AECOM

Memorandum

To	Alistair Kent	Page	1
CC	Project team		
Subject	Hydrogeological Field Investigation Summary		
From	Ryan Mills		
Date	December 3, 2009	Project Number	112359

Introduction

This memorandum summarizes the results of the hydrogeological field investigation conducted at the abandoned Mt. Nansen mine during the summer and fall of 2009. The purpose of this task was to collect field data to help refine the hydrogeological conceptual model and support water balance development. All interpretation of field data and a detailed description of the hydrogeological conceptual model are provided in a separate memo.

Key Objectives of Task

The key objectives of this task were to:

- Document drilling observations and survey all wells on site;
- Develop and sample groundwater wells in July and September;
- Conduct hydraulic conductivity testing of tailings, soil and bedrock;
- Characterize groundwater seepage emanating from the north face of the pit; and
- Determine the physical properties of the tailings.

Task Methodology

The field methods for each of the tasks are summarized below:

Borehole Drilling and Groundwater Monitor Installation

An extensive drilling program was planned during the spring of 2009 and conducted between July 7th and July 21st, 2009. Geotech Drilling Ltd. supplied a track mounted Geoprobe 8040DT drill rig with air rotary, mud rotary and direct push drilling capabilities. It was also equipped with a split spoon sampling device and an automatic SPT hammer for geotechnical testing purposes. The same drill rig was utilized for the hydrogeological (AECOM), geotechnical (AECOM) and geochemical (Lorax) investigations. An additional hand held drill was utilized by Lorax to install shallow, narrow diameter wells within the tailings facility; but are not discussed within the context of this memo.

A total of 21 new monitoring wells were installed as part of the combined hydrogeological, geotechnical and geochemical investigations within and surrounding the tailings management area (TMA), north of the Brown-McDade open pit and downslope of the mill building. Additional boreholes were completed to facilitate thermistor installation on the downstream face of the dam as part of the geotechnical program and are discussed in a separate memo. Within the TMA and downstream of the mill building, all drilling was conducted using direct push drilling technology. Drilling on the downstream face of the main tailings dam and around the open pit was conducted using air rotary drilling combined with split spoon sampling within unconsolidated sediments.

Direct push drilling technology was utilized to drill all boreholes within the TMA and downstream of the mill to facilitate collection of continuous 3" (76 mm) soil cores. Boreholes drilled using direct push technology includes MW09-01, MW09-02, MW09-03, MW09-04, MW09-05, MW09-06, MW09-07, MW09-11, MW09-16, MW09-17, MW09-18 and MW09-19. All cores were brought to surface within acrylic liners, cut open and logged for geologic properties including density, colour, grain size, moisture, plasticity and cohesiveness. All geologic materials were then classified according to the Unified Soil Classification System. After logging each borehole, photographs of each run were taken and representative samples of material were collected and placed in labelled polyethylene bags for later testing.

Air rotary drilling technology combined with the ODEX casing system was used for all drilling downstream of the main dam crest and for all boreholes in the vicinity of the open pit including MW09-08, MW09-13, MW09-14, MW09-15, MW09-20, MW09-21, MW09-22, MW09-23 and MW09-24. Geotechnical boreholes GT09-01, GT09-02, GT09-03, GT09-04 and GT09-05 were also drilled in the same way. Drilling in unconsolidated sediments on the downstream face of the tailings dam was conducted using a 4" (102 mm) air rotary/ODEX bit to drill and case from surface down to the bottom of the borehole. Standard penetration tests were conducted at regular intervals and split spoon samples were collected for later analysis.

Surrounding the open pit, drilling through the unconsolidated sediments overlying bedrock was conducted using a 4" (102 mm) air rotary/ODEX bit. After setting the casing into competent bedrock, the ODEX drill bit was retrieved and a 3-7/8" (98 mm) open hole bedrock bit was used to drill the remainder of each borehole. Drilling was completed without injecting water whenever possible. A record of bedrock encountered during drilling was preserved in chip trays by collecting chip samples approximately every 2 feet (0.61 m).

Following completion of each borehole within the TMA (MW09-01, MW09-02, MW09-03, MW09-04, MW09-05, MW09-06 and MW09-07), a flush-threaded 2" (52 mm) schedule 40 PVC groundwater monitoring well was installed through the casing. In all cases, a standard 10 slot screen was wrapped in nylon (Nitex) mesh with an opening of 5 μm to restrict the movement of tailings into each well. Screen lengths and target installation depths were selected in conjunction with Lorax staff to ensure the geochemical and hydraulic information provided by each well was optimal. Whenever possible, the use of a sand filter pack was avoided and wells were allowed to naturally develop. However, this was not always possible and 10/20 quartz filter sand was used when necessary to backfill the borehole annulus surrounding the screen. Following installation of the filter pack, each borehole was grouted to surface using bentonite chips and a 6" (152 mm) protective PVC casing was installed at surface and backfilled with quartz sand and the well was labelled.

All monitoring wells installed elsewhere on site were completed by lowering conventional 2" (52 mm) flush-threaded PVC screen and riser pipe down the borehole and installing a 10/20 quartz filter pack. Either 10-slot or 20-slot screens were used depending on the nature of the surrounding geologic materials. After installing the filter pack to approximately 0.5 m above the top of the screen, a bentonite chip plug was installed and hydrated. After hydration of the bentonite plug above the screen, a bentonite grout mixture was prepared and pumped down the borehole using a Moyno pump until grout return was observed at surface. A protective lockable steel casing was then installed and set in concrete and the annulus between the PVC riser pipe and the steel casing was backfilled with quartz sand and the well was labelled.

To help identify the nature of interactions between groundwater and surface water, 14 mini-piezometers were installed within the Dome Creek and Pony Creek drainages and within the TMA. Some of the mini-piezometers (MP09-04, MP09-05, MP09-09, MP09-10, MP09-11 and MP09-12) were installed as 1.25" (32 mm) PVC monitoring wells by Rocky Mountain Soil Sampling using a portable gas-powered hammer under the supervision of Lorax staff. The remainder of the mini-piezometers (MP09-01, MP09-02, MP09-03, MP09-06, MP09-07, MP09-08, MP09-13 and MP09-14) were 1" (25 mm) Solinst stainless steel drive points installed by AECOM hydrogeologists using a slide hammer apparatus. All drive point piezometers were fitted with LDPE tubing to facilitate water level measurement and sampling using a peristaltic pump.

A summary of monitoring well and mini-piezometer completion details is provided in Tables 1 and 2 and borehole logs for all monitoring wells that were part of the hydrogeological and geotechnical investigation are

included in Appendix A. The location of all groundwater monitoring wells and mini-piezometers installed during the July 2009 field investigation are shown on Figure 1.

Surveying

Following completion of the drilling program, all boreholes, monitoring wells and other points of interest were surveyed using a Thales Promark differential GPS. Prior to conducting the survey, a base station was set up and the rover unit was initialized. In most cases, the survey was conducted in kinetic mode; however, static mode was used for more remote locations. At each monitoring well location, the ground surface elevation was surveyed immediately adjacent to the well and the well stickup was measured. Following completion of the survey, the data was post-processed to provide corrected orthometric elevations of the ground surface surrounding each groundwater monitoring well. The elevation of the top of each piezometer was then calculated using the surveyed ground elevation and the measured vertical stickup of each monitor. A summary of surveyed borehole and monitoring well co-ordinates is provided in Table 1.

Groundwater Sampling

Prior to groundwater sample collection, each monitoring well was developed to improve the hydraulic connection between the well and the aquifer and remove drill cuttings from the borehole. Generally, a surge block and inertial footvalve was installed on 5/8" (16 mm) HDPE tubing and lowered to just above the well screen. Pumping was initiated above the well screen and the assembly was slowly lowered deeper into the well. Where permeability of the surrounding formation was sufficient, a Waterra Hydrolift was used to provide continuous pumping. Each well was developed for approximately one hour and then allowed to recover. In some cases, additional development was conducted due to the presence of suspended sediment in purge water.

Following well development, groundwater samples were collected using inertial footvalve pumps for wells surrounding the mill, wells located on the downstream face of the tailings facility and wells located in the vicinity of the open pit. Select wells located within the TMA and on the downstream face of the dam where parameters sensitive to redox conditions were to be analyzed were purged until field parameters stabilized and sampled using low-flow bladder pumps. The majority of groundwater sampling within the TMA was conducted by Lorax staff. Static groundwater levels were collected prior to sample collection in both July and September 2009 and are presented in Tables 1 and 2.

Two sets of groundwater samples were collected, with the first set of groundwater samples collected during the second and third week of July 2009 and the second set of samples collected during the first week of September 2009. Field parameters including pH, conductivity and temperature were recorded prior to collecting each sample. Samples were collected in laboratory provided bottles and placed in coolers complete with ice packs for shipment to the ALS Environmental, a CAEAL accredited laboratory located in Vancouver, British Columbia for analysis. Groundwater samples collected as part of the hydrogeological investigation were analyzed for pH, conductivity, total dissolved solids, hardness, ammonia, nitrate, nitrite, dissolved anions, cyanide species, total organic carbon and dissolved metals. In addition to the above analyses, LEPH, HEPH and polycyclic aromatic hydrocarbons were analyzed in samples collected from wells downslope of the mill building as part of a preliminary contaminant investigation targeted at identifying whether any large scale fuel or cyanide spills were impacting groundwater on site. Dissolved metals samples were field filtered and preserved with nitric acid prior to shipment, while nutrient parameters were preserved with sulphuric acid and some cyanide species were preserved with sodium hydroxide. The remainder of the parameters were shipped to the laboratory unpreserved. The results of the analytical testing conducted in 2009 by AECOM and Lorax are summarized in Table 3. The original laboratory results are provided in Appendix B.

Soil Sampling

During installation of groundwater monitors MW09-15, MW09-16, MW09-17 and MW09-18 downslope of the mill building, soil samples were collected from the continuous soil cores brought to surface during direct push drilling for the purposes of hydrocarbon and metals analysis. Two soil sample jars were filled from discrete intervals at or near the water table to help identify the presence of any light non-aqueous phase liquid (LNAPL) or metal contamination as a result of any fuel or ore concentrate spills in the area surrounding the mill building.

All samples were collected by hand using latex gloves. Large rocks were removed from the soil prior to placing it in the sample jars. Following sampling, soil samples were placed in coolers complete with ice packs and shipped to ALS Environmental in Vancouver, British Columbia for analysis of LEPH, HEPH and metals. The soil analytical results are summarized in Table 4 and the original laboratory results are provided in Appendix B.

Hydraulic Conductivity Testing

In order to understand the permeability of the various overburden and bedrock units found on site, rising and falling head slug tests were conducted in MW09-02, MW09-03, MW09-06, MW09-15 and MW09-23. In each case, the static groundwater level was measured using an electronic water level tape and a Solinst pressure transducer attached to a direct read cable was installed to a pre-determined depth and programmed to record groundwater pressure and temperatures at 1 second intervals. After allowing the water level to re-equilibrate, a solid slug of known dimensions was lowered into the well to displace the water column. After the water level recovered to static water level, the solid slug was removed. After the water level had again recovered to static, the pressure transducer was downloaded and removed from the well. This process resulted in a pair of slug tests for each well consisting of one falling head test and one rising head test. All slug test data was analyzed using the Bouwer and Rice solution for an unconfined aquifer. The results of the slug test analyses are presented in Appendix C and summarized in Table 5.

Pit Seepage Characterization

During the July and September field programs, an attempt was made to characterize the volume and quality of seepage entering the north end of the Brown-McDade pit through one of the abandoned cross-cut drifts. During the July visit, the site was accessed by boat and inspected on July 13, 2009 by two AECOM hydrogeologists. At the time of inspection, the drift remained largely full of ice from the previous winter, but evidence of slow melting was observed in the form of small runoff channels in the surface of the ice. Occasional drips of water were also falling from the ceiling at the time of the site visit. During the September site visit, the drift was again inspected and ice was still present in the drift, with only occasional dripping from the drift ceiling which formed a small puddle on the drift floor. Unfortunately no direct measurements of flow into the pit could be made as a result of the ice blockage (July) and general lack of concentrated flow (both July and September). The presence of numerous north trending faults and the long-term weathering of bedrock has likely resulted in inflows to the pit that take place largely below ground surface and are thus, immeasurable. However, the presence of a large block of ice in the drift, dripping water from the drift ceiling and the presence of a large icing which forms on top of the resistant quartize beds above the drift every fall and early winter indicates an input of groundwater to the pit. The geologic structure north of the pit is well described by R. Strohshein in a memo dated August 21, 2009 (Appendix D). The input of groundwater to the pit is most likely the result of flow through the shallow active zone and along northerly trending faults that are exposed in the pit walls and are inferred to extend beneath the Pony Creek channel which provides a source of recharge to the shallow groundwater system.

Physical Characterization of Tailings

To provide an understanding of the physical properties of on site materials including the coarse and fine fractions of tailings and the dam foundation materials, several soil samples were collected from 3” (76 mm) Geoprobe acrylic liners employed during direct push drilling in the vicinity of the TMA. After the soil core was logged, sampling intervals were identified based on soil texture and an understanding of site geology. Each soil sampling interval was separated from the remainder of the core using a utility knife and slid into tared heavy duty polyethylene sample bags for weighing in the field. Each sample bag was labelled with borehole and sampling interval information as well as the sample weight. Because samples were only obtained from full sections of core (i.e., no core loss), the soil volume was known and a field wet density was calculated. The results of field density calculations are provided in Table 6.

Following sample collection and measurement of field wet density, samples were shipped to MDH Engineered Solutions in Saskatoon, Saskatchewan for determination of grain size distributions, water contents, specific gravity, Atterberg limits and soil moisture characteristic curves, as appropriate. Original laboratory analytical certificates are provided in Appendix E.

Information Provided by Others

The following information, provided by others and/or in previous studies, was:

- Geological mapping of the area surrounding the Brown-McDade open pit and anecdotal information pertaining to groundwater inflows during mine operations was provided by Altura Environmental Consulting and Robert Stroshein; and
- Groundwater quality data for wells located within the TMA was provided by Lorax Environmental.

Key Results

The following sections describe the data and results obtained from the task:

- On site drilling observations were documented and all groundwater wells and mini-piezometers installed on site were surveyed using differential GPS to provide an accurate borehole location and elevation;
- All groundwater wells installed during July 2009 were developed and sampled in both July 2009 and September 2009;
- Hydraulic conductivity testing of tailings, soil and bedrock was conducted on wells MW09-02, MW09-03, MW09-06; MW09-15 and MW09-23;
- Several inspections of the north face of the Brown-McDade pit were conducted confirming that no observable groundwater seepage into the pit occurs above ground surface during the summer and early fall months. Seepage into the pit occurs through the shallow active layer in addition to the deep flow system below the regional water table; and
- The physical properties of the tailings and other sediments were determined based on sampling conducted as part of the July 2009 drilling program.

Attachments:

Figure 1	Mt. Nansen Mine Site Overview
Table 1	Summary of Groundwater Monitoring Well and Geotechnical Borehole Installation Details
Table 2	Summary of Mini-Piezometer Installation Details
Table 3	2009 Groundwater Quality Analytical Results
Table 4	2009 Soil Quality Analytical Results
Table 5	Permeability Testing Results
Table 6	Summary of Physical Soil Property Characterization
Appendix A	Borehole and Monitoring Well Logs
Appendix B	Laboratory Analytical Certificates
Appendix C	Permeability Testing Results
Appendix D	Open Pit Geological Considerations Memo
Appendix E	2009 Physical Soil Testing Analytical Results

RDM:mq
Encl.

Pony Creek
Back Creek
Dome Creek
Victoria Creek
Pony u/s
MP09-01
Berms
MP09-02
MP09-03
GLL07-01
GLL07-02
Pony d/s
MP09-08
Pony Creek Adit
EL. 1183.43m
MW09-13
MW09-14
Northwest Pile
L1
NW Seep-01
Pit Lake
EL. 1184.7m ASL
(Nov. 2007)
East Pile
Pit Site
Pony Creek Adit
EL. +/- 1185m
GLL07-03
L2
Ore Stockpile
West Piles
LW-Seep01
South Pile
South Pit
Southwest Lower Pile
Artesian Well
Mine Camp
DX Site
MW09-16 1.20 (1182.47)
Mill Complex
MW09-19 2.67 (1174.97)
MW09-17 4.10 (1174.78)
MW09-18 4.46 (1175.36)
D1 Site
DESS-03
DESS-01
DESS-02
Dry Creek Reference Site
MP09-07 0.60 (1099.76)
MP09-14 0.43 (1098.11)
MP09-13 0.67 (1100.11)
Diversion Channel
MP09-06 1.64 (1097.64)
Emergency Spillway
Tailings Pond Site
MW09-11 4.18(1103.90)
MP09-09 2.35 (1096.26)
MP09-10 2.39 (1096.20)
MP09-11 1.37 (1097.82)
MP09-12 1.34 (1097.62)
MW09-01 (Dry)
MW09-05 (Dry)
MW09-06 (Dry)
Tailings Pond
Seepage Pond Return Lines
Tailings Dam Crest
MW09-24 9.67 (1078.33)
MW09-20 (Dry)
Seepage Discharge Site
Seepage Pond
MW09-21 1.79 (1079.61)
MW09-22 4.60 (1084.59)
MW09-23 13.19 (1086.24)
Interceptor Ditch (2008 Survey)
MW09-02 3.56 (1093.69)
MW09-01 7.54 (1089.81)
MW09-03 7.12 (1089.94)
MW09-04 4.30 (1092.50)
Tailings Pile (1105)
Upper Dome Creek Site
MW09-08 1.05 (1073.82)
Dome Creek at Road Site
Victoria Creek Reference Site
Back
Upper Victoria Creek Site
A
A'
B
B'

Legend

- Lysimeter
- Seep
- Water Quality (EDI)
- Waste Rock Outline
- Watercourse
- Monitoring Well (Gartner Lee, 2007)
- Monitoring Well (AECOM, 2009)
- Mini Piezometer (AECOM, 2009)
- Thermistor (AECOM, 2009)
- Section Line
- Pond/Tailings Pond
- Tailings
- Exploration Spoils
- Mine Infrastructure
- Road/Trail

Topography (Except Pit)
- Interm. (0.5m)
- Index 2.5m)

Pit Topography
- Index 2.5m
- Interm. 0.5m

N E S W

1:5,000
UTM Zone 8N, NAD 83
0 50 100
Metres

Topographic data by The Orthoshop, based on 1998 aerial photography at 1:50,000 scale. Brown McDade Pit survey by Underhill Geomatics Ltd. Drawing 281-058 dated March 18, 2003. Inferred fault by B.Y.G. Natural Resources, Inc. Waste rock outlines and sample sites, Altura, 2009. All other data, AECOM, 2009.

Yukon Government

Project: Mt. Nansen Site Investigation

Mt. Nansen Mine Site

December 2009

AECOM

Figure 1

File Location: E:\GIS\GIS_proj\Y2009\112359_MtNansen\By16_GW_Flow\60119144_By16_Fig1_NansenPlan_09Dec03.mxd Date Revised: December 3, 2009 Prepared by: MM Project: 112359

Table 1. Summary of Groundwater Monitoring Well and Geotechnical Borehole Installation Details

Station Name	Location		Elevations				Depths					Water Levels		Groundwater Elevations		Comments
	Easting	Northing	Ground Surface Elevation	Top of Piezometer Elevation	Top of Screen Elevation	Bottom of Screen Elevation	Stickup	Borehole Depth Below Ground	Depth to Top of Screen Below Ground	Depth to Bottom of Screen Below Ground	Depth to Bottom of Well Below Top of Pipe	Jul-09	Sep-09	Jul-09	Sep-09	
	m	m	m ASL	m ASL	m ASL	m ASL	m AGS	m BGS	m BGS	m BGS	m BTOP	m BTOP	m BTOP	m ASL	m ASL	
GT09-01	389459.00	6880612.00	1099.35	1100.37	N/A	N/A	1.03	30.09	N/A	N/A	31.12	N/A	N/A	N/A	N/A	
GT09-02	389498.00	6880549.00	1088.32	1089.13	N/A	N/A	0.80	16.77	N/A	N/A	17.57	N/A	N/A	N/A	N/A	Cross-ref. MW09-22
GT09-03	389510.00	6880620.00	1090.24	1091.11	N/A	N/A	0.88	19.81	N/A	N/A	20.73	N/A	N/A	N/A	N/A	
GT09-04	389593.00	6880583.00	1078.72	1079.55	N/A	N/A	0.83	16.23	N/A	N/A	16.93	N/A	N/A	N/A	N/A	Cross-ref. MW09-20
GT09-05	389591.00	6881551.00	1087.51	1088.08	N/A	N/A	0.57	19.81	N/A	N/A	20.43	N/A	N/A	N/A	N/A	Cross-ref. MW09-24
GLL07-01	388852.00	6881779.00	1210.46	1211.26	1199.79	1192.17	0.80	18.29	10.67	18.29	19.09	12.95	12.44	1198.31	1198.82	Borehole drilled in 2007, but PVC monitoring well installed in July 2009
GLL07-02	389071.00	6881706.00	1183.13	1184.51	1180.08	1177.35	1.38	5.78	3.05	5.78	7.16	dry	dry	<1177.352	<1177.352	
GLL07-03	388960.20	6881476.29	1184.84	1185.98	1175.94	1174.25	1.14	10.60	8.91	10.60	11.73	2.13	2.08	1183.85	1183.90	Borehole drilled in 2007, but PVC monitoring well installed in July 2009
MW09-01	389 394.6	6880 559.3	1096.25	1097.35	1086.80	1086.49	1.10	10.67	9.45	9.75	10.97	7.53	7.54	1089.82	1089.81	
MW09-02	389 395.7	6880 560.4	1096.28	1097.25	1093.24	1091.71	0.97	4.57	3.05	4.57	5.28	3.26	3.56	1093.99	1093.69	
MW09-03	389 421.1	6880 557.9	1096.15	1096.96	1088.07	1087.00	0.81	9.14	8.08	9.14	9.96	6.91	7.12	1090.05	1089.84	
MW09-04	389 421.0	6880 558.7	1096.02	1096.80	1090.53	1089.01	0.79	7.01	5.49	7.01	7.61	3.81	4.30	1092.99	1092.50	
MW09-05	389 413.4	6880 656.0	1095.26	1096.21	1089.48	1088.56	0.96	6.69	5.77	6.69	7.65	dry	dry	<1088.562	<1088.562	
MW09-06	389414.38	6880655.66	1095.32	1096.62	1093.63	1090.58	1.30	4.74	1.70	4.74	6.04	2.95	dry	1093.67	<1090.577	
MW09-07	389 324.2	6880 700.5	1095.75	1096.78	1093.65	1093.40	1.03	2.36	2.11	2.36	3.39	dry	dry	<1093.395	<1093.395	
MW09-08	389619.94	6880576.74	1073.94	1074.87	1072.63	1071.10	0.93	3.66	1.31	2.83	3.76	1.03	1.05	1073.84	1073.82	
MW09-11	389458.00	6880632.00	1107.31	1108.08	1104.62	1103.10	0.77	4.22	2.69	4.22	4.92	4.27	4.18	1103.81	1103.90	
MW09-13	389006.00	6881664.00	1208.11	1208.87	1178.24	1172.15	0.76	35.97	29.87	35.97	36.70	33.24	(frozen)	1175.64	#VALUE!	
MW09-14	389 008.2	6881 663.5	1207.85	1208.59	1202.37	1199.32	0.73	10.67	5.49	8.53	11.40	8.13 (frozen)	(frozen)	<1200.455	<1197.183	
MW09-15	388 920.5	6881 724.4	1206.82	1207.70	1172.84	1169.79	0.88	37.03	33.99	37.03	37.91	16.74	15.04	1190.96	1192.66	
MW09-16	387 992.2	6881 096.0	1182.81	1183.67	1182.55	1181.03	0.86	1.78	0.26	1.78	2.64	1.21	1.20	1182.46	1182.47	
MW09-17	388078.00	6880970.00	1178.03	1178.88	1174.67	1173.15	0.85	4.88	3.35	4.88	5.58	3.88	4.10	1175.00	1174.78	
MW09-18	388056.00	6880984.00	1178.93	1179.82	1172.84	1172.04	0.88	6.90	6.10	6.89	7.78	4.40	4.46	1175.41	1175.36	
MW09-19	388 052.5	6881 017.4	1176.84	1177.64	1173.26	1171.73	0.80	5.11	3.59	5.11	5.91	2.61	2.67	1175.03	1174.97	
MW09-20	389593.00	6880585.00	1078.64	1079.53	1077.39	1075.86	0.89	3.05	1.26	2.78	3.67	dry	dry	<1075.861	<1075.861	Cross-ref. GT09-04
MW09-21	389537.00	6880575.00	1080.68	1081.41	1079.36	1077.83	0.73	3.20	1.32	2.85	3.57	1.67	1.79	1079.74	1079.61	
MW09-22	389498.00	6880547.00	1088.34	1089.19	1085.48	1083.96	0.85	4.39	2.86	4.39	5.23	4.85	4.60	1084.34	1084.59	Cross-ref. GT09-02
MW09-23	389461.00	6880553.00	1098.52	1099.43	1085.04	1083.51	0.91	15.00	13.48	15.00	15.92	13.39	13.19	1086.04	1086.24	
MW09-24	389591.00	6881550.00	1087.33	1087.99	1081.27	1078.22	0.66	11.28	6.06	9.11	9.77	9.77	9.67	1078.22	1078.33	Cross-ref. GT09-05
TH09-01	389383.00	6880671.00	Not measured	No Well	No Well	No Well	No Well	5.18	No Well	No Well	No Well	No Well	No Well	N/A	No Well	

Notes:

m BGS — *metres below ground surface*
m AGS — *metres above ground surface*
m ASL — *metres above mean sea level*
m BTOP — *metres below top of PVC pipe*

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Table 2. Summary of Mini-Piezometer Installation Details

