/L)					
	Silicon (Si)-Leachable (mg/L)					
	Silver (Ag)-Leachable (mg/L)					
	Sodium (Na)-Leachable (mg/L)					
	Strontium (Sr)-Leachable (mg/L)					
	Sulfur (S)-Leachable (mg/L)					
	Thallium (Tl)-Leachable (mg/L)					
	Titanium (Ti)-Leachable (mg/L)					
	Uranium (U)-Leachable (mg/L)					
	Vanadium (V)-Leachable (mg/L)					
	Zinc (Zn)-Leachable (mg/L)					

* 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	Arsenic (As)	DUP-H	L1353073-1, -2, -3, -4, -5, -7, -8, -9
Duplicate	Phosphorus (P)	DUP-H	L1353073-1, -2, -3, -4, -5, -7, -8, -9
Duplicate	Alkalinity, Total (as CaCO3)	DUP-H	L1353073-1, -2, -5
Duplicate	Sulfate (SO4)	DUP-H	L1353073-3, -4
Duplicate	Aluminum (Al)-Leachable	DUP-H	L1353073-3, -4
Duplicate	Arsenic (As)-Leachable	DUP-H	L1353073-3, -4
Duplicate	Chromium (Cr)-Leachable	DUP-H	L1353073-3, -4
Duplicate	Copper (Cu)-Leachable	DUP-H	L1353073-3, -4
Duplicate	Vanadium (V)-Leachable	DUP-H	L1353073-3, -4
Matrix Spike	Calcium (Ca)-Leachable	MS-B	L1353073-1, -2, -5
Matrix Spike	Iron (Fe)-Leachable	MS-B	L1353073-1, -2, -5
Matrix Spike	Magnesium (Mg)-Leachable	MS-B	L1353073-1, -2, -5
Matrix Spike	Silicon (Si)-Leachable	MS-B	L1353073-1, -2, -5
Matrix Spike	Aluminum (Al)-Leachable	MS-B	L1353073-1, -2, -5
Matrix Spike	Manganese (Mn)-Leachable	MS-B	L1353073-1, -2, -5
Matrix Spike	Calcium (Ca)-Leachable	MS-B	L1353073-3, -4
Matrix Spike	Iron (Fe)-Leachable	MS-B	L1353073-3, -4
Matrix Spike	Magnesium (Mg)-Leachable	MS-B	L1353073-3, -4
Matrix Spike	Silicon (Si)-Leachable	MS-B	L1353073-3, -4

Qualifiers for Individual Parameters Listed:

Qualifier	Description
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**
ACY-SHKFL96-PCT-VA	Soil	Acidity by PCT (96 hour SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES

"This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines, (Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures adapted from APHA Method 2310 "Acidity".

ALK-SHKFL96-PCT-VA	Soil	Alkalinity by PCT (96 hour SHAKEFLASK)	BC MINISTRY OF ENERGY AND MINES

"This analysis is based upon the extraction procedure outlined in ""Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia"" BC Ministry of Energy and Mines, (Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures adapted from APHA Method 2320 "Alkalinity"

ATTERBERG-SK	Soil	Atterberg limits	CARTER CSSS 58

The liquid limit (or upper plastic limit) is the point at which the soil becomes semifluid, like softened butter. In operational terms, the liquid limit is defined as the water content at which a trapezoidal groove cut in moist soil is closed after 25 taps on a hard rubber plate (ASTM D-18, 1958).

The plastic limit (or lower plastic limit) is defined as the water content at which soil begins to crumble on being rolled into a thread 1/8 inch (or 3 mm) in diameter. It represents the lowest water content at which soil can be deformed readily without cracking.

The plastic index (which is the difference between the liquid and plastic limits) gives an indication of the "clayeyness" or plasticity of a clay and is employed in engineering classification systems for soils.

References: McKeague, J.A. 1978. Atterberg Limits pp 50 - 55 In: Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci. p. 50 - 55

B-200.2-CCMS-VA	Soil	Boron 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."

C-INORG-SK Soil Inorganic Carbon / Calcium Carbonate SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-ORG-WB-SK Soil Total Organic Carbon - Walkley Black CSSS (1993) method 21.2

The soil sample is treated with excess potassium dichromate and sulfuric acid to oxidize organic carbon. Oxidized organic carbon is determined by back-titration with ferrous ammonium sulfate. Organic matter is estimated from the organic carbon result using the Van Bemmelon factor.

EC-SHKFL96-PCT-VA Soil EC by PCT (96 hour SHAKEFLASK) BC MINISTRY OF ENERGY AND MINES

"This analysis is based upon the extraction procedure outlined in ""Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines, (Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures adapted from APHA Method 2510 "Conductivity".

GRAIN SIZE-SK Soil Grain Size Analysis SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

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-SHKFL96-CVAFS-VA Soil Mercury by CVAFS (96 hour SHAKEFLASK) BC MINISTRY OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines,
(Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

IC-CACO3-CALC-SK Soil Inorganic Carbon as CaCO3 Equivalent Calculation

ME-MS81-AX Soil ME-MS81

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-SHKFL96-CCMS-VA Soil Metals by CCMS (SHAKEFLASK - 96hours) BC MINISTRY OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines,
(Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using inductively coupled plasma - mass spectrophotometry (EPA Method 6020A).

MET-SHKFL96-ICP-VA Soil Metals by ICPOES (SHAKEFLASK - 96Hours) BC MINISTRY OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines,
(Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane 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.

NP-TU Soil Neutralization Potential (NP) Sobek 3.2.3, MOD

ORP-SHKFL96-VA Soil ORP by Electrode (96 hour SHAKEFLASK) BC MIN. OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines, (Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures carried out in accordance "ASTM" method D1498-00 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM), May 2000. Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

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.

PH-PASTE-VA Soil pH in Soil (Paste) by Meter Carter-CSSS / APHA 4500 H

A soil extract produced by the saturated paste extraction procedure is analyzed by pH meter.

PH-SHKFL96-MAN-VA Soil pH by Manual Meter (96 HOUR SHAKEFLASK) BC MINISTRY OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines, (Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water . The extract is then allowed to settle and subsequently analysed using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode.

S-TOT-LECO-SK Soil Total Sulphur by combustion method ISO 15178:2000

The sample is ignited in a combustion analyzer where sulfur in the reduced SO2 gas is determined using a thermal conductivity detector.

SAT-PCNT-VA Soil Saturation Percentage Carter-CSSS

Saturation Percentage (SP) is the total volume of water present in a saturated paste (in mL) divided by the dry weight of the sample (in grams), expressed as a percentage, as described in "Soil Sampling and Methods of Analysis" by M. Carter.

SO4-SHKFL96-TURB-VA Soil SO4 by Turbidimetric(96 hour SHAKEFLASK) BC MINISTRY OF ENERGY AND MINES

This analysis is based upon the extraction procedure outlined in "Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia" BC Ministry of Energy and Mines, (Dr. William A. Price, 1997). In summary, the sample is extracted at a 3:1 liquid to solids ratio for 96 hours using deionized water. The extract is then allowed to settle and subsequently filtered through a 0.45 micron membrane filter and analysed using procedures adapted from APHA Method 4500-SO4 "Sulfate". Sulfate is determined using the turbidimetric method."

SPECIAL REQUEST-SK Misc. Special Request Sask Lab SEE SUBLET LAB RESULTS

SULPHUR-S-GRA06A-AX Soil Sulphur (S) S-GRA06a

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

Reference Information

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
TU	ALS ENVIRONMENTAL - TUCSON, ARIZONA, USA
AX	ALS MINERALS - VANCOUVER, B.C., CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

ALS08251301 ALS08251301H ALS08251301R

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

Workorder: L1353073 Report Date: 30-OCT-13

Client: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-SHKFL96-PCT-VA	**Soil**							
Batch R2701355								
WG1750996-2 DUP		**L1353073-5**						
Acidity (as CaCO3)		6.4	6.5		mg/L	1.2	25	25-SEP-13
Batch R2704422								
WG1755367-2 DUP		**L1353073-3**						
Acidity (as CaCO3)		2.4	3.0		mg/L	23	25	30-SEP-13
ALK-SHKFL96-PCT-VA	**Soil**							
Batch R2701206								
WG1750996-2 DUP		**L1353073-5**						
Alkalinity, Total (as CaCO3)		21.1	16.7	DUP-H	mg/L	24	20	25-SEP-13
WG1750996-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	25-SEP-13
WG1754214-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	25-SEP-13
Batch R2705468								
WG1755367-2 DUP		**L1353073-3**						
Alkalinity, Total (as CaCO3)		37.2	32.6		mg/L	13	20	30-SEP-13
WG1755367-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	30-SEP-13
B-200.2-CCMS-VA	**Soil**							
Batch R2690605								
WG1742136-4 CRM		**VA-CANMET-TILL1**						
Boron (B)			3		mg/kg		0-13	09-SEP-13
WG1742136-2 DUP		**L1353073-1**						
Boron (B)		<10	<10	RPD-NA	mg/kg	N/A	30	09-SEP-13
WG1742136-1 MB								
Boron (B)			<10		mg/kg		10	09-SEP-13
Batch R2695962								
WG1748934-1 MB								
Boron (B)			<10		mg/kg		10	17-SEP-13
Batch R2696477								
WG1748934-2 DUP		**L1353073-6**						
Boron (B)		<10	<10	RPD-NA	mg/kg	N/A	30	18-SEP-13
C-INORG-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-INORG-SK	**Soil**							
Batch R2683486								
WG1736810-1 DUP		**L1353073-3**						
Inorganic Carbon		<0.10	<0.10	RPD-NA	%	N/A	20	30-AUG-13
WG1736810-2 IRM		**0.1%IC**						
Inorganic Carbon			123.2		%		60-140	30-AUG-13
WG1736810-3 IRM		**0.4%IC**						
Inorganic Carbon			99.0		%		80-120	30-AUG-13
WG1736810-4 MB								
Inorganic Carbon			<0.10		%		0.1	30-AUG-13
Batch R2687497								
WG1737938-10 IRM		**0.1%IC**						
Inorganic Carbon			133.0		%		60-140	05-SEP-13
WG1737938-11 IRM		**0.4%IC**						
Inorganic Carbon			108.5		%		80-120	05-SEP-13
WG1737938-14 IRM		**0.1%IC**						
Inorganic Carbon			132.2		%		60-140	05-SEP-13
WG1737938-15 IRM		**0.4%IC**						
Inorganic Carbon			107.0		%		80-120	05-SEP-13
WG1737938-18 IRM		**0.1%IC**						
Inorganic Carbon			123.4		%		60-140	05-SEP-13
WG1737938-19 IRM		**0.4%IC**						
Inorganic Carbon			110.5		%		80-120	05-SEP-13
WG1737938-2 IRM		**0.1%IC**						
Inorganic Carbon			122.1		%		60-140	05-SEP-13
WG1737938-3 IRM		**0.4%IC**						
Inorganic Carbon			108.4		%		80-120	05-SEP-13
WG1737938-6 IRM		**0.1%IC**						
Inorganic Carbon			130.8		%		60-140	05-SEP-13
WG1737938-7 IRM		**0.4%IC**						
Inorganic Carbon			99.2		%		80-120	05-SEP-13
WG1737938-12 MB								
Inorganic Carbon			<0.10		%		0.1	05-SEP-13
WG1737938-16 MB								
Inorganic Carbon			<0.10		%		0.1	05-SEP-13
WG1737938-20 MB								
Inorganic Carbon			<0.10		%		0.1	05-SEP-13
WG1737938-4 MB								
Inorganic Carbon			<0.10		%		0.1	05-SEP-13
WG1737938-8 MB								
Inorganic Carbon			<0.10		%		0.1	05-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-WB-SK	**Soil**							
Batch R2684025								
WG1736878-1 DUP		**L1353073-8**						
Organic Carbon		1.90	1.90		%	0.0	30	31-AUG-13
Organic Matter		3.35	3.25		%	3.0	20	31-AUG-13
WG1736878-3 IRM		**FARM2009**						
Organic Carbon			112.1		%		80-120	31-AUG-13
Organic Matter			112.2		%		80-120	31-AUG-13
WG1736878-2 MB								
Organic Carbon			<0.40		%		0.4	31-AUG-13
Organic Matter			<0.70		%		0.7	31-AUG-13
Batch R2686563								
WG1738512-1 DUP		**L1353073-9**						
Organic Carbon		<0.40	<0.40	RPD-NA	%	N/A	30	04-SEP-13
Organic Matter		<0.70	<0.70	RPD-NA	%	N/A	20	04-SEP-13
WG1738512-3 IRM		**FARM2009**						
Organic Carbon			103.4		%		80-120	04-SEP-13
Organic Matter			102.4		%		80-120	04-SEP-13
WG1738512-2 MB								
Organic Carbon			<0.40		%		0.4	04-SEP-13
Organic Matter			<0.70		%		0.7	04-SEP-13
EC-SHKFL96-PCT-VA	**Soil**							
Batch R2701206								
WG1750996-1 MB								
Conductivity			<2.0		uS/cm		2	25-SEP-13
WG1754214-1 MB								
Conductivity			<2.0		uS/cm		2	25-SEP-13
Batch R2701355								
WG1754437-1 MB								
Conductivity			<2.0		uS/cm		2	25-SEP-13
HG-200.2-CVAF-VA	**Soil**							
Batch R2689268								
WG1742136-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			95.4		%		70-130	09-SEP-13
WG1742136-2 DUP		**L1353073-1**						
Mercury (Hg)		0.0133	0.0116		mg/kg	14	40	09-SEP-13
WG1742136-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	09-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-200.2-CVAF-VA	**Soil**							
Batch R2694962								
WG1748934-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			94.4		%		70-130	17-SEP-13
WG1748934-2 DUP		**L1353073-6**						
Mercury (Hg)		0.0310	0.0309		mg/kg	0.2	40	17-SEP-13
WG1748934-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	17-SEP-13
HG-SHKFL96-CVAFS-VA	**Soil**							
Batch R2699917								
WG1750996-2 DUP		**L1353073-5**						
Mercury (Hg)-Leachable		<0.000050	<0.000050	RPD-NA	mg/L	N/A	40	24-SEP-13
WG1750996-1 MB								
Mercury (Hg)-Leachable			<0.000050		mg/L		0.00005	24-SEP-13
WG1754009-1 MB								
Mercury (Hg)-Leachable			<0.000050		mg/L		0.00005	24-SEP-13
WG1750996-3 MS		**L1352371-5**						
Mercury (Hg)-Leachable			113.6		%		70-130	24-SEP-13
Batch R2704448								
WG1755367-2 DUP		**L1353073-3**						
Mercury (Hg)-Leachable		<0.000050	<0.000050	RPD-NA	mg/L	N/A	40	30-SEP-13
WG1755367-1 MB								
Mercury (Hg)-Leachable			<0.000050		mg/L		0.00005	30-SEP-13
WG1758068-1 MB								
Mercury (Hg)-Leachable			<0.000050		mg/L		0.00005	30-SEP-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2690605								
WG1742136-3 CRM		**VA-CANMET-TILL1**						
Aluminum (Al)			108.9		%		70-130	09-SEP-13
Antimony (Sb)			107.9		%		70-130	09-SEP-13
Arsenic (As)			115.6		%		70-130	09-SEP-13
Barium (Ba)			108.0		%		70-130	09-SEP-13
Beryllium (Be)			0.54		mg/kg		0.34-0.74	09-SEP-13
Bismuth (Bi)			105.8		%		70-130	09-SEP-13
Cadmium (Cd)			103.0		%		70-130	09-SEP-13
Calcium (Ca)			110.8		%		70-130	09-SEP-13
Chromium (Cr)			112.5		%		70-130	09-SEP-13
Cobalt (Co)			108.4		%		70-130	09-SEP-13
Copper (Cu)			105.9		%		70-130	09-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2690605								
WG1742136-3 CRM		**VA-CANMET-TILL1**						
Iron (Fe)			102.4		%		70-130	09-SEP-13
Lead (Pb)			95.5		%		70-130	09-SEP-13
Lithium (Li)			106.1		%		70-130	09-SEP-13
Magnesium (Mg)			109.8		%		70-130	09-SEP-13
Manganese (Mn)			111.6		%		70-130	09-SEP-13
Molybdenum (Mo)			0.74		mg/kg		0.24-1.24	09-SEP-13
Nickel (Ni)			108.9		%		70-130	09-SEP-13
Phosphorus (P)			111.3		%		70-130	09-SEP-13
Potassium (K)			114.3		%		70-130	09-SEP-13
Selenium (Se)			0.39		mg/kg		0.12-0.52	09-SEP-13
Silver (Ag)			0.27		mg/kg		0.12-0.32	09-SEP-13
Sodium (Na)			113.5		%		70-130	09-SEP-13
Strontium (Sr)			108.6		%		70-130	09-SEP-13
Thallium (Tl)			0.132		mg/kg		0.075-0.175	09-SEP-13
Tin (Sn)			1.0		mg/kg		0-3	09-SEP-13
Titanium (Ti)			113.8		%		70-130	09-SEP-13
Uranium (U)			112.8		%		70-130	09-SEP-13
Vanadium (V)			116.0		%		70-130	09-SEP-13
Zinc (Zn)			107.6		%		70-130	09-SEP-13
WG1742136-2 DUP		**L1353073-1**						
Aluminum (Al)		13200	12900		mg/kg	2.2	40	09-SEP-13
Antimony (Sb)		0.33	0.32		mg/kg	3.4	30	09-SEP-13
Arsenic (As)		12.1	29.1	DUP-H	mg/kg	82	30	09-SEP-13
Barium (Ba)		118	118		mg/kg	0.2	40	09-SEP-13
Beryllium (Be)		0.38	0.44		mg/kg	15	30	09-SEP-13
Bismuth (Bi)		0.25	0.31		mg/kg	19	30	09-SEP-13
Cadmium (Cd)		0.119	0.136		mg/kg	14	30	09-SEP-13
Calcium (Ca)		2550	1960		mg/kg	26	30	09-SEP-13
Chromium (Cr)		24.3	24.7		mg/kg	1.6	30	09-SEP-13
Cobalt (Co)		9.22	10.5		mg/kg	13	30	09-SEP-13
Copper (Cu)		15.9	16.8		mg/kg	5.2	30	09-SEP-13
Iron (Fe)		23900	24600		mg/kg	3.0	30	09-SEP-13
Lead (Pb)		9.19	9.45		mg/kg	2.7	40	09-SEP-13
Lithium (Li)		19.9	20.5		mg/kg	2.9	30	09-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2690605								
WG1742136-2 DUP		**L1353073-1**						
Magnesium (Mg)		5560	5460		mg/kg	1.8	30	09-SEP-13
Manganese (Mn)		262	278		mg/kg	5.9	30	09-SEP-13
Molybdenum (Mo)		1.20	1.25		mg/kg	4.1	40	09-SEP-13
Nickel (Ni)		19.8	22.0		mg/kg	10	30	09-SEP-13
Phosphorus (P)		614	280	DUP-H	mg/kg	75	30	09-SEP-13
Potassium (K)		710	670		mg/kg	5.7	40	09-SEP-13
Selenium (Se)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	09-SEP-13
Silver (Ag)		<0.10	<0.10	RPD-NA	mg/kg	N/A	40	09-SEP-13
Sodium (Na)		210	180		mg/kg	14	40	09-SEP-13
Strontium (Sr)		17.2	16.1		mg/kg	6.4	40	09-SEP-13
Thallium (Tl)		0.136	0.136		mg/kg	0.1	30	09-SEP-13
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	09-SEP-13
Titanium (Ti)		418	408		mg/kg	2.5	40	09-SEP-13
Uranium (U)		1.35	1.30		mg/kg	3.6	30	09-SEP-13
Vanadium (V)		36.6	35.6		mg/kg	2.9	30	09-SEP-13
Zinc (Zn)		59.5	62.8		mg/kg	5.3	30	09-SEP-13
WG1742136-1 MB								
Aluminum (Al)			<50		mg/kg		50	09-SEP-13
Antimony (Sb)			<0.10		mg/kg		0.1	09-SEP-13
Arsenic (As)			<0.050		mg/kg		0.05	09-SEP-13
Barium (Ba)			<0.50		mg/kg		0.5	09-SEP-13
Beryllium (Be)			<0.20		mg/kg		0.2	09-SEP-13
Bismuth (Bi)			<0.20		mg/kg		0.2	09-SEP-13
Cadmium (Cd)			<0.050		mg/kg		0.05	09-SEP-13
Calcium (Ca)			<50		mg/kg		50	09-SEP-13
Chromium (Cr)			<0.50		mg/kg		0.5	09-SEP-13
Cobalt (Co)			<0.10		mg/kg		0.1	09-SEP-13
Copper (Cu)			<0.50		mg/kg		0.5	09-SEP-13
Iron (Fe)			<50		mg/kg		50	09-SEP-13
Lead (Pb)			<0.50		mg/kg		0.5	09-SEP-13
Lithium (Li)			<5.0		mg/kg		5	09-SEP-13
Magnesium (Mg)			<20		mg/kg		20	09-SEP-13
Manganese (Mn)			<1.0		mg/kg		1	09-SEP-13
Molybdenum (Mo)			<0.50		mg/kg		0.5	09-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2690605								
WG1742136-1 MB								
Nickel (Ni)			<0.50		mg/kg		0.5	09-SEP-13
Phosphorus (P)			<50		mg/kg		50	09-SEP-13
Potassium (K)			<100		mg/kg		100	09-SEP-13
Selenium (Se)			<0.20		mg/kg		0.2	09-SEP-13
Silver (Ag)			<0.10		mg/kg		0.1	09-SEP-13
Sodium (Na)			<100		mg/kg		100	09-SEP-13
Strontium (Sr)			<0.50		mg/kg		0.5	09-SEP-13
Thallium (Tl)			<0.050		mg/kg		0.05	09-SEP-13
Tin (Sn)			<2.0		mg/kg		2	09-SEP-13
Titanium (Ti)			<1.0		mg/kg		1	09-SEP-13
Uranium (U)			<0.050		mg/kg		0.05	09-SEP-13
Vanadium (V)			<0.20		mg/kg		0.2	09-SEP-13
Zinc (Zn)			<1.0		mg/kg		1	09-SEP-13
Batch R2695962								
WG1748934-1 MB								
Aluminum (Al)			<50		mg/kg		50	17-SEP-13
Antimony (Sb)			<0.10		mg/kg		0.1	17-SEP-13
Arsenic (As)			<0.050		mg/kg		0.05	17-SEP-13
Barium (Ba)			<0.50		mg/kg		0.5	17-SEP-13
Beryllium (Be)			<0.20		mg/kg		0.2	17-SEP-13
Bismuth (Bi)			<0.20		mg/kg		0.2	17-SEP-13
Cadmium (Cd)			<0.050		mg/kg		0.05	17-SEP-13
Calcium (Ca)			<50		mg/kg		50	17-SEP-13
Chromium (Cr)			<0.50		mg/kg		0.5	17-SEP-13
Cobalt (Co)			<0.10		mg/kg		0.1	17-SEP-13
Copper (Cu)			<0.50		mg/kg		0.5	17-SEP-13
Iron (Fe)			<50		mg/kg		50	17-SEP-13
Lead (Pb)			<0.50		mg/kg		0.5	17-SEP-13
Lithium (Li)			<5.0		mg/kg		5	17-SEP-13
Magnesium (Mg)			<20		mg/kg		20	17-SEP-13
Manganese (Mn)			<1.0		mg/kg		1	17-SEP-13
Molybdenum (Mo)			<0.50		mg/kg		0.5	17-SEP-13
Nickel (Ni)			<0.50		mg/kg		0.5	17-SEP-13
Phosphorus (P)			<50		mg/kg		50	17-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2695962								
WG1748934-1 MB								
Potassium (K)			<100		mg/kg		100	17-SEP-13
Selenium (Se)			<0.20		mg/kg		0.2	17-SEP-13
Silver (Ag)			<0.10		mg/kg		0.1	17-SEP-13
Sodium (Na)			<100		mg/kg		100	17-SEP-13
Strontium (Sr)			<0.50		mg/kg		0.5	17-SEP-13
Thallium (Tl)			<0.050		mg/kg		0.05	17-SEP-13
Tin (Sn)			<2.0		mg/kg		2	17-SEP-13
Titanium (Ti)			<1.0		mg/kg		1	17-SEP-13
Uranium (U)			<0.050		mg/kg		0.05	17-SEP-13
Vanadium (V)			<0.20		mg/kg		0.2	17-SEP-13
Zinc (Zn)			<1.0		mg/kg		1	17-SEP-13
Batch R2696477								
WG1748934-3 CRM		**VA-CANMET-TILL1**						
Aluminum (Al)			97.8		%		70-130	18-SEP-13
Antimony (Sb)			93.4		%		70-130	18-SEP-13
Arsenic (As)			105.9		%		70-130	18-SEP-13
Barium (Ba)			100.7		%		70-130	18-SEP-13
Beryllium (Be)			0.50		mg/kg		0.34-0.74	18-SEP-13
Bismuth (Bi)			99.0		%		70-130	18-SEP-13
Cadmium (Cd)			93.8		%		70-130	18-SEP-13
Calcium (Ca)			109.3		%		70-130	18-SEP-13
Chromium (Cr)			106.2		%		70-130	18-SEP-13
Cobalt (Co)			100.0		%		70-130	18-SEP-13
Copper (Cu)			96.7		%		70-130	18-SEP-13
Iron (Fe)			98.3		%		70-130	18-SEP-13
Lead (Pb)			96.1		%		70-130	18-SEP-13
Lithium (Li)			99.9		%		70-130	18-SEP-13
Magnesium (Mg)			99.2		%		70-130	18-SEP-13
Manganese (Mn)			100.9		%		70-130	18-SEP-13
Molybdenum (Mo)			0.68		mg/kg		0.24-1.24	18-SEP-13
Nickel (Ni)			102.7		%		70-130	18-SEP-13
Phosphorus (P)			106.5		%		70-130	18-SEP-13
Potassium (K)			105.7		%		70-130	18-SEP-13
Selenium (Se)			0.33		mg/kg		0.12-0.52	18-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2696477								
WG1748934-3 CRM		**VA-CANMET-TILL1**						
Silver (Ag)			0.22		mg/kg		0.12-0.32	18-SEP-13
Sodium (Na)			107.4		%		70-130	18-SEP-13
Strontium (Sr)			102.7		%		70-130	18-SEP-13
Thallium (Tl)			0.119		mg/kg		0.075-0.175	18-SEP-13
Tin (Sn)			1.0		mg/kg		0-3	18-SEP-13
Titanium (Ti)			116.6		%		70-130	18-SEP-13
Uranium (U)			103.7		%		70-130	18-SEP-13
Vanadium (V)			106.8		%		70-130	18-SEP-13
Zinc (Zn)			100.7		%		70-130	18-SEP-13
WG1748934-2 DUP		**L1353073-6**						
Aluminum (Al)		20600	20300		mg/kg	1.5	40	18-SEP-13
Antimony (Sb)		0.54	0.51		mg/kg	4.4	30	18-SEP-13
Arsenic (As)		11.2	11.1		mg/kg	1.1	30	18-SEP-13
Barium (Ba)		295	292		mg/kg	0.9	40	18-SEP-13
Beryllium (Be)		0.70	0.70		mg/kg	0.0	30	18-SEP-13
Bismuth (Bi)		0.38	0.40		mg/kg	5.8	30	18-SEP-13
Cadmium (Cd)		0.443	0.437		mg/kg	1.3	30	18-SEP-13
Calcium (Ca)		3550	3470		mg/kg	2.5	30	18-SEP-13
Chromium (Cr)		74.9	86.5		mg/kg	14	30	18-SEP-13
Cobalt (Co)		16.3	16.1		mg/kg	0.9	30	18-SEP-13
Copper (Cu)		38.9	37.9		mg/kg	2.5	30	18-SEP-13
Iron (Fe)		33300	33700		mg/kg	1.2	30	18-SEP-13
Lead (Pb)		19.3	19.9		mg/kg	3.0	40	18-SEP-13
Lithium (Li)		33.3	34.0		mg/kg	2.3	30	18-SEP-13
Magnesium (Mg)		8540	8510		mg/kg	0.3	30	18-SEP-13
Manganese (Mn)		488	470		mg/kg	3.7	30	18-SEP-13
Molybdenum (Mo)		1.09	1.19		mg/kg	9.0	40	18-SEP-13
Nickel (Ni)		51.5	52.6		mg/kg	2.1	30	18-SEP-13
Phosphorus (P)		798	753		mg/kg	5.7	30	18-SEP-13
Potassium (K)		2020	1910		mg/kg	5.9	40	18-SEP-13
Selenium (Se)		0.26	0.27		mg/kg	5.6	30	18-SEP-13
Silver (Ag)		0.16	0.17		mg/kg	3.9	40	18-SEP-13
Sodium (Na)		290	290		mg/kg	2.2	40	18-SEP-13
Strontium (Sr)		24.2	24.2		mg/kg	0.1	40	18-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2696477								
WG1748934-2 DUP		**L1353073-6**						
Thallium (Tl)		0.190	0.193		mg/kg	1.3	30	18-SEP-13
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	18-SEP-13
Titanium (Ti)		537	494		mg/kg	8.4	40	18-SEP-13
Uranium (U)		1.60	1.84		mg/kg	14	30	18-SEP-13
Vanadium (V)		42.0	41.1		mg/kg	2.2	30	18-SEP-13
Zinc (Zn)		102	101		mg/kg	1.0	30	18-SEP-13
MET-SHKFL96-CCMS-VA	**Soil**							
Batch R2700611								
WG1750996-2 DUP		**L1353073-5**						
Aluminum (Al)-Leachable		32.4	34.3		mg/L	5.7	40	25-SEP-13
Antimony (Sb)-Leachable		0.00074	0.00079		mg/L	7.0	40	25-SEP-13
Arsenic (As)-Leachable		0.0271	0.0278		mg/L	2.5	40	25-SEP-13
Barium (Ba)-Leachable		0.218	0.215		mg/L	1.1	40	25-SEP-13
Beryllium (Be)-Leachable		0.00108	0.00118		mg/L	8.5	40	25-SEP-13
Boron (B)-Leachable		0.038	0.038		mg/L	0.3	40	25-SEP-13
Cadmium (Cd)-Leachable		0.000402	0.000480		mg/L	18	40	25-SEP-13
Chromium (Cr)-Leachable		0.0300	0.0329		mg/L	9.3	40	25-SEP-13
Cobalt (Co)-Leachable		0.0190	0.0197		mg/L	3.6	40	25-SEP-13
Copper (Cu)-Leachable		0.0274	0.0273		mg/L	0.3	40	25-SEP-13
Lead (Pb)-Leachable		0.0256	0.0281		mg/L	9.4	40	25-SEP-13
Lithium (Li)-Leachable		0.0127	0.0142		mg/L	11	40	25-SEP-13
Manganese (Mn)-Leachable		0.555	0.585		mg/L	5.2	40	25-SEP-13
Molybdenum (Mo)-Leachable		0.00123	0.00130		mg/L	5.8	40	25-SEP-13
Nickel (Ni)-Leachable		0.0301	0.0341		mg/L	12	40	25-SEP-13
Selenium (Se)-Leachable		0.00054	0.00053		mg/L	2.4	40	25-SEP-13
Silver (Ag)-Leachable		0.000175	0.000169		mg/L	3.4	40	25-SEP-13
Strontium (Sr)-Leachable		0.0241	0.0243		mg/L	0.7	40	25-SEP-13
Thallium (Tl)-Leachable		0.00019	0.00023		mg/L	16	40	25-SEP-13
Uranium (U)-Leachable		0.00109	0.00113		mg/L	3.9	40	25-SEP-13
Vanadium (V)-Leachable		0.0401	0.0454		mg/L	13	40	25-SEP-13
Zinc (Zn)-Leachable		0.053	0.059		mg/L	9.7	40	25-SEP-13
WG1750996-1 MB								
Aluminum (Al)-Leachable			<0.0050		mg/L		0.005	25-SEP-13
Antimony (Sb)-Leachable			<0.00010		mg/L		0.0001	25-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-SHKFL96-CCMS-VA	**Soil**							
Batch	**R2700611**							
WG1750996-1	**MB**							
Arsenic (As)-Leachable			<0.0010		mg/L		0.001	25-SEP-13
Barium (Ba)-Leachable			<0.0010		mg/L		0.001	25-SEP-13
Beryllium (Be)-Leachable			<0.00050		mg/L		0.0005	25-SEP-13
Boron (B)-Leachable			<0.010		mg/L		0.01	25-SEP-13
Cadmium (Cd)-Leachable			<0.000050		mg/L		0.00005	25-SEP-13
Chromium (Cr)-Leachable			<0.00050		mg/L		0.0005	25-SEP-13
Cobalt (Co)-Leachable			<0.00010		mg/L		0.0001	25-SEP-13
Copper (Cu)-Leachable			<0.0010		mg/L		0.001	25-SEP-13
Lead (Pb)-Leachable			<0.00010		mg/L		0.0001	25-SEP-13
Lithium (Li)-Leachable			<0.0050		mg/L		0.005	25-SEP-13
Manganese (Mn)-Leachable			<0.00050		mg/L		0.0005	25-SEP-13
Molybdenum (Mo)-Leachable			<0.00010		mg/L		0.0001	25-SEP-13
Nickel (Ni)-Leachable			<0.00050		mg/L		0.0005	25-SEP-13
Selenium (Se)-Leachable			<0.00050		mg/L		0.0005	25-SEP-13
Silver (Ag)-Leachable			<0.000050		mg/L		0.00005	25-SEP-13
Strontium (Sr)-Leachable			<0.00050		mg/L		0.0005	25-SEP-13
Thallium (Tl)-Leachable			<0.00010		mg/L		0.0001	25-SEP-13
Uranium (U)-Leachable			<0.000010		mg/L		0.00001	25-SEP-13
Vanadium (V)-Leachable			<0.0010		mg/L		0.001	25-SEP-13
Zinc (Zn)-Leachable			<0.010		mg/L		0.01	25-SEP-13
Batch	**R2701409**							
WG1750996-3	**MS**	**L1352371-5**						
Aluminum (Al)-Leachable			N/A	MS-B	%		-	25-SEP-13
Antimony (Sb)-Leachable			96.3		%		70-130	25-SEP-13
Arsenic (As)-Leachable			99.8		%		70-130	25-SEP-13
Barium (Ba)-Leachable			101.1		%		70-130	25-SEP-13
Beryllium (Be)-Leachable			93.3		%		70-130	25-SEP-13
Boron (B)-Leachable			87.8		%		70-130	25-SEP-13
Cadmium (Cd)-Leachable			96.3		%		70-130	25-SEP-13
Chromium (Cr)-Leachable			94.7		%		70-130	25-SEP-13
Cobalt (Co)-Leachable			92.8		%		70-130	25-SEP-13
Copper (Cu)-Leachable			89.6		%		70-130	25-SEP-13
Lead (Pb)-Leachable			95.4		%		70-130	25-SEP-13
Lithium (Li)-Leachable			86.1		%		70-130	25-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-SHKFL96-CCMS-VA	**Soil**							
Batch	**R2701409**							
WG1750996-3	**MS**	**L1352371-5**						
Manganese (Mn)-Leachable			N/A	MS-B	%		-	25-SEP-13
Molybdenum (Mo)-Leachable			87.1		%		70-130	25-SEP-13
Nickel (Ni)-Leachable			92.8		%		70-130	25-SEP-13
Selenium (Se)-Leachable			87.4		%		70-130	25-SEP-13
Silver (Ag)-Leachable			89.4		%		70-130	25-SEP-13
Strontium (Sr)-Leachable			82.7		%		70-130	25-SEP-13
Thallium (Tl)-Leachable			95.3		%		70-130	25-SEP-13
Vanadium (V)-Leachable			98.8		%		70-130	25-SEP-13
Zinc (Zn)-Leachable			94.5		%		70-130	25-SEP-13
Batch	**R2705847**							
WG1755367-2	**DUP**	**L1353073-3**						
Aluminum (Al)-Leachable		1.15	2.20	DUP-H	mg/L	63	40	01-OCT-13
Antimony (Sb)-Leachable		0.00067	0.00087		mg/L	26	40	01-OCT-13
Arsenic (As)-Leachable		0.0091	0.0141	DUP-H	mg/L	42	40	01-OCT-13
Barium (Ba)-Leachable		0.121	0.127		mg/L	4.2	40	01-OCT-13
Beryllium (Be)-Leachable		<0.00050	<0.00050	RPD-NA	mg/L	N/A	40	01-OCT-13
Boron (B)-Leachable		0.014	0.011		mg/L	23	40	01-OCT-13
Cadmium (Cd)-Leachable		0.000123	0.000162		mg/L	28	40	01-OCT-13
Chromium (Cr)-Leachable		0.00336	0.00559	DUP-H	mg/L	50	40	01-OCT-13
Cobalt (Co)-Leachable		0.00394	0.00558		mg/L	34	40	01-OCT-13
Copper (Cu)-Leachable		0.0167	0.0256	DUP-H	mg/L	42	40	01-OCT-13
Lead (Pb)-Leachable		0.00666	0.00942		mg/L	34	40	01-OCT-13
Lithium (Li)-Leachable		<0.0050	<0.0050	RPD-NA	mg/L	N/A	40	01-OCT-13
Manganese (Mn)-Leachable		0.167	0.232		mg/L	33	40	01-OCT-13
Molybdenum (Mo)-Leachable		0.00064	0.00083		mg/L	26	40	01-OCT-13
Nickel (Ni)-Leachable		0.0115	0.0170		mg/L	39	40	01-OCT-13
Selenium (Se)-Leachable		<0.00050	<0.00050	RPD-NA	mg/L	N/A	40	01-OCT-13
Silver (Ag)-Leachable		<0.000050	<0.000050	RPD-NA	mg/L	N/A	40	01-OCT-13
Strontium (Sr)-Leachable		0.0540	0.0478		mg/L	12	40	01-OCT-13
Thallium (Tl)-Leachable		<0.00010	<0.00010	RPD-NA	mg/L	N/A	40	01-OCT-13
Uranium (U)-Leachable		0.000404	0.000580		mg/L	36	40	01-OCT-13
Vanadium (V)-Leachable		0.0079	0.0126	DUP-H	mg/L	47	40	01-OCT-13
Zinc (Zn)-Leachable		0.022	0.030		mg/L	33	40	01-OCT-13
WG1755367-1	**MB**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-SHKFL96-CCMS-VA	**Soil**							
Batch R2705847								
WG1755367-1 MB								
Aluminum (Al)-Leachable			<0.0050		mg/L		0.005	01-OCT-13
Antimony (Sb)-Leachable			<0.00010		mg/L		0.0001	01-OCT-13
Arsenic (As)-Leachable			<0.0010		mg/L		0.001	01-OCT-13
Barium (Ba)-Leachable			<0.0010		mg/L		0.001	01-OCT-13
Beryllium (Be)-Leachable			<0.00050		mg/L		0.0005	01-OCT-13
Boron (B)-Leachable			<0.010		mg/L		0.01	01-OCT-13
Cadmium (Cd)-Leachable			<0.000050		mg/L		0.00005	01-OCT-13
Chromium (Cr)-Leachable			<0.00050		mg/L		0.0005	01-OCT-13
Cobalt (Co)-Leachable			<0.00010		mg/L		0.0001	01-OCT-13
Copper (Cu)-Leachable			<0.0010		mg/L		0.001	01-OCT-13
Lead (Pb)-Leachable			<0.00010		mg/L		0.0001	01-OCT-13
Lithium (Li)-Leachable			<0.0050		mg/L		0.005	01-OCT-13
Manganese (Mn)-Leachable			<0.00050		mg/L		0.0005	01-OCT-13
Molybdenum (Mo)-Leachable			<0.00010		mg/L		0.0001	01-OCT-13
Nickel (Ni)-Leachable			<0.00050		mg/L		0.0005	01-OCT-13
Selenium (Se)-Leachable			<0.00050		mg/L		0.0005	01-OCT-13
Silver (Ag)-Leachable			<0.000050		mg/L		0.00005	01-OCT-13
Strontium (Sr)-Leachable			<0.00050		mg/L		0.0005	01-OCT-13
Thallium (Tl)-Leachable			<0.00010		mg/L		0.0001	01-OCT-13
Uranium (U)-Leachable			<0.000010		mg/L		0.00001	01-OCT-13
Vanadium (V)-Leachable			<0.0010		mg/L		0.001	01-OCT-13
Zinc (Zn)-Leachable			<0.010		mg/L		0.01	01-OCT-13
WG1755367-3 MS		**L1353073-3**						
Aluminum (Al)-Leachable			129.8		%		70-130	01-OCT-13
Antimony (Sb)-Leachable			103.6		%		70-130	01-OCT-13
Arsenic (As)-Leachable			100.6		%		70-130	01-OCT-13
Barium (Ba)-Leachable			107.1		%		70-130	01-OCT-13
Beryllium (Be)-Leachable			103.7		%		70-130	01-OCT-13
Boron (B)-Leachable			91.7		%		70-130	01-OCT-13
Cadmium (Cd)-Leachable			99.0		%		70-130	01-OCT-13
Chromium (Cr)-Leachable			98.8		%		70-130	01-OCT-13
Cobalt (Co)-Leachable			100.8		%		70-130	01-OCT-13
Copper (Cu)-Leachable			98.5		%		70-130	01-OCT-13
Lead (Pb)-Leachable			98.1		%		70-130	01-OCT-13

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-SHKFL96-CCMS-VA	**Soil**							
Batch **R2705847**								
WG1755367-3 **MS**		**L1353073-3**						
Lithium (Li)-Leachable			96.2		%		70-130	01-OCT-13
Manganese (Mn)-Leachable			117.7		%		70-130	01-OCT-13
Molybdenum (Mo)-Leachable			95.9		%		70-130	01-OCT-13
Nickel (Ni)-Leachable			96.7		%		70-130	01-OCT-13
Selenium (Se)-Leachable			97.9		%		70-130	01-OCT-13
Silver (Ag)-Leachable			102.4		%		70-130	01-OCT-13
Strontium (Sr)-Leachable			95.2		%		70-130	01-OCT-13
Thallium (Tl)-Leachable			97.1		%		70-130	01-OCT-13
Vanadium (V)-Leachable			99.9		%		70-130	01-OCT-13
Zinc (Zn)-Leachable			103.0		%		70-130	01-OCT-13
MET-SHKFL96-ICP-VA	**Soil**							
Batch **R2700632**								
WG1750996-2 **DUP**		**L1353073-5**						
Calcium (Ca)-Leachable		1.27	1.31		mg/L	2.5	40	24-SEP-13
Iron (Fe)-Leachable		31.3	33.4		mg/L	6.6	40	24-SEP-13
Magnesium (Mg)-Leachable		2.64	3.43		mg/L	26	40	24-SEP-13
Potassium (K)-Leachable		11.7	12.1		mg/L	3.7	40	24-SEP-13
Silicon (Si)-Leachable		44.7	46.3		mg/L	3.5	40	24-SEP-13
Sodium (Na)-Leachable		6.9	6.3		mg/L	8.7	40	24-SEP-13
Sulfur (S)-Leachable		1.24	1.44		mg/L	15	40	24-SEP-13
Titanium (Ti)-Leachable		0.725	0.883		mg/L	20	40	24-SEP-13
WG1750996-1 **MB**								
Calcium (Ca)-Leachable			<0.050		mg/L		0.05	24-SEP-13
Iron (Fe)-Leachable			<0.030		mg/L		0.03	24-SEP-13
Magnesium (Mg)-Leachable			<0.10		mg/L		0.1	24-SEP-13
Potassium (K)-Leachable			<2.0		mg/L		2	24-SEP-13
Silicon (Si)-Leachable			<0.050		mg/L		0.05	24-SEP-13
Sodium (Na)-Leachable			<2.0		mg/L		2	24-SEP-13
Sulfur (S)-Leachable			<0.50		mg/L		0.5	24-SEP-13
Titanium (Ti)-Leachable			<0.010		mg/L		0.01	24-SEP-13
WG1750996-3 **MS**		**L1352371-5**						
Calcium (Ca)-Leachable			N/A	MS-B	%		-	24-SEP-13
Iron (Fe)-Leachable			N/A	MS-B	%		-	24-SEP-13
Magnesium (Mg)-Leachable			N/A	MS-B	%		-	24-SEP-13
Potassium (K)-Leachable			101.2		%		70-130	24-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-SHKFL96-ICP-VA	**Soil**							
Batch R2700632								
WG1750996-3 MS		**L1352371-5**						
Silicon (Si)-Leachable			N/A	MS-B	%		-	24-SEP-13
Sodium (Na)-Leachable			97.8		%		70-130	24-SEP-13
Titanium (Ti)-Leachable			97.5		%		70-130	24-SEP-13
Batch R2705506								
WG1755367-2 DUP		**L1353073-3**						
Calcium (Ca)-Leachable		9.87	8.76		mg/L	12	40	30-SEP-13
Iron (Fe)-Leachable		6.61	9.85		mg/L	39	40	30-SEP-13
Magnesium (Mg)-Leachable		2.31	2.12		mg/L	8.5	40	30-SEP-13
Potassium (K)-Leachable		<2.0	<2.0	RPD-NA	mg/L	N/A	40	30-SEP-13
Silicon (Si)-Leachable		9.68	11.5		mg/L	17	40	30-SEP-13
Sodium (Na)-Leachable		<2.0	<2.0	RPD-NA	mg/L	N/A	40	30-SEP-13
Sulfur (S)-Leachable		0.72	0.75		mg/L	3.4	40	30-SEP-13
Titanium (Ti)-Leachable		0.119	0.176		mg/L	39	40	30-SEP-13
WG1755367-1 MB								
Calcium (Ca)-Leachable			<0.050		mg/L		0.05	30-SEP-13
Iron (Fe)-Leachable			<0.030		mg/L		0.03	30-SEP-13
Magnesium (Mg)-Leachable			<0.10		mg/L		0.1	30-SEP-13
Potassium (K)-Leachable			<2.0		mg/L		2	30-SEP-13
Silicon (Si)-Leachable			<0.050		mg/L		0.05	30-SEP-13
Sodium (Na)-Leachable			<2.0		mg/L		2	30-SEP-13
Sulfur (S)-Leachable			<0.50		mg/L		0.5	30-SEP-13
Titanium (Ti)-Leachable			<0.010		mg/L		0.01	30-SEP-13
WG1755367-3 MS		**L1353073-3**						
Calcium (Ca)-Leachable			N/A	MS-B	%		-	30-SEP-13
Iron (Fe)-Leachable			N/A	MS-B	%		-	30-SEP-13
Magnesium (Mg)-Leachable			N/A	MS-B	%		-	30-SEP-13
Potassium (K)-Leachable			110.6		%		70-130	30-SEP-13
Silicon (Si)-Leachable			N/A	MS-B	%		-	30-SEP-13
Sodium (Na)-Leachable			103.8		%		70-130	30-SEP-13
Titanium (Ti)-Leachable			98.0		%		70-130	30-SEP-13
MOISTURE-VA	**Soil**							
Batch R2687778								
WG1741296-2 LCS								
Moisture			99.99		%		70-130	05-SEP-13
WG1741296-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-VA	**Soil**							
Batch R2687778								
WG1741296-1 MB								
Moisture			<0.25		%		0.25	05-SEP-13
Batch R2688801								
WG1742244-3 DUP		**L1353073-8**						
Moisture		25.7	23.3		%	9.6	20	07-SEP-13
WG1742244-2 LCS								
Moisture			99.7		%		70-130	07-SEP-13
WG1742244-1 MB								
Moisture			<0.25		%		0.25	07-SEP-13
Batch R2695064								
WG1748958-3 DUP		**L1353073-6**						
Moisture		<0.25	<0.25	RPD-NA	%	N/A	20	17-SEP-13
WG1748958-2 LCS								
Moisture			100.0		%		70-130	17-SEP-13
WG1748958-1 MB								
Moisture			<0.25		%		0.25	17-SEP-13
ORP-SHKFL96-VA	**Soil**							
Batch R2700061								
WG1750996-2 DUP		**L1353073-5**						
Oxidation-Reduction Potential (ORP)		455	454		mV	0.3	25	25-SEP-13
Batch R2704320								
WG1755367-2 DUP		**L1353073-3**						
Oxidation-Reduction Potential (ORP)		457	458		mV	0.2	25	30-SEP-13
PH-1:2-VA	**Soil**							
Batch R2690237								
WG1742136-2 DUP		**L1353073-1**						
pH (1:2 soil:water)		5.27	5.27	J	pH	0.00	0.3	10-SEP-13
Batch R2695273								
WG1748934-2 DUP		**L1353073-6**						
pH (1:2 soil:water)		5.57	5.55	J	pH	0.02	0.3	17-SEP-13
PH-SHKFL96-MAN-VA	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-SHKFL96-MAN-VA	**Soil**							
Batch R2699711								
WG1750996-2 DUP		**L1353073-5**						
pH		6.25	6.18	J	pH	0.07	0.3	24-SEP-13
Batch R2704287								
WG1755367-2 DUP		**L1353073-3**						
pH		6.75	6.74	J	pH	0.01	0.3	30-SEP-13
S-TOT-LECO-SK	**Soil**							
Batch R2683482								
WG1736818-1 DUP		**L1353073-6**						
Sulfur (S)-Total		<500	<500	RPD-NA	mg/kg	N/A	30	30-AUG-13
WG1736818-2 IRM		**1646A_SOIL**						
Sulfur (S)-Total			3000		mg/kg		2500-4600	30-AUG-13
WG1736818-3 MB								
Sulfur (S)-Total			<500		mg/kg		500	30-AUG-13
SO4-SHKFL96-TURB-VA	**Soil**							
Batch R2700668								
WG1750996-2 DUP		**L1353073-5**						
Sulfate (SO4)		8.2	7.8		mg/L	4.8	30	25-SEP-13
WG1750996-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	25-SEP-13
WG1754746-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	25-SEP-13
WG1754746-3 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	25-SEP-13
Batch R2705667								
WG1755367-2 DUP		**L1353073-3**						
Sulfate (SO4)		2.52	3.36		mg/L	29	30	30-SEP-13
WG1755367-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	30-SEP-13
WG1758074-5 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	30-SEP-13
WG1758074-7 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	30-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
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
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							
Moisture content							
	6	23-AUG-13 13:00	17-SEP-13 13:12	14	25	days	EHT
	7	23-AUG-13 15:00	07-SEP-13 12:51	14	15	days	EHT
	8	23-AUG-13 15:15	07-SEP-13 12:51	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 L1353073 were received on 26-AUG-13 10:30.

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.

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

September 26, 2013

Client: ALS Environmental-Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1353073 Date Received: August 30, 2013

Certificate of Analysis

Client ID:	Sample Date:		Lab #:		Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3$/1,000t
L1353073-1	8/22/2013	0000	T1301295-001		12.14	4
L1353073-2	8/22/2013	0000	T1301295-002		13.54	10
L1353073-3	8/22/2013	0000	T1301295-003		11.06	5
L1353073-4	8/23/2013	0000	T1301295-004		7.44	4
L1353073-5	8/23/2013	0000	T1301295-005		7.03	4
L1353073-6	8/23/2013	0000	T1301295-006		12.19	5
L1353073-7	8/23/2013	0000	T1301295-007		13.24	7
L1353073-8	8/23/2013	0000	T1301295-008		14.29	4
L1353073-9	8/22/2013	0000	T1301295-009		13.12	6

Notes:
Samples were air dried then ground to < 60 mesh.

W. Hyatt
Digitally signed by Wendy Hyatt
Date: 2013.09.26 14:43:47 -07'00'
Wendy Hyatt, Project Chemist

ALS Environmental

September 26, 2013

Client: ALS Environmental-Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1353073

Date Received: August 30, 2013

Quality Control

				Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3$/1,000t
Prep Blank				0.02	< 1
Laboratory Control Sample (LCS) - Rice Flour CN 3451			Observed Value	9.63	n/a
			True Value	9.50	
			%R	101	
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	1,002
			True Value		1,000
			%R		100
Duplicate Results			T1301295-001	0.59 **	
			Duplicate	0.55 **	
			%R	7	
Duplicate Results			*T1301294-001		9
			Duplicate		9
			%RPD		0

* Sample from the same batch, but a different project.

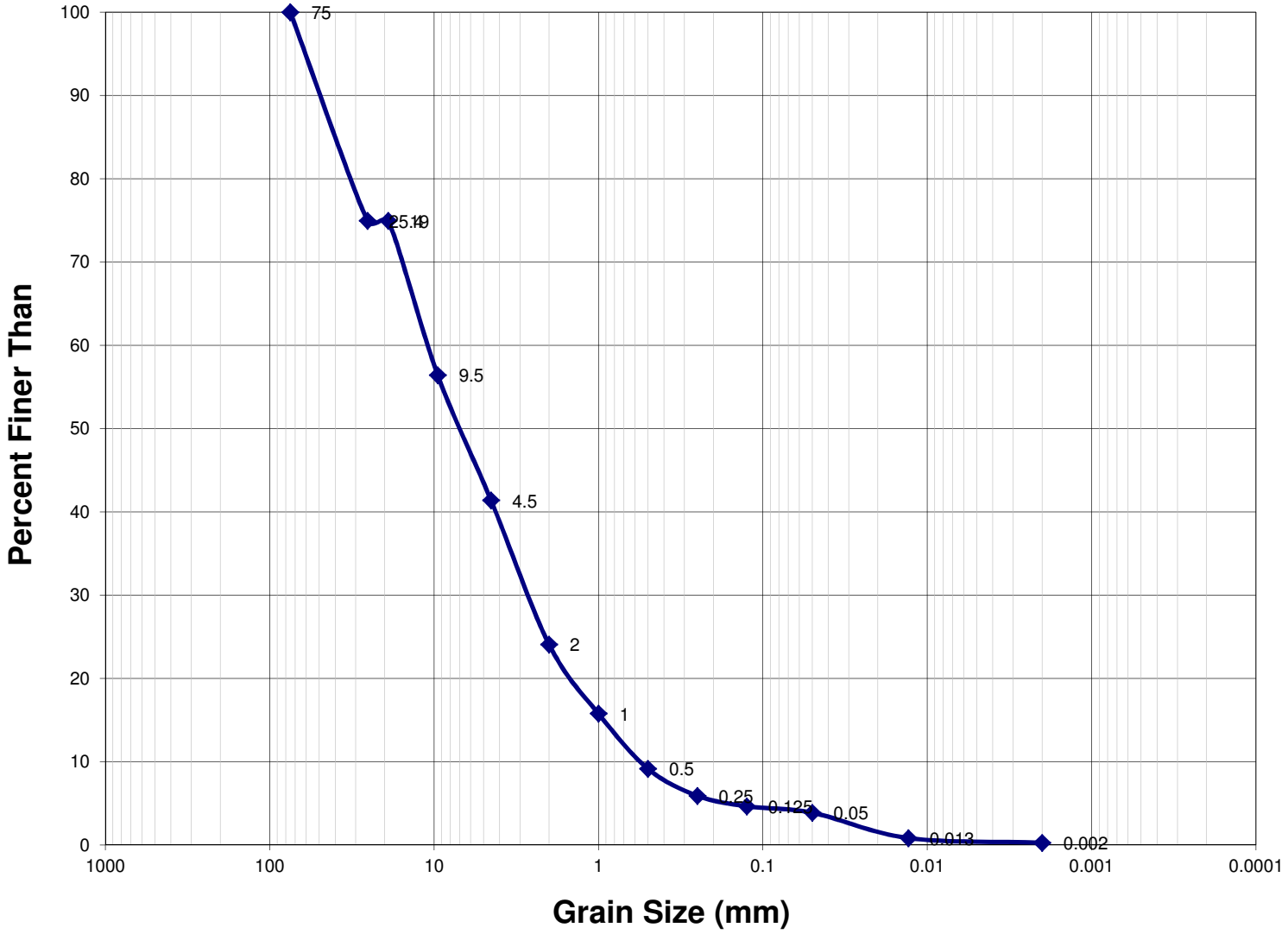
**Residual moisture - does not include air dry moisture.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH001_SOB
Lab ID: L1353073-5

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	58
Coarse Sand	2.0mm - 4.75mm	18
Medium Sand	0.425mm - 2.0mm	15
Fine Sand	0.075mm - 0.425mm	5
Fines	< 0.075mm	4

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	76
Sand	0.05mm - 2mm	20
Silt	0.002mm - 0.05mm	4
Clay	< 0.002mm	0
Texture	Loamy sand	

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 10- SEP- 2013
Account: APN

CERTIFICATE VA13153553

Project: L1353073

P.O. No.: L1353073

This report is for 9 Clay samples submitted to our lab in Vancouver, BC, Canada on 29- AUG- 2013.

The following have access to data associated with this certificate:

ALS E VANCOUVER WEBTRIEVE	AMBER SPRINGER	

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI- 21	Received Sample Weight
LOG- 22	Sample login - Rcd w/o BarCode
PUL- 31	Pulverize split to 85% < 75 um
PUL- QC	Pulverizing QC Test

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
S- GRA06a	Sulfate Sulfur (HCl leachable)	WST- SEQ
ME- MS81	Lithium Borate Fusion ICP- MS	ICP- MS

To: ALS ENVIRONMENTAL
ATTN: AMBER SPRINGER
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

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

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

Signature:
Colin Ramshaw, Vancouver Laboratory Manager

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 10- SEP- 2013
Account: APN

Project: L1353073

CERTIFICATE OF ANALYSIS VA13153553

Sample Description	Method Analyte Units LOR	WEI-21 Rec'vd Wt. kg 0.02	S-GRA06a S % 0.01	MC-MS81 Ba ppm 0.5
L1353073-1		0.18	0.02	837
L1353073-2		0.20	0.02	1160
L1353073-3		0.24	0.01	1070
L1353073-4		0.20	0.01	815
L1353073-5		0.20	0.01	864
L1353073-6		0.18	0.01	1026
L1353073-7		0.20	0.01	1050
L1353073-8		0.20	0.01	752
L1353073-9		0.26	<0.01	1070

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

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 10- SEP- 2013
Account: APN

Project: L1353073

CERTIFICATE OF ANALYSIS VA13153553

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

Applies to Method:				
	LOG- 22	ME- MS81	PUL- 31	PUL- QC
	S- GRA06a	WEI- 21		

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 10-SEP-2013
Account: APN

QC CERTIFICATE VA13153553

Project: L1353073

P.O. No.: L1353073

This report is for 9 Clay samples submitted to our lab in Vancouver, BC, Canada on 29-AUG-2013.

The following have access to data associated with this certificate:

ALSE VANCOUVER WEBTRIEVE	AMBER SPRINGER	

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
PUL-31	Pulverize split to 85% <75 um
PUL-QC	Pulverizing QC Test

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
S-GRA06a	Sulfate Sulfur (HCl leachable)	WST-SEQ
ME-MS81	Lithium Borate Fusion ICP-MS	ICP-MS

To: ALS ENVIRONMENTAL
ATTN: AMBER SPRINGER
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

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

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

Signature:
Colin Ramshaw, Vancouver Laboratory Manager

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Project: LI353073

QC CERTIFICATE OF ANALYSIS VA13153553

Sample Description	Method Analyte Units LOR	S-GRA09a S % 0.01	ME-MS81 Ba ppm 0.5
STANDARDS			
ORLAS 146			>10000
OREAS 146			>10000
Target Range - Lower Bound			11460
Upper Bound			>10000
RTS-1		1.22	
Target Range - Lower Bound		1.14	
Upper Bound		1.34	
SY-4			358
SY-4			352
Target Range - Lower Bound			306
Upper Bound			376
UTS-1		0.86	
Target Range - Lower Bound		0.81	
Upper Bound		0.95	
BLANKS			
BLANK			<0.6
BLANK			<0.5
Target Range - Lower Bound			<0.5
Upper Bound			1.0
BLANK		<0.01	
Target Range - Lower Bound		<0.01	
Upper Bound		0.02	
DUPLICATES			
ORIGINAL			1805
DUP			1860
Target Range - Lower Bound			1740
Upper Bound			1925

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

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 10- SEP- 2013
Account: APN

Project: L1353073

QC CERTIFICATE OF ANALYSIS VA13153553

Sample Description	Method / Analyte / Units / LOR	S GRA06a S % 0.01	MC-MS81 Ba ppm 0.5
		DUPLICATES	
ORIGINAL			812
DUP			812
Target Range - Lower Bound			771
Upper Bound			853
L1353113-5		<0.01	
DUP		<0.01	
Target Range - Lower Bound		<0.01	
Upper Bound		0.02	

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

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 10- SEP- 2013
Account: APN

Project: L1353073

QC CERTIFICATE OF ANALYSIS VA13153553

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Applies to Method: Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

LOG- 22	ME- MS81	PUL- 31	PUL- QC
S- GRA06a	WEI- 21		

CH2MHILL

CHAIN OF CUSTODY RECORD

8/26/2013 12:22:30 PM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 10 Days
Shipping Date: 8/24/2013
COC Number: ALS08251301

				(ASTM 2216) Moisture	(CSSS/APHA4500H) 1:1 Paste pH	(DI/EPA600/2-78-054) Acid Soluable Sulfate	(EPA200.0/245.7/SW6020A) Total Metals Table 1	(ModifiedSobek) Mod Neutralization Potential	(SSSA (1996) P455-456) TIC	(SSSA (1996) P995-996) TOC	(SW6020A) Ba(Li) Metaborate	(ASTM 4318) Atterberg limits	(ASTM D422) Gradation	Number of Containers	COMMENTS
Container:				4oz jar	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon		
Preservatives:				4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C		
Filtered:				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Holding Time:				14	28	180	14	28	28	28	14	NA	NA		
	DATE	**TIME**	**Matrix**												
CH13-311-BH002_SOb	8/22/2013	12:00	Soil	X	X	X	X	X	X	X	X			4	
CH13-311-BH003_SOa	8/22/2013	14:30	Soil	X	X	X	X	X	X	X	X			4	
CH13-311-BH003_SOb	8/22/2013	14:45	Soil	X	X	X	X	X	X	X	X			4	
CH13-311-BH903_SOb	8/22/2013	14:45	Soil	X	X	X	X	X	X	X	X			4	
CH13-311-BH001_SOa	8/23/2013	10:00	Soil	X	X	X	X	X	X	X	X			4	
CH13-311-BH001_SOb	8/23/2013	10:15	Soil	X	X	X	X	X	X	X	X	X	X	6	
CH13-311-BH004_SOa	8/23/2013	13:00	Soil	X	X	X	X	X	X	X	X			4	
CH13-311-BH005_SOa	8/23/2013	15:00	Soil	X	X	X	X	X	X	X	X			4	
CH13-311-BH005_SOb	8/23/2013	15:15	Soil	X	X	X	X	X	X	X	X			4	
														TOTAL NUMBER OF CONTAINERS	38

L1353073-COFC

Approved by
Sampled by
Relinquished by
Received by
Relinquished by
Received by

20-Aug-13 10:30
1.1, 3.4, 2.5

Shipping Details

thod of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

8/26/2013 12:22:57 PM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 3 Days
Shipping Date: 8/24/2013
COC Number: ALS08251301R

	Container:	Preservatives:	Filtered:	Holding Time:
	1 Gallon	4°C	NA	180

	DATE	TIME	Matrix	(ISO 15178-2000) Total Sulphur	Number of Containers	COMMENTS
CH13-311-BH002_SOb	8/22/2013	12:00	Soil	X	1	
CH13-311-BH003_SOa	8/22/2013	14:30	Soil	X	1	
CH13-311-BH003_SOb	8/22/2013	14:45	Soil	X	1	
CH13-311-BH903_SOb	8/22/2013	14:45	Soil	X	1	
CH13-311-BH001_SOa	8/23/2013	10:00	Soil	X	1	
CH13-311-BH001_SOb	8/23/2013	10:15	Soil	X	1	
CH13-311-BH004_SOa	8/23/2013	13:00	Soil	X	1	
CH13-311-BH005_SOa	8/23/2013	15:00	Soil	X	1	
CH13-311-BH005_SOb	8/23/2013	15:15	Soil	X	1	
					1	
				TOTAL NUMBER OF CONTAINERS	9	

L1353073-COFC

	Signatures	Date/Time
Approved by		
Sampled by		25-Aug-13
Relinquished by		
Received by		
Relinquished by		
Received by		

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

8/26/2013 12:21:48 PM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 10 Days
Shipping Date: 8/24/2013
COC Number: ALS08251301H

	Container:	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	
	Preservatives:	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	
	Filtered:	NA	NA	NA	NA	NA	NA	NA	NA	
	Holding Time:	14	14	180	14	14	14	14	14	
		(DI/ASTMD1498) DI ORP	(DI/E245.7) DI Mercury	(DI/E300) DI Sulphate	(DI/SM2310) DI Acidity	(DI/SM2320) DI Alkalinity	(DI/SM2510) DI Conductivity	(DI/SM4500H) DI pH	(DI/SW6020A) DI Diss Metals	Number of Containers
	DATE	TIME	Matrix							COMMENTS
CH13-311-BH002_SOb	8/22/2013	12:00	Soil	X	X	X	X	X	X	X	X	3
CH13-311-BH003_SOa	8/22/2013	14:30	Soil	X	X	X	X	X	X	X	X	3
CH13-311-BH003_SOb	8/22/2013	14:45	Soil	X	X	X	X	X	X	X	X	3
CH13-311-BH903_SOb	8/22/2013	14:45	Soil	X	X	X	X	X	X	X	X	3
CH13-311-BH001_SOa	8/23/2013	10:00	Soil	X	X	X	X	X	X	X	X	3
CH13-311-BH001_SOb	8/23/2013	10:15	Soil	X	X	X	X	X	X	X	X	3
CH13-311-BH004_SOa	8/23/2013	13:00	Soil	X	X	X	X	X	X	X	X	3
CH13-311-BH005_SOa	8/23/2013	15:00	Soil	X	X	X	X	X	X	X	X	3
CH13-311-BH005_SOb	8/23/2013	15:15	Soil	X	X	X	X	X	X	X	X	3
										TOTAL NUMBER OF CONTAINERS		27

L1353073-COFC

	Signatures	Date/Time
Approved by		
Sampled by		25-Aug-13
Relinquished by		
Received by		
Relinquished by		
Received by		

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3202

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 26-AUG-13
Report Date: 24-OCT-13 11:43 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1353100

Project P.O. #: 472645.06.AD.01.04.13 "PO=604564"
Job Reference: BSI NE AREA OF GRUM PIT 2013 311.5C
C of C Numbers: ALS08251302
Legal Site Desc:

Comments:

24-OCT-13: Additional QC data has been included.

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1353100-1	L1353100-2	L1353100-3	L1353100-4	
	Description	Soil	Soil	Soil	Soil	
	Sampled Date	22-AUG-13	22-AUG-13	23-AUG-13	23-AUG-13	
	Sampled Time	12:00	14:45	10:15	15:15	
	Client ID	CH13-311-BH002_SOB	CH13-311-BH003_SOB	CH13-311-BH001_SOB	CH13-311-BH005_SOB	
Grouping	**Analyte**					
SOIL						
Physical Tests	Conductivity (1:2) (dS m-1)	<0.10	<0.10	<0.10	<0.10	
	pH (1:2 CaCl2) (pH)	5.29	5.14	5.70	5.34	
Anions and Nutrients	Total Nitrogen by LECO (%)			0.064		
Organic / Inorganic Carbon	CaCO3 Equivalent (%)	0.82	<0.80	<0.80	<0.80	
	Inorganic Carbon (%)	<0.10	<0.10	<0.10	<0.10	
	Total Carbon by Combustion (%)	0.6	0.4	1.2	1.4	
	Total Organic Carbon (%)	0.65	0.42	1.15	1.38	
Plant Available Nutrients	Available Ammonium-N (mg/kg)			5.8		
	Calcium (Ca) (meq/100g)	4.14	3.11	<0.50	1.51	
	Cation Exchange Capacity (meq/100g)	6.63	6.85	11.3	10.5	
	Copper (Cu) (mg/kg)	0.73	0.76	0.77	0.92	
	Iron (Fe) (mg/kg)	63.1	57.5	76.7	264	
	Magnesium (Mg) (meq/100g)	0.60	0.70	<0.50	<0.50	
	Manganese (Mn) (mg/kg)	2.48	4.22	4.74	5.37	
	Available Nitrate-N (mg/kg)			<2.0		
	Available Phosphate-P (mg/kg)	<2.0	<2.0	3.1	<2.0	
	Potassium (K) (meq/100g)	<0.50	<0.50	<0.50	<0.50	
	Sodium (Na) (meq/100g)	<0.50	<0.50	<0.50	<0.50	
	Available Sulfate-S (mg/kg)	3.8	<3.0	5.0	4.1	
	Zinc (Zn) (mg/kg)	0.70	0.47	0.48	0.47	
Saturated Paste Extractables	SAR (SAR)	0.51	0.49	SAR:INC Incalculable	0.58	
	Calcium (Ca) (mg/L)	15.4	7.9	<2.0	6.9	
	Chloride (Cl) (mg/L)	4.0	6.7	3.9	5.9	
	Conductivity Sat. Paste (dS m-1)	0.12	<0.10	<0.10	<0.10	
	ESP (%)	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL	
	Magnesium (Mg) (mg/L)	2.6	4.2	<2.0	2.3	
	pH in Saturated Paste (pH)	5.83	5.77	5.48	5.08	
	Potassium (K) (mg/L)	3.2	6.2	4.3	6.8	
	% Saturation (%)	33.8	24.5	36.1	39.5	
	Sodium (Na) (mg/L)	8.2	6.8	5.5	6.8	
	Sulfur (as SO4) (mg/L)	26.2	11.0	<5.0	19.9	
Metals	Phosphorus (P) (mg/kg)			571		
Miscellaneous	SMP Buffer pH (pH)	6.64	6.89	6.44	6.06	

* 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)
Internal Reference Material	Chloride (Cl)	DLA	L1353100-1, -2, -3, -4
Internal Reference Material	Calcium (Ca)	DLA	L1353100-1, -2, -3, -4
Internal Reference Material	Magnesium (Mg)	DLA	L1353100-1, -2, -3, -4
Internal Reference Material	Potassium (K)	DLA	L1353100-1, -2, -3, -4
Internal Reference Material	Sodium (Na)	DLA	L1353100-1, -2, -3, -4
Internal Reference Material	Sulfur (as SO4)	DLA	L1353100-1, -2, -3, -4
Internal Reference Material	Calcium (Ca)	DLA	L1353100-1, -2, -3, -4
Internal Reference Material	Magnesium (Mg)	DLA	L1353100-1, -2, -3, -4
Internal Reference Material	Potassium (K)	DLA	L1353100-1, -2, -3, -4
Internal Reference Material	Sodium (Na)	DLA	L1353100-1, -2, -3, -4

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
SAR:INC	SAR is incalculable due to Ca and Mg below detection limit.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-INORG-ORG-SK	Soil	Inorganic and Organic Carbon	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-LECO-SK	Soil	Total Carbon by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.

CAT-XTR-SK	Soil	Ammonium Acetate Extractable Cations	CSSS 19.4 - 1M NH4OAc Extraction @ pH 7

Exchangeable Ca, Mg, Na, and K are extracted from the soil using neutral 1N ammonium acetate, then determined by ICP-OES. This method does not correct for calcium or magnesium extracted from carbonates or free gypsum.

CEC-SK	Soil	Cation Exchange Capacity (NH4OAC Extn)	CSSS(1978) 3.321/Comm Soil Sci 17(7)

Soil exchange sites are saturated with ammonium, then displaced with sodium. Ammonium in the extract is determined colorimetrically.

CL-SAR-SK	Soil	Chloride (Cl) (Saturated Paste)	CSSS(1993) 18.2.2/APHA 4500-CL E

Chloride in a saturated soil extract is determined colorimetrically by auto-analyzer.

EC-1:2-SK	Soil	EC (1:2 Soil:Water Extraction)	CSSS 18.3.1

1 part dry soil and 2 parts de-ionized water (by volume) is mixed. The slurry is allowed to stand with occasional stirring for 30 - 60 minutes. After equilibration, the conductivity of the filtered extract is measured by a conductivity meter.

ETL-ESP-SK	Soil	Exchangeable Sodium Percentage - Calc	Calculation
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.

METAL-DTPA-SK	Soil	Available Micronutrients (Cu,Fe,Zn,Mn)	CSSS 1993 (11.3 AND 11.4)

Plant available micronutrients are extracted from soil using 0.005 M DTPA. Cu, Fe, Mn and Zn in the extract are determined by ICP-OES.

N-TOT-LECO-SK	Soil	Total Nitrogen by combustion method	SSSA (1996) P. 973-974

Reference Information

The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.

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.

NO3-AVAIL-KCL-SK	Soil	Available Nitrate-N (2N KCl)	CSSS (1993) 4.2, 4.3

Available Nitrate and Nitrite are extracted from the soil using a 2N KCl 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) methods 4.2, 4.3

PH-1:2CACL2-SK	Soil	pH (1:2 Soil:CaCl2 Extraction)	CSSC 3.11

1 part dry soil and 2 parts de-ionized 0.01M CaCl2 (by volume) is mixed. The slurry is allowed to stand with occasional stirring for 30 - 60 minutes. pH of the soil slurry is then measured using a pH meter.

PH-BUFFER-SMP-SK	Soil	Buffer pH (SMP)	CSSS (1993) method 14.2

After equilibration with SMP buffer solution, pH of the soil solution is measured with a pH meter. Lime requirement must be determined by the client using location-specific regression equations.

PO4-AVAIL-BRAY-SK	Soil	Plant Available Phosphate-P (Bray)	SSSA (1996) p. 894-895

Plant available phosphorus is extracted from the sample using Bray-1 solution (0.025M HCl and 0.03M NH4F). PO4-P in the filtered extract is determined colorimetrically at 880 nm

SAR-CALC-SK	Soil	SAR and Cations in saturated soil	CSSS 18.4-Calculation
SAR-CALC-SO4-SK	Soil	SAR, Cations and SO4 in saturated soil	APHA 3120B

Ca, Mg, Na, K and SO4 in a saturated soil extract are determined by ICP-OES.

SAT/PH/EC-SK	Soil	pH and EC (Saturated Paste)	CSSS 18.2.2/CSSC 3.14/CSSS 18.3.1

pH of a saturated soil paste is measured using a pH meter. After equilibration, an extract is obtained by vacuum filtration with conductivity of the extract measured by a conductivity meter.

SO4-AVAIL-CALPHOS-SK	Soil	Plant Available Sulfate - Ca(H2PO4)2	NCR (1998) p. 36/APHA 3120B

Plant available sulfate is extracted from the sample using dilute calcium phosphate. SO4-S in the filtered extract is determined by ICP-OES.

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

Chain of Custody Numbers:

ALS08251302

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-INORG-ORG-SK	**Soil**							
Batch R2686716								
WG1738103-2 IRM		**0.1%IC**						
Inorganic Carbon			116.7		%		60-140	04-SEP-13
CaCO3 Equivalent			117.2		%		60-140	04-SEP-13
WG1738103-3 IRM		**0.4%IC**						
Inorganic Carbon			107.2		%		80-120	04-SEP-13
CaCO3 Equivalent			107.3		%		80-120	04-SEP-13
WG1738103-4 MB								
Inorganic Carbon			<0.10		%		0.1	04-SEP-13
CaCO3 Equivalent			<0.80		%		0.8	04-SEP-13
C-TOT-LECO-SK	**Soil**							
Batch R2686328								
WG1738100-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			105.4		%		80-120	03-SEP-13
WG1738100-3 MB								
Total Carbon by Combustion			<0.1		%		0.1	03-SEP-13
CAT-XTR-SK	**Soil**							
Batch R2686485								
WG1737951-1 DUP		**L1353100-1**						
Sodium (Na)		<0.50	<0.50	RPD-NA	meq/100g	N/A	25	04-SEP-13
Potassium (K)		<0.50	<0.50	RPD-NA	meq/100g	N/A	25	04-SEP-13
Calcium (Ca)		4.14	4.12		meq/100g	0.5	30	04-SEP-13
Magnesium (Mg)		0.60	0.57		meq/100g	5.6	30	04-SEP-13
WG1737951-3 IRM		**SAL814**						
Sodium (Na)			98.7		%		70-130	04-SEP-13
Potassium (K)			105.7		%		70-130	04-SEP-13
Calcium (Ca)			94.3		%		70-130	04-SEP-13
Magnesium (Mg)			85.1		%		70-130	04-SEP-13
WG1737951-2 MB								
Sodium (Na)			<0.50		meq/100g		0.5	04-SEP-13
Potassium (K)			<0.50		meq/100g		0.5	04-SEP-13
Calcium (Ca)			<0.50		meq/100g		0.5	04-SEP-13
Magnesium (Mg)			<0.50		meq/100g		0.5	04-SEP-13
CEC-SK	**Soil**							
Batch R2686541								
WG1737954-1 DUP		**L1353100-1**						
Cation Exchange Capacity		6.63	7.11		meq/100g	7.0	20	04-SEP-13
WG1737954-3 IRM		**SAL814**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CEC-SK	**Soil**							
Batch R2686541								
WG1737954-3 IRM		**SAL814**						
Cation Exchange Capacity			104.9		%		70-130	04-SEP-13
WG1737954-2 MB								
Cation Exchange Capacity			<0.80		meq/100g		0.8	04-SEP-13
CL-SAR-SK	**Soil**							
Batch R2686630								
WG1737965-1 DUP		**L1353100-3**						
Chloride (Cl)		3.9	4.8		mg/L	19	30	04-SEP-13
WG1737965-3 IRM		**ED-SAL_NAT1**						
Chloride (Cl)			88.6		%		70-130	04-SEP-13
WG1737965-2 MB								
Chloride (Cl)			<2.0		mg/L		2	04-SEP-13
EC-1:2-SK	**Soil**							
Batch R2689656								
WG1742004-3 IRM		**SAL814**						
Conductivity (1:2)			100.8		%		80-120	09-SEP-13
WG1742004-2 MB								
Conductivity (1:2)			<0.10		dS m-1		0.1	09-SEP-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2688181								
WG1740332-3 CRM		**VA-CANMET-TILL1**						
Phosphorus (P)			104.9		%		70-130	06-SEP-13
WG1740332-2 DUP		**L1353100-3**						
Phosphorus (P)		571	520		mg/kg	9.3	30	06-SEP-13
WG1740332-1 MB								
Phosphorus (P)			<50		mg/kg		50	06-SEP-13
METAL-DTPA-SK	**Soil**							
Batch R2686264								
WG1737915-1 DUP		**L1353100-1**						
Copper (Cu)		0.73	0.74		mg/kg	0.5	30	03-SEP-13
Iron (Fe)		63.1	62.9		mg/kg	0.4	30	03-SEP-13
Manganese (Mn)		2.48	2.49		mg/kg	0.6	30	03-SEP-13
Zinc (Zn)		0.70	0.60		mg/kg	15	30	03-SEP-13
WG1737915-3 IRM		**11-119**						
Copper (Cu)			86.4		%		70-130	03-SEP-13
Iron (Fe)			97.8		%		70-130	03-SEP-13
Manganese (Mn)			87.0		%		70-130	03-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
METAL-DTPA-SK	**Soil**							
Batch R2686264								
WG1737915-3 IRM		**11-119**						
Zinc (Zn)			88.8		%		70-130	03-SEP-13
WG1737915-2 MB								
Copper (Cu)			<0.10		mg/kg		0.1	03-SEP-13
Iron (Fe)			<2.0		mg/kg		2	03-SEP-13
Manganese (Mn)			<0.050		mg/kg		0.05	03-SEP-13
Zinc (Zn)			<0.20		mg/kg		0.2	03-SEP-13
N-TOT-LECO-SK	**Soil**							
Batch R2686328								
WG1738100-2 IRM		**08-109_SOIL**						
Total Nitrogen by LECO			0.102		%		0.085-0.135	03-SEP-13
WG1738100-3 MB								
Total Nitrogen by LECO			<0.020		%		0.02	03-SEP-13
NH4-AVAIL-SK	**Soil**							
Batch R2684719								
WG1737924-3 IRM		**SAL814**						
Available Ammonium-N			109.0		%		70-130	03-SEP-13
WG1737924-2 MB								
Available Ammonium-N			<1.0		mg/kg		1	03-SEP-13
NO3-AVAIL-KCL-SK	**Soil**							
Batch R2684676								
WG1737928-3 IRM		**SAL814**						
Available Nitrate-N			98.0		%		70-130	03-SEP-13
WG1737928-2 MB								
Available Nitrate-N			<2.0		mg/kg		2	03-SEP-13
PH-1:2CACL2-SK	**Soil**							
Batch R2684687								
WG1737918-3 IRM		**SAL814**						
pH (1:2 CaCl2)			7.67		pH		7.55-8.15	03-SEP-13
PH-BUFFER-SMP-SK	**Soil**							
Batch R2684669								
WG1737942-1 DUP		**L1353100-2**						
SMP Buffer pH		6.89	6.93	J	pH	0.04	0.2	03-SEP-13
WG1737942-2 IRM		**SAL814**						
SMP Buffer pH			7.54		pH		7.44-7.64	03-SEP-13
PO4-AVAIL-BRAY-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4-AVAIL-BRAY-SK	**Soil**							
Batch R2686681								
WG1739115-1 DUP		**L1353100-2**						
Available Phosphate-P		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	04-SEP-13
WG1739115-3 IRM		**SAL814**						
Available Phosphate-P			101.9		%		70-130	04-SEP-13
WG1739115-2 MB								
Available Phosphate-P			<2.0		mg/kg		2	04-SEP-13
SAR-CALC-SK	**Soil**							
Batch R2686705								
WG1737965-1 DUP		**L1353100-3**						
Calcium (Ca)		<2.0	<2.0	RPD-NA	mg/L	N/A	30	04-SEP-13
Potassium (K)		4.3	4.6		mg/L	6.9	30	04-SEP-13
Magnesium (Mg)		<2.0	<2.0	RPD-NA	mg/L	N/A	30	04-SEP-13
Sodium (Na)		5.5	5.6		mg/L	1.5	30	04-SEP-13
WG1737965-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			99.2		%		70-130	04-SEP-13
Potassium (K)			102.6		%		70-130	04-SEP-13
Magnesium (Mg)			95.8		%		70-130	04-SEP-13
Sodium (Na)			107.5		%		70-130	04-SEP-13
WG1737965-2 MB								
Calcium (Ca)			<2.0		mg/L		2	04-SEP-13
Potassium (K)			<1.0		mg/L		1	04-SEP-13
Magnesium (Mg)			<2.0		mg/L		2	04-SEP-13
Sodium (Na)			<4.0		mg/L		4	04-SEP-13
SAR-CALC-SO4-SK	**Soil**							
Batch R2686705								
WG1737965-1 DUP		**L1353100-3**						
Calcium (Ca)		<2.0	<2.0	RPD-NA	mg/L	N/A	30	04-SEP-13
Potassium (K)		4.3	4.6		mg/L	6.9	30	04-SEP-13
Magnesium (Mg)		<2.0	<2.0	RPD-NA	mg/L	N/A	30	04-SEP-13
Sodium (Na)		5.5	5.6		mg/L	1.5	30	04-SEP-13
Sulfur (as SO4)		<5.0	5.4	RPD-NA	mg/L	N/A	30	04-SEP-13
WG1737965-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			99.2		%		70-130	04-SEP-13
Potassium (K)			102.6		%		70-130	04-SEP-13
Magnesium (Mg)			95.8		%		70-130	04-SEP-13
Sodium (Na)			107.5		%		70-130	04-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAR-CALC-SO4-SK	**Soil**							
Batch R2686705								
WG1737965-3 IRM		**ED-SAL_NAT1**						
Sulfur (as SO4)			102.3		%		70-130	04-SEP-13
WG1737965-2 MB								
Calcium (Ca)			<2.0		mg/L		2	04-SEP-13
Potassium (K)			<1.0		mg/L		1	04-SEP-13
Magnesium (Mg)			<2.0		mg/L		2	04-SEP-13
Sodium (Na)			<4.0		mg/L		4	04-SEP-13
Sulfur (as SO4)			<5.0		mg/L		5	04-SEP-13
SAT/PH/EC-SK	**Soil**							
Batch R2686547								
WG1737965-1 DUP		**L1353100-3**						
% Saturation		36.1	31.6	J	%	4.5	5	04-SEP-13
pH in Saturated Paste		5.48	5.53	J	pH	0.05	0.3	04-SEP-13
Conductivity Sat. Paste		<0.10	<0.10	RPD-NA	dS m-1	N/A	20	04-SEP-13
WG1737965-3 IRM		**ED-SAL_NAT1**						
% Saturation			41.7		%		38-48	04-SEP-13
pH in Saturated Paste			6.54		pH		6.5-7.1	04-SEP-13
Conductivity Sat. Paste			91.4		%		80-120	04-SEP-13
WG1737965-2 MB								
Conductivity Sat. Paste			<0.10		dS m-1		0.1	04-SEP-13
SO4-AVAIL-CALPHOS-SK	**Soil**							
Batch R2685320								
WG1737922-1 DUP		**L1353100-3**						
Available Sulfate-S		5.0	4.2		mg/kg	19	40	03-SEP-13
WG1737922-3 IRM		**SAL814**						
Available Sulfate-S			93.1		%		60-140	03-SEP-13
WG1737922-2 MB								
Available Sulfate-S			<3.0		mg/kg		3	03-SEP-13

Quality Control Report

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.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

8/24/2013 12:22:01 PM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 10 Days
Shipping Date: 8/24/2013
COC Number: ALS08251302

	Container:	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon		
	Preservatives:	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C		
	Filtered:	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
	Holding Time:	180	28	28	28	28	180	180	28	28	180	180	28	180	180	28	
		(CSSS (2008) 11.3 and 11.4) Ext Micro Nut (ZnFeCuMn)	(CSSS (2008) 12.2) SMP Buffer pH (for pH<6.0)	(CSSS (2008) 15.2.1 or 14.4.4) Sodium Adsorption Ratio	(CSSS (2008) 15.2.1) ECe (sat paste)	(CSSS (2008) 15.3) Soluable Salts	(CSSS (2008) 18.4) 1N, pH7 NH4OAc ext CaMgKNa	(CSSS (2008) 18.4_CEC) Cation Exchange Capacity	(CSSS (2008) 20.3) CaCO3 equivalent	(CSSS (2008) 6.2) NH4-N and NO3-N (2N KCL)	(CSSS (2008) 7.2 and 7.3.1 if pH>7.2) Available P (pH>7.2)	(CSSS 16.3 (2008)) pH (1:2 CaCL2) CP17	(EPA200.2/SW6020A) Total P	(S-11.10 in Gavlak et al. (2005)) Ca(H2PO4)2.H2O ext SO4-S	(SSSA (1996) p894-895 if pH<7.2) Available P (pH<7.2)	(SSSA (1996) P973-974) Total N	Number of Containers	COMMENTS
DATE	**TIME**	**Matrix**																	
CH13-311-BH002_SOb	8/22/2013	12:00	Soil	X	X	X	X	X	X		X		X	X		X	X		2	
CH13-311-BH003_SOb	8/22/2013	14:45	Soil	X	X	X	X	X	X		X		X	X		X	X		2	
CH13-311-BH001_SOb	8/23/2013	10:15	Soil	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3	
CH13-311-BH005_SOb	8/23/2013	15:15	Soil	X	X	X	X	X	X		X		X	X		X	X		2	
															TOTAL NUMBER OF CONTAINERS				9	

L1353100-COFC

	Signatures	Date/Time
Approved by		
Sampled by		8/25/13 1200
Relinquished by		
Received by		
Relinquished by	10:30	26-Aug-13
Received by		

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 26-AUG-13
Report Date: 28-OCT-13 13:17 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1353113

Project P.O. #: 472645.06.AD.01.04.13 "PO=604564"
Job Reference: BSI RIDGE NORTH OF GRUM 2013 NEW
C of C Numbers: ALS08251305, ALS08251305H, ALS08251305R
Legal Site Desc:

Comments:

28-OCT-13: Additional QC data has been included.