Station Name	Location		Elevations				Depths					Water Levels				Comments
	Easting (NAD 83)	Northing (NAD 83)	Ground Surface Elevation	Top of Piezometer Elevation	Top of Screen Elevation	Bottom of Screen Elevation	Stickup	Borehole Depth Below Ground	Depth to Top of Screen Below Ground	Depth to Bottom of Screen Below Ground	Depth to Bottom of Well Below Top of Pipe	Depth to Water below Top of Pipe July, 2009	Depth to Surface Water from Top of Pipe July 2009	Depth to Water below Top of Pipe Sept, 2009	Depth to Surface Water from Top of Pipe Sept, 2009	
	m	m	m ASL	m ASL	m ASL	m ASL	m AGS	m BGS	m BGS	m BGS	m BTOP	m BTOP	m BTOP	m BTOP	m BTOP	
MP09-01	388707.00	6881933.00	1224.28	1225.73	1224.10	1223.80	1.45	N/A	0.18	0.48	1.63	1.13	1.12	1.02	1.08	Upper Pony Creek
MP09-02	388869.00	6881815.00	1204.86	1206.31	1204.66	1204.36	1.46	N/A	0.20	0.50	1.63	1.08	1.08	1.21	1.06	Upper Middle Pony Creek
MP09-03	388958.00	6881740.00	1196.22	1197.61	1195.92	1195.62	1.39	N/A	0.30	0.60	1.63	0.70	0.70	1.62	0.67	Lower Middle Pony Creek
MP09-04	-	-	-	-	-	-	1.30	N/A	0.84	1.75	3.05	2.26	Dry	Not measured	Dry	Seepage Pond North
MP09-05	-	-	-	-	-	-	0.99	N/A	0.31	0.61	1.83	1.40	Dry	1.43	Dry	Seepage Pond West
MP09-06	389 485.5	6880 774.0	1098.29	1099.28	1097.66	1097.36	0.99	N/A	0.63	0.93	1.63	dry	0.82	1.64	0.80	Div. Channel Bridge
MP09-07	389 151.6	6880 783.0	1099.51	1100.36	1098.66	1098.36	0.85	N/A	0.86	1.16	1.63	0.64	0.65	0.60	0.63	Div. Channel Reclaim
MP09-08	389160.00	6881722.00	1167.70	1168.81	1167.11	1166.81	1.11	N/A	0.59	0.89	1.63	0.68	0.89	0.66	0.88	Lower Pony Creek
MP09-09	389 240.2	6880 682.0	1097.20	1098.61	1093.14	1092.94	1.41	N/A	4.06	4.26	5.66	2.47	Dry	2.35	Dry	Tailings Pond North
MP09-10	389 240.4	6880 682.9	1097.23	1098.63	1093.37	1093.37	1.40	N/A	3.86	3.86	5.26	2.51	Dry	2.39	Dry	Tailings Pond North
MP09-11	389 220.7	6880 615.0	1097.78	1098.99	1094.30	1094.00	1.21	N/A	3.48	3.78	4.99	1.45	Dry	1.17	Dry	Tailings Pond South
MP09-12	389 220.7	6880 614.3	1097.78	1098.95	1095.01	1094.71	1.17	N/A	2.77	3.07	4.24	1.45	Dry	1.34	Dry	Tailings Pond South
MP09-13	389 076.6	6880 750.8	1099.94	1100.78	1099.57	1099.26	0.85	N/A	0.36	0.67	1.52	0.52	0.78	0.67	0.72	Div. Channel Dome Inlet
MP09-14	389 141.2	6880 721.6	1097.96	1098.54	1097.33	1097.03	0.58	N/A	0.63	0.93	1.51	0.77	dry	0.43	0.41	Tailings Pond North West

Notes:

m BGS *metres below ground surface*

m AGS *metres above ground surface*

m ASL *metres above mean sea level*

m BTOP *metres below top of PVC pipe*

Table 3. 2009 Groundwater Quality Analytical Results

	Groundwater Monitoring Wells																															
Sample ID	**GLL07-03**	**MW09-01**	**MW09-1**	**MW09-02**	**MW09-2**	**MW09-03**	**MW09-3**	**MW09-04**		**MW09-4**	**MW09-06**		**MW09-6**	**MW09-08**	**MW09-08**	**MW09-11**	**MW09-11**	**MW09-15**	**MW09-15**	**MW09-16**	**MW09-16**	**MW09-17**	**MW09-17**	**MW09-18**		**MW09-18**	**MW09-19**	**MW09-21**		**MW09-21**	**MW09-22**	**MW09-22**
Date Sampled	**1-Sep-09**	**12-Jul-09**	**3-Sep-09**	**12-Jul-09**	**3-Sep-09**	**11-Jul-09**	**3-Sep-09**	**11-Jul-09**	**11-Jul-09**	**3-Sep-09**	**13-Jul-09**	**13-Jul-09**	**3-Sep-09**	**8-Jul-09**	**1-Sep-09**	**22-Jul-09**	**2-Sep-09**	**14-Jul-09**	**1-Sep-09**	**19-Jul-09**	**1-Sep-09**	**19-Jul-09**	**1-Sep-09**	**19-Jul-09**	**19-Jul-09**	**1-Sep-09**	**1-Sep-09**	**21-Jul-09**	**21-Jul-09**	**1-Sep-09**	**22-Jul-09**	**1-Sep-09**
Time Sampled	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**
ALS Sample ID	**L814853-1**	**L791918-12**	**L815006-5**	**L791918-13**	**L815006-6**	**L791918-5**	**L815006-7**	**L791918-6**	**L791918-10**	**L815006-8**	**L791918-3**	**L791918-4**	**L815006-9**	**L796873-1**	**L814853-2**	**L796873-2**	**L814853-3**	**L796959-1**	**L814853-4**	**L796959-2**	**L814853-5**	**L796959-3**	**L814853-6**	**L796959-4**	**L796959-5**	**L814853-7**	**L814853-9**	**L796873-3**	**L796873-7**	**L814853-10**	**L796873-4**	**L814853-11**
Matrix	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**
Physical Tests																																
Conductivity	1740	-	-	-	-	-	-	-	-	-	-	-	-	187	222	433	659	1010	937	1930	1770	2570	2570	2660	2660	2670	2470	1630	1640	1790	630	543
Hardness (as $CaCO_3$)	1110	923	943	1390	1440	1470	1510	1410	1420	1480	1480	1490	1550	72.2	99.5	209	352	581	579	1210	1180	1760	1840	1830	1860	1920	1750	711	710	838	248	244
pH	5.66	-	-	-	-	-	-	-	-	-	-	-	-	7.5	6.92	7.96	7.78	7.08	7.28	7.38	7.23	7.74	7.42	7.71	7.71	7.47	7.16	7.1	7.17	6.67	7.12	6.92
Total Dissolved Solids	1670	-	-	-	-	-	-	-	-	-	-	-	-	189	233	262	445	757	682	1650	1540	2380	2430	2490	2440	2560	2370	1230	1280	1420	389	378
Anions and Nutrients																																
Acidity (as $CaCO_3$)	81.4	-	-	-	-	-	-	-	-	-	-	-	-	13.9	26.6	5.3	10.9	23.3	26.3	35.4	31.2	28.5	39.9	30.3	29.7	31.9	45.7	38.8	31.9	143	21.1	27.2
Alkalinity, Total (as $CaCO_3$)	15.5	-	-	-	-	-	-	-	-	-	-	-	-	91.1	88.3	227	325	288	276	298	294	435	434	427	425	426	389	266	269	231	176	122
Ammonia as N	0.103	13.9	13.5	15.5	14	14.4	10.7	13.6	13.7	14.7	0.47	0.743	1.96	3.27	3.77	1.85	2.48	0.331	0.1	0.079	<0.020	0.229	<0.020	0.041	0.066	0.021	2.24	6.3	12.1	17.9	6.65	4.37
Bromide (Br)	<0.25	<0.50	<5.0	<0.50	<2.5	<0.50	<1.0	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<0.50	<0.25	<0.050	0.05	<0.050	<0.50	<2.5	<0.50	<2.5	<1.0	<2.5	<2.5	<1.0	<1.0	<2.5	<2.5	<1.0	<0.25	<0.50
Chloride (Cl)	<2.5	5.3	<50	<5.0	<25	<5.0	<10	<5.0	<5.0	<10	<5.0	<5.0	<10	<5.0	<2.5	3.23	4.9	<0.50	<5.0	<25	<5.0	<25	<10	<25	<25	<10	<10	<25	<25	<10	<2.5	<5.0
Fluoride (F)	0.15	<0.20	0.076	0.43	0.729	0.57	0.56	0.4	0.53	0.68	<0.20	<0.20	<0.40	<0.20	<0.10	0.723	0.697	0.07	<0.20	0.152	<0.20	0.144	<0.40	0.143	0.122	<0.40	<0.40	0.057	0.059	<0.40	0.075	<0.20
Nitrate (as N)	0.779	<0.050	<0.50	<0.050	<0.25	7.07	7.15	<0.050	<0.050	<0.10	0.401	0.197	<0.10	<0.050	<0.025	0.283	0.495	<0.0050	<0.050	<0.25	0.201	<0.25	0.3	<0.25	<0.25	<0.10	<0.10	1.44	1.37	<0.10	4.79	<0.050
Nitrite (as N)	0.0544	<0.010	<0.10	<0.010	<0.050	0.694	1.14	0.058	0.085	<0.020	0.335	0.375	<0.020	<0.010	<0.0050	0.0059	0.0277	0.0027	<0.010	<0.050	<0.010	<0.050	<0.020	<0.050	<0.050	<0.020	<0.020	0.058	<0.050	<0.020	0.0996	<0.010
Sulfate (SO4)	529	646	531	1730	1690	1700	1570	1680	1650	1610	1400	1430	1450	16	14.9	11	50.2	289	271	934	832	1360	1400	1490	1470	1490	1340	617	617	818	126	156
Cyanides																																
Cyanide, Weak Acid Diss	-	0.0261	0.0209	0.326	0.0281	0.0305	0.0107	0.207	0.295	0.0239	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0331	0.0209	0.0169	<0.0050	<0.0050
Cyanide, Total	-	0.0401	0.0525	0.547	0.361	0.254	0.298	0.654	0.812	0.0425	0.0083	0.0062	<0.0050	0.0542	0.0104	<0.0050	<0.0050	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0146	0.0504	0.0465	0.0293	0.0165	0.0102
Cyanate (CNO)	-	<1.8	5.1	3	4.7	<1.8	1.74	<1.8	<1.8	5.9	<0.50	<0.50	<0.50	<1.6	<0.50	<1.6	<0.50	-	-	<1.8	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.75	5	6.9	20.7	<1.6	1.14
Thiocyanate (SCN)	0.82	35	27.1	5.56	3.11	1	1.1	3.05	2.99	1.21	0.69	0.68	0.71	-	5.8	-	1.03	-	0.93	-	1.16	-	1.35	-	-	1.23	1.25	-	-	1.98	-	1.2
Organic / Inorganic Carbon																																
Total Organic Carbon	1.27	41.4	66.8	7.48	6.23	10.2	8.8	7.67	7.22	5.16	6.05	5.87	6.05	-	23.3	-	26.2	-	4.62	-	3.67	-	5.01	-	-	2.89	80.8	-	-	42.5	-	13.7
Dissolved Metals																																
Aluminum (Al)-Dissolved	1.39	0.0696	0.0812	<0.0050	<0.010	0.0116	<0.010	<0.0050	<0.0050	<0.010	<0.010	<0.010	<0.010	0.118	0.098	<0.0050	<0.0050	<0.025	<0.010	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.050	<0.025	0.158	0.15	0.152	0.0332	0.0982
Antimony (Sb)-Dissolved	<0.0050	0.0124	0.00404	0.0235	0.0068	0.33	0.439	0.434	0.486	0.484	0.72	0.838	0.591	<0.00050	<0.00050	<0.00050	<0.00050	0.0178	0.0023	0.175	0.102	<0.0025	<0.0025	<0.0025	<0.0025	<0.0050	<0.0025	<0.0025	<0.0025	<0.0025	<0.00050	<0.00050
Arsenic (As)-Dissolved	<0.0050	0.0923	0.215	10.5	15.3	3.08	3.29	2.99	3.42	4.06	0.274	0.353	0.868	0.178	0.284	0.0182	0.0239	0.122	0.187	0.0506	0.0391	0.0119	0.0128	0.0382	0.0423	0.0526	0.0834	0.0329	0.0341	0.0443	0.014	0.0368
Barium (Ba)-Dissolved	<0.020	0.117	0.163	0.0165	0.0138	0.0652	0.0523	0.0105	0.011	0.00834	0.00531	0.00598	0.00564	0.102	0.126	0.169	0.311	<0.020	<0.020	0.034	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.077	0.3	0.294	0.426	0.157	0.115
Beryllium (Be)-Dissolved	<0.010	<0.0025	<0.0025	<0.0025	<0.0050	<0.0025	<0.0050	<0.0025	<0.0025	<0.0050	<0.0050	<0.0050	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0020	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0010	<0.0010
Bismuth (Bi)-Dissolved	<0.20	<0.0025	<0.0025	<0.0025	<0.0050	<0.0025	<0.0050	<0.0025	<0.0025	<0.0050	<0.0050	<0.0050	<0.0050	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)-Dissolved	<0.10	0.055	0.051	<0.050	<0.10	0.231	0.28	0.151	0.152	0.23	0.24	0.28	0.36	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.27	0.19	0.27	0.16	<0.10	<0.10	<0.10	0.4	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium (Cd)-Dissolved	0.436	<0.000085	<0.000085	0.000278	0.00019	0.000194	0.00018	0.000549	0.000364	<0.00017	0.00835	0.00894	0.00827	<0.000017	<0.000017	0.000082	0.000038	0.00754	0.000758	0.0558	0.0419	<0.000085	<0.000085	<0.000085	<0.000085	<0.00017	<0.000085	0.000196	0.000188	0.000162	0.000109	0.000077
Calcium (Ca)-Dissolved	336	274	293	487	488	477	493	484	484	489	528	527	548	21.8	30.9	39.3	65.5	157	158	276	273	327	350	352	355	375	373	247	247	293	91.6	89.9
Chromium (Cr)-Dissolved	<0.010	0.0036	<0.0070	<0.0025	<0.0050	<0.0025	<0.0050	<0.0025	<0.0025	<0.0050	<0.0050	<0.0050	<0.0050	0.0017	<0.0020	<0.0010	<0.0010	<0.0050	<0.0020	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0010	<0.0020
Cobalt (Co)-Dissolved	0.0144	0.011	0.011	0.02	0.0122	0.0123	0.0091	0.00819	0.00875	0.0051	0.0056	0.0057	0.0038	0.00145	0.00147	0.00169	0.00096	<0.0015	0.00076	0.002	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0030	<0.0015	0.0268	0.0272	0.026	0.0134	0.0123
Copper (Cu)-Dissolved	0.55	0.00164	<0.00050	<0.00050	<0.0010	0.0006	0.0018	0.0006	0.00286	<0.0010	0.0052	0.0055	0.0045	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0020	0.01	0.0105	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.0050	0.0036	0.0015
Iron (Fe)-Dissolved	11.6	57.1	66.4	4.85	9.46	0.118	0.126	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	31.9	40.7	0.596	1.52	0.192	1.58	0.389	0.331	<0.030	<0.030	<0.030	<0.030	<0.030	30.4	19	18.7	66.4	3.46	14.6
Lead (Pb)-Dissolved	0.0114	0.00255	0.00044	<0.00025	<0.00050	0.00041	<0.00050	<0.00025	<0.00025	<0.00050	<0.00050	<0.00050	0.00087	<0.00050	<0.00050	<0.00050	<0.00050	0.0171	0.0059	0.0364	0.0284	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.00050	<0.00050
Lithium (Li)-Dissolved	<0.050	<0.025	<0.025	<0.025	<0.050	<0.025	<0.050	<0.025	<0.025	<0.050	<0.050	<0.050	<0.050	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	<0.010	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.050	<0.025	<0.025	<0.025	<0.025	<0.0050	<0.0050
Magnesium (Mg)-Dissolved	66.4	57.9	51.7	43.3	53.2	68.9	69	50.2	50.6	62.7	38.6	41.4	44	4.3	5.45	26.9	45.8	45.7	44.5	126	120	230	235	231	236	240	200	22.9	22.5	26.1	4.57	4.84
Manganese (Mn)-Dissolved	10.5	6.16	6.05	21.8	23.7	0.555	0.761	4.94	3.31	3.32	12.6	17.1	14	2.09	2.32	0.987	1.42	0.905	0.681	0.389	0.208	0.0164	0.0096	0.349	0.409	0.427	1.97	7.52	7.66	6.73	3.88	3.2
Mercury (Hg)-Dissolved	<0.000020	-	-	-	-	-	-	-	-	-	-	-	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Molybdenum (Mo)-Dissolved	<0.010	0.00292	0.00121	0.0135	0.00974	0.0229	0.0128	0.0122	0.0116	0.0105	0.0075	0.00899	0.00899	<0.0010	<0.0010	0.01	0.0079	<0.0050	<0.0020	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0017	<0.0010
Nickel (Ni)-Dissolved	0.014	0.0038	0.0033	0.0029	<0.0050	<0.0025	<0.0050	<0.0025	<0.0025	<0.0050	0.006	0.0077	0.0059	<0.0010	<0.0010	0.0033	0.0027	<0.0050	<0.0020	0.0071	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.0050	0.0096	0.0092
Phosphorus (P)-Dissolved	<0.30	<0.30	<0.30	<0.60	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0.41	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved	2.1	8.4	9	43.9	51.8	28.5	31	40.6	44	44	10.7	11.2	11.4	<2.0	<2.0	3.2	4.2	<2.0	<2.0	6.5	6.4	7.2	7.5	6.9	7.1	7.1	4.9	8.2	8.1	9.4	5.7	4.4
Selenium (Se)-Dissolved	<0.010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.0010	0.001	<0.0010	<0.0050	<0.0020	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0010	<0.0010
Silicon (Si)-Dissolved	4.92	5.79	6.65	5.19	5.36	4.62	5.29	10.2	10.1	9.61	7.58	7.42	7.43	8.28	8.72	5.5	6.03	5.85	6.32	5.29	5.28	4.74	4.75	4.8	4.87	4.85	7.6	5.69	5.61	5.69	4.69	5.51
Silver (Ag)-Dissolved	<0.00020	<0.000050	<0.000050	<0.000050	0.00014	<0.000050	0.00012	<0.000050	0.000071	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.000020	<0.000020	<0.000020	<0.00010	<0.000040	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.000020
Sodium (Na)-Dissolved	8	76.2	81.9	183	123	149	72.7	101	109	55.9	24.6	26.9	28.4	4.1	3.8	15.3	20.1	7.7	6.9	18.9	9	10.8	11	10	10.2	10.5	14	102	99.4	73.1	25.6	15.4
Strontium (Sr)-Dissolved	0.354	0.968	1.03	0.9	1.08	1.08	1.18	1.03	1.06	1.14	0.847	0.892	1.02	0.106	0.14	0.376	0.637	1.48	1.32	0.67	0.596	0.972	0.99	0.981	1	1.01	1.01	0.927	0.906	1	0.341	0.286
Thallium (Tl)-Dissolved	<0.0020	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00020	<0.00020	<0.00020	<0.00020	<0.0010	<0.00040	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.00020	<0.00020
Tin (Sn)-Dissolved	<0.0050	<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.0025	<0.0010	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0050	<0.0025	<0.0025	<0.0025	<0.0025	<0.00050	<0.00050
Titanium (Ti)-Dissolved	0.014	0.01	<0.010	0.026	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011	0.011	0.013	0.013	0.014	0.014	0.015	0.014	0.014	0.015	0.019	0.018	0.019	<0.010	0.011
Uranium (U)-Dissolved	<0.0020	0.00209	0.0012	0.000658	0.00048	0.00514	0.00513	0.000486	0.000501	0.00015	0.00489	0.00501	0.00309	<0.00020	<0.00020	0.00273	0.00346	0.086	0.0128	0.0037	0.0029	0.007	0.007	0.0068	0.007	0.0075	<0.0010	0.0016	0.0016	0.001	0.00067	0.00071
Vanadium (V)-Dissolved	<0.010	0.0083	0.0125	<0.0050	<0.010	<0.0050	<0.010	<0.0050	<0.0050	<0.010	<0.010	<0.010	<0.010	0.0059	0.0048	0.0015	0.0018	<0.0050	<0.0020	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	0.0052	0.0051	0.0064	0.0019	0.0044
Zinc (Zn)-Dissolved	23.2	0.0307	0.0094	0.197	0.462	<0.0050	<0.010	<0.0050	<0.0050	<0.010	0.123	0.129	0.121	<0.0050	0.0117	<0.0050	<0.0050	0.437	0.233	4.44	3.66	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0099	0.0104	0.0076	<0.0050	<0.0050
Hydrocarbons																																
EPH10-19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.25	-	<0.25	-	<0.25	<0.25	-	-	-	-	-	-	-
EPH19-32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.25	-	<0.25	-	<0.25	<0.25	-	-	-	-	-	-	-
LEPH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.25	-	<0.25	-	<0.25	<0.25	-	-	-	-	-	-	-
HEPH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.25	-	<0.25	-	<0.25	<0.25	-	-	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons																																
Acenaphthene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	-	-	-	-	-	-	-
Acenaphthylene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	-	-	-	-	-	-	-
Acridine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	-	-	-	-	-	-	-
Anthracene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	-	-	-	-	-	-	-
Benz(a)anthracene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	-	-	-	-	-	-	-
Benzo(a)pyrene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000010	-	<0.000010	-	<0.000010	<0.000010	-	-	-	-	-	-	-
Benzo(b)fluoranthene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	-	-	-	-	-	-	-
Benzo(k)fluoranthene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	-	-	-	-	-	-	-
Chrysene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	-	-	-	-	-	-	-
Fluoranthene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	-	-	-	-	-	-	-
Fluorene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	-	-	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	-	-	-	-	-	-	-
2-Methylnaphthalene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	-	-	-	-	-	-	-
Phenanthrene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	-	-	-	-	-	-	-
Pyrene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	-	-	-	-	-	-	-
Quinoline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	-	<0.000050	-	<0.000050	<0.000050	-	-	-	-	-	-	-
d10-Acenaphthene (SS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	93	-	97	-	98	96	-	-	-	-	-	-	-
d9-Acridine (SS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	90	-	92	-	92	89	-	-	-	-	-	-	-
d12-Chrysene (SS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	89	-	91	-	92	90	-	-	-	-	-	-	-
d8-Naphthalene (SS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	87	-	93	-	93	83	-	-	-	-	-	-	-
d10-Phenanthrene (SS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	94	-	97	-	97	97	-	-	-	-	-	-	-

Table 3. 2009 Groundwater Quality Analytical Results

	Groundwater Monitoring Wells						Mini-Piezometers										
Sample ID	**MW09-23**	**MW09-23**	**MW09-23**	**MW09-24**	**MW09-24**	**MW09-26**	**MP09-04**	**MP09-05**	**MP09-5**	**MP09-09**	**MP09-09**	**MP09-10**	**MP09-10**	**MP09-11**	**MP09-11**	**MP09-12**	**MP09-12**
Date Sampled	**21-Jul-09**	**1-Sep-09**	**3-Sep-09**	**22-Jul-09**	**1-Sep-09**	**1-Sep-09**	**13-Jul-09**	**13-Jul-09**	**3-Sep-09**	**12-Jul-09**	**2-Sep-09**	**12-Jul-09**	**2-Sep-09**	**11-Jul-09**	**2-Sep-09**	**12-Jul-09**	**2-Sep-09**
Time Sampled	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**	**00:00**
ALS Sample ID	**L796873-5**	**L814853-12**	**L815006-10**	**L796873-6**	**L814853-13**	**L814853-14**	**L791918-1**	**L791918-2**	**L815006-11**	**L791918-11**	**L815006-1**	**L791918-9**	**L815006-2**	**L791918-7**	**L815006-3**	**L791918-8**	**L815006-4**
Matrix	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**
Physical Tests																	
Conductivity	1930	1890	-	564	378	666	-	-	-	-	-	-	-	-	-	-	-
Hardness (as $CaCO_3$)	1020	1030	1070	297	197	355	377	684	693	415	382	210	196	722	607	709	668
pH	7.5	7.3	-	7.75	7.69	7.85	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	1630	1610	-	364	255	434	-	-	-	-	-	-	-	-	-	-	-
Anions and Nutrients																	
Acidity (as $CaCO_3$)	21	24.4	-	7.5	5.9	9.1	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Total (as $CaCO_3$)	269	247	-	210	107	317	-	-	-	-	-	-	-	-	-	-	-
Ammonia as N	9.49	8.73	9.27	0.032	<0.020	2.43	0.843	8.17	8.06	9.6	8.5	2.94	2.65	1.7	1.6	1.92	1.98
Bromide (Br)	<2.5	<0.50	<1.0	<0.050	<0.050	0.05	<0.050	<0.50	<0.50	<0.050	<0.50	<0.050	<0.50	<0.50	<0.50	<0.50	<0.50
Chloride (Cl)	<25	<5.0	<10	0.76	<0.50	4.96	<0.50	<5.0	6.6	1.96	6.5	1.6	<5.0	11.2	8.5	<5.0	6.3
Fluoride (F)	0.058	<0.20	<0.40	<0.020	0.032	0.711	<0.020	<0.20	<0.20	0.568	0.64	1.5	1.67	0.197	0.218	<0.20	0.2
Nitrate (as N)	<0.25	<0.050	<0.10	2.2	2.52	0.544	9.55	15.2	5.7	<0.0050	<0.050	0.026	<0.050	<0.050	<0.050	<0.050	<0.050
Nitrite (as N)	<0.050	<0.010	<0.020	0.0092	0.0016	0.0271	0.0264	0.028	0.119	<0.0010	<0.010	0.0019	<0.010	<0.010	<0.010	<0.010	<0.010
Sulfate (SO4)	879	916	976	86.6	81.7	51.4	297	634	530	136	179	263	237	<5.0	<5.0	79	59.9
Cyanides																	
Cyanide, Weak Acid Diss	0.107	0.019	0.0583	<0.0050	<0.0050	<0.0050	<0.0050	0.0149	0.0171	<0.0050	0.0335	0.627	0.964	0.0124	0.0099	<0.0050	<0.0050
Cyanide, Total	0.419	0.0324	0.0729	0.012	0.0119	0.0074	<0.0050	0.02	0.0219	<0.0050	0.125	2.69	2.96	0.0591	0.0747	0.0326	0.0387
Cyanate (CNO)	3.5	2.34	3	<0.50	<0.50	<0.50	<0.50	0.87	3.42	<0.50	<0.60	2.1	0.54	<0.50	0.54	<0.50	<0.50
Thiocyanate (SCN)	-	3.72	5.86	-	<0.50	1.04	0.5	1.11	1.62	1.6	1.96	3.39	3.2	4.3	4.46	2.37	2.89
Organic / Inorganic Carbon																	
Total Organic Carbon	-	18.8	18.1	-	4.18	26.8	5.24	15.2	24.3	32	35.4	49.2	48.5	164	142	45.2	55.9
Dissolved Metals																	
Aluminum (Al)-Dissolved	0.033	0.037	0.039	<0.0050	<0.0050	<0.0050	0.0037	0.015	0.0198	0.0045	0.0023	<0.0050	<0.010	0.0353	0.0244	0.0058	0.0052
Antimony (Sb)-Dissolved	<0.0025	<0.0025	<0.00050	<0.00050	<0.00050	<0.00050	0.00055	<0.00050	<0.00050	0.108	0.109	0.163	0.178	0.00148	0.00098	0.0653	0.0707
Arsenic (As)-Dissolved	0.01	0.0137	0.00912	0.00117	0.00102	0.0235	0.00105	0.00132	0.00355	6.58	5.73	24.9	24.2	1.16	1.33	7.56	9.27
Barium (Ba)-Dissolved	0.089	0.064	0.0683	0.077	0.056	0.315	0.0435	0.0441	0.044	0.0137	0.013	0.00475	0.00361	0.139	0.158	0.053	0.047
Beryllium (Be)-Dissolved	<0.0050	<0.0050	<0.0025	<0.0010	<0.0010	<0.0010	<0.0010	<0.0025	<0.0025	<0.0010	<0.0010	<0.0025	<0.0050	<0.0010	<0.0010	<0.0025	<0.0025
Bismuth (Bi)-Dissolved	<0.20	<0.20	<0.0025	<0.20	<0.20	<0.20	<0.0010	<0.0025	<0.0025	<0.0010	<0.0010	<0.0025	<0.0050	<0.0010	<0.0010	<0.0025	<0.0025
Boron (B)-Dissolved	0.14	0.14	0.152	<0.10	<0.10	<0.10	0.076	0.073	0.071	<0.020	<0.020	<0.050	<0.10	0.027	0.027	0.119	0.114
Cadmium (Cd)-Dissolved	0.000184	0.000126	0.000132	0.000055	0.000034	0.000035	0.0028	0.00227	0.00239	0.000134	0.000166	0.000489	0.00089	0.000458	0.000229	0.00091	0.000546
Calcium (Ca)-Dissolved	327	332	353	88.7	60.4	65.8	121	237	232	122	115	80.6	76	147	129	195	185
Chromium (Cr)-Dissolved	<0.0050	<0.0050	<0.0025	<0.0010	<0.0010	<0.0010	<0.0010	<0.0025	<0.0025	<0.0010	<0.0010	<0.0025	<0.0050	<0.0080	<0.0070	<0.0035	<0.0025
Cobalt (Co)-Dissolved	0.0189	0.0171	0.017	0.00063	0.00063	0.00097	0.00153	0.0214	0.0211	0.00828	0.00954	0.0834	0.0896	0.0033	0.00276	0.00215	0.00208
Copper (Cu)-Dissolved	<0.0050	<0.0050	<0.00050	0.0085	0.0057	<0.0010	0.00513	0.0267	0.0324	0.0152	<0.015	0.732	0.725	0.00107	0.00075	0.00199	0.00102
Iron (Fe)-Dissolved	3.86	7.93	5.55	<0.030	<0.030	1.45	<0.030	<0.030	0.346	0.192	0.16	0.381	0.496	8.55	8.1	0.661	1.03
Lead (Pb)-Dissolved	<0.0025	<0.0025	<0.00025	<0.00050	<0.00050	<0.00050	<0.00010	<0.00025	<0.00025	0.00104	0.00077	0.00212	0.00311	0.00166	0.00023	0.00285	0.00404
Lithium (Li)-Dissolved	<0.025	<0.025	<0.025	<0.0050	<0.0050	<0.0050	<0.010	<0.025	<0.025	<0.010	<0.010	<0.025	<0.050	<0.010	<0.010	<0.025	<0.025
Magnesium (Mg)-Dissolved	50.1	47.8	47.2	18.4	11.3	46.4	18	22.5	28	26.7	23	2.05	1.49	86.3	69	53.7	50.1
Manganese (Mn)-Dissolved	6.69	6.06	6.88	0.0115	0.00267	1.38	5.25	8.6	9.04	0.81	0.679	0.349	0.26	2.67	2.03	3.83	3.3
Mercury (Hg)-Dissolved	<0.000020	<0.000020		<0.000020	<0.000020	<0.000020	-	-	-	-	-	-	-	-	-	-	-
Molybdenum (Mo)-Dissolved	<0.0050	<0.0050	0.00252	<0.0010	<0.0010	0.0078	0.00035	0.00049	0.00034	0.0148	0.0151	0.0139	0.0123	0.0223	0.0246	0.021	0.0235
Nickel (Ni)-Dissolved	<0.0050	<0.0050	<0.0025	<0.0010	<0.0010	0.0028	0.0064	0.0068	0.0097	0.0049	0.0084	0.0413	0.0367	0.0151	0.016	0.0127	0.0133
Phosphorus (P)-Dissolved	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0.73	0.68	0.56	0.54	0.43	0.41	<0.30	<0.30
Potassium (K)-Dissolved	15.5	14.4	15.6	<2.0	<2.0	4.3	4.1	7.2	7.4	34.3	32	12.9	12.6	2.5	2.5	6.3	6.6
Selenium (Se)-Dissolved	<0.0050	<0.0050	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.00050	0.00053	0.0006	0.00191	0.00259	0.00124	0.00111	<0.00050	0.00065
Silicon (Si)-Dissolved	5.35	5.69	5.33	5.74	5.62	6.06	9.19	3.94	5.07	22.8	22.7	16.2	15.9	13.5	12	16.1	16.7
Silver (Ag)-Dissolved	<0.00010	<0.00010	0.00128	<0.000020	<0.000020	<0.000020	<0.000020	<0.000050	<0.000050	0.000166	0.000079	0.0196	0.0285	0.000061	0.000068	<0.000050	<0.000050
Sodium (Na)-Dissolved	59.5	56.9	80.9	9.2	8.7	20.3	21.2	92.8	79	34.8	36.8	105	106	44.6	39.1	41.4	40.1
Strontium (Sr)-Dissolved	0.736	0.698	0.752	0.467	0.295	0.645	0.299	0.706	0.679	0.766	0.731	0.253	0.233	0.694	0.582	0.655	0.633
Thallium (Tl)-Dissolved	<0.0010	<0.0010	<0.00050	<0.00020	<0.00020	<0.00020	<0.00020	<0.00050	<0.00050	<0.00020	<0.00020	<0.00050	<0.0010	<0.00020	<0.00020	<0.00050	<0.00050
Tin (Sn)-Dissolved	<0.0025	<0.0025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020	<0.00050	<0.00050	<0.00020	<0.00020	<0.00050	<0.0010	<0.00020	<0.00020	<0.00050	<0.00050
Titanium (Ti)-Dissolved	0.015	0.016	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.014	<0.010	<0.010	<0.010
Uranium (U)-Dissolved	0.0023	0.0015	0.00157	0.00252	0.00058	0.00341	0.000252	0.00125	0.00133	0.00587	0.00337	0.00111	0.00077	0.000697	0.000211	0.0042	0.00384
Vanadium (V)-Dissolved	<0.0050	<0.0050	<0.0050	<0.0010	<0.0010	0.0017	<0.0020	<0.0050	<0.0050	<0.0020	<0.0020	<0.0050	<0.010	0.0716	0.0507	0.0053	<0.0050
Zinc (Zn)-Dissolved	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.011	0.0286	0.0354	0.0073	0.0044	0.0225	0.033	0.0158	0.0048	0.0451	0.038
Hydrocarbons																	
EPH10-19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EPH19-32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LEPH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HEPH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons																	
Acenaphthene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acridine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benz(a)anthracene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Quinoline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
d10-Acenaphthene (SS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
d9-Acridine (SS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
d12-Chrysene (SS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
d8-Naphthalene (SS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
d10-Phenanthrene (SS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