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1353113-1 Soil 24-AUG-13 15:00 CH13-311-BH023_SOA	L1353113-2 Soil 24-AUG-13 15:15 CH13-311-BH023_SOB	L1353113-3 Soil 24-AUG-13 11:45 CH13-311-BH024_SOA	L1353113-4 Soil 24-AUG-13 12:00 CH13-311-BH024_SOB	L1353113-5 Soil 24-AUG-13 12:00 CH13-311-BH924_SOB
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
SOIL						
Physical Tests	Grain Size Curve		SEE ATTACHED		SEE ATTACHED	SEE ATTACHED
	Moisture (%)	15.9	33.7	6.66	3.72	3.44
	Liquid Limit (LL) (%)		27			
	pH (1:2 soil:water) (pH)	7.60	5.60	6.63	6.25	6.19
	Plasticity Index (PI) (%)		4			
	Acid Soluble Sulphate Sulphur (%)	0.01	0.02	<0.01	0.01	<0.01
Organic / Inorganic Carbon	Inorganic Carbon (%)	<0.10	<0.10	<0.10	<0.10	<0.10
	Inorganic Carbon (as CaCO3 Equivalent) (%)	<0.80	<0.80	<0.80	<0.80	<0.80
	Organic Carbon (%)	<0.40	0.90	<0.40	<0.40	<0.40
	Organic Matter (%)	<0.70	1.51	<0.70	<0.70	<0.70
Saturated Paste Extractables	Paste pH (pH)	5.91	5.82	6.41	5.82	5.75
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	5.0	3.0	3.0	1.0	2.0
Metals	Aluminum (Al) (mg/kg)	12200	10000	4560	5090	3820
	Antimony (Sb) (mg/kg)	0.37	0.21	0.40	0.33	0.26
	Arsenic (As) (mg/kg)	11.9	5.83	9.36	7.64	4.12
	Barium (Ba) (mg/kg)	121	99.8	63.1	27.8	18.4
	Beryllium (Be) (mg/kg)	0.89	1.00	0.48	0.41	0.31
	Bismuth (Bi) (mg/kg)	0.57	0.38	0.42	0.54	4.07
	Boron (B) (mg/kg)	<10	<10	<10	<10	<10
	Cadmium (Cd) (mg/kg)	0.234	0.110	0.220	0.145	0.089
	Calcium (Ca) (mg/kg)	2400	1810	1890	1210	496
	Chromium (Cr) (mg/kg)	18.4	12.2	9.82	13.6	4.15
	Cobalt (Co) (mg/kg)	6.66	2.92	3.04	2.76	1.92
	Copper (Cu) (mg/kg)	15.0	9.84	7.26	4.09	2.71
	Iron (Fe) (mg/kg)	17800	9710	8760	7830	5730
	Lead (Pb) (mg/kg)	23.2	16.5	15.6	16.5	10.6
	Lithium (Li) (mg/kg)	25.8	17.5	12.1	11.9	10.3
	Magnesium (Mg) (mg/kg)	3780	2600	1740	1730	1170
	Manganese (Mn) (mg/kg)	309	123	170	142	103
	Mercury (Hg) (mg/kg)	0.0154	0.0214	0.0118	0.0069	0.0234
	Molybdenum (Mo) (mg/kg)	0.89	<0.50	0.68	<0.50	<0.50
	Nickel (Ni) (mg/kg)	14.9	7.57	8.22	6.41	4.04
	Phosphorus (P) (mg/kg)	510	520	628	577	205
	Potassium (K) (mg/kg)	2710	890	870	680	550
	Selenium (Se) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1353113-1	L1353113-2	L1353113-3	L1353113-4	L1353113-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	24-AUG-13	24-AUG-13	24-AUG-13	24-AUG-13	24-AUG-13
	Sampled Time	15:00	15:15	11:45	12:00	12:00
	Client ID	CH13-311-BH023_SOA	CH13-311-BH023_SOB	CH13-311-BH024_SOA	CH13-311-BH024_SOB	CH13-311-BH924_SOB
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.11	0.23	0.13	<0.10	<0.10
	Sodium (Na) (mg/kg)	190	230	<100	<100	<100
	Strontium (Sr) (mg/kg)	17.8	14.5	9.46	5.19	2.60
	Sulfur (S)-Total (mg/kg)	<500	<500	<500	<500	<500
	Thallium (Tl) (mg/kg)	0.298	0.227	0.174	0.130	0.090
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	469	349	190	153	109
	Uranium (U) (mg/kg)	2.87	8.79	1.58	1.15	0.842
	Vanadium (V) (mg/kg)	22.2	18.3	10.4	8.66	12.1
	Zinc (Zn) (mg/kg)	69.8	42.4	48.2	37.8	27.9
Total Metals	Barium by borate-fusion (ppm)	816	830	813	679	710

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ATTERBERG-SK	Soil	Atterberg limits	CARTER CSSS 58

The liquid limit (or upper plastic limit) is the point at which the soil becomes semifluid, like softened butter. In operational terms, the liquid limit is defined as the water content at which a trapezoidal groove cut in moist soil is closed after 25 taps on a hard rubber plate (ASTM D-18, 1958).

The plastic limit (or lower plastic limit) is defined as the water content at which soil begins to crumble on being rolled into a thread 1/8 inch (or 3 mm) in diameter. It represents the lowest water content at which soil can be deformed readily without cracking.

The plastic index (which is the difference between the liquid and plastic limits) gives an indication of the "clayeyness" or plasticity of a clay and is employed in engineering classification systems for soils.

References: McKeague, J.A. 1978. Atterberg Limits pp 50 - 55 In: Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci. p. 50 - 55

B-200.2-CCMS-VA	Soil	Boron 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."

C-INORG-SK	Soil	Inorganic Carbon / Calcium Carbonate	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-ORG-WB-SK	Soil	Total Organic Carbon - Walkley Black	CSSS (1993) method 21.2

The soil sample is treated with excess potassium dichromate and sulfuric acid to oxidize organic carbon. Oxidized organic carbon is determined by back-titration with ferrous ammonium sulfate. Organic matter is estimated from the organic carbon result using the Van Bemmelon factor.

GRAIN SIZE-SK	Soil	Grain Size Analysis	SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

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.

IC-CACO3-CALC-SK	Soil	Inorganic Carbon as CaCO3 Equivalent	Calculation
ME-MS81-AX	Soil		ME-MS81
MET-200.2-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A

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 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.

NP-TU	Soil	Neutralization Potential (NP)	Sobek 3.2.3, MOD
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.

PH-PASTE-VA	Soil	pH in Soil (Paste) by Meter	Carter-CSSS / APHA 4500 H

A soil extract produced by the saturated paste extraction procedure is analyzed by pH meter.

S-TOT-LECO-SK	Soil	Total Sulphur by combustion method	ISO 15178:2000

The sample is ignited in a combustion analyzer where sulfur in the reduced SO2 gas is determined using a thermal conductivity detector.

SAT-PCNT-VA	Soil	Saturation Percentage	Carter-CSSS

Saturation Percentage (SP) is the total volume of water present in a saturated paste (in mL) divided by the dry weight of the sample (in grams), expressed as a percentage, as described in "Soil Sampling and Methods of Analysis" by M. Carter.

SPECIAL REQUEST-SK	Misc.	Special Request Sask Lab	SEE SUBLET LAB RESULTS
SULPHUR-S-GRA06A-AX	Soil	Sulphur (S)	S-GRA06a

** 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
TU	ALS ENVIRONMENTAL - TUCSON, ARIZONA, USA
AX	ALS MINERALS - VANCOUVER, B.C., CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

ALS08251305 ALS08251305H ALS08251305R

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-200.2-CCMS-VA	**Soil**							
Batch R2690605								
WG1742139-4 CRM		**VA-CANMET-TILL1**						
Boron (B)			3		mg/kg		0-13	09-SEP-13
WG1742139-2 DUP		**L1353113-1**						
Boron (B)		<10	<10	RPD-NA	mg/kg	N/A	30	09-SEP-13
WG1742139-1 MB								
Boron (B)			<10		mg/kg		10	09-SEP-13
C-INORG-SK	**Soil**							
Batch R2683486								
WG1736810-2 IRM		**0.1%IC**						
Inorganic Carbon			123.2		%		60-140	30-AUG-13
WG1736810-3 IRM		**0.4%IC**						
Inorganic Carbon			99.0		%		80-120	30-AUG-13
WG1736810-4 MB								
Inorganic Carbon			<0.10		%		0.1	30-AUG-13
C-TOT-ORG-WB-SK	**Soil**							
Batch R2684025								
WG1736878-3 IRM		**FARM2009**						
Organic Carbon			112.1		%		80-120	31-AUG-13
Organic Matter			112.2		%		80-120	31-AUG-13
WG1736878-2 MB								
Organic Carbon			<0.40		%		0.4	31-AUG-13
Organic Matter			<0.70		%		0.7	31-AUG-13
HG-200.2-CVAF-VA	**Soil**							
Batch R2689268								
WG1742139-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			98.2		%		70-130	09-SEP-13
WG1742139-2 DUP		**L1353113-1**						
Mercury (Hg)		0.0154	0.0165		mg/kg	6.8	40	09-SEP-13
WG1742139-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	09-SEP-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2690605								
WG1742139-3 CRM		**VA-CANMET-TILL1**						
Aluminum (Al)			102.1		%		70-130	09-SEP-13
Antimony (Sb)			103.5		%		70-130	09-SEP-13
Arsenic (As)			106.9		%		70-130	09-SEP-13
Barium (Ba)			99.6		%		70-130	09-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2690605								
WG1742139-3 CRM		**VA-CANMET-TILL1**						
Beryllium (Be)			0.48		mg/kg		0.34-0.74	09-SEP-13
Bismuth (Bi)			102.6		%		70-130	09-SEP-13
Cadmium (Cd)			91.1		%		70-130	09-SEP-13
Calcium (Ca)			106.8		%		70-130	09-SEP-13
Chromium (Cr)			109.6		%		70-130	09-SEP-13
Cobalt (Co)			100.5		%		70-130	09-SEP-13
Copper (Cu)			98.0		%		70-130	09-SEP-13
Iron (Fe)			99.7		%		70-130	09-SEP-13
Lead (Pb)			91.1		%		70-130	09-SEP-13
Lithium (Li)			99.0		%		70-130	09-SEP-13
Magnesium (Mg)			96.9		%		70-130	09-SEP-13
Manganese (Mn)			103.5		%		70-130	09-SEP-13
Molybdenum (Mo)			0.66		mg/kg		0.24-1.24	09-SEP-13
Nickel (Ni)			102.5		%		70-130	09-SEP-13
Phosphorus (P)			105.4		%		70-130	09-SEP-13
Potassium (K)			112.1		%		70-130	09-SEP-13
Selenium (Se)			0.35		mg/kg		0.12-0.52	09-SEP-13
Silver (Ag)			0.28		mg/kg		0.12-0.32	09-SEP-13
Sodium (Na)			114.9		%		70-130	09-SEP-13
Strontium (Sr)			105.5		%		70-130	09-SEP-13
Thallium (Tl)			0.125		mg/kg		0.075-0.175	09-SEP-13
Tin (Sn)			1.0		mg/kg		0-3	09-SEP-13
Titanium (Ti)			108.8		%		70-130	09-SEP-13
Uranium (U)			107.6		%		70-130	09-SEP-13
Vanadium (V)			108.6		%		70-130	09-SEP-13
Zinc (Zn)			99.7		%		70-130	09-SEP-13
WG1742139-2 DUP		**L1353113-1**						
Aluminum (Al)		12200	12600		mg/kg	3.4	40	09-SEP-13
Antimony (Sb)		0.37	0.37		mg/kg	1.4	30	09-SEP-13
Arsenic (As)		11.9	11.0		mg/kg	8.1	30	09-SEP-13
Barium (Ba)		121	120		mg/kg	0.8	40	09-SEP-13
Beryllium (Be)		0.89	0.90		mg/kg	0.9	30	09-SEP-13
Bismuth (Bi)		0.57	0.58		mg/kg	2.3	30	09-SEP-13
Cadmium (Cd)		0.234	0.235		mg/kg	0.4	30	09-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2690605								
WG1742139-2 DUP		**L1353113-1**						
Calcium (Ca)		2400	2440		mg/kg	1.8	30	09-SEP-13
Chromium (Cr)		18.4	18.5		mg/kg	0.5	30	09-SEP-13
Cobalt (Co)		6.66	6.76		mg/kg	1.5	30	09-SEP-13
Copper (Cu)		15.0	15.0		mg/kg	0.3	30	09-SEP-13
Iron (Fe)		17800	18000		mg/kg	0.9	30	09-SEP-13
Lead (Pb)		23.2	22.3		mg/kg	3.9	40	09-SEP-13
Lithium (Li)		25.8	27.5		mg/kg	6.4	30	09-SEP-13
Magnesium (Mg)		3780	3940		mg/kg	4.0	30	09-SEP-13
Manganese (Mn)		309	307		mg/kg	0.6	30	09-SEP-13
Molybdenum (Mo)		0.89	0.87		mg/kg	2.3	40	09-SEP-13
Nickel (Ni)		14.9	15.0		mg/kg	0.4	30	09-SEP-13
Phosphorus (P)		510	495		mg/kg	3.0	30	09-SEP-13
Potassium (K)		2710	2730		mg/kg	0.9	40	09-SEP-13
Selenium (Se)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	09-SEP-13
Silver (Ag)		0.11	0.15		mg/kg	30	40	09-SEP-13
Sodium (Na)		190	230		mg/kg	15	40	09-SEP-13
Strontium (Sr)		17.8	18.4		mg/kg	3.6	40	09-SEP-13
Thallium (Tl)		0.298	0.299		mg/kg	0.1	30	09-SEP-13
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	09-SEP-13
Titanium (Ti)		469	480		mg/kg	2.4	40	09-SEP-13
Uranium (U)		2.87	3.52		mg/kg	20	30	09-SEP-13
Vanadium (V)		22.2	22.7		mg/kg	2.6	30	09-SEP-13
Zinc (Zn)		69.8	70.4		mg/kg	0.8	30	09-SEP-13
WG1742139-1 MB								
Aluminum (Al)			<50		mg/kg		50	09-SEP-13
Antimony (Sb)			<0.10		mg/kg		0.1	09-SEP-13
Arsenic (As)			<0.050		mg/kg		0.05	09-SEP-13
Barium (Ba)			<0.50		mg/kg		0.5	09-SEP-13
Beryllium (Be)			<0.20		mg/kg		0.2	09-SEP-13
Bismuth (Bi)			<0.20		mg/kg		0.2	09-SEP-13
Cadmium (Cd)			<0.050		mg/kg		0.05	09-SEP-13
Calcium (Ca)			<50		mg/kg		50	09-SEP-13
Chromium (Cr)			<0.50		mg/kg		0.5	09-SEP-13
Cobalt (Co)			<0.10		mg/kg		0.1	09-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2690605								
WG1742139-1 MB								
Copper (Cu)			<0.50		mg/kg		0.5	09-SEP-13
Iron (Fe)			<50		mg/kg		50	09-SEP-13
Lead (Pb)			<0.50		mg/kg		0.5	09-SEP-13
Lithium (Li)			<5.0		mg/kg		5	09-SEP-13
Magnesium (Mg)			<20		mg/kg		20	09-SEP-13
Manganese (Mn)			<1.0		mg/kg		1	09-SEP-13
Molybdenum (Mo)			<0.50		mg/kg		0.5	09-SEP-13
Nickel (Ni)			<0.50		mg/kg		0.5	09-SEP-13
Phosphorus (P)			<50		mg/kg		50	09-SEP-13
Potassium (K)			<100		mg/kg		100	09-SEP-13
Selenium (Se)			<0.20		mg/kg		0.2	09-SEP-13
Silver (Ag)			<0.10		mg/kg		0.1	09-SEP-13
Sodium (Na)			<100		mg/kg		100	09-SEP-13
Strontium (Sr)			<0.50		mg/kg		0.5	09-SEP-13
Thallium (Tl)			<0.050		mg/kg		0.05	09-SEP-13
Tin (Sn)			<2.0		mg/kg		2	09-SEP-13
Titanium (Ti)			<1.0		mg/kg		1	09-SEP-13
Uranium (U)			<0.050		mg/kg		0.05	09-SEP-13
Vanadium (V)			<0.20		mg/kg		0.2	09-SEP-13
Zinc (Zn)			<1.0		mg/kg		1	09-SEP-13
MOISTURE-VA	**Soil**							
Batch R2689146								
WG1742495-3 DUP		**L1353113-1**						
Moisture		15.9	13.4		%	17	20	07-SEP-13
WG1742495-2 LCS								
Moisture			100.1		%		70-130	07-SEP-13
WG1742495-1 MB								
Moisture			<0.25		%		0.25	07-SEP-13
PH-1:2-VA	**Soil**							
Batch R2690237								
WG1742139-2 DUP		**L1353113-1**						
pH (1:2 soil:water)		7.60	7.58	J	pH	0.02	0.3	10-SEP-13
S-TOT-LECO-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-TOT-LECO-SK	**Soil**							
Batch R2683482								
WG1736818-2 IRM		**1646A_SOIL**						
Sulfur (S)-Total			3000		mg/kg		2500-4600	30-AUG-13
WG1736818-3 MB								
Sulfur (S)-Total			<500		mg/kg		500	30-AUG-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.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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.

September 26, 2013

Client: ALS Environmental-Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1353113

Date Received: August 30, 2013

Certificate of Analysis

Client ID:	Sample Date:		Lab #:		Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3$/1,000t
L1353113-1	8/24/2013	0000	T1301296-001		12.92	5
L1353113-2	8/24/2013	0000	T1301296-002		25.74	3
L1353113-3	8/24/2013	0000	T1301296-003		5.63	3
L1353113-4	8/24/2013	0000	T1301296-004		4.14	1
L1353113-5	8/24/2013	0000	T1301296-005		3.67	2

Notes:
Samples were air dried then ground to < 60 mesh.

W. Hyatt
Digitally signed by Wendy Hyatt
Date: 2013.09.26 14:56:09 -07'00'

Wendy Hyatt, Project Chemist

ALS Environmental

September 26, 2013

Client: ALS Environmental-Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1353113

Date Received: August 30, 2013

Quality Control

				Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3$/1,000t
Prep Blank				0.02	< 1
Laboratory Control Sample (LCS) - Rice Flour CN 3451			Observed Value	9.63	n/a
			True Value	9.50	
			%R	101	
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	1,002
			True Value		1,000
			%R		100
Duplicate Results			T1301296-002	0.55 **	
			Duplicate	0.54 **	
			%R	2	
Duplicate Results				T1301296-003	3
				Duplicate	4
				%RPD	29

* Sample from the same batch, but a different project.

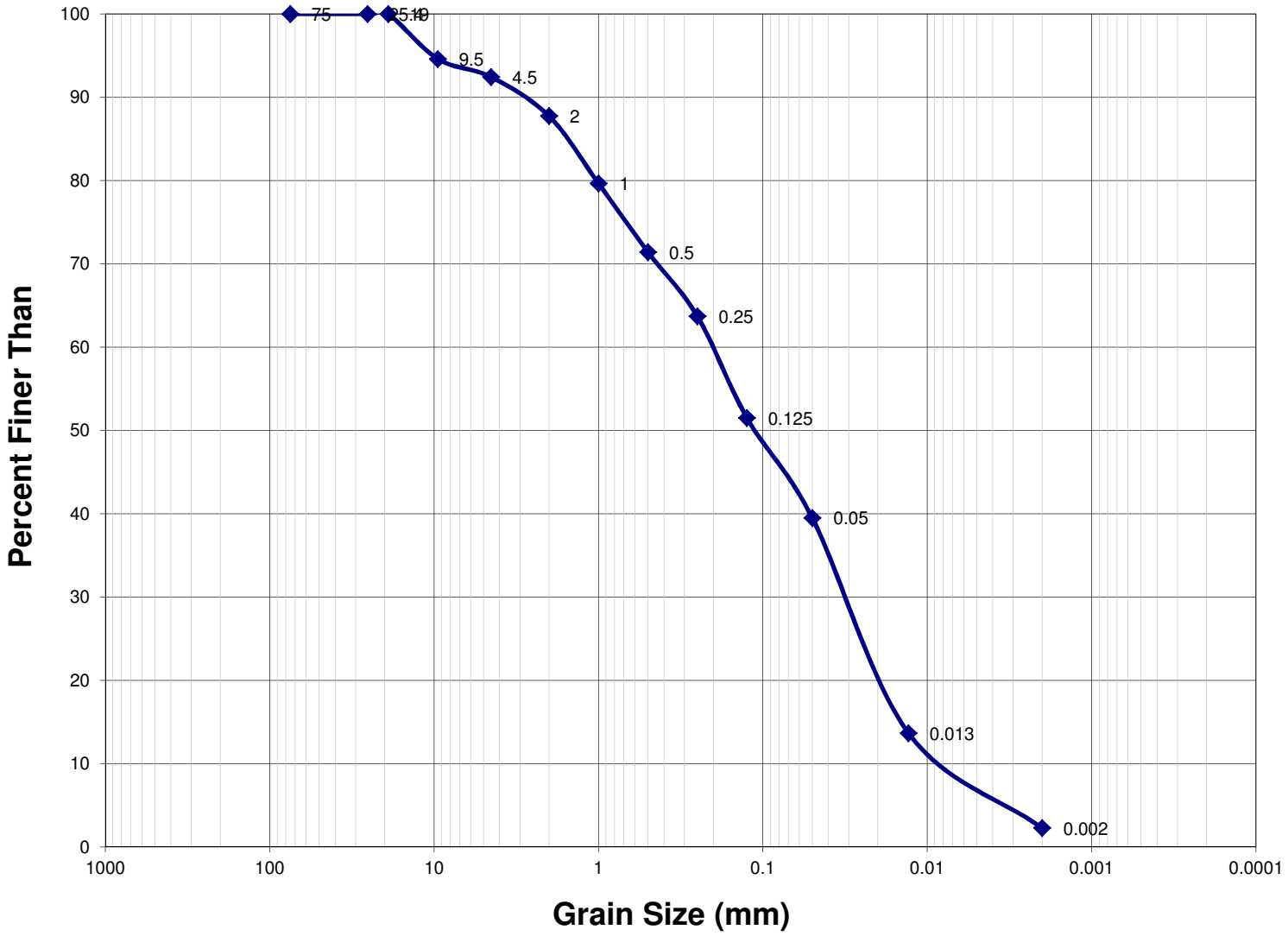
**Residual moisture - does not include air dry moisture.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH023_SOB
Lab ID: L1353113-2

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	7
Coarse Sand	2.0mm - 4.75mm	5
Medium Sand	0.425mm - 2.0mm	16
Fine Sand	0.075mm - 0.425mm	28
Fines	< 0.075mm	43

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	12
Sand	0.05mm - 2mm	48
Silt	0.002mm - 0.05mm	37
Clay	< 0.002mm	2

Texture Sandy loam

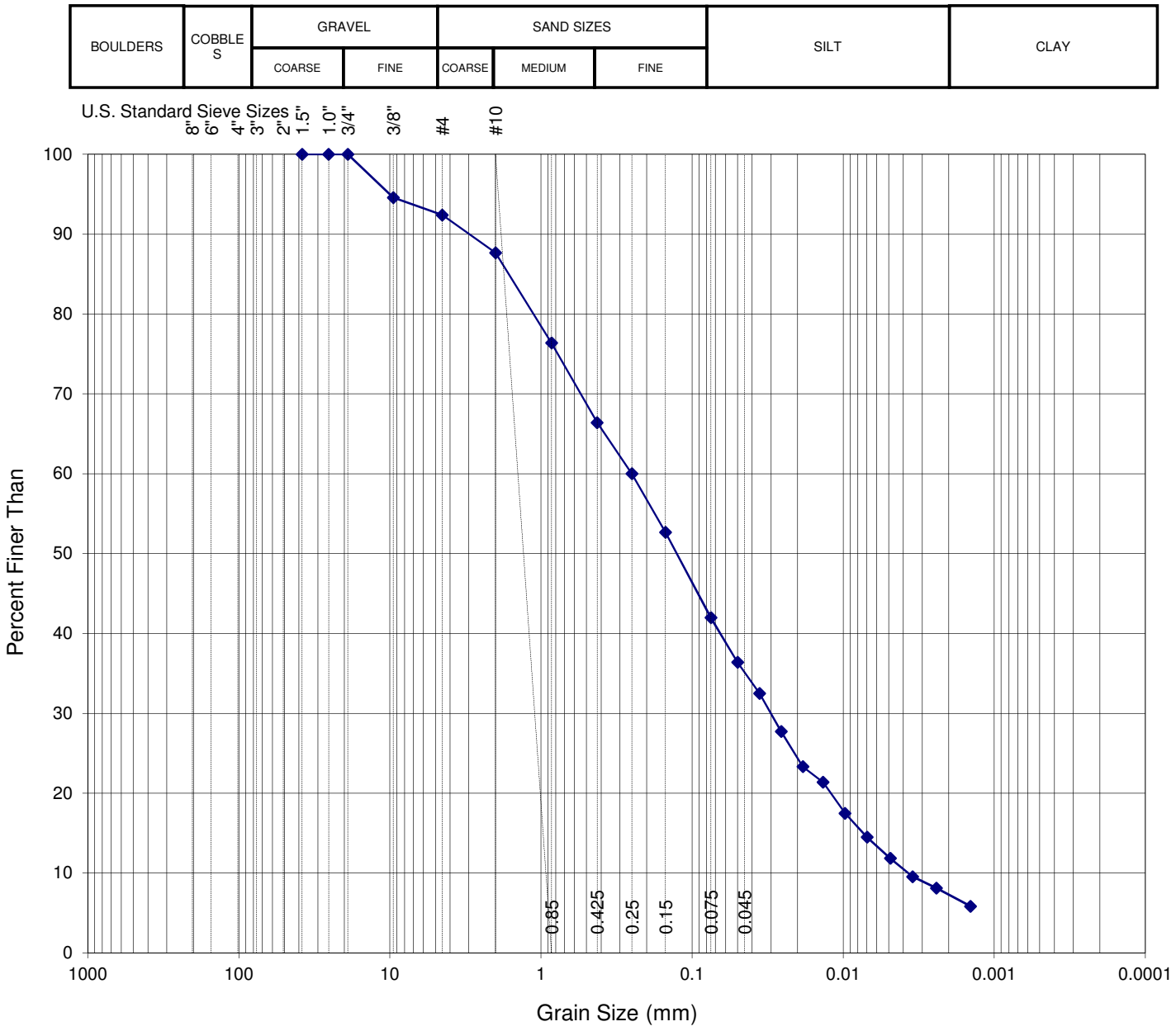
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group

819-58th Street, Saskatoon,SK

PARTICLE SIZE DISTRIBUTION CURVE

Client Name:	CH2M HILL, INC
Project Number:	CHM400-CHM200-VA
Client Sample ID	CH13-311-BH023_SOB
Lab Sample ID	L1353113-2
Date Sample Received	26-Aug-13
Test Completion Date:	10-Sep-13
Analyst:	HSL



METHOD DESCRIPTION

Method Reference: ASTM D 422 - 63 (2002)

Dispersion method: Mechanical

Dispesion period: 1 minute cm/s

Soil classification system used: Unified Soil Classification

DESCRIPTION OF SAND AND GRAVEL PARTICLES

Shape: Angular

Hardness: Hard

SUMMARY OF RESULTS

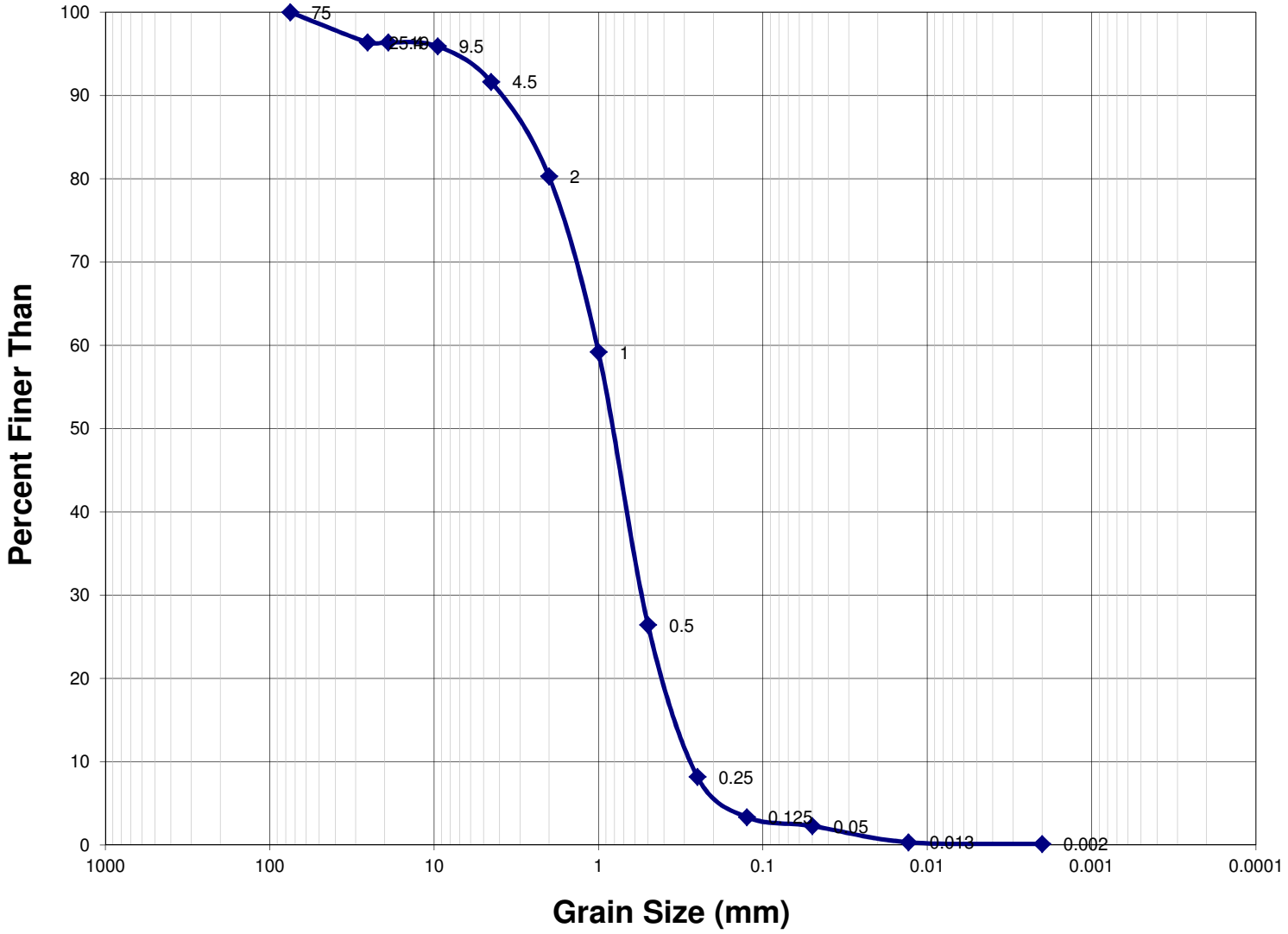
GRAIN SIZE	WT %	DIA. RANGE (mm)
% GRAVEL :	7.62	> 4.5
% COARSE SAND :	4.72	2.0 - 4.5
% MEDIUM SAND :	21.27	0.425 - 2.0
% FINE SAND :	24.41	0.075 - 0.425
% SILT :	34.68	0.075 - 0.002
% CLAY :	7.29	< 0.002

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH024_SOB
Lab ID: L1353113-4

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	8
Coarse Sand	2.0mm - 4.75mm	12
Medium Sand	0.425mm - 2.0mm	54
Fine Sand	0.075mm - 0.425mm	24
Fines	< 0.075mm	3

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	20
Sand	0.05mm - 2mm	78
Silt	0.002mm - 0.05mm	2
Clay	< 0.002mm	0

Texture Sand

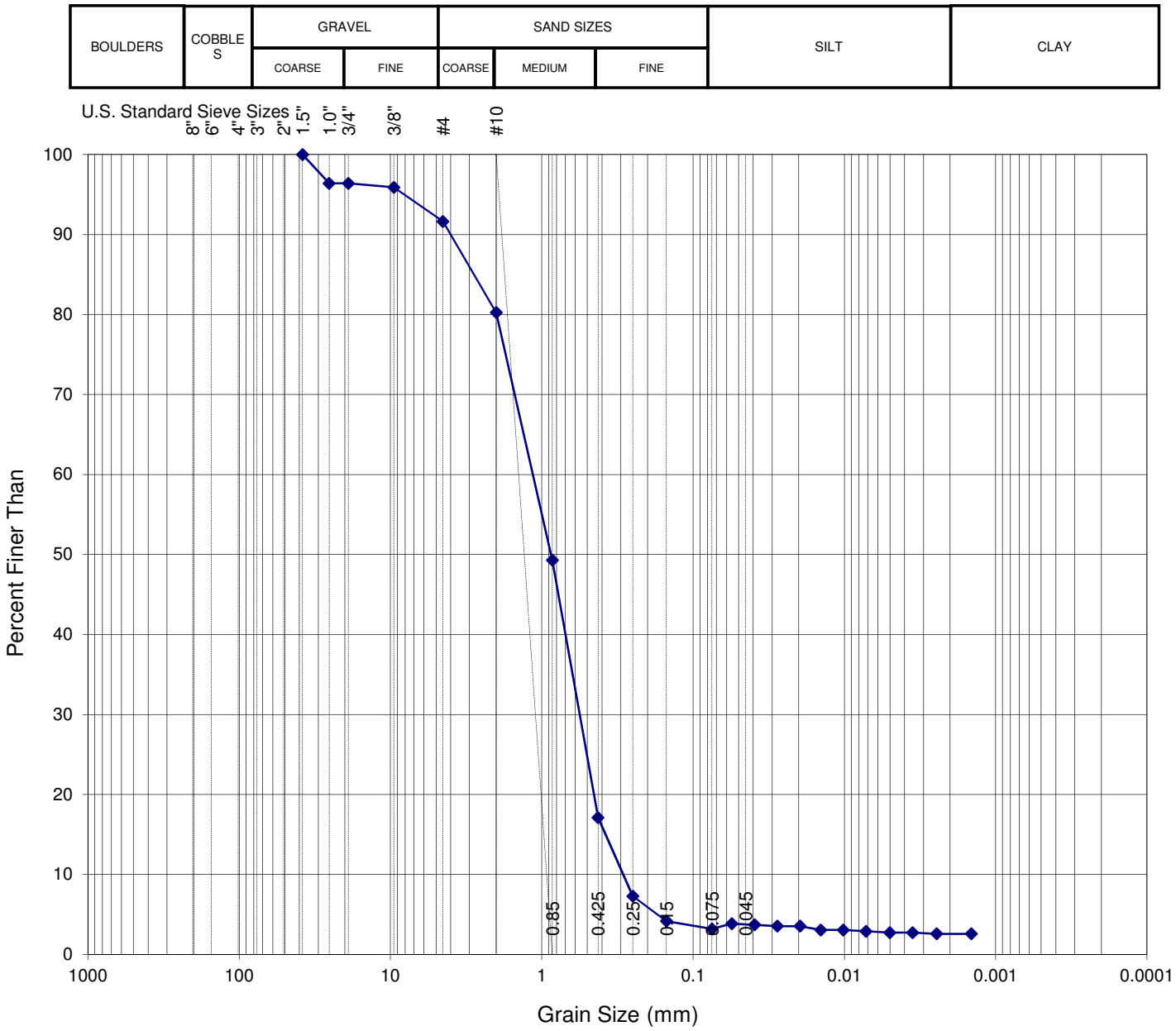
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group

819-58th Street, Saskatoon,SK

PARTICLE SIZE DISTRIBUTION CURVE

Client Name:	CH2M HILL, INC
Project Number:	CHM400-CHM200-VA
Client Sample ID	CH13-311-BH024_SOB
Lab Sample ID	L1353113-4
Date Sample Received	26-Aug-13
Test Completion Date:	10-Sep-13
Analyst:	HSL



METHOD DESCRIPTION

Method Reference: ASTM D 422 - 63 (2002)

Dispersion method: Mechanical

Dispesion period: 1 minute cm/s

Soil classification system used: Unified Soil Classification

DESCRIPTION OF SAND AND GRAVEL PARTICLES

Shape: Angular

Hardness: Hard

SUMMARY OF RESULTS

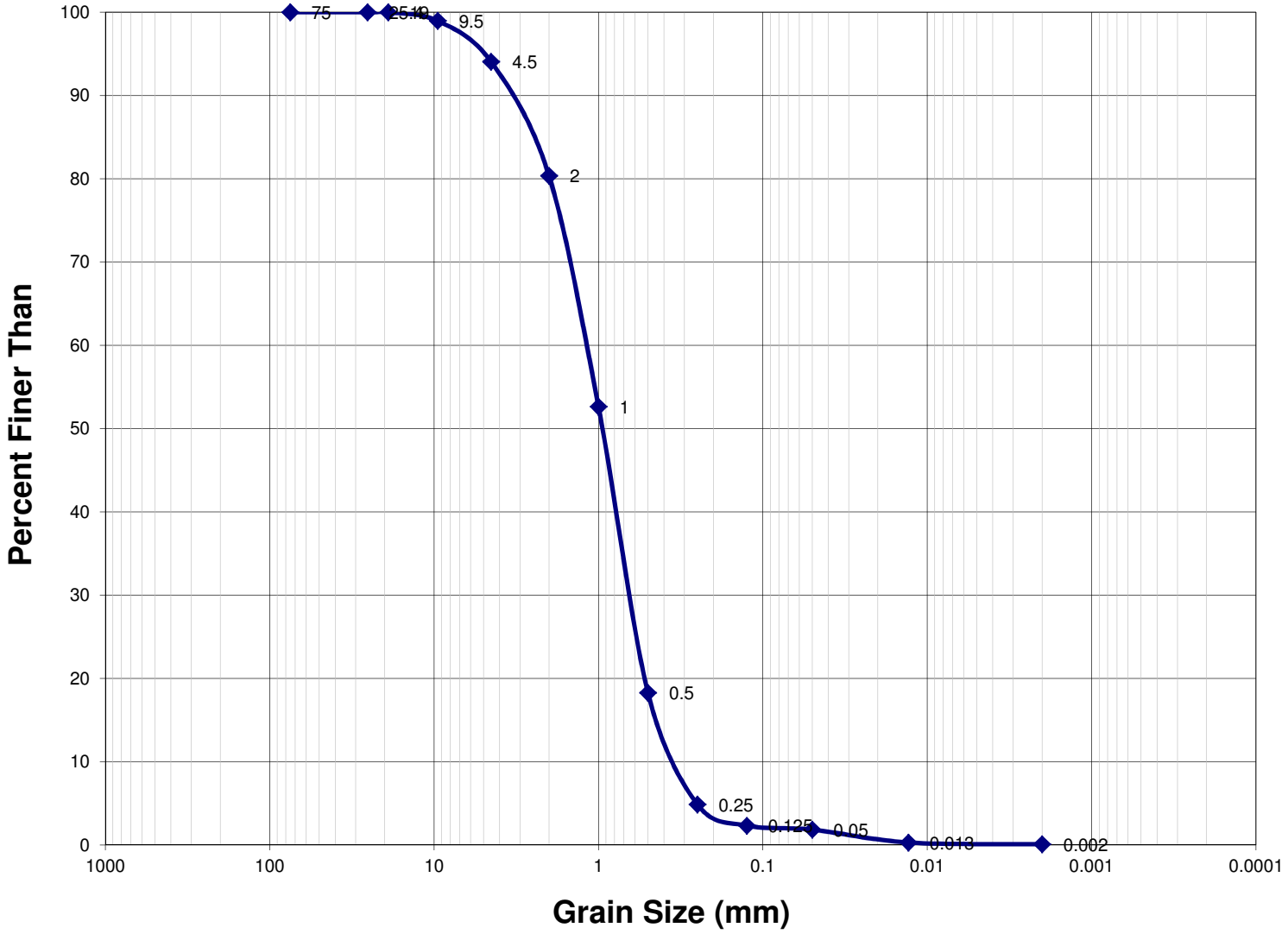
GRAIN SIZE	WT %	DIA. RANGE (mm)
% GRAVEL :	8.38	> 4.5
% COARSE SAND :	11.39	2.0 - 4.5
% MEDIUM SAND :	63.13	0.425 - 2.0
% FINE SAND :	13.92	0.075 - 0.425
% SILT :	0.61	0.075 - 0.002
% CLAY :	2.57	< 0.002

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH924_SOB
Lab ID: L1353113-5

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	6
Coarse Sand	2.0mm - 4.75mm	14
Medium Sand	0.425mm - 2.0mm	62
Fine Sand	0.075mm - 0.425mm	16
Fines	< 0.075mm	2

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	20
Sand	0.05mm - 2mm	79
Silt	0.002mm - 0.05mm	2
Clay	< 0.002mm	0

Texture Sand

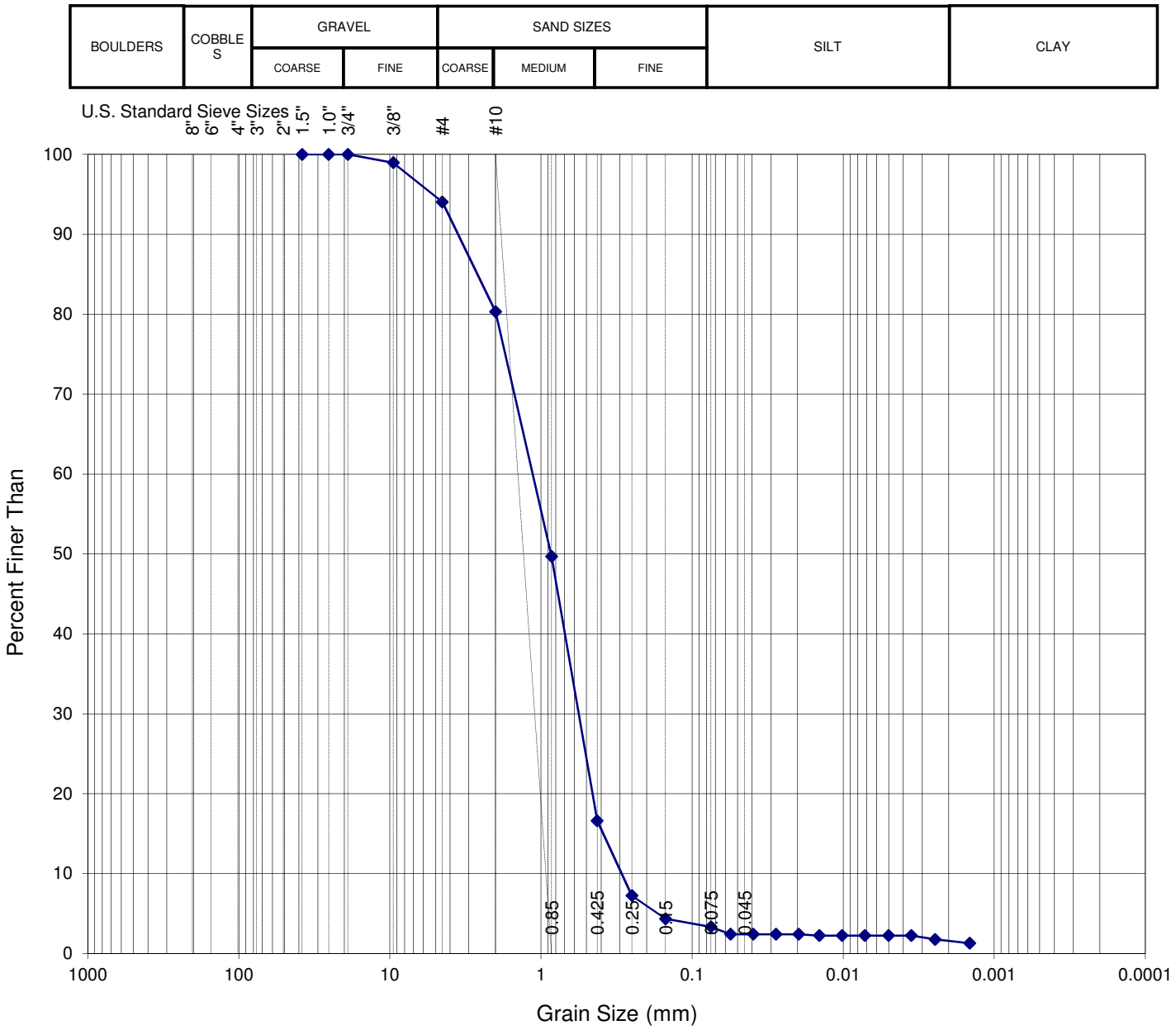
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group

819-58th Street, Saskatoon,SK

PARTICLE SIZE DISTRIBUTION CURVE

Client Name:	CH2M HILL, INC
Project Number:	CHM400-CHM200-VA
Client Sample ID	CH13-311-BH924_SOB
Lab Sample ID	L1353113-5
Date Sample Received	26-Aug-13
Test Completion Date:	10-Sep-13
Analyst:	HSL



METHOD DESCRIPTION

Method Reference: ASTM D 422 - 63 (2002)

Dispersion method: Mechanical

Dispesion period: 1 minute cm/s

Soil classification system used: Unified Soil Classification

DESCRIPTION OF SAND AND GRAVEL PARTICLES

Shape: Angular

Hardness: Hard

SUMMARY OF RESULTS

GRAIN SIZE	WT %	DIA. RANGE (mm)
% GRAVEL :	5.96	> 4.5
% COARSE SAND :	13.72	2.0 - 4.5
% MEDIUM SAND :	63.70	0.425 - 2.0
% FINE SAND :	13.29	0.075 - 0.425
% SILT :	1.76	0.075 - 0.002
% CLAY :	1.57	< 0.002

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 9-SEP-2013
Account: APN

CERTIFICATE VA13153551

Project: L1353113
P.O. No.: L1353113
This report is for 5 Clay samples submitted to our lab in Vancouver, BC, Canada on 29-AUG-2013.
The following have access to data associated with this certificate:

ALSE VANCOUVER WEBTRIEVE	AMBER SPRINGER	

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
PUL-31	Pulverize split to 85% <75 um

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
S-GRA06a	Sulfate Sulfur (HCl leachable)	WST-SEQ
ME-MS81	Lithium Borate Fusion ICP-MS	ICP-MS

To: ALS ENVIRONMENTAL
ATTN: AMBER SPRINGER
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

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

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

Signature:
Colin Ramshaw, Vancouver Laboratory Manager

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY,
BURNABY BC V5A 1W9

Project: L1353113

CERTIFICATE OF ANALYSIS VA13153551

Sample Description	Method / Analyte / Units / LOR	WEI-21 Recvd Wt. kg 0.02	S-GRA08a S % 0.01	ME-MS81 Ba ppm 0.5
L1353113-1		0.24	0.01	816
L1353113-2		0.20	0.02	830
L1353113-3		0.22	<0.01	813
L1353113-4		0.22	0.01	670
L1353113-5		0.22	<0.01	710

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

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 9- SEP- 2013
Account: APN

Project: L1353113

CERTIFICATE OF ANALYSIS VA13153551

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Applies to Method: Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

LOG- 22	ME- MS81	PUL- 31	S- GRA06a
WEI- 21			

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 9- SEP- 2013
Account: APN

QC CERTIFICATE VA13153551

Project: L1353113
P.O. No.: L1353113
This report is for 5 Clay samples submitted to our lab in Vancouver, BC, Canada on 29- AUG- 2013.
The following have access to data associated with this certificate:

ALSE VANCOUVER WEBTRIEVE	AMBER SPRINGER	

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI- 21	Received Sample Weight
LOG- 22	Sample login - Rcd w/o BarCode
PUL- 31	Pulverize split to 85% < 75 um

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
S- GRA06a	Sulfate Sulfur (HCl leachable)	WST- SEQ
ME- MS81	Lithium Borate Fusion ICP- MS	ICP- MS

To: ALS ENVIRONMENTAL
ATTN: AMBER SPRINGER
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

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

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

Signature:
Colin Ramshaw, Vancouver Laboratory Manager

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 9- SEP- 2013
Account: APN

Project: L1353113

QC CERTIFICATE OF ANALYSIS VA13153551

Sample Description	Method	S- GRA06a	ME- MS81
	Analyte	S	Ba
	Units	%	ppm
	LOR	0.01	0.5
STANDARDS			
ORFAS 14b			>10000
Target Range - Lower Bound			11450
Upper Bound			>10000
RTS- 1		1.22	
Target Range - Lower Bound		1.14	
Upper Bound		1.34	
SY- 4			346
Target Range - Lower Bound			306
Upper Bound			375
OTS- 1		0.06	
Target Range - Lower Bound		0.01	
Upper Bound		0.05	
BLANKS			
BLANK			<0.5
Target Range - Lower Bound			<0.5
Upper Bound			1.0
BLANK		<0.01	
Target Range - Lower Bound		<0.01	
Upper Bound		0.02	
DUPLICATES			
ORIGINAL			1.0
DUP			0.6
Target Range - Lower Bound			<0.5
Upper Bound			1.0
L1353113- 5		<0.01	
DUP		<0.01	
Target Range - Lower Bound		<0.01	
Upper Bound		0.02	

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

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Project: L1353113

QC CERTIFICATE OF ANALYSIS VA13153551

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Applies to Method: Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

LOG- 22 ME- MS81 PUL- 31 S- GRA06a
WEI- 21

CH2MHILL

CHAIN OF CUSTODY RECORD

8/25/2013 11:07:12 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order NEW
Project BSI RIDGE NORTH OF GRUM 2013
Turnaround Time 10 Days
Shipping Date: 8/25/2013
COC Number: ALS08251305

	DATE	TIME	Matrix	(ASTM 2216) Moisture	(CSSS/APHA4500H) 1:1 Paste pH	(DI/EPA600/2-78-054) Acid Soluable Sulfate	(EPA200.0/245.7/SW6020A) Total Metals Table 1	(ModifiedSobek) Mod Neutralization Potential	(SSSA (1996) P455-456) TIC	(SSSA (1996) P995-996) TOC	(SW6020A) Ba(Li) Metaborate	(ASTM 4318) Atterberg limits	(ASTM D422) Gradation		Number of Containers	COMMENTS
Container:				4oz jar	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon			
Preservatives:				4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C			
Filtered:				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
Holding Time:				14	28	180	14	28	28	28	14	NA	NA			
CH13-311-BH023_SOa	8/24/2013	15:00	Soil	X	X	X	X	X	X	X	X				4	
CH13-311-BH023_SOb	8/24/2013	15:15	Soil	X	X	X	X	X	X	X	X	X	X		6	
CH13-311-BH024_SOa	8/24/2013	11:45	Soil	X	X	X	X	X	X	X	X				4	
CH13-311-BH024_SOb	8/24/2013	12:00	Soil	X	X	X	X	X	X	X	X		X		5	
CH13-311-BH924_SOb	8/24/2013	12:00	Soil	X	X	X	X	X	X	X	X		X		5	
														TOTAL NUMBER OF CONTAINERS	24	



L1353113-COFC

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		8/25/13 1100
Received by		10:50 26-Aug-13
Relinquished by		
Received by	1.9, 3.4, 2.5 °C	

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

8/25/2013 11:07:48 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order NEW
Project BSI RIDGE NORTH OF GRUM 2013
Turnaround Time 3 Days
Shipping Date: 8/25/2013
COC Number: ALS08251305R

	Container:	Preservatives:	Filtered:	Holding Time:	
	1 Gallon	4°C	NA	180	(ISO 15178-2000) Total Sulphur

	DATE	TIME	Matrix			Number of Containers	COMMENTS
CH13-311-BH023_SOa	8/24/2013	15:00	Soil	X		1	RUSH
CH13-311-BH023_SOb	8/24/2013	15:15	Soil	X		1	
CH13-311-BH024_SOa	8/24/2013	11:45	Soil	X		1	
CH13-311-BH024_SOb	8/24/2013	12:00	Soil	X		1	
CH13-311-BH924_SOb	8/24/2013	12:00	Soil	X		1	
					TOTAL NUMBER OF CONTAINERS	5	

L1353113-COFC

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		8/25/13 1100
Received by		
Relinquished by		
Received by		

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:

Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

8/25/2013 11:07:36 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order NEW
Project BSI RIDGE NORTH OF GRUM 2013
Turnaround Time 10 Days
Shipping Date: 8/25/2013
COC Number: ALS08251305H

				Container:	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon		
				Preservatives:	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C		
				Filtered:	NA	NA	NA	NA	NA	NA	NA	NA		
				Holding Time:	14	14	180	14	14	14	14	14		
	DATE	TIME	Matrix		(DI/ASTMD1498) DI ORP	(DI/E245.7) DI Mercury	(DI/E300) DI Sulphate	(DI/SM2310) DI Acidity	(DI/SM2320) DI Alkalinity	(DI/SM2510) DI Conductivity	(DI/SM4500H) DI pH	(DI/SW6020A) DI Diss Metals	Number of Containers	COMMENTS
CH13-311-BH023_SOa	8/24/2013	15:00	Soil		X	X	X	X	X	X	X	X	3	HOLD
CH13-311-BH023_SOb	8/24/2013	15:15	Soil		X	X	X	X	X	X	X	X	3	
CH13-311-BH024_SOa	8/24/2013	11:45	Soil		X	X	X	X	X	X	X	X	3	
CH13-311-BH024_SOb	8/24/2013	12:00	Soil		X	X	X	X	X	X	X	X	3	
CH13-311-BH924_SOb	8/24/2013	12:00	Soil		X	X	X	X	X	X	X	X	3	
												TOTAL NUMBER OF CONTAINERS	15	



L1353113-COFC

	Signatures	Date/Time
Approved by		
Sampled by	Jay Bk	8/25/13 1100
Relinquished by		
Received by		
Relinquished by		
Received by		

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:

Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 26-AUG-13
Report Date: 24-OCT-13 11:44 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1353150

Project P.O. #: 472645.06.AD.01.04.13 "PO=604564"
Job Reference: BSI RIDGE NORTH OF GRUM 2013 NEW
C of C Numbers: ALS08251306
Legal Site Desc:

Comments:

24-OCT-13: Additional QC data has been included.

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1353150-1	L1353150-2	L1353150-3		
	Description	Soil	Soil	Soil		
	Sampled Date	24-AUG-13	24-AUG-13	24-AUG-13		
	Sampled Time	15:15	12:00	12:00		
	Client ID	CH13-311-BH023_SOB	CH13-311-BH024_SOB	CH13-311-BH924_SOB		
Grouping	**Analyte**					
SOIL						
Physical Tests	Conductivity (1:2) (dS m-1)	<0.10	<0.10	<0.10		
	pH (1:2 CaCl2) (pH)	5.49	5.01	5.00		
Anions and Nutrients	Total Nitrogen by LECO (%)	0.087	<0.020	<0.020		
Organic / Inorganic Carbon	CaCO3 Equivalent (%)	<0.80	<0.80	<0.80		
	Inorganic Carbon (%)	<0.10	<0.10	<0.10		
	Total Carbon by Combustion (%)	1.4	0.2	0.1		
	Total Organic Carbon (%)	1.37	0.16	0.14		
Plant Available Nutrients	Available Ammonium-N (mg/kg)	5.2	3.5	3.7		
	Calcium (Ca) (meq/100g)	3.69	<0.50	<0.50		
	Cation Exchange Capacity (meq/100g)	7.13	2.19	2.39		
	Copper (Cu) (mg/kg)	1.57	0.16	0.17		
	Iron (Fe) (mg/kg)	115	8.5	8.6		
	Magnesium (Mg) (meq/100g)	0.51	<0.50	<0.50		
	Manganese (Mn) (mg/kg)	10.0	0.357	0.364		
	Available Nitrate-N (mg/kg)	<2.0	<2.0	<2.0		
	Available Phosphate-P (mg/kg)	<2.0	16.2	15.9		
	Potassium (K) (meq/100g)	<0.50	<0.50	<0.50		
	Sodium (Na) (meq/100g)	<0.50	<0.50	<0.50		
	Available Sulfate-S (mg/kg)	5.1	<3.0	<3.0		
	Zinc (Zn) (mg/kg)	1.02	<0.20	0.29		
Saturated Paste Extractables	SAR (SAR)	0.33	SAR:INC Incalculable	SAR:INC Incalculable		
	Calcium (Ca) (mg/L)	24.0	<2.0	<2.0		
	Chloride (Cl) (mg/L)	10.2	<2.0	<2.0		
	Conductivity Sat. Paste (dS m-1)	0.19	<0.10	<0.10		
	ESP (%)	N/A; Na<DL	N/A; Na<DL	N/A; Na<DL		
	Magnesium (Mg) (mg/L)	4.2	<2.0	<2.0		
	pH in Saturated Paste (pH)	6.16	5.90	5.95		
	Potassium (K) (mg/L)	2.6	2.2	2.5		
	% Saturation (%)	46.7	32.5	29.8		
	Sodium (Na) (mg/L)	6.6	<4.0	<4.0		
	Sulfur (as SO4) (mg/L)	26.5	<5.0	<5.0		
Metals	Phosphorus (P) (mg/kg)	547	389	549		
Miscellaneous	SMP Buffer pH (pH)	6.59	7.09	7.19		

* 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)
Internal Reference Material	Chloride (Cl)	DLA	L1353150-1, -2, -3
Internal Reference Material	Calcium (Ca)	DLA	L1353150-1, -2, -3
Internal Reference Material	Magnesium (Mg)	DLA	L1353150-1, -2, -3
Internal Reference Material	Potassium (K)	DLA	L1353150-1, -2, -3
Internal Reference Material	Sodium (Na)	DLA	L1353150-1, -2, -3
Internal Reference Material	Sulfur (as SO4)	DLA	L1353150-1, -2, -3
Internal Reference Material	Calcium (Ca)	DLA	L1353150-1, -2, -3
Internal Reference Material	Magnesium (Mg)	DLA	L1353150-1, -2, -3
Internal Reference Material	Potassium (K)	DLA	L1353150-1, -2, -3
Internal Reference Material	Sodium (Na)	DLA	L1353150-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
SAR:INC	SAR is incalculable due to Ca and Mg below detection limit.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-INORG-ORG-SK	Soil	Inorganic and Organic Carbon	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-LECO-SK	Soil	Total Carbon by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.

CAT-XTR-SK	Soil	Ammonium Acetate Extractable Cations	CSSS 19.4 - 1M NH4OAc Extraction @ pH 7

Exchangeable Ca, Mg, Na, and K are extracted from the soil using neutral 1N ammonium acetate, then determined by ICP-OES. This method does not correct for calcium or magnesium extracted from carbonates or free gypsum.

CEC-SK	Soil	Cation Exchange Capacity (NH4OAC Extn)	CSSS(1978) 3.321/Comm Soil Sci 17(7)

Soil exchange sites are saturated with ammonium, then displaced with sodium. Ammonium in the extract is determined colorimetrically.

CL-SAR-SK	Soil	Chloride (Cl) (Saturated Paste)	CSSS(1993) 18.2.2/APHA 4500-CL E

Chloride in a saturated soil extract is determined colorimetrically by auto-analyzer.

EC-1:2-SK	Soil	EC (1:2 Soil:Water Extraction)	CSSS 18.3.1

1 part dry soil and 2 parts de-ionized water (by volume) is mixed. The slurry is allowed to stand with occasional stirring for 30 - 60 minutes. After equilibration, the conductivity of the filtered extract is measured by a conductivity meter.

ETL-ESP-SK	Soil	Exchangeable Sodium Percentage - Calc	Calculation
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.

METAL-DTPA-SK	Soil	Available Micronutrients (Cu,Fe,Zn,Mn)	CSSS 1993 (11.3 AND 11.4)

Plant available micronutrients are extracted from soil using 0.005 M DTPA. Cu, Fe, Mn and Zn in the extract are determined by ICP-OES.

N-TOT-LECO-SK	Soil	Total Nitrogen by combustion method	SSSA (1996) P. 973-974

Reference Information

The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.

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.

NO3-AVAIL-KCL-SK	Soil	Available Nitrate-N (2N KCl)	CSSS (1993) 4.2, 4.3

Available Nitrate and Nitrite are extracted from the soil using a 2N KCl 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) methods 4.2, 4.3

PH-1:2CACL2-SK	Soil	pH (1:2 Soil:CaCl2 Extraction)	CSSC 3.11

1 part dry soil and 2 parts de-ionized 0.01M CaCl2 (by volume) is mixed. The slurry is allowed to stand with occasional stirring for 30 - 60 minutes. pH of the soil slurry is then measured using a pH meter.

PH-BUFFER-SMP-SK	Soil	Buffer pH (SMP)	CSSS (1993) method 14.2

After equilibration with SMP buffer solution, pH of the soil solution is measured with a pH meter. Lime requirement must be determined by the client using location-specific regression equations.

PO4-AVAIL-BRAY-SK	Soil	Plant Available Phosphate-P (Bray)	SSSA (1996) p. 894-895

Plant available phosphorus is extracted from the sample using Bray-1 solution (0.025M HCl and 0.03M NH4F). PO4-P in the filtered extract is determined colorimetrically at 880 nm

SAR-CALC-SK	Soil	SAR and Cations in saturated soil	CSSS 18.4-Calculation
SAR-CALC-SO4-SK	Soil	SAR, Cations and SO4 in saturated soil	APHA 3120B

Ca, Mg, Na, K and SO4 in a saturated soil extract are determined by ICP-OES.

SAT/PH/EC-SK	Soil	pH and EC (Saturated Paste)	CSSS 18.2.2/CSSC 3.14/CSSS 18.3.1

pH of a saturated soil paste is measured using a pH meter. After equilibration, an extract is obtained by vacuum filtration with conductivity of the extract measured by a conductivity meter.

SO4-AVAIL-CALPHOS-SK	Soil	Plant Available Sulfate - Ca(H2PO4)2	NCR (1998) p. 36/APHA 3120B

Plant available sulfate is extracted from the sample using dilute calcium phosphate. SO4-S in the filtered extract is determined by ICP-OES.

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

Chain of Custody Numbers:

ALS08251306

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-INORG-ORG-SK	**Soil**							
Batch R2686716								
WG1738103-2 IRM		**0.1%IC**						
Inorganic Carbon			116.7		%		60-140	04-SEP-13
CaCO3 Equivalent			117.2		%		60-140	04-SEP-13
WG1738103-3 IRM		**0.4%IC**						
Inorganic Carbon			107.2		%		80-120	04-SEP-13
CaCO3 Equivalent			107.3		%		80-120	04-SEP-13
WG1738103-4 MB								
Inorganic Carbon			<0.10		%		0.1	04-SEP-13
CaCO3 Equivalent			<0.80		%		0.8	04-SEP-13
C-TOT-LECO-SK	**Soil**							
Batch R2686328								
WG1738100-1 DUP		**L1353150-3**						
Total Carbon by Combustion		0.1	0.2		%	11	20	03-SEP-13
WG1738100-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			105.4		%		80-120	03-SEP-13
WG1738100-3 MB								
Total Carbon by Combustion			<0.1		%		0.1	03-SEP-13
CAT-XTR-SK	**Soil**							
Batch R2686485								
WG1737951-3 IRM		**SAL814**						
Sodium (Na)			98.7		%		70-130	04-SEP-13
Potassium (K)			105.7		%		70-130	04-SEP-13
Calcium (Ca)			94.3		%		70-130	04-SEP-13
Magnesium (Mg)			85.1		%		70-130	04-SEP-13
WG1737951-2 MB								
Sodium (Na)			<0.50		meq/100g		0.5	04-SEP-13
Potassium (K)			<0.50		meq/100g		0.5	04-SEP-13
Calcium (Ca)			<0.50		meq/100g		0.5	04-SEP-13
Magnesium (Mg)			<0.50		meq/100g		0.5	04-SEP-13
CEC-SK	**Soil**							
Batch R2686541								
WG1737954-3 IRM		**SAL814**						
Cation Exchange Capacity			104.9		%		70-130	04-SEP-13
WG1737954-2 MB								
Cation Exchange Capacity			<0.80		meq/100g		0.8	04-SEP-13
CL-SAR-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-SAR-SK	**Soil**							
Batch R2686630								
WG1737965-3 IRM		**ED-SAL_NAT1**						
Chloride (Cl)			88.6		%		70-130	04-SEP-13
WG1737965-2 MB								
Chloride (Cl)			<2.0		mg/L		2	04-SEP-13
EC-1:2-SK	**Soil**							
Batch R2689653								
WG1742007-3 IRM		**SAL814**						
Conductivity (1:2)			98.6		%		80-120	09-SEP-13
WG1742007-2 MB								
Conductivity (1:2)			<0.10		dS m-1		0.1	09-SEP-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2701219								
WG1742394-3 CRM		**VA-CANMET-TILL1**						
Phosphorus (P)			110.8		%		70-130	08-SEP-13
WG1742394-1 MB								
Phosphorus (P)			<50		mg/kg		50	08-SEP-13
METAL-DTPA-SK	**Soil**							
Batch R2686264								
WG1737915-3 IRM		**11-119**						
Copper (Cu)			86.4		%		70-130	03-SEP-13
Iron (Fe)			97.8		%		70-130	03-SEP-13
Manganese (Mn)			87.0		%		70-130	03-SEP-13
Zinc (Zn)			88.8		%		70-130	03-SEP-13
WG1737915-2 MB								
Copper (Cu)			<0.10		mg/kg		0.1	03-SEP-13
Iron (Fe)			<2.0		mg/kg		2	03-SEP-13
Manganese (Mn)			<0.050		mg/kg		0.05	03-SEP-13
Zinc (Zn)			<0.20		mg/kg		0.2	03-SEP-13
N-TOT-LECO-SK	**Soil**							
Batch R2686328								
WG1738100-1 DUP		**L1353150-3**						
Total Nitrogen by LECO		<0.020	<0.020	RPD-NA	%	N/A	20	03-SEP-13
WG1738100-2 IRM		**08-109_SOIL**						
Total Nitrogen by LECO			0.102		%		0.085-0.135	03-SEP-13
WG1738100-3 MB								
Total Nitrogen by LECO			<0.020		%		0.02	03-SEP-13
NH4-AVAIL-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH4-AVAIL-SK	**Soil**							
Batch R2684719								
WG1737924-1 DUP		**L1353150-3**						
Available Ammonium-N		3.7	3.6		mg/kg	2.5	20	03-SEP-13
WG1737924-3 IRM		**SAL814**						
Available Ammonium-N			109.0		%		70-130	03-SEP-13
WG1737924-2 MB								
Available Ammonium-N			<1.0		mg/kg		1	03-SEP-13
NO3-AVAIL-KCL-SK	**Soil**							
Batch R2684676								
WG1737928-1 DUP		**L1353150-3**						
Available Nitrate-N		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	03-SEP-13
WG1737928-3 IRM		**SAL814**						
Available Nitrate-N			98.0		%		70-130	03-SEP-13
WG1737928-2 MB								
Available Nitrate-N			<2.0		mg/kg		2	03-SEP-13
PH-1:2CACL2-SK	**Soil**							
Batch R2684687								
WG1737918-1 DUP		**L1353150-1**						
pH (1:2 CaCl2)		5.49	5.49	J	pH	0.00	0.3	03-SEP-13
WG1737918-3 IRM		**SAL814**						
pH (1:2 CaCl2)			7.67		pH		7.55-8.15	03-SEP-13
PH-BUFFER-SMP-SK	**Soil**							
Batch R2684669								
WG1737942-2 IRM		**SAL814**						
SMP Buffer pH			7.54		pH		7.44-7.64	03-SEP-13
PO4-AVAIL-BRAY-SK	**Soil**							
Batch R2686681								
WG1739115-3 IRM		**SAL814**						
Available Phosphate-P			101.9		%		70-130	04-SEP-13
WG1739115-2 MB								
Available Phosphate-P			<2.0		mg/kg		2	04-SEP-13
SAR-CALC-SK	**Soil**							
Batch R2686705								
WG1737965-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			99.2		%		70-130	04-SEP-13
Potassium (K)			102.6		%		70-130	04-SEP-13
Magnesium (Mg)			95.8		%		70-130	04-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAR-CALC-SK	**Soil**							
Batch R2686705								
WG1737965-3 IRM		**ED-SAL_NAT1**						
Sodium (Na)			107.5		%		70-130	04-SEP-13
WG1737965-2 MB								
Calcium (Ca)			<2.0		mg/L		2	04-SEP-13
Potassium (K)			<1.0		mg/L		1	04-SEP-13
Magnesium (Mg)			<2.0		mg/L		2	04-SEP-13
Sodium (Na)			<4.0		mg/L		4	04-SEP-13
SAR-CALC-SO4-SK	**Soil**							
Batch R2686705								
WG1737965-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			99.2		%		70-130	04-SEP-13
Potassium (K)			102.6		%		70-130	04-SEP-13
Magnesium (Mg)			95.8		%		70-130	04-SEP-13
Sodium (Na)			107.5		%		70-130	04-SEP-13
Sulfur (as SO4)			102.3		%		70-130	04-SEP-13
WG1737965-2 MB								
Calcium (Ca)			<2.0		mg/L		2	04-SEP-13
Potassium (K)			<1.0		mg/L		1	04-SEP-13
Magnesium (Mg)			<2.0		mg/L		2	04-SEP-13
Sodium (Na)			<4.0		mg/L		4	04-SEP-13
Sulfur (as SO4)			<5.0		mg/L		5	04-SEP-13
SAT/PH/EC-SK	**Soil**							
Batch R2686547								
WG1737965-3 IRM		**ED-SAL_NAT1**						
% Saturation			41.7		%		38-48	04-SEP-13
pH in Saturated Paste			6.54		pH		6.5-7.1	04-SEP-13
Conductivity Sat. Paste			91.4		%		80-120	04-SEP-13
WG1737965-2 MB								
Conductivity Sat. Paste			<0.10		dS m-1		0.1	04-SEP-13
SO4-AVAIL-CALPHOS-SK	**Soil**							
Batch R2685320								
WG1737922-3 IRM		**SAL814**						
Available Sulfate-S			93.1		%		60-140	03-SEP-13
WG1737922-2 MB								
Available Sulfate-S			<3.0		mg/kg		3	03-SEP-13

Quality Control Report

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.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

8/25/2013 11:08:03 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order NEW
Project BSI RIDGE NORTH OF GRUM 2013
Turnaround Time 10 Days
Shipping Date: 8/25/2013
COC Number: ALS08251306

	DATE	TIME	Matrix	(CSSS (2008) 11.3 and 11.4) Ext Micro Nut (ZnFeCuMn)	(CSSS (2008) 12.2) SMP Buffer pH (for pH<6.0)	(CSSS (2008) 15.2.1 or 14.4.4) Sodium Adsorption Ratio	(CSSS (2008) 15.2.1) ECe (sat paste)	(CSSS (2008) 15.3) Soluable Salts	(CSSS (2008) 18.4) 1N, pH7 NH4OAc ext CaMgKNa	(CSSS (2008) 18.4_CEC) Cation Exchange Capacity	(CSSS (2008) 20.3) CaCO3 equivalent	(CSSS (2008) 6.2) NH4-N and NO3-N (2N KCL)	(CSSS (2008) 7.2 and 7.3.1 if pH>7.2) Available P (pH>7.2)	(CSSS 16.3 (2008)) pH (1:2 CaCL2) CP17	(EPA200.2/SW6020A) Total P	(S-11.10 in Gavlak et al. (2005)) Ca(H2PO4)2.H2O ext SO4-S	(SSSA (1996) p894-895 if pH<7.2) Available P (pH<7.2)	(SSSA (1996) P973-974) Total N	Number of Containers	COMMENTS
Container:				1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	
Preservatives:				4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	4'C	
Filtered:				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Holding Time:				180	28	28	28	28	180	180	28	28	180	180	28	180	180	28	
CH13-311-BH023_SOb	8/24/2013	15:15	Soil	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3	
CH13-311-BH024_SOb	8/24/2013	12:00	Soil	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3	
CH13-311-BH924_SOb	8/24/2013	12:00	Soil	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3	
																		TOTAL NUMBER OF CONTAINERS	9	



L1353150-COFC

	Signatures	Date/Time
Approved by	Jay B	8/25/13 1100
Sampled by		
Relinquished by		
Received by		
Relinquished by		
Received by		

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:

Sample Custody
and
Amber Springer

Special Instructions:

Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 30-AUG-13
Report Date: 25-OCT-13 10:39 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1355921

Project P.O. #: 472645.06.AD.01.04.13 "PO=604564"
Job Reference: BSI RIDGE NORTH OF GRUM 2013 NEW
C of C Numbers: ALS80291301, ALS80291301H, ALS80291301R
Legal Site Desc:

Comments:

25-OCT-13: Additional QC data has been included.

Amber Springer
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1355921-1	L1355921-2			
	Description	Soil	Soil			
	Sampled Date	25-AUG-13	25-AUG-13			
	Sampled Time	15:00	15:15			
	Client ID	CH13-311-BH022_SOA	CH13-311-BH022_SOB			
Grouping	**Analyte**					
SOIL						
Physical Tests	Grain Size Curve		SEE ATTACHED			
	Moisture (%)	14.0	16.1			
	pH (1:2 soil:water) (pH)	5.98	5.51			
	Acid Soluble Sulphate Sulphur (%)	<0.01	<0.01			
Organic / Inorganic Carbon	Inorganic Carbon (%)	<0.10	<0.10			
	Inorganic Carbon (as CaCO3 Equivalent) (%)	<0.80	<0.80			
	Organic Carbon (%)	0.40	0.90			
	Organic Matter (%)	<0.70	1.48			
Saturated Paste Extractables	Paste pH (pH)	5.80	5.39			
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	3.0	3.0			
Metals	Aluminum (Al) (mg/kg)	6810	7700			
	Antimony (Sb) (mg/kg)	0.22	0.17			
	Arsenic (As) (mg/kg)	7.45	6.10			
	Barium (Ba) (mg/kg)	63.0	90.7			
	Beryllium (Be) (mg/kg)	0.44	0.50			
	Bismuth (Bi) (mg/kg)	0.29	0.35			
	Boron (B) (mg/kg)	<10	<10			
	Cadmium (Cd) (mg/kg)	0.105	0.120			
	Calcium (Ca) (mg/kg)	1630	1690			
	Chromium (Cr) (mg/kg)	11.8	14.0			
	Cobalt (Co) (mg/kg)	4.77	2.95			
	Copper (Cu) (mg/kg)	7.25	8.54			
	Iron (Fe) (mg/kg)	10500	12300			
	Lead (Pb) (mg/kg)	12.0	9.48			
	Lithium (Li) (mg/kg)	14.7	14.5			
	Magnesium (Mg) (mg/kg)	2540	2480			
	Manganese (Mn) (mg/kg)	204	120			
	Mercury (Hg) (mg/kg)	0.0074	0.0102			
	Molybdenum (Mo) (mg/kg)	0.64	0.51			
	Nickel (Ni) (mg/kg)	11.2	8.24			
	Phosphorus (P) (mg/kg)	497	504			
	Potassium (K) (mg/kg)	650	630			
	Selenium (Se) (mg/kg)	<0.20	<0.20			
	Silver (Ag) (mg/kg)	<0.10	<0.10			
	Sodium (Na) (mg/kg)	<100	<100			

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1355921-1	L1355921-2			
	Description	Soil	Soil			
	Sampled Date	25-AUG-13	25-AUG-13			
	Sampled Time	15:00	15:15			
	Client ID	CH13-311-BH022_SOA	CH13-311-BH022_SOB			
Grouping	**Analyte**					
SOIL						
Metals	Strontium (Sr) (mg/kg)	9.19	10.4			
	Sulfur (S)-Total (mg/kg)	600	<500			
	Thallium (Tl) (mg/kg)	0.113	0.134			
	Tin (Sn) (mg/kg)	<2.0	<2.0			
	Titanium (Ti) (mg/kg)	213	226			
	Uranium (U) (mg/kg)	2.94	3.35			
	Vanadium (V) (mg/kg)	15.4	18.3			
	Zinc (Zn) (mg/kg)	39.3	39.0			
Total Metals	Barium by borate-fusion (ppm)	788	775			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
B-200.2-CCMS-VA	Soil	Boron 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."

C-INORG-SK	Soil	Inorganic Carbon / Calcium Carbonate	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-ORG-WB-SK	Soil	Total Organic Carbon - Walkley Black	CSSS (1993) method 21.2

The soil sample is treated with excess potassium dichromate and sulfuric acid to oxidize organic carbon. Oxidized organic carbon is determined by back-titration with ferrous ammonium sulfate. Organic matter is estimated from the organic carbon result using the Van Bemmelon factor.

GRAIN SIZE-SK	Soil	Grain Size Analysis	SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

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.

IC-CACO3-CALC-SK	Soil	Inorganic Carbon as CaCO3 Equivalent	Calculation
ME-MS81-AX	Soil		ME-MS81
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

Reference Information

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

NP-TU	Soil	Neutralization Potential (NP)	Sobek 3.2.3, MOD
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.

PH-PASTE-VA	Soil	pH in Soil (Paste) by Meter	Carter-CSSS / APHA 4500 H

A soil extract produced by the saturated paste extraction procedure is analyzed by pH meter.

S-TOT-LECO-SK	Soil	Total Sulphur by combustion method	ISO 15178:2000

The sample is ignited in a combustion analyzer where sulfur in the reduced SO2 gas is determined using a thermal conductivity detector.

SAT-PCNT-VA	Soil	Saturation Percentage	Carter-CSSS

Saturation Percentage (SP) is the total volume of water present in a saturated paste (in mL) divided by the dry weight of the sample (in grams), expressed as a percentage, as described in "Soil Sampling and Methods of Analysis" by M. Carter.

SPECIAL REQUEST-SK	Misc.	Special Request Sask Lab	SEE SUBLET LAB RESULTS
SULPHUR-S-GRA06A-AX	Soil	Sulphur (S)	S-GRA06a

** 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
TU	ALS ENVIRONMENTAL - TUCSON, ARIZONA, USA
AX	ALS MINERALS - VANCOUVER, B.C., CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

ALS80291301 ALS80291301H ALS80291301R

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

Workorder: L1355921 Report Date: 25-OCT-13

Client: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-200.2-CCMS-VA	**Soil**							
Batch R2691909								
WG1744402-3 CRM		**VA-CANMET-TILL1**						
Boron (B)			3		mg/kg		0-13	11-SEP-13
WG1744402-2 DUP		**L1355921-2**						
Boron (B)		<10	<10	RPD-NA	mg/kg	N/A	30	11-SEP-13
WG1744402-1 MB								
Boron (B)			<10		mg/kg		10	11-SEP-13
C-INORG-SK	**Soil**							
Batch R2688404								
WG1741185-1 DUP		**L1355921-1**						
Inorganic Carbon		<0.10	<0.10	RPD-NA	%	N/A	20	06-SEP-13
WG1741185-2 IRM		**0.1%IC**						
Inorganic Carbon			132.6		%		60-140	06-SEP-13
WG1741185-3 IRM		**0.4%IC**						
Inorganic Carbon			108.8		%		80-120	06-SEP-13
WG1741185-4 MB								
Inorganic Carbon			<0.10		%		0.1	06-SEP-13
C-TOT-ORG-WB-SK	**Soil**							
Batch R2689320								
WG1741630-3 IRM		**FARM2009**						
Organic Carbon			107.8		%		80-120	07-SEP-13
Organic Matter			107.5		%		80-120	07-SEP-13
WG1741630-2 MB								
Organic Carbon			<0.40		%		0.4	07-SEP-13
Organic Matter			<0.70		%		0.7	07-SEP-13
HG-200.2-CVAF-VA	**Soil**							
Batch R2691248								
WG1744402-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			88.4		%		70-130	11-SEP-13
WG1744402-2 DUP		**L1355921-2**						
Mercury (Hg)		0.0102	0.0094		mg/kg	8.6	40	11-SEP-13
WG1744402-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	11-SEP-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2691909								
WG1744402-3 CRM		**VA-CANMET-TILL1**						
Aluminum (Al)			100.6		%		70-130	11-SEP-13
Antimony (Sb)			106.1		%		70-130	11-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2691909								
WG1744402-3 CRM		**VA-CANMET-TILL1**						
Arsenic (As)			105.9		%		70-130	11-SEP-13
Barium (Ba)			105.4		%		70-130	11-SEP-13
Beryllium (Be)			0.53		mg/kg		0.34-0.74	11-SEP-13
Bismuth (Bi)			100.4		%		70-130	11-SEP-13
Cadmium (Cd)			98.1		%		70-130	11-SEP-13
Calcium (Ca)			114.5		%		70-130	11-SEP-13
Chromium (Cr)			106.7		%		70-130	11-SEP-13
Cobalt (Co)			100.2		%		70-130	11-SEP-13
Copper (Cu)			96.5		%		70-130	11-SEP-13
Iron (Fe)			99.3		%		70-130	11-SEP-13
Lead (Pb)			94.5		%		70-130	11-SEP-13
Lithium (Li)			103.4		%		70-130	11-SEP-13
Magnesium (Mg)			102.7		%		70-130	11-SEP-13
Manganese (Mn)			98.6		%		70-130	11-SEP-13
Molybdenum (Mo)			0.67		mg/kg		0.24-1.24	11-SEP-13
Nickel (Ni)			100.7		%		70-130	11-SEP-13
Phosphorus (P)			92.7		%		70-130	11-SEP-13
Potassium (K)			122.9		%		70-130	11-SEP-13
Selenium (Se)			0.33		mg/kg		0.12-0.52	11-SEP-13
Silver (Ag)			0.23		mg/kg		0.12-0.32	11-SEP-13
Sodium (Na)			128.3		%		70-130	11-SEP-13
Strontium (Sr)			115.2		%		70-130	11-SEP-13
Thallium (Tl)			0.128		mg/kg		0.075-0.175	11-SEP-13
Tin (Sn)			1.1		mg/kg		0-3	11-SEP-13
Titanium (Ti)			116.0		%		70-130	11-SEP-13
Uranium (U)			112.7		%		70-130	11-SEP-13
Vanadium (V)			108.7		%		70-130	11-SEP-13
Zinc (Zn)			100.4		%		70-130	11-SEP-13
WG1744402-2 DUP		**L1355921-2**						
Aluminum (Al)		7700	7540		mg/kg	2.1	40	11-SEP-13
Antimony (Sb)		0.17	0.18		mg/kg	10	30	11-SEP-13
Arsenic (As)		6.10	6.80		mg/kg	11	30	11-SEP-13
Barium (Ba)		90.7	104		mg/kg	14	40	11-SEP-13
Beryllium (Be)		0.50	0.50		mg/kg	0.6	30	11-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2691909								
WG1744402-2 DUP		**L1355921-2**						
Bismuth (Bi)		0.35	0.41		mg/kg	17	30	11-SEP-13
Cadmium (Cd)		0.120	0.142		mg/kg	17	30	11-SEP-13
Calcium (Ca)		1690	1550		mg/kg	8.7	30	11-SEP-13
Chromium (Cr)		14.0	12.9		mg/kg	7.9	30	11-SEP-13
Cobalt (Co)		2.95	2.96		mg/kg	0.3	30	11-SEP-13
Copper (Cu)		8.54	9.03		mg/kg	5.6	30	11-SEP-13
Iron (Fe)		12300	12300		mg/kg	0.3	30	11-SEP-13
Lead (Pb)		9.48	10.5		mg/kg	10	40	11-SEP-13
Lithium (Li)		14.5	14.5		mg/kg	0.4	30	11-SEP-13
Magnesium (Mg)		2480	2260		mg/kg	9.3	30	11-SEP-13
Manganese (Mn)		120	125		mg/kg	3.6	30	11-SEP-13
Molybdenum (Mo)		0.51	0.59		mg/kg	14	40	11-SEP-13
Nickel (Ni)		8.24	7.40		mg/kg	11	30	11-SEP-13
Phosphorus (P)		504	469		mg/kg	7.3	30	11-SEP-13
Potassium (K)		630	590		mg/kg	5.9	40	11-SEP-13
Selenium (Se)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	11-SEP-13
Silver (Ag)		<0.10	<0.10	RPD-NA	mg/kg	N/A	40	11-SEP-13
Sodium (Na)		<100	<100	RPD-NA	mg/kg	N/A	40	11-SEP-13
Strontium (Sr)		10.4	11.6		mg/kg	11	40	11-SEP-13
Thallium (Tl)		0.134	0.133		mg/kg	0.8	30	11-SEP-13
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	11-SEP-13
Titanium (Ti)		226	211		mg/kg	6.7	40	11-SEP-13
Uranium (U)		3.35	3.58		mg/kg	6.7	30	11-SEP-13
Vanadium (V)		18.3	18.3		mg/kg	0.4	30	11-SEP-13
Zinc (Zn)		39.0	39.5		mg/kg	1.2	30	11-SEP-13
WG1744402-1 MB								
Aluminum (Al)			<50		mg/kg		50	11-SEP-13
Antimony (Sb)			<0.10		mg/kg		0.1	11-SEP-13
Arsenic (As)			<0.050		mg/kg		0.05	11-SEP-13
Barium (Ba)			<0.50		mg/kg		0.5	11-SEP-13
Beryllium (Be)			<0.20		mg/kg		0.2	11-SEP-13
Bismuth (Bi)			<0.20		mg/kg		0.2	11-SEP-13
Cadmium (Cd)			<0.050		mg/kg		0.05	11-SEP-13
Calcium (Ca)			<50		mg/kg		50	11-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2691909								
WG1744402-1 MB								
Chromium (Cr)			<0.50		mg/kg		0.5	11-SEP-13
Cobalt (Co)			<0.10		mg/kg		0.1	11-SEP-13
Copper (Cu)			<0.50		mg/kg		0.5	11-SEP-13
Iron (Fe)			<50		mg/kg		50	11-SEP-13
Lead (Pb)			<0.50		mg/kg		0.5	11-SEP-13
Lithium (Li)			<5.0		mg/kg		5	11-SEP-13
Magnesium (Mg)			<20		mg/kg		20	11-SEP-13
Manganese (Mn)			<1.0		mg/kg		1	11-SEP-13
Molybdenum (Mo)			<0.50		mg/kg		0.5	11-SEP-13
Nickel (Ni)			<0.50		mg/kg		0.5	11-SEP-13
Phosphorus (P)			<50		mg/kg		50	11-SEP-13
Potassium (K)			<100		mg/kg		100	11-SEP-13
Selenium (Se)			<0.20		mg/kg		0.2	11-SEP-13
Silver (Ag)			<0.10		mg/kg		0.1	11-SEP-13
Sodium (Na)			<100		mg/kg		100	11-SEP-13
Strontium (Sr)			<0.50		mg/kg		0.5	11-SEP-13
Thallium (Tl)			<0.050		mg/kg		0.05	11-SEP-13
Tin (Sn)			<2.0		mg/kg		2	11-SEP-13
Titanium (Ti)			<1.0		mg/kg		1	11-SEP-13
Uranium (U)			<0.050		mg/kg		0.05	11-SEP-13
Vanadium (V)			<0.20		mg/kg		0.2	11-SEP-13
Zinc (Zn)			<1.0		mg/kg		1	11-SEP-13
MOISTURE-VA	**Soil**							
Batch R2689869								
WG1743211-6 LCS								
Moisture			99.5		%		70-130	09-SEP-13
WG1743211-5 MB								
Moisture			<0.25		%		0.25	09-SEP-13
PH-1:2-VA	**Soil**							
Batch R2691535								
WG1744402-2 DUP		**L1355921-2**						
pH (1:2 soil:water)		5.51	5.44	J	pH	0.07	0.3	11-SEP-13
S-TOT-LECO-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-TOT-LECO-SK	**Soil**							
Batch R2688255								
WG1741188-2 IRM		**1646A_SOIL**						
Sulfur (S)-Total			3500		mg/kg		2500-4600	06-SEP-13
WG1741188-3 MB								
Sulfur (S)-Total			<500		mg/kg		500	06-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.
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							
Moisture content							
	1	25-AUG-13 15:00	09-SEP-13 04:15	14	15	days	EHT
	2	25-AUG-13 15:15	09-SEP-13 04:15	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 L1355921 were received on 30-AUG-13 10:00.

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.

September 26, 2013

Client: ALS Environmental-Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1355921

Date Received: September 6, 2013

Certificate of Analysis

Client ID:	Sample Date:	Lab #:		Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3$/1,000t
L1355921-1	8/25/2013 0000	T1301325-001		13.99	3
L1355921-2	8/25/2013 0000	T1301325-002		14.35	3

Notes:
Samples were air dried then ground to < 60 mesh.

Digitally signed by Wendy Hyatt
Date: 2013.09.26 14:49:28 -07'00'

Wendy Hyatt, Project Chemist

ADDRESS 3860 S. Palo Verde Road, Suite 302, Tucson, AZ 85714
PHONE +1 520 573 1061
FAX +1 520 573 1063

ALS Environmental

September 26, 2013

Client: ALS Environmental-Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1355921

Date Received: September 6, 2013

Quality Control

				Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3$/1,000t
Prep Blank				<0.01	< 1
Laboratory Control Sample (LCS) - Rice Flour CN 3451			Observed Value	9.36	n/a
			True Value	9.50	
			%R	99	
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	1,002
			True Value		1,000
			%R		100
Duplicate Results			*T1301360-010	4.69 **	
			Duplicate	4.67 **	
			%R	0	
Duplicate Results				*T1301297-002	12
				Duplicate	11
				%RPD	9

* Sample from the same batch, but a different project.

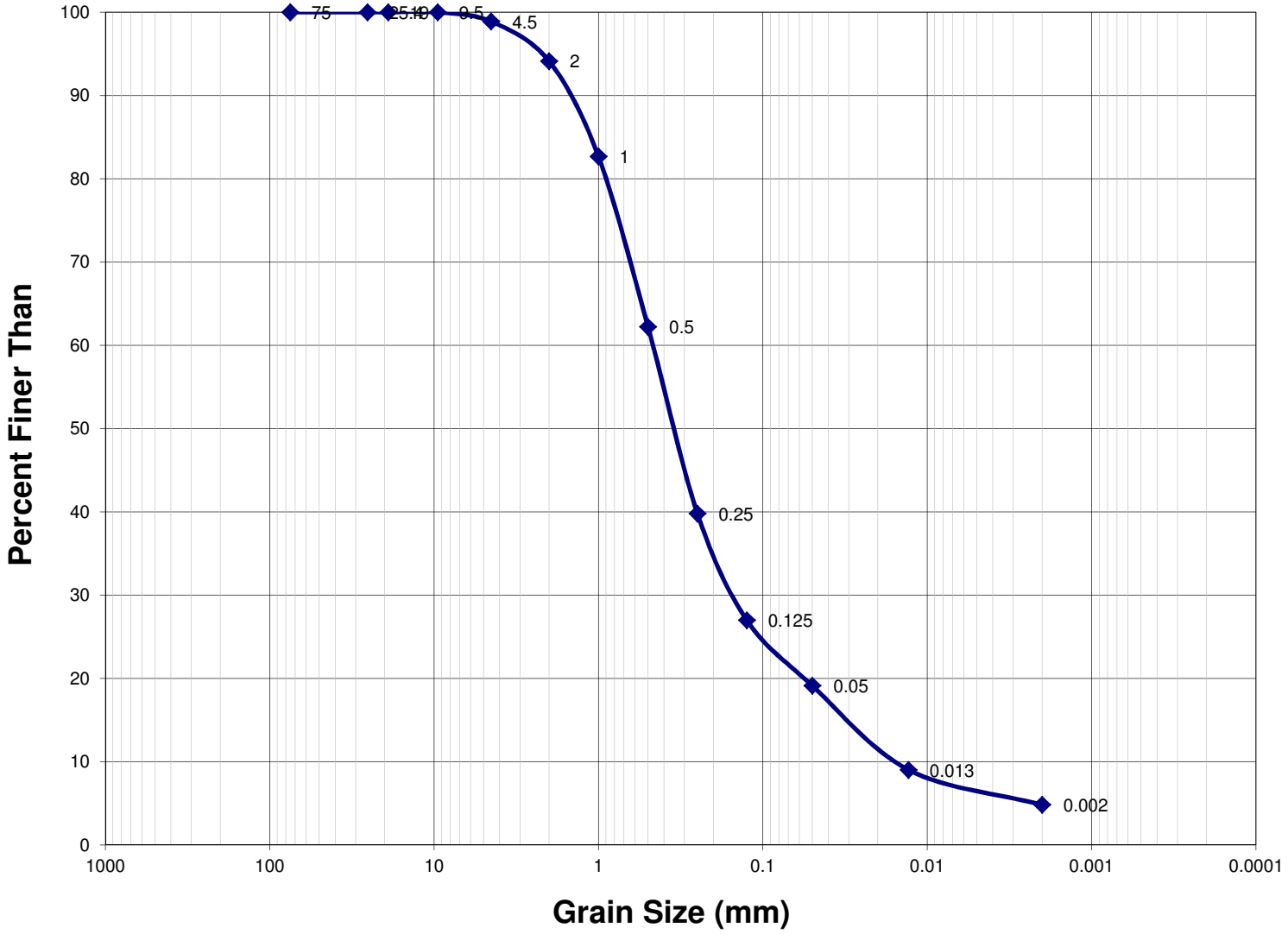
**Residual moisture - does not include air dry moisture.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-BH022_SOB
Lab ID: L1355921-2

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	1
Coarse Sand	2.0mm - 4.75mm	5
Medium Sand	0.425mm - 2.0mm	32
Fine Sand	0.075mm - 0.425mm	40
Fines	< 0.075mm	22

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	6
Sand	0.05mm - 2mm	75
Silt	0.002mm - 0.05mm	14
Clay	< 0.002mm	5
Texture	Loamy sand	

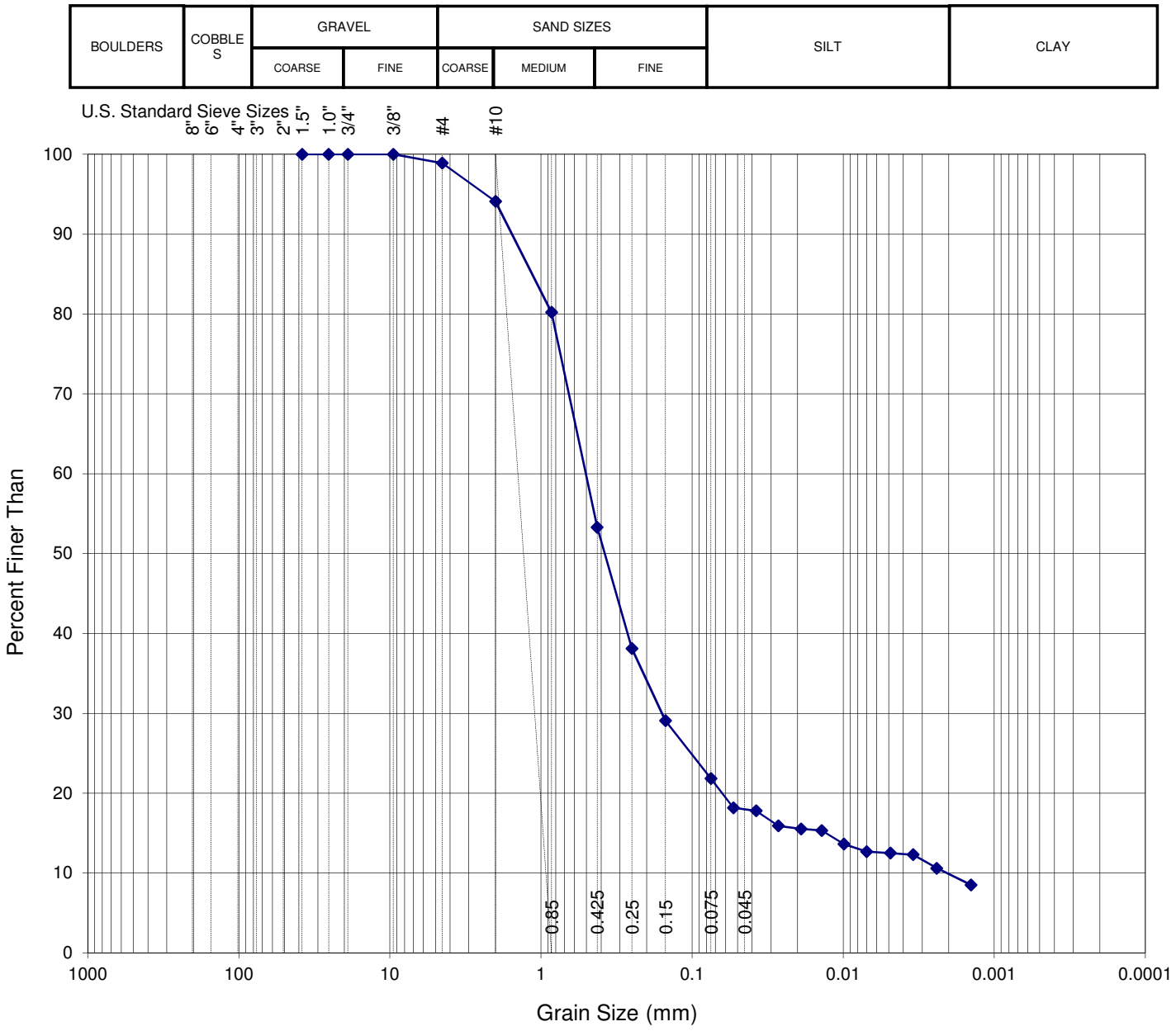
Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Laboratory Group

819-58th Street, Saskatoon,SK

PARTICLE SIZE DISTRIBUTION CURVE

Client Name:	CH2M HILL, INC
Project Number:	CHM400-CHM200-VA
Client Sample ID	CH13-311-BH022_SOB
Lab Sample ID	L1355921-2
Date Sample Received	30-Aug-13
Test Completion Date:	10-Sep-13
Analyst:	HSL



METHOD DESCRIPTION

Method Reference: ASTM D 422 - 63 (2002)

Dispersion method: Mechanical

Dispesion period: 1 minute cm/s

Soil classification system used: Unified Soil Classification

DESCRIPTION OF SAND AND GRAVEL PARTICLES

Shape: Angular

Hardness: Hard

SUMMARY OF RESULTS

GRAIN SIZE	WT %	DIA. RANGE (mm)
% GRAVEL :	1.12	> 4.5
% COARSE SAND :	4.79	2.0 - 4.5
% MEDIUM SAND :	40.80	0.425 - 2.0
% FINE SAND :	31.46	0.075 - 0.425
% SILT :	11.97	0.075 - 0.002
% CLAY :	9.87	< 0.002

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 14- SEP- 2013
Account: APN

CERTIFICATE VA13161589

Project: L1355921

P.O. No.: L1355921

This report is for 2 Soil samples submitted to our lab in Vancouver, BC, Canada on 4- SEP- 2013.

The following have access to data associated with this certificate:

ALSE VANCOUVER WEBTRIEVE	ANDRE LANGLAIS	A. SPRINGER

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI- 21	Received Sample Weight
LOG- 22	Sample login - Rcd w/o BarCode
SCR- 41	Screen to - 180um and save both

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME- MS81	Lithium Borate Fusion ICP- MS	ICP- MS
S- GRA06a	Sulfate Sulfur (HCl leachable)	WST- SEQ

To: ALS ENVIRONMENTAL
ATTN: A. SPRINGER
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

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

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

Signature:

Colin Ramshaw, Vancouver Laboratory Manager

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 14- SEP- 2013
Account: APN

Project: L1355921

CERTIFICATE OF ANALYSIS VA13161589

Sample Description	Method / Analyte / Units / LOR	WEI-21 Weight kg 0.02	S-GRA06a Sulphur % 0.01	ME-MS81 Ba ppm 0.5
L1355921-1		0.24	<0.01	788
L1355921-2		0.24	<0.01	775

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

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 14- SEP- 2013
Account: APN

Project: L1355921

CERTIFICATE OF ANALYSIS VA13161589

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

Applies to Method:			
LOG- 22	ME- MS81	SCR- 41	S- GRA06a
WEI- 21			

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 14- SEP- 2013
Account: APN

QC CERTIFICATE VA13161589

Project: L1355921

P.O. No.: L1355921

This report is for 2 Soil samples submitted to our lab in Vancouver, BC, Canada on 4- SEP- 2013.

The following have access to data associated with this certificate:

ALSE VANCOUVER WEBTRIEVE	ANDRE LANGLAIS	A. SPRINGER

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI- 21	Received Sample Weight
LOG- 22	Sample login - Rcd w/o BarCode
SCR- 41	Screen to - 180um and save both

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME- MS81	Lithium Borate Fusion ICP- MS	ICP- MS
S- GRA06a	Sulfate Sulfur (HCl leachable)	WST- SEQ

To: ALS ENVIRONMENTAL
ATTN: A. SPRINGER
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

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

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

Signature:

Colin Ramshaw, Vancouver Laboratory Manager

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 14- SEP- 2013
Account: APN

Project: L1355921

QC CERTIFICATE OF ANALYSIS VA13161589

Sample Description	Method Analyte Units LOR	S- GRA06a Sulphur % 0.01	ME- MS81 Ba ppm 0.5
STANDARDS			
OREAS 146			>10000
Target Range - Lower Bound			11450
Upper Bound			>10000
RTS- 1		1.16	
Target Range - Lower Bound		1.14	
Upper Bound		1.34	
UTS- 1		0.87	
Target Range - Lower Bound		0.81	
Upper Bound		0.95	
BLANKS			
BLANK			<0.5
Target Range - Lower Bound			<0.5
Upper Bound			1.0
BLANK		<0.01	
Target Range - Lower Bound		<0.01	
Upper Bound		0.02	
DUPLICATES			
ORIGINAL			1.6
DUP			1.7
Target Range - Lower Bound			1.1
Upper Bound			2.2
L1358594- 1			
DUP		0.02	
Target Range - Lower Bound		<0.01	
Upper Bound		0.03	

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

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Project: L1355921

QC CERTIFICATE OF ANALYSIS VA13161589

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

Applies to Method:			
LOG- 22	ME- MS81	SCR- 41	S- GRA06a
WEI- 21			

CH2MHILL

CHAIN OF CUSTODY RECORD

8/29/2013 8:43:53 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order NEW
Project BSI RIDGE NORTH OF GRUM 2013
Turnaround Time 10 Days
Shipping Date: 8/28/2013
COC Number: ALS08291301

	DATE	TIME	Matrix	(ASTM 2216) Moisture	(CSSS/APHA4500H) 1:1 Paste pH	(DI/EPA600/2-78-054) Acid Soluable Sulfate	(EPA200.0/245.7/SW6020A) Total Metals Table 1	(ModifiedSobek) Mod Neutralization Potential	(SSSA (1996) P455-456) TIC	(SSSA (1996) P995-998) TOC	(SW6020A) Ba(Li) Metaborate	(ASTM D422) Gradation		Number of Containers	COMMENTS
Container:				4oz jar	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon			
Preservatives:				4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C			
Filtered:				NA	NA	NA	NA	NA	NA	NA	NA	NA			
Holding Time:				14	28	180	14	28	28	28	14	NA			
CH13-311-BH022_SOa	8/25/2013	15:00	Soil	X	X	X	X	X	X	X	X			4	
CH13-311-BH022_SOb	8/25/2013	15:15	Soil	X	X	X	X	X	X	X	X	X		5	
													TOTAL NUMBER OF CONTAINERS	9	



L1355921-COFC

Signatures		Date/Time
Approved by		8/29/13 1400
Sampled by		
Relinquished by		30-Aug-13
Received by		
Relinquished by		
Received by		

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

8/29/2013 8:45:41 AM Page 1 OF 1

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order NEW
Project BSI RIDGE NORTH OF GRUM 2013
Turnaround Time 10 Days
Shipping Date: 8/28/2013
COC Number: ALS08291301H

	DATE	TIME	Matrix	(DI/ASTMD1498) DI ORP	(DI/E245.7) DI Mercury	(DI/E300) DI Sulphate	(DI/SM2310) DI Acidity	(DI/SM2320) DI Alkalinity	(DI/SM2510) DI Conductivity	(DI/SM4500H) DI pH	(DI/SW6020A) DI Diss Metals		Number of Containers	COMMENTS
Container:				1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon			
Preservatives:				4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C			
Filtered:				NA	NA	NA	NA	NA	NA	NA	NA			
Holding Time:				14	14	180	14	14	14	14	14			
CH13-311-BH022_SOa	8/25/2013	15:00	Soil	X	X	X	X	X	X	X	X		3	HOLD
CH13-311-BH022_SOb	8/25/2013	15:15	Soil	X	X	X	X	X	X	X	X		3	↓
												TOTAL NUMBER OF CONTAINERS	6	

L1355921-COFC

Signatures	Date/Time
Approved by	
Sampled by	8/29/13 1400
Relinquished by	
Received by	
Relinquished by	
Received by	

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

8/29/2013 8:46:50 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order NEW
Project BSI RIDGE NORTH OF GRUM 2013
Turnaround Time 3 Days
Shipping Date: 8/28/2013
COC Number: ALS08291301R

	Container:	Preservatives:	Filtered:	Holding Time:	
	1 Gallon	4°C	NA	180	(ISO 15178-2000) Total Sulphur
DATE / TIME / Matrix					
CH13-311-BH022_SOa 8/25/2013 15:00 Soil					X
CH13-311-BH022_SOb 8/25/2013 15:15 Soil					X

	Number of Containers	COMMENTS
CH13-311-BH022_SOa	1	RUSH
CH13-311-BH022_SOb	1	↓
TOTAL NUMBER OF CONTAINERS	2	



L1355921-COFC

Signatures		Date/Time
Approved by		
Sampled by	[signature]	8/29/13 1400
Relinquished by		
Received by		
Relinquished by		
Received by		

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 30-AUG-13
Report Date: 24-OCT-13 12:01 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1355973

Project P.O. #: 472645.06.AD.01.04.13 "PO:604564"
Job Reference: BSI RIDGE NORTH OF GRUM 2013
C of C Numbers: ALS08291302
Legal Site Desc:

Comments:

24-OCT-13: Additional QC data has been included.

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1355973-1				
	Description	Soil				
	Sampled Date	25-AUG-13				
	Sampled Time	15:15				
	Client ID	CH13-311-BH022_SOB				
Grouping	**Analyte**					
SOIL						
Physical Tests	Conductivity (1:2) (dS m-1)	<0.10				
	pH (1:2 CaCl2) (pH)	5.14				
Anions and Nutrients	Total Nitrogen by LECO (%)	0.049				
Organic / Inorganic Carbon	CaCO3 Equivalent (%)	1.05				
	Inorganic Carbon (%)	0.13				
	Total Carbon by Combustion (%)	0.8				
	Total Organic Carbon (%)	0.69				
Plant Available Nutrients	Available Ammonium-N (mg/kg)	1.3				
	Calcium (Ca) (meq/100g)	3.53				
	Cation Exchange Capacity (meq/100g)	8.82				
	Copper (Cu) (mg/kg)	0.94				
	Iron (Fe) (mg/kg)	120				
	Magnesium (Mg) (meq/100g)	0.63				
	Manganese (Mn) (mg/kg)	0.897				
	Available Nitrate-N (mg/kg)	<2.0				
	Available Phosphate-P (mg/kg)	2.7				
	Potassium (K) (meq/100g)	<0.50				
	Sodium (Na) (meq/100g)	<0.50				
	Available Sulfate-S (mg/kg)	<3.0				
	Zinc (Zn) (mg/kg)	0.71				
Saturated Paste Extractables	SAR (SAR)	0.32				
	Calcium (Ca) (mg/L)	7.9				
	Chloride (Cl) (mg/L)	4.4				
	Conductivity Sat. Paste (dS m-1)	<0.10				
	ESP (%)	N/A; Na<DL				
	Magnesium (Mg) (mg/L)	2.8				
	pH in Saturated Paste (pH)	5.45				
	Potassium (K) (mg/L)	2.3				
	% Saturation (%)	29.0				
	Sodium (Na) (mg/L)	4.1				
	Sulfur (as SO4) (mg/L)	12.5				
Metals	Phosphorus (P) (mg/kg)	470				
Miscellaneous	SMP Buffer pH (pH)	6.75				

* 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)
Internal Reference Material	Chloride (Cl)	DLA	L1355973-1
Internal Reference Material	Calcium (Ca)	DLA	L1355973-1
Internal Reference Material	Magnesium (Mg)	DLA	L1355973-1
Internal Reference Material	Potassium (K)	DLA	L1355973-1
Internal Reference Material	Sodium (Na)	DLA	L1355973-1
Internal Reference Material	Sulfur (as SO4)	DLA	L1355973-1
Internal Reference Material	Calcium (Ca)	DLA	L1355973-1
Internal Reference Material	Magnesium (Mg)	DLA	L1355973-1
Internal Reference Material	Potassium (K)	DLA	L1355973-1
Internal Reference Material	Sodium (Na)	DLA	L1355973-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-INORG-ORG-SK	Soil	Inorganic and Organic Carbon	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-LECO-SK	Soil	Total Carbon by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.

CAT-XTR-SK	Soil	Ammonium Acetate Extractable Cations	CSSS 19.4 - 1M NH4OAc Extraction @ pH 7

Exchangeable Ca, Mg, Na, and K are extracted from the soil using neutral 1N ammonium acetate, then determined by ICP-OES. This method does not correct for calcium or magnesium extracted from carbonates or free gypsum.

CEC-SK	Soil	Cation Exchange Capacity (NH4OAC Extn)	CSSS(1978) 3.321/Comm Soil Sci 17(7)

Soil exchange sites are saturated with ammonium, then displaced with sodium. Ammonium in the extract is determined colorimetrically.

CL-SAR-SK	Soil	Chloride (Cl) (Saturated Paste)	CSSS(1993) 18.2.2/APHA 4500-CL E

Chloride in a saturated soil extract is determined colorimetrically by auto-analyzer.

EC-1:2-SK	Soil	EC (1:2 Soil:Water Extraction)	CSSS 18.3.1

1 part dry soil and 2 parts de-ionized water (by volume) is mixed. The slurry is allowed to stand with occasional stirring for 30 - 60 minutes. After equilibration, the conductivity of the filtered extract is measured by a conductivity meter.

ETL-ESP-SK	Soil	Exchangeable Sodium Percentage - Calc	Calculation
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.

METAL-DTPA-SK	Soil	Available Micronutrients (Cu,Fe,Zn,Mn)	CSSS 1993 (11.3 AND 11.4)

Plant available micronutrients are extracted from soil using 0.005 M DTPA. Cu, Fe, Mn and Zn in the extract are determined by ICP-OES.

N-TOT-LECO-SK	Soil	Total Nitrogen by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.

Reference Information

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.

NO3-AVAIL-KCL-SK	Soil	Available Nitrate-N (2N KCl)	CSSS (1993) 4.2, 4.3

Available Nitrate and Nitrite are extracted from the soil using a 2N KCl 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) methods 4.2, 4.3

PH-1:2CACL2-SK	Soil	pH (1:2 Soil:CaCl2 Extraction)	CSSC 3.11

1 part dry soil and 2 parts de-ionized 0.01M CaCl2 (by volume) is mixed. The slurry is allowed to stand with occasional stirring for 30 - 60 minutes. pH of the soil slurry is then measured using a pH meter.

PH-BUFFER-SMP-SK	Soil	Buffer pH (SMP)	CSSS (1993) method 14.2

After equilibration with SMP buffer solution, pH of the soil solution is measured with a pH meter. Lime requirement must be determined by the client using location-specific regression equations.

PO4-AVAIL-BRAY-SK	Soil	Plant Available Phosphate-P (Bray)	SSSA (1996) p. 894-895

Plant available phosphorus is extracted from the sample using Bray-1 solution (0.025M HCl and 0.03M NH4F). PO4-P in the filtered extract is determined colorimetrically at 880 nm

SAR-CALC-SK	Soil	SAR and Cations in saturated soil	CSSS 18.4-Calculation
SAR-CALC-SO4-SK	Soil	SAR, Cations and SO4 in saturated soil	APHA 3120B

Ca, Mg, Na, K and SO4 in a saturated soil extract are determined by ICP-OES.

SAT/PH/EC-SK	Soil	pH and EC (Saturated Paste)	CSSS 18.2.2/CSSC 3.14/CSSS 18.3.1

pH of a saturated soil paste is measured using a pH meter. After equilibration, an extract is obtained by vacuum filtration with conductivity of the extract measured by a conductivity meter.

SO4-AVAIL-CALPHOS-SK	Soil	Plant Available Sulfate - Ca(H2PO4)2	NCR (1998) p. 36/APHA 3120B

Plant available sulfate is extracted from the sample using dilute calcium phosphate. SO4-S in the filtered extract is determined by ICP-OES.

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

Chain of Custody Numbers:

ALS08291302

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-INORG-ORG-SK	**Soil**							
Batch R2690494								
WG1741183-2 IRM		**0.1%IC**						
Inorganic Carbon			126.3		%		60-140	10-SEP-13
CaCO3 Equivalent			126.8		%		60-140	10-SEP-13
WG1741183-3 IRM		**0.4%IC**						
Inorganic Carbon			109.9		%		80-120	10-SEP-13
CaCO3 Equivalent			110.1		%		80-120	10-SEP-13
WG1741183-6 IRM		**0.1%IC**						
Inorganic Carbon			126.6		%		60-140	10-SEP-13
CaCO3 Equivalent			127.1		%		60-140	10-SEP-13
WG1741183-7 IRM		**0.4%IC**						
Inorganic Carbon			105.8		%		80-120	10-SEP-13
CaCO3 Equivalent			106.0		%		80-120	10-SEP-13
WG1741183-4 MB								
Inorganic Carbon			<0.10		%		0.1	10-SEP-13
CaCO3 Equivalent			<0.80		%		0.8	10-SEP-13
WG1741183-8 MB								
Inorganic Carbon			<0.10		%		0.1	10-SEP-13
CaCO3 Equivalent			<0.80		%		0.8	10-SEP-13
C-TOT-LECO-SK	**Soil**							
Batch R2689795								
WG1741190-14 IRM		**08-109_SOIL**						
Total Carbon by Combustion			103.0		%		80-120	06-SEP-13
WG1741190-17 IRM		**08-109_SOIL**						
Total Carbon by Combustion			99.4		%		80-120	06-SEP-13
WG1741190-20 IRM		**08-109_SOIL**						
Total Carbon by Combustion			99.6		%		80-120	06-SEP-13
WG1741190-15 MB								
Total Carbon by Combustion			<0.1		%		0.1	06-SEP-13
WG1741190-18 MB								
Total Carbon by Combustion			<0.1		%		0.1	06-SEP-13
WG1741190-21 MB								
Total Carbon by Combustion			<0.1		%		0.1	06-SEP-13
CAT-XTR-SK	**Soil**							
Batch R2689415								
WG1740911-3 IRM		**SAL814**						
Sodium (Na)			100.8		%		70-130	09-SEP-13
Potassium (K)			98.5		%		70-130	09-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CAT-XTR-SK	**Soil**							
Batch R2689415								
WG1740911-3 IRM		**SAL814**						
Calcium (Ca)			101.8		%		70-130	09-SEP-13
Magnesium (Mg)			95.4		%		70-130	09-SEP-13
WG1740911-2 MB								
Sodium (Na)			<0.50		meq/100g		0.5	09-SEP-13
Potassium (K)			<0.50		meq/100g		0.5	09-SEP-13
Calcium (Ca)			<0.50		meq/100g		0.5	09-SEP-13
Magnesium (Mg)			<0.50		meq/100g		0.5	09-SEP-13
CEC-SK	**Soil**							
Batch R2689499								
WG1740914-3 IRM		**SAL814**						
Cation Exchange Capacity			107.3		%		70-130	09-SEP-13
WG1740914-2 MB								
Cation Exchange Capacity			<0.80		meq/100g		0.8	09-SEP-13
CL-SAR-SK	**Soil**							
Batch R2690442								
WG1741053-3 IRM		**ED-SAL_NAT1**						
Chloride (Cl)			92.5		%		70-130	10-SEP-13
WG1741053-2 MB								
Chloride (Cl)			<2.0		mg/L		2	10-SEP-13
EC-1:2-SK	**Soil**							
Batch R2689653								
WG1742007-1 DUP		**L1355973-1**						
Conductivity (1:2)		<0.10	<0.10	RPD-NA	dS m-1	N/A	20	09-SEP-13
WG1742007-3 IRM		**SAL814**						
Conductivity (1:2)			98.6		%		80-120	09-SEP-13
WG1742007-2 MB								
Conductivity (1:2)			<0.10		dS m-1		0.1	09-SEP-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2692736								
WG1744403-3 CRM		**VA-CANMET-TILL1**						
Phosphorus (P)			110.8		%		70-130	12-SEP-13
WG1744403-2 DUP		**L1355973-1**						
Phosphorus (P)		470	550		mg/kg	16	30	12-SEP-13
WG1744403-1 MB								
Phosphorus (P)			<50		mg/kg		50	12-SEP-13
METAL-DTPA-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
METAL-DTPA-SK	**Soil**							
Batch R2689469								
WG1740924-3 IRM		**11-119**						
Copper (Cu)			87.8		%		70-130	09-SEP-13
Iron (Fe)			92.7		%		70-130	09-SEP-13
Manganese (Mn)			84.9		%		70-130	09-SEP-13
Zinc (Zn)			88.0		%		70-130	09-SEP-13
WG1740924-2 MB								
Copper (Cu)			<0.10		mg/kg		0.1	09-SEP-13
Iron (Fe)			<2.0		mg/kg		2	09-SEP-13
Manganese (Mn)			<0.050		mg/kg		0.05	09-SEP-13
Zinc (Zn)			<0.20		mg/kg		0.2	09-SEP-13
N-TOT-LECO-SK	**Soil**							
Batch R2689795								
WG1741190-14 IRM		**08-109_SOIL**						
Total Nitrogen by LECO			0.104		%		0.085-0.135	06-SEP-13
WG1741190-15 MB								
Total Nitrogen by LECO			<0.020		%		0.02	06-SEP-13
NH4-AVAIL-SK	**Soil**							
Batch R2689601								
WG1740927-3 IRM		**SAL814**						
Available Ammonium-N			101.4		%		70-130	09-SEP-13
WG1740927-2 MB								
Available Ammonium-N			<1.0		mg/kg		1	09-SEP-13
NO3-AVAIL-KCL-SK	**Soil**							
Batch R2689560								
WG1740928-3 IRM		**SAL814**						
Available Nitrate-N			95.7		%		70-130	09-SEP-13
WG1740928-2 MB								
Available Nitrate-N			<2.0		mg/kg		2	09-SEP-13
PH-1:2CACL2-SK	**Soil**							
Batch R2688041								
WG1740933-2 IRM		**SAL814**						
pH (1:2 CaCl2)			7.70		pH		7.55-8.15	06-SEP-13
PH-BUFFER-SMP-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-BUFFER-SMP-SK	**Soil**							
Batch R2688531								
WG1740916-2 IRM		**SAL814**						
SMP Buffer pH			7.51		pH		7.44-7.64	06-SEP-13
PO4-AVAIL-BRAY-SK	**Soil**							
Batch R2690623								
WG1741744-3 IRM		**SAL814**						
Available Phosphate-P			96.6		%		70-130	10-SEP-13
WG1741744-2 MB								
Available Phosphate-P			<2.0		mg/kg		2	10-SEP-13
SAR-CALC-SK	**Soil**							
Batch R2691105								
WG1741053-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			95.2		%		70-130	10-SEP-13
Potassium (K)			87.3		%		70-130	10-SEP-13
Magnesium (Mg)			96.0		%		70-130	10-SEP-13
Sodium (Na)			94.6		%		70-130	10-SEP-13
WG1741053-2 MB								
Calcium (Ca)			<2.0		mg/L		2	10-SEP-13
Potassium (K)			<1.0		mg/L		1	10-SEP-13
Magnesium (Mg)			<2.0		mg/L		2	10-SEP-13
Sodium (Na)			<4.0		mg/L		4	10-SEP-13
SAR-CALC-SO4-SK	**Soil**							
Batch R2691105								
WG1741053-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			95.2		%		70-130	10-SEP-13
Potassium (K)			87.3		%		70-130	10-SEP-13
Magnesium (Mg)			96.0		%		70-130	10-SEP-13
Sodium (Na)			94.6		%		70-130	10-SEP-13
Sulfur (as SO4)			99.9		%		70-130	10-SEP-13
WG1741053-2 MB								
Calcium (Ca)			<2.0		mg/L		2	10-SEP-13
Potassium (K)			<1.0		mg/L		1	10-SEP-13
Magnesium (Mg)			<2.0		mg/L		2	10-SEP-13
Sodium (Na)			<4.0		mg/L		4	10-SEP-13
Sulfur (as SO4)			<5.0		mg/L		5	10-SEP-13
SAT/PH/EC-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAT/PH/EC-SK	**Soil**							
Batch R2690397								
WG1741053-3 IRM		**ED-SAL_NAT1**						
% Saturation			43.1		%		38-48	10-SEP-13
pH in Saturated Paste			6.73		pH		6.5-7.1	10-SEP-13
Conductivity Sat. Paste			96.0		%		80-120	10-SEP-13
WG1741053-2 MB								
Conductivity Sat. Paste			<0.10		dS m-1		0.1	10-SEP-13
SO4-AVAIL-CALPHOS-SK	**Soil**							
Batch R2688293								
WG1740929-3 IRM		**SAL814**						
Available Sulfate-S			93.2		%		60-140	06-SEP-13
WG1740929-2 MB								
Available Sulfate-S			<3.0		mg/kg		3	06-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.
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
Organic / Inorganic Carbon							
Inorganic and Organic Carbon							
	1	25-AUG-13 15:15	10-SEP-13 00:00	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 L1355973 were received on 30-AUG-13 10:00.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

8/29/2013 8:47:20 AM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order NEW
Project BSI RIDGE NORTH OF GRUM 2013
Turnaround Time 10 Days
Shipping Date: 8/28/2013
COC Number: ALS08291302

	DATE	TIME	Matrix	Container:	Preservatives:	Filtered:	Holding Time:	(CSSS (2008) 11.3 and 11.4) Ext Micro Nut (ZnFeCuMn)	(CSSS (2008) 12.2) SMP Buffer pH (for pH<6.0)	(CSSS (2008) 15.2.1 or 14.4.4) Sodium Adsorption Ratio	(CSSS (2008) 15.2.1) ECe (sat paste)	(CSSS (2008) 15.3) Soluable Salts	(CSSS (2008) 18.4) 1N, pH7 NH4OAc ext CaMgKNa	(CSSS (2008) 18.4_CEC) Cation Exchange Capacity	(CSSS (2008) 20.3) CaCO3 equivalent	(CSSS (2008) 6.2) NH4-N and NO3-N (2N KCL)	(CSSS (2008) 7.2 and 7.3.1 if pH>7.2) Available P (pH>7.2)	(CSSS 16.3 (2008)) pH (1:2 CaCL2) CP17	(EPA200.2/SW6020A) Total P	(S-11.10 in Gavlak et al. (2005)) Ca(H2PO4)2.H2O ext SO4-S	(SSSA (1996) p894-895 if pH<7.2) Available P (pH<7.2)	(SSSA (1996) P973-974) Total N	Number of Containers	COMMENTS
				1 Gallon	4'C	NA	180																
				1 Gallon	4'C	NA	28																
				1 Gallon	4'C	NA	28																
				1 Gallon	4'C	NA	28																
				1 Gallon	4'C	NA	28																
				1 Gallon	4'C	NA	180																
				1 Gallon	4'C	NA	180																
				1 Gallon	4'C	NA	28																
				1 Gallon	4'C	NA	28																
				1 Gallon	4'C	NA	180																
				1 Gallon	4'C	NA	180																
				1 Gallon	4'C	NA	28																
				1 Gallon	4'C	NA	180																
				1 Gallon	4'C	NA	180																
				1 Gallon	4'C	NA	28																
CH13-311-BH022_SOb	8/25/2013	15:15	Soil					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
																						TOTAL NUMBER OF CONTAINERS	3



L1355973-COFC

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		8/29/13 1400
Received by	4.1, 2.1, 2.9, 3.4	
Relinquished by	1.4 1.4 oc	
Received by		

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 09-SEP-13
Report Date: 04-NOV-13 15:21 (MT)
Version: FINAL REV. 3

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1359691

Project P.O. #: 472645.06.AD.01.04.13, PO=604564
Job Reference: BSI NE AREA OF GRUM PIT 2013 311.5C
C of C Numbers: ALS09081301, ALS09081301H, ALS09081301R
Legal Site Desc:

Comments: 28-OCT-13: Additional QC data has been included.

The Neutralization Potential report from ALS-Tucson has been ammended to include the QC page.

Amber Springer
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1359691-1	L1359691-2	L1359691-3		
	Description	Soil	Soil	Soil		
	Sampled Date	26-AUG-13	26-AUG-13	27-AUG-13		
	Sampled Time	17:00	16:00	11:00		
	Client ID	CH13-311-TP022_SOA	CH13-311-TP023_SOA	CH13-311-TP021_SOA		
Grouping	**Analyte**					
SOIL						
Physical Tests	Grain Size Curve			SEE ATTACHED		
	Moisture (%)	9.09	11.3	11.9		
	Liquid Limit (LL) (%)			28		
	pH (1:2 soil:water) (pH)	7.83	6.92	4.57		
	Plasticity Index (PI) (%)			8		
	Acid Soluble Sulphate Sulphur (%)	<0.01	<0.01	<0.01		
Organic / Inorganic Carbon	Inorganic Carbon (%)	0.74	<0.10	<0.10		
	Inorganic Carbon (as CaCO3 Equivalent) (%)	6.18	<0.80	<0.80		
	Organic Carbon (%)	1.10	<0.40	<0.40		
	Organic Matter (%)	1.90	<0.70	<0.70		
Saturated Paste Extractables	Paste pH (pH)	6.98	6.17	5.08		
Acid Base Accounting	Neutralization Potential (NP) (tCaCO3/1Kt)	8.0	5.0	5.0		
Metals	Aluminum (Al) (mg/kg)	19500	21000	23100		
	Antimony (Sb) (mg/kg)	0.83	0.57	0.50		
	Arsenic (As) (mg/kg)	14.0	17.3	18.0		
	Barium (Ba) (mg/kg)	349	225	269		
	Beryllium (Be) (mg/kg)	0.68	0.72	0.84		
	Bismuth (Bi) (mg/kg)	0.33	0.37	0.33		
	Boron (B) (mg/kg)	<10	<10	<10		
	Cadmium (Cd) (mg/kg)	0.505	0.293	0.201		
	Calcium (Ca) (mg/kg)	3850	2280	4070		
	Chromium (Cr) (mg/kg)	47.3	45.1	44.6		
	Cobalt (Co) (mg/kg)	15.0	18.9	16.0		
	Copper (Cu) (mg/kg)	36.0	41.5	36.6		
	Iron (Fe) (mg/kg)	32700	36900	39200		
	Lead (Pb) (mg/kg)	13.7	33.3	12.8		
	Lithium (Li) (mg/kg)	31.4	35.3	37.2		
	Magnesium (Mg) (mg/kg)	8570	9790	9140		
	Manganese (Mn) (mg/kg)	463	573	344		
	Mercury (Hg) (mg/kg)	0.0499	0.0251	0.0202		
	Molybdenum (Mo) (mg/kg)	0.85	0.65	0.81		
	Nickel (Ni) (mg/kg)	44.7	46.6	43.3		
	Phosphorus (P) (mg/kg)	733	630	773		
	Potassium (K) (mg/kg)	2330	2020	2730		
	Selenium (Se) (mg/kg)	0.28	<0.20	<0.20		

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1359691-1	L1359691-2	L1359691-3		
	Description	Soil	Soil	Soil		
	Sampled Date	26-AUG-13	26-AUG-13	27-AUG-13		
	Sampled Time	17:00	16:00	11:00		
	Client ID	CH13-311-TP022_SOA	CH13-311-TP023_SOA	CH13-311-TP021_SOA		
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.16	0.14	0.13		
	Sodium (Na) (mg/kg)	250	140	460		
	Strontium (Sr) (mg/kg)	26.9	17.0	42.0		
	Sulfur (S)-Total (mg/kg)	2700	600	500		
	Thallium (Tl) (mg/kg)	0.196	0.162	0.214		
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0		
	Titanium (Ti) (mg/kg)	458	406	549		
	Uranium (U) (mg/kg)	0.832	1.01	1.24		
	Vanadium (V) (mg/kg)	45.6	37.7	38.4		
	Zinc (Zn) (mg/kg)	100	97.0	93.1		
Total Metals	Barium by borate-fusion (ppm)	1240	1190	1235		

* 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	Lead (Pb)	DUP-H	L1359691-1, -2, -3
Duplicate	Paste pH	DUP-H	L1359691-1, -2, -3

Qualifiers for Individual Parameters Listed:

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

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ATTERBERG-SK	Soil	Atterberg limits	CARTER CSSS 58

The liquid limit (or upper plastic limit) is the point at which the soil becomes semifluid, like softened butter. In operational terms, the liquid limit is defined as the water content at which a trapezoidal groove cut in moist soil is closed after 25 taps on a hard rubber plate (ASTM D-18, 1958).

The plastic limit (or lower plastic limit) is defined as the water content at which soil begins to crumble on being rolled into a thread 1/8 inch (or 3 mm) in diameter. It represents the lowest water content at which soil can be deformed readily without cracking.

The plastic index (which is the difference between the liquid and plastic limits) gives an indication of the "clayeyness" or plasticity of a clay and is employed in engineering classification systems for soils.

References: McKeague, J.A. 1978. Atterberg Limits pp 50 - 55 In: Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci. p. 50 - 55

B-200.2-CCMS-VA	Soil	Boron 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."

C-INORG-SK	Soil	Inorganic Carbon / Calcium Carbonate	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-ORG-WB-SK	Soil	Total Organic Carbon - Walkley Black	CSSS (1993) method 21.2

The soil sample is treated with excess potassium dichromate and sulfuric acid to oxidize organic carbon. Oxidized organic carbon is determined by back-titration with ferrous ammonium sulfate. Organic matter is estimated from the organic carbon result using the Van Bemmelon factor.

GRAIN SIZE-SK	Soil	Grain Size Analysis	SSIR-51 METHOD 3.2.1

Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

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,

Reference Information

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.

IC-CACO3-CALC-SK	Soil	Inorganic Carbon as CaCO3 Equivalent	Calculation
ME-MS81-AX	Soil		ME-MS81
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.

NP-TU	Soil	Neutralization Potential (NP)	Sobek 3.2.3, MOD
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.

PH-PASTE-VA	Soil	pH in Soil (Paste) by Meter	Carter-CSSS / APHA 4500 H

A soil extract produced by the saturated paste extraction procedure is analyzed by pH meter.

S-TOT-LECO-SK	Soil	Total Sulphur by combustion method	ISO 15178:2000

The sample is ignited in a combustion analyzer where sulfur in the reduced SO2 gas is determined using a thermal conductivity detector.

SAT-PCNT-VA	Soil	Saturation Percentage	Carter-CSSS

Saturation Percentage (SP) is the total volume of water present in a saturated paste (in mL) divided by the dry weight of the sample (in grams), expressed as a percentage, as described in "Soil Sampling and Methods of Analysis" by M. Carter.

SPECIAL REQUEST-SK	Misc.	Special Request Sask Lab	SEE SUBLET LAB RESULTS
SULPHUR-S-GRA06A-AX	Soil	Sulphur (S)	S-GRA06a

** 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
TU	ALS ENVIRONMENTAL - TUCSON, ARIZONA, USA
AX	ALS MINERALS - VANCOUVER, B.C., CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

ALS09081301 ALS09081301H ALS09081301R

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-200.2-CCMS-VA	**Soil**							
Batch R2694303								
WG1746682-4 CRM		**VA-CANMET-TILL1**						
Boron (B)			3		mg/kg		0-13	15-SEP-13
WG1746682-2 DUP		**L1359691-2**						
Boron (B)		<10	<10	RPD-NA	mg/kg	N/A	30	15-SEP-13
WG1746682-1 MB								
Boron (B)			<10		mg/kg		10	15-SEP-13
C-INORG-SK	**Soil**							
Batch R2692992								
WG1746185-1 DUP		**L1359691-1**						
Inorganic Carbon		0.74	0.78		%	5.6	20	13-SEP-13
WG1746185-2 IRM		**0.1%IC**						
Inorganic Carbon			114.0		%		60-140	13-SEP-13
WG1746185-3 IRM		**0.4%IC**						
Inorganic Carbon			97.1		%		80-120	13-SEP-13
WG1746185-4 MB								
Inorganic Carbon			<0.10		%		0.1	13-SEP-13
C-TOT-ORG-WB-SK	**Soil**							
Batch R2697236								
WG1745707-3 IRM		**FARM2009**						
Organic Carbon			107.8		%		80-120	19-SEP-13
Organic Matter			106.5		%		80-120	19-SEP-13
WG1745707-2 MB								
Organic Carbon			<0.40		%		0.4	19-SEP-13
Organic Matter			<0.70		%		0.7	19-SEP-13
HG-200.2-CVAF-VA	**Soil**							
Batch R2693968								
WG1746682-3 CRM		**VA-CANMET-TILL1**						
Mercury (Hg)			110.9		%		70-130	15-SEP-13
WG1746682-2 DUP		**L1359691-2**						
Mercury (Hg)		0.0251	0.0281		mg/kg	11	40	15-SEP-13
WG1746682-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	15-SEP-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2694303								
WG1746682-3 CRM		**VA-CANMET-TILL1**						
Aluminum (Al)			95.3		%		70-130	15-SEP-13
Antimony (Sb)			99.9		%		70-130	15-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2694303								
WG1746682-3 CRM		**VA-CANMET-TILL1**						
Arsenic (As)			103.8		%		70-130	15-SEP-13
Barium (Ba)			95.0		%		70-130	15-SEP-13
Beryllium (Be)			0.47		mg/kg		0.34-0.74	15-SEP-13
Bismuth (Bi)			98.0		%		70-130	15-SEP-13
Cadmium (Cd)			91.6		%		70-130	15-SEP-13
Calcium (Ca)			100.2		%		70-130	15-SEP-13
Chromium (Cr)			103.0		%		70-130	15-SEP-13
Cobalt (Co)			98.1		%		70-130	15-SEP-13
Copper (Cu)			94.1		%		70-130	15-SEP-13
Iron (Fe)			93.1		%		70-130	15-SEP-13
Lead (Pb)			89.5		%		70-130	15-SEP-13
Lithium (Li)			96.4		%		70-130	15-SEP-13
Magnesium (Mg)			98.6		%		70-130	15-SEP-13
Manganese (Mn)			94.3		%		70-130	15-SEP-13
Molybdenum (Mo)			0.67		mg/kg		0.24-1.24	15-SEP-13
Nickel (Ni)			98.1		%		70-130	15-SEP-13
Phosphorus (P)			103.3		%		70-130	15-SEP-13
Potassium (K)			103.2		%		70-130	15-SEP-13
Selenium (Se)			0.35		mg/kg		0.12-0.52	15-SEP-13
Silver (Ag)			0.21		mg/kg		0.12-0.32	15-SEP-13
Sodium (Na)			110.3		%		70-130	15-SEP-13
Strontium (Sr)			98.4		%		70-130	15-SEP-13
Thallium (Tl)			0.118		mg/kg		0.075-0.175	15-SEP-13
Tin (Sn)			1.0		mg/kg		0-3	15-SEP-13
Titanium (Ti)			105.2		%		70-130	15-SEP-13
Uranium (U)			100.5		%		70-130	15-SEP-13
Vanadium (V)			103.2		%		70-130	15-SEP-13
Zinc (Zn)			97.6		%		70-130	15-SEP-13
WG1746682-2 DUP		**L1359691-2**						
Aluminum (Al)		21000	21200		mg/kg	0.9	40	15-SEP-13
Antimony (Sb)		0.57	0.53		mg/kg	7.7	30	15-SEP-13
Arsenic (As)		17.3	16.8		mg/kg	3.0	30	15-SEP-13
Barium (Ba)		225	230		mg/kg	2.4	40	15-SEP-13
Beryllium (Be)		0.72	0.73		mg/kg	0.9	30	15-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2694303								
WG1746682-2 DUP		**L1359691-2**						
Bismuth (Bi)		0.37	0.35		mg/kg	4.5	30	15-SEP-13
Cadmium (Cd)		0.293	0.316		mg/kg	7.5	30	15-SEP-13
Calcium (Ca)		2280	2280		mg/kg	0.2	30	15-SEP-13
Chromium (Cr)		45.1	43.7		mg/kg	3.3	30	15-SEP-13
Cobalt (Co)		18.9	18.0		mg/kg	4.9	30	15-SEP-13
Copper (Cu)		41.5	40.2		mg/kg	3.2	30	15-SEP-13
Iron (Fe)		36900	32000		mg/kg	14	30	15-SEP-13
Lead (Pb)		33.3	17.5	DUP-H	mg/kg	62	40	15-SEP-13
Lithium (Li)		35.3	33.5		mg/kg	5.2	30	15-SEP-13
Magnesium (Mg)		9790	9310		mg/kg	5.0	30	15-SEP-13
Manganese (Mn)		573	572		mg/kg	0.0	30	15-SEP-13
Molybdenum (Mo)		0.65	0.67		mg/kg	2.6	40	15-SEP-13
Nickel (Ni)		46.6	46.3		mg/kg	0.4	30	15-SEP-13
Phosphorus (P)		630	678		mg/kg	7.3	30	15-SEP-13
Potassium (K)		2020	2010		mg/kg	0.2	40	15-SEP-13
Selenium (Se)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	15-SEP-13
Silver (Ag)		0.14	0.11		mg/kg	24	40	15-SEP-13
Sodium (Na)		140	130		mg/kg	3.1	40	15-SEP-13
Strontium (Sr)		17.0	16.8		mg/kg	1.5	40	15-SEP-13
Thallium (Tl)		0.162	0.170		mg/kg	4.8	30	15-SEP-13
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	15-SEP-13
Titanium (Ti)		406	405		mg/kg	0.4	40	15-SEP-13
Uranium (U)		1.01	1.03		mg/kg	2.3	30	15-SEP-13
Vanadium (V)		37.7	37.6		mg/kg	0.3	30	15-SEP-13
Zinc (Zn)		97.0	95.7		mg/kg	1.4	30	15-SEP-13
WG1746682-1 MB								
Aluminum (Al)			<50		mg/kg		50	15-SEP-13
Antimony (Sb)			<0.10		mg/kg		0.1	15-SEP-13
Arsenic (As)			<0.050		mg/kg		0.05	15-SEP-13
Barium (Ba)			<0.50		mg/kg		0.5	15-SEP-13
Beryllium (Be)			<0.20		mg/kg		0.2	15-SEP-13
Bismuth (Bi)			<0.20		mg/kg		0.2	15-SEP-13
Cadmium (Cd)			<0.050		mg/kg		0.05	15-SEP-13
Calcium (Ca)			<50		mg/kg		50	15-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-VA	**Soil**							
Batch R2694303								
WG1746682-1 MB								
Chromium (Cr)			<0.50		mg/kg		0.5	15-SEP-13
Cobalt (Co)			<0.10		mg/kg		0.1	15-SEP-13
Copper (Cu)			<0.50		mg/kg		0.5	15-SEP-13
Iron (Fe)			<50		mg/kg		50	15-SEP-13
Lead (Pb)			<0.50		mg/kg		0.5	15-SEP-13
Lithium (Li)			<5.0		mg/kg		5	15-SEP-13
Magnesium (Mg)			<20		mg/kg		20	15-SEP-13
Manganese (Mn)			<1.0		mg/kg		1	15-SEP-13
Molybdenum (Mo)			<0.50		mg/kg		0.5	15-SEP-13
Nickel (Ni)			<0.50		mg/kg		0.5	15-SEP-13
Phosphorus (P)			<50		mg/kg		50	15-SEP-13
Potassium (K)			<100		mg/kg		100	15-SEP-13
Selenium (Se)			<0.20		mg/kg		0.2	15-SEP-13
Silver (Ag)			<0.10		mg/kg		0.1	15-SEP-13
Sodium (Na)			<100		mg/kg		100	15-SEP-13
Strontium (Sr)			<0.50		mg/kg		0.5	15-SEP-13
Thallium (Tl)			<0.050		mg/kg		0.05	15-SEP-13
Tin (Sn)			<2.0		mg/kg		2	15-SEP-13
Titanium (Ti)			<1.0		mg/kg		1	15-SEP-13
Uranium (U)			<0.050		mg/kg		0.05	15-SEP-13
Vanadium (V)			<0.20		mg/kg		0.2	15-SEP-13
Zinc (Zn)			<1.0		mg/kg		1	15-SEP-13
MOISTURE-VA	**Soil**							
Batch R2693167								
WG1746666-4 DUP		**L1359691-2**						
Moisture		11.3	13.5		%	18	20	13-SEP-13
WG1746666-2 LCS								
Moisture			99.6		%		70-130	13-SEP-13
WG1746666-1 MB								
Moisture			<0.25		%		0.25	13-SEP-13
PH-1:2-VA	**Soil**							
Batch R2694329								
WG1746682-2 DUP		**L1359691-2**						
pH (1:2 soil:water)		6.92	6.79	J	pH	0.13	0.3	16-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-PASTE-VA	**Soil**							
Batch R2699663								
WG1751080-3 DUP		**L1359691-3**						
Paste pH		5.08	5.61	DUP-H	pH	0.53	0.3	24-SEP-13
S-TOT-LECO-SK	**Soil**							
Batch R2692986								
WG1746169-1 DUP		**L1359691-2**						
Sulfur (S)-Total		600	<500	RPD-NA	mg/kg	N/A	30	13-SEP-13
WG1746169-2 IRM		**1646A_SOIL**						
Sulfur (S)-Total			3400		mg/kg		2500-4600	13-SEP-13
WG1746169-3 MB								
Sulfur (S)-Total			<500		mg/kg		500	13-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
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
J	Duplicate results and limits are expressed in terms of absolute difference.
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							
Moisture content							
	1	26-AUG-13 17:00	13-SEP-13 22:41	14	18	days	EHTL
	2	26-AUG-13 16:00	13-SEP-13 22:41	14	18	days	EHTL
	3	27-AUG-13 11:00	13-SEP-13 22:41	14	17	days	EHT
Organic / Inorganic Carbon							
Inorganic Carbon / Calcium Carbonate							
	1	26-AUG-13 17:00	13-SEP-13 00:00	14	17	days	EHTL
	2	26-AUG-13 16:00	13-SEP-13 00:00	14	17	days	EHTL
	3	27-AUG-13 11:00	13-SEP-13 00:00	14	17	days	EHT
Inorganic Carbon as CaCO3 Equivalent							
	1	26-AUG-13 17:00	13-SEP-13 15:53	14	18	days	EHTL
	2	26-AUG-13 16:00	13-SEP-13 15:53	14	18	days	EHTL
	3	27-AUG-13 11:00	13-SEP-13 15:53	14	17	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 L1359691 were received on 09-SEP-13 10:36.

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.

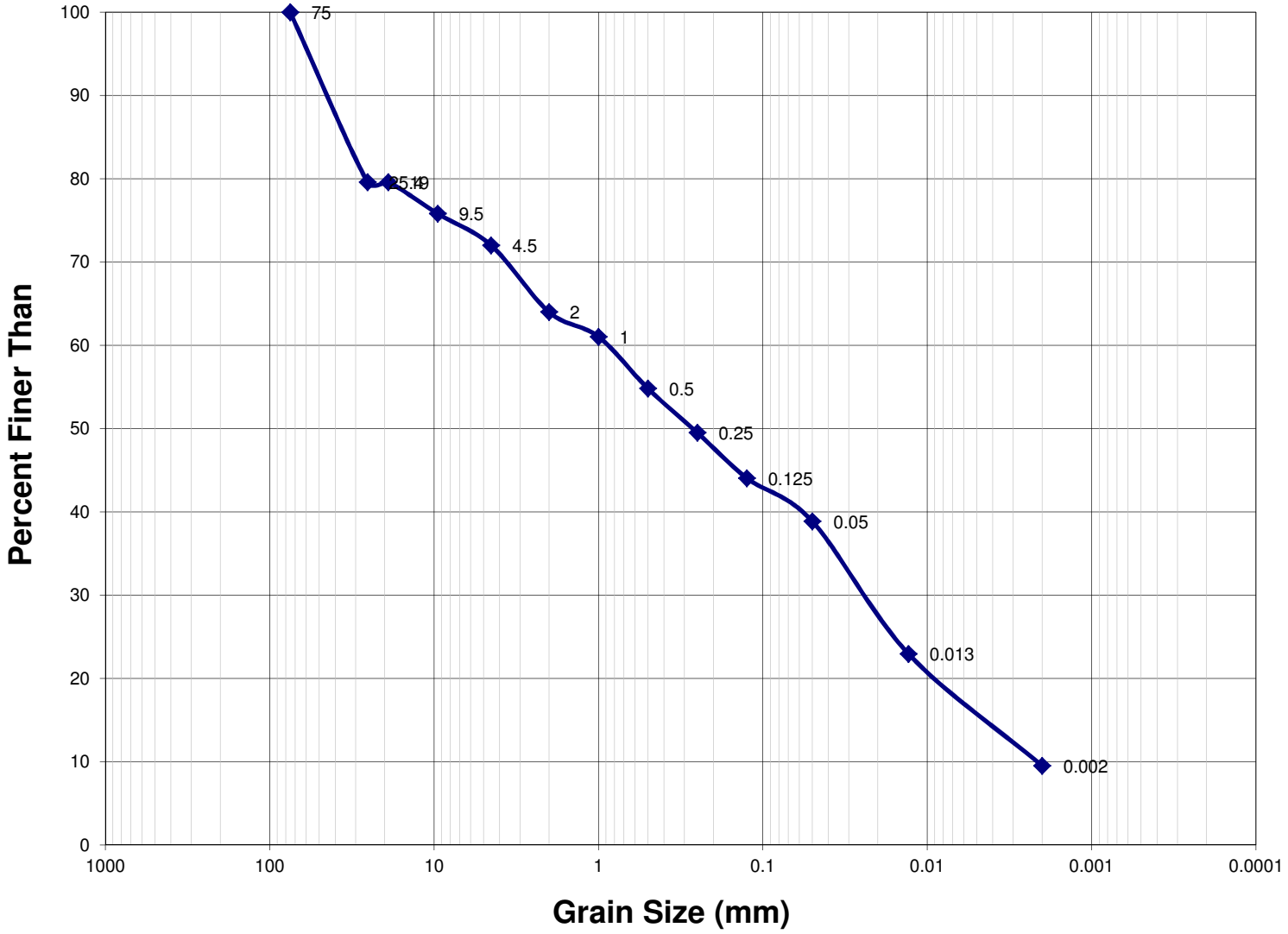
Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

819-58th Street, Saskatoon, SK S7K 6X5

Client Name: CH2M HILL, INC
Project: CHM400-CHM200-VA
Sample ID: CH13-311-TP021_SOA
Lab ID: L1359691-3

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	28
Coarse Sand	2.0mm - 4.75mm	8
Medium Sand	0.425mm - 2.0mm	9
Fine Sand	0.075mm - 0.425mm	14
Fines	< 0.075mm	41

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	36
Sand	0.05mm - 2mm	25
Silt	0.002mm - 0.05mm	29
Clay	< 0.002mm	10
Texture	Loam	

Method Reference: Can. Soc. Soil Sci. (1993) Method 47.2

ALS Environmental

September 27, 2013

Client: ALS Environmental-Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1359691 Date Received: September 12, 2013

Certificate of Analysis

Client ID:	Sample Date:		Lab #:		Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3$/1,000t
L1359691-1	8/26/2013	0000	T1301368-001		9.63	8
L1359691-2	8/26/2013	0000	T1301368-002		12.25	5
L1359691-3	8/26/2013	0000	T1301368-003		9.64	5

Notes:
Samples were air dried then ground to < 60 mesh.

W. Hyatt
Digitally signed by Wendy Hyatt
Date: 2013.11.04 15:11:38 -07'00'

Wendy Hyatt, Project Chemist

September 27, 2013

Client: ALS Environmental-Canada
8081 Lougheed Hwy, Ste 100
Burnaby, BC V5A 1W9
CANADA
Attn: Amber Springer
Project: L1359691

Date Received: September 12, 2013

Quality Control

				Moisture, Total 3.1 wt%	Neutralization Potential Sobek 3.2.3, MOD $tCaCO_3$/1,000t
Prep Blank				<0.01	< 1
Laboratory Control Sample (LCS) - Rice Flour CN 3451			Observed Value	9.70	n/a
			True Value	9.50	
			%R	102	
Laboratory Control Sample (LCS) - Na_2CO3 CN 1045			Observed Value	n/a	965
			True Value		1,000
			%R		97
Duplicate Results			*T1301248-040	0.43 **	
			Duplicate	0.46 **	
			%R	7	
Duplicate Results				T1301368-001	8
				Duplicate	8
				%RPD	0

* Sample from the same batch, but a different project.

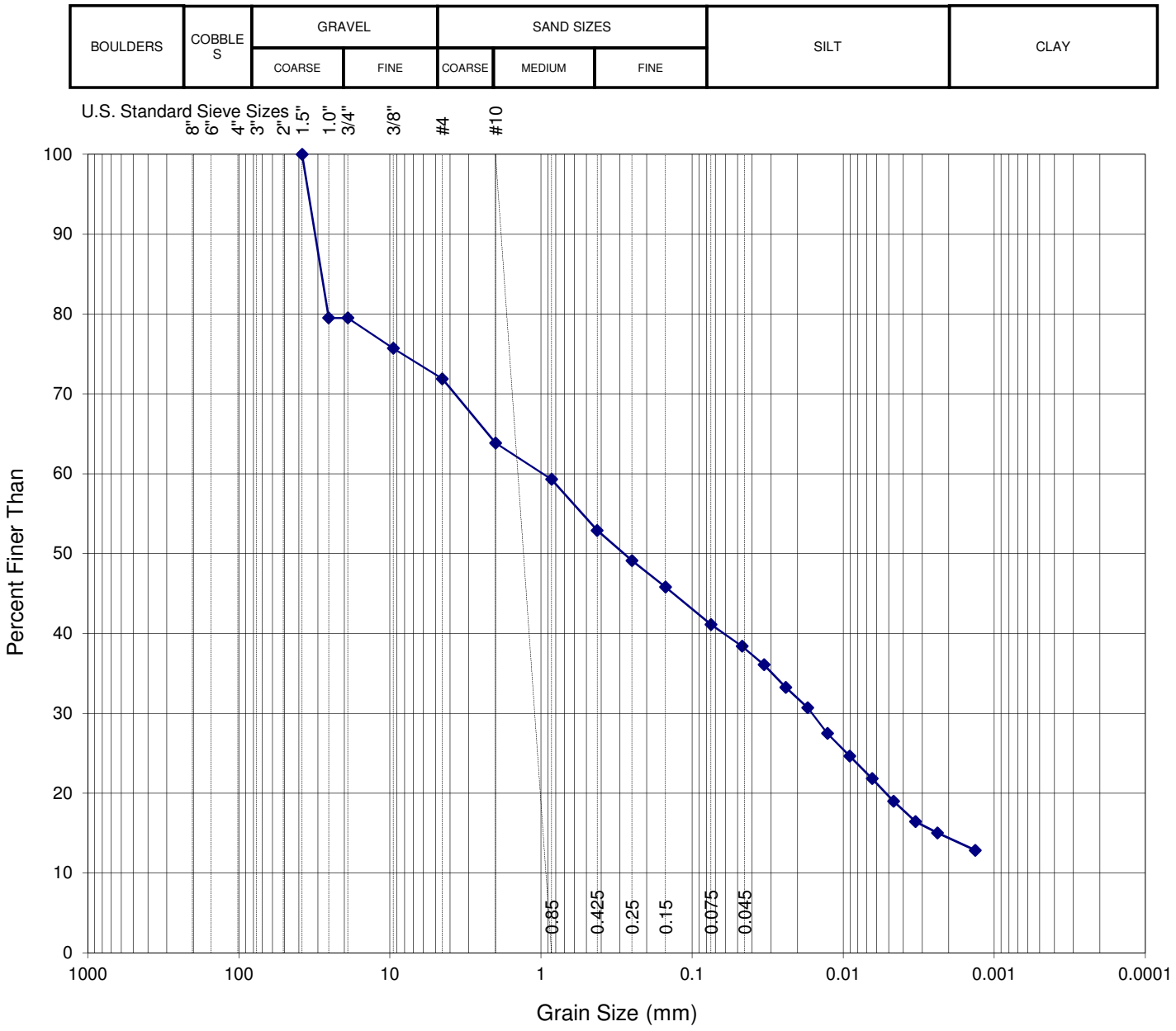
**Residual moisture - does not include air dry moisture.

ALS Laboratory Group

819-58th Street, Saskatoon,SK

PARTICLE SIZE DISTRIBUTION CURVE

Client Name:	CH2M HILL, INC
Project Number:	CHM400-CHM200-VA
Client Sample ID	CH13-311-TP021_SOA
Lab Sample ID	L1359691-3
Date Sample Received	09-Sep-13
Test Completion Date:	23-Sep-13
Analyst:	HSL



METHOD DESCRIPTION

Method Reference: ASTM D 422 - 63 (2002)

Dispersion method: Mechanical

Dispesion period: 1 minute cm/s

Soil classification system used: Unified Soil Classification

DESCRIPTION OF SAND AND GRAVEL PARTICLES

Shape: Angular

Hardness: Hard

SUMMARY OF RESULTS

GRAIN SIZE	WT %	DIA. RANGE (mm)
% GRAVEL :	28.12	> 4.5
% COARSE SAND :	8.03	2.0 - 4.5
% MEDIUM SAND :	10.95	0.425 - 2.0
% FINE SAND :	11.76	0.075 - 0.425
% SILT :	26.76	0.075 - 0.002
% CLAY :	14.37	< 0.002

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 18- SEP- 2013
Account: APN

CERTIFICATE VA13165280

Project: L1359691

P.O. No.: L1359691

This report is for 3 Soil samples submitted to our lab in Vancouver, BC, Canada on 11- SEP- 2013.

The following have access to data associated with this certificate:

ALSE VANCOUVER WEBTRIEVE	ANDRE LANGLAIS	AMBER SPRINGER

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI- 21	Received Sample Weight
LOG- 22	Sample login - Rcd w/o BarCode
SCR- 41	Screen to - 180um and save both

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME- MS81	Lithium Borate Fusion ICP- MS	ICP- MS
S- GRA06a	Sulfate Sulfur (HCl leachable)	WST- SEQ

To: ALS ENVIRONMENTAL
ATTN: AMBER SPRINGER
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

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

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

Signature:
Colin Ramshaw, Vancouver Laboratory Manager

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
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To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Project: L1359691

CERTIFICATE OF ANALYSIS VA13165280

Sample Description	Method	WEI-21	ME-MS61	S-IR08
	Analyte	Weight	Ba	S
	Units	kg	ppm	%
	LOR	0.02	0.5	0.01
L1359691-1		0.22	1240	<0.01
L1359691-2		0.24	1190	<0.01
L1359691-3		0.34	1235	<0.01

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

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To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 18- SEP- 2013
Account: APN

Project: L1359691

CERTIFICATE OF ANALYSIS VA13165280

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

Applies to Method:			
LOG- 22	ME- MS81	SCR- 41	S- GRA06a
WEI- 21			

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 18- SEP- 2013
Account: APN

QC CERTIFICATE VA13165280

Project: L1359691

P.O. No.: L1359691

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ALSE VANCOUVER WEBTRIEVE	ANDRE LANGLAIS	AMBER SPRINGER

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI- 21	Received Sample Weight
LOG- 22	Sample login - Rcd w/o BarCode
SCR- 41	Screen to - 180um and save both

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ALS CODE	DESCRIPTION	INSTRUMENT
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S- GRA06a	Sulfate Sulfur (HCl leachable)	WST- SEQ

To: ALS ENVIRONMENTAL
ATTN: AMBER SPRINGER
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

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

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

Signature:
Colin Ramshaw, Vancouver Laboratory Manager

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Finalized Date: 18- SEP- 2013
Account: APN

Project: L1359691

QC CERTIFICATE OF ANALYSIS VA13165280

Sample Description	Method	ME- MS61	S- GRA08a
	Analyte	Ba	S
	Units	ppm	%
	LOR	0.5	0.01
STANDARDS			
HV- 2			0.17
Target Range - Lower Bound			0.16
Upper Bound			0.20
OREAS 146		>10000	
Target Range - Lower Bound		11460	
Upper Bound		>>10000	
RTS- 1			1.15
Target Range - Lower Bound			1.14
Upper Bound			1.34
SY- 4		359	
Target Range - Lower Bound		306	
Upper Bound		375	
BLANKS			
BLANK		<0.5	
Target Range - Lower Bound		<0.5	
Upper Bound		1.0	
BLANK			<0.01
Target Range - Lower Bound			<0.01
Upper Bound			0.02
DUPLICATES			
ORIGINAL		117.0	
DUP		116.0	
Target Range - Lower Bound		110.5	
Upper Bound		123.0	
L1359691- 3			<0.01
DUP			<0.01
Target Range - Lower Bound			<0.01
Upper Bound			0.02

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

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: 604 984 0221 Fax: 604 984 0218 www.alsglobal.com

To: ALS ENVIRONMENTAL
100 - 8081 LOUGHEED HWY.
BURNABY BC V5A 1W9

Project: L1359691

QC CERTIFICATE OF ANALYSIS VA13165280

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

Applies to Method:			
LOG- 22	ME- MS81	SCR- 41	S- GRA06a
WEI- 21			

CH2MHILL **CHAIN OF CUSTODY RECORD** *9/8/2013 3:41:45 PM* Page 1 OF 1

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 10 Days
Shipping Date: 9/8/2013
COC Number: ALS09081301

	DATE	TIME	Matrix	(ASTM 2216) Moisture	(CSSS/APHA4500H) 1:1 Paste pH	(DI/EPA600/2-78-054) Acid Soluable Sulfate	(EPA200.0/245.7/SW6020A) Total Metals Table 1	(ModifiedSobek) Mod Neutralization Potential	(SSSA (1996) P455-456) TIC	(SSSA (1996) P995-996) TOC	(SW6020A) Ba(Li) Metaborate	(ASTM 4318) Atterberg limits	(ASTM D422) Gradation	Number of Containers	COMMENTS
Container:				4oz jar	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon		
Preservatives:				4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C		
Filtered:				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Holding Time:				14	28	180	14	28	28	28	14	NA	NA		
CH13-311-TP022_SOa	8/26/2013	17:00	Soil	X	X	X	X	X	X	X	X			4	
CH13-311-TP023_SOa	8/26/2013	16:00	Soil	X	X	X	X	X	X	X	X			4	
Ch13-311-TP021_SOa	8/27/2013	11:00	Soil	X	X	X	X	X	X	X	X	X	X	6	
													TOTAL NUMBER OF CONTAINERS	14	

L1359691-COFC

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		9/6/13 1400
Received by	PR. / 10SEPT	13:25 6.8°C
Relinquished by		
Received by		10:36 9-Sep-13

3.3 °C

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL **CHAIN OF CUSTODY RECORD** *9/8/2013 3:42:23 PM* Page 1 OF 1

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 3 Days
Shipping Date: 9/8/2013
COC Number: ALS09081301R

	Container:	1 Gallon
	Preservatives:	4°C
	Filtered:	NA
	Holding Time:	180

L1359691-COFC

	DATE	TIME	Matrix	(ISO 15178-2000) Total Sulphur	Number of Containers	COMMENTS
CH13-311-TP022_SOa	8/26/2013	17:00	Soil	X	1	RUSH
CH13-311-TP023_SOa	8/26/2013	16:00	Soil	X	1	
Ch13-311-TP021_SOa	8/27/2013	11:00	Soil	X	1	
				TOTAL NUMBER OF CONTAINERS	3	

RUSH

Priority processing

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		9/6/13 1400
Received by		
Relinquished by		
Received by	PR/10SEPT/13:25/6.8°C	

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL **CHAIN OF CUSTODY RECORD** *9/8/2013 3:42:05 PM* Page 1 OF 1

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 10 Days
Shipping Date: 9/8/2013
COC Number: ALS09081301H

				Container:	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon		
				Preservatives:	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C		
				Filtered:	NA	NA	NA	NA	NA	NA	NA	NA		
				Holding Time:	14	14	180	14	14	14	14	14		
	DATE	TIME	Matrix		(DI/ASTMD1498) DI ORP	(DI/E245.7) DI Mercury	(DI/E300) DI Sulphate	(DI/SM2310) DI Acidity	(DI/SM2320) DI Alkalinity	(DI/SM2510) DI Conductivity	(DI/SM4500H) DI pH	(DI/SW6020A) DI Diss Metals	L1359691-COFC	Number of Containers	COMMENTS
CH13-311-TP022_SOa	8/26/2013	17:00	Soil		x	x	x	x	x	x	x	x		3	HOLD
CH13-311-TP023_SOa	8/26/2013	16:00	Soil		x	x	x	x	x	x	x	x		3	
Ch13-311-TP021_SOa	8/27/2013	11:00	Soil		x	x	x	x	x	x	x	x		3	
													TOTAL NUMBER OF CONTAINERS	9	

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		9/8/13 1400
Received by		
Relinquished by		
Received by	P.R.	10 SEPT 13:25 6.8°C

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 09-SEP-13
Report Date: 19-SEP-13 13:31 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1360747

Project P.O. #: 472645.06.AD.01.04.13 PO=604564
Job Reference: BSI NE AREA OF GRUM PIT 2013 311.5C
C of C Numbers: ALS09081303
Legal Site Desc:



Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1360747-1				
	Description					
	Sampled Date	27-AUG-13				
	Sampled Time	11:00				
	Client ID	CH13-311-TP021_SOA				
Grouping	**Analyte**					
SOIL						
Anions and Nutrients	Total Nitrogen by LECO (%)	0.035				
Plant Available Nutrients	Available Ammonium-N (mg/kg)	2.7				
	Calcium (Ca) (meq/100g)	4.07				
	Cation Exchange Capacity (meq/100g)	4.47				
	Magnesium (Mg) (meq/100g)	0.71				
	Available Nitrate-N (mg/kg)	<2.0				
	Potassium (K) (meq/100g)	<0.50				
	Sodium (Na) (meq/100g)	<0.50				
Saturated Paste Extractables	ESP (%)	N/A; Na<DL				
Metals	Phosphorus (P) (mg/kg)	819				

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CAT-XTR-SK	Soil	Ammonium Acetate Extractable Cations	CSSS 19.4 - 1M NH4OAc Extraction @ pH 7

Exchangeable Ca, Mg, Na, and K are extracted from the soil using neutral 1N ammonium acetate, then determined by ICP-OES. This method does not correct for calcium or magnesium extracted from carbonates or free gypsum.

CEC-SK	Soil	Cation Exchange Capacity (NH4OAC Extn)	CSSS(1978) 3.321/Comm Soil Sci 17(7)

Soil exchange sites are saturated with ammonium, then displaced with sodium. Ammonium in the extract is determined colorimetrically.

ETL-ESP-SK	Soil	Exchangeable Sodium Percentage - Calc	Calculation
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.

N-TOT-LECO-SK	Soil	Total Nitrogen by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.

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.

NO3-AVAIL-KCL-SK	Soil	Available Nitrate-N (2N KCl)	CSSS (1993) 4.2, 4.3

Available Nitrate and Nitrite are extracted from the soil using a 2N KCl 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) methods 4.2, 4.3

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

Chain of Custody Numbers:

ALS09081303

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CAT-XTR-SK	**Soil**							
Batch R2695238								
WG1745982-3 IRM		**SAL814**						
Sodium (Na)			107.4		%		70-130	17-SEP-13
Potassium (K)			106.3		%		70-130	17-SEP-13
Calcium (Ca)			107.3		%		70-130	17-SEP-13
Magnesium (Mg)			97.8		%		70-130	17-SEP-13
WG1745982-2 MB								
Sodium (Na)			<0.50		meq/100g		0.5	17-SEP-13
Potassium (K)			<0.50		meq/100g		0.5	17-SEP-13
Calcium (Ca)			<0.50		meq/100g		0.5	17-SEP-13
Magnesium (Mg)			<0.50		meq/100g		0.5	17-SEP-13
CEC-SK	**Soil**							
Batch R2694967								
WG1745987-3 IRM		**SAL814**						
Cation Exchange Capacity			100.6		%		70-130	17-SEP-13
WG1745987-2 MB								
Cation Exchange Capacity			<0.80		meq/100g		0.8	17-SEP-13
MET-200.2-CCMS-VA	**Soil**							
Batch R2694303								
WG1746956-3 CRM		**VA-CANMET-TILL1**						
Phosphorus (P)			96.2		%		70-130	15-SEP-13
WG1746956-1 MB								
Phosphorus (P)			<50		mg/kg		50	15-SEP-13
N-TOT-LECO-SK	**Soil**							
Batch R2694719								
WG1746177-2 IRM		**08-109_SOIL**						
Total Nitrogen by LECO			0.120		%		0.085-0.135	16-SEP-13
WG1746177-3 MB								
Total Nitrogen by LECO			<0.020		%		0.02	16-SEP-13
NH4-AVAIL-SK	**Soil**							
Batch R2694431								
WG1746032-3 IRM		**SAL814**						
Available Ammonium-N			105.0		%		70-130	16-SEP-13
WG1746032-2 MB								
Available Ammonium-N			<1.0		mg/kg		1	16-SEP-13
NO3-AVAIL-KCL-SK	**Soil**							

Quality Control Report

Workorder: L1360747 Report Date: 19-SEP-13

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-AVAIL-KCL-SK	**Soil**							
Batch R2693139								
WG1746082-1 DUP		**L1360747-1**						
Available Nitrate-N		<2.0	<2.0	RPD-NA	mg/kg	N/A	30	13-SEP-13
WG1746082-3 IRM		**SAL814**						
Available Nitrate-N			101.4		%		70-130	13-SEP-13
WG1746082-2 MB								
Available Nitrate-N			<2.0		mg/kg		2	13-SEP-13

Quality Control Report

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
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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.

L1360747

CH2MHILL

CHAIN OF CUSTODY RECORD

9/8/2013 3:42:55 PM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 10 Days
Shipping Date: 9/8/2013
COC Number: ALS09081303

				Container:	1 Gallon	1 Gallon	1 Gallon	1 Gallon		
				Preservatives:	4°C	4°C	4°C	4°C		
				Filtered:	NA	NA	NA	NA		
				Holding Time:	180	28	28	28		
					(CSSS (2008) 18.4_CEC) Cation Exchange Capacity	(CSSS (2008) 6.2) Nh4-N and NO3-N (2N KCL)	(EPA200.2/SW6020A) Total P	(SSSA (1996) P973-974) Total N		
	DATE	TIME	Matrix						Number of Containers	COMMENTS
Ch13-311-TP021_SOa	8/27/2013	11:00	Soil		X	X	X	X	2	
									TOTAL NUMBER OF CONTAINERS	2	

L1360747-COFC

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		9/9/13 1450
Received by		
Relinquished by		
Received by	P.R.	10SEPT/13:25/6.8°C

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 09-SEP-13
Report Date: 04-NOV-13 13:30 (MT)
Version: FINAL REV. 3

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1360748

Project P.O. #: 472645.06.AD.01.04.13 PO=604564
Job Reference: BSI NE AREA OF GRUM PIT 2013 311.5C
C of C Numbers: ALS09081302
Legal Site Desc:

Comments: SMP Buffer pH not required for samples with pH >6.
29-OCT-13: Cation Exchange Capacity has been removed from this data package.

Additional QC data has been included.

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1360748-1				
	Description	Soil				
	Sampled Date	27-AUG-13				
	Sampled Time	11:00				
	Client ID	CH13-311-TP021_SOA				
Grouping	**Analyte**					
SOIL						
Physical Tests	Conductivity (1:2) (dS m-1)	0.18				
	pH (1:2 CaCl2) (pH)	7.38				
Organic / Inorganic Carbon	CaCO3 Equivalent (%)	<0.80				
	Inorganic Carbon (%)	<0.10				
	Total Carbon by Combustion (%)	0.3				
	Total Organic Carbon (%)	0.26				
Plant Available Nutrients	Calcium (Ca) (meq/100g)	7.24				
	Copper (Cu) (mg/kg)	3.95				
	Iron (Fe) (mg/kg)	32.5				
	Magnesium (Mg) (meq/100g)	1.03				
	Manganese (Mn) (mg/kg)	13.9				
	Available Phosphate-P (mg/kg)	7.6				
	Potassium (K) (meq/100g)	<0.50				
	Sodium (Na) (meq/100g)	<0.50				
	Available Sulfate-S (mg/kg)	40.2				
	Zinc (Zn) (mg/kg)	0.50				
Saturated Paste Extractables	SAR (SAR)	0.17				
	Calcium (Ca) (mg/L)	106				
	Chloride (Cl) (mg/L)	15.6				
	Conductivity Sat. Paste (dS m-1)	0.69				
	ESP (%)	N/A; Na<DL				
	Magnesium (Mg) (mg/L)	16.2				
	pH in Saturated Paste (pH)	7.54				
	Potassium (K) (mg/L)	8.0				
	Sodium (Na) (mg/L)	7.2				
	Sulfur (as SO4) (mg/L)	296				

* 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	Calcium (Ca)	DLA	L1360748-1
Duplicate	Magnesium (Mg)	DLA	L1360748-1
Duplicate	Potassium (K)	DLA	L1360748-1
Duplicate	Sodium (Na)	DLA	L1360748-1
Duplicate	Sulfur (as SO4)	DLA	L1360748-1
Internal Reference Material	Calcium (Ca)	DLA	L1360748-1
Internal Reference Material	Magnesium (Mg)	DLA	L1360748-1
Internal Reference Material	Potassium (K)	DLA	L1360748-1
Internal Reference Material	Sodium (Na)	DLA	L1360748-1
Internal Reference Material	Sulfur (as SO4)	DLA	L1360748-1
Internal Reference Material	Calcium (Ca)	DLA	L1360748-1
Internal Reference Material	Magnesium (Mg)	DLA	L1360748-1
Internal Reference Material	Potassium (K)	DLA	L1360748-1
Internal Reference Material	Sodium (Na)	DLA	L1360748-1
Duplicate	Chloride (Cl)	DLA	L1360748-1
Internal Reference Material	Chloride (Cl)	DLA	L1360748-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-INORG-ORG-SK	Soil	Inorganic and Organic Carbon	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
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

C-TOT-LECO-SK	Soil	Total Carbon by combustion method	SSSA (1996) P. 973-974

The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.

CAT-XTR-SK	Soil	Ammonium Acetate Extractable Cations	CSSS 19.4 - 1M NH4OAc Extraction @ pH 7

Exchangeable Ca, Mg, Na, and K are extracted from the soil using neutral 1N ammonium acetate, then determined by ICP-OES. This method does not correct for calcium or magnesium extracted from carbonates or free gypsum.

CEC-SK	Soil	Cation Exchange Capacity (NH4OAC Extn)	CSSS(1978) 3.321/Comm Soil Sci 17(7)

Soil exchange sites are saturated with ammonium, then displaced with sodium. Ammonium in the extract is determined colorimetrically.

CL-SAR-SK	Soil	Chloride (Cl) (Saturated Paste)	CSSS(1993) 18.2.2/APHA 4500-CL E

Chloride in a saturated soil extract is determined colorimetrically by auto-analyzer.

EC-1:2-SK	Soil	EC (1:2 Soil:Water Extraction)	CSSS 18.3.1

1 part dry soil and 2 parts de-ionized water (by volume) is mixed. The slurry is allowed to stand with occasional stirring for 30 - 60 minutes. After equilibration, the conductivity of the filtered extract is measured by a conductivity meter.

ETL-ESP-SK	Soil	Exchangeable Sodium Percentage - Calc	Calculation
METAL-DTPA-SK	Soil	Available Micronutrients (Cu,Fe,Zn,Mn)	CSSS 1993 (11.3 AND 11.4)

Plant available micronutrients are extracted from soil using 0.005 M DTPA. Cu, Fe, Mn and Zn in the extract are determined by ICP-OES.

PH-1:2CACL2-SK	Soil	pH (1:2 Soil:CaCl2 Extraction)	CSSC 3.11

1 part dry soil and 2 parts de-ionized 0.01M CaCl2 (by volume) is mixed. The slurry is allowed to stand with occasional stirring for 30 - 60 minutes. pH of the soil slurry is then measured using a pH meter.

PH-BUFFER-SMP-SK	Soil	Buffer pH (SMP)	CSSS (1993) method 14.2

After equilibration with SMP buffer solution, pH of the soil solution is measured with a pH meter. Lime requirement must be determined by the client using location-specific regression equations.

Reference Information

PO4-AVAIL-OLSEN-SK	Soil	Available Phosphate-P by Olsen	CSSS (1993) 7.2,7.3.1

Plant available phosphorus is extracted from the sample with sodium bicarbonate. PO4-P in the filtered extract is determined colorimetrically at 880 nm.

SAR-CALC-SK	Soil	SAR and Cations in saturated soil	CSSS 18.4-Calculation
SAR-CALC-SO4-SK	Soil	SAR, Cations and SO4 in saturated soil	APHA 3120B

Ca, Mg, Na, K and SO4 in a saturated soil extract are determined by ICP-OES.

SAT/PH/EC-SK	Soil	pH and EC (Saturated Paste)	CSSS 18.2.2/CSSC 3.14/CSSS 18.3.1

pH of a saturated soil paste is measured using a pH meter. After equilibration, an extract is obtained by vacuum filtration with conductivity of the extract measured by a conductivity meter.

SO4-AVAIL-CALPHOS-SK	Soil	Plant Available Sulfate - Ca(H2PO4)2	NCR (1998) p. 36/APHA 3120B

Plant available sulfate is extracted from the sample using dilute calcium phosphate. SO4-S in the filtered extract is determined by ICP-OES.