AECOM

Table 4. 2009 Soil Quality Analytical Results

Sample ID	MW09-16(6FT-7FT)	MW09-17(11FT-12FT)	MW09-18(2FT-3FT)	MW09-18(21FT-22FT)	MW09-19(7FT10	MW09-19(15FT-16FT9
Date Sampled	15-Jul-09	15-Jul-09	15-Jul-09	15-Jul-09	15-Jul-09	15-Jul-09
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L796959-7	L796959-9	L796959-10	L796959-11	L796959-12	L796959-15
Matrix	Soil	Soil	Soil	Soil	Soil	Soil
Physical Tests						
Conductivity	-	-	-	-	-	-
Hardness (as $CaCO_3$)	-	-	-	-	-	-
% Moisture	11.1	9.68	30.1	7.2	11.7	20
pH	7.64	7.97	6.39	8.14	6.96	7.13
Total Dissolved Solids	-	-	-	-	-	-
Anions and Nutrients						
Acidity (as $CaCO_3$)	-	-	-	-	-	-
Alkalinity, Total (as $CaCO_3$)	-	-	-	-	-	-
Ammonia as N	-	-	-	-	-	-
Bromide (Br)	-	-	-	-	-	-
Chloride (Cl)	-	-	-	-	-	-
Fluoride (F)	-	-	-	-	-	-
Nitrate (as N)	-	-	-	-	-	-
Nitrite (as N)	-	-	-	-	-	-
Sulfate (SO4)	-	-	-	-	-	-
Cyanides						
Cyanide, Weak Acid Diss	-	-	-	-	-	-
Cyanide, Total	-	-	-	-	-	-
Cyanate (CNO)	-	-	-	-	-	-
Metals						
Antimony (Sb)	162	<10	<10	11	898	<10
Arsenic (As)	1980	65.7	103	285	13000	9.4
Barium (Ba)	150	95.1	271	113	99.9	56.6
Beryllium (Be)	0.5	<0.50	<0.50	0.73	1.25	<0.50
Cadmium (Cd)	41.4	<0.50	<0.50	<0.50	91.1	<0.50
Chromium (Cr)	16.2	15.6	19.6	111	5.1	10.5
Cobalt (Co)	9.8	8.6	8.3	20	6.7	3.6
Copper (Cu)	111	44.9	54.5	71.9	401	6.4
Lead (Pb)	1570	<30	<30	<30	8260	<30
Mercury (Hg)	0.151	0.0419	0.0458	0.103	0.426	0.0076
Molybdenum (Mo)	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Nickel (Ni)	11.8	8.1	12.2	47.8	7.1	5.9
Selenium (Se)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Silver (Ag)	35.2	<2.0	<2.0	<2.0	96.9	<2.0
Thallium (Tl)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tin (Sn)	<5.0	<5.0	<5.0	<5.0	8.2	<5.0
Vanadium (V)	56.7	76	60.7	136	22.9	27.4
Zinc (Zn)	2760	60.1	60.3	127	4300	24.9
Dissolved Metals						
Aluminum (Al)-Dissolved	-	-	-	-	-	-
Antimony (Sb)-Dissolved	-	-	-	-	-	-
Arsenic (As)-Dissolved	-	-	-	-	-	-
Barium (Ba)-Dissolved	-	-	-	-	-	-
Beryllium (Be)-Dissolved	-	-	-	-	-	-
Bismuth (Bi)-Dissolved	-	-	-	-	-	-
Boron (B)-Dissolved	-	-	-	-	-	-
Cadmium (Cd)-Dissolved	-	-	-	-	-	-
Calcium (Ca)-Dissolved	-	-	-	-	-	-
Chromium (Cr)-Dissolved	-	-	-	-	-	-
Cobalt (Co)-Dissolved	-	-	-	-	-	-
Copper (Cu)-Dissolved	-	-	-	-	-	-
Iron (Fe)-Dissolved	-	-	-	-	-	-
Lead (Pb)-Dissolved	-	-	-	-	-	-
Lithium (Li)-Dissolved	-	-	-	-	-	-
Magnesium (Mg)-Dissolved	-	-	-	-	-	-
Manganese (Mn)-Dissolved	-	-	-	-	-	-
Mercury (Hg)-Dissolved	-	-	-	-	-	-
Molybdenum (Mo)-Dissolved	-	-	-	-	-	-
Nickel (Ni)-Dissolved	-	-	-	-	-	-
Phosphorus (P)-Dissolved	-	-	-	-	-	-
Potassium (K)-Dissolved	-	-	-	-	-	-
Selenium (Se)-Dissolved	-	-	-	-	-	-
Silicon (Si)-Dissolved	-	-	-	-	-	-
Silver (Ag)-Dissolved	-	-	-	-	-	-
Sodium (Na)-Dissolved	-	-	-	-	-	-
Strontium (Sr)-Dissolved	-	-	-	-	-	-
Thallium (Tl)-Dissolved	-	-	-	-	-	-
Tin (Sn)-Dissolved	-	-	-	-	-	-
Titanium (Ti)-Dissolved	-	-	-	-	-	-
Uranium (U)-Dissolved	-	-	-	-	-	-
Vanadium (V)-Dissolved	-	-	-	-	-	-
Zinc (Zn)-Dissolved	-	-	-	-	-	-

Table 4. 2009 Soil Quality Analytical Results

Sample ID	MW09-16(6FT-7FT)	MW09-17(11FT-12FT)	MW09-18(2FT-3FT)	MW09-18(21FT-22FT)	MW09-19(7FT10	MW09-19(15FT-16FT9
Date Sampled	15-Jul-09	15-Jul-09	15-Jul-09	15-Jul-09	15-Jul-09	15-Jul-09
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L796959-7	L796959-9	L796959-10	L796959-11	L796959-12	L796959-15
Matrix	Soil	Soil	Soil	Soil	Soil	Soil
Hydrocarbons						
EPH10-19	<200	<200	<200	<200	<200	<200
EPH19-32	<200	<200	<200	<200	<200	<200
LEPH	<200	<200	<200	<200	<200	<200
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Acenaphthylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Acridine	-	-	-	-	-	-
Anthracene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benz(a)anthracene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(a)pyrene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(b)fluoranthene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(g,h,i)perylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(k)fluoranthene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chrysene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Dibenz(a,h)anthracene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Fluoranthene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Fluorene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Indeno(1,2,3-c,d)pyrene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
2-Methylnaphthalene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Naphthalene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Phenanthrene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Pyrene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Quinoline	-	-	-	-	-	-
d10-Acenaphthene (SS)	99	95	103	99	91	94
d9-Acridine (SS)	-	-	-	-	-	-
d12-Chrysene (SS)	72	70	84	71	74	66
d8-Naphthalene (SS)	94	95	100	97	89	91
d10-Phenanthrene (SS)	89	86	94	90	87	84

Table 5. Permeability Testing Results

Station Name	Stickup	Borehole Depth	Depth to Top of Screen	Depth to Bottom of Screen	Depth to Static Water Level		Depth to Top of Screen	H0	H	d	b	L	rc	rw	K	Analytical Solution
	m ags	m bgs	m bgs	m bgs	m btop	m bgs	m bswl	m	m		m	m	m	m	m/s	
MW09-02	0.97	4.57	3.05	4.57	3.26	2.29	0.76	0.305	2.28	0.76	2.28	1.52	0.025	0.030	1.04E-06	Bouwer-Rice (1976)
MW09-03	0.81	9.14	5.49	7.01	6.91	6.10	-0.61	0.255	3.04	0.00	3.04	1.07	0.025	0.030	5.53E-06	Bouwer-Rice (1976)
MW09-06	1.30	4.57	1.52	4.57	2.95	1.66	-0.13	0.472	2.92	0.00	2.92	3.05	0.025	0.030	2.04E-06	Bouwer-Rice (1976)
MW09-15	0.88	37.03	33.99	37.03	16.74	15.86	18.12	0.586	21.17	18.12	21.17	3.05	0.025	0.046	1.20E-06	Barker-Black (1983)
MW09-23	0.91	15.00	13.41	14.94	13.39	12.48	0.94	0.380	2.53	0.94	2.53	1.52	0.025	0.054	1.29E-05	Bouwer-Rice (1976)

Notes:

m ags	*Metres above ground surface*
m bgs	*Metres below ground surface*
m btop	*Metres below top of pvc piezometer*
m bswl	*Metres below static water level*
m	*Metres*
m/s	*Metres per second*

Table 6. Summary of Physical Soil Property Characterization

Sample Name	Location		Top of Interval	Bottom of Interval	Interval Length		Soil Core Diameter		Sample Volume	Sample Weight	In-situ Density	Material Type	Texture	Physical Testing Conducted
	Easting (m)	Northing (m)	ft BGS	ft BGS	ft	m	in	m	m3	kg	kg/m3			
MW09-01	389395	6880559	18	20	2	0.6096	3.25	0.0826	3.26E-03	4.03	1235	Tailings	Clay with minor silt	-
MW09-01	389395	6880559	26	29	3	0.9144	3.25	0.0826	4.89E-03	6.61	1351	Tailings	Clay	Moisture content, Atterberg limits, specific gravity, grain size, soil moisture characteristic curve
MW09-02	389396	6880560	10	15	5	1.5240	3.25	0.0826	8.16E-03	8.1	993	Tailings	Silty sand	Moisture content, Atterberg limits, specific gravity, grain size, soil moisture characteristic curve
MW09-03	389421	6880558	3	4	1	0.3048	3.25	0.0826	1.63E-03	1.88	1152	Tailings	Silty sand	-
MW09-03	389421	6880558	10	11	1	0.3048	3.25	0.0826	1.63E-03	2.26	1385	Tailings	Silty sand	-
MW09-03	389421	6880558	23	24	1	0.3048	3.25	0.0826	1.63E-03	2.31	1416	Tailings	Clay with minor silt	-
MW09-03	389421	6880558	27	28	1	0.3048	3.25	0.0826	1.63E-03	1.07	1312	Half core, Dam Fill	Fine to medium sand, minor silt	Grain size
MW09-04	389421	6880559	16	17	1	0.3048	3.25	0.0826	1.63E-03	2.91	1784	Tailings	Silty sand	-
MW09-07	389324	6880701	11	13	2	0.6096	3.25	0.0826	3.26E-03	4.51	1382	Native	Silty sand	-
MW09-11	389458	6880632	10	13.8	3.8	1.1684	3.25	0.0826	6.25E-03	7.52	2405	Half core, Aeolian	Fine to medium sand	Grain size
TH09-01	389383	6880671	6	7	1	0.3048	3.25	0.0826	1.63E-03	2.39	1465	Tailings	Silty clay	-
TH09-01	389383	6880671	13	14	1	0.3048	3.25	0.0826	1.63E-03	2.4	1471	Native	Aeolian sand	-

Notes:
ft BGS *feet below ground surface.*

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **GT09-01**
LOCATION: Tailings Dam Crest, near TH-03 N 2,097,210.5 E 118,707.1		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1101.44

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	ELEVATION
0		SAND (fill), trace gravel, trace silt, trace organics - yellowish orange-brown - moist, compact to dense - medium grained sand, sub-rounded - sub-angular gravel, >0.5 cm to 2 cm - matrix supported - presence of roots until 3.05 m below ground surface					335
1							
2							334
3		- moist with dry lenses		S-1	10-14-15		333
4							332
5	FILL						331
6							330
7							329
8							328
9	FILL	- SAND and GRAVEL		S-2	7-14-15		327
10		SAND (fill), trace to some gravel, trace silt - yellowish orange-brown - medium grained to fine grained sand (trace coarse sand), sub-rounded - sub-rounded gravel, >0.5 cm to <2 cm - matrix supported - moist, compact to dense					326
11							325
12	FILL						324
13							323
14		SAND and GRAVEL (fill), trace silt - brown - medium grained to fine grained sand, sub-rounded - sub-angular gravel, >0.5 cm to <2 cm - clast supported		S-3	43-57-48		322
15	FILL						321

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m^3)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

AECOM	LOGGED BY: Marc Lavigne	COMPLETION DEPTH: 30.18 m
	REVIEWED BY: Alex Knop	COMPLETION DATE: 7/19/09
	PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 3

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **GT09-01**
LOCATION: Tailings Dam Crest, near TH-03 N 2,097,210.5 E 118,707.1		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1101.44

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	ELEVATION
15	FILL	- wet, dense to very dense - GRAVEL (fill), sandy					320
16	SA	SAND (native soil), trace to some silt, trace organics - dark grey - medium grained to fine grained sand, sub-rounded - wet, loose to compact - silt content increases with depth		S-4	7-13-14		319
17	GRSA	SAND and GRAVEL, trace silt - dark grey - medium grained sand (trace coarse sand), sub-rounded - sub-angular gravel, >0.5 cm to 5 cm					318
18		- clast supported - wet, very loose		S-5	2-1-2		317
19		SAND (native soil), trace to some silt, trace organics - dark grey - fine sand, sub-rounded - wet, very loose					316
20	SA	- sand coarsens with depth - some gravel					315
21	GRSA	SAND and GRAVEL, trace silt - dark grey-brown - medium sand, sub-rounded - sub-angular gravel, >0.5 cm to 2 cm		S-6	4-20-47		314
22		- clast supported - permafrost at 21.5 m below ground surface, Nbn, 2.8C					313
23		SAND, trace to some silt, trace gravel - dark grey - medium grained to fine grained sand, sub-rounded - sub-angular gravel, <1 cm - compact to dense					312
24		- SAND and GRAVEL until approx. 27.4 m below ground surface					311
25	SA						310
26		- fine sand content decreases with depth		S-7	31-61-		309
27							308
28		- some gravel SAND and GRAVEL - light grey-brown - fine grained to medium-coarse sand, sub-rounded - sub-angular gravel, <1 cm					307
29	GRSA	- coarsening downward sequences		G-8			306
30							

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m³)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

AECOM	LOGGED BY: Marc Lavigne	COMPLETION DEPTH: 30.18 m
	REVIEWED BY: Alex Knop	COMPLETION DATE: 7/19/09
	PROJECT ENGINEER: Ken Skaftfeld	Page 2 of 3

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **GT09-01**
LOCATION: Tailings Dam Crest, near TH-03 N 2,097,210.5 E 118,707.1		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1101.44

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS / Total Unit Wt / Plastic MC Liquid	COMMENTS	ELEVATION
30			END OF DRILLING at 30.18 m in permafrost (refusal) - 10 cm of heaving at 17.53 m below ground surface Thermistor install: - 2" PVC pipe SCHED 40 - grout from 30.2 m below ground surface to ground surface - 1" PVC pipe SCHED 40 install inside the 2" PVC pipe SCHED 40 - grout inside the annulus space						305
31									304
32									303
33									302
34									301
35									300
36									299
37									298
38									297
39									296
40									295
41									294
42									293
43									292
44									291
45									

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100

■ Total Unit Wt ■ (kN/m³) 16 17 18 19 20 21

Plastic MC Liquid 20 40 60 80 100

AECOM

LOGGED BY: Marc Lavigne	COMPLETION DEPTH: 30.18 m
REVIEWED BY: Alex Knop	COMPLETION DATE: 7/19/09
PROJECT ENGINEER: Ken Skaftfeld	Page 3 of 3

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **GT09-02**
LOCATION: Tailings Dam, on Road from South Abutment N 2,097,191.5 E 118,719.0		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1090.41

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m³)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	ELEVATION
0	FILL	SAND (fill), trace silt - medium brown - fine grained to medium grained sand, sub-rounded - moist, loose					332
1							331
2				S-1	5-7-10		330
3		- some gravel below 2.13 m below ground surface		S-2	5-6-6		329
4							328
5	SA	SAND, trace silt, trace organics - wood debris, <2 cm - dark grey - sub-rounded - permafrost at 5.64 m below ground surface, Nbn, 1.6°C - gravel content increases with depth to "gravelly"		S-3	1-1-1		327
6				S-4	28-34-61		326
7	GRSA	GRAVEL, sandy, trace silt - dark grey - medium to coarse sand, sub-angular - sub-angular gravel, >0.5 cm to 2 cm		S-5	25-42-35		325
8		SAND, trace silt - dark grey - medium grained sand, sub-rounded					324
9		- trace gravel (>0.5 cm) below 8.84 m below ground surface - fine grained to medium grained sand below 9.14 m below ground surface		S-6	27-42-34		323
10		- medium grained sand below 10.36 m below ground surface					322
11	SA	- trace gravel (<2 cm) below 10.67 m below ground surface		S-7	37-38-46		321
12		- fine grained to medium grained sand below 12.19 m below ground surface		S-8	38-47-56		320
13							319
14		- some gravel below 13.41 m below ground surface		S-9	37-45-47		318
15							

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

AECOM

LOGGED BY: Marc Lavigne	COMPLETION DEPTH: 16.23 m
REVIEWED BY: Alex Knop	COMPLETION DATE: 7/17/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 2

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **GT09-02**
LOCATION: Tailings Dam, on Road from South Abutment N 2,097,191.5 E 118,719.0		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1090.41

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS: Becker / Dynamic Cone / SPT (Standard Pen Test) (Blows/300mm) 0 20 40 60 80 100; Total Unit Wt (kN/m³) 16 17 18 19 20 21; Plastic MC Liquid 20 40 60 80 100	COMMENTS	ELEVATION
15	SA		GRAVEL, sandy, trace silt - yellowish orange - fine grained to medium grained sand, sub-rounded - sub-angular gravel, >0.5 cm to 2 cm - clast supported		S-10	38-49-60			317
16	GRSA		END OF DRILLING at 16.77 m in permafrost (refusal) MW09-22 install: - Screen interval: 1.22 m - 4.27 m - Screen type: 10-Slot 2" PVC SCHED 40 - Filter pack interval: 0.92 m - 4.27 m - Bentonite seal from ground surface to 0.92 m - WL: 4.845 mTPVC (22-Jul-09, 8:33:00 AM) Thermistor install: - 1" PVC pipe SCHED 40 - Tip at 16.77 m below ground surface						316
17									315
18									314
19									313
20									312
21									311
22									310
23									309
24									308
25									307
26									306
27									305
28									304
29									303
30									

AECOM

LOGGED BY: Marc Lavigne	COMPLETION DEPTH: 16.23 m
REVIEWED BY: Alex Knop	COMPLETION DATE: 7/17/09
PROJECT ENGINEER: Ken Skaftfeld	Page 2 of 2

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **GT09-03**
LOCATION: Tailings Dam, North Terrace N 2,097,213.3 E 118,722.8		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1092.33

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m³)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	ELEVATION
0	FI	SAND and GRAVEL(Fill), trace silt - dark brown - moist, loose - medium grained sand, sub-angular - sub-angular gravel, 0.5 cm to <1.5 cm - clast supported - staining on gravel					
1							332
2		SAND (Aeolian), trace silt, trace gravel - orange-brown - moist with dry lenses, loose to compact - fine grained to medium grained sand, sub-rounded - sub-angular gravel, >0.5 cm to < 2.5 cm - matrix supported		S-1	4-5-4		331
3				S-2	4-5-5		330
4	SA						329
5				S-3	3-4-5		328
		- some gravel below 5.33 m below ground surface					
6				S-4	6-7-7		327
		- trace gravel below 6.10 m below ground surface					
7							326
		- some gravel below 7.32 m below ground surface					
8	GRSA	SAND and GRAVEL, trace silt - light brown-orange - moist, compact - medium grained sand, sub-rounded - sub-angular gravel, >0.5 cm to 2 cm - iron staining on gravel		S-5	4-7-5		325
9	SA	SAND, trace gravel, trace silt (Aeolian) - orange-brown - moist, compact - medium grained sand, sub-rounded - sub-rounded gravel, 1 cm to 1.5 cm - matrix supported		S-6	3-7-9		324
10	GRSA						323
11		SAND and GRAVEL, trace silt SAND, trace gravel, trace silt		S-7	6-8-4		322
12	SA						321
		- some gravel below 12.19 m below ground surface		S-8	4-5-10		
13							320
14	GRSA	SAND and GRAVEL, trace silt - coarsening downward sequence		S-9	3-7-2		319
15							

AECOM

LOGGED BY: Marc Lavigne	COMPLETION DEPTH: 19.81 m
REVIEWED BY: Alex Knop	COMPLETION DATE: 7/19/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 2

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **GT09-03**
LOCATION: Tailings Dam, North Terrace N 2,097,213.3 E 118,722.8		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1092.33

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	ELEVATION
15	GRSA	GRAVEL, sandy, trace silt - coarsening downward sequence		S-10	5-24-16		
16	GRSA						317
17		SAND, some silt, trace gravel - olive grey - very dense - fine grained to medium grained sand, sub-rounded - sub-angular, >0.5 cm to 1 cm - permarfrost at 16.52 m below ground surface		S-11	25-52-34		316
18	SA						315
19							314
20		END OF DRILLING at 19.87 m in permafrost (refusal) Thermistor install: - 1" PVC pipe SCHED 40 - Tip at 19.86 m below ground surface					313
21							312
22							311
23							310
24							309
25							308
26							307
27							306
28							305
29							304
30							

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m^3)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

AECOM

LOGGED BY: Marc Lavigne	COMPLETION DEPTH: 19.81 m
REVIEWED BY: Alex Knop	COMPLETION DATE: 7/19/09
PROJECT ENGINEER: Ken Skaftfeld	Page 2 of 2

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **GT09-04**
LOCATION: Seepage Dam Crest N 2,097,202.0 E 118,747.9		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1080.81