** 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:

ALS09081302

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-INORG-ORG-SK	**Soil**							
Batch R2694344								
WG1746190-1 DUP		**L1360748-1**						
Inorganic Carbon		<0.10	<0.10	RPD-NA	%	N/A	20	16-SEP-13
CaCO3 Equivalent		<0.80	<0.80	RPD-NA	%	N/A	25	16-SEP-13
WG1746190-2 IRM		**0.1%IC**						
Inorganic Carbon			122.3		%		60-140	16-SEP-13
CaCO3 Equivalent			122.8		%		60-140	16-SEP-13
WG1746190-3 IRM		**0.4%IC**						
Inorganic Carbon			104.7		%		80-120	16-SEP-13
CaCO3 Equivalent			104.9		%		80-120	16-SEP-13
WG1746190-4 MB								
Inorganic Carbon			<0.10		%		0.1	16-SEP-13
CaCO3 Equivalent			<0.80		%		0.8	16-SEP-13
C-TOT-LECO-SK	**Soil**							
Batch R2694719								
WG1746177-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			106.5		%		80-120	16-SEP-13
WG1746177-3 MB								
Total Carbon by Combustion			<0.1		%		0.1	16-SEP-13
CAT-XTR-SK	**Soil**							
Batch R2695238								
WG1745982-3 IRM		**SAL814**						
Sodium (Na)			107.4		%		70-130	17-SEP-13
Potassium (K)			106.3		%		70-130	17-SEP-13
Calcium (Ca)			107.3		%		70-130	17-SEP-13
Magnesium (Mg)			97.8		%		70-130	17-SEP-13
WG1745982-2 MB								
Sodium (Na)			<0.50		meq/100g		0.5	17-SEP-13
Potassium (K)			<0.50		meq/100g		0.5	17-SEP-13
Calcium (Ca)			<0.50		meq/100g		0.5	17-SEP-13
Magnesium (Mg)			<0.50		meq/100g		0.5	17-SEP-13
CL-SAR-SK	**Soil**							
Batch R2695262								
WG1746065-3 IRM		**ED-SAL_NAT1**						
Chloride (Cl)			83.4		%		70-130	17-SEP-13
WG1746065-2 MB								
Chloride (Cl)			<2.0		mg/L		2	17-SEP-13
EC-1:2-SK	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-1:2-SK	**Soil**							
Batch R2692839								
WG1746053-1 DUP		**L1360748-1**						
Conductivity (1:2)		0.18	0.18		dS m-1	1.4	20	13-SEP-13
WG1746053-3 IRM		**SAL814**						
Conductivity (1:2)			83.7		%		80-120	13-SEP-13
WG1746053-2 MB								
Conductivity (1:2)			<0.10		dS m-1		0.1	13-SEP-13
METAL-DTPA-SK	**Soil**							
Batch R2694339								
WG1745966-3 IRM		**11-119**						
Copper (Cu)			85.2		%		70-130	16-SEP-13
Iron (Fe)			95.2		%		70-130	16-SEP-13
Manganese (Mn)			87.4		%		70-130	16-SEP-13
Zinc (Zn)			99.5		%		70-130	16-SEP-13
WG1745966-2 MB								
Copper (Cu)			<0.10		mg/kg		0.1	16-SEP-13
Iron (Fe)			<2.0		mg/kg		2	16-SEP-13
Manganese (Mn)			<0.050		mg/kg		0.05	16-SEP-13
Zinc (Zn)			<0.20		mg/kg		0.2	16-SEP-13
PH-1:2CACL2-SK	**Soil**							
Batch R2692840								
WG1746084-1 DUP		**L1360748-1**						
pH (1:2 CaCl2)		7.38	7.45	J	pH	0.07	0.3	13-SEP-13
WG1746084-2 IRM		**SAL814**						
pH (1:2 CaCl2)			7.76		pH		7.55-8.15	13-SEP-13
PO4-AVAIL-OLSEN-SK	**Soil**							
Batch R2695285								
WG1748237-1 DUP		**L1360748-1**						
Available Phosphate-P		7.6	9.2		mg/kg	19	30	17-SEP-13
WG1748237-3 IRM		**FARM2005**						
Available Phosphate-P			88.6		%		70-130	17-SEP-13
WG1748237-2 MB								
Available Phosphate-P			<1.0		mg/kg		1	17-SEP-13
SAR-CALC-SK	**Soil**							
Batch R2695246								
WG1746065-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			99.3		%		70-130	17-SEP-13
Potassium (K)			107.3		%		70-130	17-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAR-CALC-SK	**Soil**							
Batch R2695246								
WG1746065-3 IRM		**ED-SAL_NAT1**						
Magnesium (Mg)			104.2		%		70-130	17-SEP-13
Sodium (Na)			121.7		%		70-130	17-SEP-13
WG1746065-2 MB								
Calcium (Ca)			<2.0		mg/L		2	17-SEP-13
Potassium (K)			<1.0		mg/L		1	17-SEP-13
Magnesium (Mg)			<2.0		mg/L		2	17-SEP-13
Sodium (Na)			<4.0		mg/L		4	17-SEP-13
SAR-CALC-SO4-SK	**Soil**							
Batch R2695246								
WG1746065-3 IRM		**ED-SAL_NAT1**						
Calcium (Ca)			99.3		%		70-130	17-SEP-13
Potassium (K)			107.3		%		70-130	17-SEP-13
Magnesium (Mg)			104.2		%		70-130	17-SEP-13
Sodium (Na)			121.7		%		70-130	17-SEP-13
Sulfur (as SO4)			108.7		%		70-130	17-SEP-13
WG1746065-2 MB								
Calcium (Ca)			<2.0		mg/L		2	17-SEP-13
Potassium (K)			<1.0		mg/L		1	17-SEP-13
Magnesium (Mg)			<2.0		mg/L		2	17-SEP-13
Sodium (Na)			<4.0		mg/L		4	17-SEP-13
Sulfur (as SO4)			<5.0		mg/L		5	17-SEP-13
SAT/PH/EC-SK	**Soil**							
Batch R2695219								
WG1746065-3 IRM		**ED-SAL_NAT1**						
pH in Saturated Paste			6.94		pH		6.5-7.1	17-SEP-13
Conductivity Sat. Paste			93.3		%		80-120	17-SEP-13
WG1746065-2 MB								
Conductivity Sat. Paste			<0.10		dS m-1		0.1	17-SEP-13
SO4-AVAIL-CALPHOS-SK	**Soil**							
Batch R2692808								
WG1746090-1 DUP		**L1360748-1**						
Available Sulfate-S		40.2	40.6		mg/kg	0.9	40	13-SEP-13
WG1746090-3 IRM		**SAL814**						
Available Sulfate-S			104.6		%		60-140	13-SEP-13
WG1746090-2 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-AVAIL-CALPHOS-SK	**Soil**							
Batch R2692808								
WG1746090-2 MB								
Available Sulfate-S			<3.0		mg/kg		3	13-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.
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
Organic / Inorganic Carbon							
Inorganic and Organic Carbon							
	1	27-AUG-13 11:00	16-SEP-13 00:00	14	20	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 L1360748 were received on 09-SEP-13 10:36.

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.

L1360748

CH2MHILL

CHAIN OF CUSTODY RECORD

9/8/2013 3:42:40 PM

Project Name Faro
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager Heather MacDonald
Sample Manager Charles Shewen

Task Order 311.5C
Project BSI NE AREA OF GRUM PIT 2013
Turnaround Time 10 Days
Shipping Date: 9/8/2013
COC Number: ALS09081302

	DATE	TIME	Matrix	(CSSS (2008) 11.3 and 11.4) Ext Micro Nut (ZnFeCuMn)	(CSSS (2008) 12.2) SMP Buffer pH (for pH<6.0)	(CSSS (2008) 15.2.1 or 14.4.4) Sodium Adsorption Ratio	(CSSS (2008) 15.2.1) ECe (sat paste)	(CSSS (2008) 15.3) Soluable Salts	(CSSS (2008) 18.4) 1N, pH7 NH4OAc ext CaMgKNa	(CSSS (2008) 20.3) CaCO3 equivalent	(CSSS (2008) 7.2 and 7.3.1 if pH>7.2) Available P (pH>7.2)	(CSSS (2008) 16.3 (2008)) pH (1:2 CaCL2) CP17	(S-11.10 in Gavlak et al (2005)) Ca(H2PO4)2.H2O ext SO4-S	(SSSA (1996) p894-895 if pH<7.2) Available P (pH<7.2)		Number of Containers	COMMENTS
Container:				1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon	1 Gallon		
Preservatives:				4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C	4°C		
Filtered:				NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Holding Time:				180	28	28	28	28	180	28	180	180	180	180		
Ch13-311-TP021_SOa	8/27/2013	11:00	Soil	x	x	x	x	x	x	x	x	x	x	x		2	
															TOTAL NUMBER OF CONTAINERS	2	

L1360748-COFC

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		9/8/13
Received by		
Relinquished by		
Received by	PR/10SEPT/13:25/6.8°C	

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
Tar06 PO:604564 Metals Table1 Perform Lab Dup/MS on samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA

Date Received: 16-SEP-13
Report Date: 03-OCT-13 10:48 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1363247

Project P.O. #: 472645.06.AD.01.04.13 "PO:604564"
Job Reference: FARO MINE SEEP SAMPLING 2013 SW-015
C of C Numbers: ALS09151301
Legal Site Desc:

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1363247-1	L1363247-2	L1363247-3	L1363247-4	L1363247-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	14-SEP-13	12-SEP-13	12-SEP-13	12-SEP-13	12-SEP-13
	Sampled Time	14:00	14:00	13:50	15:30	14:45
	Client ID	GP09_SEFL13	CH-FP-38_SEFL13	CH-RCTA-03_SEFL13	CH-RCTA-05_SEFL13	CH-RCTA-07_SEFL13
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	1110	969	1230	271	526
	pH (pH)	8.08	5.47	5.79	8.07	6.17
	Total Suspended Solids (mg/L)	30.8	72.8	163	<1.0	107
	Total Dissolved Solids (mg/L)	1440	1560	3160	289	1090
Anions and Nutrients	Acidity (as CaCO3) (mg/L)		69.9		3.5	
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)			606		153
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	381	8.9	16.3	249	26.2
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<2.0	<2.0	<2.0	<2.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<2.0	<2.0	<2.0	<2.0
	Alkalinity, Total (as CaCO3) (mg/L)	381	8.9	16.3	249	26.2
	Ammonia, Total (as N) (mg/L)	0.0053	0.0422	0.217	<0.0050	0.0177
	Chloride (Cl) (mg/L)	<5.0 DLA	<5.0 DLA	<10 DLA	<0.50	<5.0 DLA
	Fluoride (F) (mg/L)	0.25	0.29	<0.40 DLA	0.263	<0.20 DLA
	Nitrate (as N) (mg/L)	1.07	0.068	<0.10 DLA	0.0666	<0.050 DLA
	Nitrite (as N) (mg/L)	<0.010 DLA	<0.010 DLA	<0.020 DLA	<0.0010	<0.010 DLA
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Sulfate (SO4) (mg/L)	703	995	1890	28.1	645
Cyanides	Cyanide, Free (mg/L)			<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.55	1.01	1.29	2.99	1.31
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)	0.0014	0.0282	0.663	<0.0010	0.352
	Antimony (Sb)-Dissolved (mg/L)	0.00027	<0.00050 DLA	<0.00050 DLA	0.00016	<0.00020 DLA
	Arsenic (As)-Dissolved (mg/L)	0.00055	<0.00050 DLA	0.00124	0.00022	<0.00020 DLA
	Barium (Ba)-Dissolved (mg/L)	0.0177	0.00910	0.0154	0.0873	0.0227
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00050 DLA	<0.00050 DLA	<0.00010	<0.00020 DLA
	Boron (B)-Dissolved (mg/L)	<0.010	<0.050 DLA	<0.050 DLA	<0.010	<0.020 DLA
	Cadmium (Cd)-Dissolved (mg/L)	0.000059	0.0442	0.00226	0.000015	0.00491
	Calcium (Ca)-Dissolved (mg/L)	129	168	408	78.0	174
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00050 DLA	<0.00050 DLA	0.00011	<0.00020 DLA
	Cobalt (Co)-Dissolved (mg/L)	0.00066	0.155	0.185	<0.00010	0.0252
	Copper (Cu)-Dissolved (mg/L)	<0.00020	0.103	0.0049	0.00077	0.00466
	Iron (Fe)-Dissolved (mg/L)	<0.030	6.27	451	<0.030	147
	Ferrous Iron, Dissolved (mg/L)	0.021	6.9	497	<0.020	139
	Lead (Pb)-Dissolved (mg/L)	0.00105	0.0349	0.00303	0.000058	0.00115
	Lithium (Li)-Dissolved (mg/L)	0.0396	0.0592	0.0311	0.00675	0.0129

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1363247-6	L1363247-7	L1363247-8	L1363247-9	L1363247-10
	Description	Water	Water	Water	Water	Water
	Sampled Date	13-SEP-13	13-SEP-13	13-SEP-13	13-SEP-13	13-SEP-13
	Sampled Time	13:00	13:30	11:55	13:05	11:55
	Client ID	A30_SEFL13	CH-FP-42_SEFL13	CH-FP-34_SEFL13	CH-FP-39_SEFL13	CH-FP-934_SEFL13
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	379	70.7	292	254	292
	pH (pH)		7.88	7.49	7.86	7.65
	Total Suspended Solids (mg/L)	15.7	3.9	4.2	<1.0	2.2
	Total Dissolved Solids (mg/L)	892	107	459	382	457
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	149	1.7	25.3	8.0	26.0
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)					
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		60.7	82.1	68.4	83.2
	Alkalinity, Carbonate (as CaCO3) (mg/L)		<2.0	<2.0	<2.0	<2.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)		<2.0	<2.0	<2.0	<2.0
	Alkalinity, Total (as CaCO3) (mg/L)		60.7	82.1	68.4	83.2
	Ammonia, Total (as N) (mg/L)	0.0142	<0.0050	<0.0050	<0.0050	<0.0050
	Chloride (Cl) (mg/L)	<5.0 DLA	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.57	0.300	0.404	0.199	0.406
	Nitrate (as N) (mg/L)	0.266	0.231	0.208	0.161	0.208
	Nitrite (as N) (mg/L)	<0.010 DLA	<0.0010	<0.0010	<0.0010	<0.0010
	Orthophosphate-Dissolved (as P) (mg/L)	0.0029	0.0073	<0.0010	<0.0010	<0.0010
	Sulfate (SO4) (mg/L)	505	27.6	232	191	233
Cyanides	Cyanide, Free (mg/L)					
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.56	0.79	0.72	0.99	0.74
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)	8.53	<0.0010	0.0763	0.0096	0.0619
	Antimony (Sb)-Dissolved (mg/L)	<0.00050 DLA	<0.00010	<0.00020 DLA	<0.00010	<0.00020 DLA
	Arsenic (As)-Dissolved (mg/L)	<0.00050 DLA	0.00012	<0.00020 DLA	0.00011	<0.00020 DLA
	Barium (Ba)-Dissolved (mg/L)	0.0216	0.0193	0.0296	0.0284	0.0279
	Beryllium (Be)-Dissolved (mg/L)	0.00387	<0.00010	0.00052	<0.00010	0.00048
	Boron (B)-Dissolved (mg/L)	<0.050 DLA	<0.010	<0.020 DLA	<0.010	<0.020 DLA
	Cadmium (Cd)-Dissolved (mg/L)	0.0766	<0.000010	0.0282	0.00732	0.0267
	Calcium (Ca)-Dissolved (mg/L)	57.7	21.6	72.5	65.6	73.1
	Chromium (Cr)-Dissolved (mg/L)	0.00423	0.00038	<0.00020 DLA	0.00015	0.00024
	Cobalt (Co)-Dissolved (mg/L)	0.120	<0.00010	0.0298	0.00032	0.0288
	Copper (Cu)-Dissolved (mg/L)	0.880	<0.00020	0.111	0.00241	0.107
	Iron (Fe)-Dissolved (mg/L)	2.08	<0.030	<0.030	<0.030	<0.030
	Ferrous Iron, Dissolved (mg/L)	0.372	<0.020	<0.020	0.024	<0.020
	Lead (Pb)-Dissolved (mg/L)	0.350	0.000051	0.00068	0.00127	0.00038
	Lithium (Li)-Dissolved (mg/L)	0.0388	0.00878	0.0208	0.0239	0.0201

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1363247-11	L1363247-12	L1363247-13	L1363247-14	L1363247-15
	Description	Water	Water	Water	Water	Water
	Sampled Date	13-SEP-13	13-SEP-13	13-SEP-13	13-SEP-13	13-SEP-13
	Sampled Time	17:00	12:00	10:15	15:50	14:05
	Client ID	FP05_SEFL13	GP12_SEFL13	SRK-FD05_SEFL13	SRK-FD18_SEFL13	SRK-FD40_SEFL13
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	764	480	202	92.0	412
	pH (pH)	8.00	6.33	8.04	7.70	
	Total Suspended Solids (mg/L)	104	115	15.5	1.1	12.4
	Total Dissolved Solids (mg/L)	1090	874	205	124	1040
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	8.7		30	30	232
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)		<25			
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	176	24.0	188	77.8	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0	<1.0	<2.0	<2.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0	<1.0	<2.0	<2.0	
	Alkalinity, Total (as CaCO3) (mg/L)	176	24.0	188	77.8	
	Ammonia, Total (as N) (mg/L)	<0.0050	0.287	<0.0050	<0.0050	0.0308
	Chloride (Cl) (mg/L)	<5.0 DLA	<5.0 DLA	<0.50	<0.50	<5.0 DLA
	Fluoride (F) (mg/L)	0.33	0.63	0.273	0.123	0.60
	Nitrate (as N) (mg/L)	10.1	<0.050 DLA	0.0067	0.0531	0.162
	Nitrite (as N) (mg/L)	<0.010 DLA	<0.010 DLA	<0.0010	<0.0010	<0.010 DLA
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	0.0019
	Sulfate (SO4) (mg/L)	573	523	17.7	20.1	647
Cyanides	Cyanide, Free (mg/L)			<0.0050		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	2.57	0.66	1.03	2.74	1.28
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)	0.0022	0.0074	<0.0010	0.0039	10.1
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	0.0112	<0.00010	<0.00010	<0.0010 DLA
	Arsenic (As)-Dissolved (mg/L)	0.00018	0.184	<0.00010	0.00012	<0.0010 DLA
	Barium (Ba)-Dissolved (mg/L)	0.0205	0.0120	0.0918	0.0679	0.0193
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00050 DLA	<0.00010	<0.00010	0.0041
	Boron (B)-Dissolved (mg/L)	<0.010	<0.050 DLA	<0.010	<0.010	<0.10 DLA
	Cadmium (Cd)-Dissolved (mg/L)	0.00322	0.0168	<0.000010	0.000239	0.0854
	Calcium (Ca)-Dissolved (mg/L)	116	111	54.9	28.9	56.9
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00050 DLA	<0.00010	<0.00010	0.0078
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	0.0994	<0.00010	<0.00010	0.186
	Copper (Cu)-Dissolved (mg/L)	0.00152	0.0070	0.00020	0.00306	1.26
	Iron (Fe)-Dissolved (mg/L)	<0.030	53.0	<0.030	<0.030	13.8
	Ferrous Iron, Dissolved (mg/L)	<0.020	44	<0.020	<0.020	1.32
	Lead (Pb)-Dissolved (mg/L)	0.000130	0.00106	<0.000050	0.000954	0.328
	Lithium (Li)-Dissolved (mg/L)	0.0257	0.0145	0.0119	0.00249	0.0378

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1363247-16	L1363247-17	L1363247-18	L1363247-19	L1363247-20
	Description	Water	Water	Water	Water	Water
	Sampled Date	13-SEP-13	14-SEP-13	14-SEP-13	14-SEP-13	14-SEP-13
	Sampled Time	14:05	13:30	12:00	13:30	14:18
	Client ID	SRK-FD940_SEFL13	CH-GP-19_SEFL13	CH-GP-27_SEFL13	CH-GP-919_SEFL13	FP02_SEFL13
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	409	1290	1030	1240	409
	pH (pH)		8.09	8.39	7.96	8.28
	Total Suspended Solids (mg/L)	129	36.1	2.6	31.7	402
	Total Dissolved Solids (mg/L)	1040	1770	1320	1760	449
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	273	10.0			
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)					
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		470	336	476	302
	Alkalinity, Carbonate (as CaCO3) (mg/L)		<1.0	2.4	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)		<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)		470	338	476	302
	Ammonia, Total (as N) (mg/L)	0.0299	0.519	<0.0050	0.479	<0.0050
	Chloride (Cl) (mg/L)	<5.0 DLA	<10 DLA	<5.0 DLA	<10 DLA	<0.50
	Fluoride (F) (mg/L)	0.59	<0.40 DLA	<0.20 DLA	<0.40 DLA	0.548
	Nitrate (as N) (mg/L)	0.157	<0.10 DLA	0.414	<0.10 DLA	0.0496
	Nitrite (as N) (mg/L)	<0.010 DLA	<0.020 DLA	<0.010 DLA	<0.020 DLA	<0.0010
	Orthophosphate-Dissolved (as P) (mg/L)	0.0019	<0.0010	<0.0010	<0.0010	<0.0010
	Sulfate (SO4) (mg/L)	647	868	639	852	122
Cyanides	Cyanide, Free (mg/L)					
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.26	9.99	0.58	10.8	0.92
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)	10.2	0.0148	0.0013	0.0186	0.0030
	Antimony (Sb)-Dissolved (mg/L)	<0.0010 DLA	<0.00050 DLA	0.00358	<0.00050 DLA	<0.00010
	Arsenic (As)-Dissolved (mg/L)	<0.0010 DLA	0.00155	0.00163	0.00181	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0195	0.126	0.0137	0.129	0.0434
	Beryllium (Be)-Dissolved (mg/L)	0.0039	<0.00050 DLA	<0.00010	<0.00050 DLA	<0.00010
	Boron (B)-Dissolved (mg/L)	<0.10 DLA	<0.050 DLA	<0.010	<0.050 DLA	0.010
	Cadmium (Cd)-Dissolved (mg/L)	0.0867	0.000206	0.00151	0.000218	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	55.9	321	127	308	81.9
	Chromium (Cr)-Dissolved (mg/L)	0.0083	<0.00050 DLA	<0.00010	<0.00050 DLA	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	0.189	0.0286	0.00274	0.0295	<0.00010
	Copper (Cu)-Dissolved (mg/L)	1.28	<0.0010 DLA	0.00064	<0.0010 DLA	<0.00020
	Iron (Fe)-Dissolved (mg/L)	13.6	9.34	<0.030	12.4	<0.030
	Ferrous Iron, Dissolved (mg/L)	0.400	6.92	<0.020	13.0	<0.020
	Lead (Pb)-Dissolved (mg/L)	0.329	<0.00025 DLA	0.00384	<0.00025 DLA	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0378	<0.0025 DLA	0.0360	<0.0025 DLA	0.0482

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L1363247-21 Description: Water Sampled Date: 14-SEP-13 Sampled Time: 16:16 Client ID: FP06_SEFL13	Sample ID: L1363247-22 Description: Water Sampled Date: 14-SEP-13 Sampled Time: 15:42 Client ID: FP09_SEFL13	Sample ID: L1363247-23 Description: Water Sampled Date: 14-SEP-13 Sampled Time: 13:01 Client ID: FP12_SEFL13	Sample ID: L1363247-24 Description: Water Sampled Date: 14-SEP-13 Sampled Time: 13:43 Client ID: FP13_SEFL13	Sample ID: L1363247-25 Description: Water Sampled Date: 14-SEP-13 Sampled Time: 12:13 Client ID: FP14_SEFL13
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	231	188	374	216	886
	pH (pH)	8.51	6.48	8.46	8.35	
	Total Suspended Solids (mg/L)	9.9	23.1	14.0	37.6	2.4
	Total Dissolved Solids (mg/L)	244	365	417	222	2990
Anions and Nutrients	Acidity (as CaCO3) (mg/L)		29.6			
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)					1020
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	200	25.1	291	199	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	5.7	<2.0	6.4	<1.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<2.0	<1.0	<1.0	
	Alkalinity, Total (as CaCO3) (mg/L)	206	25.1	297	199	
	Ammonia, Total (as N) (mg/L)	<0.0050	0.0062	<0.0050	<0.0050	<0.0050
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<10 DLA
	Fluoride (F) (mg/L)	0.980	0.348	0.362	0.296	0.51
	Nitrate (as N) (mg/L)	0.0073	0.195	0.0074	0.0091	<0.10 DLA
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.020 DLA
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	0.0171
	Sulfate (SO4) (mg/L)	24.9	198	91.1	23.4	1780
Cyanides	Cyanide, Free (mg/L)					
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	2.32	0.69	0.91	0.85	0.85
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)	0.0023	0.0448	<0.0010	<0.0010	2.60
	Antimony (Sb)-Dissolved (mg/L)	0.00011	<0.00020 DLA	<0.00010	<0.00010	<0.0050 DLA
	Arsenic (As)-Dissolved (mg/L)	0.00036	<0.00020 DLA	<0.00010	<0.00010	0.0078
	Barium (Ba)-Dissolved (mg/L)	0.0298	0.0238	0.0527	0.0927	0.0033
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	0.00032	<0.00010	<0.00010	0.0063
	Boron (B)-Dissolved (mg/L)	<0.010	<0.020 DLA	<0.010	<0.010	<0.50 DLA
	Cadmium (Cd)-Dissolved (mg/L)	0.000025	0.0263	0.00130	0.000022	0.286
	Calcium (Ca)-Dissolved (mg/L)	55.5	37.2	85.1	57.0	134
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	0.00052	<0.00010	<0.00010	<0.0050 DLA
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	0.0422	0.00058	<0.00010	0.370
	Copper (Cu)-Dissolved (mg/L)	0.00110	0.102	0.00060	0.00028	1.53
	Iron (Fe)-Dissolved (mg/L)	<0.030	0.033	<0.030	<0.030	154
	Ferrous Iron, Dissolved (mg/L)	<0.020	0.027	<0.020	<0.020	9.7
	Lead (Pb)-Dissolved (mg/L)	0.000169	0.0131	0.000660	0.000269	1.05
	Lithium (Li)-Dissolved (mg/L)	0.0259	0.0196	0.0391	0.0174	0.043

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1363247-26	L1363247-27	L1363247-28	L1363247-29	L1363247-30
	Description	Water	Water	Water	Water	Water
	Sampled Date	14-SEP-13	14-SEP-13	14-SEP-13	14-SEP-13	14-SEP-13
	Sampled Time	14:54	15:13	09:45	10:45	15:45
	Client ID	FP15_SEFL13	FP16_SEFL13	GP02_SEFL13	GP22_SEFL13	SRK-GD01_SEFL13
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	409	518	681	260	2120
	pH (pH)	8.05		8.26	8.32	7.77
	Total Suspended Solids (mg/L)	1.4	34.4	82.3	20.0	11.0
	Total Dissolved Solids (mg/L)	580	1020	951	352	2990
Anions and Nutrients	Acidity (as CaCO3) (mg/L)		132	<1.0		36.1
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)					
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	79.4		252	148	585
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0		<2.0	<1.0	<20
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0		<2.0	<1.0	<20
	Alkalinity, Total (as CaCO3) (mg/L)	79.4		252	148	585
	Ammonia, Total (as N) (mg/L)	<0.0050	0.0122	0.0054	<0.0050	<0.0050
	Chloride (Cl) (mg/L)	<0.50	<5.0 DLA	<5.0 DLA	<0.50	<10 DLA
	Fluoride (F) (mg/L)	0.329	0.61	<0.20 DLA	0.312	<0.40 DLA
	Nitrate (as N) (mg/L)	0.0141	0.431	0.051	0.0438	5.76
	Nitrite (as N) (mg/L)	<0.0010	<0.010 DLA	<0.010 DLA	<0.0010	<0.020 DLA
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	0.0011	<0.0010
	Sulfate (SO4) (mg/L)	315	621	439	130	1570
Cyanides	Cyanide, Free (mg/L)					<0.0050
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.57	0.88	5.12	0.75	2.71
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)	0.0090	5.09	0.0070	0.0018	<0.0020 DLA
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00050 DLA	0.00014	0.00014	0.00076
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00050 DLA	0.00082	0.00037	0.00268
	Barium (Ba)-Dissolved (mg/L)	0.0125	0.0140	0.110	0.0489	0.0275
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	0.00294	<0.00010	<0.00010	<0.00020 DLA
	Boron (B)-Dissolved (mg/L)	<0.010	<0.050 DLA	<0.010	<0.010	<0.020 DLA
	Cadmium (Cd)-Dissolved (mg/L)	0.00157	0.0683	0.000050	0.000013	0.00106
	Calcium (Ca)-Dissolved (mg/L)	101	94.8	189	74.7	341
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	0.00253	0.00021	0.00012	<0.00020 DLA
	Cobalt (Co)-Dissolved (mg/L)	0.00080	0.0882	0.00010	0.00012	0.00109
	Copper (Cu)-Dissolved (mg/L)	0.00252	0.608	0.00179	0.00025	0.00151
	Iron (Fe)-Dissolved (mg/L)	<0.030	2.79	<0.030	<0.030	<0.030
	Ferrous Iron, Dissolved (mg/L)	<0.020	0.314	<0.020	<0.020	<0.020
	Lead (Pb)-Dissolved (mg/L)	0.00291	0.176	0.000202	<0.000050	0.00106
	Lithium (Li)-Dissolved (mg/L)	0.0250	0.0318	0.00057	0.00499	0.0308

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1363247-31				
	Description					
	Sampled Date	14-SEP-13				
	Sampled Time	15:40				
	Client ID	SRK-GD13_SEFL13				
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	1700				
	pH (pH)	8.14				
	Total Suspended Solids (mg/L)	3.1				
	Total Dissolved Solids (mg/L)	2080				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)					
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)					
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	453				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0				
	Alkalinity, Total (as CaCO3) (mg/L)	453				
	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)	19.8				
	Nitrite (as N) (mg/L)	<0.020 DLA				
	Orthophosphate-Dissolved (as P) (mg/L)	0.0020				
	Sulfate (SO4) (mg/L)	1140				
Cyanides	Cyanide, Free (mg/L)	<0.0050				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	3.73				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	0.0097				
	Antimony (Sb)-Dissolved (mg/L)	0.00041				
	Arsenic (As)-Dissolved (mg/L)	0.00248				
	Barium (Ba)-Dissolved (mg/L)	0.0276				
	Beryllium (Be)-Dissolved (mg/L)	<0.00020 DLA				
	Boron (B)-Dissolved (mg/L)	<0.020 DLA				
	Cadmium (Cd)-Dissolved (mg/L)	0.000089				
	Calcium (Ca)-Dissolved (mg/L)	304				
	Chromium (Cr)-Dissolved (mg/L)	<0.00020 DLA				
	Cobalt (Co)-Dissolved (mg/L)	0.00044				
	Copper (Cu)-Dissolved (mg/L)	0.00145				
	Iron (Fe)-Dissolved (mg/L)	0.035				
	Ferrous Iron, Dissolved (mg/L)	0.042				
	Lead (Pb)-Dissolved (mg/L)	0.00149				
	Lithium (Li)-Dissolved (mg/L)	0.0147				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1363247-1 Water 14-SEP-13 14:00 GP09_SEFL13	L1363247-2 Water 12-SEP-13 14:00 CH-FP-38_SEFL13	L1363247-3 Water 12-SEP-13 13:50 CH-RCTA-03_SEFL13	L1363247-4 Water 12-SEP-13 15:30 CH-RCTA-05_SEFL13	L1363247-5 Water 12-SEP-13 14:45 CH-RCTA-07_SEFL13
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	192	134	52.4	18.6	22.1
	Manganese (Mn)-Dissolved (mg/L)	0.0152	6.32	32.0	0.000514	4.60
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.00145	<0.00025 DLA	<0.00025 DLA	0.000519	<0.00010 DLA
	Nickel (Ni)-Dissolved (mg/L)	0.0205	0.198	0.172	<0.00050	0.0255
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	3.75	4.54	5.33	1.68	3.37
	Selenium (Se)-Dissolved (mg/L)	0.00036	<0.00050 DLA	<0.00050 DLA	0.00065	<0.00020 DLA
	Silicon (Si)-Dissolved (mg/L)	1.58	5.91	10.0	4.59	5.45
	Silicon (as SiO2)-Dissolved (mg/L)	3.38	12.6	21.4	9.81	11.6
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000050 DLA	<0.000050 DLA	<0.000010	<0.000020 DLA
	Sodium (Na)-Dissolved (mg/L)	3.46	4.78	13.6	1.72	3.65
	Strontium (Sr)-Dissolved (mg/L)	0.614	0.464	1.13	0.274	0.579
	Sulfur (S)-Dissolved (mg/L)	230	332	614	9.46	208
	Thallium (Tl)-Dissolved (mg/L)	0.000144	0.00157	0.000117 DLA	<0.000010	0.000049
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.050 DLA	<0.050 DLA	<0.010	<0.020 DLA
	Uranium (U)-Dissolved (mg/L)	0.0243	0.000365	0.00352	0.00302	0.00347
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0050 DLA	<0.0050 DLA	<0.0010	<0.0020 DLA
	Zinc (Zn)-Dissolved (mg/L)	0.0385	35.5	17.9	0.0014	11.8

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1363247-6	L1363247-7	L1363247-8	L1363247-9	L1363247-10
	Description	Water	Water	Water	Water	Water
	Sampled Date	13-SEP-13	13-SEP-13	13-SEP-13	13-SEP-13	13-SEP-13
	Sampled Time	13:00	13:30	11:55	13:05	11:55
	Client ID	A30_SEFL13	CH-FP-42_SEFL13	CH-FP-34_SEFL13	CH-FP-39_SEFL13	CH-FP-934_SEFL13
Grouping	**Analyte**					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	56.9	4.08	26.8	21.9	26.6
	Manganese (Mn)-Dissolved (mg/L)	3.16	0.000102	1.52	0.0178	1.51
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	<0.00025 DLA	0.00100	0.00034	0.000135	0.00032
	Nickel (Ni)-Dissolved (mg/L)	0.146	<0.00050	0.0663	0.0288	0.0649
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	1.67	0.691	1.46	1.28	1.44
	Selenium (Se)-Dissolved (mg/L)	<0.00050 DLA	0.00029	<0.00020 DLA	0.00021	0.00020
	Silicon (Si)-Dissolved (mg/L)	13.2	6.44	9.47	9.20	9.47
	Silicon (as SiO2)-Dissolved (mg/L)	28.3	13.8	20.3	19.7	20.3
	Silver (Ag)-Dissolved (mg/L)	0.000635	<0.000010	<0.000020 DLA	<0.000010	<0.000020 DLA
	Sodium (Na)-Dissolved (mg/L)	3.92	2.49	4.89	4.26	4.57
	Strontium (Sr)-Dissolved (mg/L)	0.253	0.0983	0.247	0.223	0.242
	Sulfur (S)-Dissolved (mg/L)	167	6.27	79.2	64.6	79.3
	Thallium (Tl)-Dissolved (mg/L)	0.000191	<0.000010	<0.000020 DLA	0.000046	<0.000020 DLA
	Titanium (Ti)-Dissolved (mg/L)	<0.050 DLA	<0.010	<0.020 DLA	<0.010	<0.020 DLA
	Uranium (U)-Dissolved (mg/L)	0.00952	0.00228	0.00161	0.00116	0.00141
	Vanadium (V)-Dissolved (mg/L)	<0.0050 DLA	<0.0010	<0.0020 DLA	<0.0010	<0.0020 DLA
	Zinc (Zn)-Dissolved (mg/L)	47.3	<0.0010	16.8	5.79	16.7

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1363247-11 Water 13-SEP-13 17:00 FP05_SEFL13	L1363247-12 Water 13-SEP-13 12:00 GP12_SEFL13	L1363247-13 Water 13-SEP-13 10:15 SRK-FD05_SEFL13	L1363247-14 Water 13-SEP-13 15:50 SRK-FD18_SEFL13	L1363247-15 Water 13-SEP-13 14:05 SRK-FD40_SEFL13
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	115	49.1	15.8	4.83	65.6
	Manganese (Mn)-Dissolved (mg/L)	0.000931	3.78	0.000156	0.00134	4.32
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000130	0.00170	0.000768	0.000826	<0.00050 DLA
	Nickel (Ni)-Dissolved (mg/L)	0.0444	0.0656	<0.00050	0.00063	0.155
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	3.57	1.41	2.04	1.19	1.16
	Selenium (Se)-Dissolved (mg/L)	0.00224	<0.00050 DLA	0.00011	<0.00010	<0.0010 DLA
	Silicon (Si)-Dissolved (mg/L)	5.29	4.67	2.17	6.21	9.48
	Silicon (as SiO2)-Dissolved (mg/L)	11.3	9.99	4.64	13.3	20.3
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000050 DLA	<0.000010	<0.000010	0.00047
	Sodium (Na)-Dissolved (mg/L)	6.12	15.6	2.75	1.98	3.87
	Strontium (Sr)-Dissolved (mg/L)	0.453	0.480	0.595	0.0955	0.257
	Sulfur (S)-Dissolved (mg/L)	181	172	5.99	6.76	215
	Thallium (Tl)-Dissolved (mg/L)	0.000137	0.00391	0.000017	0.000058	0.00048
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.050 DLA	<0.010	<0.010	<0.10 DLA
	Uranium (U)-Dissolved (mg/L)	0.00890	0.00256	0.00136	0.000606	0.00903
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0050 DLA	<0.0010	<0.0010	<0.010 DLA
	Zinc (Zn)-Dissolved (mg/L)	5.64	18.3	<0.0010	0.0899	51.8

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1363247-16	L1363247-17	L1363247-18	L1363247-19	L1363247-20
	Description	Water	Water	Water	Water	Water
	Sampled Date	13-SEP-13	14-SEP-13	14-SEP-13	14-SEP-13	14-SEP-13
	Sampled Time	14:05	13:30	12:00	13:30	14:18
	Client ID	SRK-FD940_SEFL13	CH-GP-19_SEFL13	CH-GP-27_SEFL13	CH-GP-919_SEFL13	FP02_SEFL13
Grouping	**Analyte**					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	65.4	120	172	114	49.5
	Manganese (Mn)-Dissolved (mg/L)	4.27	21.5	0.00673	21.9	0.000249
	Mercury (Hg)-Dissolved (mg/L)	0.000053	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	<0.00050 DLA	0.00207	0.00185	0.00217	0.000940
	Nickel (Ni)-Dissolved (mg/L)	0.154	0.0162	0.0809	0.0153	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	1.19	4.51	3.12	4.20	4.68
	Selenium (Se)-Dissolved (mg/L)	<0.0010 DLA	<0.00050 DLA	0.00032	<0.00050 DLA	0.00019
	Silicon (Si)-Dissolved (mg/L)	9.29	6.18	1.49	6.11	0.999
	Silicon (as SiO2)-Dissolved (mg/L)	19.9	13.2	3.18	13.1	2.14
	Silver (Ag)-Dissolved (mg/L)	0.00051	<0.000050 DLA	<0.000010	<0.000050 DLA	<0.000010
	Sodium (Na)-Dissolved (mg/L)	4.30	18.7	4.09	17.9	20.8
	Strontium (Sr)-Dissolved (mg/L)	0.266	1.08	0.694	1.05	1.88
	Sulfur (S)-Dissolved (mg/L)	212	280	213	263	41.6
	Thallium (Tl)-Dissolved (mg/L)	0.00048	0.000057	0.00137	0.000067	0.000112
	Titanium (Ti)-Dissolved (mg/L)	<0.10 DLA	<0.050 DLA	<0.010	<0.050 DLA	<0.010
	Uranium (U)-Dissolved (mg/L)	0.00898	0.0395	0.0157	0.0420	0.00438
	Vanadium (V)-Dissolved (mg/L)	<0.010 DLA	<0.0050 DLA	<0.0010	<0.0050 DLA	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	52.7	0.0233	2.33	0.0258	0.0017

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1363247-21	L1363247-22	L1363247-23	L1363247-24	L1363247-25
	Description	Water	Water	Water	Water	Water
	Sampled Date	14-SEP-13	14-SEP-13	14-SEP-13	14-SEP-13	14-SEP-13
	Sampled Time	16:16	15:42	13:01	13:43	12:13
	Client ID	FP06_SEFL13	FP09_SEFL13	FP12_SEFL13	FP13_SEFL13	FP14_SEFL13
Grouping	**Analyte**					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	22.4	23.1	39.2	17.8	134
	Manganese (Mn)-Dissolved (mg/L)	0.000614	1.07	0.0385	0.000731	19.0
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	0.000015
	Molybdenum (Mo)-Dissolved (mg/L)	0.00129	0.00047	0.000564	0.000683	<0.0025 DLA
	Nickel (Ni)-Dissolved (mg/L)	0.00101	0.0511	0.00078	<0.00050	0.363
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	2.17	1.07	3.07	2.34	<2.5 DLA
	Selenium (Se)-Dissolved (mg/L)	0.00059	0.00025	0.00013	0.00012	<0.0050 DLA
	Silicon (Si)-Dissolved (mg/L)	5.23	8.46	1.54	2.06	3.86
	Silicon (as SiO2)-Dissolved (mg/L)	11.2	18.1	3.29	4.41	8.26
	Silver (Ag)-Dissolved (mg/L)	<0.000010	0.000118	<0.000010	<0.000010	<0.00050 DLA
	Sodium (Na)-Dissolved (mg/L)	3.20	3.24	5.60	5.93	3.9
	Strontium (Sr)-Dissolved (mg/L)	0.441	0.158	1.58	0.716	0.409
	Sulfur (S)-Dissolved (mg/L)	8.40	65.8	30.5	7.83	568
	Thallium (Tl)-Dissolved (mg/L)	0.000029	0.000058	0.000335	0.000069	0.00804
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.020 DLA	<0.010	<0.010	<0.50 DLA
	Uranium (U)-Dissolved (mg/L)	0.0131	0.000370	0.00348	0.00149	0.0160
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0020 DLA	<0.0010	<0.0010	<0.050 DLA
	Zinc (Zn)-Dissolved (mg/L)	0.0024	16.2	0.985	0.0149	237

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1363247-26 Water 14-SEP-13 14:54 FP15_SEFL13	L1363247-27 Water 14-SEP-13 15:13 FP16_SEFL13	L1363247-28 Water 14-SEP-13 09:45 GP02_SEFL13	L1363247-29 Water 14-SEP-13 10:45 GP22_SEFL13	L1363247-30 Water 14-SEP-13 15:45 SRK-GD01_SEFL13
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	38.1	68.4	50.5	17.9	309
	Manganese (Mn)-Dissolved (mg/L)	0.0114	2.72	0.00598	0.0290	0.0460
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000088	<0.00025 DLA	0.000429	0.000684	0.00083
	Nickel (Ni)-Dissolved (mg/L)	0.00678	0.154	0.00191	0.00134	0.229
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	2.51	1.79	2.17	1.94	6.50
	Selenium (Se)-Dissolved (mg/L)	0.00012	<0.00050 DLA	0.00015	0.00460	0.00056
	Silicon (Si)-Dissolved (mg/L)	4.61	12.1	7.26	5.90	3.85
	Silicon (as SiO2)-Dissolved (mg/L)	9.87	25.9	15.5	12.6	8.24
	Silver (Ag)-Dissolved (mg/L)	<0.000010	0.000171	<0.000010	<0.000010	<0.000020 DLA
	Sodium (Na)-Dissolved (mg/L)	5.22	4.44	14.3	8.63	8.53
	Strontium (Sr)-Dissolved (mg/L)	0.296	0.284	0.701	0.344	1.20
	Sulfur (S)-Dissolved (mg/L)	107	204	142	42.9	496
	Thallium (Tl)-Dissolved (mg/L)	0.000661	0.000170	<0.000010	<0.000010	0.000280
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.050 DLA	<0.010	<0.010	<0.020 DLA
	Uranium (U)-Dissolved (mg/L)	0.000619	0.00461	0.0180	0.0163	0.0457
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0050 DLA	<0.0010	<0.0010	<0.0020 DLA
	Zinc (Zn)-Dissolved (mg/L)	0.813	45.9	0.0106	<0.0010	2.25

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1363247-31				
	Description					
	Sampled Date	14-SEP-13				
	Sampled Time	15:40				
	Client ID	SRK-GD13_SEFL13				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	229				
	Manganese (Mn)-Dissolved (mg/L)	0.0104				
	Mercury (Hg)-Dissolved (mg/L)	<0.000010				
	Molybdenum (Mo)-Dissolved (mg/L)	0.00141				
	Nickel (Ni)-Dissolved (mg/L)	0.0945				
	Phosphorus (P)-Dissolved (mg/L)	<0.30				
	Potassium (K)-Dissolved (mg/L)	3.28				
	Selenium (Se)-Dissolved (mg/L)	0.00248				
	Silicon (Si)-Dissolved (mg/L)	4.80				
	Silicon (as SiO2)-Dissolved (mg/L)	10.3				
	Silver (Ag)-Dissolved (mg/L)	<0.000020 DLA				
	Sodium (Na)-Dissolved (mg/L)	5.57				
	Strontium (Sr)-Dissolved (mg/L)	1.14				
	Sulfur (S)-Dissolved (mg/L)	372				
	Thallium (Tl)-Dissolved (mg/L)	0.000063				
	Titanium (Ti)-Dissolved (mg/L)	<0.020 DLA				
	Uranium (U)-Dissolved (mg/L)	0.0333				
	Vanadium (V)-Dissolved (mg/L)	<0.0020 DLA				
	Zinc (Zn)-Dissolved (mg/L)	0.231				

* 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	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Beryllium (Be)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Boron (B)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Chromium (Cr)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Molybdenum (Mo)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Selenium (Se)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Silver (Ag)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Titanium (Ti)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Vanadium (V)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Antimony (Sb)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Beryllium (Be)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Boron (B)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Chromium (Cr)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Copper (Cu)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Lead (Pb)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Lithium (Li)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Selenium (Se)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Silver (Ag)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Titanium (Ti)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Duplicate	Vanadium (V)-Dissolved	DLA	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Matrix Spike	Dissolved Organic Carbon	MS-B	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19,

Reference Information

	Parameter	Qualifier	Applies to Sample Number(s)
			-2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Matrix Spike	Cadmium (Cd)-Dissolved	MS-B	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Matrix Spike	Copper (Cu)-Dissolved	MS-B	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Matrix Spike	Aluminum (Al)-Dissolved	MS-B	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Matrix Spike	Cadmium (Cd)-Dissolved	MS-B	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Matrix Spike	Copper (Cu)-Dissolved	MS-B	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Matrix Spike	Lead (Pb)-Dissolved	MS-B	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1363247-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -21, -22, -23, -24, -25, -26, -27, -28, -29, -3, -30, -31, -4, -5, -6, -7, -8, -9

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.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-H2O2-MAN-VA	Water	Acidity by Hot Peroxide Manual Titration	APHA - ACIDITY (2310)

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". The procedure involves preliminary sample treatment by the hot peroxide procedure, and Acidity is subsequently determined by potentiometric titration to a specified endpoint (i.e. pH = 8.3).

ACY-MAN-VA	Water	Acidity by Manual Titration	APHA - ACIDITY (2310)

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.

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-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"

Reference Information

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.

ALK-SCR-VA Water Alkalinity by colour or titration EPA 310.2 OR APHA 2320

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
OR
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-DOC-VA Water Dissolved 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)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

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.

FE2-D-COL-VA Water Diss. Ferrous Iron in Water by Colour James W. Ball et al (1999)

This analysis is carried out using procedures adapted from "A New Method for the Direct Determination of Dissolved Iron Concentration in Acid Mine Waters" published by James W. Ball et al (1999). The procedures involves preliminary sample filtration (0.1um filter) and Ferrous Iron is determined using the "FerroZine" colorimteric method.

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).

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

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-VA Water pH by Manual Meter 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-MAN-VA Water pH by Manual Meter 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.

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.

PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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.

SIO2-D-CALC-VA Water Dissolved Silicon (reported as Silica) CALCULATION

Dissolved Silicon (as SiO2) is a calculated parameter. Dissolved Silicon (as SiO2 mg/L) = 2.139 x Dissolved Silicon (mg/L).

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-LOW-VA Water Total Suspended Solids by Grav. (1 mg/L) APHA 2540 Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** 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:

ALS09151301

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-H2O2-MAN-VA	**Water**							
Batch R2704309								
WG1757874-2 CRM		**VA-ACY-M-CONTROL**						
Acidity-Hot Peroxide Treated (as CaCO3)			97.9		%		85-115	30-SEP-13
WG1757874-1 MB								
Acidity-Hot Peroxide Treated (as CaCO3)			<25		mg/L		25	30-SEP-13
Batch R2705166								
WG1758431-2 CRM		**VA-ACY-M-CONTROL**						
Acidity-Hot Peroxide Treated (as CaCO3)			97.9		%		85-115	01-OCT-13
WG1758431-1 MB								
Acidity-Hot Peroxide Treated (as CaCO3)			<25		mg/L		25	01-OCT-13
ACY-MAN-VA	**Water**							
Batch R2696844								
WG1750874-2 CRM		**VA-ACY-M-CONTROL**						
Acidity (as CaCO3)			97.9		%		85-115	19-SEP-13
WG1750874-3 DUP		**L1363247-13**						
Acidity (as CaCO3)		30	30		mg/L	0.0	20	19-SEP-13
WG1750874-1 MB								
Acidity (as CaCO3)			<25		mg/L		25	19-SEP-13
ACY-PCT-VA	**Water**							
Batch R2697555								
WG1750339-9 CRM		**VA-ACY-CONTROL**						
Acidity (as CaCO3)			101.5		%		85-115	19-SEP-13
WG1750339-33 DUP		**L1363247-10**						
Acidity (as CaCO3)		26.0	25.7		mg/L	1.0	20	19-SEP-13
WG1750339-1 MB								
Acidity (as CaCO3)			<1.0		mg/L		1	19-SEP-13
ALK-PCT-VA	**Water**							
Batch R2698704								
WG1751240-9 CRM		**VA-ALK-PCT-CONTROL**						
Alkalinity, Total (as CaCO3)			90.6		%		85-115	20-SEP-13
WG1751240-33 DUP		**L1363247-29**						
Alkalinity, Total (as CaCO3)		148	141		mg/L	4.8	20	20-SEP-13
Alkalinity, Bicarbonate (as CaCO3)		148	141		mg/L	4.8	20	20-SEP-13
Alkalinity, Carbonate (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	25	20-SEP-13
Alkalinity, Hydroxide (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	20-SEP-13
WG1751240-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	20-SEP-13
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	20-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-PCT-VA	**Water**							
Batch R2698704								
WG1751240-1 MB								
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	20-SEP-13
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	20-SEP-13
Batch R2699525								
WG1752582-9 CRM		**VA-ALK-PCT-CONTROL**						
Alkalinity, Total (as CaCO3)			95.4		%		85-115	23-SEP-13
WG1752582-33 DUP		**L1363247-20**						
Alkalinity, Total (as CaCO3)		302	301		mg/L	0.4	20	23-SEP-13
Alkalinity, Bicarbonate (as CaCO3)		302	301		mg/L	0.4	20	23-SEP-13
Alkalinity, Carbonate (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	25	23-SEP-13
Alkalinity, Hydroxide (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	23-SEP-13
WG1752582-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	23-SEP-13
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	23-SEP-13
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	23-SEP-13
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	23-SEP-13
ALK-SCR-VA	**Water**							
Batch R2695832								
WG1749647-2 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			98.8		%		85-115	18-SEP-13
WG1749647-5 CRM		**VA-ALKM-CONTROL**						
Alkalinity, Total (as CaCO3)			102.9		%		85-115	18-SEP-13
WG1749647-6 DUP		**L1363247-31**						
Alkalinity, Total (as CaCO3)		453	451		mg/L	0.4	20	18-SEP-13
WG1749647-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	18-SEP-13
WG1749647-4 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	18-SEP-13
WG1749647-7 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	18-SEP-13
ANIONS-CL-IC-WR	**Water**							
Batch R2698830								
WG1750442-7 DUP		**L1363247-13**						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	16-SEP-13
WG1750442-2 LCS								
Chloride (Cl)			96.7		%		85-115	16-SEP-13
WG1750442-6 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-CL-IC-WR	**Water**							
Batch R2698830								
WG1750442-6 LCS								
Chloride (Cl)			96.5		%		85-115	16-SEP-13
WG1750442-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	16-SEP-13
WG1750442-5 MB								
Chloride (Cl)			<0.50		mg/L		0.5	16-SEP-13
WG1750442-4 MS		**L1363235-18**						
Chloride (Cl)			99.1		%		75-125	16-SEP-13
WG1750442-8 MS		**L1363247-14**						
Chloride (Cl)			98.7		%		75-125	16-SEP-13
ANIONS-F-IC-WR	**Water**							
Batch R2698830								
WG1750442-7 DUP		**L1363247-13**						
Fluoride (F)		0.273	0.272		mg/L	0.4	20	16-SEP-13
WG1750442-2 LCS								
Fluoride (F)			97.5		%		85-115	16-SEP-13
WG1750442-6 LCS								
Fluoride (F)			97.5		%		85-115	16-SEP-13
WG1750442-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	16-SEP-13
WG1750442-5 MB								
Fluoride (F)			<0.020		mg/L		0.02	16-SEP-13
WG1750442-4 MS		**L1363235-18**						
Fluoride (F)			102.9		%		75-125	16-SEP-13
WG1750442-8 MS		**L1363247-14**						
Fluoride (F)			104.1		%		75-125	16-SEP-13
ANIONS-NO2-IC-WR	**Water**							
Batch R2698830								
WG1750442-7 DUP		**L1363247-13**						
Nitrite (as N)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	16-SEP-13
WG1750442-2 LCS								
Nitrite (as N)			97.0		%		85-115	16-SEP-13
WG1750442-6 LCS								
Nitrite (as N)			97.1		%		85-115	16-SEP-13
WG1750442-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	16-SEP-13
WG1750442-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	16-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-NO2-IC-WR	**Water**							
Batch R2698830								
WG1750442-4 MS		**L1363235-18**						
Nitrite (as N)			102.8		%		75-125	16-SEP-13
WG1750442-8 MS		**L1363247-14**						
Nitrite (as N)			102.0		%		75-125	16-SEP-13
ANIONS-NO3-IC-WR	**Water**							
Batch R2698830								
WG1750442-7 DUP		**L1363247-13**						
Nitrate (as N)		0.0067	0.0065		mg/L	3.4	20	16-SEP-13
WG1750442-2 LCS								
Nitrate (as N)			97.2		%		85-115	16-SEP-13
WG1750442-6 LCS								
Nitrate (as N)			97.2		%		85-115	16-SEP-13
WG1750442-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	16-SEP-13
WG1750442-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	16-SEP-13
WG1750442-4 MS		**L1363235-18**						
Nitrate (as N)			99.4		%		75-125	16-SEP-13
WG1750442-8 MS		**L1363247-14**						
Nitrate (as N)			98.0		%		75-125	16-SEP-13
ANIONS-SO4-IC-WR	**Water**							
Batch R2698830								
WG1750442-7 DUP		**L1363247-13**						
Sulfate (SO4)		17.7	17.7		mg/L	0.0	20	16-SEP-13
WG1750442-2 LCS								
Sulfate (SO4)			96.7		%		85-115	16-SEP-13
WG1750442-6 LCS								
Sulfate (SO4)			96.4		%		85-115	16-SEP-13
WG1750442-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	16-SEP-13
WG1750442-5 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	16-SEP-13
WG1750442-4 MS		**L1363235-18**						
Sulfate (SO4)			N/A	MS-B	%		-	16-SEP-13
WG1750442-8 MS		**L1363247-14**						
Sulfate (SO4)			94.7		%		75-125	16-SEP-13
CARBONS-DOC-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CARBONS-DOC-VA	**Water**							
Batch R2696568								
WG1749473-1 DUP		**L1363247-7**						
Dissolved Organic Carbon		0.79	0.71		mg/L	11	20	18-SEP-13
WG1749473-2 DUP		**L1363247-12**						
Dissolved Organic Carbon		0.66	0.69		mg/L	4.6	20	18-SEP-13
WG1749473-5 LCS								
Dissolved Organic Carbon			95.8		%		80-120	18-SEP-13
WG1749473-4 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	18-SEP-13
WG1749473-3 MS		**L1363247-17**						
Dissolved Organic Carbon			N/A	MS-B	%		-	18-SEP-13
Batch R2696569								
WG1749478-1 DUP		**L1363247-23**						
Dissolved Organic Carbon		0.91	0.86		mg/L	5.1	20	18-SEP-13
WG1749478-4 LCS								
Dissolved Organic Carbon			93.6		%		80-120	18-SEP-13
WG1749478-3 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	18-SEP-13
WG1749478-2 MS		**L1363288-4**						
Dissolved Organic Carbon			98.7		%		70-130	18-SEP-13
CN-FREE-CFA-VA	**Water**							
Batch R2699516								
WG1752995-3 DUP		**L1363247-31**						
Cyanide, Free		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	23-SEP-13
WG1752995-2 LCS								
Cyanide, Free			100.8		%		80-120	23-SEP-13
WG1752995-1 MB								
Cyanide, Free			<0.0050		mg/L		0.005	23-SEP-13
WG1752995-4 MS		**L1363247-31**						
Cyanide, Free			104.3		%		70-130	23-SEP-13
FE2-D-COL-VA	**Water**							
Batch R2700072								
WG1750906-3 DUP		**L1363247-1**						
Ferrous Iron, Dissolved		0.021	0.021		mg/L	1.0	20	19-SEP-13
WG1750906-2 LCS								
Ferrous Iron, Dissolved			103.5		%		80-120	19-SEP-13
WG1750906-6 LCS								
Ferrous Iron, Dissolved			113.5		%		80-120	19-SEP-13
WG1750906-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FE2-D-COL-VA	**Water**							
Batch R2700072								
WG1750906-1 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	19-SEP-13
WG1750906-5 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	19-SEP-13
WG1750906-4 MS		**L1363247-1**						
Ferrous Iron, Dissolved			102.2		%		70-130	19-SEP-13
WG1750906-7 MS		**L1363288-4**						
Ferrous Iron, Dissolved			97.7		%		70-130	20-SEP-13
Batch R2700129								
WG1751889-2 LCS								
Ferrous Iron, Dissolved			100.3		%		80-120	20-SEP-13
WG1751889-6 LCS								
Ferrous Iron, Dissolved			99.0		%		80-120	20-SEP-13
WG1751889-1 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	20-SEP-13
WG1751889-5 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	20-SEP-13
WG1751889-4 MS		**L1363235-17**						
Ferrous Iron, Dissolved			95.8		%		70-130	20-SEP-13
WG1751889-8 MS		**L1364160-9**						
Ferrous Iron, Dissolved			98.5		%		70-130	20-SEP-13
Batch R2706594								
WG1759471-2 LCS								
Ferrous Iron, Dissolved			102.2		%		80-120	02-OCT-13
WG1759471-1 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	02-OCT-13
WG1759471-3 MS		**L1363247-10**						
Ferrous Iron, Dissolved			96.3		%		70-130	02-OCT-13
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2696881								
WG1750101-2 LCS								
Mercury (Hg)-Dissolved			95.2		%		80-120	19-SEP-13
Batch R2697527								
WG1750101-3 DUP		**L1363247-5**						
Mercury (Hg)-Dissolved		0.000010	0.000010		mg/L	1.4	20	19-SEP-13
WG1750101-6 DUP		**L1363247-19**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	19-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2697527								
WG1750101-4 MS		**L1363247-11**						
Mercury (Hg)-Dissolved			81.6		%		70-130	19-SEP-13
WG1750101-5 MS		**L1363247-25**						
Mercury (Hg)-Dissolved			85.5		%		70-130	19-SEP-13
Batch R2700321								
WG1750101-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	24-SEP-13
MET-D-CCMS-VA	**Water**							
Batch R2697492								
WG1751097-5 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Dissolved			97.9		%		80-120	19-SEP-13
Antimony (Sb)-Dissolved			96.7		%		80-120	19-SEP-13
Arsenic (As)-Dissolved			97.8		%		80-120	19-SEP-13
Barium (Ba)-Dissolved			95.3		%		80-120	19-SEP-13
Beryllium (Be)-Dissolved			95.8		%		80-120	19-SEP-13
Boron (B)-Dissolved			88.7		%		80-120	19-SEP-13
Cadmium (Cd)-Dissolved			95.4		%		80-120	19-SEP-13
Chromium (Cr)-Dissolved			97.3		%		80-120	19-SEP-13
Cobalt (Co)-Dissolved			95.8		%		80-120	19-SEP-13
Copper (Cu)-Dissolved			94.1		%		80-120	19-SEP-13
Lead (Pb)-Dissolved			97.7		%		80-120	19-SEP-13
Lithium (Li)-Dissolved			94.8		%		80-120	19-SEP-13
Manganese (Mn)-Dissolved			98.1		%		80-120	19-SEP-13
Molybdenum (Mo)-Dissolved			95.6		%		80-120	19-SEP-13
Nickel (Ni)-Dissolved			95.7		%		80-120	19-SEP-13
Potassium (K)-Dissolved			98.1		%		80-120	19-SEP-13
Selenium (Se)-Dissolved			98.7		%		80-120	19-SEP-13
Silver (Ag)-Dissolved			96.0		%		80-120	19-SEP-13
Sodium (Na)-Dissolved			101.4		%		80-120	19-SEP-13
Strontium (Sr)-Dissolved			95.2		%		80-120	19-SEP-13
Thallium (Tl)-Dissolved			97.1		%		80-120	19-SEP-13
Titanium (Ti)-Dissolved			95.0		%		80-120	19-SEP-13
Uranium (U)-Dissolved			98.8		%		80-120	19-SEP-13
Vanadium (V)-Dissolved			97.6		%		80-120	19-SEP-13
Zinc (Zn)-Dissolved			96.2		%		80-120	19-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2697846								
WG1751097-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	19-SEP-13
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-13
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-13
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	19-SEP-13
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-13
Boron (B)-Dissolved			<0.010		mg/L		0.01	19-SEP-13
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	19-SEP-13
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-13
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-13
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	19-SEP-13
Lithium (Li)-Dissolved			<0.00050		mg/L		0.0005	19-SEP-13
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	19-SEP-13
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	19-SEP-13
Potassium (K)-Dissolved			<0.050		mg/L		0.05	19-SEP-13
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-13
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	19-SEP-13
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	19-SEP-13
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	19-SEP-13
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	19-SEP-13
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	19-SEP-13
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	19-SEP-13
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	19-SEP-13
Batch R2698927								
WG1751097-3 DUP		**L1363247-3**						
Aluminum (Al)-Dissolved		0.663	0.698		mg/L	5.1	20	27-SEP-13
Antimony (Sb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-SEP-13
Arsenic (As)-Dissolved		0.00124	0.00133		mg/L	7.0	20	27-SEP-13
Barium (Ba)-Dissolved		0.0154	0.0155		mg/L	0.7	20	27-SEP-13
Beryllium (Be)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-SEP-13
Boron (B)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	27-SEP-13
Cadmium (Cd)-Dissolved		0.00226	0.00228		mg/L	1.0	20	27-SEP-13
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-SEP-13
Cobalt (Co)-Dissolved		0.185	0.192		mg/L	3.5	20	27-SEP-13
Copper (Cu)-Dissolved		0.0049	0.0050		mg/L	3.0	20	27-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2698927								
WG1751097-3 DUP		**L1363247-3**						
Lead (Pb)-Dissolved		0.00303	0.00322		mg/L	6.1	20	27-SEP-13
Lithium (Li)-Dissolved		0.0311	0.0325		mg/L	4.3	20	27-SEP-13
Manganese (Mn)-Dissolved		32.0	33.7		mg/L	5.1	20	27-SEP-13
Molybdenum (Mo)-Dissolved		<0.00025	<0.00025	RPD-NA	mg/L	N/A	20	27-SEP-13
Nickel (Ni)-Dissolved		0.172	0.180		mg/L	4.4	20	27-SEP-13
Potassium (K)-Dissolved		5.33	5.50		mg/L	3.2	20	27-SEP-13
Selenium (Se)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-SEP-13
Silver (Ag)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	27-SEP-13
Sodium (Na)-Dissolved		13.6	13.8		mg/L	1.4	20	27-SEP-13
Strontium (Sr)-Dissolved		1.13	1.18		mg/L	4.2	20	27-SEP-13
Thallium (Tl)-Dissolved		0.000117	0.000126		mg/L	7.6	20	27-SEP-13
Titanium (Ti)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	27-SEP-13
Uranium (U)-Dissolved		0.00352	0.00368		mg/L	4.5	20	27-SEP-13
Vanadium (V)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	27-SEP-13
Zinc (Zn)-Dissolved		17.9	18.3		mg/L	2.3	20	27-SEP-13
WG1751097-7 DUP		**L1363247-19**						
Aluminum (Al)-Dissolved		0.0186	0.0172		mg/L	8.0	20	27-SEP-13
Antimony (Sb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-SEP-13
Arsenic (As)-Dissolved		0.00181	0.00183		mg/L	0.9	20	27-SEP-13
Barium (Ba)-Dissolved		0.129	0.132		mg/L	2.6	20	27-SEP-13
Beryllium (Be)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-SEP-13
Boron (B)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	27-SEP-13
Cadmium (Cd)-Dissolved		0.000218	0.000229		mg/L	5.0	20	27-SEP-13
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-SEP-13
Cobalt (Co)-Dissolved		0.0295	0.0301		mg/L	2.0	20	27-SEP-13
Copper (Cu)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-SEP-13
Lead (Pb)-Dissolved		<0.00025	<0.00025	RPD-NA	mg/L	N/A	20	27-SEP-13
Lithium (Li)-Dissolved		<0.0025	<0.0025	RPD-NA	mg/L	N/A	20	27-SEP-13
Manganese (Mn)-Dissolved		21.9	21.9		mg/L	0.0	20	27-SEP-13
Molybdenum (Mo)-Dissolved		0.00217	0.00231		mg/L	6.2	20	27-SEP-13
Nickel (Ni)-Dissolved		0.0153	0.0154		mg/L	0.6	20	27-SEP-13
Potassium (K)-Dissolved		4.20	4.25		mg/L	1.4	20	27-SEP-13
Selenium (Se)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-SEP-13
Silver (Ag)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	27-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2698927								
WG1751097-7 DUP		**L1363247-19**						
Sodium (Na)-Dissolved		17.9	17.7		mg/L	0.7	20	27-SEP-13
Strontium (Sr)-Dissolved		1.05	1.07		mg/L	2.3	20	27-SEP-13
Thallium (Tl)-Dissolved		0.000067	0.000055		mg/L	19	20	27-SEP-13
Titanium (Ti)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	27-SEP-13
Uranium (U)-Dissolved		0.0420	0.0427		mg/L	1.6	20	27-SEP-13
Vanadium (V)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	27-SEP-13
Zinc (Zn)-Dissolved		0.0258	0.0267		mg/L	3.4	20	27-SEP-13
WG1751097-1 MB								
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	20-SEP-13
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	20-SEP-13
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	20-SEP-13
WG1751097-4 MS		**L1363247-8**						
Aluminum (Al)-Dissolved			95.4		%		70-130	27-SEP-13
Antimony (Sb)-Dissolved			105.7		%		70-130	27-SEP-13
Arsenic (As)-Dissolved			100.5		%		70-130	27-SEP-13
Barium (Ba)-Dissolved			106.6		%		70-130	27-SEP-13
Beryllium (Be)-Dissolved			96.5		%		70-130	27-SEP-13
Boron (B)-Dissolved			96.6		%		70-130	27-SEP-13
Cadmium (Cd)-Dissolved			N/A	MS-B	%		-	27-SEP-13
Chromium (Cr)-Dissolved			101.5		%		70-130	27-SEP-13
Cobalt (Co)-Dissolved			101.8		%		70-130	27-SEP-13
Copper (Cu)-Dissolved			N/A	MS-B	%		-	27-SEP-13
Lead (Pb)-Dissolved			99.7		%		70-130	27-SEP-13
Lithium (Li)-Dissolved			102.7		%		70-130	27-SEP-13
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	27-SEP-13
Molybdenum (Mo)-Dissolved			100.8		%		70-130	27-SEP-13
Nickel (Ni)-Dissolved			102.3		%		70-130	27-SEP-13
Potassium (K)-Dissolved			99.3		%		70-130	27-SEP-13
Selenium (Se)-Dissolved			103.0		%		70-130	27-SEP-13
Silver (Ag)-Dissolved			101.2		%		70-130	27-SEP-13
Sodium (Na)-Dissolved			N/A	MS-B	%		-	27-SEP-13
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	27-SEP-13
Thallium (Tl)-Dissolved			99.8		%		70-130	27-SEP-13
Titanium (Ti)-Dissolved			102.9		%		70-130	27-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2698927								
WG1751097-4 MS		**L1363247-8**						
Uranium (U)-Dissolved			101.1		%		70-130	27-SEP-13
Vanadium (V)-Dissolved			102.5		%		70-130	27-SEP-13
Zinc (Zn)-Dissolved			N/A	MS-B	%		-	27-SEP-13
WG1751097-6 MS		**L1363247-27**						
Aluminum (Al)-Dissolved			N/A	MS-B	%		-	27-SEP-13
Antimony (Sb)-Dissolved			96.5		%		70-130	27-SEP-13
Arsenic (As)-Dissolved			94.6		%		70-130	27-SEP-13
Barium (Ba)-Dissolved			97.4		%		70-130	27-SEP-13
Beryllium (Be)-Dissolved			93.9		%		70-130	27-SEP-13
Boron (B)-Dissolved			88.4		%		70-130	27-SEP-13
Cadmium (Cd)-Dissolved			N/A	MS-B	%		-	27-SEP-13
Chromium (Cr)-Dissolved			94.8		%		70-130	27-SEP-13
Cobalt (Co)-Dissolved			92.5		%		70-130	27-SEP-13
Copper (Cu)-Dissolved			N/A	MS-B	%		-	27-SEP-13
Lead (Pb)-Dissolved			N/A	MS-B	%		-	27-SEP-13
Lithium (Li)-Dissolved			95.5		%		70-130	27-SEP-13
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	27-SEP-13
Molybdenum (Mo)-Dissolved			95.3		%		70-130	27-SEP-13
Nickel (Ni)-Dissolved			94.8		%		70-130	27-SEP-13
Potassium (K)-Dissolved			91.0		%		70-130	27-SEP-13
Selenium (Se)-Dissolved			96.0		%		70-130	27-SEP-13
Silver (Ag)-Dissolved			94.8		%		70-130	27-SEP-13
Sodium (Na)-Dissolved			90.8		%		70-130	27-SEP-13
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	27-SEP-13
Thallium (Tl)-Dissolved			94.7		%		70-130	27-SEP-13
Titanium (Ti)-Dissolved			97.2		%		70-130	27-SEP-13
Uranium (U)-Dissolved			96.0		%		70-130	27-SEP-13
Vanadium (V)-Dissolved			94.3		%		70-130	27-SEP-13
Zinc (Zn)-Dissolved			N/A	MS-B	%		-	27-SEP-13
MET-DIS-ICP-VA	**Water**							
Batch R2697813								
WG1751097-5 CRM		**VA-HIGH-WATRM**						
Calcium (Ca)-Dissolved			97.1		%		80-120	20-SEP-13
Iron (Fe)-Dissolved			94.1		%		80-120	20-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA	**Water**							
Batch R2697813								
WG1751097-5 CRM		**VA-HIGH-WATRM**						
Magnesium (Mg)-Dissolved			99.3		%		80-120	20-SEP-13
Phosphorus (P)-Dissolved			101.8		%		80-120	20-SEP-13
Silicon (Si)-Dissolved			101.4		%		80-120	20-SEP-13
Batch R2698717								
WG1751097-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	21-SEP-13
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	21-SEP-13
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	21-SEP-13
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	21-SEP-13
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	21-SEP-13
Batch R2702560								
WG1751097-3 DUP		**L1363247-3**						
Calcium (Ca)-Dissolved		408	410		mg/L	0.6	20	26-SEP-13
Iron (Fe)-Dissolved		451	449		mg/L	0.5	20	26-SEP-13
Magnesium (Mg)-Dissolved		52.4	51.9		mg/L	1.1	20	26-SEP-13
Phosphorus (P)-Dissolved		<0.30	<0.30	RPD-NA	mg/L	N/A	20	26-SEP-13
Silicon (Si)-Dissolved		10.0	9.83		mg/L	1.8	20	26-SEP-13
WG1751097-7 DUP		**L1363247-19**						
Calcium (Ca)-Dissolved		308	303		mg/L	1.6	20	26-SEP-13
Iron (Fe)-Dissolved		12.4	12.2		mg/L	1.3	20	26-SEP-13
Magnesium (Mg)-Dissolved		114	112		mg/L	1.8	20	26-SEP-13
Phosphorus (P)-Dissolved		<0.30	<0.30	RPD-NA	mg/L	N/A	20	26-SEP-13
Silicon (Si)-Dissolved		6.11	6.09		mg/L	0.4	20	26-SEP-13
WG1751097-4 MS		**L1363247-8**						
Calcium (Ca)-Dissolved			94.6		%		70-130	26-SEP-13
Iron (Fe)-Dissolved			92.2		%		70-130	26-SEP-13
Magnesium (Mg)-Dissolved			94.8		%		70-130	26-SEP-13
WG1751097-6 MS		**L1363247-27**						
Calcium (Ca)-Dissolved			92.1		%		70-130	26-SEP-13
Iron (Fe)-Dissolved			90.8		%		70-130	26-SEP-13
Magnesium (Mg)-Dissolved			92.5		%		70-130	26-SEP-13
NH3-F-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-F-VA	**Water**							
Batch R2700923								
WG1753159-2 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			103.6		%		85-115	25-SEP-13
WG1753159-3 DUP		**L1363247-13**						
Ammonia, Total (as N)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	25-SEP-13
WG1753159-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	25-SEP-13
WG1753159-4 MS		**L1363247-13**						
Ammonia, Total (as N)			99.5		%		75-125	25-SEP-13
Batch R2700924								
WG1755021-2 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			102.8		%		85-115	25-SEP-13
WG1755021-3 DUP		**L1363247-2**						
Ammonia, Total (as N)		0.0422	0.0415		mg/L	1.6	20	25-SEP-13
WG1755021-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	25-SEP-13
WG1755021-4 MS		**L1363247-2**						
Ammonia, Total (as N)			98.2		%		75-125	25-SEP-13
Batch R2701725								
WG1755573-2 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			98.7		%		85-115	26-SEP-13
WG1755573-3 DUP		**L1363247-18**						
Ammonia, Total (as N)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	26-SEP-13
WG1755573-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	26-SEP-13
WG1755573-4 MS		**L1363247-18**						
Ammonia, Total (as N)			95.0		%		75-125	26-SEP-13
PH-MAN-VA	**Water**							
Batch R2696857								
WG1750907-1 CRM		**VA-PH7-BUF**						
pH			6.99		pH		6.9-7.1	19-SEP-13
WG1750907-2 DUP		**L1363247-13**						
pH		8.04	8.14	J	pH	0.10	0.3	19-SEP-13
PH-PCT-VA	**Water**							
Batch R2696763								
WG1749376-35 CRM		**VA-PH7-BUF**						
pH			7.04		pH		6.9-7.1	18-SEP-13
WG1749376-34 DUP		**L1363247-26**						
pH		8.05	8.02	J	pH	0.03	0.3	18-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-PCT-VA	**Water**							
Batch R2697555								
WG1750339-25 CRM		**VA-PH7-BUF**						
pH			7.01		pH		6.9-7.1	19-SEP-13
WG1750339-33 DUP		**L1363247-10**						
pH		7.65	7.67	J	pH	0.02	0.3	19-SEP-13
Batch R2698704								
WG1751240-25 CRM		**VA-PH7-BUF**						
pH			7.05		pH		6.9-7.1	20-SEP-13
PO4-DO-COL-VA	**Water**							
Batch R2696129								
WG1749229-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			88.0		%		80-120	17-SEP-13
WG1749229-9 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			95.0		%		80-120	17-SEP-13
WG1749229-3 DUP		**L1363247-1**						
Orthophosphate-Dissolved (as P)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	17-SEP-13
WG1749229-5 DUP		**L1363247-23**						
Orthophosphate-Dissolved (as P)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	17-SEP-13
WG1749229-7 DUP		**L1363247-31**						
Orthophosphate-Dissolved (as P)		0.0020	0.0023		mg/L	15	20	17-SEP-13
WG1749229-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	17-SEP-13
WG1749229-8 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	17-SEP-13
WG1749229-4 MS		**L1363247-2**						
Orthophosphate-Dissolved (as P)			86.7		%		70-130	17-SEP-13
WG1749229-6 MS		**L1363247-24**						
Orthophosphate-Dissolved (as P)			96.9		%		70-130	17-SEP-13
S-DIS-ICP-VA	**Water**							
Batch R2697813								
WG1751097-5 CRM		**VA-HIGH-WATRM**						
Sulfur (S)-Dissolved			100.2		%		80-120	20-SEP-13
Batch R2698717								
WG1751097-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	21-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-DIS-ICP-VA	**Water**							
Batch R2702560								
WG1751097-3 DUP		**L1363247-3**						
Sulfur (S)-Dissolved		614	611		mg/L	0.4	20	26-SEP-13
WG1751097-7 DUP		**L1363247-19**						
Sulfur (S)-Dissolved		263	260		mg/L	1.1	20	26-SEP-13
WG1751097-4 MS		**L1363247-8**						
Sulfur (S)-Dissolved			92.9		%		70-130	26-SEP-13
WG1751097-6 MS		**L1363247-27**						
Sulfur (S)-Dissolved			N/A	MS-B	%		-	26-SEP-13
TDS-VA	**Water**							
Batch R2696805								
WG1749280-3 DUP		**L1363247-1**						
Total Dissolved Solids		1440	1460		mg/L	2.0	20	18-SEP-13
WG1749280-6 DUP		**L1363247-25**						
Total Dissolved Solids		2990	3060		mg/L	2.1	20	18-SEP-13
WG1749280-2 LCS								
Total Dissolved Solids			100.9		%		85-115	18-SEP-13
WG1749280-5 LCS								
Total Dissolved Solids			100.2		%		85-115	18-SEP-13
WG1749280-1 MB								
Total Dissolved Solids			<10		mg/L		10	18-SEP-13
WG1749280-4 MB								
Total Dissolved Solids			<10		mg/L		10	18-SEP-13
TSS-LOW-VA	**Water**							
Batch R2695463								
WG1749281-2 LCS								
Total Suspended Solids			86.9		%		85-115	18-SEP-13
WG1749281-4 LCS								
Total Suspended Solids			94.3		%		85-115	18-SEP-13
WG1749281-1 MB								
Total Suspended Solids			<1.0		mg/L		1	18-SEP-13
WG1749281-3 MB								
Total Suspended Solids			<1.0		mg/L		1	18-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.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH by Manual Meter							
	13	13-SEP-13 10:15	19-SEP-13 09:10	0.25	143	hours	EHTR-FM
	14	13-SEP-13 15:50	19-SEP-13 09:10	0.25	137	hours	EHTR-FM
pH by Meter (Automated)							
	1	14-SEP-13 14:00	20-SEP-13 23:00	0.25	153	hours	EHTR-FM
	2	12-SEP-13 14:00	19-SEP-13 23:00	0.25	177	hours	EHTR-FM
	3	12-SEP-13 13:50	19-SEP-13 23:00	0.25	177	hours	EHTR-FM
	4	12-SEP-13 15:30	19-SEP-13 23:00	0.25	175	hours	EHTR-FM
	5	12-SEP-13 14:45	19-SEP-13 23:00	0.25	176	hours	EHTR-FM
	7	13-SEP-13 13:30	19-SEP-13 23:00	0.25	154	hours	EHTR-FM
	8	13-SEP-13 11:55	19-SEP-13 23:00	0.25	155	hours	EHTR-FM
	9	13-SEP-13 13:05	19-SEP-13 23:00	0.25	154	hours	EHTR-FM
	10	13-SEP-13 11:55	19-SEP-13 23:00	0.25	155	hours	EHTR-FM
	11	13-SEP-13 17:00	19-SEP-13 23:00	0.25	150	hours	EHTR-FM
	12	13-SEP-13 12:00	19-SEP-13 23:00	0.25	155	hours	EHTR-FM
	17	14-SEP-13 13:30	19-SEP-13 23:00	0.25	130	hours	EHTR-FM
	18	14-SEP-13 12:00	18-SEP-13 23:00	0.25	107	hours	EHTR-FM
	19	14-SEP-13 13:30	18-SEP-13 23:00	0.25	106	hours	EHTR-FM
	20	14-SEP-13 14:18	18-SEP-13 23:00	0.25	105	hours	EHTR-FM
	21	14-SEP-13 16:16	18-SEP-13 23:00	0.25	103	hours	EHTR-FM
	22	14-SEP-13 15:42	19-SEP-13 23:00	0.25	127	hours	EHTR-FM
	23	14-SEP-13 13:01	18-SEP-13 23:00	0.25	106	hours	EHTR-FM
	24	14-SEP-13 13:43	18-SEP-13 23:00	0.25	105	hours	EHTR-FM
	26	14-SEP-13 14:54	18-SEP-13 23:00	0.25	104	hours	EHTR-FM
	28	14-SEP-13 09:45	19-SEP-13 23:00	0.25	133	hours	EHTR-FM
	29	14-SEP-13 10:45	18-SEP-13 23:00	0.25	108	hours	EHTR-FM
	30	14-SEP-13 15:45	19-SEP-13 23:00	0.25	127	hours	EHTR-FM
	31	14-SEP-13 15:40	18-SEP-13 23:00	0.25	103	hours	EHTR-FM
Anions and Nutrients							
Acidity by Hot Peroxide Manual Titration							
	3	12-SEP-13 13:50	30-SEP-13 09:44	14	18	days	EHT
	5	12-SEP-13 14:45	30-SEP-13 09:44	14	18	days	EHT
	12	13-SEP-13 12:00	30-SEP-13 09:44	14	17	days	EHT
	25	14-SEP-13 12:13	01-OCT-13 02:40	14	17	days	EHT
Diss. Orthophosphate in Water by Colour							
	2	12-SEP-13 14:00	17-SEP-13 18:02	3	5	days	EHTR
	3	12-SEP-13 13:50	17-SEP-13 18:02	3	5	days	EHTR
	4	12-SEP-13 15:30	17-SEP-13 18:02	3	5	days	EHTR
	5	12-SEP-13 14:45	17-SEP-13 18:02	3	5	days	EHTR
	6	13-SEP-13 13:00	17-SEP-13 18:02	3	4	days	EHTL
	7	13-SEP-13 13:30	17-SEP-13 18:02	3	4	days	EHTL
	8	13-SEP-13 11:55	17-SEP-13 18:02	3	4	days	EHTL
	9	13-SEP-13 13:05	17-SEP-13 18:02	3	4	days	EHTL
	10	13-SEP-13 11:55	17-SEP-13 18:02	3	4	days	EHTL
	11	13-SEP-13 17:00	17-SEP-13 22:15	3	4	days	EHTL
	12	13-SEP-13 12:00	17-SEP-13 18:19	3	4	days	EHTL
	13	13-SEP-13 10:15	17-SEP-13 18:19	3	4	days	EHTL
	14	13-SEP-13 15:50	17-SEP-13 18:19	3	4	days	EHTL
	15	13-SEP-13 14:05	17-SEP-13 18:19	3	4	days	EHTL
	16	13-SEP-13 14:05	17-SEP-13 18:19	3	4	days	EHTL
Nitrate Nitrogen by Ion Chromatography							
	2	12-SEP-13 14:00	16-SEP-13 20:23	3	4	days	EHTR
	3	12-SEP-13 13:50	16-SEP-13 20:23	3	4	days	EHTR
	4	12-SEP-13 15:30	16-SEP-13 20:23	3	4	days	EHTR
	5	12-SEP-13 14:45	16-SEP-13 20:23	3	4	days	EHTR
Nitrite Nitrogen by Ion Chromatography							

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Anions and Nutrients							
Nitrite Nitrogen by Ion Chromatography							
	2	12-SEP-13 14:00	16-SEP-13 20:23	3	4	days	EHTR
	3	12-SEP-13 13:50	16-SEP-13 20:23	3	4	days	EHTR
	4	12-SEP-13 15:30	16-SEP-13 20:23	3	4	days	EHTR
	5	12-SEP-13 14:45	16-SEP-13 20:23	3	4	days	EHTR
Dissolved Metals							
Diss. Ferrous Iron in Water by Colour							
	10	13-SEP-13 11:55	02-OCT-13 09:30	7	19	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 L1363247 were received on 16-SEP-13 09:45.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

9/16/2013 11:51:53 AM

L1363247-COFC

Project Name Faro Mine
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-015
Project FARO MINE SEEP SAMPLING 2013
Turnaround Time 10 Days
Shipping Date: 9/15/2013
COC Number: ALS09151301

				Container:	125mL Poly	40ml vial	125ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	250ml Glass	125ml Poly	250ml glass	
				Preservatives:	NaOH, 4°C	HCl, 4°C	HCl, 4°C	4C	4C	4°C	4°C	4°C	4°C	H2SO4, pH<2, 4°C	HNO3, 4°C	H2SO4, pH<2, 4C	
				Filtered:	NA	Field	Field	NA	NA	NA	NA	NA	NA	Field	Field	NA	
				Holding Time:	14	14	180	14	14	7	7	3	3	28	180/28	28	
					Free Cyanide	(E245.7-Diss) Field Filtered Dissolved Hg	(Ferrozine Method) Field Filtered Ferrous Iron	(SM2310) Acidity – Run Hot H2O2 if Fe >15ppm	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM4110B) CL F NO2 NO3 and SO4	(SM4500P) ortho-Phosphate	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered For Metals Analyte List see Table 1	Ammonia (JEM/SM4500NH3) Ammonia	
	DATE	TIME	Matrix														IMENTS
GP09_SEFL13	9/14/2012	14:00	Water		X	X		X	X	X	X	X	X	X	X	X	8
CH-FP-38_SEFL13	9/12/2013	14:00	Water		X	X	X	X	X	X	X	X	X	X	X	X	8
CH-RCTA-03_SEFL13	9/12/2013	13:50	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	9
CH-RCTA-05_SEFL13	9/12/2013	15:30	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	9
CH-RCTA-07_SEFL13	9/12/2013	14:45	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	9
A30_SEFL13	9/13/2013	13:00	Water		X	X	X		X	X	X	X	X	X	X	X	8
CH-FP-30_SEFL13	9/13/2013	13:30	Water		X	X	X	X	X	X	X	X	X	X	X	X	8
CH-FP-34_SEFL13	9/13/2013	11:55	Water		X	X	X	X	X	X	X	X	X	X	X	X	8
CH-FP-39_SEFL13	9/13/2013	13:05	Water		X	X	X	X	X	X	X	X	X	X	X	X	8
CH-FP-934_SEFL13	9/13/2013	11:55	Water		X	X	X	X	X	X	X	X	X	X	X	X	8
FP05_SEFL13	9/13/2013	17:00	Water		X	X	X	X	X	X	X	X	X	X	X	X	8
GP12_SEFL13	9/13/2013	12:00	Water		X	X	X	X	X	X	X	X	X	X	X	X	8
SRK-FD05_SEFL13	9/13/2013	10:15	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	9
SRK-FD18_SEFL13	9/13/2013	15:50	Water		X	X	X	X	X	X	X	X	X	X	X	X	8

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		09/15/13
Received by		
Relinquished by		16-Sep-13 9:45
Received by	0.2, 3.6, 2.1, 4.4	

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:

Sample Custody
and
Amber Springer

Special Instructions:

PO: 604564 on Invoice Perform Lab Dup/MS on these samples

Report Copy to
Bernice Kidd
(530) 229-3203

Project Name Faro Mine
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-015
Project FARO MINE SEEP SAMPLING 2013
Turnaround Time 10 Days
Shipping Date: 9/15/2013
COC Number: ALS09151301

				Container:	125mL Poly	40ml vial	125ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	250ml Glass	125ml Poly	250ml glass		Number of Containers	COMMENTS
				Preservatives:	NaOH, 4°C	HCl, 4°C	HCl, 4°C	4C	4C	4°C	4°C	4°C	4°C	H2SO4, pH<2, 4°C	HNO3, 4°C	H2SO4, pH<2, 4C			
				Filtered:	NA	Field	Field	NA	NA	NA	NA	NA	NA	Field	Field	NA			
				Holding Time:	14	14	180	14	14	7	7	3	3	28	180/28	28			
	DATE	TIME	Matrix		Free Cyanide	(E245.7-Diss) Field Filtered Dissolved Hg	(Ferrozine Method) Field Filtered Ferrous Iron	(SM2310) Acidity – Run Hot H2O2 if Fe >15ppm	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM4110B) CL F NO2 NO3 and SO4	(SM4500P) ortho-Phosphate	(SM5310) Field Filtered DOC	(SW6C10B/SW6020A) Field Filtered For Metals Analyte List see Table 1	Ammonia (JEM/SM4500NH3) Ammonia			
SRK-FD40_SEFL13	9/13/2013	14:05	Water			X	X	X		X	X	X	X	X	X	X		8	
SRK-FD940_SEFL13	9/13/2013	14:05	Water			X	X	X		X	X	X	X	X	X	X		8	
CH-GP-19_SEFL13	9/14/2013	13:30	Water			X	X	X	X	X	X	X	X	X	X	X		8	
CH-GP-27_SEFL13	9/14/2013	12:00	Water			X	X		X	X	X	X	X	X	X	X		8	
CH-GP-919_SEFL13	9/14/2013	13:30	Water			X	X		X	X	X	X	X	X	X	X		8	
FP02_SEFL13	9/14/2013	14:18	Water			X	X		X	X	X	X	X	X	X	X		8	
FP06_SEFL13	9/14/2013	16:16	Water			X	X		X	X	X	X	X	X	X	X		8	
FP09_SEFL13	9/14/2013	15:42	Water			X	X	X	X	X	X	X	X	X	X	X		8	
FP12_SEFL13	9/14/2013	13:01	Water			X	X		X	X	X	X	X	X	X	X		8	
FP13_SEFL13	9/14/2013	13:43	Water			X	X		X	X	X	X	X	X	X	X		8	
FP14_SEFL13	9/14/2013	12:13	Water			X	X	X		X	X	X	X	X	X	X		8	
FP15_SEFL13	9/14/2013	14:54	Water			X	X		X	X	X	X	X	X	X	X		8	
FP16_SEFL13	9/14/2013	15:13	Water			X	X	X		X	X	X	X	X	X	X		8	
GP02_SEFL13	9/14/2013	9:45	Water			X	X	X	X	X	X	X	X	X	X	X		8	

Signatures

Approved by
Sampled by
Relinquished by
Received by
Relinquished by
Received by

Date/Time

09/15/13

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:

Sample Custody
and
Amber Springer

Special Instructions:

PO: 604564 on Invoice Perform Lab Dup/MS on these samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

9/16/2013 11:51:55 AM

Project Name Faro Mine
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-015
Project FARO MINE SEEP SAMPLING 2013
Turnaround Time 10 Days
Shipping Date: 9/15/2013
COC Number: ALS09151301

	Container:	125mL Poly	40ml vial	125ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	250ml Glass	125ml Poly	250ml glass			
	Preservatives:	NaOH, 4°C	HCl, 4°C	HCl, 4°C	4C	4C	4°C	4°C	4°C	4°C	H2SO4, pH<2, 4°C	HNO3, 4°C	H2SO4, pH<2, 4C			
	Filtered:	NA	Field	Field	NA	NA	NA	NA	NA	NA	Field	Field	NA			
	Holding Time:	14	14	180	14	14	7	7	3	3	28	180/28	28			
		Free Cyanide	(E245.7-Diss) Field Filtered Dissolved Hg	(Ferrozine Method) Field Filtered Ferrous Iron	(SM2310) Acidity - Run Hot H2O2 if Fe >15ppm	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM4110B) CL F NO2 NO3 and SO4	(SM4500P) ortho-Phosphate	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered For Metals Analyte List see Table 1	Ammonia (JEM/SM4500NH3) Ammonia			
DATE	TIME	Matrix													Number of Containers	COMMENTS
GP22_SEFL13	9/14/2013	10:45	Water		X	X		X	X	X	X	X	X	X		8	
SRK-GD01_SEFL13	9/14/2013	15:45	Water	X	X	X	X	X	X	X	X	X	X	X		9	
SRK-GD13_SEFL13	9/14/2013	15:40	Water	X	X	X		X	X	X	X	X	X	X		9	
														TOTAL NUMBER OF CONTAINERS		254	

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		09/15/13
Received by		
Relinquished by		
Received by		

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
PO: 604564 on Invoice Perform Lab Dup/MS on these samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 20-SEP-13
Report Date: 11-OCT-13 13:03 (MT)
Version: FINAL REV. 2

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1365908

Project P.O. #: 472645.06.AD.01.04.13 "PO:604564"
Job Reference: FARO MINE SEEP SAMPLING 2013 SW-015
C of C Numbers: ALS09191301
Legal Site Desc:

Comments:

11-OCT-13: Alkalinity data and associated QC has been added for L1365908-5.