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m³)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	ELEVATION
0	FILL	SAND and GRAVEL (Fill), trace silt - light brown-orange - moist, very loose - medium grained sand, sub-rounded - gravel sub-angular, from 0.5 cm to >6 cm - matrix supported					329
1							
2	FILL	SAND (Fill), trace to some silt, trace gravel - light brown-orange - mois, very dense - medium grained sand, sub-rounded - gravel sub-angular, from 2 cm to >4 cm - matrix supported		S-1	3-2-2		328
3		- permafrost at 2.8 m below ground surface, -0.3°C, Nbn		S-2	30-40-42		327
4		SAND (Native soil), trace to some silt, trace to some organic - dark grey-brown - mediumgrained to coarse grained sand, sub-rounded					326
5				S-3	14-19-20		325
6	SA						324
7	SA	- trace gravel below 6.5 m below ground surface - silt content increases with depth - sand becomes finer with depth		S-4	31-39-39		323
8		SAND and GRAVEL, some silt - dark brown - coarse sand - sub-angular gravel - sub-angular sand		G-5			322
9				G-6			321
10	GRSA						320
11				G-7			319
12		- gravel content decreases to become SAND, gravelly, trace of silt					318
13		SAND, trace to some silt, trace gravel - sub-angular gravel, 0.5 cm to < 2 cm - fine grained to medium grained sand, sub-rounded		G-8			317
14	SA	- SAND, gravelly, trace of silt below 13.41 m below ground surface		S-9	41-71-51		316
15							315

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

AECOM

LOGGED BY: Marc Lavigne	COMPLETION DEPTH: 16.23 m
REVIEWED BY: Alex Knop	COMPLETION DATE: 7/16/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 2

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **GT09-04**
LOCATION: Seepage Dam Crest N 2,097,202.0 E 118,747.9		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1080.81

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS / Total Unit Wt / Plastic MC Liquid	COMMENTS	ELEVATION
15	SA		SAND and GRAVEL, trace of silt		S-10	67--			314
16	GRSA		- dark grey-brown - medium sand, sub-rounded - gravel sub-angular, from 0.5 cm to > 4 cm - silt content increases with depth - permafrost temperature: 0.9 oC description: Nbn						313
17			END OF DRILLING at16.23 m in permafrost (refusal)						312
18			MW09-20 install: - Screen interval: 1.37 m - 2.90 m - Screen type: 10-Slot 2" PVC SCHED 40 - Filter pack interval: 1.10 m - 2.90 m - Bentonite seal from ground surface to1.10 m - WL: Dry (22-Jul-09, 8:25:00 AM)						311
19			Thermistor install: - 1" PVC pipe SCHED 40 - Tip at 16.10 m below ground surface						310
20									309
21									308
22									307
23									306
24									305
25									304
26									303
27									302
28									301
29									300
30									

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100

■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21

Plastic MC Liquid 20 40 60 80 100

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

AECOM

LOGGED BY: Marc Lavigne	COMPLETION DEPTH: 16.23 m
REVIEWED BY: Alex Knop	COMPLETION DATE: 7/16/09
PROJECT ENGINEER: Ken Skaftfeld	Page 2 of 2

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **GT09-05**
LOCATION: North terrace, near Seepage Dam N 2,097,214.2 E 118,738.1		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1089.60

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆ (Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■ (kN/m^3)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	ELEVATION
0			SAND, trace silt, trace gravel (Aeolian) - Medium brown - moist, loose - fine grained to medium grained sand, sub-rounded - gravel sub-angular, >0.5 cm to 2 cm					332
1								331
2					S-1	1-3-3		330
3			- fine sand content decreases with depth - coarsening downward sequence		S-2	3-4-4		329
4								328
5			- moist with dry lenses		S-3	4-9-8		327
6			- coarsening downward sequence		S-4	5-8-10		326
7								325
8	SA		- some dark brown sand between 4.1 and 4.4 m below ground surface - moist, dense		S-5	10-18-18		324
9			- some gravel below 8.38 m below ground surface - coarsening downward sequence - wet, loose		S-6	2-3-5		323
10								322
11			- Permafrost at approximately 11.28 m below ground surface, Nbn		S-7	5-9-23		321
12								320
13					S-8	23-32-41		319
14	GRSA		SAND AND GRAVEL, trace silt (description from dill cuttings)					318
15	SA		- SAND, some gravel, trace silt (description from dill cuttings)					

AECOM

LOGGED BY: Marc Lavigne	COMPLETION DEPTH: 19.81 m
REVIEWED BY: Alex Knop	COMPLETION DATE: 7/21/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 2

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **GT09-05**
LOCATION: North terrace, near Seepage Dam N 2,097,214.2 E 118,738.1		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1089.60

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	ELEVATION
15	SASI	SILT, some sand, trace gravel, trace organic (description from dill cuttings) - sand content increases with depth					317
16	SA	SAND, trace to some silt, trace gravel - dark grey - dense - fine grained to medium grained sand, sub-rounded - sub-angular gravel, < 1 cm - matrix supported - lenses of organic material, <2 cm					316
17				S-9	21-26-23		315
18							314
19	GRSA	SAND and GRAVEL, trace silt - gravel content increases with depth - sub-angular gravel, < 2 cm - coarse sand, sub-rounded					313
20		END OF DRILLING at 19.87 m in permafrost (refusal) MW09-24 install: - Screen interval: 8.23 m - 11.28 m - Screen type: 10-Slot 2" PVC SCHED 40 - Filter pack interval: 7.82 m - 11.28 m - Bentonite seal from 0.61 m to 7.92 m - Drill cutting from ground surface - WL: 9.774 mTPVC (22-Jul-09, 8:06:00 AM) Thermistor install: - 1" PVC pipe SCHED 40 - Tip at 19.86 m below ground surface					312
21							311
22							310
23							309
24							308
25							307
26							306
27							305
28							304
29							303
30							

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m³)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

AECOM

LOGGED BY: Marc Lavigne	COMPLETION DEPTH: 19.81 m
REVIEWED BY: Alex Knop	COMPLETION DATE: 7/21/09
PROJECT ENGINEER: Ken Skaftfeld	Page 2 of 2

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-01**
LOCATION: South side of tailings empoundment		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Direct Push - 114 mm	ELEVATION (m): 1103 (est.)

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m^3)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0			SAND TAILINGS FILL - dark yellowish orange - moist, loose, non-cohesive - fine grained sand, sub-rounded					0
1	FILL							1
			SAND TAILINGS - dark reddish brown - wet, very loose, non-cohesive, non-plastic, rapid dilatency - fine grained sand, sub-rounded					
2	SA							2
3			SILTY SAND TAILINGS - dark yellow brown - wet, loose, non-cohesive, non-plastic, rapid dilatency - fine grained sand					3
4	SM				S-1			4
			CLAY TAILINGS - dark yellow brown - wet, medium stiff, cohesive, medium plasticity, slow dilatency - minor silt, fining downward and finely laminated					
5								5
6					S-2			6
7	CI							7
			- damp from 7.62 m to 9.14 m					
8					S-3			8
9	SM		SILTY SAND - brown - wet, very loose, non-cohesive, non-plastic, rapid dilatency - fine grained sand, organic odour, twigs and organic matter embedded, sharp contact with overlying clay - encountered heaving sands at approx. 10 m; switched to cable tool drilling					9
	SA							
10	SA		SAND - brown - wet, very loose, non-cohesive, non-plastic - coarse subrounded sand with minor angular gravel inferred to be colluvium					10
11			SAND - brown grading to black below 10.21 m - wet, dense, non-cohesive, non-plastic - coarse sand with increasing silt content downhole, organic odour					11
12			END OF DRILLING at 10.66 m					12
13			MW09-01 installation: - Screen interval: 9.45 m - 9.75 m - Screen type: 10-Slot 1.25" PVC SCHED 40 - Filter pack interval: 9.14 m - 9.75 m - Bentonite seal: 8.53 m - 9.14 m - WL: 7.648 m bTOP (8-Jul-09, 8:00 AM)					13
14								14
15								

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 10.67 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/7/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 1

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-02**
LOCATION: South side of tailings empoundment		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Direct Push - 114 mm	ELEVATION (m): 1103 (est.)

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m^3)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0	FILL		SAND TAILINGS FILL - dark yellowish orange - moist, loose, non-cohesive - fine grained sand, sub-rounded					0
1								1
2	SA		SAND TAILINGS - dark reddish brown - wet, very loose, non-cohesive, non-plastic, rapid dilatency - fine grained sand, sub-rounded					2
3								3
4	SM		SILTY SAND TAILINGS - dark yellow brown - wet, loose, non-cohesive, non-plastic, rapid dilatency - fine grained sand		S-1			4
5			END OF DRILLING at 4.57 m MW09-02 installation: - Screen interval: 3.05 m - 4.57 m - Screen type: 10-Slot 2" PVC SCHED 40 wrapped in 5 micron Nitex cloth - Filter pack interval: Naturally developed - Bentonite seal: None - WL: 3.211 m bTOP (9-Jul-09, 11:35 AM)					5
6								6
7								7
8								8
9								9
10								10
11								11
12								12
13								13
14								14
15								

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 4.57 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/7/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 1

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-03**
LOCATION: South side of tailings empoundment N 2,097,195.3 E 118,691.9		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Direct Push - 114 mm	ELEVATION (m): 1103 (est.)

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m^3)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0	FILL	SAND TAILINGS FILL - dark yellowish orange - moist, loose, non-cohesive, non-plastic, slow dilatency - fine grained sand, sub-rounded					0
1				S-1			1
		SILTY SAND TAILINGS - dark yellowish orange - moist becoming wet at 2.31 m, loose, non-cohesive, non-plastic, slow dilatency - fine grained sand, sub-rounded					
2	SM						2
3				S-2			3
4	SASI SICL	SANDY SILT TAILINGS - dark yellowish orange - wet, medium dense, non-cohesive, non-plastic, slow dilatency - fine grained sand, sub-rounded					4
5		SILTY CLAY TAILINGS - dark yellow brown - wet, soft, cohesive, medium plasticity, slow dilatency					5
6	SM	SILTY SAND - dark yellow brown - wet, medium dense, non-cohesive, non-plastic, rapid dilatency - fine grained sand, sub-rounded					6
7	CL	CLAY TAILINGS - dark yellow brown - wet, soft, cohesive, high plasticity, slow dilatency		S-3			7
8	CB	COBBLES AND SAND AND SILT - brown - wet, dense, non-cohesive, non-plastic - loose fine sand, silt and clay fraction inferred to be waste rock armouring on upstream face of dam		S-4			8
9	SA	SAND - brown - wet, loose, non-cohesive, non-plastic, rapid dilatency - fine to medium sand with minor silt inferred to be dam fill					9
10		END OF DRILLING at 9.14 m MW09-03 installation: - Screen interval: 8.08 m - 9.14 m - Screen type: 10-Slot 2" PVC SCHED 40 - Filter pack interval: 7.93 m - 9.14 m - Bentonite seal: 7.32 m - 7.92 m - WL: 6.910 m bTOP (22-Jul-09)					10
11							11
12							12
13							13
14							14
15							

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 9.14 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/8/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 1

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-04**
LOCATION: South side of tailings empoundment		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Direct Push - 114 mm	ELEVATION (m): 1103 (est.)

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m^3)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0	FILL	SAND TAILINGS FILL - dark yellowish orange - moist, loose, non-cohesive, non-plastic, slow dilatency - fine grained sand, sub-rounded					0
1		SILTY SAND TAILINGS - dark yellowish orange - moist becoming wet at 2.31 m, loose, non-cohesive, non-plastic, slow dilatency - fine grained sand, sub-rounded					1
2	SM						2
3				S-1			3
4	SASI SICL	SANDY SILT TAILINGS - dark yellowish orange - wet, medium dense, non-cohesive, non-plastic, slow dilatency - fine grained sand, sub-rounded					4
5		SILTY CLAY TAILINGS - dark yellow brown - wet, soft, cohesive, medium plasticity, slow dilatency		S-2			5
6	SM	SILTY SAND - dark yellow brown - wet, medium dense, non-cohesive, non-plastic, rapid dilatency - fine grained sand, sub-rounded					6
7		END OF DRILLING at 7.01 m MW09-04 installation: - Screen interval: 5.49 m - 7.01 m - Screen type: 10-Slot 2" PVC SCHED 40 wrapped in 5 micron Nitex cloth - Filter pack interval: Naturally developed - Bentonite seal: None - WL: 3.810 m bTOP (22-Jul-09)					7
8							8
9							9
10							10
11							11
12							12
13							13
14							14
15							

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 7.01 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/9/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 1

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-05**
LOCATION: North side of tailings empoundment N 2,097,224.9 E 2,097,224.9		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Direct Push - 114 mm	ELEVATION (m): 1103 (est.)

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0	SICL	SILTY CLAY TAILINGS - dark yellow orange - wet, soft, cohesive, medium plasticity, rapid dilatency					0
1							1
2	SM	SILTY SAND TAILINGS - dark yellowish brown - wet, loose, non-cohesive, non-plastic, rapid dilatency - fine to medium grained sand, sub-rounded					2
3	CL	CLAY TAILINGS - dark yellow brown - wet, very soft, cohesive, high plasticity, rapid dilatency					3
4							4
5	OR	ORGANICS - dark brown - wet - primarily moss					5
6	SM SA	SILTY SAND - dark brown - moist, dense, non cohesive, non plastic, slow dilatency - fine to medium sand, sub-rounded, occasional angular clast up to 10 mm inferred to be native aeolian sand					6
7		SAND - brown - moist, loose, non-cohesive, non-plastic, slow dilatency - medium sand with minor silt inferred to be native aeolian sand with developed soil horizon					7
8		END OF DRILLING at 6.71 m					8
9		MW09-05 installation: - Screen interval: 5.79 m - 6.70 m - Screen type: 10-Slot 2" PVC SCHED 40 - Filter pack interval: 5.49 m - 6.70 m - Bentonite seal: 5.18 m - 5.79 m - WL: Dry (22-Jul-09)					9
10							10
11							11
12							12
13							13
14							14
15							

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m³)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 6.71 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/9/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 1

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-06**
LOCATION: North side of tailings empoundment N 2,097,224.9 E 2,097,224.9		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Direct Push - 114 mm	ELEVATION (m): 1103 (est.)

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS / Total Unit Wt / Plastic MC Liquid	COMMENTS	DEPTH
0	SICL	SILTY CLAY TAILINGS - dark yellow orange - wet, soft, cohesive, medium plasticity, rapid dilatency						0
1								1
2	SM	SILTY SAND TAILINGS - dark yellowish brown - wet, loose, non-cohesive, non-plastic, rapid dilatency - fine to medium grained sand, sub-rounded						2
3	CL	CLAY TAILINGS - dark yellow brown - wet, very soft, cohesive, high plasticity, rapid dilatency						3
4								4
5		END OF DRILLING at 4.57 m MW09-06 installation: - Screen interval: 1.52 m - 4.57 m - Screen type: 10-Slot 2" PVC SCHED 40 wrapped in 5 micron Nitex cloth - Filter pack interval: Naturally developed - Bentonite seal: None - WL: 2.95 m bTOP (22-Jul-09)						5
6								6
7								7
8								8
9								9
10								10
11								11
12								12
13								13
14								14
15								

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100

■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21

Plastic MC Liquid 20 40 60 80 100

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 4.57 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/10/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 1

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-07**
LOCATION: North side of tailings empoundment		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Direct Push - 114 mm	ELEVATION (m): 1103 (est.)

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m^3)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0		SILTY SAND FILL - brown - dry, loose, non-cohesive, non-plastic - native fill used for drill pad construction					0
1	SM						1
2	SM OR SA CL	SILTY SAND TAILINGS - dark yellowish brown - moist, medium dense, non-cohesive, non-plastic - fine to medium grained sand, sub-rounded					2
3		ORGANICS - dark brown to black - moist - fibrous roots and moss becoming more decomposed with depth					3
4	SM	SAND - dark brown - moist, dense, non-cohesive, non-plastic - fine sand, sub-rounded, inferred to be developing soil horizon within native aeolian sand					4
5		CLAY - light grey - moist, very dense, cohesive, non-plastic - clay sized volcanic ash sediments					5
6		SILTY SAND - dark grey to black - moist, dense, cohesive, non-plastic - fine sand, sub-rounded, organic rich, grading coarser with depth					6
7		END OF DRILLING at 4.57 m					7
8		MW09-07 installation: - Screen interval: 2.31 m - 2.57 m - Screen type: 10-Slot 2" PVC SCHED 40 wrapped in 5 micron Nitex cloth - Filter pack interval: 2.00 m - 2.57 m - Bentonite seal: None - WL: Dry (22-Jul-09)					8
9							9
10							10
11							11
12							12
13							13
14							14
15							

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 4.57 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/8/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 1

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-08**
LOCATION: Downstream of Seepage Dam N 2,097,199.8 E 118,756.2		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1076.03

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m^3)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	ELEVATION
0	GRSA	SAND and GRAVEL, trace silt - orange-brown - moist, loose - medium grained sand, sub-rounded - gravel sub-angular to sub-angular, 0.5 cm to 5 cm - clast supported - presence of organic (roots, grass)					
1							327
2	SA	SAND, some silt, some organic - dark grey - moist to wet, loose - fine grained to medium grained sand - presence of roots					326
3	GRSA	SAND and GRAVEL, trace silt - dark yellowish brown - medium grained sand, sub-rounded - sub-angular gravel, 0.5 cm to > 8 cm - clast supported - permafrost at 3.05 m below ground surface, Nbn					325
4	SA	SAND, trace silt - dark brown and grey - very dense - medium grained sand - presence of wood debris - permafrost, Nbn					324
5							323
6		END OF DRILLING at 3.66 m in permafrost (refusal)					322
7		MW09-08 install: - Screen interval: 1.52 m - 3.05 m - Screen type: 10-Slot 2" PVC SCHED 40 - Filter pack interval: 1.22 m - 3.58 m - Bentonite seal from ground surface to 1.22 m - WL: 1.028 mTPVC (22-Jul-09, 08:28:00 AM)					321
8							320
9							319
10							318
11							317
12							316
13							315
14							314
15							

AECOM

LOGGED BY: Marc Lavigne	COMPLETION DEPTH: 3.66 m
REVIEWED BY: Ryan Mills	COMPLETION DATE: 7/15/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 1

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-11**
LOCATION: South of Dome Creek and west of Diversion Channel N 2,097,216.6 E 118,706.8		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Direct Push - 114 mm	ELEVATION (m): 1102.24

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS / Total Unit Wt / Plastic MC Liquid	COMMENTS	ELEVATION
0			SAND (Aeolian) - grey brown - dry, loose, non-cohesive - uniform fine to medium grained sand, sub-rounded, minor silt						
1									335
2	SA		- becoming moist at 1.37 m - medium dense (incresing density with depth), becoming wet at 1.92 m - increasing silt content with depth with medium sand interbeds, thinly bedded - non-cohesive, non-plastic, slow dilatency						334
3			- saturated at 3.25 m, dense, sandy silt interbed <1 cm thick						333
4			- occasional nugget of frozen sand between 3.66 m and 4.11 m		S-1				332
			- permafrost 4.11 m to 4.22 m, refusal at 4.22 m using direct push drilling method END OF DRILLING at 4.22 m in permafrost (refusal)						
5			MW09-11 install: - Screen interval: 2.69 m - 4.22 m - Screen type: 10-Slot 2" PVC SCHED 40 - Filter pack interval: 2.39 m - 4.22 m - Bentonite seal from 1.83 m to 2.39 m - Drill cutting from ground surface - WL: 4.27 m BTOP (22-Jul-09)						331
6									330
7									329
8									328
9									327
10									326
11									325
12									324
13									323
14									322
15									

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100

■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21

Plastic MC Liquid 20 40 60 80 100

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 4.22 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/8/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 1

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-13**
LOCATION: Northeast of Brown-McDade pit N 2,097,531.2 E 118,569.0		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1209.35

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS / Total Unit Wt / Plastic MC Liquid	COMMENTS	ELEVATION
0		CLAY (minor SAND and some SILT) - brown - dry, loose, cohesive, plasic, rapid dilatency when wet						
1	CL			S-1				368
2		DIORITE - yellow-orange - dry, highly weathered with iron staining, chips very coarse - inferred to be shallow fractured bedrock aquifer - becoming wet		S-2 S-3 S-4				367 366
3				S-5				365
4	BE			S-6				
5		- casing to 4.57 m		S-7 S-8				364
6		- borehole producing approx. 1-2 L/min during air development		S-9 S-10				363 362
7		GRANODIORITE - light grey - moist, moderately weathered, abundant iron staining, chips fine - increasing mafic content downhole		S-11 S-12				361
8				S-13				
9		- chips coarser from 8.53 m to 10.46 m		S-14				360
10	BE			S-15 S-16				359
11				S-17				358
12				S-18 S-19				357
13		DIORITE - light grey - dry, slightly weathered feldspars, quartz rich, low mafic content, massive structure - unreactive with HCl, overall less weathered and more competent than overlying rock		S-20 S-21				356
14	BE			S-22 S-23				355
15								354

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 35.97 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/12/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 3

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-13**
LOCATION: Northeast of Brown-McDade pit N 2,097,531.2 E 118,569.0		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1209.35

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS / Total Unit Wt / Plastic MC Liquid	COMMENTS	ELEVATION
15					S-24				
					S-25				353
16					S-26				
					S-27				352
17					S-28				
	BE								351
18					S-29				
					S-30				350
19					S-31				
					S-32				349
20			HORNEBLENDE DIORITE - dark grey - dry, potassium feldspar and horneblende mildly weathered, chips fine		S-33				
									348
21					S-34				
					S-35				347
22					S-36				
									346
23					S-37				
					S-38				345
24					S-39				
					S-40				344
25	BE				S-41				
									343
26					S-42				
					S-43				342
27					S-44				
					S-45				341
28					S-46				
									340
29					S-47				
					S-48				339
30									

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m³)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

AECOM	LOGGED BY: Ryan Mills	COMPLETION DEPTH: 35.97 m
	REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/12/09
	PROJECT ENGINEER: Ken Skaftfeld	Page 2 of 3

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-13**
LOCATION: Northeast of Brown-McDade pit N 2,097,531.2 E 118,569.0		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1209.35

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS / Total Unit Wt / Plastic MC Liquid	COMMENTS	ELEVATION
30	BE		QUARTZOLITE - white to light grey - primarily quartz with minor plagioclase feldspar and biotite - very hard (drilling at approx. 1.5 m/hour)		S-49				338
31					S-50				
32	BE				S-51				337
33					S-52				
34					S-53				336
35	BE		GRANODIORITE - light grey - dry, high quartz content with minor amount of highly weathered potassium feldspar		S-54				335
36					S-55				
37			END OF DRILLING at 35.97 m MW09-13 install: - Screen interval: 29.87 m - 35.97 m - Screen type: 20-Slot 2" PVC SCHED 40 - Filter pack interval: 28.34 m - 35.97 m - Bentonite seal from 27.43 m to 28.34 m - Grouted to ground surface - WL: 33.24 m BTOP (22-Jul-09)		S-56				334
38					S-57				
39					S-58				333
40									
41									332
42									
43									331
44									
45									330
									329
									328
									327
									326
									325
									324

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100

■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21

Plastic MC Liquid 20 40 60 80 100

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 35.97 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/12/09
PROJECT ENGINEER: Ken Skaftfeld	Page 3 of 3

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-14**
LOCATION: Northeast of Brown-McDade pit		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1209 (est.)

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m^3)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0		CLAY (minor SAND and some SILT) - brown - dry, loose, cohesive, plasic, rapid dilatency when wet					0
1	CL			S-1			1
2		DIORITE - yellow-orange - dry, highly weathered with iron staining, chips very coarse - inferred to be shallow fractured bedrock aquifer - becoming wet		S-2 S-3			2
3				S-4			3
4	BE			S-5 S-6			4
5		- casing to 4.57 m		S-7 S-8			5
6		- borehole producing approx. 1-2 L/min during air development		S-9 S-10			6
7		GRANODIORITE - light grey - moist, moderately weathered, abundant iron staining, chips fine - increasing mafic content downhole		S-11 S-12			7
8				S-13			8
9	BE	- chips coarser from 8.53 m to 10.46 m		S-14			9
10				S-15 S-16			10
11							11
12							12
13							13
14							14
15							

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 10.67 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/12/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 3

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-14**
LOCATION: Northeast of Brown-McDade pit		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1209 (est.)

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100; ■ Total Unit Wt ■ (kN/m³) 16 17 18 19 20 21; Plastic MC Liquid 20 40 60 80 100	COMMENTS	DEPTH
15									15
16									16
17									17
18									18
19									19
20									20
21									21
22									22
23									23
24									24
25									25
26									26
27									27
28									28
29									29
30									

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 10.67 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/12/09
PROJECT ENGINEER: Ken Skaftfeld	Page 2 of 3

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-14**
LOCATION: Northeast of Brown-McDade pit		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1209 (est.)

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100; ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21; Plastic MC Liquid 20 40 60 80 100	COMMENTS	DEPTH
30									30
31									31
32									32
33									33
34									34
35									35
36			END OF DRILLING at 10.67 m MW09-14 install: - Screen interval: 5.49 m - 8.53 m - Screen type: 20-Slot 2" PVC SCHED 40 - Filter pack interval: 5.18 m - 8.53 m - Bentonite seal from 0 m to 5.18 m - WL: Frozen at 8.13 m BTOP (22-Jul-09)						36
37									37
38									38
39									39
40									40
41									41
42									42
43									43
44									44
45									

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 10.67 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/12/09
PROJECT ENGINEER: Ken Skaftfeld	Page 3 of 3

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-15**
LOCATION: North of Brown-McDade pit N 2,097,550.1 E 118,541.3		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1208 (est.)

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m^3)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0			CLAY (minor SAND and some GRAVEL) - brown - dry, loose, cohesive, non-plastic, rapid dilatency when wet					0
1					S-1			1
2	CL							2
3					S-2			3
4								4
					S-3			
5	BE		DIORITE - yellow-orange - dry, highly weathered with iron staining, chips very coarse - inferred to be shallow fractured bedrock aquifer		S-4 S-5 S-6			5
			- wet 4.88 m to 6.01 m		S-7			
6			HORNEBLENDE DIORITE - light grey - dry, slightly weathered, occasional iron staining, chips coarse - casing to 4.57 m; approx. 1 L of water in hole after changing bit		S-8 S-9			6
7	BE							7
					S-10			
8					S-11			8
			- highly weathered 8.53 m to 9.14 m - dry, absence of mafic minerals, high degree of iron staining - inferred conductive fracture zone when saturated					
9					S-12			9
			- slightly weathered from 9.14 m to 14.63 m - dry, light grey		S-13			
10					S-14			10
					S-15			
11			- quartz vein 10.97 m to 11.58 m		S-16			11
12					S-17			12
					S-18			
13					S-19			13
					S-20			
14					S-21			14
15	BE		GRANODIORITE					

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 38.10 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/11/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 3

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-15**
LOCATION: North of Brown-McDade pit N 2,097,550.1 E 118,541.3		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1208 (est.)