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1365908-1 Water 16-SEP-13 08:45 E_015_13_007	L1365908-2 Water 17-SEP-13 11:45 CH-FD72_SEFL13	L1365908-3 Water 17-SEP-13 15:45 CH-FP41_SEFL13	L1365908-4 Water 17-SEP-13 10:00 CH-VP-17_SEFL13	L1365908-5 Water 17-SEP-13 11:00 CH-VP-20_SEFL13
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	<0.50	10100	891	1690	1250
	pH (pH)			5.88		3.88
	Total Suspended Solids (mg/L)		34.9	72.3	97.6	63.4
	Total Dissolved Solids (mg/L)		18600	1490	8960	7060
Anions and Nutrients	Acidity (as CaCO3) (mg/L)			85.4		
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)		2040		3980	3260
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)			7.8		<1.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)			<2.0		<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)			<2.0		<1.0
	Alkalinity, Total (as CaCO3) (mg/L)			7.8		<1.0
	Ammonia, Total (as N) (mg/L)		1.31 DLA	0.0388 DLA	0.271 DLA	0.161 DLA
	Chloride (Cl) (mg/L)		<25	<5.0	<10	<10
	Fluoride (F) (mg/L)		5.9 DLA	0.32	2.49 DLA	1.29 DLA
	Nitrate (as N) (mg/L)		<0.25 DLA	0.087 DLA	<0.10 DLA	<0.10 DLA
	Nitrite (as N) (mg/L)		<0.050	<0.010	<0.020	<0.020
	Orthophosphate-Dissolved (as P) (mg/L)		<0.0010	<0.0010	0.0652	<0.0010
	Sulfate (SO4) (mg/L)		12000 DLM	981	5340	3880
Cyanides	Cyanide, Total (mg/L)		<0.050			
	Cyanide, Free (mg/L)					
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50	9.56	0.90	1.70	1.42
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)	0.0089	21.2 DLA	0.0435 DLA	18.2 DLA	3.89 DLA
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.010	<0.00050 DLA	<0.010	<0.0050
	Arsenic (As)-Dissolved (mg/L)	<0.00010	0.029	<0.00050	1.14	0.0489
	Barium (Ba)-Dissolved (mg/L)	0.000471	0.0328	0.00914 DLA	0.0079 DLA	0.0040 DLA
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	0.012 DLA	<0.00050 DLA	<0.010 DLA	<0.0050 DLA
	Boron (B)-Dissolved (mg/L)	<0.010	<1.0	<0.050	<1.0	<0.50
	Cadmium (Cd)-Dissolved (mg/L)	0.000016	0.399	0.0449	0.756	0.451
	Calcium (Ca)-Dissolved (mg/L)	<0.050	464 DLA	154 DLA	250 DLA	217 DLA
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.010	<0.00050	<0.010	<0.0050
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	3.28	0.153	2.90	2.01
	Copper (Cu)-Dissolved (mg/L)	<0.00020	0.173	0.135	4.91	0.372
	Iron (Fe)-Dissolved (mg/L)	<0.030	126	6.28	1280	1170
	Ferrous Iron, Dissolved (mg/L)	<0.020	146	7.8	479	599
	Lead (Pb)-Dissolved (mg/L)	0.000496	0.0471	0.0507	1.26	1.19

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1365908-6	L1365908-7	L1365908-8	L1365908-9	L1365908-10
Sample ID		L1365908-6	L1365908-7	L1365908-8	L1365908-9	L1365908-10
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		08:45	15:20	12:45	13:40	10:10
Client ID		E_015_13_008	SRK-FD24_SEFL13	SRK-FD30_SEFL13	SRK-FD51_SEFL13	SRK-FD54_SEFL13
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	<0.50	918	1030	299	11000
	pH (pH)			6.74		6.79
	Total Suspended Solids (mg/L)		24.1	20.2	9.9	387
	Total Dissolved Solids (mg/L)		1580	1380	484	21200
Anions and Nutrients	Acidity (as CaCO3) (mg/L)		148	88.0	9.7	1830
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)					
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)			35.6		164
	Alkalinity, Carbonate (as CaCO3) (mg/L)			<2.0		<2.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)			<2.0		<2.0
	Alkalinity, Total (as CaCO3) (mg/L)			35.6		164
	Ammonia, Total (as N) (mg/L)		0.0435	0.0168	<0.0050	1.56
	Chloride (Cl) (mg/L)		<5.0 DLA	<5.0 DLA	0.73	<25 DLA
	Fluoride (F) (mg/L)		0.37	1.34	0.287	1.6
	Nitrate (as N) (mg/L)		0.072	<0.050 DLA	0.161	0.64
	Nitrite (as N) (mg/L)		<0.010 DLA	<0.010 DLA	<0.0010	<0.050 DLA
	Orthophosphate-Dissolved (as P) (mg/L)		<0.0010	<0.0010	<0.0010	0.0021
	Sulfate (SO4) (mg/L)		1060	1190	274	13400
Cyanides	Cyanide, Total (mg/L)					
	Cyanide, Free (mg/L)			<0.0050		<0.050 DLM
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50	1.16	2.24	1.27	15.6
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)	<0.0010	3.69	0.525	0.0514	0.30
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00050 DLA	<0.00050 DLA	<0.00010	<0.020 DLA
	Arsenic (As)-Dissolved (mg/L)	<0.00010	0.00085	0.00132	0.00018	<0.020 DLA
	Barium (Ba)-Dissolved (mg/L)	<0.000050	0.00824	0.0182	0.0190	0.025
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	0.00178	0.00062	<0.00010	<0.020 DLA
	Boron (B)-Dissolved (mg/L)	<0.010	<0.050 DLA	<0.050 DLA	<0.010	<2.0 DLA
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	0.0512	0.00870	0.00718	0.815
	Calcium (Ca)-Dissolved (mg/L)	<0.050	156	131	72.4	503
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	0.00080	0.00104	<0.00010	<0.020 DLA
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	0.180	0.150	0.00644	3.53
	Copper (Cu)-Dissolved (mg/L)	<0.00020	0.401	0.0080	0.0705	<0.040 DLA
	Iron (Fe)-Dissolved (mg/L)	<0.030	10.8	6.48	0.075	<0.15 DLA
	Ferrous Iron, Dissolved (mg/L)	<0.020	13.3	0.371	0.069	<0.20 DLM
	Lead (Pb)-Dissolved (mg/L)	<0.000050	0.724	0.00811	0.0416	<0.010 DLA

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1365908-11 Water 17-SEP-13 11:10 SRK-FD56_SEFL13	L1365908-12 Water 17-SEP-13 15:00 SRK-FD68_SEFL13	L1365908-13 Water 19-SEP-13 12:00 CH-FP-35_SEFL13	L1365908-14 Water 19-SEP-13 11:00 SRK-FD19_SEFL13
WATER					
Physical Tests	Hardness (as CaCO3) (mg/L)	9380	3270	777	5670
	pH (pH)		4.60	4.85	6.81
	Total Suspended Solids (mg/L)	34.1	493	14.4	139
	Total Dissolved Solids (mg/L)	17800	5260	1580	9490
Anions and Nutrients	Acidity (as CaCO3) (mg/L)		214	240	456
	Acidity-Hot Peroxide Treated (as CaCO3) (mg/L)	2350			
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		11.3	5.9	151
	Alkalinity, Carbonate (as CaCO3) (mg/L)		<2.0	<2.0	<2.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)		<2.0	<2.0	<2.0
	Alkalinity, Total (as CaCO3) (mg/L)		11.3	5.9	151
	Ammonia, Total (as N) (mg/L)	1.23	<0.0050	<0.0050	0.141
	Chloride (Cl) (mg/L)	DLA <25	DLA <10	DLA <5.0	DLA <25
	Fluoride (F) (mg/L)	4.8	2.05	1.63	1.0
	Nitrate (as N) (mg/L)	0.57	0.68	0.407	1.62
	Nitrite (as N) (mg/L)	DLA <0.050	DLA <0.020	DLA <0.010	DLA <0.050
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	Sulfate (SO4) (mg/L)	11500	3370	993	6300
Cyanides	Cyanide, Total (mg/L)				
	Cyanide, Free (mg/L)				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	5.57	1.37	0.71	6.28
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	6.10	18.0	7.76	1.96
	Antimony (Sb)-Dissolved (mg/L)	DLA <0.010	DLA <0.00050	DLA <0.0020	DLA <0.0050
	Arsenic (As)-Dissolved (mg/L)	DLA <0.010	0.00291	DLA <0.0020	DLA <0.0050
	Barium (Ba)-Dissolved (mg/L)	0.0213	0.0123	0.0130	0.0427
	Beryllium (Be)-Dissolved (mg/L)	DLA <0.010	0.00636	0.0078	DLA <0.0050
	Boron (B)-Dissolved (mg/L)	DLA <1.0	DLA <0.050	DLA <0.20	DLA <0.50
	Cadmium (Cd)-Dissolved (mg/L)	0.485	0.121	0.164	0.217
	Calcium (Ca)-Dissolved (mg/L)	463	376	139	563
	Chromium (Cr)-Dissolved (mg/L)	DLA <0.010	0.00052	DLA <0.0020	DLA <0.0050
	Cobalt (Co)-Dissolved (mg/L)	2.61	0.191	0.198	0.877
	Copper (Cu)-Dissolved (mg/L)	0.109	1.50	1.12	1.00
	Iron (Fe)-Dissolved (mg/L)	294	0.099	<0.030	1.69
	Ferrous Iron, Dissolved (mg/L)	290	0.158	0.022	1.10
	Lead (Pb)-Dissolved (mg/L)	0.237	0.150	0.0249	0.0026

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1365908-1 Water 16-SEP-13 08:45 E_015_13_007	L1365908-2 Water 17-SEP-13 11:45 CH-FD72_SEFL13	L1365908-3 Water 17-SEP-13 15:45 CH-FP41_SEFL13	L1365908-4 Water 17-SEP-13 10:00 CH-VP-17_SEFL13	L1365908-5 Water 17-SEP-13 11:00 CH-VP-20_SEFL13
WATER						
Dissolved Metals	Lithium (Li)-Dissolved (mg/L)	<0.00050	0.383	0.0574	0.098	0.063
	Magnesium (Mg)-Dissolved (mg/L)	<0.10	2170	123	259	172
	Manganese (Mn)-Dissolved (mg/L)	0.00838	163	6.33	185	141
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000050 DLM
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	<0.0050 DLA	<0.00025 DLA	<0.0050 DLA	<0.0025 DLA
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	4.54	0.188	1.56	0.900
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<1.5 DLA	<0.30	<0.60 DLA	<0.60 DLA
	Potassium (K)-Dissolved (mg/L)	<0.050	16.1	4.43	<5.0 DLA	<2.5 DLA
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.010 DLA	<0.00050 DLA	<0.010 DLA	<0.0050 DLA
	Silicon (Si)-Dissolved (mg/L)	<0.050	11.7	6.07	12.9	9.72
	Silicon (as SiO2)-Dissolved (mg/L)	<0.20	24.9	13.0	27.5	20.8
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.0010 DLA	<0.000050 DLA	<0.0010 DLA	<0.00050 DLA
	Sodium (Na)-Dissolved (mg/L)	<0.050	73.7	4.87	<5.0 DLA	<2.5 DLA
	Strontium (Sr)-Dissolved (mg/L)	<0.00020	2.23	0.475	0.810	0.620
	Sulfur (S)-Dissolved (mg/L)	<0.50	4080	330	1800	1340
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	0.0043	0.00161	0.0041	0.00486
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<1.0 DLA	<0.050 DLA	<1.0 DLA	<0.50 DLA
	Uranium (U)-Dissolved (mg/L)	<0.000010	0.0047	0.000371	0.0261	0.00765
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.10 DLA	<0.0050 DLA	<0.10 DLA	<0.050 DLA
	Zinc (Zn)-Dissolved (mg/L)	0.0325	901	34.8	630	333

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1365908-6 Water 17-SEP-13 08:45 E_015_13_008	L1365908-7 Water 17-SEP-13 15:20 SRK-FD24_SEFL13	L1365908-8 Water 17-SEP-13 12:45 SRK-FD30_SEFL13	L1365908-9 Water 17-SEP-13 13:40 SRK-FD51_SEFL13	L1365908-10 Water 17-SEP-13 10:10 SRK-FD54_SEFL13
WATER						
Dissolved Metals	Lithium (Li)-Dissolved (mg/L)	<0.00050	0.0567	0.105	0.0271	0.22
	Magnesium (Mg)-Dissolved (mg/L)	<0.10	128	171	28.8	2370
	Manganese (Mn)-Dissolved (mg/L)	<0.000050	7.29	8.83	0.0305	322
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	<0.00025 DLA	<0.00025 DLA	<0.000050	<0.010 DLA
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.208	0.381	0.0119	8.00
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<1.5 DLA
	Potassium (K)-Dissolved (mg/L)	<0.050	4.39	6.77	2.55	16
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00050 DLA	<0.00050 DLA	0.00025	<0.020 DLA
	Silicon (Si)-Dissolved (mg/L)	<0.050	6.94	2.78	5.98	18.7
	Silicon (as SiO2)-Dissolved (mg/L)	<0.20	14.8	5.94	12.8	40.0
	Silver (Ag)-Dissolved (mg/L)	<0.000010	0.000073	<0.000050 DLA	0.000059	<0.0020 DLA
	Sodium (Na)-Dissolved (mg/L)	<0.050	4.66	9.25	3.39	34
	Strontium (Sr)-Dissolved (mg/L)	<0.00020	0.455	0.847	0.259	2.34
	Sulfur (S)-Dissolved (mg/L)	<0.50	342	356	91.1	4470
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	0.00176	0.000386	0.000366	<0.0020 DLA
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.050 DLA	<0.050 DLA	<0.010	<2.0 DLA
	Uranium (U)-Dissolved (mg/L)	<0.000010	0.00312	0.000394	0.000138	<0.0020 DLA
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0050 DLA	<0.0050 DLA	<0.0010	<0.20 DLA
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	40.0	32.8	2.18	1280

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1365908-11	L1365908-12	L1365908-13	L1365908-14	
	Description	Water	Water	Water	Water	
	Sampled Date	17-SEP-13	17-SEP-13	19-SEP-13	19-SEP-13	
	Sampled Time	11:10	15:00	12:00	11:00	
	Client ID	SRK-FD56_SEFL13	SRK-FD68_SEFL13	CH-FP-35_SEFL13	SRK-FD19_SEFL13	
Grouping	**Analyte**					
WATER						
Dissolved Metals	Lithium (Li)-Dissolved (mg/L)	0.264	0.0759	0.043	0.069	
	Magnesium (Mg)-Dissolved (mg/L)	2000	565	104	1040	
	Manganese (Mn)-Dissolved (mg/L)	154	5.07	9.41	61.4	
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Molybdenum (Mo)-Dissolved (mg/L)	<0.0050 DLA	<0.00025 DLA	<0.0010 DLA	<0.0025 DLA	
	Nickel (Ni)-Dissolved (mg/L)	3.99	0.492	0.381	1.07	
	Phosphorus (P)-Dissolved (mg/L)	<1.5 DLA	<0.60	<0.30	<0.90	
	Potassium (K)-Dissolved (mg/L)	15.2	11.2	2.7	9.4	
	Selenium (Se)-Dissolved (mg/L)	<0.010 DLA	0.00227	<0.0020 DLA	<0.0050 DLA	
	Silicon (Si)-Dissolved (mg/L)	7.78	6.70	16.8	7.13	
	Silicon (as SiO2)-Dissolved (mg/L)	16.6	14.3	35.9	15.3	
	Silver (Ag)-Dissolved (mg/L)	<0.0010 DLA	0.000064	<0.00020 DLA	<0.00050 DLA	
	Sodium (Na)-Dissolved (mg/L)	81.3	10.2	6.0	20.0	
	Strontium (Sr)-Dissolved (mg/L)	1.79	1.53	0.416	3.14	
	Sulfur (S)-Dissolved (mg/L)	3900	1110	319 DLA	1990 DLA	
	Thallium (Tl)-Dissolved (mg/L)	0.0067	0.000147	<0.00020 DLA	<0.00050 DLA	
	Titanium (Ti)-Dissolved (mg/L)	<1.0 DLA	<0.050 DLA	<0.20 DLA	<0.50 DLA	
	Uranium (U)-Dissolved (mg/L)	0.0485	0.0288	0.00614	0.00968	
	Vanadium (V)-Dissolved (mg/L)	<0.10 DLA	<0.0050 DLA	<0.020 DLA	<0.050 DLA	
	Zinc (Zn)-Dissolved (mg/L)	952	45.4	97.1	257	

* 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	Sulfate (SO4)	MS-B	L1365908-10, -11, -12, -13, -14, -2, -3, -4, -5, -7, -8, -9
Matrix Spike	Dissolved Organic Carbon	MS-B	L1365908-10
Matrix Spike	Cadmium (Cd)-Dissolved	MS-B	L1365908-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Cobalt (Co)-Dissolved	MS-B	L1365908-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Lead (Pb)-Dissolved	MS-B	L1365908-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1365908-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1365908-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1365908-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1365908-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L1365908-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -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**
ACY-H2O2-MAN-VA	Water	Acidity by Hot Peroxide Manual Titration	APHA - ACIDITY (2310)

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". The procedure involves preliminary sample treatment by the hot peroxide procedure, and Acidity is subsequently determined by potentiometric titration to a specified endpoint (i.e. pH = 8.3).

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-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.

ALK-SCR-VA	Water	Alkalinity by colour or titration	EPA 310.2 OR APHA 2320

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
OR
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

Reference Information

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-DOC-VA Water Dissolved 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)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

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-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.

FE2-D-COL-VA Water Diss. Ferrous Iron in Water by Colour James W. Ball et al (1999)

This analysis is carried out using procedures adapted from "A New Method for the Direct Determination of Dissolved Iron Concentration in Acid Mine Waters" published by James W. Ball et al (1999). The procedures involves preliminary sample filtration (0.1um filter) and Ferrous Iron is determined using the "FerroZine" colorimteric method.

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).

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).

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.

Reference Information

PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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.

SIO2-D-CALC-VA	Water	Dissolved Silicon (reported as Silica)	CALCULATION

Dissolved Silicon (as SiO2) is a calculated parameter. Dissolved Silicon (as SiO2 mg/L) = 2.139 x Dissolved Silicon (mg/L).

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-LOW-VA	Water	Total Suspended Solids by Grav. (1 mg/L)	APHA 2540 Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** 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:

ALS09191301

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-H2O2-MAN-VA	**Water**							
Batch R2705166								
WG1758431-2 CRM		**VA-ACY-M-CONTROL**						
Acidity-Hot Peroxide Treated (as CaCO3)			97.9		%		85-115	01-OCT-13
WG1758431-3 DUP		**L1365908-5**						
Acidity-Hot Peroxide Treated (as CaCO3)		3260	3260		mg/L	0.0	20	01-OCT-13
WG1758431-1 MB								
Acidity-Hot Peroxide Treated (as CaCO3)			<25		mg/L		25	01-OCT-13
ACY-PCT-VA	**Water**							
Batch R2702343								
WG1755261-9 CRM		**VA-ACY-CONTROL**						
Acidity (as CaCO3)			104.6		%		85-115	26-SEP-13
WG1755261-33 DUP		**L1365908-7**						
Acidity (as CaCO3)		148	147		mg/L	0.6	20	26-SEP-13
ALK-PCT-VA	**Water**							
Batch R2710452								
WG1761706-34 CRM		**VA-ALK-PCT-CONTROL**						
Alkalinity, Total (as CaCO3)			89.3		%		85-115	04-OCT-13
WG1761706-33 DUP		**L1365908-5**						
Alkalinity, Total (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	04-OCT-13
Alkalinity, Bicarbonate (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	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
WG1761706-1 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
ALK-SCR-VA	**Water**							
Batch R2701963								
WG1755665-2 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			99.8		%		85-115	26-SEP-13
WG1755665-5 CRM		**VA-ALKM-CONTROL**						
Alkalinity, Total (as CaCO3)			97.3		%		85-115	26-SEP-13
WG1755665-3 DUP		**L1365908-12**						
Alkalinity, Total (as CaCO3)		11.3	11.3		mg/L	0.5	20	26-SEP-13
WG1755665-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	26-SEP-13
WG1755665-4 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-SCR-VA	**Water**							
Batch R2701963								
WG1755665-4 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	26-SEP-13
WG1755665-6 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	26-SEP-13
ANIONS-CL-IC-WR	**Water**							
Batch R2700637								
WG1752925-3 DUP		**L1365908-9**						
Chloride (Cl)		0.73	0.74		mg/L	0.6	20	20-SEP-13
WG1752925-2 LCS								
Chloride (Cl)			101.3		%		85-115	20-SEP-13
WG1752925-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	20-SEP-13
WG1752925-4 MS		**L1365908-9**						
Chloride (Cl)			101.2		%		75-125	20-SEP-13
ANIONS-F-IC-WR	**Water**							
Batch R2700637								
WG1752925-3 DUP		**L1365908-9**						
Fluoride (F)		0.287	0.288		mg/L	0.4	20	20-SEP-13
WG1752925-2 LCS								
Fluoride (F)			102.3		%		85-115	20-SEP-13
WG1752925-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	20-SEP-13
WG1752925-4 MS		**L1365908-9**						
Fluoride (F)			100.2		%		75-125	20-SEP-13
ANIONS-NO2-IC-WR	**Water**							
Batch R2700637								
WG1752925-3 DUP		**L1365908-9**						
Nitrite (as N)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-SEP-13
WG1752925-2 LCS								
Nitrite (as N)			100.8		%		85-115	20-SEP-13
WG1752925-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	20-SEP-13
WG1752925-4 MS		**L1365908-9**						
Nitrite (as N)			102.5		%		75-125	20-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 R2700637								
WG1752925-3 DUP		**L1365908-9**						
Nitrate (as N)		0.161	0.160		mg/L	0.1	20	20-SEP-13
WG1752925-2 LCS								
Nitrate (as N)			101.8		%		85-115	20-SEP-13
WG1752925-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	20-SEP-13
WG1752925-4 MS		**L1365908-9**						
Nitrate (as N)			101.0		%		75-125	20-SEP-13
ANIONS-SO4-IC-WR	**Water**							
Batch R2700637								
WG1752925-3 DUP		**L1365908-9**						
Sulfate (SO4)		274	275		mg/L	0.1	20	20-SEP-13
WG1752925-2 LCS								
Sulfate (SO4)			99.5		%		85-115	20-SEP-13
WG1752925-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	20-SEP-13
WG1752925-4 MS		**L1365908-9**						
Sulfate (SO4)			N/A	MS-B	%		-	20-SEP-13
CARBONS-DOC-VA	**Water**							
Batch R2699389								
WG1752767-1 DUP		**L1365908-3**						
Dissolved Organic Carbon		0.90	0.84		mg/L	6.4	20	23-SEP-13
WG1752767-2 DUP		**L1365908-13**						
Dissolved Organic Carbon		0.71	0.84		mg/L	16	20	23-SEP-13
WG1752767-5 LCS								
Dissolved Organic Carbon			92.7		%		80-120	23-SEP-13
WG1752767-4 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	23-SEP-13
WG1752767-3 MS		**L1365983-2**						
Dissolved Organic Carbon			104.1		%		70-130	23-SEP-13
Batch R2701317								
WG1753874-1 DUP		**L1365908-10**						
Dissolved Organic Carbon		15.6	15.3		mg/L	2.2	20	25-SEP-13
WG1753874-4 LCS								
Dissolved Organic Carbon			94.3		%		80-120	25-SEP-13
WG1753874-3 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	25-SEP-13
WG1753874-2 MS		**L1365908-10**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CARBONS-DOC-VA	**Water**							
Batch R2701317								
WG1753874-2 MS		**L1365908-10**						
Dissolved Organic Carbon			N/A	MS-B	%		-	25-SEP-13
CN-FREE-CFA-VA	**Water**							
Batch R2704471								
WG1757843-3 DUP		**L1365908-8**						
Cyanide, Free		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	30-SEP-13
WG1757843-2 LCS								
Cyanide, Free			99.6		%		80-120	30-SEP-13
WG1757843-1 MB								
Cyanide, Free			<0.0050		mg/L		0.005	30-SEP-13
WG1757843-4 MS		**L1365908-8**						
Cyanide, Free			98.5		%		70-130	30-SEP-13
CN-T-CFA-VA	**Water**							
Batch R2705584								
WG1757848-4 DUP		**L1365908-2**						
Cyanide, Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	30-SEP-13
WG1757848-3 IRM		**ALS-TCN-IRM1**						
Cyanide, Total			90.3		%		75-105	30-SEP-13
WG1757848-2 LCS								
Cyanide, Total			103.0		%		80-120	30-SEP-13
WG1757848-1 MB								
Cyanide, Total			<0.0050		mg/L		0.005	30-SEP-13
WG1757848-5 MS		**L1365908-2**						
Cyanide, Total			73.5		%		70-130	30-SEP-13
FE2-D-COL-VA	**Water**							
Batch R2700181								
WG1752303-11 DUP		**L1365908-6**						
Ferrous Iron, Dissolved		<0.020	<0.020	RPD-NA	mg/L	N/A	20	21-SEP-13
WG1752303-10 LCS								
Ferrous Iron, Dissolved			100.9		%		80-120	21-SEP-13
WG1752303-2 LCS								
Ferrous Iron, Dissolved			101.5		%		80-120	21-SEP-13
WG1752303-6 LCS								
Ferrous Iron, Dissolved			102.2		%		80-120	21-SEP-13
WG1752303-1 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	21-SEP-13
WG1752303-5 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FE2-D-COL-VA	**Water**							
Batch R2700181								
WG1752303-5 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	21-SEP-13
WG1752303-9 MB								
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	21-SEP-13
WG1752303-12 MS		**L1365908-6**						
Ferrous Iron, Dissolved			99.6		%		70-130	21-SEP-13
WG1752303-4 MS		**L1364173-2**						
Ferrous Iron, Dissolved			100.8		%		70-130	21-SEP-13
WG1752303-8 MS		**L1364538-7**						
Ferrous Iron, Dissolved			109.5		%		70-130	21-SEP-13
HG-DIS-LOW-CVAFS-VA	**Water**							
Batch R2699917								
WG1753058-3 DUP		**L1365908-6**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	24-SEP-13
WG1753058-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	25-SEP-13
Batch R2700321								
WG1753058-4 MS		**L1365908-5**						
Mercury (Hg)-Dissolved			99.2		%		70-130	24-SEP-13
Batch R2700758								
WG1753058-2 LCS								
Mercury (Hg)-Dissolved			99.5		%		80-120	25-SEP-13
MET-D-CCMS-VA	**Water**							
Batch R2698676								
WG1752263-2 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Dissolved			98.9		%		80-120	21-SEP-13
Antimony (Sb)-Dissolved			99.4		%		80-120	21-SEP-13
Arsenic (As)-Dissolved			96.4		%		80-120	21-SEP-13
Barium (Ba)-Dissolved			96.4		%		80-120	21-SEP-13
Beryllium (Be)-Dissolved			95.9		%		80-120	21-SEP-13
Boron (B)-Dissolved			82.1		%		80-120	21-SEP-13
Cadmium (Cd)-Dissolved			95.0		%		80-120	21-SEP-13
Chromium (Cr)-Dissolved			95.8		%		80-120	21-SEP-13
Cobalt (Co)-Dissolved			94.5		%		80-120	21-SEP-13
Copper (Cu)-Dissolved			92.0		%		80-120	21-SEP-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2698676								
WG1752263-2 CRM		**VA-HIGH-WATRM**						
Lead (Pb)-Dissolved			98.2		%		80-120	21-SEP-13
Lithium (Li)-Dissolved			96.2		%		80-120	21-SEP-13
Manganese (Mn)-Dissolved			98.5		%		80-120	21-SEP-13
Molybdenum (Mo)-Dissolved			97.5		%		80-120	21-SEP-13
Nickel (Ni)-Dissolved			95.7		%		80-120	21-SEP-13
Potassium (K)-Dissolved			92.9		%		80-120	21-SEP-13
Selenium (Se)-Dissolved			95.3		%		80-120	21-SEP-13
Silver (Ag)-Dissolved			97.4		%		80-120	21-SEP-13
Sodium (Na)-Dissolved			91.9		%		80-120	21-SEP-13
Strontium (Sr)-Dissolved			96.5		%		80-120	21-SEP-13
Thallium (Tl)-Dissolved			96.6		%		80-120	21-SEP-13
Titanium (Ti)-Dissolved			97.8		%		80-120	21-SEP-13
Uranium (U)-Dissolved			100.4		%		80-120	21-SEP-13
Vanadium (V)-Dissolved			97.3		%		80-120	21-SEP-13
Zinc (Zn)-Dissolved			96.2		%		80-120	21-SEP-13
Batch R2699004								
WG1752263-4 DUP		**L1365908-6**						
Aluminum (Al)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	02-OCT-13
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	01-OCT-13
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	01-OCT-13
Barium (Ba)-Dissolved		<0.000050	0.000061	RPD-NA	mg/L	N/A	20	02-OCT-13
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	01-OCT-13
Boron (B)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	01-OCT-13
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	01-OCT-13
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	01-OCT-13
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	01-OCT-13
Copper (Cu)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	01-OCT-13
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	01-OCT-13
Lithium (Li)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	01-OCT-13
Manganese (Mn)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	02-OCT-13
Molybdenum (Mo)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	01-OCT-13
Nickel (Ni)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	01-OCT-13
Potassium (K)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	01-OCT-13
Selenium (Se)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	01-OCT-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2699004								
WG1752263-4 DUP		**L1365908-6**						
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	01-OCT-13
Sodium (Na)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	01-OCT-13
Strontium (Sr)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	01-OCT-13
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	01-OCT-13
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	01-OCT-13
Uranium (U)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	01-OCT-13
Vanadium (V)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	01-OCT-13
Zinc (Zn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	01-OCT-13
WG1752263-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	21-SEP-13
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-13
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-13
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-13
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-13
Boron (B)-Dissolved			<0.010		mg/L		0.01	21-SEP-13
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	21-SEP-13
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-13
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-13
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	21-SEP-13
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-13
Lithium (Li)-Dissolved			<0.00050		mg/L		0.0005	21-SEP-13
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-13
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	21-SEP-13
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	21-SEP-13
Potassium (K)-Dissolved			<0.050		mg/L		0.05	21-SEP-13
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	21-SEP-13
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	21-SEP-13
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	21-SEP-13
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	21-SEP-13
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	21-SEP-13
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	21-SEP-13
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	21-SEP-13
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	21-SEP-13
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	21-SEP-13
WG1752263-5 MS		**L1365908-5**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2699004								
WG1752263-5 MS		**L1365908-5**						
Aluminum (Al)-Dissolved			100.2		%		70-130	01-OCT-13
Antimony (Sb)-Dissolved			98.9		%		70-130	01-OCT-13
Arsenic (As)-Dissolved			98.6		%		70-130	01-OCT-13
Barium (Ba)-Dissolved			97.3		%		70-130	01-OCT-13
Beryllium (Be)-Dissolved			90.6		%		70-130	01-OCT-13
Boron (B)-Dissolved			89.1		%		70-130	01-OCT-13
Cadmium (Cd)-Dissolved			N/A	MS-B	%		-	01-OCT-13
Chromium (Cr)-Dissolved			99.6		%		70-130	01-OCT-13
Cobalt (Co)-Dissolved			N/A	MS-B	%		-	01-OCT-13
Copper (Cu)-Dissolved			99.5		%		70-130	01-OCT-13
Lead (Pb)-Dissolved			N/A	MS-B	%		-	01-OCT-13
Lithium (Li)-Dissolved			92.9		%		70-130	01-OCT-13
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	01-OCT-13
Molybdenum (Mo)-Dissolved			95.3		%		70-130	01-OCT-13
Nickel (Ni)-Dissolved			101.5		%		70-130	01-OCT-13
Potassium (K)-Dissolved			100.5		%		70-130	01-OCT-13
Selenium (Se)-Dissolved			98.4		%		70-130	01-OCT-13
Silver (Ag)-Dissolved			98.7		%		70-130	01-OCT-13
Sodium (Na)-Dissolved			98.0		%		70-130	01-OCT-13
Strontium (Sr)-Dissolved			89.5		%		70-130	01-OCT-13
Thallium (Tl)-Dissolved			97.8		%		70-130	01-OCT-13
Titanium (Ti)-Dissolved			101.3		%		70-130	01-OCT-13
Uranium (U)-Dissolved			97.7		%		70-130	01-OCT-13
Vanadium (V)-Dissolved			99.4		%		70-130	01-OCT-13
Zinc (Zn)-Dissolved			N/A	MS-B	%		-	01-OCT-13
MET-DIS-ICP-VA	**Water**							
Batch R2698843								
WG1752263-2 CRM		**VA-HIGH-WATRM**						
Calcium (Ca)-Dissolved			104.4		%		80-120	23-SEP-13
Iron (Fe)-Dissolved			96.9		%		80-120	23-SEP-13
Magnesium (Mg)-Dissolved			101.4		%		80-120	23-SEP-13
Phosphorus (P)-Dissolved			99.2		%		80-120	23-SEP-13
Silicon (Si)-Dissolved			102.1		%		80-120	23-SEP-13
WG1752263-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA	**Water**							
Batch R2698843								
WG1752263-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	23-SEP-13
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	23-SEP-13
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	23-SEP-13
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	23-SEP-13
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	23-SEP-13
Batch R2708002								
WG1752263-4 DUP		**L1365908-6**						
Calcium (Ca)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	03-OCT-13
Iron (Fe)-Dissolved		<0.030	<0.030	RPD-NA	mg/L	N/A	20	03-OCT-13
Magnesium (Mg)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	03-OCT-13
Phosphorus (P)-Dissolved		<0.30	<0.30	RPD-NA	mg/L	N/A	20	03-OCT-13
Silicon (Si)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	03-OCT-13
WG1752263-5 MS		**L1365908-5**						
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	03-OCT-13
Iron (Fe)-Dissolved			N/A	MS-B	%		-	03-OCT-13
Magnesium (Mg)-Dissolved			101.1		%		70-130	03-OCT-13
NH3-F-VA	**Water**							
Batch R2703541								
WG1757230-2 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			96.8		%		85-115	29-SEP-13
WG1757230-3 DUP		**L1365908-12**						
Ammonia, Total (as N)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	29-SEP-13
WG1757230-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	29-SEP-13
WG1757230-4 MS		**L1365908-12**						
Ammonia, Total (as N)			96.1		%		75-125	29-SEP-13
PH-PCT-VA	**Water**							
Batch R2702343								
WG1755261-25 CRM		**VA-PH7-BUF**						
pH			7.05		pH		6.9-7.1	26-SEP-13
PO4-DO-COL-VA	**Water**							
Batch R2700012								
WG1752275-2 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			94.0		%		80-120	21-SEP-13
WG1752275-6 CRM		**VA-OPO4-CONTROL**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4-DO-COL-VA	**Water**							
Batch R2700012								
WG1752275-6 CRM		**VA-OPO4-CONTROL**						
Orthophosphate-Dissolved (as P)			91.4		%		80-120	21-SEP-13
WG1752275-3 DUP		**L1365908-3**						
Orthophosphate-Dissolved (as P)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	21-SEP-13
WG1752275-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	21-SEP-13
WG1752275-5 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	21-SEP-13
WG1752275-4 MS		**L1365908-2**						
Orthophosphate-Dissolved (as P)			100.5		%		70-130	21-SEP-13
S-DIS-ICP-VA	**Water**							
Batch R2698843								
WG1752263-2 CRM		**VA-HIGH-WATRM**						
Sulfur (S)-Dissolved			99.9		%		80-120	23-SEP-13
WG1752263-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	23-SEP-13
Batch R2708002								
WG1752263-4 DUP		**L1365908-6**						
Sulfur (S)-Dissolved		<0.50	<0.50	RPD-NA	mg/L	N/A	20	03-OCT-13
WG1752263-5 MS		**L1365908-5**						
Sulfur (S)-Dissolved			N/A	MS-B	%		-	03-OCT-13
TDS-VA	**Water**							
Batch R2699722								
WG1752795-3 DUP		**L1365908-2**						
Total Dissolved Solids		18600	18200		mg/L	2.1	20	23-SEP-13
WG1752795-2 LCS								
Total Dissolved Solids			89.0		%		85-115	23-SEP-13
WG1752795-1 MB								
Total Dissolved Solids			<10		mg/L		10	23-SEP-13
TSS-LOW-VA	**Water**							
Batch R2699336								
WG1752790-2 LCS								
Total Suspended Solids			101.9		%		85-115	23-SEP-13
WG1752790-1 MB								
Total Suspended Solids			<1.0		mg/L		1	23-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
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)							
	3	17-SEP-13 15:45	26-SEP-13 23:00	0.25	223	hours	EHTR-FM
	5	17-SEP-13 11:00	26-SEP-13 23:00	0.25	228	hours	EHTR-FM
	8	17-SEP-13 12:45	26-SEP-13 23:00	0.25	226	hours	EHTR-FM
	10	17-SEP-13 10:10	26-SEP-13 23:00	0.25	229	hours	EHTR-FM
	12	17-SEP-13 15:00	26-SEP-13 23:00	0.25	224	hours	EHTR-FM
	13	19-SEP-13 12:00	26-SEP-13 23:00	0.25	179	hours	EHTR-FM
	14	19-SEP-13 11:00	26-SEP-13 23:00	0.25	180	hours	EHTR-FM
Anions and Nutrients							
Alkalinity by Auto. Titration							
	5	17-SEP-13 11:00	04-OCT-13 13:00	14	17	days	EHT
Diss. Orthophosphate in Water by Colour							
	2	17-SEP-13 11:45	21-SEP-13 14:02	72	98	hours	EHTL
	3	17-SEP-13 15:45	21-SEP-13 14:05	3	4	days	EHTL
	4	17-SEP-13 10:00	21-SEP-13 14:05	3	4	days	EHTL
	5	17-SEP-13 11:00	21-SEP-13 14:05	3	4	days	EHTL
	7	17-SEP-13 15:20	21-SEP-13 14:15	3	4	days	EHTL
	8	17-SEP-13 12:45	21-SEP-13 14:15	3	4	days	EHTL
	9	17-SEP-13 13:40	21-SEP-13 14:15	3	4	days	EHTL
	10	17-SEP-13 10:10	21-SEP-13 14:15	3	4	days	EHTL
	11	17-SEP-13 11:10	21-SEP-13 14:15	3	4	days	EHTL
	12	17-SEP-13 15:00	21-SEP-13 14:15	3	4	days	EHTL
Nitrate Nitrogen by Ion Chromatography							
	2	17-SEP-13 11:45	20-SEP-13 19:15	72	79	hours	EHTL
Nitrite Nitrogen by Ion Chromatography							
	2	17-SEP-13 11:45	20-SEP-13 19:15	72	79	hours	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 L1365908 were received on 20-SEP-13 09:20.

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.

CH2MHILL

CHAIN OF CUSTODY RECORD

9/19/2013 3:54:25 PM

Project Name Faro Mine
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-015
Project FARO MINE SEEP SAMPLING 2013
Turnaround Time 10 Days
Shipping Date: 9/19/2013
COC Number: ALS09191301

	DATE	TIME	Matrix	Container:	125mL Poly	125mL Poly	40ml vial	125ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	500ml Poly	250ml Glass	125ml Poly	250ml glass	
				Preservatives:	NaOH, 4'C	NaOH, 4'C	HCl, 4'C	HCl, 4'C	4C	4C	4'C	4'C	4'C	4'C	H2SO4, pH<2, 4'C	HNO3, 4'C	H2SO4, pH<2, 4C	
				Filtered:	NA	NA	Field	Field	NA	NA	NA	NA	NA	NA	Field	Field	NA	
				Holding Time:	14	14	14	180	14	14	7	7	3	3	28	180/28	28	
					Cyanide	Free Cyanide	(E245.7-Diss) Field Filtered Dissolved Hg	(Ferrozine Method) Field Filtered Ferrous Iron	(SM2310) Acidity – Run Hot H2O2 if Fe >15ppm	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM4110B) CL F NO2 NO3 and SO4	(SM4500P) ortho-Phosphate	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered For Metals Analyte List see Table 1	Ammonia (JEM/SM4500NH3) Ammonia	
E_015_13_007	9/16/2013	8:45	Water				X	X							X	X		4
CH-FD72_SEFL13	9/17/2013	11:10	Water		X		X	X	X		X	X	X	X	X	X	X	9
CH-FP41_SEFL13	9/17/2013	15:45	Water				X	X	X	X	X	X	X	X	X	X	X	8
CH-VP-17_SEFL13	9/17/2013	10:00	Water				X	X	X		X	X	X	X	X	X	X	8
CH-VP-20_SEFL13	9/17/2013	11:00	Water				X	X	X	X	X	X	X	X	X	X	X	8
E_015_13_008	9/17/2013	8:45	Water				X	X							X	X		4
SRK-FD24_SEFL13	9/17/2013	15:20	Water				X	X	X		X	X	X	X	X	X	X	8
SRK-FD30_SEFL13	9/17/2013	12:45	Water			X	X	X	X	X	X	X	X	X	X	X	X	9
SRK-FD51_SEFL13	9/17/2013	13:40	Water				X	X	X		X	X	X	X	X	X	X	8
SRK-FD54_SEFL13	9/17/2013	10:10	Water			X	X	X	X	X	X	X	X	X	X	X	X	9
SRK-FD56_SEFL13	9/17/2013	11:10	Water				X	X	X		X	X	X	X	X	X	X	8
SRK-FD68_SEFL13	9/17/2013	15:00	Water				X	X	X	X	X	X	X	X	X	X	X	8
CH-FP-35_SEFL13	9/19/2013	12:00	Water				X	X	X	X	X	X	X	X	X	X	X	8
SRK-FD19_SEFL13	9/19/2013	11:00	Water				X	X	X	X	X	X	X	X	X	X	X	8

L1365808-COFC

	Signatures	Date/Time
Approved by		
Sampled by		
Relinquished by		09/19/13
Received by		
Relinquished by	20 SEP-13	0.4, 1.0, 0.8
Received by		9:20

Shipping Details
Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:
Sample Custody
and
Amber Springer

Special Instructions:
PO: 604564 on Invoice Perform Lab Dup/MS on these samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2MHILL

CHAIN OF CUSTODY RECORD

9/19/2013 3:54:25 PM

Project Name Faro Mine
Location Faro Mine Complex - Faro YK
Project Number 472645.06.AD.01.04.13
Project Manager BT Thomas
Sample Manager Charles Shewen

Task Order SW-015
Project FARO MINE SEEP SAMPLING 2013
Turnaround Time 10 Days
Shipping Date: 9/19/2013
COC Number: ALS09191301

	DATE	TIME	Matrix	Container:	Preservatives:	Filtered:	Holding Time:	Cyanide	Free Cyanide	(E245.7-Diss) Field Filtered Dissolved Hg	(Ferrozine Method) Field Filtered Ferrous Iron	(SM2310) Acidity - Run Hot H2O2 if Fe >15ppm	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM4110B) CL F NO2 NO3 and SO4	(SM4500P) ortho-Phosphate	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered For Metals Analyte List see Table 1	Ammonia (JEM/SM4500NH3) Ammonia		Number of Containers	COMMENTS
				125mL Poly	NaOH, 4'C	NA	14																
				125mL Poly	NaOH, 4'C	NA	14																
				40ml vial	HCl, 4'C	Field	14																
				125ml Poly	HCl, 4'C	Field	180																
				500ml Poly	4C	NA	14																
				500ml Poly	4C	NA	14																
				500ml Poly	4'C	NA	7																
				500ml Poly	4'C	NA	7																
				500ml Poly	4'C	NA	3																
				500ml Poly	4'C	NA	3																
				250ml Glass	H2SO4, pH<2, 4'C	Field	28																
				125ml Poly	HNO3, 4'C	Field	180/28																
				250ml glass	H2SO4, pH<2, 4C	NA	28																
																					TOTAL NUMBER OF CONTAINERS	107	

Signatures	Date/Time
Approved by	
Sampled by	
Relinquished by	
Received by	
Relinquished by	
Received by	

Shipping Details

Method of Shipment: FedEx
On Ice: yes / no
Airbill No:
Lab Name: ALS Vancouver
Lab Phone: (604) 253-4188

ATTN:

Sample Custody
and
Amber Springer

Special Instructions:

PO: 604564 on Invoice Perform Lab Dup/MS on these samples

Report Copy to
Bernice Kidd
(530) 229-3203

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 27-SEP-13
Report Date: 03-OCT-13 12:26 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1369643

Project P.O. #: 472645.06.AD.01.04.13, PO=604564
Job Reference: BSI GRUM OVERBURDEN DUMP 2013 311.5B.
C of C Numbers: ALS07141301H
Legal Site Desc:

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1369643-1	L1369643-2	L1369643-3		
	Description	Soil	Soil	Soil		
	Sampled Date	12-JUL-13	12-JUL-13	12-JUL-13		
	Sampled Time	13:50	16:21	16:50		
	Client ID	CH13-311-SS023_SOA	CH13-311-SS024_SOA	CH13-311-SS025_SOA		
Grouping	**Analyte**					
SOIL						
Physical Tests	Liquid Limit (LL) (%)	26	23	22		
	Plasticity Index (PI) (%)	8	8	7		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ATTERBERG-SK	Soil	Atterberg limits	CARTER CSSS 58

The liquid limit (or upper plastic limit) is the point at which the soil becomes semifluid, like softened butter. In operational terms, the liquid limit is defined as the water content at which a trapezoidal groove cut in moist soil is closed after 25 taps on a hard rubber plate (ASTM D-18, 1958).

The plastic limit (or lower plastic limit) is defined as the water content at which soil begins to crumble on being rolled into a thread 1/8 inch (or 3 mm) in diameter. It represents the lowest water content at which soil can be deformed readily without cracking.

The plastic index (which is the difference between the liquid and plastic limits) gives an indication of the "clayeyness" or plasticity of a clay and is employed in engineering classification systems for soils.

References: McKeague, J.A. 1978. Atterberg Limits pp 50 - 55 In: Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci. p. 50 - 55

** 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:

ALS07141301H

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: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed

Quality Control Report

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

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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.

CH2M HILL, INC
ATTN: Bernice Kidd
2525 Airpark Drive
Redding CA 96001

Date Received: 15-OCT-13
Report Date: 25-OCT-13 13:10 (MT)
Version: FINAL

Client Phone: 530-229-3203

Certificate of Analysis

Lab Work Order #: L1377913

Project P.O. #: 472645.06.AD.01.04.13, PO = 604564
Job Reference: BSI GRUM OVERBURDEN DUMP 2013
C of C Numbers:
Legal Site Desc:

Amber Springer
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1377913-1	L1377913-2	L1377913-3	L1377913-4	L1377913-5
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	23-JUL-13	23-JUL-13	23-JUL-13	23-JUL-13	24-JUL-13
Sampled Time	14:25	14:55	16:40	17:45	09:30
Client ID	CH13-311-BH011_SOA	CH13-311-BH011_SOB	CH13-311-BH011_SOC	CH13-311-BH011_SOD	CH13-311-BH011_SOE
Grouping **Analyte**					
SOIL					
Leachable Metals Boron (B), Hot Water Ext. (mg/kg)	0.27	0.22	0.24	<0.20	0.27

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID	L1377913-6	L1377913-7	L1377913-8	L1377913-9	L1377913-10
		Description	Soil	Soil	Soil	Soil	Soil
		Sampled Date	24-JUL-13	24-JUL-13	24-JUL-13	24-JUL-13	25-JUL-13
		Sampled Time	09:30	15:00	15:35	16:50	10:45
		Client ID	CH13-311-BH911_SOE	CH13-311-BH012_SOA	CH13-311-BH012_SOB	CH13-311-BH012_SOC	CH13-311-BH012_SOD
SOIL							
Leachable Metals	Boron (B), Hot Water Ext. (mg/kg)		0.26	<0.20	0.25	<0.20	0.20

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1377913-11	L1377913-12	L1377913-13	L1377913-14	L1377913-15
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	18-JUL-13	18-JUL-13	18-JUL-13	19-JUL-13	19-JUL-13
Sampled Time	14:44	16:28	17:30	09:30	12:15
Client ID	CH13-311-BH013_SOA	CH13-311-BH013_SOB	CH13-311-BH013_SOC	CH13-311-BH013_SOD	CH13-311-BH013_SOE
Grouping **Analyte**					
SOIL					
Leachable Metals Boron (B), Hot Water Ext. (mg/kg)	0.21	<0.20	<0.20	<0.20	<0.20

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1377913-16	L1377913-17	L1377913-18	L1377913-19	L1377913-20
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	18-JUL-13	20-JUL-13	20-JUL-13	20-JUL-13	20-JUL-13
Sampled Time	16:35	09:15	09:50	12:00	13:45
Client ID	CH13-311-BH913_SOB	CH13-311-BH014_SOA	CH13-311-BH014_SOB	CH13-311-BH014_SOC	CH13-311-BH014_SOD
Grouping **Analyte**					
SOIL					
Leachable Metals Boron (B), Hot Water Ext. (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID	L1377913-21	L1377913-22	L1377913-23	L1377913-24	L1377913-25
		Description	Soil	Soil	Soil	Soil	Soil
		Sampled Date	20-JUL-13	22-JUL-13	22-JUL-13	22-JUL-13	22-JUL-13
		Sampled Time	14:45	10:24	10:44	13:30	14:10
		Client ID	CH13-311-BH014_SOE	CH13-311-BH015_SOA	CH13-311-BH015_SOB	CH13-311-BH015_SOC	CH13-311-BH015_SOD
SOIL							
Leachable Metals	Boron (B), Hot Water Ext. (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1377913-26	L1377913-27	L1377913-28	L1377913-29	L1377913-30
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	22-JUL-13	22-JUL-13	14-AUG-13	14-AUG-13	14-AUG-13
Sampled Time	16:00	13:40	13:55	14:05	12:39
Client ID	CH13-311-BH015_SOE	CH13-311-BH915_SOC	CH13-311-TP002_SOA	CH13-311-TP902_SOA	CH13-311-TP003_SOA
Grouping **Analyte**					
SOIL					
Leachable Metals Boron (B), Hot Water Ext. (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1377913-31	L1377913-32	L1377913-33	L1377913-34	L1377913-35
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	14-AUG-13	14-AUG-13	14-AUG-13	14-AUG-13	14-AUG-13
Sampled Time	12:49	11:24	11:34	10:03	10:13
Client ID	CH13-311-TP903_SOA	CH13-311-TP004_SOA	CH13-311-TP904_SOA	CH13-311-TP005_SOA	CH13-311-TP905_SOA
Grouping **Analyte**					
SOIL					
Leachable Metals Boron (B), Hot Water Ext. (mg/kg)	0.20	<0.20	0.32	0.24	0.25

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1377913-36	L1377913-37	L1377913-38	L1377913-39	L1377913-40
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	13-AUG-13	13-AUG-13	23-AUG-13	22-AUG-13	22-AUG-13
Sampled Time	17:13	17:23	10:15	12:00	14:45
Client ID	CH13-311-TP006_SOA	CH13-311-TP906_SOA	CH13-311-BH001_SOB	CH13-311-BH002_SOB	CH13-311-BH003_SOB
Grouping **Analyte**					
SOIL					
Leachable Metals Boron (B), Hot Water Ext. (mg/kg)	<0.20	0.20	0.29	0.20	<0.20

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1377913-41	L1377913-42	L1377913-43	L1377913-44	L1377913-45
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	23-AUG-13	18-JUL-13	18-JUL-13	18-JUL-13	12-JUL-13
Sampled Time	15:15	08:57	09:33	10:58	13:50
Client ID	CH13-311-BH005_SOB	CH13-311-BH010_SOA	CH13-311-BH010_SOB	CH13-311-BH010_SOD	CH13-311-SS023_SOA
Grouping **Analyte**					
SOIL					
Leachable Metals Boron (B), Hot Water Ext. (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID	Description	Sampled Date	Sampled Time	Client ID
		L1377913-46	Soil	12-JUL-13	16:21	CH13-311-SS024_SOA
		L1377913-47	Soil	12-JUL-13	16:50	CH13-311-SS025_SOA
		L1377913-48	Soil	15-JUL-13	11:48	CH13-311-SS030_SOA
		L1377913-49	Soil	15-JUL-13	12:59	CH13-311-SS033_SOA
		L1377913-50	Soil	15-JUL-13	13:45	CH13-311-SS037_SOA
SOIL						
Leachable Metals	Boron (B), Hot Water Ext. (mg/kg)	0.22	<0.20	<0.20	<0.20	0.21

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1377913-51	L1377913-52	L1377913-53	L1377913-54	L1377913-55
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	27-AUG-13	25-AUG-13	24-AUG-13	24-AUG-13	24-AUG-13
Sampled Time	11:00	15:15	15:15	12:00	12:00
Client ID	CH13-311-TP021_SOA	CH13-311-BH022_SOB	CH13-311-BH023_SOB	CH13-311-BH024_SOB	CH13-311-BH924_SOB
Grouping **Analyte**					
SOIL					
Leachable Metals Boron (B), Hot Water Ext. (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
B-HOTW-SK	Soil	Available Boron, Hot Water	SSSA (1996) P. 610-611

Hot water is used to extract the plant-available and potentially plant-available boron from soil. Boron in the extract is determined by ICP-OES.

** 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.

Quality Control Report

Client: CH2M HILL, INC
2525 Airpark Drive
Redding CA 96001
Contact: Bernice Kidd

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-HOTW-SK	**Soil**							
Batch R2719933								
WG1769191-1 DUP		**L1377913-17**						
Boron (B), Hot Water Ext.		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	19-OCT-13
WG1769191-3 IRM		**SAL814**						
Boron (B), Hot Water Ext.			92.8		%		70-130	19-OCT-13
WG1769191-2 MB								
Boron (B), Hot Water Ext.			<0.20		mg/kg		0.2	19-OCT-13
Batch R2722168								
WG1770136-3 IRM		**SAL814**						
Boron (B), Hot Water Ext.			96.6		%		70-130	22-OCT-13
WG1770136-2 MB								
Boron (B), Hot Water Ext.			<0.20		mg/kg		0.2	22-OCT-13
Batch R2722169								
WG1770138-3 IRM		**SAL814**						
Boron (B), Hot Water Ext.			97.9		%		70-130	22-OCT-13
WG1770138-2 MB								
Boron (B), Hot Water Ext.			<0.20		mg/kg		0.2	22-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
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
Leachable Metals							
Available Boron, Hot Water							
	1	23-JUL-13 14:25	22-OCT-13	5	90	days	EHTR
	2	23-JUL-13 14:55	22-OCT-13	5	90	days	EHTR
	3	23-JUL-13 16:40	22-OCT-13	5	90	days	EHTR
	4	23-JUL-13 17:45	22-OCT-13	5	90	days	EHTR
	5	24-JUL-13 09:30	22-OCT-13	5	90	days	EHTR
	6	24-JUL-13 09:30	22-OCT-13	5	90	days	EHTR
	7	24-JUL-13 15:00	22-OCT-13	5	89	days	EHTR
	8	24-JUL-13 15:35	22-OCT-13	5	89	days	EHTR
	9	24-JUL-13 16:50	22-OCT-13	5	89	days	EHTR
	10	25-JUL-13 10:45	22-OCT-13	5	89	days	EHTR
	11	18-JUL-13 14:44	19-OCT-13	5	92	days	EHTR
	12	18-JUL-13 16:28	19-OCT-13	5	92	days	EHTR
	13	18-JUL-13 17:30	19-OCT-13	5	92	days	EHTR
	14	19-JUL-13 09:30	19-OCT-13	5	92	days	EHTR
	15	19-JUL-13 12:15	19-OCT-13	5	91	days	EHTR
	16	18-JUL-13 16:35	19-OCT-13	5	92	days	EHTR
	17	20-JUL-13 09:15	19-OCT-13	5	91	days	EHTR
	18	20-JUL-13 09:50	19-OCT-13	5	91	days	EHTR
	19	20-JUL-13 12:00	19-OCT-13	5	91	days	EHTR
	20	20-JUL-13 13:45	19-OCT-13	5	90	days	EHTR
	21	20-JUL-13 14:45	19-OCT-13	5	90	days	EHTR
	22	22-JUL-13 10:24	19-OCT-13	5	89	days	EHTR
	23	22-JUL-13 10:44	19-OCT-13	5	89	days	EHTR
	24	22-JUL-13 13:30	19-OCT-13	5	88	days	EHTR
	25	22-JUL-13 14:10	19-OCT-13	5	88	days	EHTR
	26	22-JUL-13 16:00	19-OCT-13	5	88	days	EHTR
	27	22-JUL-13 13:40	19-OCT-13	5	88	days	EHTR
	28	14-AUG-13 13:55	22-OCT-13	5	68	days	EHTR
	29	14-AUG-13 14:05	22-OCT-13	5	68	days	EHTR
	30	14-AUG-13 12:39	22-OCT-13	5	68	days	EHTR
	31	14-AUG-13 12:49	22-OCT-13	5	68	days	EHTR
	32	14-AUG-13 11:24	22-OCT-13	5	69	days	EHTR
	33	14-AUG-13 11:34	22-OCT-13	5	69	days	EHTR
	34	14-AUG-13 10:03	22-OCT-13	5	69	days	EHTR
	35	14-AUG-13 10:13	22-OCT-13	5	69	days	EHTR
	36	13-AUG-13 17:13	19-OCT-13	5	66	days	EHTR
	37	13-AUG-13 17:23	19-OCT-13	5	66	days	EHTR
	38	23-AUG-13 10:15	22-OCT-13	5	60	days	EHTR
	39	22-AUG-13 12:00	22-OCT-13	5	61	days	EHTR
	40	22-AUG-13 14:45	22-OCT-13	5	60	days	EHTR
	41	23-AUG-13 15:15	22-OCT-13	5	59	days	EHTR
	42	18-JUL-13 08:57	19-OCT-13	5	93	days	EHTR
	43	18-JUL-13 09:33	19-OCT-13	5	93	days	EHTR
	44	18-JUL-13 10:58	19-OCT-13	5	93	days	EHTR
	45	12-JUL-13 13:50	22-OCT-13	5	101	days	EHTR
	46	12-JUL-13 16:21	22-OCT-13	5	101	days	EHTR
	47	12-JUL-13 16:50	22-OCT-13	5	101	days	EHTR
	48	15-JUL-13 11:48	22-OCT-13	5	99	days	EHTR
	49	15-JUL-13 12:59	22-OCT-13	5	98	days	EHTR
	50	15-JUL-13 13:45	22-OCT-13	5	98	days	EHTR
	51	27-AUG-13 11:00	22-OCT-13	5	56	days	EHTR
	52	25-AUG-13 15:15	22-OCT-13	5	57	days	EHTR
	53	24-AUG-13 15:15	22-OCT-13	5	58	days	EHTR
	54	24-AUG-13 12:00	22-OCT-13	5	59	days	EHTR
	55	24-AUG-13 12:00	22-OCT-13	5	59	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 L1377913 were received on 15-OCT-13 14:47.

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.

Appendix E
Data Quality Evaluation

APPENDIX E

Phase II Borrow Reconnaissance Data Quality Evaluation Report

Soil samples were collected and analyzed during the sampling event at the Grum Overburden Dump, the North Wall of Grum Pit/Grum Overburden Foundation, and the Ridge North of Grum Pit (i.e., the Borrow Reconnaissance) in support of the Faro Mine Remediation Project. All analytical data were evaluated as described in the *Quality Assurance Project Plan, Faro Mine Remediation Project* (QAPP) (CH2M HILL, 2013a). This Data Quality Evaluation report summarizes the results of the quality assurance/quality control (QA/QC) activities prescribed in the QAPP and provides a complete data usability assessment. The QAPP identifies the method-specific QC requirements for each analytical parameter and matrix and defines a plan to test that the correct sampling, analytical, and data reduction procedures are followed using audits and data validation.

This report is intended as a general data quality assessment designed to summarize data issues.

1.0 Analytical Data

A total of 64 native environmental soil samples and 10 soil field duplicates (FD) were collected from July 12 through August 27, 2013. Samples were analyzed by the ALS network of laboratories, with the majority of analyses performed by ALS Vancouver in Burnaby, British Columbia. The laboratory divided the samples into 31 sample delivery groups (SDG). Summaries of the samples collected are presented in Tables 1 and 2. A total of 37 methods were used to analyze the environmental samples. Samples were collected and couriered to the ALS Whitehorse laboratory. Samples were then shipped by overnight carrier to the ALS Vancouver laboratory for analysis. Selected samples were analyzed for one or more of the following analytes/methods:

- Moisture by Method ASTM 2216
- Moisture at liquid limit and plasticity index by Method ASTM D4318
- Oxidation reduction potential (ORP), Leachable by Method ASTM 1498_DI
- Percent saturation by Carter Saturation Percentage Method
- pH (1:2 CACL2) by Method CSSC 3.11
- Plant available micronutrient copper, iron, manganese, and zinc by Method CSSS 11.3/11.4
- SMP buffer pH by Method CSSS 14.2
- Chloride in saturated soil extract by Method CSSS 18.2.2/SM4500CL
- Conductivity and pH in saturated soil paste by Method CSSS 18.3.1
- Exchangeable cations with ammonium acetate by Method CSSS 19.4
- Organic matter (OM) and total organic carbon (TOC) by Method CSSS 21.2
- Cation exchange capacity (CEC) by Method CSSS 3.321

- Available ammonium by Method CSSS 4.2
- Available nitrate by Method CSSS 4.2/4.3
- Available phosphate by Method CSSS 7.2/7.31 or SSSA P 894-895
- Specific conductance in deionized water (DI) by Method CSSS/APHA 2510B_DI
- Paste pH, pH, and paste pH in DI by Methods CSSS/APHA 4500H and CSSS/APHA 4500H_DI
- Mercury by Method E245.7
- Mercury in DI by Method E245.7_DI
- Acid soluble sulfate by Method E600/2-78-054
- Sulphur by Method ISO 15178:2000
- Neutralization potential by Method MOD-SOBEK-3.2.3
- Available sulfate by Method NCR P36/SM3120B
- Acidity in DI by Method SM2310_DI
- Alkalinity in DI by Method SM2320B_DI
- Calcium, magnesium, potassium, sodium, and sulfur, and sodium adsorption ratio (SAR) in saturated soil by Method SM3120B
- Sulphate in DI by Method SM4110B_DI
- Available boron by Method SSSA (1996)P 610-611
- Inorganic carbon (IC), total inorganic carbon (TIC), and TOC by Method SSSA P 455-456
- Total carbon by LECO and total nitrogen by LECO by Method SSSA P 973-974
- Metals by Method SW6010B
- Metals in DI by Method SW6010B_DI
- Barium by fusion by Method SW6020A
- Metals in DI by Method SW6020A_DI
- Exchangable sodium percentage by Method USDA-HB60 P 101_CALC

Each SDG was evaluated by CH2M HILL chemists for data quality, with analytical performance initially assessed on an SDG basis or an analytical batch basis. Several SDGs may be associated with the same laboratory QC samples. The association of laboratory QC samples and environmental samples from the same analytical batches is determined by the laboratory lot control number. Data were assessed using Level II validation, as follows:

- Reviewing the data set narrative to identify issues that the laboratory reported in the data deliverable
- Checking sample integrity (sample collection, preservation, and holding times)
- Evaluating basic QC measurements used to assess the accuracy, precision and representativeness of data, including QC blanks, laboratory control samples, matrix spikes, surrogate recovery when applicable, and FD or laboratory duplicate (LD) results

- Reviewing sample results, target compound lists, and detection limits to verify that project analytical requirements are met
- Initiating corrective actions, as necessary, based on the data review findings
- Verifying that hardcopy results match electronic deliverable results
- Qualifying data using appropriate qualifier flags, as necessary, to reflect data usability limitations

Field samples were also reviewed to ascertain field compliance and data quality issues. This included a review of FDs and equipment blanks (EBs).

Data flags were assigned according to the QC acceptance limits defined in the QAPP (CH2M HILL, 2013a). The data validation flags for each SDG are summarized in each data quality validation report. These flags, and the reason for each flag, are recorded in the electronic validation database. Multiple flags can routinely be applied to a specific sample method/matrix/analyte combination, but there will be only one final flag. As discussed below, a final flag is applied to the data on the basis of the flags entered into the database and is the most conservative of the applied validation flags. The final flag also includes matrix and blank sample impacts. The database keeps track of the type of protocol violation and of contractual and analytical completeness during data validation.

Data flags can be separated into the following two categories to be used in estimating both contractor and analytical completeness:

- Flags caused by laboratory deviation from requirements in the QAPP (CH2M HILL, 2013a)
- Flags applied because of the nature of the sample matrix or method limitations

The data flags are those listed in the QAPP (CH2M HILL, 2013a) and are defined as follows:

J	Analyte was present but the reported value may not be accurate or precise.
UJ	Analyte was not detected above the detection limit objective. However, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	Result has been rejected for use.
U	Analyte was analyzed for but not detected at the specified detection limit.
None	A database flag with no QC implications. A flag is not applied. This is a placeholder for calculating QC criteria issues that do not require flagging.
Exclude	A database flag with no QC implications. When multiple data points have been reported, such as dilutions or re-extractions, the data that best match QAPP QC requirements (CH2M HILL, 2013a) are presented to the data users and the remainders are marked with this flag.
=	A database flag with no QC implications. A place holder for the DQE reporting purposes noting that the reported result is a detected concentration greater than the RL.

1.1 Findings

The overall summaries of the data validation findings are contained in Tables 3 through 8 as follows, and summarized in the method sections presented in Section 1.3.:

- **Table 3**: Overall Flagging Summary. Presents the number of occurrences for each data validation reason by method.
- **Table 4:** Blank Contamination – Qualified Data. Presents the data qualified because of blank contamination or temperature criteria exceedances.
- **Table 5:** Holding Time Exceedances – Qualified Data. Presents the data qualified because of holding time criteria exceedances.
- **Table 6:** Field Duplicate Precision – Qualified Data. Presents the results that are qualified because of FD precision exceedances.
- **Table 7:** Matrix Spike Precision/Accuracy – Qualified Data. Presents the results which are qualified because of matrix spike or matrix spike duplicate precision or accuracy exceedances.
- **Table 8**: Site Completeness by Analyte – Qualified Data. Presents the percent completeness by method, analyte and matrix.
- Overall Flagging Summary

The frequency of field and laboratory QC samples and the associated control criteria are specified in the QAPP (CH2M HILL, 2013a). These control criteria were used to evaluate the laboratory data. In the following method-specific discussions, only the criteria exceedances that impact data qualification are discussed.

1.2 General Comments

1.2.1 Laboratory Qualifiers

The laboratory applied informational qualifiers to multiple results to note analytical issues such as dilutions, blank contamination, matrix effects, limited sample volume, holding time, and re-analyses. These qualifiers were reviewed, and where the informational qualifiers did not result in a validation flags noting a QC exceedances, the qualifiers were replaced with the concentration flags “U” or “=.” All instances of these laboratory qualifier replacements are recorded in Table 3, and are not further discussed.

1.2.2 Holding Time

Holding times were exceeded for several 2013 samples. The laboratory completed a detailed analysis and corrective action report to address these exceedances; the corrective action report is included as Attachment 1 of this report. Qualified data are discussed in detail below.

1.2.3 Sample Temperature

The sample temperature acceptance criteria were exceeded for samples collected June 13 and 14, 2013, and July 22, 2013, because of insufficient coolant in coolers shipped from the ALS Whitehorse laboratory to the ALS Vancouver laboratory. The Whitehorse laboratory team responsible for forwarding the samples was informed of the temperature exceedances and instructed to place fresh ice in coolers before shipping on to Vancouver. A corrective action report has been completed to remedy this issue and is included as Attachment 2 of this report. Qualified data are discussed in detail below.

1.3 Method-specific Findings

1.3.1 Method ASTM 2216 (Moisture)

Sample temperature

Table 4 lists the specific field samples and their associated temperature criteria exceedances. The maximum temperature was exceeded for six soil samples. The associated detected concentrations were flagged "J."

Holding Time

Table 5 lists the specific field samples and their associated holding time criteria exceedances. The 14-day holding time for soil samples was exceeded by 1 to 11 days for 31 samples. The associated detected concentrations were flagged "J" and the associated non-detected concentration was flagged "UJ."

1.3.2 Method CSSS 11.3/11.4 (Plant available Iron, Manganese, and Zinc)

Field Duplicate

Table 6 lists the specific field samples and their associated FD criteria exceedances. Four FD pairs had criteria exceedances. The associated detected concentrations were flagged "J."

1.3.3 Method CSSS 18.2.2/SM4500CL (Chloride in Saturation Extract)

Field Duplicate

Table 6 lists the specific field samples and their associated FD criteria exceedances. Three FD pairs had criteria exceedances. The associated detected concentrations were flagged "J."

1.3.4 Method CSSS 18.3.1 (Conductivity in Saturation Paste)

Field Duplicate

Table 6 lists the specific field samples and their associated FD criteria exceedances. Two FD pairs had criteria exceedances. The associated detected concentrations were flagged "J."

1.3.5 Method CSSS 21.2 (OM, TOC)

Sample temperature

Table 4 lists the specific field samples and their associated temperature criteria exceedances. The maximum temperature was exceeded for six soil samples. The associated detected concentrations were flagged "J" and non- detected concentrations were flagged "UJ."

Blanks

Table 4 lists the specific field samples and their associated EB exceedances. Two soil sample TOC detected concentrations were less than five times the EB concentration. The associated concentrations were flagged "U," not detected at the reported concentration.

1.3.6 Method CSSS 4.2 (Available Ammonium)

Field Duplicate

Table 6 lists the specific field samples and their associated FD criteria exceedances. One FD pair had criteria exceedances. The associated detected concentrations were flagged "J."

1.3.7 Method CSSS 7.2/7.31 (Available Phosphate)

Field Duplicate

Table 6 lists the specific field samples and their associated FD criteria exceedances. Four FD pairs had criteria exceedances. The associated detected concentrations were flagged "J."

1.3.8 Method CSSS/APHA 4500H (Paste pH and pH)

Sample temperature

Table 4 lists the specific field samples and their associated temperature criteria exceedances. The maximum temperature was exceeded for six soil samples. The associated detected concentrations were flagged "J."

Holding Time

Table 5 lists the specific field samples and their associated holding time criteria exceedances. The 28-day paste pH holding time for soil samples was exceeded by 1 day for two samples. The associated detected concentrations were flagged "J."

Laboratory Duplicate

Table 7 lists the specific field sample and the associated LD relative percent difference (RPD) criteria exceedances. The RPD limit was exceeded for one soil sample. The associated detected concentration was flagged "J."

1.3.9 Method E245.7 (Mercury)

Sample temperature

Table 4 lists the specific field samples and their associated temperature criteria exceedances. The maximum temperature was exceeded for six soil samples. The associated detected concentrations were flagged "J."

Field Duplicate

Table 6 lists the specific field samples and their associated FD criteria exceedances. Three FD pairs had criteria exceedances. The associated detected concentrations were flagged "J."

Laboratory Duplicate

Table 7 lists the specific field samples and their associated LD RPD criteria exceedances. The RPD limit was exceeded for six soil samples. The associated detected concentrations were flagged "J."

1.3.10 Method ISO 15178:2000 (Sulfur)

Sample temperature

Table 4 lists the specific field samples and their associated temperature criteria exceedances. The maximum temperature was exceeded for six soil samples. The associated detected concentrations were flagged "J."

1.3.11 MOD_SOBEK-3.2.3 (Neutralization Potential)

Sample temperature

Table 4 lists the specific field samples and their associated temperature criteria exceedances. The maximum temperature was exceeded for six soil samples. The associated detected concentrations were flagged "J."

Field Duplicate

Table 6 lists the specific field samples and their associated FD criteria exceedances. Two FD pairs had criteria exceedances. The associated detected concentrations were flagged "J."

1.3.12 NCR P 36/SM3120B (Available Sulfate)

Field Duplicate

Table 6 lists the specific field samples and their associated FD criteria exceedances. Three FD pairs had criteria exceedances. The associated detected concentrations were flagged "J."

1.3.13 SM2310_DI (Acidity, DI)

Field Duplicate

Table 6 lists the specific field samples and their associated FD criteria exceedances. One FD pair had criteria exceedances. The associated detected concentrations were flagged "J."

1.3.14 SM2320B_DI (Alkalinity, DI)

Laboratory Duplicate

Table 7 lists the specific field sample and the associated LD RPD criteria exceedance. The RPD limit was exceeded for two soil samples. The associated detected concentrations were flagged "J."

1.3.15 SM3120B (Calcium, Magnesium, Potassium, SAR, and Sodium in Saturated Soil)

Field Duplicate

Table 6 lists the specific field samples and their associated FD criteria exceedances. Four FD pairs had criteria exceedances. The associated detected concentrations were flagged "J."

1.3.16 Method SM4110B_DI (Sulfate, DI)

Field Duplicate

Table 6 lists the specific field samples and their associated FD criteria exceedances. One FD pair had criteria exceedances. The associated detected concentrations were flagged "J."

1.3.17 Method SSSA P 455-456 (TOC)

Sample temperature

Table 4 lists the specific field samples and their associated temperature criteria exceedances. The maximum temperature was exceeded for six soil samples. The associated detected concentrations were flagged "J."

Field Duplicates

Table 6 lists the specific field samples and their associated FD precision criteria exceedances. One FD pair had criteria exceedances. The associated detected concentrations were flagged "J."

1.3.18 Method SSSA P 973-974 (Total Carbon by LECO)

Holding Time

Table 5 lists the specific field sample and the associated holding time criteria exceedance. The 28-day holding time for soil samples was exceeded by 26 days for 1 sample. The associated detected concentration was flagged "J."

Field Duplicate

Table 6 lists the specific field samples and their associated FD criteria exceedances. Two FD pairs had criteria exceedances. The associated detected concentrations were flagged "J."

1.3.19 Method SW6010B (Metals)

Sample temperature

Table 4 lists the specific field samples and their associated temperature criteria exceedances. The maximum temperature was exceeded for six soil samples. The associated detected concentrations were flagged "J" and non- detected concentrations were flagged "UJ."

Blanks

Table 4 lists the specific field samples and their associated EB exceedances. Five soil sample detected concentrations were less than five times the associated EB concentrations. The associated results were flagged "U," not detected at the reported concentration.

Field Duplicates

Table 6 lists the specific field samples and their associated FD precision criteria exceedances. Five FD pairs had criteria exceedances. The associated detected concentrations were flagged "J."

Laboratory Duplicate

Table 7 lists the specific field samples and their associated LD RPD criteria exceedances. RPD limits were exceeded for 16 soil samples. The associated detected concentrations were flagged "J."

1.3.20 Method SW6010B_DI (Metals, DI)

Field Duplicates

Table 6 lists the specific field samples and their associated FD precision criteria exceedances. One FD pair had criteria exceedances. The associated detected concentrations were flagged "J."

1.3.21 Method SW6020A_DI (Metals, DI)

Blanks

Table 4 lists the specific field samples and their associated EB exceedances. One soil extract sample detected concentration was less than five times the EB concentration. The associated concentration was flagged "U," not detected at the reported concentration.

Field Duplicates

Table 6 lists the specific field samples and their associated FD precision criteria exceedances. Two FD pairs had criteria exceedances. The associated detected concentrations were flagged "J."

Laboratory Duplicate

Table 7 lists the specific field samples and their associated LD RPD criteria exceedances. RPD limits were exceeded for three soil samples. The associated detected concentrations were flagged "J" and non- detected concentrations were flagged "UJ."

1.3.22 Method USDA_HB60 P 101_CALC (Exchangeable Sodium Percentage)

Holding Time

Table 5 lists the specific field sample and the associated holding time criteria exceedances. The 28-day holding time for soil samples was exceeded by 18 days for 1 sample. The associated non-detected concentration was flagged "UJ."

Field Duplicate

Table 6 lists the specific field samples and their associated FD criteria exceedances. One FD pair had criteria exceedances. The associated detected concentration was flagged "J" and the associated non-detected concentration was flagged "UJ."

1.4 Overall Assessment

Completeness is calculated and reported for each method, matrix, and analyte combination as outlined in the QAPP (CH2M HILL, 2013a). The number of valid (not qualified with an "R" flag) results divided by the number of possible individual analyte results, expressed as a percentage, determines the completeness of the data set. A summary of the completeness percentages can be found in Table 9.

The QAPP completeness goal is 90 percent and the overall data completeness is 100 percent.

- Out of 5,154 normal and FD data points, 404 detected results and 31 non-detected results (approximately 8.4 percent) were qualified as estimated concentrations because of QC exceedances, and 8 detected concentrations (approximately 0.2 percent) were qualified as non-detects because of equipment blank contamination.

- Evaluation of 100 percent of the chemical data was performed by using the QAPP (CH2M HILL, 2013a) as a guide for data quality evaluation.

2.0 Data Management

Faro Mine remediation sampling activity logs and laboratory analytical data are maintained in a project database and/or in project files, where appropriate. Data were collected and stored in a manner consistent with the requirements of the QAPP (CH2M HILL, 2013a).

All raw data will be maintained on file in the laboratory, and will be available upon request. Complete documentation of sample preparation and analysis and associated QC information will be maintained in a manner that allows easy retrieval in the event that additional information is required. The following minimum documentation should be kept for each project:

- · Original work order, chain-of-custody forms, and other pertinent documents received with the samples
- · Records of communication between the laboratory, field personnel, and the client
- · Corrective action reports
- · Laboratory data reports
- · Laboratory logbooks and all raw sample preparation and analytical data
- · Electronic data and all pertinent SOPs

Field records to be retained as a minimum will include correspondence, chain-of-custody forms, field notes, field equipment performance records, maintenance logs, field procedures, corrective action reports, field personnel files, and project-related reports.

The receipt of electronic and pdf laboratory data was logged into the sample tracking program to determine completeness and contractor turnaround time compliance.

The laboratory uploaded electronic data to the Faro Mine EQuIS site, and CH2M HILL chemists downloaded this data into the validation program. All data quality evaluation was done using a semi-automated data validation program that uses laboratory pdf report and electronic data simultaneously. All validation flags and discoveries were entered into the validation database and linked directly to each individual data point.

All data quality evaluation reports were generated from the validation database. Final validation flags were uploaded to the Faro Mine EQuIS site.

The data management system was designed to maintain the usability and integrity of the data through a series of procedures and QC checks that began at the field site and carried through to the generation of data for the user. These data included both the chemical data and field operation information. Both the chemical data and the field data were handled according to the guidelines established in the QAPP (CH2M HILL, 2013a) and in the Faro Mine Data Management Plan (CH2M HILL, 2013b).

The laboratory reports are stored in portable document format (PDF) in the project files and project local area network hard drive areas in the CH2M HILL office in Redding, California, and on the Faro

Mine SharePoint site. The original field data forms are stored on the Faro Mine SharePoint site. Laboratories are required to archive the analytical data as outlined in the QAPP (CH2M HILL, 2013a).

3.0 Works Cited

CH2M HILL. 2013a. *Quality Assurance Project Plan, Faro Mine Remediation Project*. Draft. Prepared for Government of Canada as represented by Aboriginal Affairs and Northern Development Canada and the Government of Yukon. July 3.

CH2M HILL. 2013b. *Faro Mine Data Management Plan.* Prepared for Government of Canada as represented by Aboriginal Affairs and Northern Development Canada and the Government of Yukon. August.

TABLE 1

Sample Summary by COC - Data Summary

CoC Number	Sample Date	Matrix	Sample ID / QAQC Type	SDG	Laboratory
ALS07141301					
	12-Jul-13	SOIL	CH13-311-SS023_SOa / N	L1332105	ALS
			CH13-311-SS024_SOa / N	L1332105	ALS
			CH13-311-SS025_SOa / N	L1332105	ALS
ALS07141301H					
	12-Jul-13	SOIL	CH13-311-SS023_SOa / N	L1369643	ALS
			CH13-311-SS024_SOa / N	L1369643	ALS
			CH13-311-SS025_SOa / N	L1369643	ALS
ALS07141302					
	12-Jul-13	SOIL	CH13-311-SS023_SOa / N	L1377913	ALS
			CH13-311-SS024_SOa / N	L1332147	ALS
			CH13-311-SS024_SOa / N	L1377913	ALS
			CH13-311-SS025_SOa / N	L1377913	ALS
ALS07141302H					
	12-Jul-13	SOIL	CH13-311-SS024_SOa / N	L1332147	ALS
ALS07161302					
	15-Jul-13	SOIL	CH13-311-SS027_SOa / N	L1333599	ALS
			CH13-311-SS028_SOa / N	L1333599	ALS
			CH13-311-SS029_SOa / N	L1333599	ALS
			CH13-311-SS030_SOA / N	L1333599	ALS
			CH13-311-SS031_SOa / N	L1333599	ALS
			CH13-311-SS032_SOa / N	L1333599	ALS
			CH13-311-SS033_SOA / N	L1333599	ALS
			CH13-311-SS034_SOa / N	L1333599	ALS
			CH13-311-SS035_SOa / N	L1333599	ALS
			CH13-311-SS036_SOa / N	L1333599	ALS
			CH13-311-SS037_SOA / N	L1333599	ALS
ALS07161302H					
	15-Jul-13	SOIL	CH13-311-SS027_SOa / N	L1341898	ALS
			CH13-311-SS029_SOa / N	L1341898	ALS
			CH13-311-SS032_SOa / N	L1341898	ALS
			CH13-311-SS033_SOA / N	L1341898	ALS

TABLE 1

Sample Summary by COC - Data Summary

CoC Number	Sample Date	Matrix	Sample ID / QAQC Type	SDG	Laboratory
ALS07161302H					
	15-Jul-13	SOIL	CH13-311-SS033_SOAMS / MS	L1341898	ALS
			CH13-311-SS036_SOa / N	L1341898	ALS
			CH13-311-SS037_SOA / N	L1341898	ALS
ALS07161302R					
	15-Jul-13	SOIL	CH13-311-SS027_SOa / N	L1333599	ALS
			CH13-311-SS028_SOa / N	L1333599	ALS
			CH13-311-SS029_SOa / N	L1333599	ALS
			CH13-311-SS030_SOA / N	L1333599	ALS
			CH13-311-SS031_SOa / N	L1333599	ALS
			CH13-311-SS032_SOa / N	L1333599	ALS
			CH13-311-SS033_SOA / N	L1333599	ALS
			CH13-311-SS034_SOa / N	L1333599	ALS
			CH13-311-SS035_SOa / N	L1333599	ALS
			CH13-311-SS036_SOa / N	L1333599	ALS
			CH13-311-SS037_SOA / N	L1333599	ALS
ALS07161303					
	15-Jul-13	SOIL	CH13-311-SS030_SOA / N	L1333750	ALS
			CH13-311-SS030_SOA / N	L1377913	ALS
			CH13-311-SS033_SOA / N	L1333750	ALS
			CH13-311-SS033_SOA / N	L1377913	ALS
			CH13-311-SS037_SOA / N	L1333750	ALS
			CH13-311-SS037_SOA / N	L1333856	ALS
			CH13-311-SS037_SOA / N	L1377913	ALS
ALS07161304					
	15-Jul-13	SOIL	CH13-311-SS037_SOA / N	L1333750	ALS
			CH13-311-SS037_SOA / N	L1333856	ALS
ALS07211305					
	18-Jul-13	SOIL	CH13-311-BH010_SOa / N	L1336037	ALS
			CH13-311-BH010_SOb / N	L1336037	ALS
			CH13-311-BH010_SOc / N	L1336037	ALS
			CH13-311-BH010_SOd / N	L1336037	ALS

TABLE 1

Sample Summary by COC - Data Summary

CoC Number	Sample Date	Matrix	Sample ID / QAQC Type	SDG	Laboratory
ALS07211305R					
	18-Jul-13	SOIL	CH13-311-BH010_SOa / N	L1336037	ALS
			CH13-311-BH010_SOb / N	L1336037	ALS
			CH13-311-BH010_SOc / N	L1336037	ALS
			CH13-311-BH010_SOd / N	L1336037	ALS
ALS07211306					
	18-Jul-13	SOIL	CH13-311-BH010_SOa / N	L1336049	ALS
			CH13-311-BH010_SOa / N	L1377913	ALS
			CH13-311-BH010_SOb / N	L1336049	ALS
			CH13-311-BH010_SOb / N	L1377913	ALS
			CH13-311-BH010_SOd / N	L1336049	ALS
			CH13-311-BH010_SOd / N	L1377913	ALS
ALS07211307					
	18-Jul-13	SOIL	CH13-311-BH013_SOA / N	L1336054	ALS
			CH13-311-BH013_SOB / N	L1336054	ALS
			CH13-311-BH013_SOC / N	L1336054	ALS
	19-Jul-13		CH13-311-BH013_SOD / N	L1336054	ALS
			CH13-311-BH013_SOE / N	L1336054	ALS
	20-Jul-13		CH13-311-BH014_SOA / N	L1336054	ALS
			CH13-311-BH014_SOB / N	L1336054	ALS
			CH13-311-BH014_SOC / N	L1336054	ALS
			CH13-311-BH014_SOD / N	L1336054	ALS
			CH13-311-BH014_SOE / N	L1336054	ALS
	18-Jul-13		CH13-311-BH913_SOB / FD	L1336054	ALS
ALS07211307R					
	18-Jul-13	SOIL	CH13-311-BH013_SOA / N	L1336054	ALS
			CH13-311-BH013_SOB / N	L1336054	ALS
			CH13-311-BH013_SOC / N	L1336054	ALS
	19-Jul-13		CH13-311-BH013_SOD / N	L1336054	ALS
			CH13-311-BH013_SOE / N	L1336054	ALS
	20-Jul-13		CH13-311-BH014_SOA / N	L1336054	ALS
			CH13-311-BH014_SOB / N	L1336054	ALS
			CH13-311-BH014_SOC / N	L1336054	ALS

TABLE 1

Sample Summary by COC - Data Summary

CoC Number	Sample Date	Matrix	Sample ID / QAQC Type	SDG	Laboratory
ALS07211307R					
	20-Jul-13	SOIL	CH13-311-BH014_SOD / N	L1336054	ALS
			CH13-311-BH014_SOE / N	L1336054	ALS
	18-Jul-13		CH13-311-BH913_SOB / FD	L1336054	ALS
ALS07211308					
	18-Jul-13	SOIL	CH13-311-BH013_SOA / N	L1336075	ALS
			CH13-311-BH013_SOA / N	L1377913	ALS
			CH13-311-BH013_SOB / N	L1336075	ALS
			CH13-311-BH013_SOB / N	L1377913	ALS
			CH13-311-BH013_SOC / N	L1336075	ALS
			CH13-311-BH013_SOC / N	L1377913	ALS
	19-Jul-13		CH13-311-BH013_SOD / N	L1336075	ALS
			CH13-311-BH013_SOD / N	L1377913	ALS
			CH13-311-BH013_SOE / N	L1336075	ALS
			CH13-311-BH013_SOE / N	L1377913	ALS
	20-Jul-13		CH13-311-BH014_SOA / N	L1336075	ALS
			CH13-311-BH014_SOA / N	L1377913	ALS
			CH13-311-BH014_SOB / N	L1336075	ALS
			CH13-311-BH014_SOB / N	L1377913	ALS
			CH13-311-BH014_SOC / N	L1336075	ALS
			CH13-311-BH014_SOC / N	L1377913	ALS
			CH13-311-BH014_SOD / N	L1336075	ALS
			CH13-311-BH014_SOD / N	L1377913	ALS
			CH13-311-BH014_SOE / N	L1336075	ALS
			CH13-311-BH014_SOE / N	L1377913	ALS
	18-Jul-13		CH13-311-BH913_SOB / FD	L1336075	ALS
			CH13-311-BH913_SOB / FD	L1377913	ALS
ALS07211309					
	21-Jul-13	WATER	EB_311_13_001 / EB	L1336353	ALS
			EB_311_13_001MS / MS	L1336353	ALS
ALS07211310					
	21-Jul-13	WATER	EB_311_13_002 / EB	L1336365	ALS
			EB_311_13_002MS / MS	L1336365	ALS

TABLE 1

Sample Summary by COC - Data Summary

CoC Number	Sample Date	Matrix	Sample ID / QAQC Type	SDG	Laboratory
ALS07231304					
	22-Jul-13	SOIL	CH13-311-BH015_SOA / N	L1338766	ALS
			CH13-311-BH015_SOB / N	L1338766	ALS
			CH13-311-BH015_SOC / N	L1338766	ALS
			CH13-311-BH015_SOD / N	L1338766	ALS
			CH13-311-BH015_SOE / N	L1338766	ALS
			CH13-311-BH915_SOC / FD	L1338766	ALS
			CH13-311-BH915_SOCMS / MS	L1338766	ALS
ALS07231304R					
	22-Jul-13	SOIL	CH13-311-BH015_SOA / N	L1338766	ALS
			CH13-311-BH015_SOB / N	L1338766	ALS
			CH13-311-BH015_SOC / N	L1338766	ALS
			CH13-311-BH015_SOD / N	L1338766	ALS
			CH13-311-BH015_SOE / N	L1338766	ALS
			CH13-311-BH915_SOC / FD	L1338766	ALS
ALS07231305					
	22-Jul-13	SOIL	CH13-311-BH015_SOA / N	L1338713	ALS
			CH13-311-BH015_SOA / N	L1377913	ALS
			CH13-311-BH015_SOB / N	L1338713	ALS
			CH13-311-BH015_SOB / N	L1377913	ALS
			CH13-311-BH015_SOC / N	L1338713	ALS
			CH13-311-BH015_SOC / N	L1377913	ALS
			CH13-311-BH015_SOD / N	L1338713	ALS
			CH13-311-BH015_SOD / N	L1377913	ALS
			CH13-311-BH015_SOE / N	L1338713	ALS
			CH13-311-BH015_SOE / N	L1377913	ALS
			CH13-311-BH015_SOEMS / MS	L1338713	ALS
			CH13-311-BH915_SOC / FD	L1338713	ALS
			CH13-311-BH915_SOC / FD	L1377913	ALS
ALS07251301					
	23-Jul-13	SOIL	CH13-311-BH011_SOa / N	L1338656	ALS
			CH13-311-BH011_SOb / N	L1338656	ALS
			CH13-311-BH011_SOc / N	L1338656	ALS

TABLE 1

Sample Summary by COC - Data Summary

CoC Number	Sample Date	Matrix	Sample ID / QAQC Type	SDG	Laboratory
ALS07251301					
	23-Jul-13	SOIL	CH13-311-BH011_SOd / N	L1338656	ALS
	24-Jul-13		CH13-311-BH011_SOe / N	L1338656	ALS
			CH13-311-BH911_SOe / FD	L1338656	ALS
ALS07251301R					
	23-Jul-13	SOIL	CH13-311-BH011_SOa / N	L1338656	ALS
			CH13-311-BH011_SOb / N	L1338656	ALS
			CH13-311-BH011_SOc / N	L1338656	ALS
			CH13-311-BH011_SOd / N	L1338656	ALS
	24-Jul-13		CH13-311-BH011_SOe / N	L1338656	ALS
			CH13-311-BH911_SOe / FD	L1338656	ALS
ALS07251302					
	23-Jul-13	SOIL	CH13-311-BH011_SOa / N	L1338747	ALS
			CH13-311-BH011_SOa / N	L1377913	ALS
			CH13-311-BH011_SOb / N	L1338747	ALS
			CH13-311-BH011_SOb / N	L1377913	ALS
			CH13-311-BH011_SOc / N	L1338747	ALS
			CH13-311-BH011_SOc / N	L1377913	ALS
			CH13-311-BH011_SOd / N	L1338747	ALS
			CH13-311-BH011_SOd / N	L1377913	ALS
	24-Jul-13		CH13-311-BH011_SOe / N	L1338747	ALS
			CH13-311-BH011_SOe / N	L1377913	ALS
			CH13-311-BH911_SOe / FD	L1338747	ALS
			CH13-311-BH911_SOe / FD	L1377913	ALS
ALS07271301					
	24-Jul-13	SOIL	CH13-311-BH012_SOa / N	L1339332	ALS
			CH13-311-BH012_SOb / N	L1339332	ALS
			CH13-311-BH012_SOc / N	L1339332	ALS
	25-Jul-13		CH13-311-BH012_SOd / N	L1339332	ALS
ALS07271301R					
	24-Jul-13	SOIL	CH13-311-BH012_SOa / N	L1339332	ALS
			CH13-311-BH012_SOb / N	L1339332	ALS
			CH13-311-BH012_SOc / N	L1339332	ALS

TABLE 1

Sample Summary by COC - Data Summary

CoC Number	Sample Date	Matrix	Sample ID / QAQC Type	SDG	Laboratory
ALS07271301R					
	25-Jul-13	SOIL	CH13-311-BH012_SOd / N	L1339332	ALS
ALS07271302					
	24-Jul-13	SOIL	CH13-311-BH012_SOa / N	L1339346	ALS
			CH13-311-BH012_SOa / N	L1377913	ALS
			CH13-311-BH012_SOb / N	L1339346	ALS
			CH13-311-BH012_SOb / N	L1377913	ALS
			CH13-311-BH012_SOc / N	L1339346	ALS
			CH13-311-BH012_SOc / N	L1377913	ALS
	25-Jul-13		CH13-311-BH012_SOd / N	L1339346	ALS
			CH13-311-BH012_SOd / N	L1377913	ALS
ALS08151301					
	14-Aug-13	SOIL	CH13-311-TP002_SOa / N	L1348930	ALS
			CH13-311-TP003_SOa / N	L1348930	ALS
			CH13-311-TP004_SOa / N	L1348930	ALS
			CH13-311-TP005_SOa / N	L1348930	ALS
	13-Aug-13		CH13-311-TP006_SOa / N	L1348930	ALS
	14-Aug-13		CH13-311-TP902_SOa / FD	L1348930	ALS
			CH13-311-TP903_SOa / FD	L1348930	ALS
			CH13-311-TP904_SOa / FD	L1348930	ALS
			CH13-311-TP905_SOa / FD	L1348930	ALS
	13-Aug-13		CH13-311-TP906_SOa / FD	L1348930	ALS
ALS08151301H					
	14-Aug-13	SOIL	CH13-311-TP004_SOa / N	L1348930	ALS
	13-Aug-13		CH13-311-TP006_SOa / N	L1348930	ALS
	14-Aug-13		CH13-311-TP904_SOa / FD	L1348930	ALS
	13-Aug-13		CH13-311-TP906_SOa / FD	L1348930	ALS
ALS08151301R					
	14-Aug-13	SOIL	CH13-311-TP002_SOa / N	L1348930	ALS
			CH13-311-TP003_SOa / N	L1348930	ALS
			CH13-311-TP004_SOa / N	L1348930	ALS
			CH13-311-TP005_SOa / N	L1348930	ALS
	13-Aug-13		CH13-311-TP006_SOa / N	L1348930	ALS

TABLE 1

Sample Summary by COC - Data Summary

CoC Number	Sample Date	Matrix	Sample ID / QAQC Type	SDG	Laboratory
ALS08151301R					
	14-Aug-13	SOIL	CH13-311-TP902_SOa / FD	L1348930	ALS
			CH13-311-TP903_SOa / FD	L1348930	ALS
			CH13-311-TP904_SOa / FD	L1348930	ALS
			CH13-311-TP905_SOa / FD	L1348930	ALS
	13-Aug-13		CH13-311-TP906_SOa / FD	L1348930	ALS
ALS08151302					
	14-Aug-13	SOIL	CH13-311-TP002_SOa / N	L1348958	ALS
			CH13-311-TP002_SOa / N	L1377913	ALS
			CH13-311-TP003_SOa / N	L1348958	ALS
			CH13-311-TP003_SOa / N	L1377913	ALS
			CH13-311-TP004_SOa / N	L1348958	ALS
			CH13-311-TP004_SOa / N	L1377913	ALS
			CH13-311-TP005_SOa / N	L1348958	ALS
			CH13-311-TP005_SOa / N	L1377913	ALS
	13-Aug-13		CH13-311-TP006_SOa / N	L1348958	ALS
			CH13-311-TP006_SOa / N	L1377913	ALS
	14-Aug-13		CH13-311-TP902_SOa / FD	L1348958	ALS
			CH13-311-TP902_SOa / FD	L1377913	ALS
			CH13-311-TP903_SOa / FD	L1348958	ALS
			CH13-311-TP903_SOa / FD	L1377913	ALS
			CH13-311-TP904_SOa / FD	L1348958	ALS
			CH13-311-TP904_SOa / FD	L1377913	ALS
			CH13-311-TP905_SOa / FD	L1348958	ALS
			CH13-311-TP905_SOa / FD	L1377913	ALS
	13-Aug-13		CH13-311-TP906_SOa / FD	L1348958	ALS
			CH13-311-TP906_SOa / FD	L1377913	ALS
ALS08251301					
	23-Aug-13	SOIL	CH13-311-BH001_SOa / N	L1353073	ALS
			CH13-311-BH001_SOb / N	L1353073	ALS
	22-Aug-13		CH13-311-BH002_SOb / N	L1353073	ALS
			CH13-311-BH003_SOa / N	L1353073	ALS
			CH13-311-BH003_SOb / N	L1353073	ALS
	23-Aug-13		CH13-311-BH004_SOa / N	L1353073	ALS

TABLE 1

Sample Summary by COC - Data Summary

CoC Number	Sample Date	Matrix	Sample ID / QAQC Type	SDG	Laboratory
ALS08251301					
	23-Aug-13	SOIL	CH13-311-BH005_SOa / N	L1353073	ALS
			CH13-311-BH005_SOb / N	L1353073	ALS
	22-Aug-13		CH13-311-BH903_SOb / FD	L1353073	ALS
ALS08251301H					
	23-Aug-13	SOIL	CH13-311-BH001_SOa / N	L1353073	ALS
			CH13-311-BH001_SOb / N	L1353073	ALS
	22-Aug-13		CH13-311-BH002_SOb / N	L1353073	ALS
			CH13-311-BH003_SOa / N	L1353073	ALS
			CH13-311-BH003_SOb / N	L1353073	ALS
			CH13-311-BH003_SOBMS / MS	L1353073	ALS
ALS08251301R					
	23-Aug-13	SOIL	CH13-311-BH001_SOa / N	L1353073	ALS
			CH13-311-BH001_SOb / N	L1353073	ALS
	22-Aug-13		CH13-311-BH002_SOb / N	L1353073	ALS
			CH13-311-BH003_SOa / N	L1353073	ALS
			CH13-311-BH003_SOb / N	L1353073	ALS
	23-Aug-13		CH13-311-BH004_SOa / N	L1353073	ALS
			CH13-311-BH005_SOa / N	L1353073	ALS
			CH13-311-BH005_SOb / N	L1353073	ALS
	22-Aug-13		CH13-311-BH903_SOb / FD	L1353073	ALS
ALS08251302					
	23-Aug-13	SOIL	CH13-311-BH001_SOb / N	L1353100	ALS
			CH13-311-BH001_SOb / N	L1377913	ALS
	22-Aug-13		CH13-311-BH002_SOb / N	L1353100	ALS
			CH13-311-BH002_SOb / N	L1377913	ALS
			CH13-311-BH003_SOb / N	L1353100	ALS
			CH13-311-BH003_SOb / N	L1377913	ALS
	23-Aug-13		CH13-311-BH005_SOb / N	L1353100	ALS
			CH13-311-BH005_SOb / N	L1377913	ALS
ALS08251305					
	24-Aug-13	SOIL	CH13-311-BH023_SOa / N	L1353113	ALS
			CH13-311-BH023_SOb / N	L1353113	ALS

TABLE 1

Sample Summary by COC - Data Summary

CoC Number	Sample Date	Matrix	Sample ID / QAQC Type	SDG	Laboratory
ALS08251305					
	24-Aug-13	SOIL	CH13-311-BH024_SOa / N	L1353113	ALS
			CH13-311-BH024_SOb / N	L1353113	ALS
			CH13-311-BH924_SOb / FD	L1353113	ALS
ALS08251305R					
	24-Aug-13	SOIL	CH13-311-BH023_SOa / N	L1353113	ALS
			CH13-311-BH023_SOb / N	L1353113	ALS
			CH13-311-BH024_SOa / N	L1353113	ALS
			CH13-311-BH024_SOb / N	L1353113	ALS
			CH13-311-BH924_SOb / FD	L1353113	ALS
ALS08251306					
	24-Aug-13	SOIL	CH13-311-BH023_SOb / N	L1353150	ALS
			CH13-311-BH023_SOb / N	L1377913	ALS
			CH13-311-BH024_SOb / N	L1353150	ALS
			CH13-311-BH024_SOb / N	L1377913	ALS
			CH13-311-BH924_SOb / FD	L1353150	ALS
			CH13-311-BH924_SOb / FD	L1377913	ALS
ALS08291301					
	25-Aug-13	SOIL	CH13-311-BH022_SOa / N	L1355921	ALS
			CH13-311-BH022_SOb / N	L1355921	ALS
ALS08291301R					
	25-Aug-13	SOIL	CH13-311-BH022_SOa / N	L1355921	ALS
			CH13-311-BH022_SOb / N	L1355921	ALS
ALS08291302					
	25-Aug-13	SOIL	CH13-311-BH022_SOb / N	L1355973	ALS
			CH13-311-BH022_SOb / N	L1377913	ALS
ALS09081301					
	27-Aug-13	SOIL	Ch13-311-TP021_SOa / N	L1359691	ALS
	26-Aug-13		CH13-311-TP022_SOa / N	L1359691	ALS
			CH13-311-TP023_SOa / N	L1359691	ALS

TABLE 1

Sample Summary by COC - Data Summary

CoC Number	Sample Date	Matrix	Sample ID / QAQC Type	SDG	Laboratory
ALS09081301R					
	27-Aug-13	SOIL	Ch13-311-TP021_SOa / N	L1359691	ALS
	26-Aug-13		CH13-311-TP022_SOa / N	L1359691	ALS
			CH13-311-TP023_SOa / N	L1359691	ALS
ALS09081302					
	27-Aug-13	SOIL	CH13-311-TP021_SOa / N	L1360748	ALS
			Ch13-311-TP021_SOa / N	L1377913	ALS
ALS09081303					
	27-Aug-13	SOIL	Ch13-311-TP021_SOa / N	L1360747	ALS

QAQC Type

N = normal environmental sample
FD = field duplicate
MS = matrix spike
SD = spike duplicate
TB = trip blank
EB = equipment blank
AB = ambient blank
FB = field blank

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1332105	CH13-311-SS023_SOa	ASTM 2216	7/12/2013	7/15/2013		7/25/2013
		CH13-311-SS023_SOa	CSSS 21.2	7/12/2013	7/15/2013	7/18/2013	7/18/2013
		CH13-311-SS023_SOa	CSSS/APHA 4500H	7/12/2013	7/15/2013		7/29/2013
		CH13-311-SS023_SOa	E245.7	7/12/2013	7/15/2013	7/24/2013	7/29/2013
		CH13-311-SS023_SOa	ISO 15178:2000	7/12/2013	7/15/2013	7/18/2013	7/18/2013
		CH13-311-SS023_SOa	MOD-SOBEK-3.2.3	7/12/2013	7/15/2013		8/27/2013
		CH13-311-SS023_SOa	SSSA P 455-456	7/12/2013	7/15/2013		7/24/2013
		CH13-311-SS023_SOa	SSSA P 455-456	7/12/2013	7/15/2013	7/20/2013	7/20/2013
		CH13-311-SS023_SOa	SW6010B	7/12/2013	7/15/2013	7/24/2013	7/29/2013
		CH13-311-SS024_SOa	ASTM 2216	7/12/2013	7/15/2013		7/25/2013
		CH13-311-SS024_SOa	CSSS 21.2	7/12/2013	7/15/2013	7/18/2013	7/18/2013
		CH13-311-SS024_SOa	CSSS/APHA 4500H	7/12/2013	7/15/2013		7/29/2013
		CH13-311-SS024_SOa	CSSS/APHA 4500H	7/12/2013	7/15/2013		8/1/2013
		CH13-311-SS024_SOa	E245.7	7/12/2013	7/15/2013	7/24/2013	7/29/2013
		CH13-311-SS024_SOa	ISO 15178:2000	7/12/2013	7/15/2013	7/18/2013	7/18/2013
		CH13-311-SS024_SOa	MOD-SOBEK-3.2.3	7/12/2013	7/15/2013		8/27/2013
		CH13-311-SS024_SOa	SSSA P 455-456	7/12/2013	7/15/2013		7/24/2013
		CH13-311-SS024_SOa	SSSA P 455-456	7/12/2013	7/15/2013	7/20/2013	7/20/2013
		CH13-311-SS024_SOa	SW6010B	7/12/2013	7/15/2013	7/24/2013	7/29/2013
		CH13-311-SS025_SOa	ASTM 2216	7/12/2013	7/15/2013		7/25/2013
		CH13-311-SS025_SOa	CSSS 21.2	7/12/2013	7/15/2013	7/18/2013	7/18/2013
		CH13-311-SS025_SOa	CSSS/APHA 4500H	7/12/2013	7/15/2013		7/29/2013
		CH13-311-SS025_SOa	E245.7	7/12/2013	7/15/2013	7/24/2013	7/29/2013
		CH13-311-SS025_SOa	ISO 15178:2000	7/12/2013	7/15/2013	7/18/2013	7/18/2013
		CH13-311-SS025_SOa	MOD-SOBEK-3.2.3	7/12/2013	7/15/2013		8/27/2013
		CH13-311-SS025_SOa	SSSA P 455-456	7/12/2013	7/15/2013		7/24/2013
		CH13-311-SS025_SOa	SSSA P 455-456	7/12/2013	7/15/2013	7/20/2013	7/20/2013
		CH13-311-SS025_SOa	SW6010B	7/12/2013	7/15/2013	7/24/2013	7/29/2013
	L1332147	CH13-311-SS024_SOa	CSSS 19.4	7/12/2013	7/15/2013	8/26/2013	8/26/2013
		CH13-311-SS024_SOa	CSSS 3.321	7/12/2013	7/15/2013	8/26/2013	8/26/2013
		CH13-311-SS024_SOa	CSSS 4.2	7/12/2013	7/15/2013	9/5/2013	9/5/2013
		CH13-311-SS024_SOa	CSSS 4.2/4.3	7/12/2013	7/15/2013	9/5/2013	9/5/2013
		CH13-311-SS024_SOa	SSSA P 973-974	7/12/2013	7/15/2013	9/4/2013	9/4/2013
		CH13-311-SS024_SOa	SW6010B	7/12/2013	7/15/2013	9/3/2013	9/5/2013
		CH13-311-SS024_SOa	USDA-HB60 P 101_CA	7/12/2013	7/15/2013		8/27/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1333599	CH13-311-SS027_SOa	ASTM 2216	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS027_SOa	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS027_SOa	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/31/2013
		CH13-311-SS027_SOa	E245.7	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS027_SOa	EPA600/2-78-054	7/15/2013	7/17/2013	7/29/2013	7/29/2013
		CH13-311-SS027_SOa	ISO 15178:2000	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS027_SOa	MOD-SOBEK-3.2.3	7/15/2013	7/17/2013		8/27/2013
		CH13-311-SS027_SOa	SSSA P 455-456	7/15/2013	7/17/2013		7/20/2013
		CH13-311-SS027_SOa	SSSA P 455-456	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS027_SOa	SW6010B	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS028_SOa	ASTM 2216	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS028_SOa	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS028_SOa	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/31/2013
		CH13-311-SS028_SOa	E245.7	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS028_SOa	EPA600/2-78-054	7/15/2013	7/17/2013	7/29/2013	7/29/2013
		CH13-311-SS028_SOa	ISO 15178:2000	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS028_SOa	MOD-SOBEK-3.2.3	7/15/2013	7/17/2013		8/27/2013
		CH13-311-SS028_SOa	SSSA P 455-456	7/15/2013	7/17/2013		7/20/2013
		CH13-311-SS028_SOa	SSSA P 455-456	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS028_SOa	SW6010B	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS029_SOa	ASTM 2216	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS029_SOa	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS029_SOa	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/31/2013
		CH13-311-SS029_SOa	E245.7	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS029_SOa	EPA600/2-78-054	7/15/2013	7/17/2013	7/29/2013	7/29/2013
		CH13-311-SS029_SOa	ISO 15178:2000	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS029_SOa	MOD-SOBEK-3.2.3	7/15/2013	7/17/2013		8/27/2013
		CH13-311-SS029_SOa	SSSA P 455-456	7/15/2013	7/17/2013		7/20/2013
		CH13-311-SS029_SOa	SSSA P 455-456	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS029_SOa	SW6010B	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS030_SOA	ASTM 2216	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS030_SOA	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS030_SOA	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/31/2013
		CH13-311-SS030_SOA	E245.7	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS030_SOA	EPA600/2-78-054	7/15/2013	7/17/2013	7/29/2013	7/29/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1333599	CH13-311-SS030_SOA	ISO 15178:2000	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS030_SOA	MOD-SOBEK-3.2.3	7/15/2013	7/17/2013		8/27/2013
		CH13-311-SS030_SOA	SSSA P 455-456	7/15/2013	7/17/2013		7/20/2013
		CH13-311-SS030_SOA	SSSA P 455-456	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS030_SOA	SW6010B	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS031_SOa	ASTM 2216	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS031_SOa	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS031_SOa	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/31/2013
		CH13-311-SS031_SOa	E245.7	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS031_SOa	EPA600/2-78-054	7/15/2013	7/17/2013	7/29/2013	7/29/2013
		CH13-311-SS031_SOa	ISO 15178:2000	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS031_SOa	MOD-SOBEK-3.2.3	7/15/2013	7/17/2013		8/27/2013
		CH13-311-SS031_SOa	SSSA P 455-456	7/15/2013	7/17/2013		7/20/2013
		CH13-311-SS031_SOa	SSSA P 455-456	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS031_SOa	SW6010B	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS032_SOa	ASTM 2216	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS032_SOa	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS032_SOa	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/31/2013
		CH13-311-SS032_SOa	E245.7	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS032_SOa	EPA600/2-78-054	7/15/2013	7/17/2013	7/29/2013	7/29/2013
		CH13-311-SS032_SOa	ISO 15178:2000	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS032_SOa	MOD-SOBEK-3.2.3	7/15/2013	7/17/2013		8/27/2013
		CH13-311-SS032_SOa	SSSA P 455-456	7/15/2013	7/17/2013		7/20/2013
		CH13-311-SS032_SOa	SSSA P 455-456	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS032_SOa	SW6010B	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS033_SOA	ASTM 2216	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS033_SOA	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS033_SOA	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/31/2013
		CH13-311-SS033_SOA	E245.7	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS033_SOA	EPA600/2-78-054	7/15/2013	7/17/2013	7/29/2013	7/29/2013
		CH13-311-SS033_SOA	ISO 15178:2000	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS033_SOA	MOD-SOBEK-3.2.3	7/15/2013	7/17/2013		8/27/2013
		CH13-311-SS033_SOA	SSSA P 455-456	7/15/2013	7/17/2013		7/20/2013
		CH13-311-SS033_SOA	SSSA P 455-456	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS033_SOA	SW6010B	7/15/2013	7/17/2013	7/29/2013	7/31/2013

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Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1333599	CH13-311-SS034_SOa	ASTM 2216	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS034_SOa	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS034_SOa	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/31/2013
		CH13-311-SS034_SOa	E245.7	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS034_SOa	EPA600/2-78-054	7/15/2013	7/17/2013	7/29/2013	7/29/2013
		CH13-311-SS034_SOa	ISO 15178:2000	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS034_SOa	MOD-SOBEK-3.2.3	7/15/2013	7/17/2013		8/27/2013
		CH13-311-SS034_SOa	SSSA P 455-456	7/15/2013	7/17/2013		7/20/2013
		CH13-311-SS034_SOa	SSSA P 455-456	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS034_SOa	SW6010B	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS035_SOa	ASTM 2216	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS035_SOa	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS035_SOa	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/31/2013
		CH13-311-SS035_SOa	E245.7	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS035_SOa	EPA600/2-78-054	7/15/2013	7/17/2013	7/29/2013	7/29/2013
		CH13-311-SS035_SOa	ISO 15178:2000	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS035_SOa	MOD-SOBEK-3.2.3	7/15/2013	7/17/2013		8/27/2013
		CH13-311-SS035_SOa	SSSA P 455-456	7/15/2013	7/17/2013		7/20/2013
		CH13-311-SS035_SOa	SSSA P 455-456	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS035_SOa	SW6010B	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS036_SOa	ASTM 2216	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS036_SOa	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS036_SOa	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/31/2013
		CH13-311-SS036_SOa	E245.7	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS036_SOa	EPA600/2-78-054	7/15/2013	7/17/2013	7/29/2013	7/29/2013
		CH13-311-SS036_SOa	ISO 15178:2000	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS036_SOa	MOD-SOBEK-3.2.3	7/15/2013	7/17/2013		8/27/2013
		CH13-311-SS036_SOa	SSSA P 455-456	7/15/2013	7/17/2013		7/20/2013
		CH13-311-SS036_SOa	SSSA P 455-456	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS036_SOa	SW6010B	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS037_SOA	ASTM 2216	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS037_SOA	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/29/2013
		CH13-311-SS037_SOA	CSSS/APHA 4500H	7/15/2013	7/17/2013		7/31/2013
		CH13-311-SS037_SOA	E245.7	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS037_SOA	EPA600/2-78-054	7/15/2013	7/17/2013	7/29/2013	7/29/2013

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Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1333599	CH13-311-SS037_SOA	ISO 15178:2000	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS037_SOA	MOD-SOBEK-3.2.3	7/15/2013	7/17/2013		8/27/2013
		CH13-311-SS037_SOA	SSSA P 455-456	7/15/2013	7/17/2013		7/20/2013
		CH13-311-SS037_SOA	SSSA P 455-456	7/15/2013	7/17/2013	7/20/2013	7/20/2013
		CH13-311-SS037_SOA	SW6010B	7/15/2013	7/17/2013	7/29/2013	7/31/2013
	L1333750	CH13-311-SS030_SOA	ASTM D4318	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS030_SOA	CSSC 3.11	7/15/2013	7/17/2013	7/29/2013	7/29/2013
		CH13-311-SS030_SOA	CSSS 11.3/11.4	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS030_SOA	CSSS 14.2	7/15/2013	7/17/2013	8/1/2013	8/1/2013
		CH13-311-SS030_SOA	CSSS 18.2.2/SM4500C	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS030_SOA	CSSS 18.3.1	7/15/2013	7/17/2013	7/29/2013	7/30/2013
		CH13-311-SS030_SOA	CSSS 19.4	7/15/2013	7/17/2013	7/31/2013	7/31/2013
		CH13-311-SS030_SOA	CSSS 3.321	7/15/2013	7/17/2013	7/31/2013	7/31/2013
		CH13-311-SS030_SOA	CSSS 7.2/7.31	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS030_SOA	NCR P 36/SM3120B	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS030_SOA	SM3120B	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS030_SOA	SSSA P 455-456	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS030_SOA	SSSA P 973-974	7/15/2013	7/17/2013	7/29/2013	7/29/2013
		CH13-311-SS030_SOA	USDA-HB60 P 101_CA	7/15/2013	7/17/2013		7/31/2013
		CH13-311-SS033_SOA	ASTM D4318	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS033_SOA	CSSC 3.11	7/15/2013	7/17/2013	7/29/2013	7/29/2013
		CH13-311-SS033_SOA	CSSS 11.3/11.4	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS033_SOA	CSSS 14.2	7/15/2013	7/17/2013	8/1/2013	8/1/2013
		CH13-311-SS033_SOA	CSSS 18.2.2/SM4500C	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS033_SOA	CSSS 18.3.1	7/15/2013	7/17/2013	7/29/2013	7/30/2013
		CH13-311-SS033_SOA	CSSS 19.4	7/15/2013	7/17/2013	7/31/2013	7/31/2013
		CH13-311-SS033_SOA	CSSS 3.321	7/15/2013	7/17/2013	7/31/2013	7/31/2013
		CH13-311-SS033_SOA	CSSS 7.2/7.31	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS033_SOA	NCR P 36/SM3120B	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS033_SOA	SM3120B	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS033_SOA	SSSA P 455-456	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS033_SOA	SSSA P 973-974	7/15/2013	7/17/2013	7/29/2013	7/29/2013
		CH13-311-SS033_SOA	USDA-HB60 P 101_CA	7/15/2013	7/17/2013		7/31/2013
		CH13-311-SS037_SOA	ASTM D4318	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS037_SOA	CSSC 3.11	7/15/2013	7/17/2013	7/29/2013	7/29/2013

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Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1333750	CH13-311-SS037_SOA	CSSS 11.3/11.4	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS037_SOA	CSSS 14.2	7/15/2013	7/17/2013	8/1/2013	8/1/2013
		CH13-311-SS037_SOA	CSSS 18.2.2/SM4500C	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS037_SOA	CSSS 18.3.1	7/15/2013	7/17/2013	7/29/2013	7/30/2013
		CH13-311-SS037_SOA	CSSS 19.4	7/15/2013	7/17/2013	7/31/2013	7/31/2013
		CH13-311-SS037_SOA	CSSS 3.321	7/15/2013	7/17/2013	7/31/2013	7/31/2013
		CH13-311-SS037_SOA	CSSS 7.2/7.31	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS037_SOA	NCR P 36/SM3120B	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS037_SOA	SM3120B	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS037_SOA	SSSA P 455-456	7/15/2013	7/17/2013	7/30/2013	7/30/2013
		CH13-311-SS037_SOA	SSSA P 973-974	7/15/2013	7/17/2013	7/29/2013	7/29/2013
		CH13-311-SS037_SOA	USDA-HB60 P 101_CA	7/15/2013	7/17/2013		7/31/2013
	L1333856	CH13-311-SS037_SOA	CSSS 19.4	7/15/2013	7/17/2013	7/26/2013	7/26/2013
		CH13-311-SS037_SOA	CSSS 3.321	7/15/2013	7/17/2013	7/26/2013	7/26/2013
		CH13-311-SS037_SOA	CSSS 4.2	7/15/2013	7/17/2013	7/25/2013	7/25/2013
		CH13-311-SS037_SOA	CSSS 4.2/4.3	7/15/2013	7/17/2013	7/25/2013	7/25/2013
		CH13-311-SS037_SOA	SSSA P 973-974	7/15/2013	7/17/2013	7/24/2013	7/24/2013
		CH13-311-SS037_SOA	SW6010B	7/15/2013	7/17/2013	7/29/2013	7/31/2013
		CH13-311-SS037_SOA	USDA-HB60 P 101_CA	7/15/2013	7/17/2013		7/26/2013
	L1336037	CH13-311-BH010_SOa	ASTM 2216	7/18/2013	7/22/2013		7/31/2013
		CH13-311-BH010_SOa	ASTM D4318	7/18/2013	7/22/2013	7/30/2013	7/30/2013
		CH13-311-BH010_SOa	CarterSatPercent	7/18/2013	7/22/2013	8/6/2013	8/8/2013
		CH13-311-BH010_SOa	CSSS 21.2	7/18/2013	7/22/2013	8/7/2013	8/7/2013
		CH13-311-BH010_SOa	CSSS/APHA 4500H	7/18/2013	7/22/2013		8/6/2013
		CH13-311-BH010_SOa	CSSS/APHA 4500H	7/18/2013	7/22/2013		8/7/2013
		CH13-311-BH010_SOa	E245.7	7/18/2013	7/22/2013	8/6/2013	8/7/2013
		CH13-311-BH010_SOa	ISO 15178:2000	7/18/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH010_SOa	MOD-SOBEK-3.2.3	7/18/2013	7/22/2013		9/18/2013
		CH13-311-BH010_SOa	SSSA P 455-456	7/18/2013	7/22/2013		7/26/2013
		CH13-311-BH010_SOa	SSSA P 455-456	7/18/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH010_SOa	SW6010B	7/18/2013	7/22/2013	8/6/2013	8/7/2013
		CH13-311-BH010_SOb	ASTM 2216	7/18/2013	7/22/2013		7/31/2013
		CH13-311-BH010_SOb	CarterSatPercent	7/18/2013	7/22/2013	7/28/2013	8/6/2013
		CH13-311-BH010_SOb	CSSS 21.2	7/18/2013	7/22/2013	8/7/2013	8/7/2013
		CH13-311-BH010_SOb	CSSS/APHA 4500H	7/18/2013	7/22/2013		8/6/2013

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Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1336037	CH13-311-BH010_SOb	CSSS/APHA 4500H	7/18/2013	7/22/2013		8/7/2013
		CH13-311-BH010_SOb	E245.7	7/18/2013	7/22/2013	8/6/2013	8/7/2013
		CH13-311-BH010_SOb	ISO 15178:2000	7/18/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH010_SOb	MOD-SOBEK-3.2.3	7/18/2013	7/22/2013		9/3/2013
		CH13-311-BH010_SOb	SSSA P 455-456	7/18/2013	7/22/2013		7/26/2013
		CH13-311-BH010_SOb	SSSA P 455-456	7/18/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH010_SOb	SW6010B	7/18/2013	7/22/2013	8/6/2013	8/7/2013
		CH13-311-BH010_SOc	ASTM 2216	7/18/2013	7/22/2013		8/2/2013
		CH13-311-BH010_SOc	CarterSatPercent	7/18/2013	7/22/2013	7/28/2013	8/6/2013
		CH13-311-BH010_SOc	CSSS 21.2	7/18/2013	7/22/2013	8/7/2013	8/7/2013
		CH13-311-BH010_SOc	CSSS/APHA 4500H	7/18/2013	7/22/2013		8/6/2013
		CH13-311-BH010_SOc	CSSS/APHA 4500H	7/18/2013	7/22/2013		8/7/2013
		CH13-311-BH010_SOc	E245.7	7/18/2013	7/22/2013	8/6/2013	8/7/2013
		CH13-311-BH010_SOc	ISO 15178:2000	7/18/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH010_SOc	MOD-SOBEK-3.2.3	7/18/2013	7/22/2013		9/3/2013
		CH13-311-BH010_SOc	SSSA P 455-456	7/18/2013	7/22/2013		7/26/2013
		CH13-311-BH010_SOc	SSSA P 455-456	7/18/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH010_SOc	SW6010B	7/18/2013	7/22/2013	8/6/2013	8/7/2013
		CH13-311-BH010_SOd	ASTM 2216	7/18/2013	7/22/2013		8/2/2013
		CH13-311-BH010_SOd	CarterSatPercent	7/18/2013	7/22/2013	7/28/2013	8/6/2013
		CH13-311-BH010_SOd	CSSS 21.2	7/18/2013	7/22/2013	8/7/2013	8/7/2013
		CH13-311-BH010_SOd	CSSS/APHA 4500H	7/18/2013	7/22/2013		8/6/2013
		CH13-311-BH010_SOd	CSSS/APHA 4500H	7/18/2013	7/22/2013		8/7/2013
		CH13-311-BH010_SOd	E245.7	7/18/2013	7/22/2013	8/6/2013	8/7/2013
		CH13-311-BH010_SOd	ISO 15178:2000	7/18/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH010_SOd	MOD-SOBEK-3.2.3	7/18/2013	7/22/2013		9/3/2013
		CH13-311-BH010_SOd	SSSA P 455-456	7/18/2013	7/22/2013		7/26/2013
		CH13-311-BH010_SOd	SSSA P 455-456	7/18/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH010_SOd	SW6010B	7/18/2013	7/22/2013	8/6/2013	8/7/2013
	L1336049	CH13-311-BH010_SOa	CSSC 3.11	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH010_SOa	CSSS 11.3/11.4	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH010_SOa	CSSS 14.2	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH010_SOa	CSSS 18.2.2/SM4500C	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH010_SOa	CSSS 18.3.1	7/18/2013	7/22/2013	7/31/2013	8/1/2013
		CH13-311-BH010_SOa	CSSS 19.4	7/18/2013	7/22/2013	8/2/2013	8/2/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1336049	CH13-311-BH010_SOa	CSSS 3.321	7/18/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH010_SOa	CSSS 4.2	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH010_SOa	CSSS 4.2/4.3	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH010_SOa	CSSS 7.2/7.31	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH010_SOa	NCR P 36/SM3120B	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH010_SOa	SM3120B	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH010_SOa	SSSA P 455-456	7/18/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH010_SOa	SSSA P 973-974	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH010_SOa	SW6010B	7/18/2013	7/22/2013	8/9/2013	8/13/2013
		CH13-311-BH010_SOa	USDA-HB60 P 101_CA	7/18/2013	7/22/2013		8/2/2013
		CH13-311-BH010_SOb	CSSC 3.11	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH010_SOb	CSSS 11.3/11.4	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH010_SOb	CSSS 14.2	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH010_SOb	CSSS 18.2.2/SM4500C	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH010_SOb	CSSS 18.3.1	7/18/2013	7/22/2013	7/31/2013	8/1/2013
		CH13-311-BH010_SOb	CSSS 19.4	7/18/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH010_SOb	CSSS 3.321	7/18/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH010_SOb	NCR P 36/SM3120B	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH010_SOb	SM3120B	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH010_SOb	SSSA P 455-456	7/18/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH010_SOb	SSSA P 894-895	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH010_SOb	SSSA P 973-974	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH010_SOb	USDA-HB60 P 101_CA	7/18/2013	7/22/2013		8/2/2013
		CH13-311-BH010_SOd	CSSC 3.11	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH010_SOd	CSSS 11.3/11.4	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH010_SOd	CSSS 14.2	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH010_SOd	CSSS 18.2.2/SM4500C	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH010_SOd	CSSS 18.3.1	7/18/2013	7/22/2013	7/31/2013	8/1/2013
		CH13-311-BH010_SOd	CSSS 19.4	7/18/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH010_SOd	CSSS 3.321	7/18/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH010_SOd	CSSS 7.2/7.31	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH010_SOd	NCR P 36/SM3120B	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH010_SOd	SM3120B	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH010_SOd	SSSA P 455-456	7/18/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH010_SOd	SSSA P 973-974	7/18/2013	7/22/2013	7/31/2013	7/31/2013

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Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1336049	CH13-311-BH010_SOd	USDA-HB60 P 101_CA	7/18/2013	7/22/2013		8/2/2013
	L1336054	CH13-311-BH013_SOA	ASTM 2216	7/18/2013	7/22/2013		8/2/2013
		CH13-311-BH013_SOA	ASTM D4318	7/18/2013	7/22/2013	7/30/2013	7/30/2013
		CH13-311-BH013_SOA	CarterSatPercent	7/18/2013	7/22/2013	8/6/2013	8/8/2013
		CH13-311-BH013_SOA	CSSS 21.2	7/18/2013	7/22/2013	8/7/2013	8/7/2013
		CH13-311-BH013_SOA	CSSS/APHA 4500H	7/18/2013	7/22/2013		8/6/2013
		CH13-311-BH013_SOA	CSSS/APHA 4500H	7/18/2013	7/22/2013		8/8/2013
		CH13-311-BH013_SOA	E245.7	7/18/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH013_SOA	ISO 15178:2000	7/18/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH013_SOA	MOD-SOBEK-3.2.3	7/18/2013	7/22/2013		9/18/2013
		CH13-311-BH013_SOA	SSSA P 455-456	7/18/2013	7/22/2013		7/26/2013
		CH13-311-BH013_SOA	SSSA P 455-456	7/18/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH013_SOA	SW6010B	7/18/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH013_SOB	ASTM 2216	7/18/2013	7/22/2013		8/2/2013
		CH13-311-BH013_SOB	CarterSatPercent	7/18/2013	7/22/2013	7/28/2013	8/6/2013
		CH13-311-BH013_SOB	CSSS 21.2	7/18/2013	7/22/2013	8/7/2013	8/7/2013
		CH13-311-BH013_SOB	CSSS/APHA 4500H	7/18/2013	7/22/2013		8/6/2013
		CH13-311-BH013_SOB	CSSS/APHA 4500H	7/18/2013	7/22/2013		8/8/2013
		CH13-311-BH013_SOB	E245.7	7/18/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH013_SOB	ISO 15178:2000	7/18/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH013_SOB	MOD-SOBEK-3.2.3	7/18/2013	7/22/2013		9/3/2013
		CH13-311-BH013_SOB	SSSA P 455-456	7/18/2013	7/22/2013		7/26/2013
		CH13-311-BH013_SOB	SSSA P 455-456	7/18/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH013_SOB	SW6010B	7/18/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH013_SOC	ASTM 2216	7/18/2013	7/22/2013		8/2/2013
		CH13-311-BH013_SOC	ASTM D4318	7/18/2013	7/22/2013	7/30/2013	7/30/2013
		CH13-311-BH013_SOC	CarterSatPercent	7/18/2013	7/22/2013	7/28/2013	8/6/2013
		CH13-311-BH013_SOC	CSSS 21.2	7/18/2013	7/22/2013	8/7/2013	8/7/2013
		CH13-311-BH013_SOC	CSSS/APHA 4500H	7/18/2013	7/22/2013		8/6/2013
		CH13-311-BH013_SOC	CSSS/APHA 4500H	7/18/2013	7/22/2013		8/8/2013
		CH13-311-BH013_SOC	E245.7	7/18/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH013_SOC	ISO 15178:2000	7/18/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH013_SOC	MOD-SOBEK-3.2.3	7/18/2013	7/22/2013		9/3/2013
		CH13-311-BH013_SOC	SSSA P 455-456	7/18/2013	7/22/2013		7/26/2013
		CH13-311-BH013_SOC	SSSA P 455-456	7/18/2013	7/22/2013	7/26/2013	7/26/2013

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Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1336054	CH13-311-BH013_SOC	SW6010B	7/18/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH013_SOD	ASTM 2216	7/19/2013	7/22/2013		8/2/2013
		CH13-311-BH013_SOD	CarterSatPercent	7/19/2013	7/22/2013	7/28/2013	8/6/2013
		CH13-311-BH013_SOD	CSSS 21.2	7/19/2013	7/22/2013	8/7/2013	8/7/2013
		CH13-311-BH013_SOD	CSSS/APHA 4500H	7/19/2013	7/22/2013		8/6/2013
		CH13-311-BH013_SOD	CSSS/APHA 4500H	7/19/2013	7/22/2013		8/8/2013
		CH13-311-BH013_SOD	E245.7	7/19/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH013_SOD	ISO 15178:2000	7/19/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH013_SOD	MOD-SOBEK-3.2.3	7/19/2013	7/22/2013		9/18/2013
		CH13-311-BH013_SOD	SSSA P 455-456	7/19/2013	7/22/2013		7/26/2013
		CH13-311-BH013_SOD	SSSA P 455-456	7/19/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH013_SOD	SW6010B	7/19/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH013_SOE	ASTM 2216	7/19/2013	7/22/2013		8/2/2013
		CH13-311-BH013_SOE	CarterSatPercent	7/19/2013	7/22/2013	7/28/2013	8/6/2013
		CH13-311-BH013_SOE	CSSS 21.2	7/19/2013	7/22/2013	8/7/2013	8/7/2013
		CH13-311-BH013_SOE	CSSS/APHA 4500H	7/19/2013	7/22/2013		8/6/2013
		CH13-311-BH013_SOE	CSSS/APHA 4500H	7/19/2013	7/22/2013		8/8/2013
		CH13-311-BH013_SOE	E245.7	7/19/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH013_SOE	ISO 15178:2000	7/19/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH013_SOE	MOD-SOBEK-3.2.3	7/19/2013	7/22/2013		9/3/2013
		CH13-311-BH013_SOE	SSSA P 455-456	7/19/2013	7/22/2013		7/26/2013
		CH13-311-BH013_SOE	SSSA P 455-456	7/19/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH013_SOE	SW6010B	7/19/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH014_SOA	ASTM 2216	7/20/2013	7/22/2013		8/2/2013
		CH13-311-BH014_SOA	CarterSatPercent	7/20/2013	7/22/2013	7/28/2013	8/6/2013
		CH13-311-BH014_SOA	CSSS 21.2	7/20/2013	7/22/2013	8/7/2013	8/7/2013
		CH13-311-BH014_SOA	CSSS/APHA 4500H	7/20/2013	7/22/2013		8/6/2013
		CH13-311-BH014_SOA	CSSS/APHA 4500H	7/20/2013	7/22/2013		8/8/2013
		CH13-311-BH014_SOA	E245.7	7/20/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH014_SOA	ISO 15178:2000	7/20/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH014_SOA	MOD-SOBEK-3.2.3	7/20/2013	7/22/2013		9/3/2013
		CH13-311-BH014_SOA	SSSA P 455-456	7/20/2013	7/22/2013		7/26/2013
		CH13-311-BH014_SOA	SSSA P 455-456	7/20/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH014_SOA	SW6010B	7/20/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH014_SOB	ASTM 2216	7/20/2013	7/22/2013		8/2/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1336054	CH13-311-BH014_SOB	ASTM D4318	7/20/2013	7/22/2013	7/30/2013	7/30/2013
		CH13-311-BH014_SOB	CarterSatPercent	7/20/2013	7/22/2013	7/28/2013	8/6/2013
		CH13-311-BH014_SOB	CSSS 21.2	7/20/2013	7/22/2013	8/7/2013	8/7/2013
		CH13-311-BH014_SOB	CSSS/APHA 4500H	7/20/2013	7/22/2013		8/6/2013
		CH13-311-BH014_SOB	CSSS/APHA 4500H	7/20/2013	7/22/2013		8/8/2013
		CH13-311-BH014_SOB	E245.7	7/20/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH014_SOB	ISO 15178:2000	7/20/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH014_SOB	MOD-SOBEK-3.2.3	7/20/2013	7/22/2013		9/3/2013
		CH13-311-BH014_SOB	SSSA P 455-456	7/20/2013	7/22/2013		7/26/2013
		CH13-311-BH014_SOB	SSSA P 455-456	7/20/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH014_SOB	SW6010B	7/20/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH014_SOC	ASTM 2216	7/20/2013	7/22/2013		8/3/2013
		CH13-311-BH014_SOC	CarterSatPercent	7/20/2013	7/22/2013	7/28/2013	8/6/2013
		CH13-311-BH014_SOC	CSSS 21.2	7/20/2013	7/22/2013	8/7/2013	8/7/2013
		CH13-311-BH014_SOC	CSSS/APHA 4500H	7/20/2013	7/22/2013		8/6/2013
		CH13-311-BH014_SOC	CSSS/APHA 4500H	7/20/2013	7/22/2013		8/8/2013
		CH13-311-BH014_SOC	E245.7	7/20/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH014_SOC	ISO 15178:2000	7/20/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH014_SOC	MOD-SOBEK-3.2.3	7/20/2013	7/22/2013		9/18/2013
		CH13-311-BH014_SOC	SSSA P 455-456	7/20/2013	7/22/2013		7/26/2013
		CH13-311-BH014_SOC	SSSA P 455-456	7/20/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH014_SOC	SW6010B	7/20/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH014_SOD	ASTM 2216	7/20/2013	7/22/2013		8/2/2013
		CH13-311-BH014_SOD	CarterSatPercent	7/20/2013	7/22/2013	8/6/2013	8/8/2013
		CH13-311-BH014_SOD	CSSS 21.2	7/20/2013	7/22/2013	8/7/2013	8/7/2013
		CH13-311-BH014_SOD	CSSS/APHA 4500H	7/20/2013	7/22/2013		8/8/2013
		CH13-311-BH014_SOD	CSSS/APHA 4500H	7/20/2013	7/22/2013		8/9/2013
		CH13-311-BH014_SOD	E245.7	7/20/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH014_SOD	ISO 15178:2000	7/20/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH014_SOD	MOD-SOBEK-3.2.3	7/20/2013	7/22/2013		9/18/2013
		CH13-311-BH014_SOD	SSSA P 455-456	7/20/2013	7/22/2013		7/26/2013
		CH13-311-BH014_SOD	SSSA P 455-456	7/20/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH014_SOD	SW6010B	7/20/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH014_SOE	ASTM 2216	7/20/2013	7/22/2013		8/3/2013
		CH13-311-BH014_SOE	CarterSatPercent	7/20/2013	7/22/2013	7/28/2013	8/6/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1336054	CH13-311-BH014_SOE	CSSS 21.2	7/20/2013	7/22/2013	8/8/2013	8/8/2013
		CH13-311-BH014_SOE	CSSS/APHA 4500H	7/20/2013	7/22/2013		8/6/2013
		CH13-311-BH014_SOE	CSSS/APHA 4500H	7/20/2013	7/22/2013		8/8/2013
		CH13-311-BH014_SOE	E245.7	7/20/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH014_SOE	ISO 15178:2000	7/20/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH014_SOE	MOD-SOBEK-3.2.3	7/20/2013	7/22/2013		9/3/2013
		CH13-311-BH014_SOE	SSSA P 455-456	7/20/2013	7/22/2013		7/26/2013
		CH13-311-BH014_SOE	SSSA P 455-456	7/20/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH014_SOE	SW6010B	7/20/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH913_SOB	ASTM 2216	7/18/2013	7/22/2013		8/2/2013
		CH13-311-BH913_SOB	CarterSatPercent	7/18/2013	7/22/2013	7/28/2013	8/6/2013
		CH13-311-BH913_SOB	CSSS 21.2	7/18/2013	7/22/2013	8/7/2013	8/7/2013
		CH13-311-BH913_SOB	CSSS/APHA 4500H	7/18/2013	7/22/2013		8/6/2013
		CH13-311-BH913_SOB	CSSS/APHA 4500H	7/18/2013	7/22/2013		8/8/2013
		CH13-311-BH913_SOB	E245.7	7/18/2013	7/22/2013	8/7/2013	8/8/2013
		CH13-311-BH913_SOB	ISO 15178:2000	7/18/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH913_SOB	MOD-SOBEK-3.2.3	7/18/2013	7/22/2013		9/3/2013
		CH13-311-BH913_SOB	SSSA P 455-456	7/18/2013	7/22/2013		7/26/2013
		CH13-311-BH913_SOB	SSSA P 455-456	7/18/2013	7/22/2013	7/26/2013	7/26/2013
		CH13-311-BH913_SOB	SW6010B	7/18/2013	7/22/2013	8/7/2013	8/8/2013
	L1336075	CH13-311-BH013_SOA	CSSC 3.11	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOA	CSSS 11.3/11.4	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOA	CSSS 14.2	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOA	CSSS 18.2.2/SM4500C	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOA	CSSS 18.3.1	7/18/2013	7/22/2013	7/31/2013	8/1/2013
		CH13-311-BH013_SOA	CSSS 19.4	7/18/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH013_SOA	CSSS 3.321	7/18/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH013_SOA	CSSS 4.2	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH013_SOA	CSSS 4.2/4.3	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH013_SOA	CSSS 7.2/7.31	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH013_SOA	NCR P 36/SM3120B	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH013_SOA	SM3120B	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOA	SSSA P 455-456	7/18/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH013_SOA	SSSA P 973-974	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH013_SOA	SW6010B	7/18/2013	7/22/2013	8/12/2013	8/12/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1336075	CH13-311-BH013_SOA	USDA-HB60 P 101_CA	7/18/2013	7/22/2013		8/2/2013
		CH13-311-BH013_SOB	CSSC 3.11	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOB	CSSS 11.3/11.4	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOB	CSSS 14.2	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOB	CSSS 18.2.2/SM4500C	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOB	CSSS 18.3.1	7/18/2013	7/22/2013	7/31/2013	8/1/2013
		CH13-311-BH013_SOB	CSSS 19.4	7/18/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH013_SOB	CSSS 7.2/7.31	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH013_SOB	NCR P 36/SM3120B	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH013_SOB	SM3120B	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOB	SSSA P 455-456	7/18/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH013_SOB	SSSA P 973-974	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH013_SOB	USDA-HB60 P 101_CA	7/18/2013	7/22/2013		8/2/2013
		CH13-311-BH013_SOC	CSSC 3.11	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOC	CSSS 11.3/11.4	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOC	CSSS 14.2	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOC	CSSS 18.2.2/SM4500C	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOC	CSSS 18.3.1	7/18/2013	7/22/2013	7/31/2013	8/1/2013
		CH13-311-BH013_SOC	CSSS 19.4	7/18/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH013_SOC	CSSS 7.2/7.31	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH013_SOC	NCR P 36/SM3120B	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH013_SOC	SM3120B	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOC	SSSA P 455-456	7/18/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH013_SOC	SSSA P 973-974	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH013_SOC	USDA-HB60 P 101_CA	7/18/2013	7/22/2013		8/2/2013
		CH13-311-BH013_SOD	CSSC 3.11	7/19/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOD	CSSS 11.3/11.4	7/19/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOD	CSSS 14.2	7/19/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOD	CSSS 18.2.2/SM4500C	7/19/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOD	CSSS 18.3.1	7/19/2013	7/22/2013	7/31/2013	8/1/2013
		CH13-311-BH013_SOD	CSSS 19.4	7/19/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH013_SOD	CSSS 7.2/7.31	7/19/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH013_SOD	NCR P 36/SM3120B	7/19/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH013_SOD	SM3120B	7/19/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOD	SSSA P 455-456	7/19/2013	7/22/2013	8/2/2013	8/2/2013

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Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1336075	CH13-311-BH013_SOD	SSSA P 973-974	7/19/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH013_SOD	USDA-HB60 P 101_CA	7/19/2013	7/22/2013		8/2/2013
		CH13-311-BH013_SOE	CSSC 3.11	7/19/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOE	CSSS 11.3/11.4	7/19/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOE	CSSS 14.2	7/19/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOE	CSSS 18.2.2/SM4500C	7/19/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOE	CSSS 18.3.1	7/19/2013	7/22/2013	7/31/2013	8/1/2013
		CH13-311-BH013_SOE	CSSS 19.4	7/19/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH013_SOE	CSSS 7.2/7.31	7/19/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH013_SOE	NCR P 36/SM3120B	7/19/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH013_SOE	SM3120B	7/19/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH013_SOE	SSSA P 455-456	7/19/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH013_SOE	SSSA P 973-974	7/19/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH013_SOE	USDA-HB60 P 101_CA	7/19/2013	7/22/2013		8/2/2013
		CH13-311-BH014_SOA	CSSC 3.11	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOA	CSSS 11.3/11.4	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOA	CSSS 14.2	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOA	CSSS 18.2.2/SM4500C	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOA	CSSS 18.3.1	7/20/2013	7/22/2013	7/31/2013	8/1/2013
		CH13-311-BH014_SOA	CSSS 19.4	7/20/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH014_SOA	CSSS 7.2/7.31	7/20/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH014_SOA	NCR P 36/SM3120B	7/20/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH014_SOA	SM3120B	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOA	SSSA P 455-456	7/20/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH014_SOA	SSSA P 973-974	7/20/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH014_SOA	USDA-HB60 P 101_CA	7/20/2013	7/22/2013		8/2/2013
		CH13-311-BH014_SOB	CSSC 3.11	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOB	CSSS 11.3/11.4	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOB	CSSS 14.2	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOB	CSSS 18.2.2/SM4500C	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOB	CSSS 18.3.1	7/20/2013	7/22/2013	7/31/2013	8/1/2013
		CH13-311-BH014_SOB	CSSS 19.4	7/20/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH014_SOB	CSSS 3.321	7/20/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH014_SOB	CSSS 4.2	7/20/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH014_SOB	CSSS 4.2/4.3	7/20/2013	7/22/2013	7/31/2013	7/31/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1336075	CH13-311-BH014_SOB	CSSS 7.2/7.31	7/20/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH014_SOB	NCR P 36/SM3120B	7/20/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH014_SOB	SM3120B	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOB	SSSA P 455-456	7/20/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH014_SOB	SSSA P 973-974	7/20/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH014_SOB	SW6010B	7/20/2013	7/22/2013	8/12/2013	8/12/2013
		CH13-311-BH014_SOB	USDA-HB60 P 101_CA	7/20/2013	7/22/2013		8/2/2013
		CH13-311-BH014_SOC	CSSC 3.11	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOC	CSSS 11.3/11.4	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOC	CSSS 14.2	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOC	CSSS 18.2.2/SM4500C	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOC	CSSS 18.3.1	7/20/2013	7/22/2013	7/31/2013	8/1/2013
		CH13-311-BH014_SOC	CSSS 19.4	7/20/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH014_SOC	CSSS 7.2/7.31	7/20/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH014_SOC	NCR P 36/SM3120B	7/20/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH014_SOC	SM3120B	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOC	SSSA P 455-456	7/20/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH014_SOC	SSSA P 973-974	7/20/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH014_SOC	USDA-HB60 P 101_CA	7/20/2013	7/22/2013		8/2/2013
		CH13-311-BH014_SOD	CSSC 3.11	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOD	CSSS 11.3/11.4	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOD	CSSS 14.2	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOD	CSSS 18.2.2/SM4500C	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOD	CSSS 18.3.1	7/20/2013	7/22/2013	7/31/2013	8/1/2013
		CH13-311-BH014_SOD	CSSS 19.4	7/20/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH014_SOD	CSSS 7.2/7.31	7/20/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH014_SOD	NCR P 36/SM3120B	7/20/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH014_SOD	SM3120B	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOD	SSSA P 455-456	7/20/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH014_SOD	SSSA P 973-974	7/20/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH014_SOD	USDA-HB60 P 101_CA	7/20/2013	7/22/2013		8/2/2013
		CH13-311-BH014_SOE	CSSC 3.11	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOE	CSSS 11.3/11.4	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOE	CSSS 14.2	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOE	CSSS 18.2.2/SM4500C	7/20/2013	7/22/2013	8/1/2013	8/1/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1336075	CH13-311-BH014_SOE	CSSS 18.3.1	7/20/2013	7/22/2013	7/31/2013	8/1/2013
		CH13-311-BH014_SOE	CSSS 19.4	7/20/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH014_SOE	CSSS 7.2/7.31	7/20/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH014_SOE	NCR P 36/SM3120B	7/20/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH014_SOE	SM3120B	7/20/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH014_SOE	SSSA P 455-456	7/20/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH014_SOE	SSSA P 973-974	7/20/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH014_SOE	USDA-HB60 P 101_CA	7/20/2013	7/22/2013		8/2/2013
		CH13-311-BH913_SOB	CSSC 3.11	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH913_SOB	CSSS 11.3/11.4	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH913_SOB	CSSS 14.2	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH913_SOB	CSSS 18.2.2/SM4500C	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH913_SOB	CSSS 18.3.1	7/18/2013	7/22/2013	7/31/2013	8/1/2013
		CH13-311-BH913_SOB	CSSS 19.4	7/18/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH913_SOB	CSSS 7.2/7.31	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH913_SOB	NCR P 36/SM3120B	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH913_SOB	SM3120B	7/18/2013	7/22/2013	8/1/2013	8/1/2013
		CH13-311-BH913_SOB	SSSA P 455-456	7/18/2013	7/22/2013	8/2/2013	8/2/2013
		CH13-311-BH913_SOB	SSSA P 973-974	7/18/2013	7/22/2013	7/31/2013	7/31/2013
		CH13-311-BH913_SOB	USDA-HB60 P 101_CA	7/18/2013	7/22/2013		8/2/2013
	L1336353	EB_311_13_001	E245.7	7/21/2013	7/22/2013		7/25/2013
		EB_311_13_001	SM2340B_CALC	7/21/2013	7/22/2013		8/1/2013
		EB_311_13_001	SM4110B	7/21/2013	7/22/2013		7/23/2013
		EB_311_13_001	SSSA P 455-456	7/21/2013	7/22/2013		7/25/2013
		EB_311_13_001	SSSA P 455-456	7/21/2013	7/22/2013		7/28/2013
		EB_311_13_001	SW6010B	7/21/2013	7/22/2013		7/29/2013
		EB_311_13_001	SW6010B	7/21/2013	7/22/2013		7/30/2013
		EB_311_13_001MS	E245.7	7/21/2013			7/29/2013
	L1336365	EB_311_13_002	E245.7	7/21/2013	7/22/2013		7/25/2013
		EB_311_13_002	SM2340B_CALC	7/21/2013	7/22/2013		7/31/2013
		EB_311_13_002	SM4110B	7/21/2013	7/22/2013		7/23/2013
		EB_311_13_002	SSSA P 455-456	7/21/2013	7/22/2013		7/25/2013
		EB_311_13_002	SSSA P 455-456	7/21/2013	7/22/2013		7/28/2013
		EB_311_13_002	SW6010B	7/21/2013	7/22/2013		7/29/2013
		EB_311_13_002	SW6010B	7/21/2013	7/22/2013		7/30/2013