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS / Total Unit Wt / Plastic MC Liquid	COMMENTS	DEPTH
15			- grey-brown - moist from 14.63 m to 16.46 m and dry below, highly weathered and iron stained - rapid drilling rates - highly fractured bedrock 15.94 m to 16.92 m (rapid drilling) - zone of cave during well installation		S-22				15
					S-23				
16					S-24				16
	BE				S-25				
17					S-26				17
18					S-27				18
			HORNEBLENDE DIORITE - light grey - dry, moderately weathered, minor potassium feldspar, chips fine		S-28				
19					S-29				19
	BE				S-30				
20					S-31				20
21					S-32				21
			GRANODIORITE - grey-brown - moist, highly weathered, heavily fractured and iron stained, rapid drilling rates		S-33				
22	BE				S-34				22
			DIORITE - light grey - dry, moderately weathered, trace feldspar		S-35				
23	BE				S-36				23
			GRANODIORITE - orange-brown - moist, highly weathered with high clay mineral content inferred to be fault gouge - potentially conductive fracture zone		S-37				
24	BE				S-38				24
			HORNEBLENDE DIORITE - light grey - dry, moderately weathered, minor iron staining, chips fine		S-39				
25					S-40				25
26					S-41				26
					S-42				
27	BE				S-43				27
28					S-44				28
					S-45				
29			- less than 1 m of water in borehole after sitting overnight without rods in hole		S-46				29
30									

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 38.10 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/11/09
PROJECT ENGINEER: Ken Skaftfeld	Page 2 of 3

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-15**
LOCATION: North of Brown-McDade pit N 2,097,550.1 E 118,541.3		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1208 (est.)

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS / Total Unit Wt / Plastic MC Liquid	COMMENTS	DEPTH
30	BE		DIORITE - light grey - dry, soft, moderately weathered, minor iron staining		S-47				30
31					S-48				31
32					S-49				32
33					S-50				33
34	BE				S-51				34
					S-52				
					S-53				
			- highly weathered from 34.14 m to end of hole at 38.10 m		S-54				
35					S-55				35
			- moist from 35.36 m to 35.38 m		S-56				
36					S-57				36
			- wet from 35.38 m to end of hole at 38.10 m		S-58				
37					S-59				37
38					S-60				38
			END OF DRILLING at 38.10 m						
39			MW09-15 install: - Screen interval: 33.98 m - 37.03 m - Screen type: 20-Slot 2" PVC SCHED 40 - Filter pack interval: 33.22 m - 37.03 m - Bentonite seal from 32.00 m to 33.22 m - Grouted to ground surface - 0.5 L of WDS-120 polymer used to avoid loss of hole; re-drilled 7 times to remove cave and stabilize borehole - WL: 16.74 m BTOP (22-Jul-09)						39
40									40
41									41
42									42
43									43
44									44
45									

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100

■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21

Plastic MC Liquid 20 40 60 80 100

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 38.10 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/11/09
PROJECT ENGINEER: Ken Skaftfeld	Page 3 of 3

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-16**
LOCATION: Downgradient of Mill		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Direct Push - 114 mm	ELEVATION (m): 1187 (est.)

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0		GRAVEL FILL with some SAND, SILT and CLAY - dark yellowish-brown - dry, dense, non-cohesive, non-plastic - gravel up to 3" diameter - inferred to be waste rock fill for staging area - becomes wet at 1.07 m					0
1	GR						1
2				S-1			2
3	SASI	SANDY SILT - black-brown - wet, medium dense, cohesive, rapid dilatency - roots from 2.13 m to 3.66 m - increasing sand content with depth, sand fine to medium grained					3
4							4
4.5	SM	SILTY SAND - brown - wet, medium dense, non-cohesive, non-plastic, rapid dilatency - fine to medium grained sand with very few organics - inferred to be aeolian sand					
5							5
6							6
7							7
8							8
9							9
10							10
11							11
12							12
13							13
14							14
15							

END OF DRILLING at 4.57 m

MW09-16 install:
- Screen interval: 0.30 m - 1.83 m
- Screen type: 20-Slot 2" PVC SCHED 40
- Filter pack interval: 0.15 m - 1.83 m
- Bentonite seal from 0 m to 0.15 m
- WL: 1.21 m BTOP (22-Jul-09)

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m^3)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 4.57 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/14/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 1

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-17**
LOCATION: Downgradient of Mill N 2,097,319.7 E 118,286.2		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Direct Push - 114 mm	ELEVATION (m): 1179.40

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	ELEVATION
0	SICL	SILTY CLAY with some SAND and GRAVEL - orange - dry, dense, cohesive, low plasticity - inferred to be waste rock fill used for road bed construction					359
1		- becomes moist at 1.37 m					358
2	SASI	SANDY SILT - black - moist, medium dense, cohesive, medium plasticity - odour likely the result of organics in soil; does not smell like hydrocarbon		S-1			357
3	GR	GRAVEL with some CLAY, SILT and SAND filling interstices - yellow-brown - wet to saturated, dense, non-cohesive, non-plastic fines, highly weathered - gravel to 10 cm along long axis - inferred to be colluvium		S-2			356
4							355
5	BE	BEDROCK - dark grey - wet, very dense, fine texture, laminated, friable by hand, very cold - refusal at what is inferred to be frozen bedrock END OF DRILLING at 4.88 m					354
6		MW09-17 install: - Screen interval: 3.35 m - 4.88 m - Screen type: 10-Slot 2" PVC SCHED 40 - Filter pack interval: 2.74 m - 4.88 m - Bentonite seal from 0 m to 2.74 m - WL: 3.88 m BTOP (22-Jul-09)					353
7							352
8							351
9							350
10							349
11							348
12							347
13							346
14							345
15							

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m^3)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 4.88 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/14/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 1

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-18**
LOCATION: Downgradient of Mill N 2,097,323.9 E 118,279.5		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Direct Push - 114 mm	ELEVATION (m): 1181.06

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS / Total Unit Wt / Plastic MC Liquid	COMMENTS	ELEVATION
0	SASI	SANDY SILT - brown with red staining - dry, loose, non-cohesive, non-plastic - organic rich with pervasive roots, mild unknown odour		S-1				
1								359
2		SILTY SAND - brown with yellow staining - dry, medium dense, non-cohesive, non-plastic - organics present, sand fine to medium - inferred to be waste rock fill - moist from 1.52 m to 3.81 m, becomes red-brown below 1.52 m, frequent gravel/boulders						358
3	SM							357
4		- dry from 3.81 m to 4.88 m; loose						356
5		SILTY SAND TAILINGS - yellow-orange - dry, medium dense, cohesive, low plasticity, rapid dilatency - minor subangular gravel		S-2				355
6	SM							354
7	GRSA	SAND and GRAVEL with minor CLAY - brown - wet, loose, non-cohesive, non-plastic - angular gravel sized clasts - inferred to be colluvium, potential bedrock contact at 6.70 m		S-3				353
8		END OF DRILLING at 6.86 m MW09-18 install: - Screen interval: 6.70 m - 6.86 m - Screen type: 10-Slot 2" PVC SCHED 40 - Filter pack interval: 5.94 m - 6.86 m - Bentonite seal from 0 m to 5.94 m - WL: 4.40 m BTOP (22-Jul-09)						352
9								351
10								350
11								349
12								348
13								347
14								346
15								

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100

■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21

Plastic MC Liquid 20 40 60 80 100

AECOM

LOGGED BY: Ryan Mills	COMPLETION DEPTH: 6.86 m
REVIEWED BY: Marc Lavigne	COMPLETION DATE: 7/15/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 1

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-19**
LOCATION: Downgradient of Mill		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Direct Push - 114 mm	ELEVATION (m): 1182 (est.)

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 | ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21 | Plastic MC Liquid 20 40 60 80 100

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0			No recovery					0
	SM		SAND, silty - orange-brown - dry, loose - fine grained to medium grained sand					
1	GRSA		SAND and GRAVEL, trace silt - dark brown to orange - moist, dense - medium grained sand, sub-rounded - gravel sub-rounded to sub-angular, 0.5 cm to 7 cm (limited by core barrel)					1
2	OR SA		- clast supported - presence of wood debris (waste rock?)		G-1 G-2			2
3	OR		ORGANIC, some silt, trace sand - black - moist, loose - presence of roots		G-3			3
4	SA		SAND, gravelly, trace of silt - orange-brown - moist, dense - fine grained sand, sub-rounded - volcanic ash marker		G-4			4
5			ORGANIC, some silt, trace sand - dark brown - moist, loose - presence of roots					5
6			SAND, some silt, trace gravel - dark grey - wet, loose - medium grained sand, sub-rounded - sub-angular gravel, 1 cm to >4 cm - matrix supported					6
7			END OF DRILLING at 5.11 m in permafrost (refusal)					7
8			MW09-19 install: - Screen interval: 3.58 m - 5.11 m - Screen type: 10-Slot 2" PVC SCHED 40 - Filter pack interval: 3.28 m - 5.11 m - Bentonite seal from ground surface to 3.28 m - WL: 2.614 mTPVC (22-Jul-09, 10:11:00 AM)					8
9								9
10								10
11								11
12								12
13								13
14								14
15								

AECOM

LOGGED BY: Marc Lavigne	COMPLETION DEPTH: 5.11 m
REVIEWED BY: Ryan Mills	COMPLETION DATE: 7/15/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 1

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

PROJECT: Mt. Nansen Mine Closure	CLIENT: Yukon Government - EMR	TESTHOLE NO: **MW09-21**
LOCATION: Tailings Dam N 2,097,199.5 E 118,730.8		PROJECT NO.: 112359
CONTRACTOR: Geotech Drilling Ltd.	METHOD: Geoprobe 8040DT, Air Rotary - 114 mm	ELEVATION (m): 1082.77

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	ELEVATION
0	FILL	Ditch Armour on surface - cobbles and boulders up to 1 m - iron staining					
1	FILL	GRAVEL, sandy, trace silt - orange-brown - dry, very dense - fine grained to medium grained sand, sub-rounded - gravel/cobble sub-angular to angular, 0.5 cm to 8 cm (limited by core barrel) - clast supported	G	G-1			329
2			SS	S-1	19-32-50		328
3	FILL SASI SA	SAND, gravelly, trace silt - orange-brown - medium/fine sand, sub-rounded - sub-angular gravel, from 0.5 cm to > 5 cm - clast supported, becomes matrix supported with depth - wet	SS	S-2	41-50-		327
4		SILT, sandy, trace organic - dark brown					326
5		SAND, some silt, trace gravel - dark brown - medium sand, sub-rounded - sub-angular gravel, >0.5 cm to <1 cm - matrix supported					325
6		SAND, some silt, trace to some organic (volcanic ash marker) - light grey					324
7		END OF DRILLING at 3.20 m in permafrost (refusal)					323
8		MW09-21 install: - Screen interval: 1.52 m - 3.05 m - Screen type: 10-Slot 2" PVC SCHED 40 - Filter pack interval: 1.22 m - 3.05 m - Bentonite seal from ground surface to 1.22 m - WL: 1.668 mTPVC (22-Jul-09, 8:31:00 AM)					322
9							321
10							320
11							319
12							318
13							317
14							316
15							

PENETRATION TESTS
✳ Becker ✳
◇ Dynamic Cone ◇
◆ SPT (Standard Pen Test) ◆
(Blows/300mm)
0 20 40 60 80 100
■ Total Unit Wt ■
(kN/m³)
16 17 18 19 20 21
Plastic MC Liquid
20 40 60 80 100

AECOM

LOGGED BY: Marc Lavigne	COMPLETION DEPTH: 3.20 m
REVIEWED BY: Alex Knop	COMPLETION DATE: 7/17/09
PROJECT ENGINEER: Ken Skaftfeld	Page 1 of 1

LOG OF TEST HOLE 112359 BOREHOLE LOGS OCT 5 2009 RDM.GPJ UMA WINN.GDT 10/6/09

Certificate of Analysis

AECOM CANADA LTD.

ATTN: MARK LAVIGNE

SPERLING PLAZA
SUITE 490, 6400 ROBERTS STREET
BURNABY BC V5G 4C9

Report Date: 18-AUG-09 12:24 (MT)
Version: FINAL REV. 2

Lab Work Order #: **L796873** **Date Received:** **24-JUL-09**

Project P.O. #: MT. NANSEN HYDROGEO
Job Reference: 112359
Legal Site Desc:
CofC Numbers: C085792

Other Information:

Comments: ADDITIONAL 10-AUG-09 17:55
Please note that Cyanate detection limits have been increased for some of the samples due to the low sample volumes available for analysis. Furthermore, these samples were analyzed past recommended holding time of 14 days for Cyanate analysis.

This revision, 2, of the report replaces and supersedes all previous revisions. The results of Cyanate anlaysis have been added to the report. All other data remains unchanged.

NATASHA MARKOVIC-MIROVIC
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L796873-1	L796873-2	L796873-3	L796873-4	L796873-5
	Description					
	Sampled Date	08-JUL-09	22-JUL-09	21-JUL-09	22-JUL-09	21-JUL-09
	Sampled Time					
	Client ID	MW09-08	MW09-11	MW09-21	MW09-22	MW09-23
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	187	433	1630	630	1930
	Hardness (as CaCO3) (mg/L)	72.2	209	711	248	1020
	pH (pH)	7.50	7.96	7.10	7.12	7.50
	Total Dissolved Solids (mg/L)	189	262	1230	389	1630
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	13.9	5.3	38.8	21.1	21.0
	Alkalinity, Total (as CaCO3) (mg/L)	91.1	227	266	176	269
	Ammonia as N (mg/L)	3.27	1.85	6.30	6.65	9.49
	Bromide (Br) (mg/L)	<0.50	<0.050	<2.5	<0.25	<2.5
	Chloride (Cl) (mg/L)	<5.0	3.23	<25	<2.5	<25
	Fluoride (F) (mg/L)	<0.20	0.723	0.057	0.075	0.058
	Nitrate (as N) (mg/L)	<0.050	0.283	1.44	4.79	<0.25
	Nitrite (as N) (mg/L)	<0.010	0.0059	0.058	0.0996	<0.050
	Sulfate (SO4) (mg/L)	16.0	11.0	617	126	879
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	0.0331	<0.0050	0.107
	Cyanide, Total (mg/L)	0.0542	<0.0050	0.0504	0.0165	0.419
	Cyanate (CNO) (mg/L)	<1.6	<1.6	5.0	<1.6	3.5
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.118	<0.0050	0.158	0.0332	0.033
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.00050	<0.0025	<0.00050	<0.0025
	Arsenic (As)-Dissolved (mg/L)	0.178	0.0182	0.0329	0.0140	0.0100
	Barium (Ba)-Dissolved (mg/L)	0.102	0.169	0.300	0.157	0.089
	Beryllium (Be)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0050	<0.0010	<0.0050
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B)-Dissolved (mg/L)	<0.10	<0.10	<0.10	<0.10	0.14
	Cadmium (Cd)-Dissolved (mg/L)	<0.000017	0.000082	0.000196	0.000109	0.000184
	Calcium (Ca)-Dissolved (mg/L)	21.8	39.3	247	91.6	327
	Chromium (Cr)-Dissolved (mg/L)	0.0017	<0.0010	<0.0050	<0.0010	<0.0050
	Cobalt (Co)-Dissolved (mg/L)	0.00145	0.00169	0.0268	0.0134	0.0189
	Copper (Cu)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0050	0.0036	<0.0050
	Iron (Fe)-Dissolved (mg/L)	31.9	0.596	19.0	3.46	3.86
	Lead (Pb)-Dissolved (mg/L)	<0.00050	<0.00050	<0.0025	<0.00050	<0.0025
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.025	<0.0050	<0.025
	Magnesium (Mg)-Dissolved (mg/L)	4.30	26.9	22.9	4.57	50.1
	Manganese (Mn)-Dissolved (mg/L)	2.09	0.987	7.52	3.88	6.69
	Mercury (Hg)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Molybdenum (Mo)-Dissolved (mg/L)	<0.0010	0.0100	<0.0050	0.0017	<0.0050
	Nickel (Ni)-Dissolved (mg/L)	<0.0010	0.0033	<0.0050	0.0096	<0.0050
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	<2.0	3.2	8.2	5.7	15.5
	Selenium (Se)-Dissolved (mg/L)	<0.0010	0.0010	<0.0050	<0.0010	<0.0050
	Silicon (Si)-Dissolved (mg/L)	8.28	5.50	5.69	4.69	5.35
	Silver (Ag)-Dissolved (mg/L)	<0.000020	<0.000020	<0.00010	<0.000020	<0.00010

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L796873-6	L796873-7			
	Description					
	Sampled Date	22-JUL-09	21-JUL-09			
	Sampled Time					
	Client ID	MW09-24	MW09-25			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	564	1640			
	Hardness (as CaCO3) (mg/L)	297	710			
	pH (pH)	7.75	7.17			
	Total Dissolved Solids (mg/L)	364	1280			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	7.5	31.9			
	Alkalinity, Total (as CaCO3) (mg/L)	210	269			
	Ammonia as N (mg/L)	0.032	12.1			
	Bromide (Br) (mg/L)	<0.050	<2.5			
	Chloride (Cl) (mg/L)	0.76	<25			
	Fluoride (F) (mg/L)	<0.020	0.059			
	Nitrate (as N) (mg/L)	2.20	1.37			
	Nitrite (as N) (mg/L)	0.0092	<0.050			
	Sulfate (SO4) (mg/L)	86.6	617			
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	0.0209			
	Cyanide, Total (mg/L)	0.0120	0.0465			
	Cyanate (CNO) (mg/L)	<0.50	6.90			
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	<0.0050	0.150			
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.0025			
	Arsenic (As)-Dissolved (mg/L)	0.00117	0.0341			
	Barium (Ba)-Dissolved (mg/L)	0.077	0.294			
	Beryllium (Be)-Dissolved (mg/L)	<0.0010	<0.0050			
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20			
	Boron (B)-Dissolved (mg/L)	<0.10	<0.10			
	Cadmium (Cd)-Dissolved (mg/L)	0.000055	0.000188			
	Calcium (Ca)-Dissolved (mg/L)	88.7	247			
	Chromium (Cr)-Dissolved (mg/L)	<0.0010	<0.0050			
	Cobalt (Co)-Dissolved (mg/L)	0.00063	0.0272			
	Copper (Cu)-Dissolved (mg/L)	0.0085	<0.0050			
	Iron (Fe)-Dissolved (mg/L)	<0.030	18.7			
	Lead (Pb)-Dissolved (mg/L)	<0.00050	<0.0025			
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.025			
	Magnesium (Mg)-Dissolved (mg/L)	18.4	22.5			
	Manganese (Mn)-Dissolved (mg/L)	0.0115	7.66			
	Mercury (Hg)-Dissolved (mg/L)	<0.000020	<0.000020			
	Molybdenum (Mo)-Dissolved (mg/L)	<0.0010	<0.0050			
	Nickel (Ni)-Dissolved (mg/L)	<0.0010	<0.0050			
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30			
	Potassium (K)-Dissolved (mg/L)	<2.0	8.1			
	Selenium (Se)-Dissolved (mg/L)	<0.0010	<0.0050			
	Silicon (Si)-Dissolved (mg/L)	5.74	5.61			
	Silver (Ag)-Dissolved (mg/L)	<0.000020	<0.00010			

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L796873-1	L796873-2	L796873-3	L796873-4	L796873-5
	Description					
	Sampled Date	08-JUL-09	22-JUL-09	21-JUL-09	22-JUL-09	21-JUL-09
	Sampled Time					
	Client ID	MW09-08	MW09-11	MW09-21	MW09-22	MW09-23
Grouping	**Analyte**					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	4.1	15.3	102	25.6	59.5
	Strontium (Sr)-Dissolved (mg/L)	0.106	0.376	0.927	0.341	0.736
	Thallium (Tl)-Dissolved (mg/L)	<0.00020	<0.00020	<0.0010	<0.00020	<0.0010
	Tin (Sn)-Dissolved (mg/L)	<0.00050	<0.00050	<0.0025	<0.00050	<0.0025
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	0.019	<0.010	0.015
	Uranium (U)-Dissolved (mg/L)	<0.00020	0.00273	0.0016	0.00067	0.0023
	Vanadium (V)-Dissolved (mg/L)	0.0059	0.0015	0.0052	0.0019	<0.0050
	Zinc (Zn)-Dissolved (mg/L)	<0.0050	<0.0050	0.0099	<0.0050	<0.0050

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L796873-6	L796873-7			
	Description					
	Sampled Date	22-JUL-09	21-JUL-09			
	Sampled Time					
	Client ID	MW09-24	MW09-25			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	9.2	99.4			
	Strontium (Sr)-Dissolved (mg/L)	0.467	0.906			
	Thallium (Tl)-Dissolved (mg/L)	<0.00020	<0.0010			
	Tin (Sn)-Dissolved (mg/L)	<0.00050	<0.0025			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	0.018			
	Uranium (U)-Dissolved (mg/L)	0.00252	0.0016			
	Vanadium (V)-Dissolved (mg/L)	<0.0010	0.0051			
	Zinc (Zn)-Dissolved (mg/L)	<0.0050	0.0104			

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2

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

ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.

ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CN-T-L-MAC-HH-COL-VA	Water	Total Cyanide- Low Level by HH Distillat	APHA 4500-CN CYANIDE

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
		This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.	
CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN "Cyanide"
		This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.	
CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN Cyanide
		This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.	
CN-WAD-MID-COL-VA	Water	Weak Acid Cyanide by Colorimetric	APHA 4500-CN "Cyanide"
		This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.	
CN-WAD-MID-COL-VA	Water	Weak Acid Cyanide by Colorimetric	APHA 4500-CN Cyanide
		This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.	
CNO-SIE-VA	Water	Cyanate by SIE	APHA 4500-CN Cyanide
		This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Cyanate is determined by the cyanate hydrolysis method using an ammonia selective electrode.	
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
		This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.	
F-SIE-VA	Water	Fluoride by SIE	APHA 4500-F "Fluoride"
		This analysis is carried out using procedures adapted from APHA Method 4500-F "Fluoride". Fluoride is determined using a selective ion electrode. This method has a significant negative interference (i.e. results could be biased low) when Al3+ is present in the sample at a concentration greater than 2.5 mg/L.	
F-SIE-VA	Water	Fluoride by SIE	APHA 4500-F Fluoride
		This analysis is carried out using procedures adapted from APHA Method 4500-F "Fluoride". Fluoride is determined using a selective ion electrode. This method has a significant negative interference (i.e. results could be biased low) when Al3+ is present in the sample at a concentration greater than 2.5 mg/L.	
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
		Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.	
HG-DIS-CCME-CVAFS-VA	Water	Diss. Mercury in Water by CVAFS (CCME)	EPA 3005A/245.7
		This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).	
MET-DIS-CCME-ICP-VA	Water	Diss. Metals in Water by ICPOES (CCME)	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	

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
		microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).	
MET-DIS-CCME-MS-VA	Water	Diss. Metals in Water by ICPMS (CCME)	EPA SW-846 3005A/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 either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (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-SIE-VA	Water	Ammonia by SIE	APHA 4500 D. - NH3 NITROGEN (AMMONIA)
		This analysis is carried out, on sulphuric acid preserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using an ammonia selective electrode.	
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"
		This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode	
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	
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.	

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
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.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

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Page 1 of

REPORT TO:	REPORT FORMAT / DISTRIBUTION	SERVICE REQUESTED
COMPANY: AECOM	STANDARD ✓ OTHER ___	✓ REGULAR SERVICE (DEFAULT)
CONTACT: Marc Lavigne	PDF ✓ EXCEL ✓ CUSTOM ___ FAX ___	RUSH SERVICE (2-3 DAYS)
ADDRESS: 2251 2nd Avenue	EMAIL 1: marc-andre.lavigne@aecom.com	PRIORITY SERVICE (1 DAY or ASAP)
Whitehorse YT Y1A 5W1	EMAIL 2:	EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS
PHONE: 867.633.6474 FAX: 867.633.		ANALYSIS REQUEST
INVOICE TO: SAME AS REPORT ? (YES) / NO	INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →	
COMPANY:	CLIENT / PROJECT INFORMATION:	
CONTACT:	JOB #: 112359	
ADDRESS:	PO /AFE: Mt. Nansen Hydrogeo.	
	Legal Site Description:	
PHONE: FAX:	QUOTE #:	
Lab Work Order # (lab use only): L796873	SAMPLER (Initials): MAL	

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	General Chemistry (F/P)	Dissolved Metals (P)	Nutrients (P)	Cyanide (P)	HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	MW09-08	July 08/09		GW	✓	✓	✓	✓			4
	MW09-11	July 22/09		GW	✓	✓	✓	✓			4
	MW09-21	July 21/09		GW	✓	✓	✓	✓			4
	MW09-22	July 22/09		GW	✓	✓	✓	✓			4
	MW09-23	July 21/09		GW	✓	✓	✓	✓			4
	MW09-24	July 22/09		GW	✓	✓	✓	✓			4
	MW09-25	July 21/09		GW	✓	✓	✓	✓			4

GUIDELINES / REGULATIONS	SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:	SAMPLE CONDITION (lab use only)	
Ann Thurston	July 24/09 13:00	MS	July 24	TEMPERATURE	SAMPLES RECEIVED IN GOOD CONDITION ? YES / NO (If no provide details)
RELINQUISHED BY: ✓	DATE & TIME:	RECEIVED BY:	DATE & TIME: 10:00	5	

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION

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ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Certificate of Analysis

AECOM CANADA LTD.

ATTN: RYAN MILLS

SPERLING PLAZA
SUITE 490, 6400 ROBERTS STREET
BURNABY BC V5G 4C9

Report Date: 19-AUG-09 09:58 (MT)
Version: FINAL REV. 2

Lab Work Order #: L796959 **Date Received:** 24-JUL-09

Project P.O. #:
Job Reference: YUKON GOV'T 112359- MT NANSEN
Legal Site Desc:
CofC Numbers: A014936, A014937

Other Information:

Comments:

Please note that certain metals detection limits have been increased for some of the samples due to the interferences encountered during the analysis.

ADDITIONAL 10-AUG-09 17:52

Please note that Cyanate detection limits have been increased for some of the samples due to the low sample volumes available for analysis. Furthermore, these samples were analyzed past recommended holding time of 14 days for Cyanate analysis.

This revision, 2, of the report replaces and supersedes all previous revisions. The results of Cyanate anlaysis have been added to the report. All other data remains unchanged.