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Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1336365	EB_311_13_002MS	E245.7	7/21/2013			7/29/2013
		EB_311_13_002MS	SSSA P 455-456	7/21/2013			7/26/2013
	L1338656	CH13-311-BH011_SOa	ASTM 2216	7/23/2013	7/26/2013		8/6/2013
		CH13-311-BH011_SOa	CSSS 21.2	7/23/2013	7/26/2013	8/7/2013	8/7/2013
		CH13-311-BH011_SOa	CSSS/APHA 4500H	7/23/2013	7/26/2013		8/8/2013
		CH13-311-BH011_SOa	CSSS/APHA 4500H	7/23/2013	7/26/2013		8/13/2013
		CH13-311-BH011_SOa	E245.7	7/23/2013	7/26/2013	8/9/2013	8/13/2013
		CH13-311-BH011_SOa	ISO 15178:2000	7/23/2013	7/26/2013	8/1/2013	8/1/2013
		CH13-311-BH011_SOa	MOD-SOBEK-3.2.3	7/23/2013	7/26/2013		8/28/2013
		CH13-311-BH011_SOa	SSSA P 455-456	7/23/2013	7/26/2013		8/2/2013
		CH13-311-BH011_SOa	SSSA P 455-456	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOa	SW6010B	7/23/2013	7/26/2013	8/9/2013	8/12/2013
		CH13-311-BH011_SOb	ASTM 2216	7/23/2013	7/26/2013		8/6/2013
		CH13-311-BH011_SOb	CSSS 21.2	7/23/2013	7/26/2013	8/7/2013	8/7/2013
		CH13-311-BH011_SOb	CSSS/APHA 4500H	7/23/2013	7/26/2013		8/8/2013
		CH13-311-BH011_SOb	CSSS/APHA 4500H	7/23/2013	7/26/2013		8/13/2013
		CH13-311-BH011_SOb	E245.7	7/23/2013	7/26/2013	8/9/2013	8/13/2013
		CH13-311-BH011_SOb	ISO 15178:2000	7/23/2013	7/26/2013	8/1/2013	8/1/2013
		CH13-311-BH011_SOb	MOD-SOBEK-3.2.3	7/23/2013	7/26/2013		8/28/2013
		CH13-311-BH011_SOb	SSSA P 455-456	7/23/2013	7/26/2013		8/2/2013
		CH13-311-BH011_SOb	SSSA P 455-456	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOb	SW6010B	7/23/2013	7/26/2013	8/9/2013	8/12/2013
		CH13-311-BH011_SOc	ASTM 2216	7/23/2013	7/26/2013		8/6/2013
		CH13-311-BH011_SOc	ASTM D4318	7/23/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH011_SOc	CSSS 21.2	7/23/2013	7/26/2013	8/7/2013	8/7/2013
		CH13-311-BH011_SOc	CSSS/APHA 4500H	7/23/2013	7/26/2013		8/8/2013
		CH13-311-BH011_SOc	CSSS/APHA 4500H	7/23/2013	7/26/2013		8/13/2013
		CH13-311-BH011_SOc	E245.7	7/23/2013	7/26/2013	8/9/2013	8/13/2013
		CH13-311-BH011_SOc	ISO 15178:2000	7/23/2013	7/26/2013	8/1/2013	8/1/2013
		CH13-311-BH011_SOc	MOD-SOBEK-3.2.3	7/23/2013	7/26/2013		8/28/2013
		CH13-311-BH011_SOc	SSSA P 455-456	7/23/2013	7/26/2013		8/2/2013
		CH13-311-BH011_SOc	SSSA P 455-456	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOc	SW6010B	7/23/2013	7/26/2013	8/9/2013	8/12/2013
		CH13-311-BH011_SOd	ASTM 2216	7/23/2013	7/26/2013		8/6/2013
		CH13-311-BH011_SOd	CSSS 21.2	7/23/2013	7/26/2013	8/7/2013	8/7/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1338656	CH13-311-BH011_SOd	CSSS/APHA 4500H	7/23/2013	7/26/2013		8/8/2013
		CH13-311-BH011_SOd	CSSS/APHA 4500H	7/23/2013	7/26/2013		8/13/2013
		CH13-311-BH011_SOd	E245.7	7/23/2013	7/26/2013	8/9/2013	8/13/2013
		CH13-311-BH011_SOd	ISO 15178:2000	7/23/2013	7/26/2013	8/1/2013	8/1/2013
		CH13-311-BH011_SOd	MOD-SOBEK-3.2.3	7/23/2013	7/26/2013		8/28/2013
		CH13-311-BH011_SOd	SSSA P 455-456	7/23/2013	7/26/2013		8/2/2013
		CH13-311-BH011_SOd	SSSA P 455-456	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOd	SW6010B	7/23/2013	7/26/2013	8/9/2013	8/12/2013
		CH13-311-BH011_SOe	ASTM 2216	7/24/2013	7/26/2013		8/6/2013
		CH13-311-BH011_SOe	CSSS 21.2	7/24/2013	7/26/2013	8/7/2013	8/7/2013
		CH13-311-BH011_SOe	CSSS/APHA 4500H	7/24/2013	7/26/2013		8/8/2013
		CH13-311-BH011_SOe	CSSS/APHA 4500H	7/24/2013	7/26/2013		8/13/2013
		CH13-311-BH011_SOe	E245.7	7/24/2013	7/26/2013	8/9/2013	8/13/2013
		CH13-311-BH011_SOe	ISO 15178:2000	7/24/2013	7/26/2013	8/1/2013	8/1/2013
		CH13-311-BH011_SOe	MOD-SOBEK-3.2.3	7/24/2013	7/26/2013		8/28/2013
		CH13-311-BH011_SOe	SSSA P 455-456	7/24/2013	7/26/2013		8/2/2013
		CH13-311-BH011_SOe	SSSA P 455-456	7/24/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOe	SW6010B	7/24/2013	7/26/2013	8/9/2013	8/12/2013
		CH13-311-BH911_SOe	ASTM 2216	7/24/2013	7/26/2013		8/6/2013
		CH13-311-BH911_SOe	CSSS 21.2	7/24/2013	7/26/2013	8/7/2013	8/7/2013
		CH13-311-BH911_SOe	CSSS/APHA 4500H	7/24/2013	7/26/2013		8/8/2013
		CH13-311-BH911_SOe	CSSS/APHA 4500H	7/24/2013	7/26/2013		8/13/2013
		CH13-311-BH911_SOe	E245.7	7/24/2013	7/26/2013	8/9/2013	8/13/2013
		CH13-311-BH911_SOe	ISO 15178:2000	7/24/2013	7/26/2013	8/1/2013	8/1/2013
		CH13-311-BH911_SOe	MOD-SOBEK-3.2.3	7/24/2013	7/26/2013		8/28/2013
		CH13-311-BH911_SOe	SSSA P 455-456	7/24/2013	7/26/2013		8/2/2013
		CH13-311-BH911_SOe	SSSA P 455-456	7/24/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH911_SOe	SW6010B	7/24/2013	7/26/2013	8/9/2013	8/12/2013
	L1338713	CH13-311-BH015_SOA	CSSC 3.11	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOA	CSSS 11.3/11.4	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOA	CSSS 14.2	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOA	CSSS 18.2.2/SM4500C	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOA	CSSS 18.3.1	7/22/2013	7/25/2013	7/31/2013	8/1/2013
		CH13-311-BH015_SOA	CSSS 19.4	7/22/2013	7/25/2013	8/2/2013	8/2/2013
		CH13-311-BH015_SOA	CSSS 7.2/7.31	7/22/2013	7/25/2013	7/31/2013	7/31/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1338713	CH13-311-BH015_SOA	NCR P 36/SM3120B	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH015_SOA	SM3120B	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOA	SSSA P 455-456	7/22/2013	7/25/2013	8/2/2013	8/2/2013
		CH13-311-BH015_SOA	SSSA P 973-974	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH015_SOA	USDA-HB60 P 101_CA	7/22/2013	7/25/2013		8/2/2013
		CH13-311-BH015_SOB	CSSC 3.11	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOB	CSSS 11.3/11.4	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOB	CSSS 14.2	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOB	CSSS 18.2.2/SM4500C	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOB	CSSS 18.3.1	7/22/2013	7/25/2013	7/31/2013	8/1/2013
		CH13-311-BH015_SOB	CSSS 19.4	7/22/2013	7/25/2013	8/2/2013	8/2/2013
		CH13-311-BH015_SOB	CSSS 7.2/7.31	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH015_SOB	NCR P 36/SM3120B	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH015_SOB	SM3120B	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOB	SSSA P 455-456	7/22/2013	7/25/2013	8/2/2013	8/2/2013
		CH13-311-BH015_SOB	SSSA P 973-974	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH015_SOB	USDA-HB60 P 101_CA	7/22/2013	7/25/2013		8/2/2013
		CH13-311-BH015_SOC	CSSC 3.11	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOC	CSSS 11.3/11.4	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOC	CSSS 14.2	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOC	CSSS 18.2.2/SM4500C	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOC	CSSS 18.3.1	7/22/2013	7/25/2013	7/31/2013	8/1/2013
		CH13-311-BH015_SOC	CSSS 19.4	7/22/2013	7/25/2013	8/2/2013	8/2/2013
		CH13-311-BH015_SOC	CSSS 7.2/7.31	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH015_SOC	NCR P 36/SM3120B	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH015_SOC	SM3120B	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOC	SSSA P 455-456	7/22/2013	7/25/2013	8/2/2013	8/2/2013
		CH13-311-BH015_SOC	SSSA P 973-974	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH015_SOC	USDA-HB60 P 101_CA	7/22/2013	7/25/2013		8/2/2013
		CH13-311-BH015_SOD	CSSC 3.11	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOD	CSSS 11.3/11.4	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOD	CSSS 14.2	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOD	CSSS 18.2.2/SM4500C	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOD	CSSS 18.3.1	7/22/2013	7/25/2013	7/31/2013	8/1/2013
		CH13-311-BH015_SOD	CSSS 19.4	7/22/2013	7/25/2013	8/2/2013	8/2/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1338713	CH13-311-BH015_SOD	CSSS 7.2/7.31	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH015_SOD	NCR P 36/SM3120B	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH015_SOD	SM3120B	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOD	SSSA P 455-456	7/22/2013	7/25/2013	8/2/2013	8/2/2013
		CH13-311-BH015_SOD	SSSA P 973-974	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH015_SOD	USDA-HB60 P 101_CA	7/22/2013	7/25/2013		8/2/2013
		CH13-311-BH015_SOE	CSSC 3.11	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOE	CSSS 11.3/11.4	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOE	CSSS 14.2	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOE	CSSS 18.2.2/SM4500C	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOE	CSSS 18.3.1	7/22/2013	7/25/2013	7/31/2013	8/1/2013
		CH13-311-BH015_SOE	CSSS 19.4	7/22/2013	7/25/2013	8/2/2013	8/2/2013
		CH13-311-BH015_SOE	CSSS 3.321	7/22/2013	7/25/2013	8/2/2013	8/2/2013
		CH13-311-BH015_SOE	CSSS 4.2	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH015_SOE	CSSS 4.2/4.3	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH015_SOE	CSSS 7.2/7.31	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH015_SOE	NCR P 36/SM3120B	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH015_SOE	SM3120B	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH015_SOE	SSSA P 455-456	7/22/2013	7/25/2013	8/2/2013	8/2/2013
		CH13-311-BH015_SOE	SSSA P 973-974	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH015_SOE	SW6010B	7/22/2013	7/25/2013	8/9/2013	8/13/2013
		CH13-311-BH015_SOE	USDA-HB60 P 101_CA	7/22/2013	7/25/2013		8/2/2013
		CH13-311-BH015_SOEMS	SW6010B	7/22/2013	7/25/2013	8/13/2013	8/13/2013
		CH13-311-BH915_SOC	CSSC 3.11	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH915_SOC	CSSS 11.3/11.4	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH915_SOC	CSSS 14.2	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH915_SOC	CSSS 18.2.2/SM4500C	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH915_SOC	CSSS 18.3.1	7/22/2013	7/25/2013	7/31/2013	8/1/2013
		CH13-311-BH915_SOC	CSSS 19.4	7/22/2013	7/25/2013	8/2/2013	8/2/2013
		CH13-311-BH915_SOC	CSSS 7.2/7.31	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH915_SOC	NCR P 36/SM3120B	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH915_SOC	SM3120B	7/22/2013	7/25/2013	8/1/2013	8/1/2013
		CH13-311-BH915_SOC	SSSA P 455-456	7/22/2013	7/25/2013	8/2/2013	8/2/2013
		CH13-311-BH915_SOC	SSSA P 973-974	7/22/2013	7/25/2013	7/31/2013	7/31/2013
		CH13-311-BH915_SOC	USDA-HB60 P 101_CA	7/22/2013	7/25/2013		8/2/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1338747	CH13-311-BH011_SOa	CSSC 3.11	7/23/2013	7/26/2013	8/1/2013	8/1/2013
		CH13-311-BH011_SOa	CSSS 11.3/11.4	7/23/2013	7/26/2013	8/7/2013	8/7/2013
		CH13-311-BH011_SOa	CSSS 14.2	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOa	CSSS 18.2.2/SM4500C	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOa	CSSS 18.3.1	7/23/2013	7/26/2013	8/1/2013	8/2/2013
		CH13-311-BH011_SOa	CSSS 19.4	7/23/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH011_SOa	CSSS 3.321	7/23/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH011_SOa	CSSS 7.2/7.31	7/23/2013	7/26/2013	8/3/2013	8/3/2013
		CH13-311-BH011_SOa	NCR P 36/SM3120B	7/23/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH011_SOa	SM3120B	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOa	SSSA P 455-456	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOa	SSSA P 973-974	7/23/2013	7/26/2013	8/1/2013	8/1/2013
		CH13-311-BH011_SOa	USDA-HB60 P 101_CA	7/23/2013	7/26/2013		8/7/2013
		CH13-311-BH011_SOb	CSSC 3.11	7/23/2013	7/26/2013	8/1/2013	8/1/2013
		CH13-311-BH011_SOb	CSSS 11.3/11.4	7/23/2013	7/26/2013	8/7/2013	8/7/2013
		CH13-311-BH011_SOb	CSSS 14.2	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOb	CSSS 18.2.2/SM4500C	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOb	CSSS 18.3.1	7/23/2013	7/26/2013	8/1/2013	8/2/2013
		CH13-311-BH011_SOb	CSSS 19.4	7/23/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH011_SOb	CSSS 3.321	7/23/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH011_SOb	CSSS 7.2/7.31	7/23/2013	7/26/2013	8/3/2013	8/3/2013
		CH13-311-BH011_SOb	NCR P 36/SM3120B	7/23/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH011_SOb	SM3120B	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOb	SSSA P 455-456	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOb	SSSA P 973-974	7/23/2013	7/26/2013	8/1/2013	8/1/2013
		CH13-311-BH011_SOb	USDA-HB60 P 101_CA	7/23/2013	7/26/2013		8/7/2013
		CH13-311-BH011_SOc	CSSC 3.11	7/23/2013	7/26/2013	8/1/2013	8/1/2013
		CH13-311-BH011_SOc	CSSS 11.3/11.4	7/23/2013	7/26/2013	8/7/2013	8/7/2013
		CH13-311-BH011_SOc	CSSS 14.2	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOc	CSSS 18.2.2/SM4500C	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOc	CSSS 18.3.1	7/23/2013	7/26/2013	8/1/2013	8/2/2013
		CH13-311-BH011_SOc	CSSS 19.4	7/23/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH011_SOc	CSSS 3.321	7/23/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH011_SOc	CSSS 4.2	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOc	CSSS 4.2/4.3	7/23/2013	7/26/2013	8/2/2013	8/2/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1338747	CH13-311-BH011_SOc	CSSS 7.2/7.31	7/23/2013	7/26/2013	8/3/2013	8/3/2013
		CH13-311-BH011_SOc	NCR P 36/SM3120B	7/23/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH011_SOc	SM3120B	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOc	SSSA P 455-456	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOc	SSSA P 973-974	7/23/2013	7/26/2013	8/1/2013	8/1/2013
		CH13-311-BH011_SOc	SW6010B	7/23/2013	7/26/2013	8/9/2013	8/13/2013
		CH13-311-BH011_SOc	USDA-HB60 P 101_CA	7/23/2013	7/26/2013		8/7/2013
		CH13-311-BH011_SOd	CSSC 3.11	7/23/2013	7/26/2013	8/1/2013	8/1/2013
		CH13-311-BH011_SOd	CSSS 11.3/11.4	7/23/2013	7/26/2013	8/7/2013	8/7/2013
		CH13-311-BH011_SOd	CSSS 14.2	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOd	CSSS 18.2.2/SM4500C	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOd	CSSS 18.3.1	7/23/2013	7/26/2013	8/1/2013	8/2/2013
		CH13-311-BH011_SOd	CSSS 19.4	7/23/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH011_SOd	CSSS 3.321	7/23/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH011_SOd	CSSS 7.2/7.31	7/23/2013	7/26/2013	8/3/2013	8/3/2013
		CH13-311-BH011_SOd	NCR P 36/SM3120B	7/23/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH011_SOd	SM3120B	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOd	SSSA P 455-456	7/23/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOd	SSSA P 973-974	7/23/2013	7/26/2013	8/1/2013	8/1/2013
		CH13-311-BH011_SOd	USDA-HB60 P 101_CA	7/23/2013	7/26/2013		8/7/2013
		CH13-311-BH011_SOe	CSSC 3.11	7/24/2013	7/26/2013	8/1/2013	8/1/2013
		CH13-311-BH011_SOe	CSSS 11.3/11.4	7/24/2013	7/26/2013	8/7/2013	8/7/2013
		CH13-311-BH011_SOe	CSSS 14.2	7/24/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOe	CSSS 18.2.2/SM4500C	7/24/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOe	CSSS 18.3.1	7/24/2013	7/26/2013	8/1/2013	8/2/2013
		CH13-311-BH011_SOe	CSSS 19.4	7/24/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH011_SOe	CSSS 3.321	7/24/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH011_SOe	CSSS 7.2/7.31	7/24/2013	7/26/2013	8/3/2013	8/3/2013
		CH13-311-BH011_SOe	NCR P 36/SM3120B	7/24/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH011_SOe	SM3120B	7/24/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOe	SSSA P 455-456	7/24/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH011_SOe	SSSA P 973-974	7/24/2013	7/26/2013	8/1/2013	8/1/2013
		CH13-311-BH011_SOe	USDA-HB60 P 101_CA	7/24/2013	7/26/2013		8/7/2013
		CH13-311-BH911_SOe	CSSC 3.11	7/24/2013	7/26/2013	8/1/2013	8/1/2013
		CH13-311-BH911_SOe	CSSS 11.3/11.4	7/24/2013	7/26/2013	8/7/2013	8/7/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1338747	CH13-311-BH911_SOe	CSSS 14.2	7/24/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH911_SOe	CSSS 18.2.2/SM4500C	7/24/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH911_SOe	CSSS 18.3.1	7/24/2013	7/26/2013	8/1/2013	8/2/2013
		CH13-311-BH911_SOe	CSSS 19.4	7/24/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH911_SOe	CSSS 3.321	7/24/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH911_SOe	CSSS 7.2/7.31	7/24/2013	7/26/2013	8/3/2013	8/3/2013
		CH13-311-BH911_SOe	NCR P 36/SM3120B	7/24/2013	7/26/2013	8/6/2013	8/6/2013
		CH13-311-BH911_SOe	SM3120B	7/24/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH911_SOe	SSSA P 455-456	7/24/2013	7/26/2013	8/2/2013	8/2/2013
		CH13-311-BH911_SOe	SSSA P 973-974	7/24/2013	7/26/2013	8/1/2013	8/1/2013
		CH13-311-BH911_SOe	USDA-HB60 P 101_CA	7/24/2013	7/26/2013		8/7/2013
	L1338766	CH13-311-BH015_SOA	ASTM 2216	7/22/2013	7/25/2013		8/10/2013
		CH13-311-BH015_SOA	CSSS 21.2	7/22/2013	7/25/2013	7/30/2013	7/30/2013
		CH13-311-BH015_SOA	CSSS/APHA 4500H	7/22/2013	7/25/2013		8/2/2013
		CH13-311-BH015_SOA	CSSS/APHA 4500H	7/22/2013	7/25/2013		8/14/2013
		CH13-311-BH015_SOA	E245.7	7/22/2013	7/25/2013	8/9/2013	8/14/2013
		CH13-311-BH015_SOA	ISO 15178:2000	7/22/2013	7/25/2013	7/29/2013	7/29/2013
		CH13-311-BH015_SOA	MOD-SOBEK-3.2.3	7/22/2013	7/25/2013		8/28/2013
		CH13-311-BH015_SOA	SSSA P 455-456	7/22/2013	7/25/2013		7/30/2013
		CH13-311-BH015_SOA	SSSA P 455-456	7/22/2013	7/25/2013	7/30/2013	7/30/2013
		CH13-311-BH015_SOA	SW6010B	7/22/2013	7/25/2013	8/9/2013	8/15/2013
		CH13-311-BH015_SOB	ASTM 2216	7/22/2013	7/25/2013		8/10/2013
		CH13-311-BH015_SOB	CSSS 21.2	7/22/2013	7/25/2013	7/30/2013	7/30/2013
		CH13-311-BH015_SOB	CSSS/APHA 4500H	7/22/2013	7/25/2013		8/2/2013
		CH13-311-BH015_SOB	CSSS/APHA 4500H	7/22/2013	7/25/2013		8/14/2013
		CH13-311-BH015_SOB	E245.7	7/22/2013	7/25/2013	8/9/2013	8/14/2013
		CH13-311-BH015_SOB	ISO 15178:2000	7/22/2013	7/25/2013	7/29/2013	7/29/2013
		CH13-311-BH015_SOB	MOD-SOBEK-3.2.3	7/22/2013	7/25/2013		8/28/2013
		CH13-311-BH015_SOB	SSSA P 455-456	7/22/2013	7/25/2013		7/30/2013
		CH13-311-BH015_SOB	SSSA P 455-456	7/22/2013	7/25/2013	7/30/2013	7/30/2013
		CH13-311-BH015_SOB	SW6010B	7/22/2013	7/25/2013	8/9/2013	8/13/2013
		CH13-311-BH015_SOC	ASTM 2216	7/22/2013	7/25/2013		8/10/2013
		CH13-311-BH015_SOC	CSSS 21.2	7/22/2013	7/25/2013	7/30/2013	7/30/2013
		CH13-311-BH015_SOC	CSSS/APHA 4500H	7/22/2013	7/25/2013		8/2/2013
		CH13-311-BH015_SOC	CSSS/APHA 4500H	7/22/2013	7/25/2013		8/14/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1338766	CH13-311-BH015_SOC	E245.7	7/22/2013	7/25/2013	8/9/2013	8/14/2013
		CH13-311-BH015_SOC	ISO 15178:2000	7/22/2013	7/25/2013	7/29/2013	7/29/2013
		CH13-311-BH015_SOC	MOD-SOBEK-3.2.3	7/22/2013	7/25/2013		8/28/2013
		CH13-311-BH015_SOC	SSSA P 455-456	7/22/2013	7/25/2013		7/30/2013
		CH13-311-BH015_SOC	SSSA P 455-456	7/22/2013	7/25/2013	7/30/2013	7/30/2013
		CH13-311-BH015_SOC	SW6010B	7/22/2013	7/25/2013	8/9/2013	8/13/2013
		CH13-311-BH015_SOD	ASTM 2216	7/22/2013	7/25/2013		8/10/2013
		CH13-311-BH015_SOD	CSSS 21.2	7/22/2013	7/25/2013	7/30/2013	7/30/2013
		CH13-311-BH015_SOD	CSSS/APHA 4500H	7/22/2013	7/25/2013		8/2/2013
		CH13-311-BH015_SOD	CSSS/APHA 4500H	7/22/2013	7/25/2013		8/14/2013
		CH13-311-BH015_SOD	E245.7	7/22/2013	7/25/2013	8/9/2013	8/14/2013
		CH13-311-BH015_SOD	ISO 15178:2000	7/22/2013	7/25/2013	7/29/2013	7/29/2013
		CH13-311-BH015_SOD	MOD-SOBEK-3.2.3	7/22/2013	7/25/2013		8/28/2013
		CH13-311-BH015_SOD	SSSA P 455-456	7/22/2013	7/25/2013		7/30/2013
		CH13-311-BH015_SOD	SSSA P 455-456	7/22/2013	7/25/2013	7/30/2013	7/30/2013
		CH13-311-BH015_SOD	SW6010B	7/22/2013	7/25/2013	8/9/2013	8/13/2013
		CH13-311-BH015_SOE	ASTM 2216	7/22/2013	7/25/2013		8/10/2013
		CH13-311-BH015_SOE	ASTM D4318	7/22/2013	7/25/2013	7/30/2013	7/30/2013
		CH13-311-BH015_SOE	CSSS 21.2	7/22/2013	7/25/2013	7/30/2013	7/30/2013
		CH13-311-BH015_SOE	CSSS/APHA 4500H	7/22/2013	7/25/2013		8/2/2013
		CH13-311-BH015_SOE	CSSS/APHA 4500H	7/22/2013	7/25/2013		8/14/2013
		CH13-311-BH015_SOE	E245.7	7/22/2013	7/25/2013	8/9/2013	8/14/2013
		CH13-311-BH015_SOE	ISO 15178:2000	7/22/2013	7/25/2013	7/29/2013	7/29/2013
		CH13-311-BH015_SOE	MOD-SOBEK-3.2.3	7/22/2013	7/25/2013		8/28/2013
		CH13-311-BH015_SOE	SSSA P 455-456	7/22/2013	7/25/2013		7/30/2013
		CH13-311-BH015_SOE	SSSA P 455-456	7/22/2013	7/25/2013	7/30/2013	7/30/2013
		CH13-311-BH015_SOE	SW6010B	7/22/2013	7/25/2013	8/9/2013	8/13/2013
		CH13-311-BH915_SOC	ASTM 2216	7/22/2013	7/25/2013		8/10/2013
		CH13-311-BH915_SOC	CSSS 21.2	7/22/2013	7/25/2013	7/30/2013	7/30/2013
		CH13-311-BH915_SOC	CSSS/APHA 4500H	7/22/2013	7/25/2013		8/2/2013
		CH13-311-BH915_SOC	CSSS/APHA 4500H	7/22/2013	7/25/2013		8/14/2013
		CH13-311-BH915_SOC	E245.7	7/22/2013	7/25/2013	8/9/2013	8/14/2013
		CH13-311-BH915_SOC	ISO 15178:2000	7/22/2013	7/25/2013	7/29/2013	7/29/2013
		CH13-311-BH915_SOC	MOD-SOBEK-3.2.3	7/22/2013	7/25/2013		8/28/2013
		CH13-311-BH915_SOC	SSSA P 455-456	7/22/2013	7/25/2013		7/30/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1338766	CH13-311-BH915_SOC	SSSA P 455-456	7/22/2013	7/25/2013	7/30/2013	7/30/2013
		CH13-311-BH915_SOC	SW6010B	7/22/2013	7/25/2013	8/9/2013	8/13/2013
		CH13-311-BH915_SOCMS	E245.7	7/22/2013		8/14/2013	8/13/2013
		CH13-311-BH915_SOCMS	SW6010B	7/22/2013		8/13/2013	8/13/2013
	L1339332	CH13-311-BH012_SOa	ASTM 2216	7/24/2013	7/29/2013		8/7/2013
		CH13-311-BH012_SOa	CSSS 21.2	7/24/2013	7/29/2013	8/7/2013	8/7/2013
		CH13-311-BH012_SOa	CSSS/APHA 4500H	7/24/2013	7/29/2013		8/15/2013
		CH13-311-BH012_SOa	E245.7	7/24/2013	7/29/2013	8/9/2013	8/13/2013
		CH13-311-BH012_SOa	ISO 15178:2000	7/24/2013	7/29/2013	8/2/2013	8/2/2013
		CH13-311-BH012_SOa	MOD-SOBEK-3.2.3	7/24/2013	7/29/2013		8/27/2013
		CH13-311-BH012_SOa	SSSA P 455-456	7/24/2013	7/29/2013		8/3/2013
		CH13-311-BH012_SOa	SSSA P 455-456	7/24/2013	7/29/2013	8/3/2013	8/3/2013
		CH13-311-BH012_SOa	SW6010B	7/24/2013	7/29/2013	8/9/2013	8/13/2013
		CH13-311-BH012_SOb	ASTM 2216	7/24/2013	7/29/2013		8/7/2013
		CH13-311-BH012_SOb	CarterSatPercent	7/24/2013	7/29/2013	8/12/2013	8/15/2013
		CH13-311-BH012_SOb	CSSS 21.2	7/24/2013	7/29/2013	8/7/2013	8/7/2013
		CH13-311-BH012_SOb	CSSS/APHA 4500H	7/24/2013	7/29/2013		8/15/2013
		CH13-311-BH012_SOb	E245.7	7/24/2013	7/29/2013	8/9/2013	8/13/2013
		CH13-311-BH012_SOb	ISO 15178:2000	7/24/2013	7/29/2013	8/2/2013	8/2/2013
		CH13-311-BH012_SOb	MOD-SOBEK-3.2.3	7/24/2013	7/29/2013		8/27/2013
		CH13-311-BH012_SOb	SSSA P 455-456	7/24/2013	7/29/2013		8/3/2013
		CH13-311-BH012_SOb	SSSA P 455-456	7/24/2013	7/29/2013	8/3/2013	8/3/2013
		CH13-311-BH012_SOb	SW6010B	7/24/2013	7/29/2013	8/9/2013	8/13/2013
		CH13-311-BH012_SOc	ASTM 2216	7/24/2013	7/29/2013		8/7/2013
		CH13-311-BH012_SOc	CarterSatPercent	7/24/2013	7/29/2013	8/12/2013	8/15/2013
		CH13-311-BH012_SOc	CSSS 21.2	7/24/2013	7/29/2013	8/7/2013	8/7/2013
		CH13-311-BH012_SOc	CSSS/APHA 4500H	7/24/2013	7/29/2013		8/15/2013
		CH13-311-BH012_SOc	E245.7	7/24/2013	7/29/2013	8/9/2013	8/13/2013
		CH13-311-BH012_SOc	ISO 15178:2000	7/24/2013	7/29/2013	8/2/2013	8/2/2013
		CH13-311-BH012_SOc	MOD-SOBEK-3.2.3	7/24/2013	7/29/2013		8/27/2013
		CH13-311-BH012_SOc	SSSA P 455-456	7/24/2013	7/29/2013		8/3/2013
		CH13-311-BH012_SOc	SSSA P 455-456	7/24/2013	7/29/2013	8/3/2013	8/3/2013
		CH13-311-BH012_SOc	SW6010B	7/24/2013	7/29/2013	8/9/2013	8/13/2013
		CH13-311-BH012_SOd	ASTM 2216	7/25/2013	7/29/2013		8/18/2013
		CH13-311-BH012_SOd	ASTM D4318	7/25/2013	7/29/2013	8/6/2013	8/6/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1339332	CH13-311-BH012_SOd	CarterSatPercent	7/25/2013	7/29/2013	8/12/2013	8/15/2013
		CH13-311-BH012_SOd	CSSS 21.2	7/25/2013	7/29/2013	8/7/2013	8/7/2013
		CH13-311-BH012_SOd	CSSS/APHA 4500H	7/25/2013	7/29/2013		8/15/2013
		CH13-311-BH012_SOd	E245.7	7/25/2013	7/29/2013	8/9/2013	8/13/2013
		CH13-311-BH012_SOd	ISO 15178:2000	7/25/2013	7/29/2013	8/2/2013	8/2/2013
		CH13-311-BH012_SOd	MOD-SOBEK-3.2.3	7/25/2013	7/29/2013		8/27/2013
		CH13-311-BH012_SOd	SSSA P 455-456	7/25/2013	7/29/2013		8/3/2013
		CH13-311-BH012_SOd	SSSA P 455-456	7/25/2013	7/29/2013	8/3/2013	8/3/2013
		CH13-311-BH012_SOd	SW6010B	7/25/2013	7/29/2013	8/9/2013	8/13/2013
	L1339346	CH13-311-BH012_SOa	CSSC 3.11	7/24/2013	7/29/2013	8/2/2013	8/2/2013
		CH13-311-BH012_SOa	CSSS 11.3/11.4	7/24/2013	7/29/2013	8/7/2013	8/7/2013
		CH13-311-BH012_SOa	CSSS 14.2	7/24/2013	7/29/2013	8/2/2013	8/2/2013
		CH13-311-BH012_SOa	CSSS 18.2.2/SM4500C	7/24/2013	7/29/2013	8/7/2013	8/7/2013
		CH13-311-BH012_SOa	CSSS 18.3.1	7/24/2013	7/29/2013	8/6/2013	8/7/2013
		CH13-311-BH012_SOa	CSSS 19.4	7/24/2013	7/29/2013	8/9/2013	8/9/2013
		CH13-311-BH012_SOa	CSSS 3.321	7/24/2013	7/29/2013	8/9/2013	8/9/2013
		CH13-311-BH012_SOa	CSSS 7.2/7.31	7/24/2013	7/29/2013	8/8/2013	8/8/2013
		CH13-311-BH012_SOa	NCR P 36/SM3120B	7/24/2013	7/29/2013	8/6/2013	8/6/2013
		CH13-311-BH012_SOa	SM3120B	7/24/2013	7/29/2013	8/7/2013	8/7/2013
		CH13-311-BH012_SOa	SSSA P 455-456	7/24/2013	7/29/2013	8/3/2013	8/3/2013
		CH13-311-BH012_SOa	SSSA P 973-974	7/24/2013	7/29/2013	8/2/2013	8/2/2013
		CH13-311-BH012_SOa	USDA-HB60 P 101_CA	7/24/2013	7/29/2013		8/9/2013
		CH13-311-BH012_SOb	CSSC 3.11	7/24/2013	7/29/2013	8/2/2013	8/2/2013
		CH13-311-BH012_SOb	CSSS 11.3/11.4	7/24/2013	7/29/2013	8/7/2013	8/7/2013
		CH13-311-BH012_SOb	CSSS 14.2	7/24/2013	7/29/2013	8/2/2013	8/2/2013
		CH13-311-BH012_SOb	CSSS 18.2.2/SM4500C	7/24/2013	7/29/2013	8/7/2013	8/7/2013
		CH13-311-BH012_SOb	CSSS 18.3.1	7/24/2013	7/29/2013	8/6/2013	8/7/2013
		CH13-311-BH012_SOb	CSSS 19.4	7/24/2013	7/29/2013	8/9/2013	8/9/2013
		CH13-311-BH012_SOb	CSSS 3.321	7/24/2013	7/29/2013	8/9/2013	8/9/2013
		CH13-311-BH012_SOb	CSSS 7.2/7.31	7/24/2013	7/29/2013	8/8/2013	8/8/2013
		CH13-311-BH012_SOb	NCR P 36/SM3120B	7/24/2013	7/29/2013	8/6/2013	8/6/2013
		CH13-311-BH012_SOb	SM3120B	7/24/2013	7/29/2013	8/7/2013	8/7/2013
		CH13-311-BH012_SOb	SSSA P 455-456	7/24/2013	7/29/2013	8/3/2013	8/3/2013
		CH13-311-BH012_SOb	SSSA P 973-974	7/24/2013	7/29/2013	8/2/2013	8/2/2013
		CH13-311-BH012_SOb	USDA-HB60 P 101_CA	7/24/2013	7/29/2013		8/9/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1339346	CH13-311-BH012_SOc	CSSC 3.11	7/24/2013	7/29/2013	8/2/2013	8/2/2013
		CH13-311-BH012_SOc	CSSS 11.3/11.4	7/24/2013	7/29/2013	8/7/2013	8/7/2013
		CH13-311-BH012_SOc	CSSS 14.2	7/24/2013	7/29/2013	8/2/2013	8/2/2013
		CH13-311-BH012_SOc	CSSS 18.2.2/SM4500C	7/24/2013	7/29/2013	8/7/2013	8/7/2013
		CH13-311-BH012_SOc	CSSS 18.3.1	7/24/2013	7/29/2013	8/6/2013	8/7/2013
		CH13-311-BH012_SOc	CSSS 19.4	7/24/2013	7/29/2013	8/9/2013	8/9/2013
		CH13-311-BH012_SOc	CSSS 3.321	7/24/2013	7/29/2013	8/9/2013	8/9/2013
		CH13-311-BH012_SOc	CSSS 7.2/7.31	7/24/2013	7/29/2013	8/8/2013	8/8/2013
		CH13-311-BH012_SOc	NCR P 36/SM3120B	7/24/2013	7/29/2013	8/6/2013	8/6/2013
		CH13-311-BH012_SOc	SM3120B	7/24/2013	7/29/2013	8/7/2013	8/7/2013
		CH13-311-BH012_SOc	SSSA P 455-456	7/24/2013	7/29/2013	8/3/2013	8/3/2013
		CH13-311-BH012_SOc	SSSA P 973-974	7/24/2013	7/29/2013	8/2/2013	8/2/2013
		CH13-311-BH012_SOc	USDA-HB60 P 101_CA	7/24/2013	7/29/2013		8/9/2013
		CH13-311-BH012_SOd	CSSC 3.11	7/25/2013	7/29/2013	8/2/2013	8/2/2013
		CH13-311-BH012_SOd	CSSS 11.3/11.4	7/25/2013	7/29/2013	8/7/2013	8/7/2013
		CH13-311-BH012_SOd	CSSS 14.2	7/25/2013	7/29/2013	8/2/2013	8/2/2013
		CH13-311-BH012_SOd	CSSS 18.2.2/SM4500C	7/25/2013	7/29/2013	8/7/2013	8/7/2013
		CH13-311-BH012_SOd	CSSS 18.3.1	7/25/2013	7/29/2013	8/6/2013	8/7/2013
		CH13-311-BH012_SOd	CSSS 19.4	7/25/2013	7/29/2013	8/9/2013	8/9/2013
		CH13-311-BH012_SOd	CSSS 3.321	7/25/2013	7/29/2013	8/9/2013	8/9/2013
		CH13-311-BH012_SOd	CSSS 4.2	7/25/2013	7/29/2013	8/2/2013	8/2/2013
		CH13-311-BH012_SOd	CSSS 4.2/4.3	7/25/2013	7/29/2013	8/2/2013	8/2/2013
		CH13-311-BH012_SOd	CSSS 7.2/7.31	7/25/2013	7/29/2013	8/8/2013	8/8/2013
		CH13-311-BH012_SOd	NCR P 36/SM3120B	7/25/2013	7/29/2013	8/6/2013	8/6/2013
		CH13-311-BH012_SOd	SM3120B	7/25/2013	7/29/2013	8/7/2013	8/7/2013
		CH13-311-BH012_SOd	SSSA P 455-456	7/25/2013	7/29/2013	8/3/2013	8/3/2013
		CH13-311-BH012_SOd	SSSA P 973-974	7/25/2013	7/29/2013	8/2/2013	8/2/2013
		CH13-311-BH012_SOd	SW6010B	7/25/2013	7/29/2013	8/9/2013	8/13/2013
		CH13-311-BH012_SOd	USDA-HB60 P 101_CA	7/25/2013	7/29/2013		8/9/2013
	L1341898	CH13-311-SS027_SOa	SW6020A	7/15/2013	7/17/2013	8/14/2013	8/14/2013
		CH13-311-SS029_SOa	ASTM 2216	7/15/2013	7/17/2013		8/11/2013
		CH13-311-SS029_SOa	ASTMD1498_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS029_SOa	CSSS 21.2	7/15/2013	7/17/2013	8/10/2013	8/10/2013
		CH13-311-SS029_SOa	CSSS/APHA 2510B_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS029_SOa	CSSS/APHA 4500H_DI	7/15/2013	7/17/2013		8/15/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1341898	CH13-311-SS029_SOa	E245.7_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS029_SOa	SM2310_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS029_SOa	SM2320B_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS029_SOa	SM4110B_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS029_SOa	SW6010B_DI	7/15/2013	7/17/2013		8/15/2013
		CH13-311-SS029_SOa	SW6020A	7/15/2013	7/17/2013	8/14/2013	8/14/2013
		CH13-311-SS029_SOa	SW6020A_DI	7/15/2013	7/17/2013		8/18/2013
		CH13-311-SS032_SOa	ASTM 2216	7/15/2013	7/17/2013		8/11/2013
		CH13-311-SS032_SOa	ASTMD1498_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS032_SOa	CSSS 21.2	7/15/2013	7/17/2013	8/10/2013	8/10/2013
		CH13-311-SS032_SOa	CSSS/APHA 2510B_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS032_SOa	CSSS/APHA 4500H_DI	7/15/2013	7/17/2013		8/15/2013
		CH13-311-SS032_SOa	E245.7_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS032_SOa	SM2310_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS032_SOa	SM2320B_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS032_SOa	SM4110B_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS032_SOa	SW6010B_DI	7/15/2013	7/17/2013		8/15/2013
		CH13-311-SS032_SOa	SW6020A	7/15/2013	7/17/2013	8/14/2013	8/14/2013
		CH13-311-SS032_SOa	SW6020A_DI	7/15/2013	7/17/2013		8/18/2013
		CH13-311-SS033_SOA	ASTM 2216	7/15/2013	7/17/2013		8/11/2013
		CH13-311-SS033_SOA	ASTMD1498_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS033_SOA	CSSS 21.2	7/15/2013	7/17/2013	8/10/2013	8/10/2013
		CH13-311-SS033_SOA	CSSS/APHA 2510B_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS033_SOA	CSSS/APHA 4500H_DI	7/15/2013	7/17/2013		8/15/2013
		CH13-311-SS033_SOA	E245.7_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS033_SOA	SM2310_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS033_SOA	SM2320B_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS033_SOA	SM4110B_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS033_SOA	SW6010B_DI	7/15/2013	7/17/2013		8/15/2013
		CH13-311-SS033_SOA	SW6020A	7/15/2013	7/17/2013	8/14/2013	8/14/2013
		CH13-311-SS033_SOA	SW6020A_DI	7/15/2013	7/17/2013		8/19/2013
		CH13-311-SS033_SOAMS	E245.7_DI	7/15/2013			8/11/2013
		CH13-311-SS033_SOAMS	SW6010B_DI	7/15/2013			8/11/2013
		CH13-311-SS033_SOAMS	SW6020A_DI	7/15/2013			8/11/2013
		CH13-311-SS036_SOa	ASTM 2216	7/15/2013	7/17/2013		8/11/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1341898	CH13-311-SS036_SOa	ASTMD1498_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS036_SOa	CSSS 21.2	7/15/2013	7/17/2013	8/10/2013	8/10/2013
		CH13-311-SS036_SOa	CSSS/APHA 2510B_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS036_SOa	CSSS/APHA 4500H_DI	7/15/2013	7/17/2013		8/15/2013
		CH13-311-SS036_SOa	E245.7_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS036_SOa	SM2310_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS036_SOa	SM2320B_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS036_SOa	SM4110B_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS036_SOa	SW6010B_DI	7/15/2013	7/17/2013		8/15/2013
		CH13-311-SS036_SOa	SW6020A	7/15/2013	7/17/2013	8/14/2013	8/14/2013
		CH13-311-SS036_SOa	SW6020A_DI	7/15/2013	7/17/2013		8/18/2013
		CH13-311-SS037_SOA	ASTM 2216	7/15/2013	7/17/2013		8/11/2013
		CH13-311-SS037_SOA	ASTMD1498_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS037_SOA	CSSS 21.2	7/15/2013	7/17/2013	8/10/2013	8/10/2013
		CH13-311-SS037_SOA	CSSS/APHA 2510B_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS037_SOA	CSSS/APHA 4500H_DI	7/15/2013	7/17/2013		8/15/2013
		CH13-311-SS037_SOA	E245.7_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS037_SOA	SM2310_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS037_SOA	SM2320B_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS037_SOA	SM4110B_DI	7/15/2013	7/17/2013		8/16/2013
		CH13-311-SS037_SOA	SW6010B_DI	7/15/2013	7/17/2013		8/15/2013
		CH13-311-SS037_SOA	SW6020A	7/15/2013	7/17/2013	8/14/2013	8/14/2013
		CH13-311-SS037_SOA	SW6020A_DI	7/15/2013	7/17/2013		8/18/2013
	L1348930	CH13-311-TP002_SOa	ASTM 2216	8/14/2013	8/16/2013		9/3/2013
		CH13-311-TP002_SOa	ASTM D4318	8/14/2013	8/16/2013	8/24/2013	8/24/2013
		CH13-311-TP002_SOa	CSSS 21.2	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP002_SOa	CSSS/APHA 4500H	8/14/2013	8/16/2013		8/28/2013
		CH13-311-TP002_SOa	CSSS/APHA 4500H	8/14/2013	8/16/2013		9/3/2013
		CH13-311-TP002_SOa	E245.7	8/14/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP002_SOa	EPA600/2-78-054	8/14/2013	8/16/2013	9/1/2013	9/1/2013
		CH13-311-TP002_SOa	ISO 15178:2000	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP002_SOa	MOD-SOBEK-3.2.3	8/14/2013	8/16/2013		9/19/2013
		CH13-311-TP002_SOa	SSSA P 455-456	8/14/2013	8/16/2013		8/23/2013
		CH13-311-TP002_SOa	SSSA P 455-456	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP002_SOa	SW6010B	8/14/2013	8/16/2013	8/23/2013	8/27/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1348930	CH13-311-TP002_SOa	SW6020A	8/14/2013	8/16/2013	9/1/2013	9/1/2013
		CH13-311-TP003_SOa	ASTM 2216	8/14/2013	8/16/2013		9/3/2013
		CH13-311-TP003_SOa	ASTM D4318	8/14/2013	8/16/2013	8/24/2013	8/24/2013
		CH13-311-TP003_SOa	CSSS 21.2	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP003_SOa	CSSS/APHA 4500H	8/14/2013	8/16/2013		8/28/2013
		CH13-311-TP003_SOa	CSSS/APHA 4500H	8/14/2013	8/16/2013		9/3/2013
		CH13-311-TP003_SOa	E245.7	8/14/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP003_SOa	EPA600/2-78-054	8/14/2013	8/16/2013	9/1/2013	9/1/2013
		CH13-311-TP003_SOa	ISO 15178:2000	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP003_SOa	MOD-SOBEK-3.2.3	8/14/2013	8/16/2013		9/19/2013
		CH13-311-TP003_SOa	SSSA P 455-456	8/14/2013	8/16/2013		8/23/2013
		CH13-311-TP003_SOa	SSSA P 455-456	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP003_SOa	SW6010B	8/14/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP003_SOa	SW6020A	8/14/2013	8/16/2013	9/1/2013	9/1/2013
		CH13-311-TP004_SOa	ASTM 2216	8/14/2013	8/16/2013		9/3/2013
		CH13-311-TP004_SOa	ASTM D4318	8/14/2013	8/16/2013	8/24/2013	8/24/2013
		CH13-311-TP004_SOa	ASTMD1498_DI	8/14/2013	8/16/2013		9/16/2013
		CH13-311-TP004_SOa	CSSS 21.2	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP004_SOa	CSSS/APHA 2510B_DI	8/14/2013	8/16/2013		9/11/2013
		CH13-311-TP004_SOa	CSSS/APHA 4500H	8/14/2013	8/16/2013		8/28/2013
		CH13-311-TP004_SOa	CSSS/APHA 4500H	8/14/2013	8/16/2013		9/3/2013
		CH13-311-TP004_SOa	CSSS/APHA 4500H_DI	8/14/2013	8/16/2013		9/10/2013
		CH13-311-TP004_SOa	E245.7	8/14/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP004_SOa	E245.7_DI	8/14/2013	8/16/2013		9/12/2013
		CH13-311-TP004_SOa	EPA600/2-78-054	8/14/2013	8/16/2013	9/1/2013	9/1/2013
		CH13-311-TP004_SOa	ISO 15178:2000	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP004_SOa	MOD-SOBEK-3.2.3	8/14/2013	8/16/2013		9/19/2013
		CH13-311-TP004_SOa	SM2310_DI	8/14/2013	8/16/2013		9/11/2013
		CH13-311-TP004_SOa	SM2320B_DI	8/14/2013	8/16/2013		9/11/2013
		CH13-311-TP004_SOa	SM4110B_DI	8/14/2013	8/16/2013		9/11/2013
		CH13-311-TP004_SOa	SSSA P 455-456	8/14/2013	8/16/2013		8/23/2013
		CH13-311-TP004_SOa	SSSA P 455-456	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP004_SOa	SW6010B	8/14/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP004_SOa	SW6010B_DI	8/14/2013	8/16/2013		9/12/2013
		CH13-311-TP004_SOa	SW6020A	8/14/2013	8/16/2013	9/1/2013	9/1/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1348930	CH13-311-TP004_SOa	SW6020A_DI	8/14/2013	8/16/2013		9/16/2013
		CH13-311-TP005_SOa	ASTM 2216	8/14/2013	8/16/2013		9/3/2013
		CH13-311-TP005_SOa	ASTM D4318	8/14/2013	8/16/2013	8/24/2013	8/24/2013
		CH13-311-TP005_SOa	CSSS 21.2	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP005_SOa	CSSS/APHA 4500H	8/14/2013	8/16/2013		8/28/2013
		CH13-311-TP005_SOa	CSSS/APHA 4500H	8/14/2013	8/16/2013		9/3/2013
		CH13-311-TP005_SOa	E245.7	8/14/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP005_SOa	EPA600/2-78-054	8/14/2013	8/16/2013	9/1/2013	9/1/2013
		CH13-311-TP005_SOa	ISO 15178:2000	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP005_SOa	MOD-SOBEK-3.2.3	8/14/2013	8/16/2013		9/19/2013
		CH13-311-TP005_SOa	SSSA P 455-456	8/14/2013	8/16/2013		8/23/2013
		CH13-311-TP005_SOa	SSSA P 455-456	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP005_SOa	SW6010B	8/14/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP005_SOa	SW6020A	8/14/2013	8/16/2013	9/1/2013	9/1/2013
		CH13-311-TP006_SOa	ASTM 2216	8/13/2013	8/16/2013		9/3/2013
		CH13-311-TP006_SOa	ASTM D4318	8/13/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP006_SOa	ASTMD1498_DI	8/13/2013	8/16/2013		9/16/2013
		CH13-311-TP006_SOa	CSSS 21.2	8/13/2013	8/16/2013	8/21/2013	8/21/2013
		CH13-311-TP006_SOa	CSSS/APHA 2510B_DI	8/13/2013	8/16/2013		9/11/2013
		CH13-311-TP006_SOa	CSSS/APHA 4500H	8/13/2013	8/16/2013		8/28/2013
		CH13-311-TP006_SOa	CSSS/APHA 4500H	8/13/2013	8/16/2013		9/3/2013
		CH13-311-TP006_SOa	CSSS/APHA 4500H_DI	8/13/2013	8/16/2013		9/10/2013
		CH13-311-TP006_SOa	E245.7	8/13/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP006_SOa	E245.7_DI	8/13/2013	8/16/2013		9/12/2013
		CH13-311-TP006_SOa	EPA600/2-78-054	8/13/2013	8/16/2013	9/1/2013	9/1/2013
		CH13-311-TP006_SOa	ISO 15178:2000	8/13/2013	8/16/2013	8/21/2013	8/21/2013
		CH13-311-TP006_SOa	MOD-SOBEK-3.2.3	8/13/2013	8/16/2013		9/19/2013
		CH13-311-TP006_SOa	SM2310_DI	8/13/2013	8/16/2013		9/11/2013
		CH13-311-TP006_SOa	SM2320B_DI	8/13/2013	8/16/2013		9/11/2013
		CH13-311-TP006_SOa	SM4110B_DI	8/13/2013	8/16/2013		9/11/2013
		CH13-311-TP006_SOa	SSSA P 455-456	8/13/2013	8/16/2013		8/24/2013
		CH13-311-TP006_SOa	SSSA P 455-456	8/13/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP006_SOa	SW6010B	8/13/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP006_SOa	SW6010B_DI	8/13/2013	8/16/2013		9/12/2013
		CH13-311-TP006_SOa	SW6020A	8/13/2013	8/16/2013	9/1/2013	9/1/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1348930	CH13-311-TP006_SOa	SW6020A_DI	8/13/2013	8/16/2013		9/16/2013
		CH13-311-TP902_SOa	ASTM 2216	8/14/2013	8/16/2013		9/3/2013
		CH13-311-TP902_SOa	ASTM D4318	8/14/2013	8/16/2013	8/24/2013	8/24/2013
		CH13-311-TP902_SOa	CSSS 21.2	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP902_SOa	CSSS/APHA 4500H	8/14/2013	8/16/2013		8/28/2013
		CH13-311-TP902_SOa	CSSS/APHA 4500H	8/14/2013	8/16/2013		9/3/2013
		CH13-311-TP902_SOa	E245.7	8/14/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP902_SOa	EPA600/2-78-054	8/14/2013	8/16/2013	9/1/2013	9/1/2013
		CH13-311-TP902_SOa	ISO 15178:2000	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP902_SOa	MOD-SOBEK-3.2.3	8/14/2013	8/16/2013		9/19/2013
		CH13-311-TP902_SOa	SSSA P 455-456	8/14/2013	8/16/2013		8/23/2013
		CH13-311-TP902_SOa	SSSA P 455-456	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP902_SOa	SW6010B	8/14/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP902_SOa	SW6020A	8/14/2013	8/16/2013	9/1/2013	9/1/2013
		CH13-311-TP903_SOa	ASTM 2216	8/14/2013	8/16/2013		9/3/2013
		CH13-311-TP903_SOa	ASTM D4318	8/14/2013	8/16/2013	8/24/2013	8/24/2013
		CH13-311-TP903_SOa	CSSS 21.2	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP903_SOa	CSSS/APHA 4500H	8/14/2013	8/16/2013		8/28/2013
		CH13-311-TP903_SOa	CSSS/APHA 4500H	8/14/2013	8/16/2013		9/3/2013
		CH13-311-TP903_SOa	E245.7	8/14/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP903_SOa	EPA600/2-78-054	8/14/2013	8/16/2013	9/1/2013	9/1/2013
		CH13-311-TP903_SOa	ISO 15178:2000	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP903_SOa	MOD-SOBEK-3.2.3	8/14/2013	8/16/2013		9/19/2013
		CH13-311-TP903_SOa	SSSA P 455-456	8/14/2013	8/16/2013		8/23/2013
		CH13-311-TP903_SOa	SSSA P 455-456	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP903_SOa	SW6010B	8/14/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP903_SOa	SW6020A	8/14/2013	8/16/2013	9/1/2013	9/1/2013
		CH13-311-TP904_SOa	ASTM 2216	8/14/2013	8/16/2013		9/3/2013
		CH13-311-TP904_SOa	ASTM D4318	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP904_SOa	ASTMD1498_DI	8/14/2013	8/16/2013		9/16/2013
		CH13-311-TP904_SOa	CSSS 21.2	8/14/2013	8/16/2013	8/21/2013	8/21/2013
		CH13-311-TP904_SOa	CSSS/APHA 2510B_DI	8/14/2013	8/16/2013		9/11/2013
		CH13-311-TP904_SOa	CSSS/APHA 4500H	8/14/2013	8/16/2013		8/28/2013
		CH13-311-TP904_SOa	CSSS/APHA 4500H	8/14/2013	8/16/2013		9/3/2013
		CH13-311-TP904_SOa	CSSS/APHA 4500H_DI	8/14/2013	8/16/2013		9/10/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1348930	CH13-311-TP904_SOa	E245.7	8/14/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP904_SOa	E245.7_DI	8/14/2013	8/16/2013		9/12/2013
		CH13-311-TP904_SOa	EPA600/2-78-054	8/14/2013	8/16/2013	9/1/2013	9/1/2013
		CH13-311-TP904_SOa	ISO 15178:2000	8/14/2013	8/16/2013	8/21/2013	8/21/2013
		CH13-311-TP904_SOa	MOD-SOBEK-3.2.3	8/14/2013	8/16/2013		9/19/2013
		CH13-311-TP904_SOa	SM2310_DI	8/14/2013	8/16/2013		9/11/2013
		CH13-311-TP904_SOa	SM2320B_DI	8/14/2013	8/16/2013		9/11/2013
		CH13-311-TP904_SOa	SM4110B_DI	8/14/2013	8/16/2013		9/11/2013
		CH13-311-TP904_SOa	SSSA P 455-456	8/14/2013	8/16/2013		8/24/2013
		CH13-311-TP904_SOa	SSSA P 455-456	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP904_SOa	SW6010B	8/14/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP904_SOa	SW6010B_DI	8/14/2013	8/16/2013		9/12/2013
		CH13-311-TP904_SOa	SW6020A	8/14/2013	8/16/2013	9/1/2013	9/1/2013
		CH13-311-TP904_SOa	SW6020A_DI	8/14/2013	8/16/2013		9/16/2013
		CH13-311-TP905_SOa	ASTM 2216	8/14/2013	8/16/2013		9/3/2013
		CH13-311-TP905_SOa	ASTM D4318	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP905_SOa	CSSS 21.2	8/14/2013	8/16/2013	8/21/2013	8/21/2013
		CH13-311-TP905_SOa	CSSS/APHA 4500H	8/14/2013	8/16/2013		8/28/2013
		CH13-311-TP905_SOa	CSSS/APHA 4500H	8/14/2013	8/16/2013		9/3/2013
		CH13-311-TP905_SOa	E245.7	8/14/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP905_SOa	EPA600/2-78-054	8/14/2013	8/16/2013	9/1/2013	9/1/2013
		CH13-311-TP905_SOa	ISO 15178:2000	8/14/2013	8/16/2013	8/21/2013	8/21/2013
		CH13-311-TP905_SOa	MOD-SOBEK-3.2.3	8/14/2013	8/16/2013		9/19/2013
		CH13-311-TP905_SOa	SSSA P 455-456	8/14/2013	8/16/2013		8/24/2013
		CH13-311-TP905_SOa	SSSA P 455-456	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP905_SOa	SW6010B	8/14/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP905_SOa	SW6020A	8/14/2013	8/16/2013	9/1/2013	9/1/2013
		CH13-311-TP906_SOa	ASTM 2216	8/13/2013	8/16/2013		9/3/2013
		CH13-311-TP906_SOa	ASTM D4318	8/13/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP906_SOa	ASTMD1498_DI	8/13/2013	8/16/2013		9/16/2013
		CH13-311-TP906_SOa	CSSS 21.2	8/13/2013	8/16/2013	8/21/2013	8/21/2013
		CH13-311-TP906_SOa	CSSS/APHA 2510B_DI	8/13/2013	8/16/2013		9/11/2013
		CH13-311-TP906_SOa	CSSS/APHA 4500H	8/13/2013	8/16/2013		8/28/2013
		CH13-311-TP906_SOa	CSSS/APHA 4500H	8/13/2013	8/16/2013		9/3/2013
		CH13-311-TP906_SOa	CSSS/APHA 4500H_DI	8/13/2013	8/16/2013		9/10/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1348930	CH13-311-TP906_SOa	E245.7	8/13/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP906_SOa	E245.7_DI	8/13/2013	8/16/2013		9/12/2013
		CH13-311-TP906_SOa	EPA600/2-78-054	8/13/2013	8/16/2013	9/1/2013	9/1/2013
		CH13-311-TP906_SOa	ISO 15178:2000	8/13/2013	8/16/2013	8/21/2013	8/21/2013
		CH13-311-TP906_SOa	MOD-SOBEK-3.2.3	8/13/2013	8/16/2013		9/19/2013
		CH13-311-TP906_SOa	SM2310_DI	8/13/2013	8/16/2013		9/11/2013
		CH13-311-TP906_SOa	SM2320B_DI	8/13/2013	8/16/2013		9/11/2013
		CH13-311-TP906_SOa	SM4110B_DI	8/13/2013	8/16/2013		9/11/2013
		CH13-311-TP906_SOa	SSSA P 455-456	8/13/2013	8/16/2013		8/24/2013
		CH13-311-TP906_SOa	SSSA P 455-456	8/13/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP906_SOa	SW6010B	8/13/2013	8/16/2013	8/23/2013	8/27/2013
		CH13-311-TP906_SOa	SW6010B_DI	8/13/2013	8/16/2013		9/12/2013
		CH13-311-TP906_SOa	SW6020A	8/13/2013	8/16/2013	9/1/2013	9/1/2013
		CH13-311-TP906_SOa	SW6020A_DI	8/13/2013	8/16/2013		9/16/2013
	L1348958	CH13-311-TP002_SOa	CSSC 3.11	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP002_SOa	CSSS 11.3/11.4	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP002_SOa	CSSS 14.2	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP002_SOa	CSSS 18.2.2/SM4500C	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP002_SOa	CSSS 18.3.1	8/14/2013	8/16/2013	8/22/2013	8/23/2013
		CH13-311-TP002_SOa	CSSS 18.3.1	8/14/2013	8/16/2013	9/9/2013	9/9/2013
		CH13-311-TP002_SOa	CSSS 19.4	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP002_SOa	CSSS 3.321	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP002_SOa	CSSS 4.2	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP002_SOa	CSSS 4.2/4.3	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP002_SOa	CSSS 7.2/7.31	8/14/2013	8/16/2013	8/24/2013	8/24/2013
		CH13-311-TP002_SOa	NCR P 36/SM3120B	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP002_SOa	SM3120B	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP002_SOa	SSSA P 455-456	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP002_SOa	SSSA P 973-974	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP002_SOa	SW6010B	8/14/2013	8/16/2013	8/26/2013	8/28/2013
		CH13-311-TP002_SOa	USDA-HB60 P 101_CA	8/14/2013	8/16/2013		8/27/2013
		CH13-311-TP003_SOa	CSSC 3.11	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP003_SOa	CSSS 11.3/11.4	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP003_SOa	CSSS 14.2	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP003_SOa	CSSS 18.2.2/SM4500C	8/14/2013	8/16/2013	8/23/2013	8/23/2013

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Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1348958	CH13-311-TP003_SOa	CSSS 18.3.1	8/14/2013	8/16/2013	8/22/2013	8/23/2013
		CH13-311-TP003_SOa	CSSS 18.3.1	8/14/2013	8/16/2013	9/9/2013	9/9/2013
		CH13-311-TP003_SOa	CSSS 19.4	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP003_SOa	CSSS 3.321	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP003_SOa	CSSS 7.2/7.31	8/14/2013	8/16/2013	8/24/2013	8/24/2013
		CH13-311-TP003_SOa	NCR P 36/SM3120B	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP003_SOa	SM3120B	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP003_SOa	SSSA P 455-456	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP003_SOa	SSSA P 973-974	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP003_SOa	USDA-HB60 P 101_CA	8/14/2013	8/16/2013		8/27/2013
		CH13-311-TP004_SOa	CSSC 3.11	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP004_SOa	CSSS 11.3/11.4	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP004_SOa	CSSS 14.2	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP004_SOa	CSSS 18.2.2/SM4500C	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP004_SOa	CSSS 18.3.1	8/14/2013	8/16/2013	8/22/2013	8/23/2013
		CH13-311-TP004_SOa	CSSS 18.3.1	8/14/2013	8/16/2013	9/9/2013	9/9/2013
		CH13-311-TP004_SOa	CSSS 19.4	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP004_SOa	CSSS 3.321	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP004_SOa	CSSS 7.2/7.31	8/14/2013	8/16/2013	8/24/2013	8/24/2013
		CH13-311-TP004_SOa	NCR P 36/SM3120B	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP004_SOa	SM3120B	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP004_SOa	SSSA P 455-456	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP004_SOa	SSSA P 973-974	8/14/2013	8/16/2013	8/21/2013	8/21/2013
		CH13-311-TP004_SOa	USDA-HB60 P 101_CA	8/14/2013	8/16/2013		8/27/2013
		CH13-311-TP005_SOa	CSSC 3.11	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP005_SOa	CSSS 11.3/11.4	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP005_SOa	CSSS 14.2	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP005_SOa	CSSS 18.2.2/SM4500C	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP005_SOa	CSSS 18.3.1	8/14/2013	8/16/2013	8/22/2013	8/23/2013
		CH13-311-TP005_SOa	CSSS 18.3.1	8/14/2013	8/16/2013	9/9/2013	9/9/2013
		CH13-311-TP005_SOa	CSSS 19.4	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP005_SOa	CSSS 3.321	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP005_SOa	CSSS 7.2/7.31	8/14/2013	8/16/2013	8/24/2013	8/24/2013
		CH13-311-TP005_SOa	NCR P 36/SM3120B	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP005_SOa	SM3120B	8/14/2013	8/16/2013	8/23/2013	8/23/2013

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Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1348958	CH13-311-TP005_SOa	SSSA P 455-456	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP005_SOa	SSSA P 973-974	8/14/2013	8/16/2013	8/21/2013	8/21/2013
		CH13-311-TP005_SOa	USDA-HB60 P 101_CA	8/14/2013	8/16/2013		8/27/2013
		CH13-311-TP006_SOa	CSSC 3.11	8/13/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP006_SOa	CSSS 11.3/11.4	8/13/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP006_SOa	CSSS 14.2	8/13/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP006_SOa	CSSS 18.2.2/SM4500C	8/13/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP006_SOa	CSSS 18.3.1	8/13/2013	8/16/2013	8/22/2013	8/23/2013
		CH13-311-TP006_SOa	CSSS 18.3.1	8/13/2013	8/16/2013	9/9/2013	9/9/2013
		CH13-311-TP006_SOa	CSSS 19.4	8/13/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP006_SOa	CSSS 3.321	8/13/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP006_SOa	CSSS 7.2/7.31	8/13/2013	8/16/2013	8/24/2013	8/24/2013
		CH13-311-TP006_SOa	NCR P 36/SM3120B	8/13/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP006_SOa	SM3120B	8/13/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP006_SOa	SSSA P 455-456	8/13/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP006_SOa	SSSA P 973-974	8/13/2013	8/16/2013	8/21/2013	8/21/2013
		CH13-311-TP006_SOa	USDA-HB60 P 101_CA	8/13/2013	8/16/2013		8/27/2013
		CH13-311-TP902_SOa	CSSC 3.11	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP902_SOa	CSSS 11.3/11.4	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP902_SOa	CSSS 14.2	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP902_SOa	CSSS 18.2.2/SM4500C	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP902_SOa	CSSS 18.3.1	8/14/2013	8/16/2013	8/22/2013	8/23/2013
		CH13-311-TP902_SOa	CSSS 18.3.1	8/14/2013	8/16/2013	9/9/2013	9/9/2013
		CH13-311-TP902_SOa	CSSS 19.4	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP902_SOa	CSSS 3.321	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP902_SOa	CSSS 4.2	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP902_SOa	CSSS 4.2/4.3	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP902_SOa	CSSS 7.2/7.31	8/14/2013	8/16/2013	8/24/2013	8/24/2013
		CH13-311-TP902_SOa	NCR P 36/SM3120B	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP902_SOa	SM3120B	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP902_SOa	SSSA P 455-456	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP902_SOa	SSSA P 973-974	8/14/2013	8/16/2013	8/21/2013	8/21/2013
		CH13-311-TP902_SOa	SW6010B	8/14/2013	8/16/2013	8/26/2013	8/28/2013
		CH13-311-TP902_SOa	USDA-HB60 P 101_CA	8/14/2013	8/16/2013		8/27/2013
		CH13-311-TP903_SOa	CSSC 3.11	8/14/2013	8/16/2013	8/22/2013	8/22/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1348958	CH13-311-TP903_SOa	CSSS 11.3/11.4	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP903_SOa	CSSS 14.2	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP903_SOa	CSSS 18.2.2/SM4500C	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP903_SOa	CSSS 18.3.1	8/14/2013	8/16/2013	8/22/2013	8/23/2013
		CH13-311-TP903_SOa	CSSS 18.3.1	8/14/2013	8/16/2013	9/9/2013	9/9/2013
		CH13-311-TP903_SOa	CSSS 19.4	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP903_SOa	CSSS 3.321	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP903_SOa	CSSS 7.2/7.31	8/14/2013	8/16/2013	8/24/2013	8/24/2013
		CH13-311-TP903_SOa	NCR P 36/SM3120B	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP903_SOa	SM3120B	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP903_SOa	SSSA P 455-456	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP903_SOa	SSSA P 973-974	8/14/2013	8/16/2013	8/21/2013	8/21/2013
		CH13-311-TP903_SOa	USDA-HB60 P 101_CA	8/14/2013	8/16/2013		8/27/2013
		CH13-311-TP904_SOa	CSSC 3.11	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP904_SOa	CSSS 11.3/11.4	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP904_SOa	CSSS 14.2	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP904_SOa	CSSS 18.2.2/SM4500C	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP904_SOa	CSSS 18.3.1	8/14/2013	8/16/2013	8/22/2013	8/23/2013
		CH13-311-TP904_SOa	CSSS 18.3.1	8/14/2013	8/16/2013	9/9/2013	9/9/2013
		CH13-311-TP904_SOa	CSSS 19.4	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP904_SOa	CSSS 3.321	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP904_SOa	CSSS 7.2/7.31	8/14/2013	8/16/2013	8/24/2013	8/24/2013
		CH13-311-TP904_SOa	NCR P 36/SM3120B	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP904_SOa	SM3120B	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP904_SOa	SSSA P 455-456	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP904_SOa	SSSA P 973-974	8/14/2013	8/16/2013	8/21/2013	8/21/2013
		CH13-311-TP904_SOa	USDA-HB60 P 101_CA	8/14/2013	8/16/2013		8/27/2013
		CH13-311-TP905_SOa	CSSC 3.11	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP905_SOa	CSSS 11.3/11.4	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP905_SOa	CSSS 14.2	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP905_SOa	CSSS 18.2.2/SM4500C	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP905_SOa	CSSS 18.3.1	8/14/2013	8/16/2013	8/22/2013	8/23/2013
		CH13-311-TP905_SOa	CSSS 18.3.1	8/14/2013	8/16/2013	9/9/2013	9/9/2013
		CH13-311-TP905_SOa	CSSS 19.4	8/14/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP905_SOa	CSSS 3.321	8/14/2013	8/16/2013	8/26/2013	8/26/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1348958	CH13-311-TP905_SOa	CSSS 7.2/7.31	8/14/2013	8/16/2013	8/24/2013	8/24/2013
		CH13-311-TP905_SOa	NCR P 36/SM3120B	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP905_SOa	SM3120B	8/14/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP905_SOa	SSSA P 455-456	8/14/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP905_SOa	SSSA P 973-974	8/14/2013	8/16/2013	8/21/2013	8/21/2013
		CH13-311-TP905_SOa	USDA-HB60 P 101_CA	8/14/2013	8/16/2013		8/27/2013
		CH13-311-TP906_SOa	CSSC 3.11	8/13/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP906_SOa	CSSS 11.3/11.4	8/13/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP906_SOa	CSSS 14.2	8/13/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP906_SOa	CSSS 18.2.2/SM4500C	8/13/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP906_SOa	CSSS 18.3.1	8/13/2013	8/16/2013	8/22/2013	8/23/2013
		CH13-311-TP906_SOa	CSSS 18.3.1	8/13/2013	8/16/2013	9/9/2013	9/9/2013
		CH13-311-TP906_SOa	CSSS 19.4	8/13/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP906_SOa	CSSS 3.321	8/13/2013	8/16/2013	8/26/2013	8/26/2013
		CH13-311-TP906_SOa	CSSS 7.2/7.31	8/13/2013	8/16/2013	8/24/2013	8/24/2013
		CH13-311-TP906_SOa	NCR P 36/SM3120B	8/13/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP906_SOa	SM3120B	8/13/2013	8/16/2013	8/23/2013	8/23/2013
		CH13-311-TP906_SOa	SSSA P 455-456	8/13/2013	8/16/2013	8/22/2013	8/22/2013
		CH13-311-TP906_SOa	SSSA P 973-974	8/13/2013	8/16/2013	8/21/2013	8/21/2013
		CH13-311-TP906_SOa	USDA-HB60 P 101_CA	8/13/2013	8/16/2013		8/27/2013
	L1353073	CH13-311-BH001_SOa	ASTM 2216	8/23/2013	8/26/2013		9/5/2013
		CH13-311-BH001_SOa	ASTMD1498_DI	8/23/2013	8/26/2013		9/30/2013
		CH13-311-BH001_SOa	CSSS 21.2	8/23/2013	8/26/2013	8/31/2013	8/31/2013
		CH13-311-BH001_SOa	CSSS/APHA 2510B_DI	8/23/2013	8/26/2013		9/25/2013
		CH13-311-BH001_SOa	CSSS/APHA 4500H	8/23/2013	8/26/2013		9/6/2013
		CH13-311-BH001_SOa	CSSS/APHA 4500H	8/23/2013	8/26/2013		9/10/2013
		CH13-311-BH001_SOa	CSSS/APHA 4500H_DI	8/23/2013	8/26/2013		9/30/2013
		CH13-311-BH001_SOa	E245.7	8/23/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH001_SOa	E245.7_DI	8/23/2013	8/26/2013		9/30/2013
		CH13-311-BH001_SOa	EPA600/2-78-054	8/23/2013	8/26/2013	9/10/2013	9/10/2013
		CH13-311-BH001_SOa	ISO 15178:2000	8/23/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH001_SOa	MOD-SOBEK-3.2.3	8/23/2013	8/26/2013		9/27/2013
		CH13-311-BH001_SOa	SM2310_DI	8/23/2013	8/26/2013		9/30/2013
		CH13-311-BH001_SOa	SM2320B_DI	8/23/2013	8/26/2013		9/30/2013
		CH13-311-BH001_SOa	SM4110B_DI	8/23/2013	8/26/2013		9/30/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1353073	CH13-311-BH001_SOa	SSSA P 455-456	8/23/2013	8/26/2013		8/30/2013
		CH13-311-BH001_SOa	SSSA P 455-456	8/23/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH001_SOa	SW6010B	8/23/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH001_SOa	SW6010B_DI	8/23/2013	8/26/2013		9/30/2013
		CH13-311-BH001_SOa	SW6020A	8/23/2013	8/26/2013	9/10/2013	9/10/2013
		CH13-311-BH001_SOa	SW6020A_DI	8/23/2013	8/26/2013		10/1/2013
		CH13-311-BH001_SOb	ASTM 2216	8/23/2013	8/26/2013		9/5/2013
		CH13-311-BH001_SOb	ASTM D4318	8/23/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH001_SOb	ASTMD1498_DI	8/23/2013	8/26/2013		9/25/2013
		CH13-311-BH001_SOb	CSSS 21.2	8/23/2013	8/26/2013	8/31/2013	8/31/2013
		CH13-311-BH001_SOb	CSSS/APHA 2510B_DI	8/23/2013	8/26/2013		9/25/2013
		CH13-311-BH001_SOb	CSSS/APHA 4500H	8/23/2013	8/26/2013		9/6/2013
		CH13-311-BH001_SOb	CSSS/APHA 4500H	8/23/2013	8/26/2013		9/10/2013
		CH13-311-BH001_SOb	CSSS/APHA 4500H_DI	8/23/2013	8/26/2013		9/24/2013
		CH13-311-BH001_SOb	E245.7	8/23/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH001_SOb	E245.7_DI	8/23/2013	8/26/2013		9/24/2013
		CH13-311-BH001_SOb	EPA600/2-78-054	8/23/2013	8/26/2013	9/10/2013	9/10/2013
		CH13-311-BH001_SOb	ISO 15178:2000	8/23/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH001_SOb	MOD-SOBEK-3.2.3	8/23/2013	8/26/2013		9/27/2013
		CH13-311-BH001_SOb	SM2310_DI	8/23/2013	8/26/2013		9/25/2013
		CH13-311-BH001_SOb	SM2320B_DI	8/23/2013	8/26/2013		9/25/2013
		CH13-311-BH001_SOb	SM4110B_DI	8/23/2013	8/26/2013		9/25/2013
		CH13-311-BH001_SOb	SSSA P 455-456	8/23/2013	8/26/2013		8/30/2013
		CH13-311-BH001_SOb	SSSA P 455-456	8/23/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH001_SOb	SW6010B	8/23/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH001_SOb	SW6010B_DI	8/23/2013	8/26/2013		9/24/2013
		CH13-311-BH001_SOb	SW6020A	8/23/2013	8/26/2013	9/10/2013	9/10/2013
		CH13-311-BH001_SOb	SW6020A_DI	8/23/2013	8/26/2013		9/25/2013
		CH13-311-BH002_SOb	ASTM 2216	8/22/2013	8/26/2013		9/5/2013
		CH13-311-BH002_SOb	ASTMD1498_DI	8/22/2013	8/26/2013		9/25/2013
		CH13-311-BH002_SOb	CSSS 21.2	8/22/2013	8/26/2013	8/31/2013	8/31/2013
		CH13-311-BH002_SOb	CSSS/APHA 2510B_DI	8/22/2013	8/26/2013		9/25/2013
		CH13-311-BH002_SOb	CSSS/APHA 4500H	8/22/2013	8/26/2013		9/6/2013
		CH13-311-BH002_SOb	CSSS/APHA 4500H	8/22/2013	8/26/2013		9/10/2013
		CH13-311-BH002_SOb	CSSS/APHA 4500H_DI	8/22/2013	8/26/2013		9/24/2013

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Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1353073	CH13-311-BH002_SOb	E245.7	8/22/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH002_SOb	E245.7_DI	8/22/2013	8/26/2013		9/24/2013
		CH13-311-BH002_SOb	EPA600/2-78-054	8/22/2013	8/26/2013	9/10/2013	9/10/2013
		CH13-311-BH002_SOb	ISO 15178:2000	8/22/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH002_SOb	MOD-SOBEK-3.2.3	8/22/2013	8/26/2013		9/27/2013
		CH13-311-BH002_SOb	SM2310_DI	8/22/2013	8/26/2013		9/25/2013
		CH13-311-BH002_SOb	SM2320B_DI	8/22/2013	8/26/2013		9/25/2013
		CH13-311-BH002_SOb	SM4110B_DI	8/22/2013	8/26/2013		9/25/2013
		CH13-311-BH002_SOb	SSSA P 455-456	8/22/2013	8/26/2013		8/30/2013
		CH13-311-BH002_SOb	SSSA P 455-456	8/22/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH002_SOb	SW6010B	8/22/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH002_SOb	SW6010B_DI	8/22/2013	8/26/2013		9/24/2013
		CH13-311-BH002_SOb	SW6020A	8/22/2013	8/26/2013	9/10/2013	9/10/2013
		CH13-311-BH002_SOb	SW6020A_DI	8/22/2013	8/26/2013		9/25/2013
		CH13-311-BH003_SOa	ASTM 2216	8/22/2013	8/26/2013		9/5/2013
		CH13-311-BH003_SOa	ASTMD1498_DI	8/22/2013	8/26/2013		9/25/2013
		CH13-311-BH003_SOa	CSSS 21.2	8/22/2013	8/26/2013	8/31/2013	8/31/2013
		CH13-311-BH003_SOa	CSSS/APHA 2510B_DI	8/22/2013	8/26/2013		9/25/2013
		CH13-311-BH003_SOa	CSSS/APHA 4500H	8/22/2013	8/26/2013		9/6/2013
		CH13-311-BH003_SOa	CSSS/APHA 4500H	8/22/2013	8/26/2013		9/10/2013
		CH13-311-BH003_SOa	CSSS/APHA 4500H_DI	8/22/2013	8/26/2013		9/24/2013
		CH13-311-BH003_SOa	E245.7	8/22/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH003_SOa	E245.7_DI	8/22/2013	8/26/2013		9/24/2013
		CH13-311-BH003_SOa	EPA600/2-78-054	8/22/2013	8/26/2013	9/10/2013	9/10/2013
		CH13-311-BH003_SOa	ISO 15178:2000	8/22/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH003_SOa	MOD-SOBEK-3.2.3	8/22/2013	8/26/2013		9/27/2013
		CH13-311-BH003_SOa	SM2310_DI	8/22/2013	8/26/2013		9/25/2013
		CH13-311-BH003_SOa	SM2320B_DI	8/22/2013	8/26/2013		9/25/2013
		CH13-311-BH003_SOa	SM4110B_DI	8/22/2013	8/26/2013		9/25/2013
		CH13-311-BH003_SOa	SSSA P 455-456	8/22/2013	8/26/2013		8/30/2013
		CH13-311-BH003_SOa	SSSA P 455-456	8/22/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH003_SOa	SW6010B	8/22/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH003_SOa	SW6010B_DI	8/22/2013	8/26/2013		9/24/2013
		CH13-311-BH003_SOa	SW6020A	8/22/2013	8/26/2013	9/10/2013	9/10/2013
		CH13-311-BH003_SOa	SW6020A_DI	8/22/2013	8/26/2013		9/25/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1353073	CH13-311-BH003_SOb	ASTM 2216	8/22/2013	8/26/2013		9/5/2013
		CH13-311-BH003_SOb	ASTMD1498_DI	8/22/2013	8/26/2013		9/30/2013
		CH13-311-BH003_SOb	CSSS 21.2	8/22/2013	8/26/2013	8/31/2013	8/31/2013
		CH13-311-BH003_SOb	CSSS/APHA 2510B_DI	8/22/2013	8/26/2013		9/25/2013
		CH13-311-BH003_SOb	CSSS/APHA 4500H	8/22/2013	8/26/2013		9/6/2013
		CH13-311-BH003_SOb	CSSS/APHA 4500H	8/22/2013	8/26/2013		9/10/2013
		CH13-311-BH003_SOb	CSSS/APHA 4500H_DI	8/22/2013	8/26/2013		9/30/2013
		CH13-311-BH003_SOb	E245.7	8/22/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH003_SOb	E245.7_DI	8/22/2013	8/26/2013		9/30/2013
		CH13-311-BH003_SOb	EPA600/2-78-054	8/22/2013	8/26/2013	9/10/2013	9/10/2013
		CH13-311-BH003_SOb	ISO 15178:2000	8/22/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH003_SOb	MOD-SOBEK-3.2.3	8/22/2013	8/26/2013		9/27/2013
		CH13-311-BH003_SOb	SM2310_DI	8/22/2013	8/26/2013		9/30/2013
		CH13-311-BH003_SOb	SM2320B_DI	8/22/2013	8/26/2013		9/30/2013
		CH13-311-BH003_SOb	SM4110B_DI	8/22/2013	8/26/2013		9/30/2013
		CH13-311-BH003_SOb	SSSA P 455-456	8/22/2013	8/26/2013		8/30/2013
		CH13-311-BH003_SOb	SSSA P 455-456	8/22/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH003_SOb	SW6010B	8/22/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH003_SOb	SW6010B_DI	8/22/2013	8/26/2013		9/30/2013
		CH13-311-BH003_SOb	SW6020A	8/22/2013	8/26/2013	9/10/2013	9/10/2013
		CH13-311-BH003_SOb	SW6020A_DI	8/22/2013	8/26/2013		10/1/2013
		CH13-311-BH003_SOBMS	SW6010B_DI	8/22/2013			9/26/2013
		CH13-311-BH003_SOBMS	SW6020A_DI	8/22/2013			9/26/2013
		CH13-311-BH004_SOa	ASTM 2216	8/23/2013	8/26/2013		9/17/2013
		CH13-311-BH004_SOa	ASTM D4318	8/23/2013	8/26/2013	9/6/2013	9/6/2013
		CH13-311-BH004_SOa	CSSS 21.2	8/23/2013	8/26/2013	8/31/2013	8/31/2013
		CH13-311-BH004_SOa	CSSS/APHA 4500H	8/23/2013	8/26/2013		9/6/2013
		CH13-311-BH004_SOa	CSSS/APHA 4500H	8/23/2013	8/26/2013		9/17/2013
		CH13-311-BH004_SOa	E245.7	8/23/2013	8/26/2013	9/17/2013	9/17/2013
		CH13-311-BH004_SOa	EPA600/2-78-054	8/23/2013	8/26/2013	9/10/2013	9/10/2013
		CH13-311-BH004_SOa	ISO 15178:2000	8/23/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH004_SOa	MOD-SOBEK-3.2.3	8/23/2013	8/26/2013		9/27/2013
		CH13-311-BH004_SOa	SSSA P 455-456	8/23/2013	8/26/2013		8/30/2013
		CH13-311-BH004_SOa	SSSA P 455-456	8/23/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH004_SOa	SW6010B	8/23/2013	8/26/2013	9/17/2013	9/18/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1353073	CH13-311-BH004_SOa	SW6020A	8/23/2013	8/26/2013	9/10/2013	9/10/2013
		CH13-311-BH005_SOa	ASTM 2216	8/23/2013	8/26/2013		9/7/2013
		CH13-311-BH005_SOa	CSSS 21.2	8/23/2013	8/26/2013	8/31/2013	8/31/2013
		CH13-311-BH005_SOa	CSSS/APHA 4500H	8/23/2013	8/26/2013		9/6/2013
		CH13-311-BH005_SOa	CSSS/APHA 4500H	8/23/2013	8/26/2013		9/10/2013
		CH13-311-BH005_SOa	E245.7	8/23/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH005_SOa	EPA600/2-78-054	8/23/2013	8/26/2013	9/10/2013	9/10/2013
		CH13-311-BH005_SOa	ISO 15178:2000	8/23/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH005_SOa	MOD-SOBEK-3.2.3	8/23/2013	8/26/2013		9/27/2013
		CH13-311-BH005_SOa	SSSA P 455-456	8/23/2013	8/26/2013		8/30/2013
		CH13-311-BH005_SOa	SSSA P 455-456	8/23/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH005_SOa	SW6010B	8/23/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH005_SOa	SW6020A	8/23/2013	8/26/2013	9/10/2013	9/10/2013
		CH13-311-BH005_SOb	ASTM 2216	8/23/2013	8/26/2013		9/7/2013
		CH13-311-BH005_SOb	CSSS 21.2	8/23/2013	8/26/2013	8/31/2013	8/31/2013
		CH13-311-BH005_SOb	CSSS/APHA 4500H	8/23/2013	8/26/2013		9/10/2013
		CH13-311-BH005_SOb	CSSS/APHA 4500H	8/23/2013	8/26/2013		9/13/2013
		CH13-311-BH005_SOb	E245.7	8/23/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH005_SOb	EPA600/2-78-054	8/23/2013	8/26/2013	9/10/2013	9/10/2013
		CH13-311-BH005_SOb	ISO 15178:2000	8/23/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH005_SOb	MOD-SOBEK-3.2.3	8/23/2013	8/26/2013		9/27/2013
		CH13-311-BH005_SOb	SSSA P 455-456	8/23/2013	8/26/2013		8/30/2013
		CH13-311-BH005_SOb	SSSA P 455-456	8/23/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH005_SOb	SW6010B	8/23/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH005_SOb	SW6020A	8/23/2013	8/26/2013	9/10/2013	9/10/2013
		CH13-311-BH903_SOb	ASTM 2216	8/22/2013	8/26/2013		9/5/2013
		CH13-311-BH903_SOb	CSSS 21.2	8/22/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH903_SOb	CSSS/APHA 4500H	8/22/2013	8/26/2013		9/10/2013
		CH13-311-BH903_SOb	CSSS/APHA 4500H	8/22/2013	8/26/2013		9/13/2013
		CH13-311-BH903_SOb	E245.7	8/22/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH903_SOb	EPA600/2-78-054	8/22/2013	8/26/2013	9/10/2013	9/10/2013
		CH13-311-BH903_SOb	ISO 15178:2000	8/22/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH903_SOb	MOD-SOBEK-3.2.3	8/22/2013	8/26/2013		9/27/2013
		CH13-311-BH903_SOb	SSSA P 455-456	8/22/2013	8/26/2013		9/5/2013
		CH13-311-BH903_SOb	SSSA P 455-456	8/22/2013	8/26/2013	9/5/2013	9/5/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1353073	CH13-311-BH903_SOb	SW6010B	8/22/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH903_SOb	SW6020A	8/22/2013	8/26/2013	9/10/2013	9/10/2013
	L1353100	CH13-311-BH001_SOb	CSSC 3.11	8/23/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH001_SOb	CSSS 11.3/11.4	8/23/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH001_SOb	CSSS 14.2	8/23/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH001_SOb	CSSS 18.2.2/SM4500C	8/23/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH001_SOb	CSSS 18.3.1	8/23/2013	8/26/2013	9/3/2013	9/4/2013
		CH13-311-BH001_SOb	CSSS 18.3.1	8/23/2013	8/26/2013	9/9/2013	9/9/2013
		CH13-311-BH001_SOb	CSSS 19.4	8/23/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH001_SOb	CSSS 3.321	8/23/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH001_SOb	CSSS 4.2	8/23/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH001_SOb	CSSS 4.2/4.3	8/23/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH001_SOb	NCR P 36/SM3120B	8/23/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH001_SOb	SM3120B	8/23/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH001_SOb	SSSA P 455-456	8/23/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH001_SOb	SSSA P 894-895	8/23/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH001_SOb	SSSA P 973-974	8/23/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH001_SOb	SW6010B	8/23/2013	8/26/2013	9/4/2013	9/6/2013
		CH13-311-BH001_SOb	USDA-HB60 P 101_CA	8/23/2013	8/26/2013		9/4/2013
		CH13-311-BH002_SOb	CSSC 3.11	8/22/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH002_SOb	CSSS 11.3/11.4	8/22/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH002_SOb	CSSS 14.2	8/22/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH002_SOb	CSSS 18.2.2/SM4500C	8/22/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH002_SOb	CSSS 18.3.1	8/22/2013	8/26/2013	9/3/2013	9/4/2013
		CH13-311-BH002_SOb	CSSS 18.3.1	8/22/2013	8/26/2013	9/9/2013	9/9/2013
		CH13-311-BH002_SOb	CSSS 19.4	8/22/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH002_SOb	CSSS 3.321	8/22/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH002_SOb	NCR P 36/SM3120B	8/22/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH002_SOb	SM3120B	8/22/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH002_SOb	SSSA P 455-456	8/22/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH002_SOb	SSSA P 894-895	8/22/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH002_SOb	SSSA P 973-974	8/22/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH002_SOb	USDA-HB60 P 101_CA	8/22/2013	8/26/2013		9/4/2013
		CH13-311-BH003_SOb	CSSC 3.11	8/22/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH003_SOb	CSSS 11.3/11.4	8/22/2013	8/26/2013	9/3/2013	9/3/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1353100	CH13-311-BH003_SOb	CSSS 14.2	8/22/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH003_SOb	CSSS 18.2.2/SM4500C	8/22/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH003_SOb	CSSS 18.3.1	8/22/2013	8/26/2013	9/3/2013	9/4/2013
		CH13-311-BH003_SOb	CSSS 18.3.1	8/22/2013	8/26/2013	9/9/2013	9/9/2013
		CH13-311-BH003_SOb	CSSS 19.4	8/22/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH003_SOb	CSSS 3.321	8/22/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH003_SOb	NCR P 36/SM3120B	8/22/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH003_SOb	SM3120B	8/22/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH003_SOb	SSSA P 455-456	8/22/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH003_SOb	SSSA P 894-895	8/22/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH003_SOb	SSSA P 973-974	8/22/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH003_SOb	USDA-HB60 P 101_CA	8/22/2013	8/26/2013		9/4/2013
		CH13-311-BH005_SOb	CSSC 3.11	8/23/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH005_SOb	CSSS 11.3/11.4	8/23/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH005_SOb	CSSS 14.2	8/23/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH005_SOb	CSSS 18.2.2/SM4500C	8/23/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH005_SOb	CSSS 18.3.1	8/23/2013	8/26/2013	9/3/2013	9/4/2013
		CH13-311-BH005_SOb	CSSS 18.3.1	8/23/2013	8/26/2013	9/9/2013	9/9/2013
		CH13-311-BH005_SOb	CSSS 19.4	8/23/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH005_SOb	CSSS 3.321	8/23/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH005_SOb	NCR P 36/SM3120B	8/23/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH005_SOb	SM3120B	8/23/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH005_SOb	SSSA P 455-456	8/23/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH005_SOb	SSSA P 894-895	8/23/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH005_SOb	SSSA P 973-974	8/23/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH005_SOb	USDA-HB60 P 101_CA	8/23/2013	8/26/2013		9/4/2013
	L1353113	CH13-311-BH023_SOa	ASTM 2216	8/24/2013	8/26/2013		9/7/2013
		CH13-311-BH023_SOa	CSSS 21.2	8/24/2013	8/26/2013	8/31/2013	8/31/2013
		CH13-311-BH023_SOa	CSSS/APHA 4500H	8/24/2013	8/26/2013		9/10/2013
		CH13-311-BH023_SOa	CSSS/APHA 4500H	8/24/2013	8/26/2013		9/13/2013
		CH13-311-BH023_SOa	E245.7	8/24/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH023_SOa	EPA600/2-78-054	8/24/2013	8/26/2013	9/9/2013	9/9/2013
		CH13-311-BH023_SOa	ISO 15178:2000	8/24/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH023_SOa	MOD-SOBEK-3.2.3	8/24/2013	8/26/2013		9/27/2013
		CH13-311-BH023_SOa	SSSA P 455-456	8/24/2013	8/26/2013		8/30/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1353113	CH13-311-BH023_SOa	SSSA P 455-456	8/24/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH023_SOa	SW6010B	8/24/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH023_SOa	SW6020A	8/24/2013	8/26/2013	9/9/2013	9/9/2013
		CH13-311-BH023_SOb	ASTM 2216	8/24/2013	8/26/2013		9/7/2013
		CH13-311-BH023_SOb	ASTM D4318	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH023_SOb	CSSS 21.2	8/24/2013	8/26/2013	8/31/2013	8/31/2013
		CH13-311-BH023_SOb	CSSS/APHA 4500H	8/24/2013	8/26/2013		9/10/2013
		CH13-311-BH023_SOb	CSSS/APHA 4500H	8/24/2013	8/26/2013		9/13/2013
		CH13-311-BH023_SOb	E245.7	8/24/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH023_SOb	EPA600/2-78-054	8/24/2013	8/26/2013	9/9/2013	9/9/2013
		CH13-311-BH023_SOb	ISO 15178:2000	8/24/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH023_SOb	MOD-SOBEK-3.2.3	8/24/2013	8/26/2013		9/27/2013
		CH13-311-BH023_SOb	SSSA P 455-456	8/24/2013	8/26/2013		8/30/2013
		CH13-311-BH023_SOb	SSSA P 455-456	8/24/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH023_SOb	SW6010B	8/24/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH023_SOb	SW6020A	8/24/2013	8/26/2013	9/9/2013	9/9/2013
		CH13-311-BH024_SOa	ASTM 2216	8/24/2013	8/26/2013		9/7/2013
		CH13-311-BH024_SOa	CSSS 21.2	8/24/2013	8/26/2013	8/31/2013	8/31/2013
		CH13-311-BH024_SOa	CSSS/APHA 4500H	8/24/2013	8/26/2013		9/10/2013
		CH13-311-BH024_SOa	CSSS/APHA 4500H	8/24/2013	8/26/2013		9/11/2013
		CH13-311-BH024_SOa	E245.7	8/24/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH024_SOa	EPA600/2-78-054	8/24/2013	8/26/2013	9/9/2013	9/9/2013
		CH13-311-BH024_SOa	ISO 15178:2000	8/24/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH024_SOa	MOD-SOBEK-3.2.3	8/24/2013	8/26/2013		9/27/2013
		CH13-311-BH024_SOa	SSSA P 455-456	8/24/2013	8/26/2013		8/30/2013
		CH13-311-BH024_SOa	SSSA P 455-456	8/24/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH024_SOa	SW6010B	8/24/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH024_SOa	SW6020A	8/24/2013	8/26/2013	9/9/2013	9/9/2013
		CH13-311-BH024_SOb	ASTM 2216	8/24/2013	8/26/2013		9/7/2013
		CH13-311-BH024_SOb	CSSS 21.2	8/24/2013	8/26/2013	8/31/2013	8/31/2013
		CH13-311-BH024_SOb	CSSS/APHA 4500H	8/24/2013	8/26/2013		9/10/2013
		CH13-311-BH024_SOb	CSSS/APHA 4500H	8/24/2013	8/26/2013		9/11/2013
		CH13-311-BH024_SOb	E245.7	8/24/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH024_SOb	EPA600/2-78-054	8/24/2013	8/26/2013	9/9/2013	9/9/2013
		CH13-311-BH024_SOb	ISO 15178:2000	8/24/2013	8/26/2013	8/30/2013	8/30/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1353113	CH13-311-BH024_SOb	MOD-SOBEK-3.2.3	8/24/2013	8/26/2013		9/27/2013
		CH13-311-BH024_SOb	SSSA P 455-456	8/24/2013	8/26/2013		8/30/2013
		CH13-311-BH024_SOb	SSSA P 455-456	8/24/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH024_SOb	SW6010B	8/24/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH024_SOb	SW6020A	8/24/2013	8/26/2013	9/9/2013	9/9/2013
		CH13-311-BH924_SOb	ASTM 2216	8/24/2013	8/26/2013		9/7/2013
		CH13-311-BH924_SOb	CSSS 21.2	8/24/2013	8/26/2013	8/31/2013	8/31/2013
		CH13-311-BH924_SOb	CSSS/APHA 4500H	8/24/2013	8/26/2013		9/10/2013
		CH13-311-BH924_SOb	CSSS/APHA 4500H	8/24/2013	8/26/2013		9/11/2013
		CH13-311-BH924_SOb	E245.7	8/24/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH924_SOb	EPA600/2-78-054	8/24/2013	8/26/2013	9/9/2013	9/9/2013
		CH13-311-BH924_SOb	ISO 15178:2000	8/24/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH924_SOb	MOD-SOBEK-3.2.3	8/24/2013	8/26/2013		9/27/2013
		CH13-311-BH924_SOb	SSSA P 455-456	8/24/2013	8/26/2013		8/30/2013
		CH13-311-BH924_SOb	SSSA P 455-456	8/24/2013	8/26/2013	8/30/2013	8/30/2013
		CH13-311-BH924_SOb	SW6010B	8/24/2013	8/26/2013	9/6/2013	9/9/2013
		CH13-311-BH924_SOb	SW6020A	8/24/2013	8/26/2013	9/9/2013	9/9/2013
	L1353150	CH13-311-BH023_SOb	CSSC 3.11	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH023_SOb	CSSS 11.3/11.4	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH023_SOb	CSSS 14.2	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH023_SOb	CSSS 18.2.2/SM4500C	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH023_SOb	CSSS 18.3.1	8/24/2013	8/26/2013	9/3/2013	9/4/2013
		CH13-311-BH023_SOb	CSSS 18.3.1	8/24/2013	8/26/2013	9/9/2013	9/9/2013
		CH13-311-BH023_SOb	CSSS 19.4	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH023_SOb	CSSS 3.321	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH023_SOb	CSSS 4.2	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH023_SOb	CSSS 4.2/4.3	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH023_SOb	NCR P 36/SM3120B	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH023_SOb	SM3120B	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH023_SOb	SSSA P 455-456	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH023_SOb	SSSA P 894-895	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH023_SOb	SSSA P 973-974	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH023_SOb	SW6010B	8/24/2013	8/26/2013	9/8/2013	9/8/2013
		CH13-311-BH023_SOb	USDA-HB60 P 101_CA	8/24/2013	8/26/2013		9/4/2013
		CH13-311-BH024_SOb	CSSC 3.11	8/24/2013	8/26/2013	9/3/2013	9/3/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1353150	CH13-311-BH024_SOb	CSSS 11.3/11.4	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH024_SOb	CSSS 14.2	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH024_SOb	CSSS 18.2.2/SM4500C	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH024_SOb	CSSS 18.3.1	8/24/2013	8/26/2013	9/3/2013	9/4/2013
		CH13-311-BH024_SOb	CSSS 18.3.1	8/24/2013	8/26/2013	9/9/2013	9/9/2013
		CH13-311-BH024_SOb	CSSS 19.4	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH024_SOb	CSSS 3.321	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH024_SOb	CSSS 4.2	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH024_SOb	CSSS 4.2/4.3	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH024_SOb	NCR P 36/SM3120B	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH024_SOb	SM3120B	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH024_SOb	SSSA P 455-456	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH024_SOb	SSSA P 894-895	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH024_SOb	SSSA P 973-974	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH024_SOb	SW6010B	8/24/2013	8/26/2013	9/8/2013	9/8/2013
		CH13-311-BH024_SOb	USDA-HB60 P 101_CA	8/24/2013	8/26/2013		9/4/2013
		CH13-311-BH924_SOb	CSSC 3.11	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH924_SOb	CSSS 11.3/11.4	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH924_SOb	CSSS 14.2	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH924_SOb	CSSS 18.2.2/SM4500C	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH924_SOb	CSSS 18.3.1	8/24/2013	8/26/2013	9/3/2013	9/4/2013
		CH13-311-BH924_SOb	CSSS 18.3.1	8/24/2013	8/26/2013	9/9/2013	9/9/2013
		CH13-311-BH924_SOb	CSSS 19.4	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH924_SOb	CSSS 3.321	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH924_SOb	CSSS 4.2	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH924_SOb	CSSS 4.2/4.3	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH924_SOb	NCR P 36/SM3120B	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH924_SOb	SM3120B	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH924_SOb	SSSA P 455-456	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH924_SOb	SSSA P 894-895	8/24/2013	8/26/2013	9/4/2013	9/4/2013
		CH13-311-BH924_SOb	SSSA P 973-974	8/24/2013	8/26/2013	9/3/2013	9/3/2013
		CH13-311-BH924_SOb	SW6010B	8/24/2013	8/26/2013	9/8/2013	9/8/2013
		CH13-311-BH924_SOb	USDA-HB60 P 101_CA	8/24/2013	8/26/2013		9/4/2013
	L1355921	CH13-311-BH022_SOa	ASTM 2216	8/25/2013	8/30/2013		9/9/2013
		CH13-311-BH022_SOa	CSSS 21.2	8/25/2013	8/30/2013	9/7/2013	9/7/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1355921	CH13-311-BH022_SOa	CSSS/APHA 4500H	8/25/2013	8/30/2013		9/11/2013
		CH13-311-BH022_SOa	E245.7	8/25/2013	8/30/2013	9/11/2013	9/11/2013
		CH13-311-BH022_SOa	EPA600/2-78-054	8/25/2013	8/30/2013	9/14/2013	9/14/2013
		CH13-311-BH022_SOa	ISO 15178:2000	8/25/2013	8/30/2013	9/6/2013	9/6/2013
		CH13-311-BH022_SOa	MOD-SOBEK-3.2.3	8/25/2013	8/30/2013		9/27/2013
		CH13-311-BH022_SOa	SSSA P 455-456	8/25/2013	8/30/2013		9/6/2013
		CH13-311-BH022_SOa	SSSA P 455-456	8/25/2013	8/30/2013	9/6/2013	9/6/2013
		CH13-311-BH022_SOa	SW6010B	8/25/2013	8/30/2013	9/11/2013	9/11/2013
		CH13-311-BH022_SOa	SW6020A	8/25/2013	8/30/2013	9/14/2013	9/14/2013
		CH13-311-BH022_SOb	ASTM 2216	8/25/2013	8/30/2013		9/9/2013
		CH13-311-BH022_SOb	CSSS 21.2	8/25/2013	8/30/2013	9/7/2013	9/7/2013
		CH13-311-BH022_SOb	CSSS/APHA 4500H	8/25/2013	8/30/2013		9/11/2013
		CH13-311-BH022_SOb	E245.7	8/25/2013	8/30/2013	9/11/2013	9/11/2013
		CH13-311-BH022_SOb	EPA600/2-78-054	8/25/2013	8/30/2013	9/14/2013	9/14/2013
		CH13-311-BH022_SOb	ISO 15178:2000	8/25/2013	8/30/2013	9/6/2013	9/6/2013
		CH13-311-BH022_SOb	MOD-SOBEK-3.2.3	8/25/2013	8/30/2013		9/27/2013
		CH13-311-BH022_SOb	SSSA P 455-456	8/25/2013	8/30/2013		9/6/2013
		CH13-311-BH022_SOb	SSSA P 455-456	8/25/2013	8/30/2013	9/6/2013	9/6/2013
		CH13-311-BH022_SOb	SW6010B	8/25/2013	8/30/2013	9/11/2013	9/11/2013
		CH13-311-BH022_SOb	SW6020A	8/25/2013	8/30/2013	9/14/2013	9/14/2013
	L1355973	CH13-311-BH022_SOb	CSSC 3.11	8/25/2013	8/30/2013	9/6/2013	9/6/2013
		CH13-311-BH022_SOb	CSSS 11.3/11.4	8/25/2013	8/30/2013	9/9/2013	9/9/2013
		CH13-311-BH022_SOb	CSSS 14.2	8/25/2013	8/30/2013	9/6/2013	9/6/2013
		CH13-311-BH022_SOb	CSSS 18.2.2/SM4500C	8/25/2013	8/30/2013	9/10/2013	9/10/2013
		CH13-311-BH022_SOb	CSSS 18.3.1	8/25/2013	8/30/2013	9/9/2013	9/9/2013
		CH13-311-BH022_SOb	CSSS 18.3.1	8/25/2013	8/30/2013	9/9/2013	9/10/2013
		CH13-311-BH022_SOb	CSSS 19.4	8/25/2013	8/30/2013	9/9/2013	9/9/2013
		CH13-311-BH022_SOb	CSSS 3.321	8/25/2013	8/30/2013	9/9/2013	9/9/2013
		CH13-311-BH022_SOb	CSSS 4.2	8/25/2013	8/30/2013	9/9/2013	9/9/2013
		CH13-311-BH022_SOb	CSSS 4.2/4.3	8/25/2013	8/30/2013	9/9/2013	9/9/2013
		CH13-311-BH022_SOb	NCR P 36/SM3120B	8/25/2013	8/30/2013	9/6/2013	9/6/2013
		CH13-311-BH022_SOb	SM3120B	8/25/2013	8/30/2013	9/10/2013	9/10/2013
		CH13-311-BH022_SOb	SSSA P 455-456	8/25/2013	8/30/2013	9/10/2013	9/10/2013
		CH13-311-BH022_SOb	SSSA P 894-895	8/25/2013	8/30/2013	9/10/2013	9/10/2013
		CH13-311-BH022_SOb	SSSA P 973-974	8/25/2013	8/30/2013	9/6/2013	9/6/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1355973	CH13-311-BH022_SOb	SW6010B	8/25/2013	8/30/2013	9/11/2013	9/12/2013
		CH13-311-BH022_SOb	USDA-HB60 P 101_CA	8/25/2013	8/30/2013		9/9/2013
	L1359691	Ch13-311-TP021_SOa	ASTM 2216	8/27/2013	9/9/2013		9/13/2013
		Ch13-311-TP021_SOa	ASTM D4318	8/27/2013	9/9/2013	9/21/2013	9/21/2013
		Ch13-311-TP021_SOa	CSSS 21.2	8/27/2013	9/9/2013	9/16/2013	9/19/2013
		Ch13-311-TP021_SOa	CSSS/APHA 4500H	8/27/2013	9/9/2013		9/16/2013
		Ch13-311-TP021_SOa	CSSS/APHA 4500H	8/27/2013	9/9/2013		9/24/2013
		Ch13-311-TP021_SOa	E245.7	8/27/2013	9/9/2013	9/13/2013	9/15/2013
		Ch13-311-TP021_SOa	EPA600/2-78-054	8/27/2013	9/9/2013	9/18/2013	9/18/2013
		Ch13-311-TP021_SOa	ISO 15178:2000	8/27/2013	9/9/2013	9/13/2013	9/13/2013
		Ch13-311-TP021_SOa	MOD-SOBEK-3.2.3	8/27/2013	9/9/2013		9/30/2013
		Ch13-311-TP021_SOa	SSSA P 455-456	8/27/2013	9/9/2013		9/13/2013
		Ch13-311-TP021_SOa	SSSA P 455-456	8/27/2013	9/9/2013	9/13/2013	9/13/2013
		Ch13-311-TP021_SOa	SW6010B	8/27/2013	9/9/2013	9/13/2013	9/15/2013
		Ch13-311-TP021_SOa	SW6020A	8/27/2013	9/9/2013	9/18/2013	9/18/2013
		CH13-311-TP022_SOa	ASTM 2216	8/26/2013	9/9/2013		9/13/2013
		CH13-311-TP022_SOa	CSSS 21.2	8/26/2013	9/9/2013	9/16/2013	9/19/2013
		CH13-311-TP022_SOa	CSSS/APHA 4500H	8/26/2013	9/9/2013		9/16/2013
		CH13-311-TP022_SOa	CSSS/APHA 4500H	8/26/2013	9/9/2013		9/24/2013
		CH13-311-TP022_SOa	E245.7	8/26/2013	9/9/2013	9/13/2013	9/15/2013
		CH13-311-TP022_SOa	EPA600/2-78-054	8/26/2013	9/9/2013	9/18/2013	9/18/2013
		CH13-311-TP022_SOa	ISO 15178:2000	8/26/2013	9/9/2013	9/13/2013	9/13/2013
		CH13-311-TP022_SOa	MOD-SOBEK-3.2.3	8/26/2013	9/9/2013		9/30/2013
		CH13-311-TP022_SOa	SSSA P 455-456	8/26/2013	9/9/2013		9/13/2013
		CH13-311-TP022_SOa	SSSA P 455-456	8/26/2013	9/9/2013	9/13/2013	9/13/2013
		CH13-311-TP022_SOa	SW6010B	8/26/2013	9/9/2013	9/13/2013	9/15/2013
		CH13-311-TP022_SOa	SW6020A	8/26/2013	9/9/2013	9/18/2013	9/18/2013
		CH13-311-TP023_SOa	ASTM 2216	8/26/2013	9/9/2013		9/13/2013
		CH13-311-TP023_SOa	CSSS 21.2	8/26/2013	9/9/2013	9/16/2013	9/19/2013
		CH13-311-TP023_SOa	CSSS/APHA 4500H	8/26/2013	9/9/2013		9/16/2013
		CH13-311-TP023_SOa	CSSS/APHA 4500H	8/26/2013	9/9/2013		9/24/2013
		CH13-311-TP023_SOa	E245.7	8/26/2013	9/9/2013	9/13/2013	9/15/2013
		CH13-311-TP023_SOa	EPA600/2-78-054	8/26/2013	9/9/2013	9/18/2013	9/18/2013
		CH13-311-TP023_SOa	ISO 15178:2000	8/26/2013	9/9/2013	9/13/2013	9/13/2013
		CH13-311-TP023_SOa	MOD-SOBEK-3.2.3	8/26/2013	9/9/2013		9/30/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1359691	CH13-311-TP023_SOa	SSSA P 455-456	8/26/2013	9/9/2013		9/13/2013
		CH13-311-TP023_SOa	SSSA P 455-456	8/26/2013	9/9/2013	9/13/2013	9/13/2013
		CH13-311-TP023_SOa	SW6010B	8/26/2013	9/9/2013	9/13/2013	9/15/2013
		CH13-311-TP023_SOa	SW6020A	8/26/2013	9/9/2013	9/18/2013	9/18/2013
	L1360747	Ch13-311-TP021_SOa	CSSS 19.4	8/27/2013	9/9/2013	9/17/2013	9/17/2013
		Ch13-311-TP021_SOa	CSSS 3.321	8/27/2013	9/9/2013	9/17/2013	9/17/2013
		Ch13-311-TP021_SOa	CSSS 4.2	8/27/2013	9/9/2013	9/16/2013	9/16/2013
		Ch13-311-TP021_SOa	CSSS 4.2/4.3	8/27/2013	9/9/2013	9/13/2013	9/13/2013
		Ch13-311-TP021_SOa	SSSA P 973-974	8/27/2013	9/9/2013	9/16/2013	9/16/2013
		Ch13-311-TP021_SOa	SW6010B	8/27/2013	9/9/2013	9/13/2013	9/15/2013
		Ch13-311-TP021_SOa	USDA-HB60 P 101_CA	8/27/2013	9/9/2013		9/17/2013
	L1360748	CH13-311-TP021_SOa	CSSC 3.11	8/27/2013	9/9/2013	9/13/2013	9/13/2013
		CH13-311-TP021_SOa	CSSS 11.3/11.4	8/27/2013	9/9/2013	9/16/2013	9/16/2013
		CH13-311-TP021_SOa	CSSS 18.2.2/SM4500C	8/27/2013	9/9/2013	9/17/2013	9/17/2013
		CH13-311-TP021_SOa	CSSS 18.3.1	8/27/2013	9/9/2013	9/13/2013	9/13/2013
		CH13-311-TP021_SOa	CSSS 18.3.1	8/27/2013	9/9/2013	9/16/2013	9/17/2013
		CH13-311-TP021_SOa	CSSS 19.4	8/27/2013	9/9/2013	9/17/2013	9/17/2013
		CH13-311-TP021_SOa	CSSS 7.2/7.31	8/27/2013	9/9/2013	9/17/2013	9/17/2013
		CH13-311-TP021_SOa	NCR P 36/SM3120B	8/27/2013	9/9/2013	9/13/2013	9/13/2013
		CH13-311-TP021_SOa	SM3120B	8/27/2013	9/9/2013	9/17/2013	9/17/2013
		CH13-311-TP021_SOa	SSSA P 455-456	8/27/2013	9/9/2013	9/16/2013	9/16/2013
		CH13-311-TP021_SOa	SSSA P 973-974	8/27/2013	9/9/2013	9/16/2013	9/16/2013
		CH13-311-TP021_SOa	USDA-HB60 P 101_CA	8/27/2013	9/9/2013		9/17/2013
	L1369643	CH13-311-SS023_SOa	ASTM D4318	7/12/2013	7/15/2013	10/1/2013	10/1/2013
		CH13-311-SS024_SOa	ASTM D4318	7/12/2013	7/15/2013	10/1/2013	10/1/2013
		CH13-311-SS025_SOa	ASTM D4318	7/12/2013	7/15/2013	10/1/2013	10/1/2013
	L1377913	CH13-311-BH001_SOb	SSSA (1996) P 610-61	8/23/2013	8/26/2013	10/22/2013	10/22/2013
		CH13-311-BH002_SOb	SSSA (1996) P 610-61	8/22/2013	8/26/2013	10/22/2013	10/22/2013
		CH13-311-BH003_SOb	SSSA (1996) P 610-61	8/22/2013	8/26/2013	10/22/2013	10/22/2013
		CH13-311-BH005_SOb	SSSA (1996) P 610-61	8/23/2013	8/26/2013	10/22/2013	10/22/2013
		CH13-311-BH010_SOa	SSSA (1996) P 610-61	7/18/2013	7/22/2013	10/19/2013	10/19/2013
		CH13-311-BH010_SOb	SSSA (1996) P 610-61	7/18/2013	7/22/2013	10/19/2013	10/19/2013
		CH13-311-BH010_SOd	SSSA (1996) P 610-61	7/18/2013	7/22/2013	10/19/2013	10/19/2013
		CH13-311-BH011_SOa	SSSA (1996) P 610-61	7/23/2013	7/26/2013	10/22/2013	10/22/2013
		CH13-311-BH011_SOb	SSSA (1996) P 610-61	7/23/2013	7/26/2013	10/22/2013	10/22/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1377913	CH13-311-BH011_SOc	SSSA (1996) P 610-61	7/23/2013	7/26/2013	10/22/2013	10/22/2013
		CH13-311-BH011_SOd	SSSA (1996) P 610-61	7/23/2013	7/26/2013	10/22/2013	10/22/2013
		CH13-311-BH011_SOe	SSSA (1996) P 610-61	7/24/2013	7/26/2013	10/22/2013	10/22/2013
		CH13-311-BH012_SOa	SSSA (1996) P 610-61	7/24/2013	7/29/2013	10/22/2013	10/22/2013
		CH13-311-BH012_SOb	SSSA (1996) P 610-61	7/24/2013	7/29/2013	10/22/2013	10/22/2013
		CH13-311-BH012_SOc	SSSA (1996) P 610-61	7/24/2013	7/29/2013	10/22/2013	10/22/2013
		CH13-311-BH012_SOd	SSSA (1996) P 610-61	7/25/2013	7/29/2013	10/22/2013	10/22/2013
		CH13-311-BH013_SOA	SSSA (1996) P 610-61	7/18/2013	7/22/2013	10/19/2013	10/19/2013
		CH13-311-BH013_SOB	SSSA (1996) P 610-61	7/18/2013	7/22/2013	10/19/2013	10/19/2013
		CH13-311-BH013_SOC	SSSA (1996) P 610-61	7/18/2013	7/22/2013	10/19/2013	10/19/2013
		CH13-311-BH013_SOD	SSSA (1996) P 610-61	7/19/2013	7/22/2013	10/19/2013	10/19/2013
		CH13-311-BH013_SOE	SSSA (1996) P 610-61	7/19/2013	7/22/2013	10/19/2013	10/19/2013
		CH13-311-BH014_SOA	SSSA (1996) P 610-61	7/20/2013	7/22/2013	10/19/2013	10/19/2013
		CH13-311-BH014_SOB	SSSA (1996) P 610-61	7/20/2013	7/22/2013	10/19/2013	10/19/2013
		CH13-311-BH014_SOC	SSSA (1996) P 610-61	7/20/2013	7/22/2013	10/19/2013	10/19/2013
		CH13-311-BH014_SOD	SSSA (1996) P 610-61	7/20/2013	7/22/2013	10/19/2013	10/19/2013
		CH13-311-BH014_SOE	SSSA (1996) P 610-61	7/20/2013	7/22/2013	10/19/2013	10/19/2013
		CH13-311-BH015_SOA	SSSA (1996) P 610-61	7/22/2013	7/25/2013	10/19/2013	10/19/2013
		CH13-311-BH015_SOB	SSSA (1996) P 610-61	7/22/2013	7/25/2013	10/19/2013	10/19/2013
		CH13-311-BH015_SOC	SSSA (1996) P 610-61	7/22/2013	7/25/2013	10/19/2013	10/19/2013
		CH13-311-BH015_SOD	SSSA (1996) P 610-61	7/22/2013	7/25/2013	10/19/2013	10/19/2013
		CH13-311-BH015_SOE	SSSA (1996) P 610-61	7/22/2013	7/25/2013	10/19/2013	10/19/2013
		CH13-311-BH022_SOb	SSSA (1996) P 610-61	8/25/2013	8/30/2013	10/22/2013	10/22/2013
		CH13-311-BH023_SOb	SSSA (1996) P 610-61	8/24/2013	8/26/2013	10/22/2013	10/22/2013
		CH13-311-BH024_SOb	SSSA (1996) P 610-61	8/24/2013	8/26/2013	10/22/2013	10/22/2013
		CH13-311-BH911_SOe	SSSA (1996) P 610-61	7/24/2013	7/26/2013	10/22/2013	10/22/2013
		CH13-311-BH913_SOB	SSSA (1996) P 610-61	7/18/2013	7/22/2013	10/19/2013	10/19/2013
		CH13-311-BH915_SOC	SSSA (1996) P 610-61	7/22/2013	7/25/2013	10/19/2013	10/19/2013
		CH13-311-BH924_SOb	SSSA (1996) P 610-61	8/24/2013	8/26/2013	10/22/2013	10/22/2013
		CH13-311-SS023_SOa	SSSA (1996) P 610-61	7/12/2013	7/15/2013	10/22/2013	10/22/2013
		CH13-311-SS024_SOa	SSSA (1996) P 610-61	7/12/2013	7/15/2013	10/22/2013	10/22/2013
		CH13-311-SS025_SOa	SSSA (1996) P 610-61	7/12/2013	7/15/2013	10/22/2013	10/22/2013
		CH13-311-SS030_SOA	SSSA (1996) P 610-61	7/15/2013	7/17/2013	10/22/2013	10/22/2013
		CH13-311-SS033_SOA	SSSA (1996) P 610-61	7/15/2013	7/17/2013	10/22/2013	10/22/2013
		CH13-311-SS037_SOA	SSSA (1996) P 610-61	7/15/2013	7/17/2013	10/22/2013	10/22/2013