NATASHA MARKOVIC-MIROVIC
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L796959-7	L796959-9	L796959-10	L796959-11	L796959-12
	Description					
	Sampled Date	15-JUL-09	15-JUL-09	15-JUL-09	15-JUL-09	15-JUL-09
	Sampled Time					
	Client ID	MW09-16(6FT-7FT)	MW09-17(11FT-12FT)	MW09-18(2FT-3FT)	MW09-18(21FT-22FT)	MW09-19(7FT10
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	11.1	9.68	30.1	7.20	11.7
	pH (pH)	7.64	7.97	6.39	8.14	6.96
Metals	Antimony (Sb) (mg/kg)	162	<10	<10	11	898
	Arsenic (As) (mg/kg)	1980	65.7	103	285	13000
	Barium (Ba) (mg/kg)	150	95.1	271	113	99.9
	Beryllium (Be) (mg/kg)	0.50	<0.50	<0.50	0.73	1.25
	Cadmium (Cd) (mg/kg)	41.4	<0.50	<0.50	<0.50	91.1
	Chromium (Cr) (mg/kg)	16.2	15.6	19.6	111	5.1
	Cobalt (Co) (mg/kg)	9.8	8.6	8.3	20.0	6.7
	Copper (Cu) (mg/kg)	111	44.9	54.5	71.9	401
	Lead (Pb) (mg/kg)	1570	<30	<30	<30	8260
	Mercury (Hg) (mg/kg)	0.151	0.0419	0.0458	0.103	0.426
	Molybdenum (Mo) (mg/kg)	<4.0	<4.0	<4.0	<4.0	<4.0
	Nickel (Ni) (mg/kg)	11.8	8.1	12.2	47.8	7.1
	Selenium (Se) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Silver (Ag) (mg/kg)	35.2	<2.0	<2.0	<2.0	96.9
	Thallium (Tl) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Tin (Sn) (mg/kg)	<5.0	<5.0	<5.0	<5.0	8.2
	Vanadium (V) (mg/kg)	56.7	76.0	60.7	136	22.9
	Zinc (Zn) (mg/kg)	2760	60.1	60.3	127	4300
Hydrocarbons	EPH10-19 (mg/kg)	<200	<200	<200	<200	<200
	EPH19-32 (mg/kg)	<200	<200	<200	<200	<200
	LEPH (mg/kg)	<200	<200	<200	<200	<200
	HEPH (mg/kg)	<200	<200	<200	<200	<200
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Acenaphthylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Anthracene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Benz(a)anthracene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Benzo(a)pyrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Benzo(b)fluoranthene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Benzo(g,h,i)perylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Benzo(k)fluoranthene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chrysene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Dibenz(a,h)anthracene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Fluoranthene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Fluorene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	2-Methylnaphthalene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Naphthalene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Phenanthrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L796959-15				
	Description					
	Sampled Date	15-JUL-09				
	Sampled Time					
	Client ID	MW09-19(15FT-16FT9				
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	20.0				
	pH (pH)	7.13				
Metals	Antimony (Sb) (mg/kg)	<10				
	Arsenic (As) (mg/kg)	9.4				
	Barium (Ba) (mg/kg)	56.6				
	Beryllium (Be) (mg/kg)	<0.50				
	Cadmium (Cd) (mg/kg)	<0.50				
	Chromium (Cr) (mg/kg)	10.5				
	Cobalt (Co) (mg/kg)	3.6				
	Copper (Cu) (mg/kg)	6.4				
	Lead (Pb) (mg/kg)	<30				
	Mercury (Hg) (mg/kg)	0.0076				
	Molybdenum (Mo) (mg/kg)	<4.0				
	Nickel (Ni) (mg/kg)	5.9				
	Selenium (Se) (mg/kg)	<2.0				
	Silver (Ag) (mg/kg)	<2.0				
	Thallium (Tl) (mg/kg)	<1.0				
	Tin (Sn) (mg/kg)	<5.0				
	Vanadium (V) (mg/kg)	27.4				
	Zinc (Zn) (mg/kg)	24.9				
Hydrocarbons	EPH10-19 (mg/kg)	<200				
	EPH19-32 (mg/kg)	<200				
	LEPH (mg/kg)	<200				
	HEPH (mg/kg)	<200				
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.050				
	Acenaphthylene (mg/kg)	<0.050				
	Anthracene (mg/kg)	<0.050				
	Benz(a)anthracene (mg/kg)	<0.050				
	Benzo(a)pyrene (mg/kg)	<0.050				
	Benzo(b)fluoranthene (mg/kg)	<0.050				
	Benzo(g,h,i)perylene (mg/kg)	<0.050				
	Benzo(k)fluoranthene (mg/kg)	<0.050				
	Chrysene (mg/kg)	<0.050				
	Dibenz(a,h)anthracene (mg/kg)	<0.050				
	Fluoranthene (mg/kg)	<0.050				
	Fluorene (mg/kg)	<0.050				
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.050				
	2-Methylnaphthalene (mg/kg)	<0.050				
	Naphthalene (mg/kg)	<0.050				
	Phenanthrene (mg/kg)	<0.050				

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L796959-7	L796959-9	L796959-10	L796959-11	L796959-12
	Description					
	Sampled Date	15-JUL-09	15-JUL-09	15-JUL-09	15-JUL-09	15-JUL-09
	Sampled Time					
	Client ID	MW09-16(6FT-7FT)	MW09-17(11FT-12FT)	MW09-18(2FT-3FT)	MW09-18(21FT-22FT)	MW09-19(7FT10
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Pyrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Surrogate: d10-Acenaphthene (SS) (%)	99	95	103	99	91
	Surrogate: d12-Chrysene (SS) (%)	72	70	84	71	74
	Surrogate: d8-Naphthalene (SS) (%)	94	95	100	97	89
	Surrogate: d10-Phenanthrene (SS) (%)	89	86	94	90	87

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L796959-15				
	Description					
	Sampled Date	15-JUL-09				
	Sampled Time					
	Client ID	MW09-19(15FT-16FT9				
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Pyrene (mg/kg)	<0.050				
	Surrogate: d10-Acenaphthene (SS) (%)	94				
	Surrogate: d12-Chrysene (SS) (%)	66				
	Surrogate: d8-Naphthalene (SS) (%)	91				
	Surrogate: d10-Phenanthrene (SS) (%)	84				

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L796959-1	L796959-2	L796959-3	L796959-4	L796959-5
	Description					
	Sampled Date	14-JUL-09	19-JUL-09	19-JUL-09	19-JUL-09	19-JUL-09
	Sampled Time					
	Client ID	MW09-15	MW09-16	MW09-17	MW09-18	MW09-18R
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	1010	1930	2570	2660	2660
	Hardness (as CaCO3) (mg/L)	581	1210	1760	1830	1860
	pH (pH)	7.08	7.38	7.74	7.71	7.71
	Total Dissolved Solids (mg/L)	757	1650	2380	2490	2440
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	23.3	35.4	28.5	30.3	29.7
	Alkalinity, Total (as CaCO3) (mg/L)	288	298	435	427	425
	Ammonia as N (mg/L)	0.331	0.079	0.229	0.041	0.066
	Bromide (Br) (mg/L)	<0.050	<2.5	<2.5	<2.5	<2.5
	Chloride (Cl) (mg/L)	<0.50	<25	<25	<25	<25
	Fluoride (F) (mg/L)	0.070	0.152	0.144	0.143	0.122
	Nitrate (as N) (mg/L)	<0.0050	<0.25	<0.25	<0.25	<0.25
	Nitrite (as N) (mg/L)	0.0027	<0.050	<0.050	<0.050	<0.050
	Sulfate (SO4) (mg/L)	289	934	1360	1490	1470
Cyanides	Cyanide, Weak Acid Diss (mg/L)		<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)		<0.0050	<0.0050	<0.0050	<0.0050
	Cyanate (CNO) (mg/L)		<1.8	<0.50	<0.50	<0.50
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	<0.025	<0.025	<0.025	<0.025	<0.025
	Antimony (Sb)-Dissolved (mg/L)	0.0178	0.175	<0.0025	<0.0025	<0.0025
	Arsenic (As)-Dissolved (mg/L)	0.122	0.0506	0.0119	0.0382	0.0423
	Barium (Ba)-Dissolved (mg/L)	<0.020	0.034	<0.020	<0.020	<0.020
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B)-Dissolved (mg/L)	<0.10	0.27	0.27	<0.10	<0.10
	Cadmium (Cd)-Dissolved (mg/L)	0.00754	0.0558	<0.000085	<0.000085	<0.000085
	Calcium (Ca)-Dissolved (mg/L)	157	276	327	352	355
	Chromium (Cr)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cobalt (Co)-Dissolved (mg/L)	<0.0015	0.0020	<0.0015	<0.0015	<0.0015
	Copper (Cu)-Dissolved (mg/L)	<0.0050	0.0100	<0.0050	<0.0050	<0.0050
	Iron (Fe)-Dissolved (mg/L)	0.192	0.389	<0.030	<0.030	<0.030
	Lead (Pb)-Dissolved (mg/L)	0.0171	0.0364	<0.0025	<0.0025	<0.0025
	Lithium (Li)-Dissolved (mg/L)	<0.025	<0.025	<0.025	<0.025	<0.025
	Magnesium (Mg)-Dissolved (mg/L)	45.7	126	230	231	236
	Manganese (Mn)-Dissolved (mg/L)	0.905	0.389	0.0164	0.349	0.409
	Mercury (Hg)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Molybdenum (Mo)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nickel (Ni)-Dissolved (mg/L)	<0.0050	0.0071	<0.0050	<0.0050	<0.0050
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	<2.0	6.5	7.2	6.9	7.1
	Selenium (Se)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Silicon (Si)-Dissolved (mg/L)	5.85	5.29	4.74	4.80	4.87
	Silver (Ag)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

ALS LABORATORY GROUP ANALYTICAL REPORT

		Sample ID	L796959-6				
		Description					
		Sampled Date	19-JUL-09				
		Sampled Time					
		Client ID	MW09-19				
Grouping	**Analyte**						
WATER							
Physical Tests	Conductivity (uS/cm)		2570				
	Hardness (as CaCO3) (mg/L)		1740				
	pH (pH)		7.29				
	Total Dissolved Solids (mg/L)		2260				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)		52.7				
	Alkalinity, Total (as CaCO3) (mg/L)		389				
	Ammonia as N (mg/L)		3.24				
	Bromide (Br) (mg/L)		<2.5				
	Chloride (Cl) (mg/L)		<25				
	Fluoride (F) (mg/L)		0.095				
	Nitrate (as N) (mg/L)		<0.25				
	Nitrite (as N) (mg/L)		<0.050				
	Sulfate (SO4) (mg/L)		1390				
Cyanides	Cyanide, Weak Acid Diss (mg/L)		<0.0050				
	Cyanide, Total (mg/L)		<0.0050				
	Cyanate (CNO) (mg/L)		4.26				
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)		<0.025				
	Antimony (Sb)-Dissolved (mg/L)		<0.0025				
	Arsenic (As)-Dissolved (mg/L)		0.0769				
	Barium (Ba)-Dissolved (mg/L)		0.082				
	Beryllium (Be)-Dissolved (mg/L)		<0.0050				
	Bismuth (Bi)-Dissolved (mg/L)		<0.20				
	Boron (B)-Dissolved (mg/L)		0.32				
	Cadmium (Cd)-Dissolved (mg/L)		<0.000085				
	Calcium (Ca)-Dissolved (mg/L)		368				
	Chromium (Cr)-Dissolved (mg/L)		<0.0050				
	Cobalt (Co)-Dissolved (mg/L)		0.0024				
	Copper (Cu)-Dissolved (mg/L)		<0.0050				
	Iron (Fe)-Dissolved (mg/L)		40.6				
	Lead (Pb)-Dissolved (mg/L)		<0.0025				
	Lithium (Li)-Dissolved (mg/L)		<0.025				
	Magnesium (Mg)-Dissolved (mg/L)		200				
	Manganese (Mn)-Dissolved (mg/L)		2.39				
	Mercury (Hg)-Dissolved (mg/L)		<0.000020				
	Molybdenum (Mo)-Dissolved (mg/L)		<0.0050				
	Nickel (Ni)-Dissolved (mg/L)		<0.0050				
	Phosphorus (P)-Dissolved (mg/L)		0.46				
	Potassium (K)-Dissolved (mg/L)		4.4				
	Selenium (Se)-Dissolved (mg/L)		<0.0050				
	Silicon (Si)-Dissolved (mg/L)		7.88				
	Silver (Ag)-Dissolved (mg/L)		<0.00010				

ALS LABORATORY GROUP ANALYTICAL REPORT

		Sample ID	L796959-1	L796959-2	L796959-3	L796959-4	L796959-5
		Description					
		Sampled Date	14-JUL-09	19-JUL-09	19-JUL-09	19-JUL-09	19-JUL-09
		Sampled Time					
		Client ID	MW09-15	MW09-16	MW09-17	MW09-18	MW09-18R
Grouping	**Analyte**						
WATER							
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)		7.7	18.9	10.8	10.0	10.2
	Strontium (Sr)-Dissolved (mg/L)		1.48	0.670	0.972	0.981	1.00
	Thallium (Tl)-Dissolved (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Tin (Sn)-Dissolved (mg/L)		<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
	Titanium (Ti)-Dissolved (mg/L)		0.011	0.013	0.014	0.015	0.014
	Uranium (U)-Dissolved (mg/L)		0.0860	0.0037	0.0070	0.0068	0.0070
	Vanadium (V)-Dissolved (mg/L)		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Zinc (Zn)-Dissolved (mg/L)		0.437	4.44	<0.0050	<0.0050	<0.0050
Hydrocarbons	EPH10-19 (mg/L)			<0.25	<0.25	<0.25	<0.25
	EPH19-32 (mg/L)			<0.25	<0.25	<0.25	<0.25
	LEPH (mg/L)			<0.25	<0.25	<0.25	<0.25
	HEPH (mg/L)			<0.25	<0.25	<0.25	<0.25
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)			<0.000050	<0.000050	<0.000050	<0.000050
	Acenaphthylene (mg/L)			<0.000050	<0.000050	<0.000050	<0.000050
	Acridine (mg/L)			<0.000050	<0.000050	<0.000050	<0.000050
	Anthracene (mg/L)			<0.000050	<0.000050	<0.000050	<0.000050
	Benz(a)anthracene (mg/L)			<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(a)pyrene (mg/L)			<0.000010	<0.000010	<0.000010	<0.000010
	Benzo(b)fluoranthene (mg/L)			<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(g,h,i)perylene (mg/L)			<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(k)fluoranthene (mg/L)			<0.000050	<0.000050	<0.000050	<0.000050
	Chrysene (mg/L)			<0.000050	<0.000050	<0.000050	<0.000050
	Dibenz(a,h)anthracene (mg/L)			<0.000050	<0.000050	<0.000050	<0.000050
	Fluoranthene (mg/L)			<0.000050	<0.000050	<0.000050	<0.000050
	Fluorene (mg/L)			<0.000050	<0.000050	<0.000050	<0.000050
	Indeno(1,2,3-c,d)pyrene (mg/L)			<0.000050	<0.000050	<0.000050	<0.000050
	Naphthalene (mg/L)			<0.000050	<0.000050	<0.000050	<0.000050
	Phenanthrene (mg/L)			<0.000050	<0.000050	<0.000050	<0.000050
	Pyrene (mg/L)			<0.000050	<0.000050	<0.000050	<0.000050
	Quinoline (mg/L)			<0.000050	<0.000050	<0.000050	<0.000050
	Surrogate: d10-Acenaphthene (SS) (%)			93	97	98	96
	Surrogate: d9-Acridine (SS) (%)			90	92	92	89
	Surrogate: d12-Chrysene (SS) (%)			89	91	92	90
	Surrogate: d8-Naphthalene (SS) (%)			87	93	93	83
	Surrogate: d10-Phenanthrene (SS) (%)			94	97	97	97

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L796959-6				
	Description					
	Sampled Date	19-JUL-09				
	Sampled Time					
	Client ID	MW09-19				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	20.5				
	Strontium (Sr)-Dissolved (mg/L)	0.973				
	Thallium (Tl)-Dissolved (mg/L)	<0.0010				
	Tin (Sn)-Dissolved (mg/L)	<0.0025				
	Titanium (Ti)-Dissolved (mg/L)	0.015				
	Uranium (U)-Dissolved (mg/L)	<0.0010				
	Vanadium (V)-Dissolved (mg/L)	<0.0050				
	Zinc (Zn)-Dissolved (mg/L)	0.0088				
Hydrocarbons	EPH10-19 (mg/L)	<0.25				
	EPH19-32 (mg/L)	<0.25				
	LEPH (mg/L)	<0.25				
	HEPH (mg/L)	<0.25				
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)	<0.000050				
	Acenaphthylene (mg/L)	<0.000050				
	Acridine (mg/L)	<0.000050				
	Anthracene (mg/L)	<0.000050				
	Benz(a)anthracene (mg/L)	<0.000050				
	Benzo(a)pyrene (mg/L)	<0.000010				
	Benzo(b)fluoranthene (mg/L)	<0.000050				
	Benzo(g,h,i)perylene (mg/L)	<0.000050				
	Benzo(k)fluoranthene (mg/L)	<0.000050				
	Chrysene (mg/L)	<0.000050				
	Dibenz(a,h)anthracene (mg/L)	<0.000050				
	Fluoranthene (mg/L)	<0.000050				
	Fluorene (mg/L)	<0.000050				
	Indeno(1,2,3-c,d)pyrene (mg/L)	<0.000050				
	Naphthalene (mg/L)	<0.000050				
	Phenanthrene (mg/L)	<0.000050				
	Pyrene (mg/L)	<0.000050				
	Quinoline (mg/L)	<0.000050				
	Surrogate: d10-Acenaphthene (SS) (%)	99				
	Surrogate: d9-Acridine (SS) (%)	93				
	Surrogate: d12-Chrysene (SS) (%)	93				
	Surrogate: d8-Naphthalene (SS) (%)	95				
	Surrogate: d10-Phenanthrene (SS) (%)	99				

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2

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

ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.

ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN "Cyanide"

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN Cyanide

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

CN-WAD-MID-COL-VA	Water	Weak Acid Cyanide by Colorimetric	APHA 4500-CN "Cyanide"

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

CN-WAD-MID-COL-VA Water Weak Acid Cyanide by Colorimetric APHA 4500-CN Cyanide

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

CNO-SIE-VA Water Cyanate by SIE APHA 4500-CN Cyanide

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Cyanate is determined by the cyanate hydrolysis method using an ammonia selective electrode.

EC-PCT-VA Water Conductivity (Automated) APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

EPH-SF-FID-VA Water EPH in Water by GCFID BCMOE EPH GCFID

This analysis is carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Extractable Petroleum Hydrocarbons in Water by GC/FID" (Version 2.1, July 1999). The procedure involves extraction of the entire water sample with dichloromethane. The extract is then solvent exchanged to toluene and analysed by capillary column gas chromatography with flame ionization detection (GC/FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

EPH-TUMB-FID-VA Soil EPH in Solids by Tumbler and GCFID BCMELP CSR

Extractable Hydrocarbons in Sediment/Soil
This analysis is carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Extractable Petroleum Hydrocarbons in Solids by GC/FID, Version 2.1 July 1999". The procedure, based on EPA 3570, uses a rotary extraction technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene or kept in hexane/acetone and analyzed by capillary column gas chromatography with flame ionization detection (GC/FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

Accuracy target values for Reference Materials used in this method are derived from averages of long-term method performance, as certified values do not exist for the reported parameters.

F-SIE-VA Water Fluoride by SIE APHA 4500-F "Fluoride"

This analysis is carried out using procedures adapted from APHA Method 4500-F "Fluoride". Fluoride is determined using a selective ion electrode. This method has a significant negative interference (i.e. results could be biased low) when Al3+ is present in the sample at a concentration greater than 2.5 mg/L.

F-SIE-VA Water Fluoride by SIE APHA 4500-F Fluoride

This analysis is carried out using procedures adapted from APHA Method 4500-F "Fluoride". Fluoride is determined using a selective ion electrode. This method has a significant negative interference (i.e. results could be biased low) when Al3+ is present in the sample at a concentration greater than 2.5 mg/L.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-CCME-CVAFS-VA Soil CVAFS Hg in Soil (CCME) CCME

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry (EPA Method 7000 series).

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

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-DIS-CCME-CVAFS-VA Water Diss. Mercury in Water by CVAFS (CCME) EPA 3005A/245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

LEPH/HEPH-CALC-VA Water LEPHs and HEPHs BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated
by subtracting selected Polycyclic Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene, and Pyrene
are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

LEPH/HEPH-CALC-VA Soil LEPHs and HEPHs BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated
by subtracting selected Polycyclic Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene, and Pyrene
are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

MET-CSR-FULL-ICP-VA Soil Metals in Soil by ICPOES (CSR SALM) BCMELP CSR SALM METHOD 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

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-DIS-CCME-ICP-VA Water Diss. Metals in Water by ICPOES (CCME) 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).

MET-DIS-CCME-MS-VA Water Diss. Metals in Water by ICPMS (CCME) EPA SW-846 3005A/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 either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

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).

MOISTURE-VA Soil Moisture content ASTM METHOD D2974-00

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

NH3-SIE-VA Water Ammonia by SIE APHA 4500 D. - NH3 NITROGEN (AMMONIA)

This analysis is carried out, on sulphuric acid preserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using an ammonia selective electrode.

PAH-SF-MS-VA Water PAH in Water by GCMS EPA Methods 3510, 3630 & 8270

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3510, 3630 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure involves extraction of the entire water sample with dichloromethane. The extract is then solvent exchanged to toluene prior to analysis by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

PAH-SURR-MS-VA Soil PAH Surrogates for Soils EPA METHODS 3570, 3545A & 8270

PAH-TUMB-H/A-MS-VA Soil PAH by Tumbler HEX/ACE with GCMS EPA METHODS 3570 & 8270.

Polycyclic Aromatic Hydrocarbons in Sediment/Soil
This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3570 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

PH-1:2-VA Soil CSR pH by 1:2 Water Leach 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-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

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

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.

TL-CSR-MS-VA Soil ICPMS Tl in Soil by CSR SALM BCMELP CSR SALM Method 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

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.

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

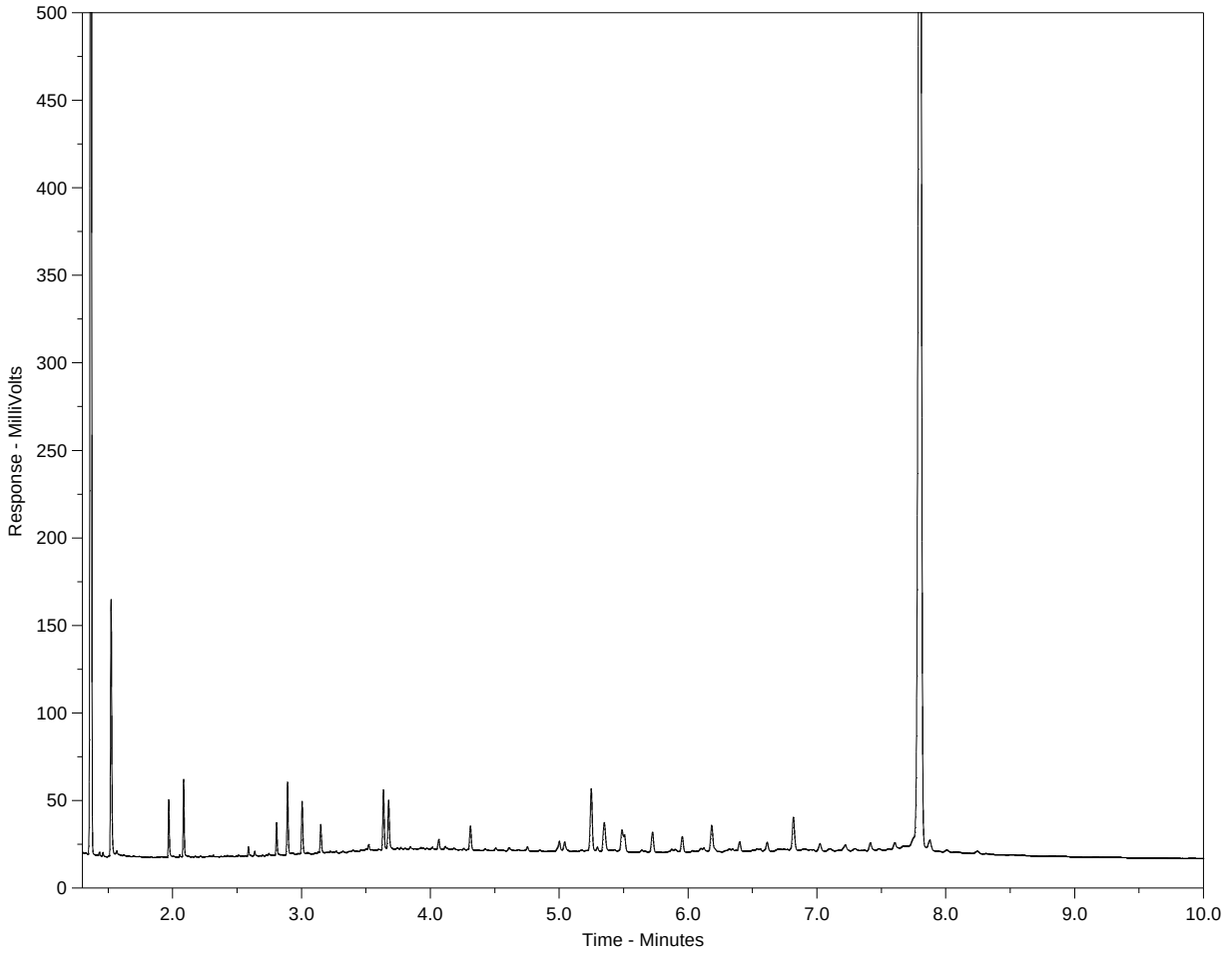
GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
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.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

Hydrocarbon Distribution Report

ALS Sample ID: L796959-2
Client Sample ID: MW09-16



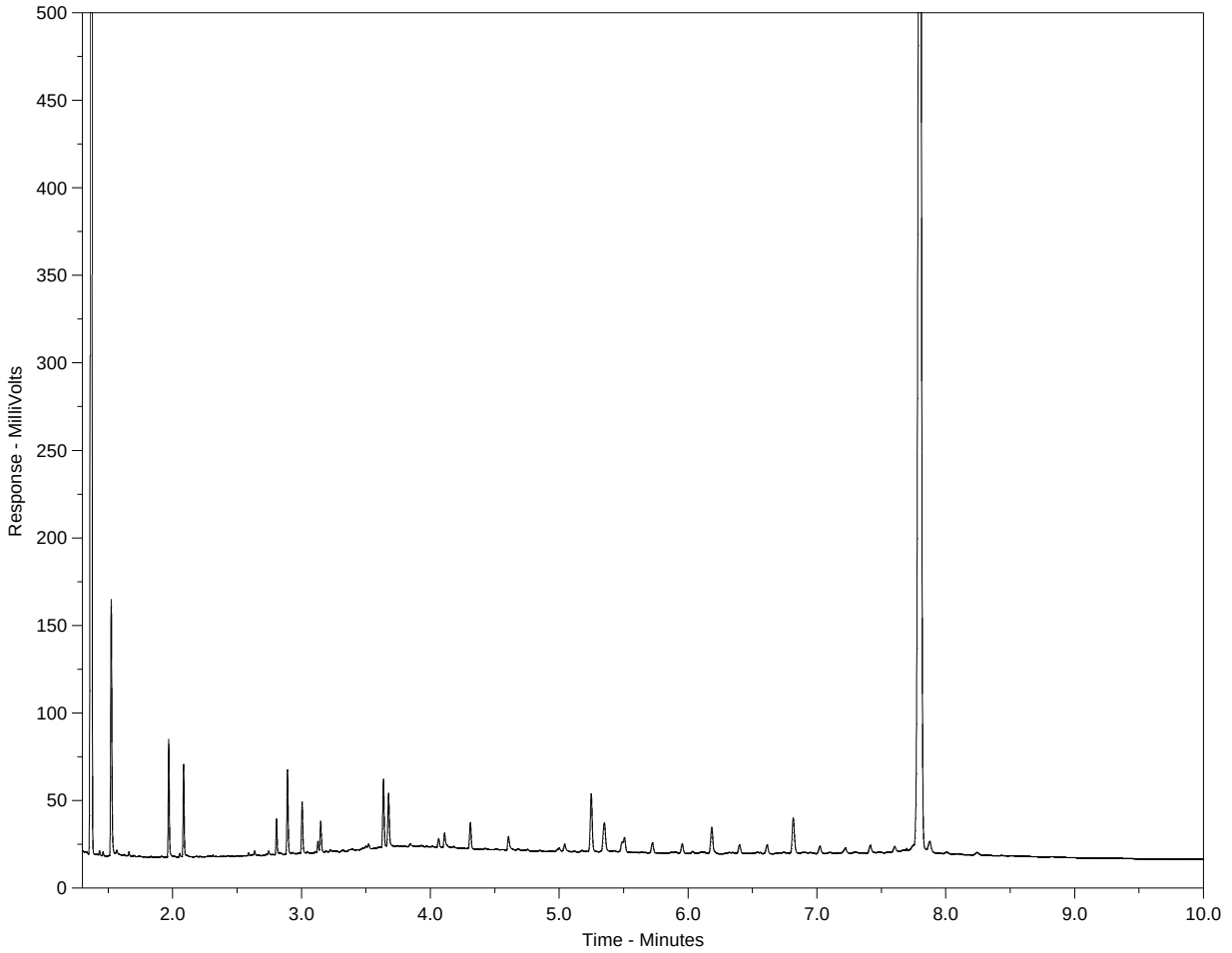
nC10	nC19	nC32	Surrogate	nC40
174°C 346°F	330°C 626°F	467°C 873°F		522°C 972°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →			
← Diesel / Jet Fuels →				

Chromatograms from the ALS HDR Reference Library indicate the patterns of hydrocarbon compounds found in petroleum products, reference standards, and some examples of natural plant and organic materials. The chromatogram from left to right roughly corresponds to increasing boiling point from approximately 174°C to 522°C, a range encompassing most middle distillate and residual petroleum products (diesel, fuel oils, lubricating oils, etc). Comparison of library chromatograms with those of unknown samples may aid in the identification of contaminants. Surrogate compounds, which are added to samples by the laboratory, are not present in HDR library chromatograms.