TABLE 2

Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1377913	CH13-311-TP002_SOa	SSSA (1996) P 610-61	8/14/2013	8/16/2013	10/22/2013	10/22/2013
		CH13-311-TP003_SOa	SSSA (1996) P 610-61	8/14/2013	8/16/2013	10/22/2013	10/22/2013
		CH13-311-TP004_SOa	SSSA (1996) P 610-61	8/14/2013	8/16/2013	10/22/2013	10/22/2013
		CH13-311-TP005_SOa	SSSA (1996) P 610-61	8/14/2013	8/16/2013	10/22/2013	10/22/2013
		CH13-311-TP006_SOa	SSSA (1996) P 610-61	8/13/2013	8/16/2013	10/19/2013	10/19/2013
		Ch13-311-TP021_SOa	SSSA (1996) P 610-61	8/27/2013	9/9/2013	10/22/2013	10/22/2013
		CH13-311-TP902_SOa	SSSA (1996) P 610-61	8/14/2013	8/16/2013	10/22/2013	10/22/2013
		CH13-311-TP903_SOa	SSSA (1996) P 610-61	8/14/2013	8/16/2013	10/22/2013	10/22/2013
		CH13-311-TP904_SOa	SSSA (1996) P 610-61	8/14/2013	8/16/2013	10/22/2013	10/22/2013
		CH13-311-TP905_SOa	SSSA (1996) P 610-61	8/14/2013	8/16/2013	10/22/2013	10/22/2013
		CH13-311-TP906_SOa	SSSA (1996) P 610-61	8/13/2013	8/16/2013	10/19/2013	10/19/2013

TABLE 3

Overall Flagging Summary

Method	Matrix	Validation Reason	Qualifier*	Qualifier Type	Number of Affected Analytes
ASTM 2216	SOIL				
Category = Blank		Cooler received by laboratory at greater than 10 degrees C			
			J	Other	6
Category = HoldingTime		Holding time exceeded			
			UJ	Protocol	1
			J	Protocol	30
CSSS 11.3/11.4	SOIL				
Category = FieldDuplicate		Field duplicate exceeds RPD criteria			
			J	Other	14
CSSS 18.2.2/SM4500CL	SOIL				
Category = FieldDuplicate		Field duplicate exceeds RPD criteria			
			J	Other	6
Category = Miscellaneous		Invalid Final Flag replaced with Concqual			
			=	Other	1
CSSS 18.3.1	SOIL				
Category = FieldDuplicate		Field duplicate exceeds RPD criteria			
			J	Other	4
CSSS 21.2	SOIL				
Category = Blank		Cooler received by laboratory at greater than 10 degrees C			
			J	Other	3
			UJ	Other	9
Category = Blank		Equipment blank concentration greater than the RL			
			U	Other	2
CSSS 4.2	SOIL				
Category = FieldDuplicate		Field duplicate exceeds RPD criteria			
			J	Other	2
Category = Miscellaneous		Invalid Final Flag replaced with Concqual			

TABLE 3

Overall Flagging Summary

Method	Matrix	Validation Reason	Qualifier*	Qualifier Type	Number of Affected Analytes
			=	Other	2
CSSS 4.2/4.3	SOIL				
Category = Miscellaneous		Invalid Final Flag replaced with Concqual			
			U	Other	2
CSSS 7.2/7.31	SOIL				
Category = FieldDuplicate		Field duplicate exceeds RPD criteria			
			J	Other	8
CSSS/APHA 4500H	SOIL				
Category = Blank		Cooler received by laboratory at greater than 10 degrees C			
			J	Other	12
Category = HoldingTime		Holding time exceeded			
			J	Protocol	2
Category = Matrix		Lab duplicate RPD criteria exceeded			
			J	Other	1
E245.7	SOIL				
Category = Blank		Cooler received by laboratory at greater than 10 degrees C			
			J	Other	6
Category = FieldDuplicate		Field duplicate exceeds RPD criteria			
			J	Other	6
Category = Matrix		Lab duplicate RPD criteria exceeded			
			J	Other	6
ISO 15178:2000	SOIL				
Category = Blank		Cooler received by laboratory at greater than 10 degrees C			
			J	Other	6
MOD-SOBEK-3.2.3	SOIL				
Category = Blank		Cooler received by laboratory at greater than 10 degrees C			
			J	Other	6

TABLE 3

Overall Flagging Summary

Method	Matrix	Validation Reason	Qualifier*	Qualifier Type	Number of Affected Analytes
Category = FieldDuplicate		Field duplicate exceeds RPD criteria			
			J	Other	4
NCR P 36/SM3120B	SOIL				
Category = FieldDuplicate		Field duplicate exceeds RPD criteria			
			J	Other	6
SM2310_DI	SOIL				
Category = FieldDuplicate		Field duplicate exceeds RPD criteria			
			J	Other	2
SM2320B_DI	SOIL				
Category = Matrix		Lab duplicate RPD criteria exceeded			
			J	Other	2
SM3120B	SOIL				
Category = FieldDuplicate		Field duplicate exceeds RPD criteria			
			J	Other	20
Category = Miscellaneous		Invalid Final Flag replaced with Concqual			
			=	Other	20
SM4110B_DI	SOIL				
Category = FieldDuplicate		Field duplicate exceeds RPD criteria			
			J	Other	2
SSSA P 455-456	SOIL				
Category = Blank		Cooler received by laboratory at greater than 10 degrees C			
			J	Other	6
Category = FieldDuplicate		Field duplicate exceeds RPD criteria			
			J	Other	2
SSSA P 973-974	SOIL				
Category = FieldDuplicate		Field duplicate exceeds RPD criteria			
			J	Other	4

TABLE 3

Overall Flagging Summary

Method	Matrix	Validation Reason	Qualifier*	Qualifier Type	Number of Affected Analytes
Category = HoldingTime		Holding time exceeded			
			J	Protocol	1
SW6010B	SOIL				
Category = Blank		Cooler received by laboratory at greater than 10 degrees C			
			UJ	Other	15
			J	Other	171
Category = Blank		Equipment blank concentration greater than the RL			
			U	Protocol	5
Category = FieldDuplicate		Field duplicate exceeds RPD criteria			
			J	Other	38
Category = Matrix		Lab duplicate RPD criteria exceeded			
			J	Other	49
SW6010B_DI	SOIL				
Category = FieldDuplicate		Field duplicate exceeds RPD criteria			
			J	Other	2
SW6020A_DI	SOIL				
Category = Blank		Equipment blank concentration greater than the RL			
			U	Protocol	1
Category = FieldDuplicate		Field duplicate exceeds RPD criteria			
			J	Other	16
Category = Matrix		Lab duplicate RPD criteria exceeded			
			J	Other	11
			UJ	Other	4
USDA-HB60 P 101_CALC	SOIL				
Category = FieldDuplicate		Field duplicate exceeds RPD criteria			
			J	Other	1
			UJ	Other	1
Category = HoldingTime		Holding time exceeded			

TABLE 3

Overall Flagging Summary

Method	Matrix	Validation Reason	Qualifier*	Qualifier Type	Number of Affected Analytes
			UJ	Protocol	1

* The most severe flag for each analyte becomes the final validation flag.

Qualifier Description:

= = Analyte was detected at a concentration greater than the RL.

J = Analyte was present but the reported value may not be accurate or precise.

U = This analyte was analyzed for but not detected at the specified detection limit.

UJ = The analyte was not detected above the detection limit objective. However, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Qualifier Type:

Protocol = Flagging due to contractor/laboratory protocol violations.
Other = Flagging due to sample, matrix, or field issues not related to Quality Assurance Project Plan (QAPP) or Sampling and Analysis Plan (SAP) protocol.

TABLE 4

Blank Contamination - Qualified Data

Method	Matrix	Analyte / Sample ID	Result	Blank Contamination Qualifier*	Criteria	Comments
ASTM 2216	SOIL	**Moisture**				
		CH13-311-BH015_SOA	10.8 percent	J	TEMP>10C	
		CH13-311-BH015_SOB	13.7 percent	J	TEMP>10C	
		CH13-311-BH015_SOC	8.14 percent	J	TEMP>10C	
		CH13-311-BH015_SOD	8.62 percent	J	TEMP>10C	
		CH13-311-BH015_SOE	9.51 percent	J	TEMP>10C	
		CH13-311-BH915_SOC	9.4 percent	J	TEMP>10C	
CSSS 21.2	SOIL	**Organic Matter**				
		CH13-311-BH015_SOA	0.7 percent	UJ	TEMP>10C	
		CH13-311-BH015_SOB	1.05 percent	J	TEMP>10C	
		CH13-311-BH015_SOC	0.7 percent	UJ	TEMP>10C	
		CH13-311-BH015_SOD	0.7 percent	UJ	TEMP>10C	
		CH13-311-BH015_SOE	0.7 percent	UJ	TEMP>10C	
		CH13-311-BH915_SOC	0.7 percent	UJ	TEMP>10C	
CSSS 21.2	SOIL	**Total Organic Carbon**				
		CH13-311-BH015_SOA	0.4 percent	J	TEMP>10C	
		CH13-311-BH015_SOB	0.6 percent	J	TEMP>10C	
		CH13-311-BH015_SOC	0.4 percent	UJ	TEMP>10C	
		CH13-311-BH015_SOD	0.4 percent	UJ	TEMP>10C	
		CH13-311-BH015_SOE	0.4 percent	UJ	TEMP>10C	
		CH13-311-BH022_SOa	0.4 percent	U	EB>RL	blank target = 0.63 mg/L
		CH13-311-BH022_SOb	0.9 percent	U	EB>RL	blank target = 0.63 mg/L
		CH13-311-BH915_SOC	0.4 percent	UJ	TEMP>10C	
CSSS/APHA 4500H	SOIL	**Paste pH**				
		CH13-311-BH015_SOA	6.81 pH Units	J	TEMP>10C	
		CH13-311-BH015_SOB	6.9 pH Units	J	TEMP>10C	
		CH13-311-BH015_SOC	7.13 pH Units	J	TEMP>10C	
		CH13-311-BH015_SOD	7.15 pH Units	J	TEMP>10C	
		CH13-311-BH015_SOE	7.29 pH Units	J	TEMP>10C	
		CH13-311-BH915_SOC	7.12 pH Units	J	TEMP>10C	
CSSS/APHA 4500H	SOIL	**pH (1:2 soil:water)**				
		CH13-311-BH015_SOA	8.13 pH Units	J	TEMP>10C	
		CH13-311-BH015_SOB	8.03 pH Units	J	TEMP>10C	

TABLE 4

Blank Contamination - Qualified Data

Method	Matrix	Analyte / Sample ID	Result	Blank Contamination Qualifier*	Criteria	Comments
		CH13-311-BH015_SOC	8.33 pH Units	J	TEMP>10C	
		CH13-311-BH015_SOD	8.02 pH Units	J	TEMP>10C	
		CH13-311-BH015_SOE	8.37 pH Units	J	TEMP>10C	
		CH13-311-BH915_SOC	8.32 pH Units	J	TEMP>10C	
E245.7	SOIL	**Mercury**				
		CH13-311-BH015_SOA	0.59 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	1.2 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	0.0277 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	1.45 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	0.0155 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	0.0258 mg/kg	J	TEMP>10C	
ISO 15178:2000	SOIL	**Sulfur**				
		CH13-311-BH015_SOA	2500 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	3400 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	800 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	1300 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	900 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	1000 mg/kg	J	TEMP>10C	
MOD-SOBEK-3.2.3	SOIL	**Neutralization Potential (as CaCO3 Eq.)**				
		CH13-311-BH015_SOA	40 T CaCO3/1000 T	J	TEMP>10C	
		CH13-311-BH015_SOB	151 T CaCO3/1000 T	J	TEMP>10C	
		CH13-311-BH015_SOC	20 T CaCO3/1000 T	J	TEMP>10C	
		CH13-311-BH015_SOD	29 T CaCO3/1000 T	J	TEMP>10C	
		CH13-311-BH015_SOE	26 T CaCO3/1000 T	J	TEMP>10C	
		CH13-311-BH915_SOC	22 T CaCO3/1000 T	J	TEMP>10C	
SSSA P 455-456	SOIL	**Total Inorganic Carbon**				
		CH13-311-BH015_SOA	0.36 percent	J	TEMP>10C	
		CH13-311-BH015_SOB	0.44 percent	J	TEMP>10C	
		CH13-311-BH015_SOC	0.2 percent	J	TEMP>10C	
		CH13-311-BH015_SOD	0.41 percent	J	TEMP>10C	
		CH13-311-BH015_SOE	0.3 percent	J	TEMP>10C	
		CH13-311-BH915_SOC	0.24 percent	J	TEMP>10C	
SW6010B	SOIL	**Aluminum**				

TABLE 4

Blank Contamination - Qualified Data

Method	Matrix	Analyte / Sample ID	Result	Blank Contamination Qualifier*	Criteria	Comments
		CH13-311-BH015_SOA	14500 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	14900 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	15700 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	10400 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	21400 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	16300 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Antimony**				
		CH13-311-BH015_SOA	4.92 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	9.6 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	0.75 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	4.83 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	0.39 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	0.75 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Arsenic**				
		CH13-311-BH015_SOA	72.9 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	153 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	9.31 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	260 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	12.1 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	9.34 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Barium**				
		CH13-311-BH015_SOA	476 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	372 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	253 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	258 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	140 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	270 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Beryllium**				
		CH13-311-BH015_SOA	0.54 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	0.4 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	0.62 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	0.46 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	0.85 mg/kg	J	TEMP>10C	

TABLE 4

Blank Contamination - Qualified Data

Method	Matrix	Analyte / Sample ID	Result	Blank Contamination Qualifier*	Criteria	Comments
		CH13-311-BH915_SOC	0.62 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Bismuth**				
		CH13-311-BH015_SOA	0.6 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	0.23 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	0.43 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	0.2 mg/kg	UJ	TEMP>10C	
		CH13-311-BH015_SOE	0.53 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	0.28 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Boron**				
		CH13-311-BH015_SOA	10 mg/kg	UJ	TEMP>10C	
		CH13-311-BH015_SOB	10 mg/kg	UJ	TEMP>10C	
		CH13-311-BH015_SOC	10 mg/kg	UJ	TEMP>10C	
		CH13-311-BH015_SOD	10 mg/kg	UJ	TEMP>10C	
		CH13-311-BH015_SOE	10 mg/kg	UJ	TEMP>10C	
		CH13-311-BH915_SOC	10 mg/kg	UJ	TEMP>10C	
SW6010B	SOIL	**Cadmium**				
		CH13-311-BH015_SOA	1.95 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	4.46 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	0.322 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	8.43 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	0.29 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	0.312 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Calcium**				
		CH13-311-BH015_SOA	11600 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	13000 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	7490 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	15900 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	8040 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	8460 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Chromium**				
		CH13-311-BH015_SOA	43.4 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	122 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	26.3 mg/kg	J	TEMP>10C	

TABLE 4

Blank Contamination - Qualified Data

Method	Matrix	Analyte / Sample ID	Result	Blank Contamination Qualifier*	Criteria	Comments
		CH13-311-BH015_SOD	256 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	46.2 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	26.9 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Cobalt**				
		CH13-311-BH015_SOA	14.1 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	22.1 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	8.71 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	29 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	14.1 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	8.5 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Copper**				
		CH13-311-BH015_SOA	46.9 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	77.8 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	17 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	65.3 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	30 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	18.4 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Iron**				
		CH13-311-BH015_SOA	33500 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	39800 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	22900 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	46100 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	33000 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	23600 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Lead**				
		CH13-311-BH015_SOA	497 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	986 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	13.8 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	658 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	22.1 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	12.4 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Lithium**				
		CH13-311-BH015_SOA	21.4 mg/kg	J	TEMP>10C	

TABLE 4

Blank Contamination - Qualified Data

Method	Matrix	Analyte / Sample ID	Result	Blank Contamination Qualifier*	Criteria	Comments
		CH13-311-BH015_SOB	22.4 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	27.8 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	11.8 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	43.7 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	27.7 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Magnesium**				
		CH13-311-BH015_SOA	9430 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	13500 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	6110 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	15500 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	9280 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	6320 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Manganese**				
		CH13-311-BH015_SOA	545 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	619 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	357 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	662 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	451 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	371 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Molybdenum**				
		CH13-311-BH011_SOa	0.7 mg/kg	U	EB>RL	blank target = 0.000093mg/l
		CH13-311-BH011_SOc	0.85 mg/kg	U	EB>RL	blank target = 0.000093mg/l
		CH13-311-BH011_SOd	0.61 mg/kg	U	EB>RL	blank target = 0.000093mg/l
		CH13-311-BH015_SOA	1.37 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	1.74 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	0.73 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	2.51 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	0.56 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	0.82 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Nickel**				
		CH13-311-BH015_SOA	47.8 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	91.2 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	22.5 mg/kg	J	TEMP>10C	

TABLE 4

Blank Contamination - Qualified Data

Method	Matrix	Analyte / Sample ID	Result	Blank Contamination Qualifier*	Criteria	Comments
		CH13-311-BH015_SOD	202 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	37.5 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	22.7 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Phosphorus**				
		CH13-311-BH015_SOA	728 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	671 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	585 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	859 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	594 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	554 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Potassium**				
		CH13-311-BH015_SOA	1630 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	1020 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	2510 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	680 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	3540 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	2630 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Selenium**				
		CH13-311-BH015_SOA	0.59 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	0.62 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	0.34 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	0.63 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	0.22 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	0.33 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Silver**				
		CH13-311-BH011_SOd	0.12 mg/kg	U	EB>RL	blank target = 0.000012mg/l
		CH13-311-BH015_SOA	0.89 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	1.86 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	0.13 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	1.77 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	0.12 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	0.12 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Sodium**				

TABLE 4

Blank Contamination - Qualified Data

Method	Matrix	Analyte / Sample ID	Result	Blank Contamination Qualifier*	Criteria	Comments
		CH13-311-BH015_SOA	200 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	100 mg/kg	UJ	TEMP>10C	
		CH13-311-BH015_SOC	290 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	100 mg/kg	UJ	TEMP>10C	
		CH13-311-BH015_SOE	320 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	350 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Strontium**				
		CH13-311-BH015_SOA	53.8 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	60.9 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	36.9 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	61.8 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	43.6 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	41.1 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Thallium**				
		CH13-311-BH015_SOA	0.359 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	0.626 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	0.183 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	0.3 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	0.244 mg/kg	J	TEMP>10C	
		CH13-311-BH022_SOa	0.113 mg/kg	U	EB>RL	blank target = 0.00001mg/l
		CH13-311-BH915_SOC	0.172 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Tin**				
		CH13-311-BH015_SOA	2 mg/kg	UJ	TEMP>10C	
		CH13-311-BH015_SOB	2 mg/kg	UJ	TEMP>10C	
		CH13-311-BH015_SOC	2 mg/kg	UJ	TEMP>10C	
		CH13-311-BH015_SOD	2 mg/kg	UJ	TEMP>10C	
		CH13-311-BH015_SOE	2 mg/kg	UJ	TEMP>10C	
		CH13-311-BH915_SOC	2 mg/kg	UJ	TEMP>10C	
SW6010B	SOIL	**Titanium**				
		CH13-311-BH015_SOA	407 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	381 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	584 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	160 mg/kg	J	TEMP>10C	

TABLE 4

Blank Contamination - Qualified Data

Method	Matrix	Analyte / Sample ID	Result	Blank Contamination Qualifier*	Criteria	Comments
		CH13-311-BH015_SOE	589 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	609 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Uranium**				
		CH13-311-BH015_SOA	1.7 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	2.16 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	1.93 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	2.53 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	2.43 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	1.98 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Vanadium**				
		CH13-311-BH015_SOA	37.6 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	40.8 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	35.1 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	45.8 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	34.8 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	37.2 mg/kg	J	TEMP>10C	
SW6010B	SOIL	**Zinc**				
		CH13-311-BH015_SOA	1070 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOB	2700 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOC	70.4 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOD	5190 mg/kg	J	TEMP>10C	
		CH13-311-BH015_SOE	99.5 mg/kg	J	TEMP>10C	
		CH13-311-BH915_SOC	69.3 mg/kg	J	TEMP>10C	
SW6020A_DI	SOIL	**Aluminum, DI**				
		CH13-311-BH003_SOa	0.0086 mg/l	U	EB>RL	blank target = 0.0156mg/l

TABLE 4

Blank Contamination - Qualified Data

Method	Matrix	Analyte / Sample ID	Result	Blank Contamination Qualifier*	Criteria	Comments

Blank target = concentration of field or laboratory blank.

* The most severe flag for each analyte becomes the final validation flag.

Qualifier Description:

J = Analyte was present but the reported value may not be accurate or precise.

U = This analyte was analyzed for but not detected at the specified detection limit.

UJ = The analyte was not detected above the detection limit objective. However, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Criteria:

EB>RL = Equipment blank concentration greater than the RL

TEMP>10C = Cooler received by laboratory at greater than 10 degrees C

TABLE 5

Holding Times - Qualified Data

Method	Matrix	Sample ID	Analyte	Holding Time	Result	Holding Time Qualifier	Final Flag*
ASTM 2216	SOIL	CH13-311-BH004_SOa					
			Moisture	25 Days	0.25 percent	UJ	UJ
ASTM 2216	SOIL	CH13-311-BH005_SOa					
			Moisture	15 Days	17.8 percent	J	J
ASTM 2216	SOIL	CH13-311-BH005_SOb					
			Moisture	15 Days	25.7 percent	J	J
ASTM 2216	SOIL	CH13-311-BH010_SOc					
			Moisture	15 Days	12.3 percent	J	J
ASTM 2216	SOIL	CH13-311-BH010_SOd					
			Moisture	15 Days	4.71 percent	J	J
ASTM 2216	SOIL	CH13-311-BH012_SOd					
			Moisture	24 Days	11.1 percent	J	J
ASTM 2216	SOIL	CH13-311-BH013_SOA					
			Moisture	15 Days	9.04 percent	J	J
ASTM 2216	SOIL	CH13-311-BH013_SOB					
			Moisture	15 Days	4.66 percent	J	J
ASTM 2216	SOIL	CH13-311-BH013_SOC					
			Moisture	15 Days	10.3 percent	J	J
ASTM 2216	SOIL	CH13-311-BH015_SOA					
			Moisture	19 Days	10.8 percent	J	J
ASTM 2216	SOIL	CH13-311-BH015_SOB					
			Moisture	19 Days	13.7 percent	J	J
ASTM 2216	SOIL	CH13-311-BH015_SOC					
			Moisture	19 Days	8.14 percent	J	J
ASTM 2216	SOIL	CH13-311-BH015_SOD					

TABLE 5

Holding Times - Qualified Data

Method	Matrix	Sample ID	Analyte	Holding Time	Result	Holding Time Qualifier	Final Flag*
ASTM 2216	SOIL	CH13-311-BH015_SOD					
			Moisture	19 Days	8.62 percent	J	J
ASTM 2216	SOIL	CH13-311-BH015_SOE					
			Moisture	19 Days	9.51 percent	J	J
ASTM 2216	SOIL	CH13-311-BH022_SOa					
			Moisture	15 Days	14 percent	J	J
ASTM 2216	SOIL	CH13-311-BH022_SOb					
			Moisture	15 Days	16.1 percent	J	J
ASTM 2216	SOIL	CH13-311-BH913_SOB					
			Moisture	15 Days	4.1 percent	J	J
ASTM 2216	SOIL	CH13-311-BH915_SOC					
			Moisture	19 Days	9.4 percent	J	J
ASTM 2216	SOIL	CH13-311-TP002_SOa					
			Moisture	20 Days	8.6 percent	J	J
ASTM 2216	SOIL	CH13-311-TP003_SOa					
			Moisture	20 Days	8.98 percent	J	J
ASTM 2216	SOIL	CH13-311-TP004_SOa					
			Moisture	20 Days	7.94 percent	J	J
ASTM 2216	SOIL	CH13-311-TP005_SOa					
			Moisture	20 Days	9.44 percent	J	J
ASTM 2216	SOIL	CH13-311-TP006_SOa					
			Moisture	21 Days	6.88 percent	J	J
ASTM 2216	SOIL	Ch13-311-TP021_SOa					
			Moisture	17 Days	11.9 percent	J	J
ASTM 2216	SOIL	CH13-311-TP022_SOa					

TABLE 5

Holding Times - Qualified Data

Method	Matrix	Sample ID	Analyte	Holding Time	Result	Holding Time Qualifier	Final Flag*
ASTM 2216	SOIL	CH13-311-TP022_SOa					
			Moisture	18 Days	9.09 percent	J	J
ASTM 2216	SOIL	CH13-311-TP023_SOa					
			Moisture	18 Days	11.3 percent	J	J
ASTM 2216	SOIL	CH13-311-TP902_SOa					
			Moisture	20 Days	9.51 percent	J	J
ASTM 2216	SOIL	CH13-311-TP903_SOa					
			Moisture	20 Days	7.68 percent	J	J
ASTM 2216	SOIL	CH13-311-TP904_SOa					
			Moisture	20 Days	5.31 percent	J	J
ASTM 2216	SOIL	CH13-311-TP905_SOa					
			Moisture	20 Days	8.9 percent	J	J
ASTM 2216	SOIL	CH13-311-TP906_SOa					
			Moisture	21 Days	9.68 percent	J	J
CSSS/APHA 4500H	SOIL	CH13-311-TP022_SOa					
			Paste pH	29 Days	6.98 pH Units	J	J
CSSS/APHA 4500H	SOIL	CH13-311-TP023_SOa					
			Paste pH	29 Days	6.17 pH Units	J	J
SSSA P 973-974	SOIL	CH13-311-SS024_SOa					
			TOTAL NITROGEN BY LECO	54 Days	0.029 percent	J	J
USDA-HB60 P 101_CALC	SOIL	CH13-311-SS024_SOa					
			EXCHANGEABLE SODIUM PER	46 Days	0.1 percent	UJ	UJ

TABLE 5

Holding Times - Qualified Data

Method	Matrix	Sample ID	Analyte	Holding Time	Result	Holding Time Qualifier	Final Flag*

* The most severe flag for each analyte becomes the final validation flag.

Qualifier Description:

J = Analyte was present but the reported value may not be accurate or precise.

UJ = The analyte was not detected above the detection limit objective. However, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Criteria:

HTa>UCL **=** Holding time exceeded

TABLE 6

Field Duplicate Precision - Qualified Data

Method	Matrix	Sample ID	Analyte	Result	Field Duplicate Qualifier*	Criteria
CSSS 11.3/11.4	SOIL		**Iron, MN**			
		CH13-311-TP002_SOa		47 mg/kg	J	FD>RPD
		CH13-311-TP003_SOa		45.7 mg/kg	J	FD>RPD
		CH13-311-TP902_SOa		89.4 mg/kg	J	FD>RPD
		CH13-311-TP903_SOa		121 mg/kg	J	FD>RPD
CSSS 11.3/11.4	SOIL		**Manganese, MN**			
		CH13-311-TP004_SOa		19.4 mg/kg	J	FD>RPD
		CH13-311-TP005_SOa		16.1 mg/kg	J	FD>RPD
		CH13-311-TP904_SOa		11.1 mg/kg	J	FD>RPD
		CH13-311-TP905_SOa		6.67 mg/kg	J	FD>RPD
CSSS 11.3/11.4	SOIL		**Zinc, MN**			
		CH13-311-TP002_SOa		2.24 mg/kg	J	FD>RPD
		CH13-311-TP003_SOa		2.6 mg/kg	J	FD>RPD
		CH13-311-TP004_SOa		49.6 mg/kg	J	FD>RPD
		CH13-311-TP902_SOa		14.6 mg/kg	J	FD>RPD
		CH13-311-TP903_SOa		5.23 mg/kg	J	FD>RPD
		CH13-311-TP904_SOa		119 mg/kg	J	FD>RPD
CSSS 18.2.2/SM4500CL	SOIL		**Chloride_SP**			
		CH13-311-BH013_SOB		196 mg/l	J	FD>RPD
		CH13-311-BH913_SOB		15.1 mg/l	J	FD>RPD
		CH13-311-TP002_SOa		2.2 mg/l	J	FD>RPD
		CH13-311-TP004_SOa		26.8 mg/l	J	FD>RPD
		CH13-311-TP902_SOa		4 mg/l	J	FD>RPD
		CH13-311-TP904_SOa		130 mg/l	J	FD>RPD
CSSS 18.3.1	SOIL		**Conductivity_SP**			
		CH13-311-TP002_SOa		2670 uS/cm	J	FD>RPD
		CH13-311-TP005_SOa		950 uS/cm	J	FD>RPD
		CH13-311-TP902_SOa		570 uS/cm	J	FD>RPD
		CH13-311-TP905_SOa		480 uS/cm	J	FD>RPD
CSSS 4.2	SOIL		**AVAILABLE AMMONIUM**			
		CH13-311-TP002_SOa		1.5 mg/kg	J	FD>RPD
		CH13-311-TP902_SOa		2.6 mg/kg	J	FD>RPD

TABLE 6

Field Duplicate Precision - Qualified Data

Method	Matrix	Sample ID	Analyte	Result	Field Duplicate Qualifier*	Criteria
CSSS 7.2/7.31	SOIL		**AVAILABLE PHOSPHATE**			
		CH13-311-TP002_SOa		2.8 mg/kg	J	FD>RPD
		CH13-311-TP003_SOa		3 mg/kg	J	FD>RPD
		CH13-311-TP004_SOa		4.4 mg/kg	J	FD>RPD
		CH13-311-TP005_SOa		4.6 mg/kg	J	FD>RPD
		CH13-311-TP902_SOa		5.2 mg/kg	J	FD>RPD
		CH13-311-TP903_SOa		5.4 mg/kg	J	FD>RPD
		CH13-311-TP904_SOa		8.4 mg/kg	J	FD>RPD
		CH13-311-TP905_SOa		9.2 mg/kg	J	FD>RPD
E245.7	SOIL		**Mercury**			
		CH13-311-BH024_SOb		0.0069 mg/kg	J	FD>RPD
		CH13-311-BH924_SOb		0.0234 mg/kg	J	FD>RPD
		CH13-311-TP004_SOa		0.735 mg/kg	J	FD>RPD
		CH13-311-TP005_SOa		0.126 mg/kg	J	FD>RPD
		CH13-311-TP904_SOa		0.349 mg/kg	J	FD>RPD
		CH13-311-TP905_SOa		0.036 mg/kg	J	FD>RPD
MOD-SOBEK-3.2.3	SOIL		**Neutralization Potential (as CaCO3 Eq.)**			
		CH13-311-BH013_SOB		59 T CaCO3/1000 T	J	FD>RPD
		CH13-311-BH024_SOb		1 T CaCO3/1000 T	J	FD>RPD
		CH13-311-BH913_SOB		32 T CaCO3/1000 T	J	FD>RPD
		CH13-311-BH924_SOb		2 T CaCO3/1000 T	J	FD>RPD
NCR P 36/SM3120B	SOIL		**AVAILABLE SULFATE**			
		CH13-311-TP002_SOa		176 mg/kg	J	FD>RPD
		CH13-311-TP003_SOa		247 mg/kg	J	FD>RPD
		CH13-311-TP005_SOa		53.3 mg/kg	J	FD>RPD
		CH13-311-TP902_SOa		25.7 mg/kg	J	FD>RPD
		CH13-311-TP903_SOa		99.2 mg/kg	J	FD>RPD
		CH13-311-TP905_SOa		19.3 mg/kg	J	FD>RPD
SM2310_DI	SOIL		**Acidity, DI**			
		CH13-311-TP006_SOa		11.7 mg/l	J	FD>RPD
		CH13-311-TP906_SOa		6.2 mg/l	J	FD>RPD
SM3120B	SOIL		**Calcium, Sat**			

TABLE 6

Field Duplicate Precision - Qualified Data

Method	Matrix	Sample ID	Analyte	Result	Field Duplicate Qualifier*	Criteria
		CH13-311-TP002_SOa		540 mg/l	J	FD>RPD
		CH13-311-TP005_SOa		138 mg/l	J	FD>RPD
		CH13-311-TP902_SOa		78.5 mg/l	J	FD>RPD
		CH13-311-TP905_SOa		60.4 mg/l	J	FD>RPD
SM3120B	SOIL		**Magnesium, Sat**			
		CH13-311-TP002_SOa		88.8 mg/l	J	FD>RPD
		CH13-311-TP005_SOa		23.8 mg/l	J	FD>RPD
		CH13-311-TP902_SOa		14.1 mg/l	J	FD>RPD
		CH13-311-TP905_SOa		10.7 mg/l	J	FD>RPD
SM3120B	SOIL		**Potassium, Sat**			
		CH13-311-TP002_SOa		17.8 mg/l	J	FD>RPD
		CH13-311-TP902_SOa		7.4 mg/l	J	FD>RPD
SM3120B	SOIL		**Sodium Adsorption Ratio**			
		CH13-311-BH013_SOB		2.12 SAR	J	FD>RPD
		CH13-311-BH913_SOB		0.65 SAR	J	FD>RPD
SM3120B	SOIL		**Sodium, Sat**			
		CH13-311-BH013_SOB		114 mg/l	J	FD>RPD
		CH13-311-BH913_SOB		30.4 mg/l	J	FD>RPD
		CH13-311-TP003_SOa		41.8 mg/l	J	FD>RPD
		CH13-311-TP903_SOa		23.8 mg/l	J	FD>RPD
SM3120B	SOIL		**SULFUR (AS SO4)_Saturated**			
		CH13-311-TP002_SOa		1860 mg/l	J	FD>RPD
		CH13-311-TP005_SOa		514 mg/l	J	FD>RPD
		CH13-311-TP902_SOa		253 mg/l	J	FD>RPD
		CH13-311-TP905_SOa		197 mg/l	J	FD>RPD
SM4110B_DI	SOIL		**Sulfate, DI**			
		CH13-311-TP004_SOa		191 mg/l	J	FD>RPD
		CH13-311-TP904_SOa		271 mg/l	J	FD>RPD
SSSA P 455-456	SOIL		**Total Organic Carbon**			
		CH13-311-TP002_SOa		0.47 percent	J	FD>RPD
		CH13-311-TP902_SOa		0.19 percent	J	FD>RPD

TABLE 6

Field Duplicate Precision - Qualified Data

Method	Matrix	Sample ID	Analyte	Result	Field Duplicate Qualifier*	Criteria
SSSA P 973-974	SOIL		**TOTAL CARBON BY LECO**			
		CH13-311-BH024_SOb		0.2 percent	J	FD>RPD
		CH13-311-BH924_SOb		0.1 percent	J	FD>RPD
		CH13-311-TP002_SOa		0.6 percent	J	FD>RPD
		CH13-311-TP902_SOa		0.3 percent	J	FD>RPD
SW6010B	SOIL		**Antimony**			
		CH13-311-TP003_SOa		1.77 mg/kg	J	FD>RPD
		CH13-311-TP004_SOa		6.44 mg/kg	J	FD>RPD
		CH13-311-TP903_SOa		0.58 mg/kg	J	FD>RPD
		CH13-311-TP904_SOa		3.01 mg/kg	J	FD>RPD
SW6010B	SOIL		**Arsenic**			
		CH13-311-BH011_SOe		26.3 mg/kg	J	FD>RPD
		CH13-311-BH024_SOb		7.64 mg/kg	J	FD>RPD
		CH13-311-BH911_SOe		15 mg/kg	J	FD>RPD
		CH13-311-BH924_SOb		4.12 mg/kg	J	FD>RPD
SW6010B	SOIL		**Bismuth**			
		CH13-311-BH024_SOb		0.54 mg/kg	J	FD>RPD
		CH13-311-BH924_SOb		4.07 mg/kg	J	FD>RPD
SW6010B	SOIL		**Calcium**			
		CH13-311-BH024_SOb		1210 mg/kg	J	FD>RPD
		CH13-311-BH924_SOb		496 mg/kg	J	FD>RPD
SW6010B	SOIL		**Chromium**			
		CH13-311-BH024_SOb		13.6 mg/kg	J	FD>RPD
		CH13-311-BH924_SOb		4.15 mg/kg	J	FD>RPD
		CH13-311-TP004_SOa		37.8 mg/kg	J	FD>RPD
		CH13-311-TP904_SOa		77.5 mg/kg	J	FD>RPD
SW6010B	SOIL		**Copper**			
		CH13-311-TP004_SOa		64 mg/kg	J	FD>RPD
		CH13-311-TP904_SOa		36.8 mg/kg	J	FD>RPD
SW6010B	SOIL		**Lead**			
		CH13-311-BH013_SOB		850 mg/kg	J	FD>RPD

TABLE 6

Field Duplicate Precision - Qualified Data

Method	Matrix	Sample ID	Analyte	Result	Field Duplicate Qualifier*	Criteria
		CH13-311-BH913_SOB		483 mg/kg	J	FD>RPD
		CH13-311-TP004_SOa		996 mg/kg	J	FD>RPD
		CH13-311-TP904_SOa		378 mg/kg	J	FD>RPD
SW6010B	SOIL		**Nickel**			
		CH13-311-TP004_SOa		44.7 mg/kg	J	FD>RPD
		CH13-311-TP904_SOa		82.9 mg/kg	J	FD>RPD
SW6010B	SOIL		**Phosphorus**			
		CH13-311-BH011_SOe		1290 mg/kg	J	FD>RPD
		CH13-311-BH024_SOb		577 mg/kg	J	FD>RPD
		CH13-311-BH911_SOe		727 mg/kg	J	FD>RPD
		CH13-311-BH924_SOb		205 mg/kg	J	FD>RPD
SW6010B	SOIL		**Silver**			
		CH13-311-BH013_SOB		2.28 mg/kg	J	FD>RPD
		CH13-311-BH913_SOB		1.21 mg/kg	J	FD>RPD
		CH13-311-TP004_SOa		2.08 mg/kg	J	FD>RPD
		CH13-311-TP904_SOa		0.74 mg/kg	J	FD>RPD
SW6010B	SOIL		**Strontium**			
		CH13-311-BH024_SOb		5.19 mg/kg	J	FD>RPD
		CH13-311-BH924_SOb		2.6 mg/kg	J	FD>RPD
SW6010B	SOIL		**Titanium**			
		CH13-311-BH013_SOB		40 mg/kg	J	FD>RPD
		CH13-311-BH913_SOB		73.6 mg/kg	J	FD>RPD
		CH13-311-TP004_SOa		226 mg/kg	J	FD>RPD
		CH13-311-TP904_SOa		118 mg/kg	J	FD>RPD
SW6010B_DI	SOIL		**Magnesium, DI**			
		CH13-311-TP004_SOa		30.4 mg/l	J	FD>RPD
		CH13-311-TP904_SOa		61.6 mg/l	J	FD>RPD
SW6020A_DI	SOIL		**Antimony, DI**			
		CH13-311-TP004_SOa		0.00977 mg/l	J	FD>RPD
		CH13-311-TP904_SOa		0.00174 mg/l	J	FD>RPD
SW6020A_DI	SOIL		**Barium, DI**			

TABLE 6

Field Duplicate Precision - Qualified Data

Method	Matrix	Sample ID	Analyte	Result	Field Duplicate Qualifier*	Criteria
		CH13-311-TP004_SOa		0.0667 mg/l	J	FD>RPD
		CH13-311-TP904_SOa		0.0398 mg/l	J	FD>RPD
SW6020A_DI	SOIL		**Cadmium, DI**			
		CH13-311-TP004_SOa		0.000645 mg/l	J	FD>RPD
		CH13-311-TP904_SOa		0.000257 mg/l	J	FD>RPD
SW6020A_DI	SOIL		**Cobalt, DI**			
		CH13-311-TP004_SOa		0.00158 mg/l	J	FD>RPD
		CH13-311-TP904_SOa		0.00087 mg/l	J	FD>RPD
SW6020A_DI	SOIL		**Lead, DI**			
		CH13-311-TP004_SOa		0.0699 mg/l	J	FD>RPD
		CH13-311-TP904_SOa		0.00355 mg/l	J	FD>RPD
SW6020A_DI	SOIL		**Manganese, DI**			
		CH13-311-TP004_SOa		0.226 mg/l	J	FD>RPD
		CH13-311-TP904_SOa		0.0856 mg/l	J	FD>RPD
SW6020A_DI	SOIL		**Strontium, DI**			
		CH13-311-TP004_SOa		0.421 mg/l	J	FD>RPD
		CH13-311-TP904_SOa		0.243 mg/l	J	FD>RPD
SW6020A_DI	SOIL		**Uranium, DI**			
		CH13-311-TP004_SOa		0.0175 mg/l	J	FD>RPD
		CH13-311-TP904_SOa		0.00614 mg/l	J	FD>RPD
USDA-HB60 P 101_CALC	SOIL		**EXCHANGEABLE SODIUM PERCENTAGE**			
		CH13-311-TP003_SOa		16 percent	J	FD>RPD
		CH13-311-TP903_SOa		0.1 percent	UJ	FD>RPD

* The most severe flag for each analyte becomes the final validation flag.

Qualifier Description:

J = Analyte was present but the reported value may not be accurate or precise.

UJ = The analyte was not detected above the detection limit objective. However, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Criteria:

FD>RPD = Field duplicate exceeds RPD criteria

TABLE 7

Matrix Spike Precision/Accuracy - Qualified Data

Method	Matrix	Sample ID	Analyte	Result	MS/MSD Qualifier*	MS Recovery	Criteria
CSSS/APHA 4500H	SOIL		**Paste pH**				
		Ch13-311-TP021_SOa		5.08 pH Units	J	%RPD = 0.53 vs 0.3	LabDupRPD
E245.7	SOIL		**Mercury**				
		CH13-311-BH015_SOA		0.59 mg/kg	J	RPD = 100 vs 40	LabDupRPD
		CH13-311-BH015_SOB		1.2 mg/kg	J	RPD = 100 vs 40	LabDupRPD
		CH13-311-BH015_SOC		0.0277 mg/kg	J	RPD = 100 vs 40	LabDupRPD
		CH13-311-BH015_SOD		1.45 mg/kg	J	RPD = 100 vs 40	LabDupRPD
		CH13-311-BH015_SOE		0.0155 mg/kg	J	RPD = 100 vs 40	LabDupRPD
		CH13-311-BH915_SOC		0.0258 mg/kg	J	RPD = 100 vs 40	LabDupRPD
SM2320B_DI	SOIL		**Alkalinity, Total, DI**				
		CH13-311-BH001_SOa		114 mg/l	J	%RPD = 23.28 vs 20	LabDupRPD
		CH13-311-BH001_SOb		21.1 mg/l	J	%RPD = 23.28 vs 20	LabDupRPD
SW6010B	SOIL		**Antimony**				
		CH13-311-BH015_SOA		4.92 mg/kg	J	%RPD = 48.8 vs 30	LabDupRPD
		CH13-311-BH015_SOB		9.6 mg/kg	J	%RPD = 48.8 vs 30	LabDupRPD
		CH13-311-BH015_SOC		0.75 mg/kg	J	%RPD = 48.8 vs 30	LabDupRPD
		CH13-311-BH015_SOD		4.83 mg/kg	J	%RPD = 48.8 vs 30	LabDupRPD
		CH13-311-BH015_SOE		0.39 mg/kg	J	%RPD = 48.8 vs 30	LabDupRPD
		CH13-311-BH915_SOC		0.75 mg/kg	J	%RPD = 48.8 vs 30	LabDupRPD
SW6010B	SOIL		**Arsenic**				
		CH13-311-BH002_SOb		12.1 mg/kg	J	%RPD = 82.52 vs 30	LabDupRPD
		CH13-311-BH003_SOa		22.1 mg/kg	J	%RPD = 82.52 vs 30	LabDupRPD
		CH13-311-BH003_SOb		12.9 mg/kg	J	%RPD = 82.52 vs 30	LabDupRPD
SW6010B	SOIL		**Barium**				
		CH13-311-BH015_SOA		476 mg/kg	J	%RPD = 41.93 vs 40	LabDupRPD
		CH13-311-BH015_SOB		372 mg/kg	J	%RPD = 41.93 vs 40	LabDupRPD
		CH13-311-BH015_SOC		253 mg/kg	J	%RPD = 41.93 vs 40	LabDupRPD
		CH13-311-BH015_SOD		258 mg/kg	J	%RPD = 41.93 vs 40	LabDupRPD
		CH13-311-BH015_SOE		140 mg/kg	J	%RPD = 41.93 vs 40	LabDupRPD
		CH13-311-BH915_SOC		270 mg/kg	J	%RPD = 41.93 vs 40	LabDupRPD
SW6010B	SOIL		**Bismuth**				
		CH13-311-BH014_SOA		0.24 mg/kg	J	Limit = 0.52 vs 0.4	LabDupRPD
		CH13-311-BH014_SOB		0.38 mg/kg	J	Limit = 0.52 vs 0.4	LabDupRPD

TABLE 7

Matrix Spike Precision/Accuracy - Qualified Data

Method	Matrix	Sample ID	Analyte	Result	MS/MSD Qualifier*	MS Recovery	Criteria
		CH13-311-BH014_SOC		0.25 mg/kg	J	Limit = 0.52 vs 0.4	LabDupRPD
		CH13-311-BH014_SOD		0.41 mg/kg	J	Limit = 0.52 vs 0.4	LabDupRPD
		CH13-311-BH014_SOE		0.96 mg/kg	J	Limit = 0.52 vs 0.4	LabDupRPD
SW6010B	SOIL		**Cadmium**				
		CH13-311-BH015_SOA		1.95 mg/kg	J	%RPD = 79.37 vs 30	LabDupRPD
		CH13-311-BH015_SOB		4.46 mg/kg	J	%RPD = 79.37 vs 30	LabDupRPD
		CH13-311-BH015_SOC		0.322 mg/kg	J	%RPD = 79.37 vs 30	LabDupRPD
		CH13-311-BH015_SOD		8.43 mg/kg	J	%RPD = 79.37 vs 30	LabDupRPD
		CH13-311-BH015_SOE		0.29 mg/kg	J	%RPD = 79.37 vs 30	LabDupRPD
		CH13-311-BH915_SOC		0.312 mg/kg	J	%RPD = 79.37 vs 30	LabDupRPD
SW6010B	SOIL		**Lead**				
		CH13-311-BH015_SOA		497 mg/kg	J	%RPD = 94.08 vs 40	LabDupRPD
		CH13-311-BH015_SOB		986 mg/kg	J	%RPD = 94.08 vs 40	LabDupRPD
		CH13-311-BH015_SOC		13.8 mg/kg	J	%RPD = 94.08 vs 40	LabDupRPD
		CH13-311-BH015_SOD		658 mg/kg	J	%RPD = 94.08 vs 40	LabDupRPD
		CH13-311-BH015_SOE		22.1 mg/kg	J	%RPD = 94.08 vs 40	LabDupRPD
		CH13-311-BH915_SOC		12.4 mg/kg	J	%RPD = 94.08 vs 40	LabDupRPD
		CH13-311-TP022_SOa		13.7 mg/kg	J	%RPD = 62.2 vs 40	LabDupRPD
		CH13-311-TP023_SOa		33.3 mg/kg	J	%RPD = 62.2 vs 40	LabDupRPD
SW6010B	SOIL		**Phosphorus**				
		CH13-311-BH002_SOb		614 mg/kg	J	%RPD = 74.72 vs 30	LabDupRPD
		CH13-311-BH003_SOa		874 mg/kg	J	%RPD = 74.72 vs 30	LabDupRPD
		CH13-311-BH003_SOb		632 mg/kg	J	%RPD = 74.72 vs 30	LabDupRPD
SW6010B	SOIL		**Silver**				
		CH13-311-BH015_SOA		0.89 mg/kg	J	%RPD = 75 vs 40	LabDupRPD
		CH13-311-BH015_SOB		1.86 mg/kg	J	%RPD = 75 vs 40	LabDupRPD
		CH13-311-BH015_SOC		0.13 mg/kg	J	%RPD = 75 vs 40	LabDupRPD
		CH13-311-BH015_SOD		1.77 mg/kg	J	%RPD = 75 vs 40	LabDupRPD
		CH13-311-BH015_SOE		0.12 mg/kg	J	%RPD = 75 vs 40	LabDupRPD
		CH13-311-BH915_SOC		0.12 mg/kg	J	%RPD = 75 vs 40	LabDupRPD
SW6010B	SOIL		**Zinc**				
		CH13-311-BH015_SOA		1070 mg/kg	J	%RPD = 83.82 vs 30	LabDupRPD
		CH13-311-BH015_SOB		2700 mg/kg	J	%RPD = 83.82 vs 30	LabDupRPD

TABLE 7

Matrix Spike Precision/Accuracy - Qualified Data

Method	Matrix	Sample ID	Analyte	Result	MS/MSD Qualifier*	MS Recovery	Criteria
		CH13-311-BH015_SOC		70.4 mg/kg	J	%RPD = 83.82 vs 30	LabDupRPD
		CH13-311-BH015_SOD		5190 mg/kg	J	%RPD = 83.82 vs 30	LabDupRPD
		CH13-311-BH015_SOE		99.5 mg/kg	J	%RPD = 83.82 vs 30	LabDupRPD
		CH13-311-BH915_SOC		69.3 mg/kg	J	%RPD = 83.82 vs 30	LabDupRPD
SW6020A_DI	SOIL		**Aluminum, DI**				
		CH13-311-BH002_SOb		24.2 mg/l	J	%RPD = 62.69 vs 40	LabDupRPD
		CH13-311-BH003_SOa		0.0086 mg/l	J	%RPD = 62.69 vs 40	LabDupRPD
		CH13-311-BH003_SOb		1.15 mg/l	J	%RPD = 62.69 vs 40	LabDupRPD
SW6020A_DI	SOIL		**Arsenic, DI**				
		CH13-311-BH002_SOb		0.0579 mg/l	J	%RPD = 43.1 vs 40	LabDupRPD
		CH13-311-BH003_SOa		0.001 mg/l	UJ	%RPD = 43.1 vs 40	LabDupRPD
		CH13-311-BH003_SOb		0.0091 mg/l	J	%RPD = 43.1 vs 40	LabDupRPD
SW6020A_DI	SOIL		**Chromium, DI**				
		CH13-311-BH002_SOb		0.0359 mg/l	J	%RPD = 49.83 vs 40	LabDupRPD
		CH13-311-BH003_SOa		0.0005 mg/l	UJ	%RPD = 49.83 vs 40	LabDupRPD
		CH13-311-BH003_SOb		0.00336 mg/l	J	%RPD = 49.83 vs 40	LabDupRPD
SW6020A_DI	SOIL		**Copper, DI**				
		CH13-311-BH002_SOb		0.0455 mg/l	J	%RPD = 42.08 vs 40	LabDupRPD
		CH13-311-BH003_SOa		0.001 mg/l	UJ	%RPD = 42.08 vs 40	LabDupRPD
		CH13-311-BH003_SOb		0.0167 mg/l	J	%RPD = 42.08 vs 40	LabDupRPD
SW6020A_DI	SOIL		**Vanadium, DI**				
		CH13-311-BH002_SOb		0.0863 mg/l	J	%RPD = 45.85 vs 40	LabDupRPD
		CH13-311-BH003_SOa		0.001 mg/l	UJ	%RPD = 45.85 vs 40	LabDupRPD
		CH13-311-BH003_SOb		0.0079 mg/l	J	%RPD = 45.85 vs 40	LabDupRPD

* The most severe flag for each analyte becomes the final validation flag.

Qualifier Description:

J = Analyte was present but the reported value may not be accurate or precise.

UJ = The analyte was not detected above the detection limit objective. However, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Criteria:

LabDupRPD = Lab duplicate RPD criteria exceeded

TABLE 8

Site Completeness by Analyte - Qualified Data

			Number of Occurrences									
Method	Analyte	Units	Analyses	Detects	Non-detects	Blank Flags	J Flags	M Flags	Contractor R Flags	Total R Flags	Contractor Percent Completeness	Overall Percent Completeness
ASTM 2216	Moisture	PERCENT	74	73	1		31				100	100
ASTM D4318	MOISTURE AT LIQUID LIMIT	PERCENT	27	27							100	100
ASTM D4318	PLASTICITY INDEX	PERCENT	27	27							100	100
ASTMD1498_DI	ORP Leachable, DI	MV	14	14							100	100
CarterSatPercent	% saturation	PERCENT	18	18							100	100
CSSC 3.11	PH (1:2 CACL2)	PH UNITS	52	52							100	100
CSSS 11.3/11.4	Copper, MN	MG/KG	52	52							100	100
CSSS 11.3/11.4	Iron, MN	MG/KG	52	52			4				100	100
CSSS 11.3/11.4	Manganese, MN	MG/KG	52	52			4				100	100
CSSS 11.3/11.4	Zinc, MN	MG/KG	52	51	1		6				100	100
CSSS 14.2	SMP Buffer pH	PH UNITS	51	51							100	100
CSSS 18.2.2/SM4500CL	Chloride_SP	MG/L	52	46	6		6				100	100
CSSS 18.3.1	Conductivity (1:2)	DS/M	8	1	7						100	100
CSSS 18.3.1	Conductivity_SP	DS/M	41	36	5						100	100
CSSS 18.3.1	% saturation_SP	PERCENT	51	51							100	100
CSSS 18.3.1	pH, SP	PH UNITS	52	52							100	100
CSSS 18.3.1	Conductivity (1:2)	US/CM	11	10	1						100	100
CSSS 18.3.1	Conductivity_SP	US/CM	11	10	1		4				100	100
CSSS 19.4	Calcium, NH4OAc	MEQ/100G	54	51	3						100	100

TABLE 8

Site Completeness by Analyte - Qualified Data

			Number of Occurrences									
Method	Analyte	Units	Analyses	Detects	Non-detects	Blank Flags	J Flags	M Flags	Contractor R Flags	Total R Flags	Contractor Percent Completeness	Overall Percent Completeness
CSSS 19.4	Magnesium, NH4OAc	MEQ/100G	54	49	5						100	100
CSSS 19.4	Potassium, NH4OAc	MEQ/100G	54		54						100	100
CSSS 19.4	Sodium, NH4OAc	MEQ/100G	54	1	53						100	100
CSSS 21.2	Organic Matter	PERCENT	68	20	48		6				100	100
CSSS 21.2	Total Organic Carbon	PERCENT	68	29	39		6				100	100
CSSS 3.321	CATION EXCHANGE CAPACITY	MEQ/100G	40	40							100	100
CSSS 4.2	AVAILABLE AMMONIUM	MG/KG	16	16			2				100	100
CSSS 4.2/4.3	AVAILABLE NITRATE	MG/KG	16		16						100	100
CSSS 7.2/7.31	AVAILABLE PHOSPHATE	MG/KG	43	41	2		8				100	100
CSSS/APHA 2510B_DI	Specific Conductance, DI	US/CM	14	14							100	100
CSSS/APHA 4500H	Paste pH	PH UNITS	74	74			9				100	100
CSSS/APHA 4500H	pH (1:2 soil:water)	PH UNITS	74	74			6				100	100
CSSS/APHA 4500H_DI	Paste pH, DI	PH UNITS	14	14							100	100
E245.7	Mercury	MG/KG	74	70	4		12				100	100
E245.7_DI	Mercury, DI	MG/L	14		14						100	100
EPA600/2-78-054	Sulfate, Acid Soluble	PERCENT	40	15	25						100	100
ISO 15178:2000	Sulfur	MG/KG	74	57	17		6				100	100
MOD-SOBEK-3.2.3	Neutralization Potential (as CaCO3 Eq.)	T CACO3/1	74	74			10				100	100
NCR P 36/SM3120B	AVAILABLE SULFATE	MG/KG	52	48	4		6				100	100

TABLE 8

Site Completeness by Analyte - Qualified Data

			Number of Occurrences									
Method	Analyte	Units	Analyses	Detects	Non-detects	Blank Flags	J Flags	M Flags	Contractor R Flags	Total R Flags	Contractor Percent Completeness	Overall Percent Completeness
SM2310_DI	Acidity, DI	MG/L	14	14			2				100	100
SM2320B_DI	Alkalinity, Total, DI	MG/L	14	14			2				100	100
SM3120B	Calcium, Sat	MG/L	52	49	3		4				100	100
SM3120B	Magnesium, Sat	MG/L	52	49	3		4				100	100
SM3120B	Potassium, Sat	MG/L	52	52			2				100	100
SM3120B	Sodium, Sat	MG/L	52	50	2		4				100	100
SM3120B	SULFUR (AS SO4)_Saturated	MG/L	52	49	3		4				100	100
SM3120B	Sodium Adsorption Ratio	SAR	49	49			2				100	100
SM4110B_DI	Sulfate, DI	MG/L	14	13	1		2				100	100
SSSA (1996) P 610-611	Available Boron	MG/KG	55	17	38						100	100
SSSA P 455-456	Inorganic Carbon (as CACO3 Equivalent)	PERCENT	74	57	17						100	100
SSSA P 455-456	Total Inorganic Carbon	PERCENT	74	57	17		6				100	100
SSSA P 455-456	Total Organic Carbon	PERCENT	52	50	2		2				100	100
SSSA P 894-895	AVAILABLE PHOSPHATE	MG/KG	9	5	4						100	100
SSSA P 973-974	TOTAL CARBON BY LECO	PERCENT	52	52			2				100	100
SSSA P 973-974	TOTAL NITROGEN BY LECO	PERCENT	16	14	2		1				100	100
SW6010B	Aluminum	MG/KG	74	74			6				100	100
SW6010B	Antimony	MG/KG	74	74			10				100	100
SW6010B	Arsenic	MG/KG	74	74			13				100	100

TABLE 8

Site Completeness by Analyte - Qualified Data

			Number of Occurrences									
Method	Analyte	Units	Analyses	Detects	Non-detects	Blank Flags	J Flags	M Flags	Contractor R Flags	Total R Flags	Contractor Percent Completeness	Overall Percent Completeness
SW6010B	Barium	MG/KG	74	74			6				100	100
SW6010B	Beryllium	MG/KG	74	74			6				100	100
SW6010B	Bismuth	MG/KG	74	70	4		13				100	100
SW6010B	Boron	MG/KG	74		74		6				100	100
SW6010B	Cadmium	MG/KG	74	74			6				100	100
SW6010B	Calcium	MG/KG	74	74			8				100	100
SW6010B	Chromium	MG/KG	74	74			10				100	100
SW6010B	Cobalt	MG/KG	74	74			6				100	100
SW6010B	Copper	MG/KG	74	74			8				100	100
SW6010B	Iron	MG/KG	74	74			6				100	100
SW6010B	Lead	MG/KG	74	74			12				100	100
SW6010B	Lithium	MG/KG	74	74			6				100	100
SW6010B	Magnesium	MG/KG	74	74			6				100	100
SW6010B	Manganese	MG/KG	74	74			6				100	100
SW6010B	Molybdenum	MG/KG	74	62	12		6				100	100
SW6010B	Nickel	MG/KG	74	74			8				100	100
SW6010B	Phosphorus	MG/KG	74	74			13				100	100
SW6010B	Potassium	MG/KG	74	74			6				100	100
SW6010B	Selenium	MG/KG	74	58	16		6				100	100

TABLE 8

Site Completeness by Analyte - Qualified Data

			Number of Occurrences									
Method	Analyte	Units	Analyses	Detects	Non-detects	Blank Flags	J Flags	M Flags	Contractor R Flags	Total R Flags	Contractor Percent Completeness	Overall Percent Completeness
SW6010B	Silver	MG/KG	74	61	13		10				100	100
SW6010B	Sodium	MG/KG	74	62	12		6				100	100
SW6010B	Strontium	MG/KG	74	74			8				100	100
SW6010B	Thallium	MG/KG	74	72	2		6				100	100
SW6010B	Tin	MG/KG	74		74		6				100	100
SW6010B	Titanium	MG/KG	74	74			10				100	100
SW6010B	Uranium	MG/KG	74	74			6				100	100
SW6010B	Vanadium	MG/KG	74	74			6				100	100
SW6010B	Zinc	MG/KG	74	74			6				100	100
SW6010B_DI	Calcium, DI	MG/L	14	14							100	100
SW6010B_DI	Iron, DI	MG/L	14	4	10						100	100
SW6010B_DI	Magnesium, DI	MG/L	14	14			2				100	100
SW6010B_DI	Potassium, DI	MG/L	14	13	1						100	100
SW6010B_DI	Silicon, DI	MG/L	14	14							100	100
SW6010B_DI	Sodium, DI	MG/L	14	13	1						100	100
SW6010B_DI	Sulfur, DI	MG/L	14	13	1						100	100
SW6010B_DI	Titanium, DI	MG/L	14	3	11						100	100
SW6020A	Barium, LMB	PPM	35	35							100	100
SW6020A_DI	Aluminum, DI	MG/L	14	13	1		2				100	100

TABLE 8

Site Completeness by Analyte - Qualified Data

			Number of Occurrences									
Method	Analyte	Units	Analyses	Detects	Non-detects	Blank Flags	J Flags	M Flags	Contractor R Flags	Total R Flags	Contractor Percent Completeness	Overall Percent Completeness
SW6020A_DI	Antimony, DI	MG/L	14	14			2				100	100
SW6020A_DI	Arsenic, DI	MG/L	14	12	2		3				100	100
SW6020A_DI	Barium, DI	MG/L	14	14			2				100	100
SW6020A_DI	Beryllium, DI	MG/L	14	2	12						100	100
SW6020A_DI	Boron, DI	MG/L	14	14							100	100
SW6020A_DI	Cadmium, DI	MG/L	14	8	6		2				100	100
SW6020A_DI	Chromium, DI	MG/L	14	3	11		3				100	100
SW6020A_DI	Cobalt, DI	MG/L	14	8	6		2				100	100
SW6020A_DI	Copper, DI	MG/L	14	12	2		3				100	100
SW6020A_DI	Lead, DI	MG/L	14	7	7		2				100	100
SW6020A_DI	Lithium, DI	MG/L	14	6	8						100	100
SW6020A_DI	Manganese, DI	MG/L	14	14			2				100	100
SW6020A_DI	Molybdenum, DI	MG/L	14	14							100	100
SW6020A_DI	Nickel, DI	MG/L	14	12	2						100	100
SW6020A_DI	Selenium, DI	MG/L	14	10	4						100	100
SW6020A_DI	Silver, DI	MG/L	14	2	12						100	100
SW6020A_DI	Strontium, DI	MG/L	14	14			2				100	100
SW6020A_DI	Thallium, DI	MG/L	14	4	10						100	100
SW6020A_DI	Uranium, DI	MG/L	14	14			2				100	100

TABLE 8

Site Completeness by Analyte - Qualified Data

			Number of Occurrences									
Method	**Analyte**	**Units**	**Analyses**	**Detects**	**Non-detects**	**Blank Flags**	**J Flags**	**M Flags**	**Contractor R Flags**	**Total R Flags**	**Contractor Percent Completeness**	**Overall Percent Completeness**
SW6020A_DI	Vanadium, DI	MG/L	14	6	8		3				100	100
SW6020A_DI	Zinc, DI	MG/L	14	5	9						100	100
USDA-HB60 P 101_CAL	EXCHANGEABLE SODIUM PERCENTAGE	PERCENT	54	1	53		3				100	100

Attachment 1
Holding Time Corrective Action Report

December 11, 2013

CH2M Hill
2525 Airpark Drive
Redding, CA
96001

Attention: Travis Gouveia

Dear Mr. Gouveia,

RE: ALS Corrective Action Report (CAR) #10939 – Missed Holding Times for CH2M Hill Faro Mine Project IDs 472645.06.AD.01.04.13, 472645.18.VG.DF, 472645.15.CS.DM.01, and 472645.13.WT.AD.01

Between July 15 and September 9, ALS Whitehorse received several submissions from CH2M Hill for the above mentioned projects. Analyses for these submissions were performed by the ALS labs in Whitehorse and Vancouver, and some unexpected holding time (HT) exceedances were experienced for HTs set at three to twenty -eight days.

The affected tests and samples span a number of submissions and the root causes have been summarized below:

Insufficient Time: ALS does request a minimum of 24 hours lead time to perform any tests where holding times are about to expire. The samples/test requests listed below were received at ALS with insufficient time to meet prescribed holding time requirements. ALS recommends submitting samples/test requests to the lab with additional lead time to ensure the laboratory can meet HT requirements.

Work Order	Samples	Client ID	Analyte	Matrix	ALS HT	Root Cause
L1359691	1-3	CH13-311-TP022_SOA CH13-311-TP023_SOA CH13-311-TP021_SOA	Moisture	Soil	14 Days	Insufficient Time to Perform Testing.
L1332147	2	CH13-311-SS024_SOA	N-Tot-LECO		28 Days	

Contingent Login: For the CH2M Hill projects listed above, the selection of the appropriate Acidity method is contingent upon the iron concentrations of the samples. Thus, Iron testing must be performed before the initiation of the acidity testing and can directly affect the acidity testing timeline. The samples listed below experienced delays for iron testing which resulted in the Acidity HT failure. For future submissions, holding time requirements can be satisfied if iron analysis is performed on a rush basis or if both acidity methods are concurrently tested with iron.

Work Order	Samples	Client ID	Analyte	Matrix	ALS HT	Root Cause
L1355914	5-8, 11, 13, 17, 19, 20	P05-01-01_GW0813 P05-01-02_GW0813 P05-01-04_GW0813 P05-01-06_GW0813 CH12-204-MW001A_GW0813 CH12-204-MW901A_GW0813 P05-02_GW0813 P905-02_GW0813 P03-08-04_GW0813	Acidity	Water	14	Contingent Login: Acidity could not be run until iron concentration was known.
L1356637	2-6, 9, 10	P03-03-03_GW0813 P03-03-06_GW0813 P03-05-02_GW0813 P03-05-03_GW0813 P903-05-02_GW0813 X21A-96_GW0813 X21B-96_GW0813				
L1356684	16-19, 23-28	P03-04-06_GW0813 P03-06-03_GW0813 P03-06-04_GW0813 P03-08-05_GW0813 P03-04-08_GW0813 P03-05-05_GW0813 P03-05-06_GW0813 P03-05-07_GW0813 P03-05-08_GW0813 P03-06-05_GW0813	Acidity - H2O2			

Lab Error: For the holding time failures listed in the table below, ALS errors pertaining to logistics and sample reception were the direct causes. These errors, and their consequences, have been reviewed with all affected staff. ALS endeavors to prevent all future occurrences though improved awareness and training.

Work Order	Samples	Client ID	Analyte	Matrix	ALS HT	Root Cause
L1349069	1	CH13-204-MW011A_GW0813	PO4	Water	3	Lab Error - shipping delays.
L1346114	1-4	CH13-311-BH017_RKA CH13-311-BH017_RKB CH13-311-BH017_RKC CH13-311-BH917_RKC	Moisture	Soil	14	Lab Error - Sample Reception: Test missed at the login stage.

No Failure: Six parameters, in two separate instances, were analyzed by ALS within their prescribed HTs but were reported with HT qualification. In both instances, the analysis date was not correctly compared to the sampling date in determination of the holding time exceedance. Revised reports with holding time qualifications removed are available upon request.

Work Order	Samples	Client ID	Analyte	Matrix	ALS HT	Root Cause
L1346114	11,12	CH13-311-BH017_RKA PH5 CH13-311-BH017_RKC PH3	SPLP Hg	Soil	28	No Failure - Reporting Error: Reports can be revised upon request.
L1338656	1-4	CH13-311-BH011_SOA CH13-311-BH011_SOB CH13-311-BH011_SOC CH13-311-BH011_SOD	Moisture		14	

Non-Routine Procedure: For the samples listed in the table below, ALS received soil core tubes which required special handling before moisture testing could be initiated. Samples required Direct Shear Testing through the Golder Associates Laboratory before our testing could be initiated. As a result, holding times could not be met.

Work Order	Samples	Client ID	Analyte	Matrix	ALS HT	Root Cause
L1345512	3,5	CH13-303-BH002_SOC CH13-303-BH002_SOE	Moisture -VA, SK	Soil	14	Non-Routine Procedure Required Prior to Testing

CH2M Hill Quality Assurance Project Plan (QAPP) - Faro Mine: The holding times listed in the Faro Mine QAPP, and agreed to by ALS, were not met for certain parameters. In response, ALS will monitor due dates where QAPP HT < ALS HT, and will ensure the applied sample due date is prior to the QAPP HT expiration dates.

Work Order	Analyte	Matrix	ALS HT	QAPP HT	Root Cause
L1332147	Exchangeable Sodium	Soil	365	28	QAPP HT < ALS Recommended Holding Time: ALS testing prioritization did not account for CH2M Hill QAPP holding times.
L1338738	Paste pH pH 1:2 soil water				
L1346114	Paste pH				
L1351297	pH 1:2 soil water				
L1352327	Paste pH				
L1359691	Paste pH				

Re-testing and Quality Assurance: During the assembly of a final report, quality checks are performed as part of the ALS Quality Assurance program, which can lead to questions about non-conforming data points. The standard response is to confirm validity of the original results through re-testing. It is not uncommon for the re-test to be requested after HTs have expired and may even require the re-tested data to be entered into the report. The table below lists four affected work orders where HT failures occurred as a result of re-testing.

Work Order	Samples	Client ID	Analyte	Matrix	ALS HT	Root Cause
L1356684	28	P03-06-05_GW0813	Alkalinity	Water	14	Retested for Quality Assurance: Retested result replaced the original data point.
L1350226	1	E_204_13_003	TIC			
L1356637	3,9	P03-03-06_GW0813 X21A-96_GW0813	Alkalinity			
L1357022	7	P03-02-05_GW0813	Alkalinity			

Temporary Re-allocation of Testing: The Whitehorse laboratory offers testing for some short holding time parameters. The scope of testing performed by this lab can be affected on short notice. For the samples listed below, the short HT parameters were missed due to the inability of the Whitehorse lab to perform testing at the time of sample receipt. ALS will improve its notification system for temporary Whitehorse testing interruptions, and will inform CH2M Hill when additional lead time will be required to satisfy alternate testing arrangements.

Work Order	Samples	Client ID	Analytes	Matrix	ALS HT	Root Cause
L1347053	1, 2	CH13-204-MW009A_GW0813 CH13-204-MW909A_GW0813	NO2 NO3 PO4	Water	3	Temporary Re-allocation of Testing: Vancouver lab used as an alternate provider during brief Whitehorse outage.

Workload Management Issue: ALS Vancouver relies on a core group of staff which is expanded seasonally to match resource requirements. During the period these samples were received at ALS, workloads for some departments at ALS Vancouver were approaching unexpected record highs at a time when the resources required to accommodate these workloads had not yet been fully mobilized.

As a result, the workload management tools used to prioritize the workloads were not performing as designed due to the backlogged test volumes. Thus, work lists were manually re-sorted during peak workloads to ensure correct prioritization was occurring.

The laboratory is taking other measures to address this gap including the reorganization of our Canadian database and workload management tools, and increased resource management planning.

The table below summarizes the affected samples and tests:

Work Order	Samples	Client ID	Analyte	Matrix	ALS HT	Root Cause
L1335790	8	CH13-204-MW007_SOG	Moisture	Soil	14	Workload Management Issue
L1335880	1, 4-6	CH13-108-TP027_SOA CH13-108-TP025_SOA CH13-108-TP026_SOA CH13-108-TP027A_SOA				
L1335953	1	CH13-108-TP031_SOA				
L1336037	3,4	CH13-311-BH010_SOC CH13-311-BH010_SOD				
L1336054	1-4	CH13-311-BH013_SOA CH13-311-BH013_SOB CH13-311-BH013_SOC CH13-311-BH913_SOB				
L1338657	1	CH13-108-TP032_SOA				
L1338766	1-6	CH13-311-BH015_SOA CH13-311-BH015_SOB CH13-311-BH015_SOC CH13-311-BH015_SOD CH13-311-BH015_SOE CH13-311-BH915_SOC				
L1339332	4	CH13-311-BH012_SOD				
L1348930	1-10	CH13-311-TP006_SOA CH13-311-TP906_SOA CH13-311-TP002_SOA CH13-311-TP003_SOA CH13-311-TP004_SOA CH13-311-TP005_SOA CH13-311-TP902_SOA CH13-311-TP903_SOA CH13-311-TP904_SOA CH13-311-TP905_SOA				
L1353073	6-8	CH13-311-BH004_SOA CH13-311-BH005_SOA CH13-311-BH005_SOB				
L1355921	1,2	CH13-311-BH022_SOA CH13-311-BH022_SOB				
L1338738	1,2	CH13-311-SS001_RKA CH13-311-SS019_RKA	Hg	Soil	28	
L1351297	1-11	CH13-204-MW016E_SOA CH13-204-MW016E_SOB CH13-204-MW016E_SOC CH13-204-MW016E_SOD CH13-204-MW016E_SOE CH13-204-MW016E_SOF CH13-204-MW016E_SOG CH13-204-MW016E_SOH CH13-204-MW016E_SOI CH13-204-MW016E_SOJ CH13-204-MW016E_SOK				

We sincerely apologize for any problems and inconvenience that holding time issues may have caused CH2M Hill. We hope that this letter sufficiently explains how these issues occurred and addresses how ALS plans to ensure that they do not occur again in the future.

Please feel free to contact myself or Joyce Chow if you require any additional information.

Sincerely,





Jerry Holzbecher, B.Sc.
Client Services Manager,
Vancouver

Joyce Chow, B.Sc.
Director,
Western Canada

Attachment 2
Sample Temperature Corrective Action Report

December 2, 2013

CH2M Hill
2525 Airpark Drive
Redding, CA
96001

Attention: Travis Gouveia

Dear Mr. Gouveia,

RE: ALS Corrective Action Report (CAR) #10763 – Sample Temperatures exceeded 10 C for Shipments Received at Processing Laboratory (ALS Vancouver) on Submissions for Project; 472645.06AD01.04.13 (ALS L1338766) and 472645.15.CS.DM.01 (ALS L1351297 and ALS L1352327). Also CAR #10895 – Not Following Sample Receipt and Inspection Procedures.

Three submissions of soil samples from the noted projects were received at ALS Whitehorse and, after logging in, were shipped down to ALS Vancouver for analyses. The samples arrived at the Vancouver laboratory with sample temperatures exceeding 10 C, as summarized in the table below.

ALS Work Order	Date Received at ALS Whitehorse	Sample Temp (C) at ALS Whitehorse	Sample Temp (C) at ALS Vancouver	Notes
L1338766	*23-Jul-13*	7.3 , 6.4	14, 15, 18, 12	Multiple sample checks
L1351297	*18-Aug-13*	-	23.1	No recorded temperature check in Whitehorse on the CoC
L1352327	*18-Aug-13*	-	23.1	

The July submission noted, as well as the August submissions noted (sent as a combined shipment) were both shipped to Vancouver via overnight service with Air North cargo. It appears that were insufficient ice packs in both shipments to keep the sample temperatures below the internal desired level of 10 C especially during the warmer July and August ambient temperatures.

Corrective Action is to ensure ALS Whitehorse not only has extra stock of ice packs but also to add additional frozen ice packs during the warmer summer period (July – September) resulting in minimum of 6 frozen ice packs per standard medium/large cooler.

As a result of CAR 10763, a separate CAR #10895, has been initiated to document why actions were not taken as a result of the sample temperatures exceeding 10 C upon receipt at ALS Vancouver as defined in our National Support Services - Sample Receipt and Subcontracting Tests (NA-SP-0325 v01).

> *… For shipments from other ALS locations, the Sublet Request form, sample temperature and sample integrity records are maintained in a permanent and easily retrievable manner at the internal (ALS) subcontract lab location. If issues are identified the main file holder is contacted and a CAR is initiated.*