Please note that retention times may vary between samples by as much as 0.5 minutes.

Hydrocarbon Distribution Report

ALS Sample ID: L796959-3
Client Sample ID: MW09-17



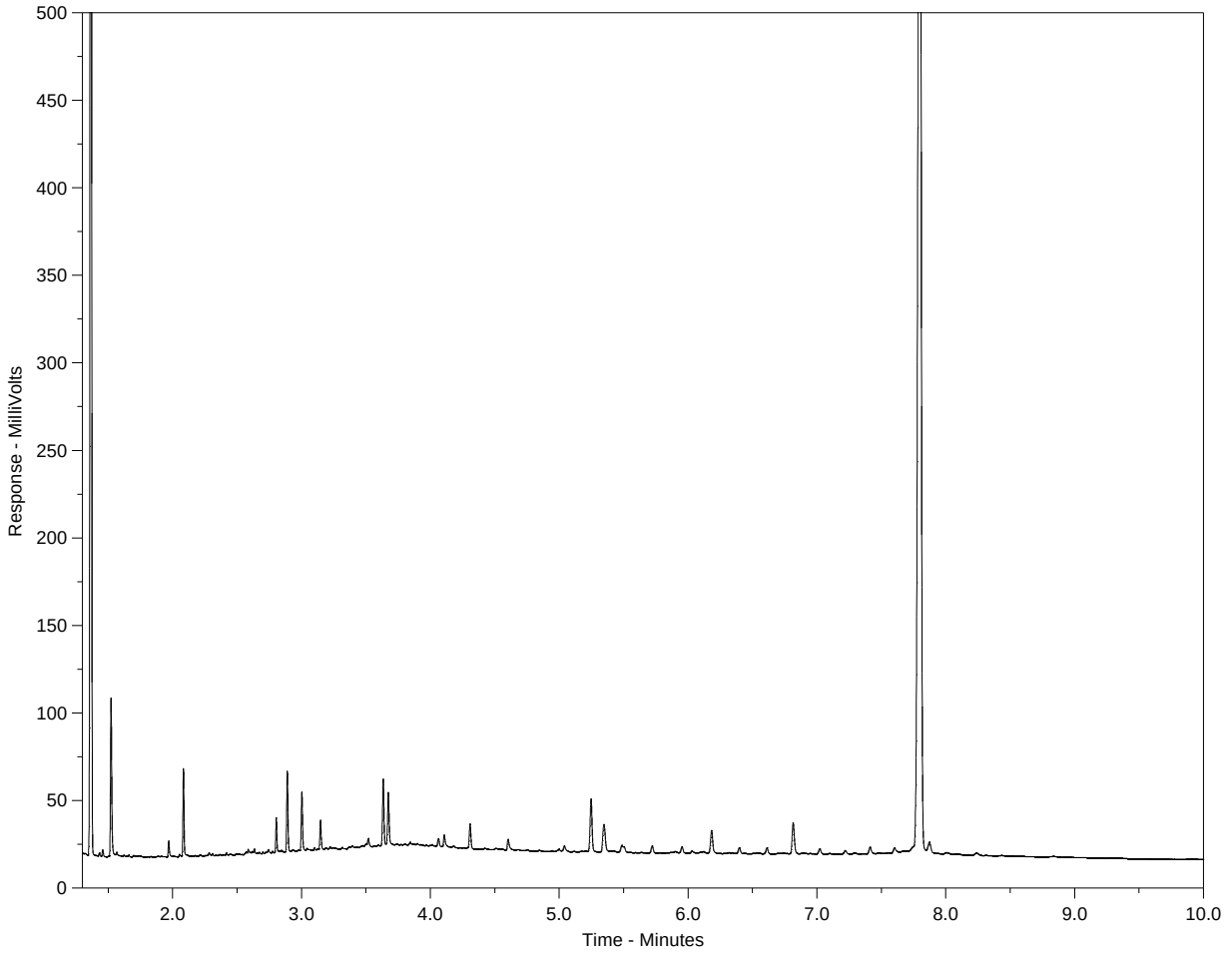
nC10	nC19	nC32	Surrogate	nC40
174°C 346°F	330°C 626°F	467°C 873°F		522°C 972°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →			
← Diesel / Jet Fuels →				

Chromatograms from the ALS HDR Reference Library indicate the patterns of hydrocarbon compounds found in petroleum products, reference standards, and some examples of natural plant and organic materials. The chromatogram from left to right roughly corresponds to increasing boiling point from approximately 174°C to 522°C, a range encompassing most middle distillate and residual petroleum products (diesel, fuel oils, lubricating oils, etc). Comparison of library chromatograms with those of unknown samples may aid in the identification of contaminants. Surrogate compounds, which are added to samples by the laboratory, are not present in HDR library chromatograms.

Please note that retention times may vary between samples by as much as 0.5 minutes.

Hydrocarbon Distribution Report

ALS Sample ID: L796959-4
Client Sample ID: MW09-18



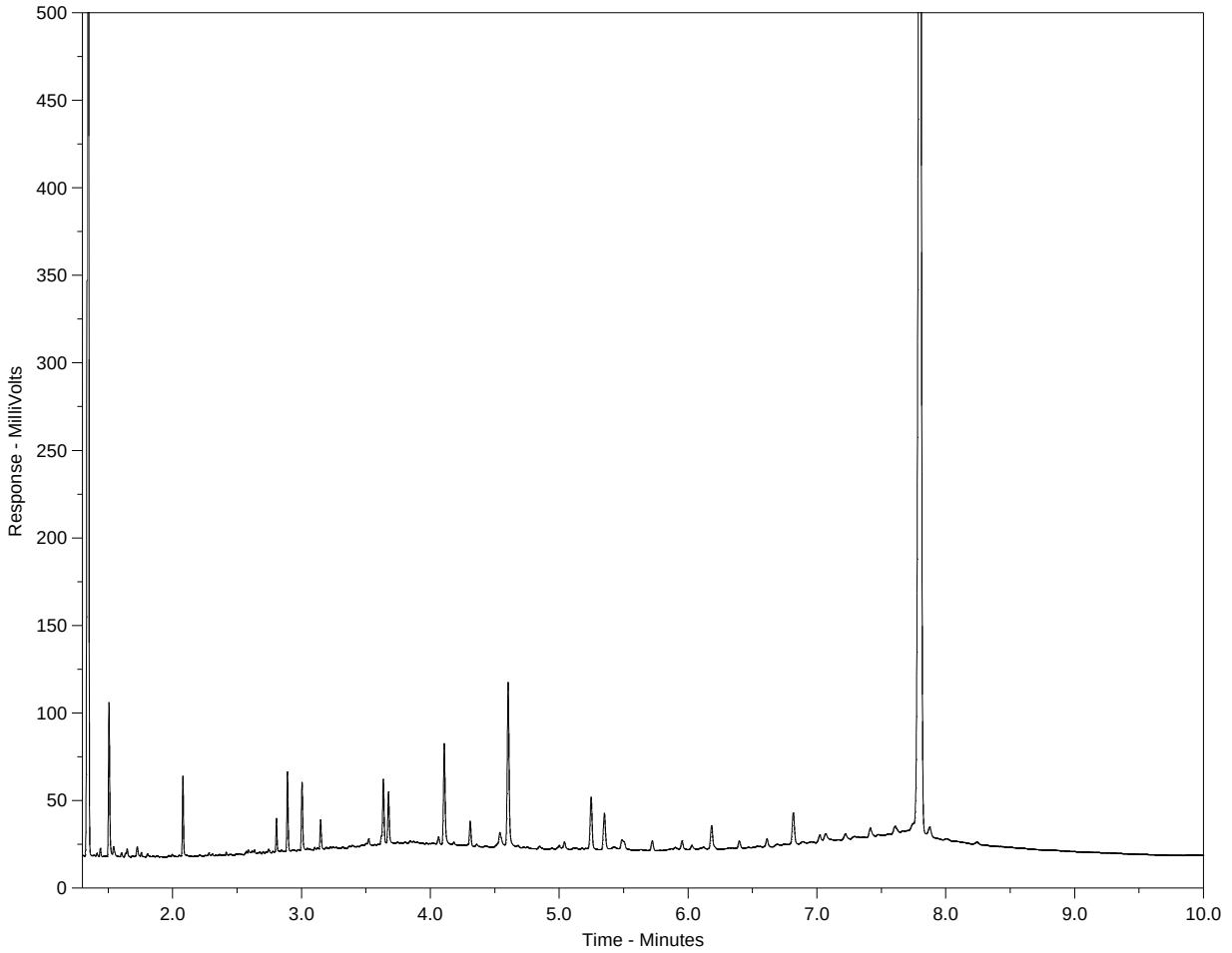
nC10	nC19	nC32	Surrogate	nC40
174°C 346°F	330°C 626°F	467°C 873°F		522°C 972°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →			
← Diesel / Jet Fuels →				

Chromatograms from the ALS HDR Reference Library indicate the patterns of hydrocarbon compounds found in petroleum products, reference standards, and some examples of natural plant and organic materials. The chromatogram from left to right roughly corresponds to increasing boiling point from approximately 174°C to 522°C, a range encompassing most middle distillate and residual petroleum products (diesel, fuel oils, lubricating oils, etc). Comparison of library chromatograms with those of unknown samples may aid in the identification of contaminants. Surrogate compounds, which are added to samples by the laboratory, are not present in HDR library chromatograms.

Please note that retention times may vary between samples by as much as 0.5 minutes.

Hydrocarbon Distribution Report

ALS Sample ID: L796959-5
Client Sample ID: MW09-18R



nC10	nC19	nC32	Surrogate	nC40
174°C 346°F	330°C 626°F	467°C 873°F		522°C 972°F

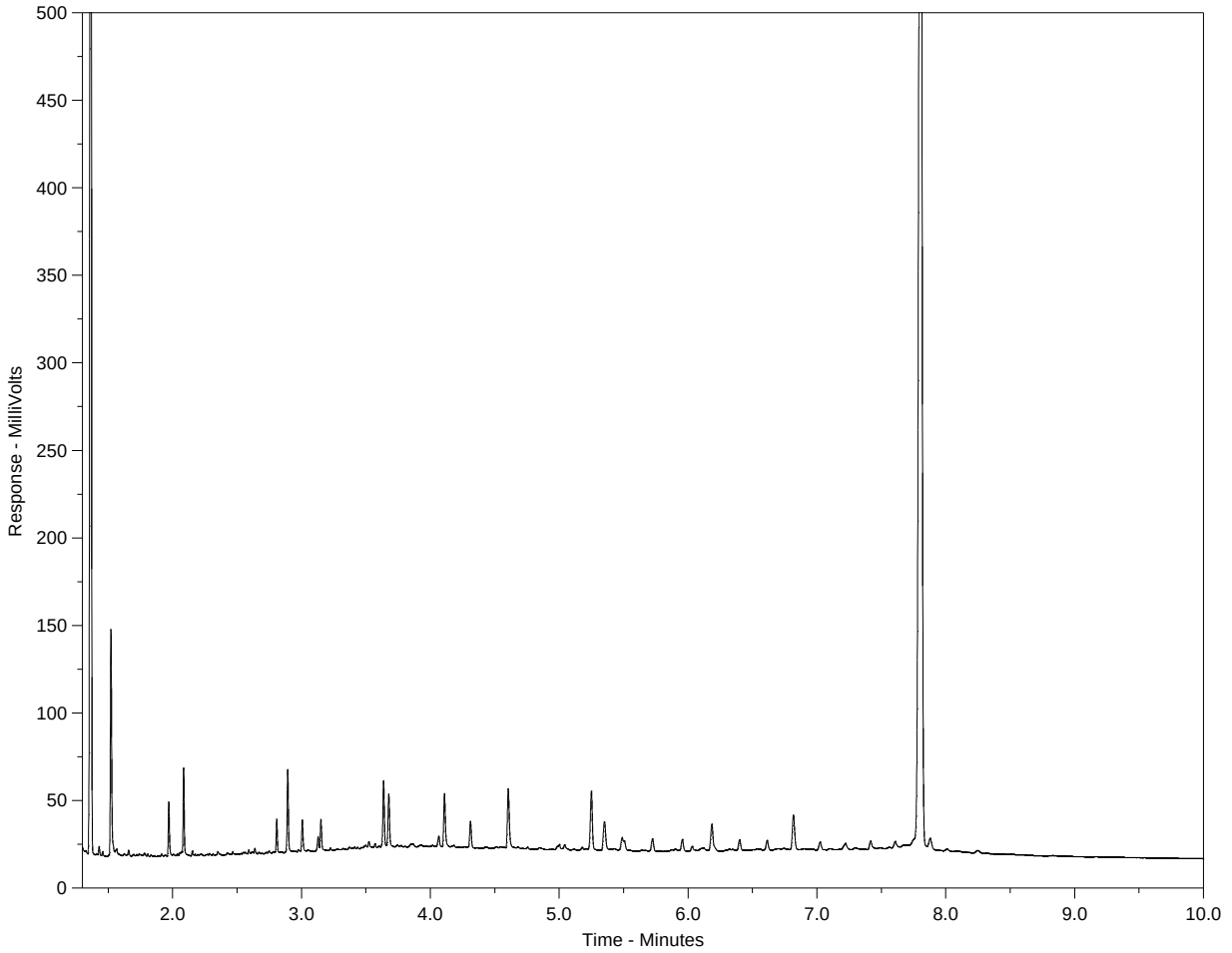
Gasoline
Motor Oils / Lube Oils / Grease
Diesel / Jet Fuels

Chromatograms from the ALS HDR Reference Library indicate the patterns of hydrocarbon compounds found in petroleum products, reference standards, and some examples of natural plant and organic materials. The chromatogram from left to right roughly corresponds to increasing boiling point from approximately 174°C to 522°C, a range encompassing most middle distillate and residual petroleum products (diesel, fuel oils, lubricating oils, etc). Comparison of library chromatograms with those of unknown samples may aid in the identification of contaminants. Surrogate compounds, which are added to samples by the laboratory, are not present in HDR library chromatograms.

Please note that retention times may vary between samples by as much as 0.5 minutes.

Hydrocarbon Distribution Report

ALS Sample ID: L796959-6
Client Sample ID: MW09-19



nC10	nC19	nC32	Surrogate	nC40
174°C 346°F	330°C 626°F	467°C 873°F		522°C 972°F

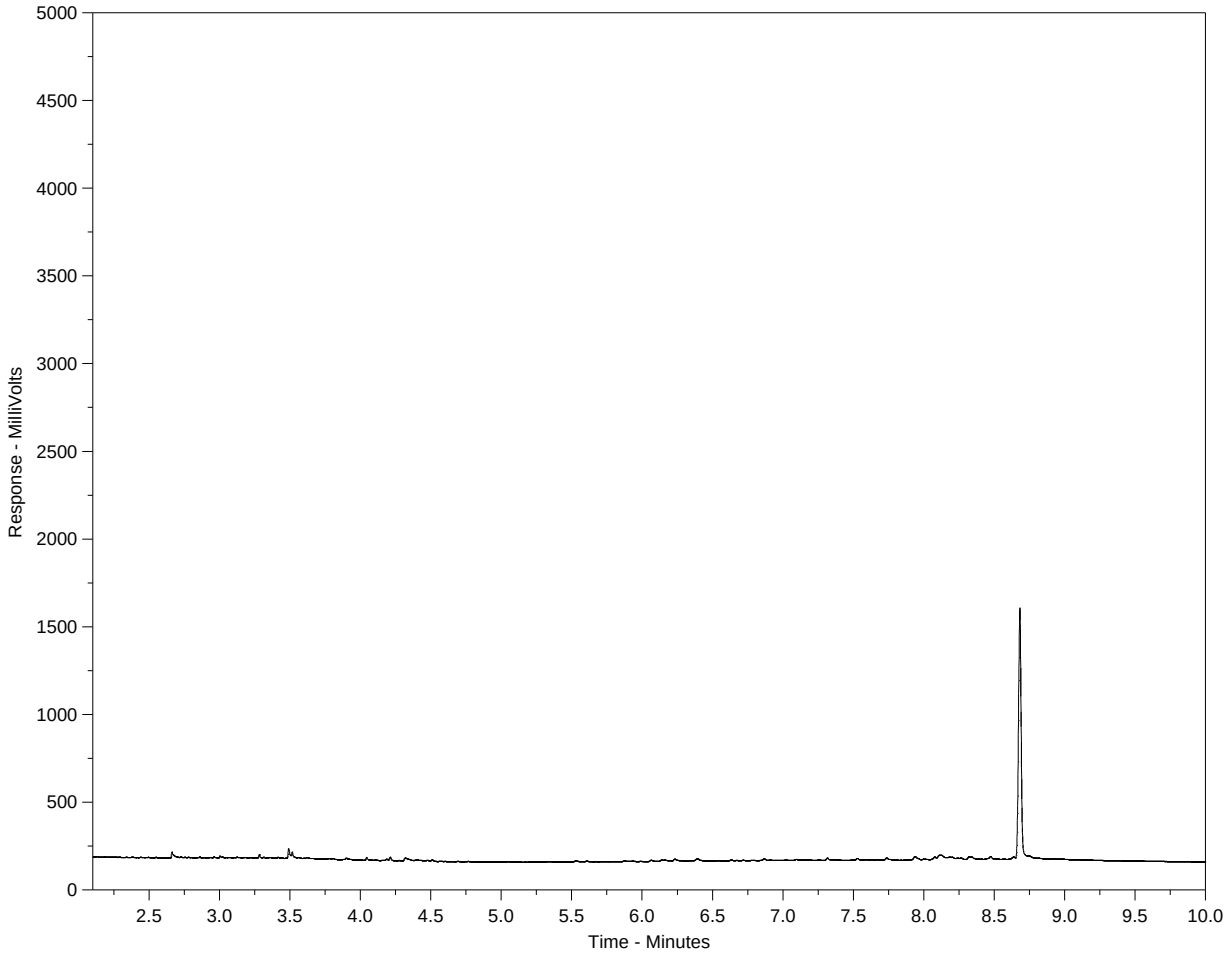
Gasoline
Motor Oils / Lube Oils / Grease
Diesel / Jet Fuels

Chromatograms from the ALS HDR Reference Library indicate the patterns of hydrocarbon compounds found in petroleum products, reference standards, and some examples of natural plant and organic materials. The chromatogram from left to right roughly corresponds to increasing boiling point from approximately 174°C to 522°C, a range encompassing most middle distillate and residual petroleum products (diesel, fuel oils, lubricating oils, etc). Comparison of library chromatograms with those of unknown samples may aid in the identification of contaminants. Surrogate compounds, which are added to samples by the laboratory, are not present in HDR library chromatograms.

Please note that retention times may vary between samples by as much as 0.5 minutes.

Hydrocarbon Distribution Report

ALS Sample ID: L796959-7
Client ID: MW09-16(6FT-7FT)



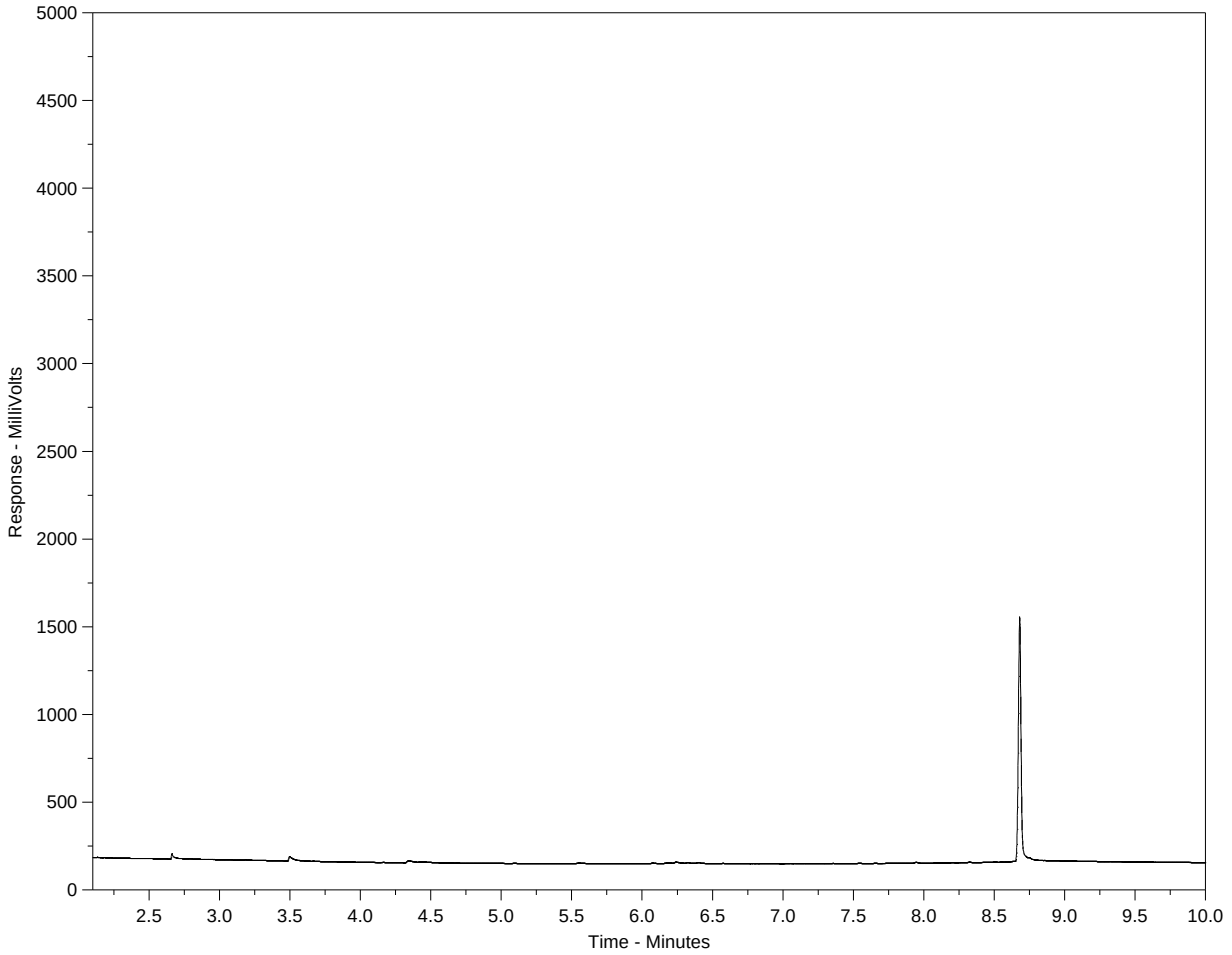
nC10	nC19	nC32	Surrogate	nC40
174°C 346°F	330°C 626°F	467°C 873°F		522°C 972°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →			
← Diesel / Jet Fuels →				

Chromatograms from the ALS HDR Reference Library indicate the patterns of hydrocarbon compounds found in petroleum products, reference standards, and some examples of natural plant and organic materials. The chromatogram from left to right roughly corresponds to increasing boiling point from approximately 174°C to 522°C, a range encompassing most middle distillate and residual petroleum products (diesel, fuel oils, lubricating oils, etc). Comparison of library chromatograms with those of unknown samples may aid in the identification of contaminants. Surrogate compounds, which are added to samples by the laboratory, are not present in HDR library chromatograms.

Please note that retention times may vary between samples by as much as 0.5 minutes.

Hydrocarbon Distribution Report

ALS Sample ID: L796959-9
Client ID: MW09-17(11FT-12FT)



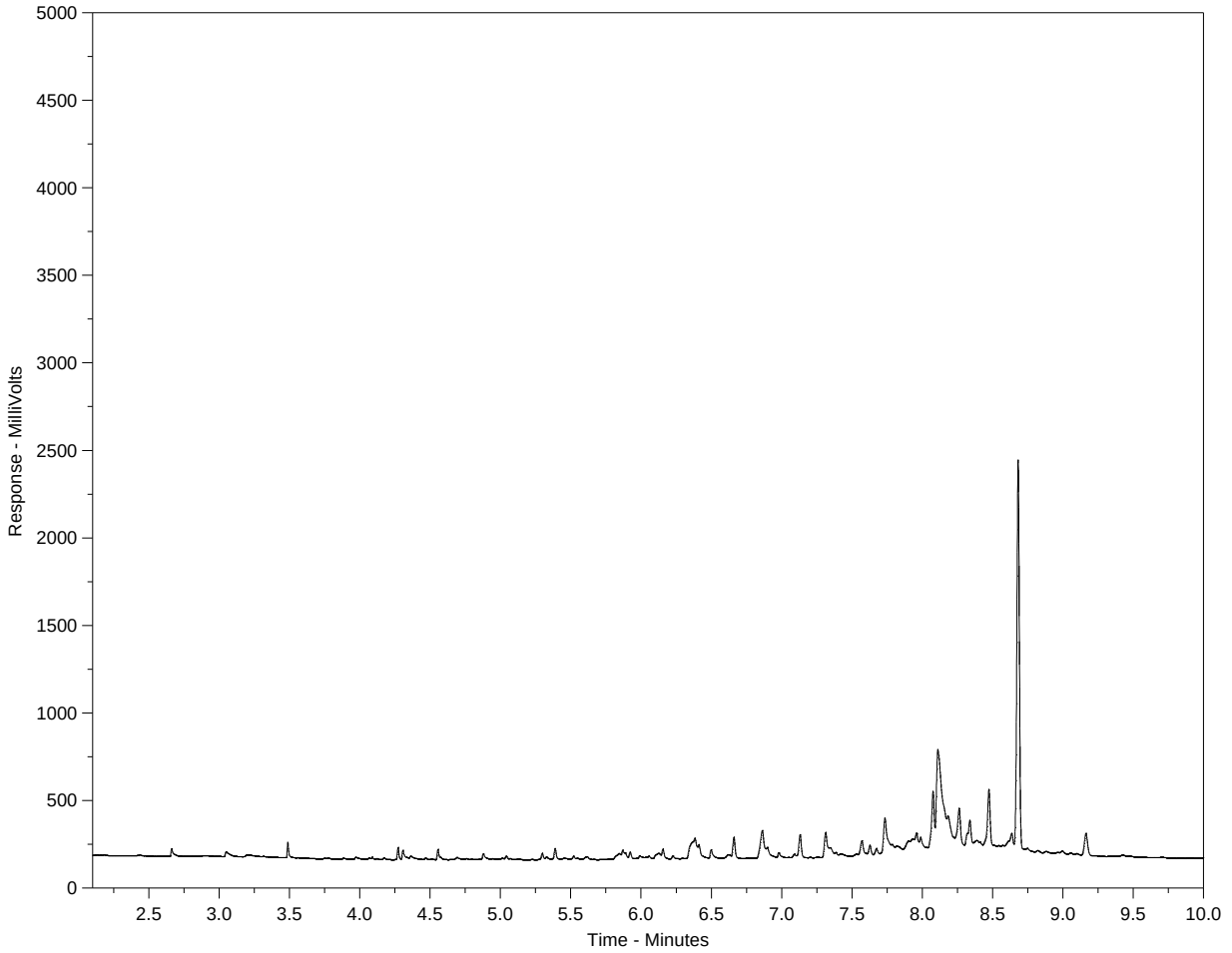
nC10	nC19	nC32	Surrogate	nC40
174°C 346°F	330°C 626°F	467°C 873°F		522°C 972°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →			
← Diesel / Jet Fuels →				

Chromatograms from the ALS HDR Reference Library indicate the patterns of hydrocarbon compounds found in petroleum products, reference standards, and some examples of natural plant and organic materials. The chromatogram from left to right roughly corresponds to increasing boiling point from approximately 174°C to 522°C, a range encompassing most middle distillate and residual petroleum products (diesel, fuel oils, lubricating oils, etc). Comparison of library chromatograms with those of unknown samples may aid in the identification of contaminants. Surrogate compounds, which are added to samples by the laboratory, are not present in HDR library chromatograms.

Please note that retention times may vary between samples by as much as 0.5 minutes.

Hydrocarbon Distribution Report

ALS Sample ID: L796959-10
Client ID: MW09-18(2FT-3FT)



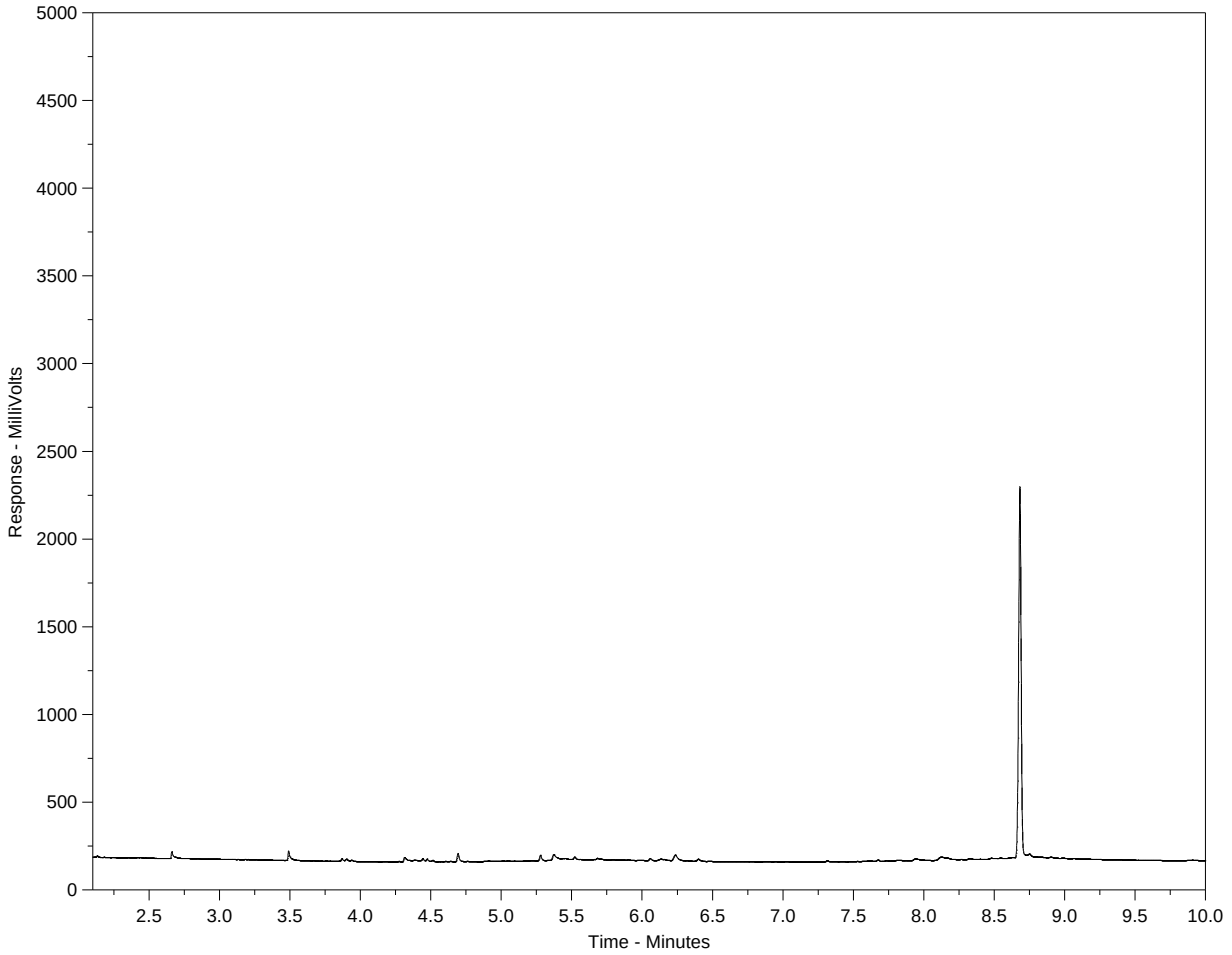
nC10	nC19	nC32	Surrogate	nC40
174°C 346°F	330°C 626°F	467°C 873°F		522°C 972°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →			
← Diesel / Jet Fuels →				

Chromatograms from the ALS HDR Reference Library indicate the patterns of hydrocarbon compounds found in petroleum products, reference standards, and some examples of natural plant and organic materials. The chromatogram from left to right roughly corresponds to increasing boiling point from approximately 174°C to 522°C, a range encompassing most middle distillate and residual petroleum products (diesel, fuel oils, lubricating oils, etc). Comparison of library chromatograms with those of unknown samples may aid in the identification of contaminants. Surrogate compounds, which are added to samples by the laboratory, are not present in HDR library chromatograms.

Please note that retention times may vary between samples by as much as 0.5 minutes.

Hydrocarbon Distribution Report

ALS Sample ID: L796959-11
Client ID: MW09-18(21FT-22FT)



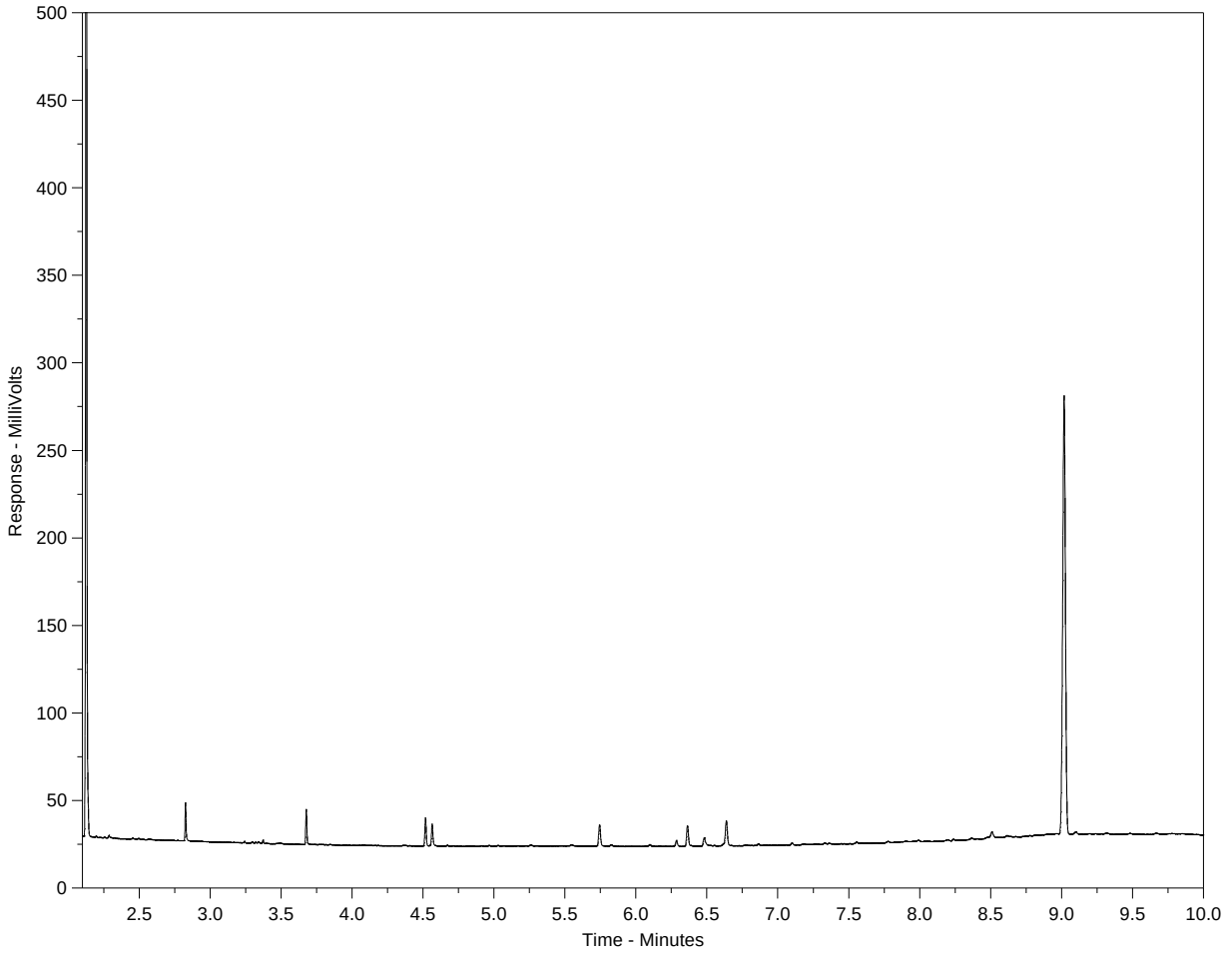
nC10	nC19	nC32	Surrogate	nC40
174°C 346°F	330°C 626°F	467°C 873°F		522°C 972°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →			
← Diesel / Jet Fuels →				

Chromatograms from the ALS HDR Reference Library indicate the patterns of hydrocarbon compounds found in petroleum products, reference standards, and some examples of natural plant and organic materials. The chromatogram from left to right roughly corresponds to increasing boiling point from approximately 174°C to 522°C, a range encompassing most middle distillate and residual petroleum products (diesel, fuel oils, lubricating oils, etc). Comparison of library chromatograms with those of unknown samples may aid in the identification of contaminants. Surrogate compounds, which are added to samples by the laboratory, are not present in HDR library chromatograms.

Please note that retention times may vary between samples by as much as 0.5 minutes.

Hydrocarbon Distribution Report

ALS Sample ID: L796959-12
Client ID: MW09-19(7FT10



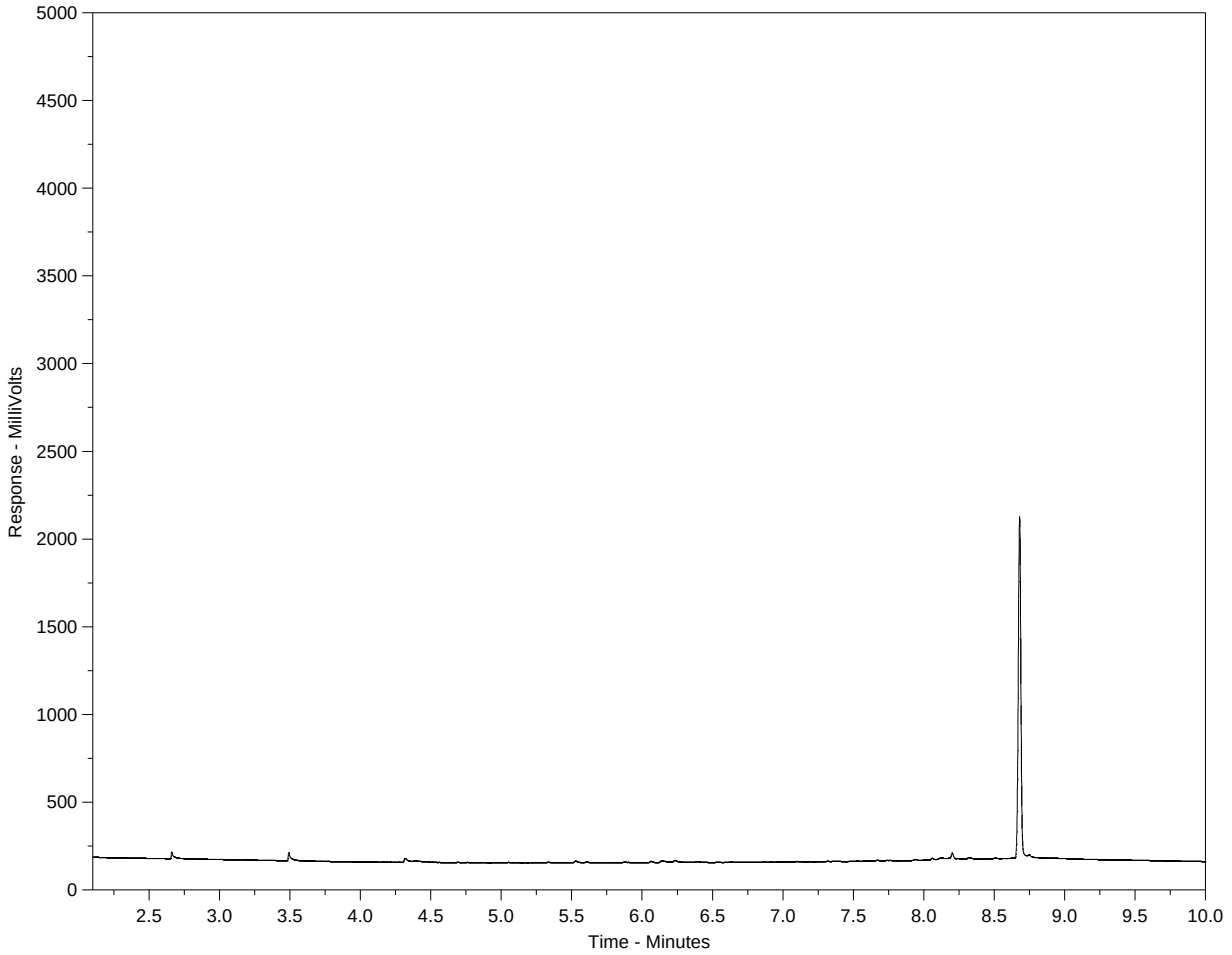
nC10	nC19	nC32	Surrogate	nC40
174°C 346°F	330°C 626°F	467°C 873°F		522°C 972°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →			
← Diesel / Jet Fuels →				

Chromatograms from the ALS HDR Reference Library indicate the patterns of hydrocarbon compounds found in petroleum products, reference standards, and some examples of natural plant and organic materials. The chromatogram from left to right roughly corresponds to increasing boiling point from approximately 174°C to 522°C, a range encompassing most middle distillate and residual petroleum products (diesel, fuel oils, lubricating oils, etc). Comparison of library chromatograms with those of unknown samples may aid in the identification of contaminants. Surrogate compounds, which are added to samples by the laboratory, are not present in HDR library chromatograms.

Please note that retention times may vary between samples by as much as 0.5 minutes.

Hydrocarbon Distribution Report

ALS Sample ID: WG979617-6#L796959-12
Client ID: MW09-19(7FT10



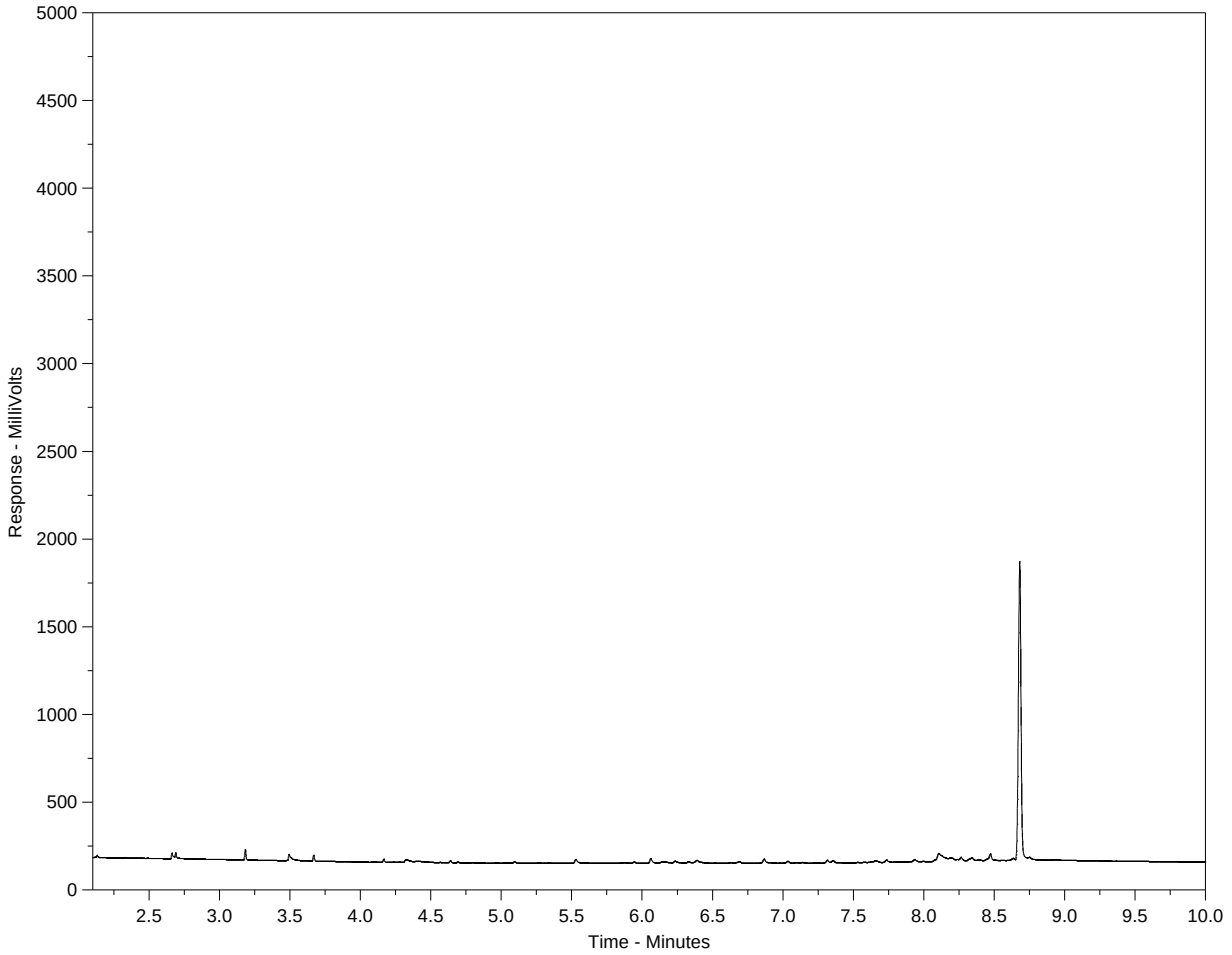
nC10	nC19	nC32	Surrogate	nC40
174°C 346°F	330°C 626°F	467°C 873°F		522°C 972°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →			
← Diesel / Jet Fuels →				

Chromatograms from the ALS HDR Reference Library indicate the patterns of hydrocarbon compounds found in petroleum products, reference standards, and some examples of natural plant and organic materials. The chromatogram from left to right roughly corresponds to increasing boiling point from approximately 174°C to 522°C, a range encompassing most middle distillate and residual petroleum products (diesel, fuel oils, lubricating oils, etc). Comparison of library chromatograms with those of unknown samples may aid in the identification of contaminants. Surrogate compounds, which are added to samples by the laboratory, are not present in HDR library chromatograms.

Please note that retention times may vary between samples by as much as 0.5 minutes.

Hydrocarbon Distribution Report

ALS Sample ID: L796959-15
Client ID: MW09-19(15FT-16FT9



nC10	nC19	nC32	Surrogate	nC40
174°C 346°F	330°C 626°F	467°C 873°F		522°C 972°F
← Gasoline →	← Motor Oils / Lube Oils / Grease →			
← Diesel / Jet Fuels →				

Chromatograms from the ALS HDR Reference Library indicate the patterns of hydrocarbon compounds found in petroleum products, reference standards, and some examples of natural plant and organic materials. The chromatogram from left to right roughly corresponds to increasing boiling point from approximately 174°C to 522°C, a range encompassing most middle distillate and residual petroleum products (diesel, fuel oils, lubricating oils, etc). Comparison of library chromatograms with those of unknown samples may aid in the identification of contaminants. Surrogate compounds, which are added to samples by the laboratory, are not present in HDR library chromatograms.

Please note that retention times may vary between samples by as much as 0.5 minutes.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # A014936

REPORT TO: RYAN MILLS	REPORT FORMAT / DISTRIBUTION
COMPANY: AECOM	STANDARD X OTHER ____
CONTACT:	PDF X EXCEL X CUSTOM ____ FAX ____
ADDRESS: 3001 WAYBURNE DRIVE SUITE 275, BURNABY, B.C. V5H4W3	EMAIL 1: ryan.mills@aecom.com
PHONE: 604-631-6213 FAX:	EMAIL 2:
INVOICE TO: SAME AS REPORT ? (YES) / NO	INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →
COMPANY:	CLIENT / PROJECT INFORMATION: YUKON GOV'T
CONTACT:	JOB #: 112359 - MT. NANSEN
ADDRESS:	PO /AFE:
	Legal Site Description:
PHONE: FAX:	QUOTE #:
Lab Work Order # (lab use only): L796959	SAMPLER (Initials): RDM

SERVICE REQUESTED

- REGULAR SERVICE (DEFAULT) ✓
- RUSH SERVICE (2-3 DAYS)
- PRIORITY SERVICE (1 DAY or ASAP)
- EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	LEPH / HEPH / PAH	DISSOLVED METALS + ICP/OES SCAN (F)	TOTAL/WAD/SAD CYANIDE (P)	Anion Scan	Ammonia, NO_3, NO_2 (T)	pH conductivity Alkalinity Acidity TDS Hardness	LEPH / HEPH / PAH SOIL	CCME METALS				HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	MW09-15	JULY 14/09		WATER		X		X	X	X								
	MW09-16	JULY 19/09		↓	X	X	X	X	X	X								
	MW09-17	↓		↓	X	X	X	X	X	X								
	MW09-18	↓		↓	X	X	X	X	X	X								
	MW09-18-R	↓		↓	X	X	X	X	X	X								
	MW09-19	↓		↓	X	X	X	X	X	X								
	MW09-16 (6 FT - 7 FT)	JULY 15/09		SOIL							X	X						
	MW09-17 (8 FT - 9 FT)	↓		↓							~~X~~	~~X~~						
	MW09-17 (11 FT - 12 FT)	↓		↓							X	X						
	MW09-18 (2 FT - 3 FT)	↓		↓							X	X						

GUIDELINES / REGULATIONS

CCME GUIDELINES + BEST DET. LIMITS POSSIBLE

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:
[signature]	JULY 22/09 2PM	MS	July 24
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME: 10:00

SAMPLE CONDITION (lab use only)

TEMPERATURE	SAMPLES RECEIVED IN GOOD CONDITION ? YES / NO (If no provide details)
16	

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # A014937

REPORT TO:	REPORT FORMAT / DISTRIBUTION	SERVICE REQUESTED
COMPANY: AECOM	STANDARD X OTHER ___	REGULAR SERVICE (DEFAULT) ✓
CONTACT: RYAN MILLS	PDF X EXCEL X CUSTOM ___ FAX	RUSH SERVICE (2-3 DAYS)
ADDRESS: 275 - 3001 WAYBURNE DR.	EMAIL 1: ryan.mills@aecom.com	PRIORITY SERVICE (1 DAY or ASAP)
BURNABY, B.C. V5G 4W3	EMAIL 2:	EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS
PHONE: 604-631-6213 FAX:		ANALYSIS REQUEST

INVOICE TO: SAME AS REPORT ? (YES) / NO	INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →
COMPANY:	CLIENT / PROJECT INFORMATION:
CONTACT:	JOB #: 112359
ADDRESS:	PO /AFE:
	Legal Site Description:
PHONE: FAX:	QUOTE #:
Lab Work Order # (lab use only): L796959	SAMPLER (Initials):

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	LEPH / HEPH PAH	CCME METALS	HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	MW09-18 (21 FT - 22 FT)	JULY 15/09		SOIL	X	X			
	MW09-19 (7 FT 10" - 8 FT 4")				X	X			
	MW09-19 (8FT 4" - 8 FT 7")								
	MW09-19 (8 FT 9" - 8 FT 10")								
	MW09-19 (15 FT - 16 FT 9")				X	X			

GUIDELINES / REGULATIONS	SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS
CCME + BEST DETECTIONS POSSIBLE	HOLD OTHER SAMPLES

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY:	DATE & TIME	RECEIVED BY	DATE & TIME:
[signature]	JULY 22/09 2pm	MS	July 24
RELINQUISHED BY:	DATE & TIME	RECEIVED BY	DATE & TIME: 10:00

SAMPLE CONDITION (lab use only)

TEMPERATURE	SAMPLES RECEIVED IN GOOD CONDITION ? YES / NO (If no provide details)
12	

Certificate of Analysis

AECOM CANADA LTD.

ATTN: RYAN MILLS

275 - 3001 WAYBURNE DRIVE
BURNABY BC V5G 4W3

Report Date: 16-SEP-09 15:59 (MT)
Version: FINAL

Lab Work Order #: **L814853** **Date Received:** **03-SEP-09**

Project P.O. #:
Job Reference: 112359
Legal Site Desc: MT NANSEN MINE,YT
CofC Numbers:

Other Information:

Comments: Certain Metals detection limits have been increased for some of the samples due to the interferences encountered during the analysis.

NATASHA MARKOVIC-MIROVIC
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L814853-1	L814853-2	L814853-3	L814853-4	L814853-5
	Description					
	Sampled Date	01-SEP-09	01-SEP-09	02-SEP-09	01-SEP-09	01-SEP-09
	Sampled Time					
	Client ID	GLL07-03	MW09-08	MW09-11	MW09-15	MW09-16
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	1740	222	659	937	1770
	Hardness (as CaCO3) (mg/L)	1110	99.5	352	579	1180
	pH (pH)	5.66	6.92	7.78	7.28	7.23
	Total Dissolved Solids (mg/L)	1670	233	445	682	1540
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	81.4	26.6	10.9	26.3	31.2
	Alkalinity, Total (as CaCO3) (mg/L)	15.5	88.3	325	276	294
	Ammonia as N (mg/L)	0.103	3.77	2.48	0.100	<0.020
	Bromide (Br) (mg/L)	<0.25	<0.25 *	0.050	<0.50	<0.50
	Chloride (Cl) (mg/L)	<2.5	<2.5 *	4.90	<5.0	<5.0
	Fluoride (F) (mg/L)	0.15	<0.10 *	0.697	<0.20	<0.20
	Nitrate (as N) (mg/L)	0.779	<0.025 *	0.495	<0.050	0.201
	Nitrite (as N) (mg/L)	0.0544	<0.0050 *	0.0277	<0.010	<0.010
	Sulfate (SO4) (mg/L)	529	14.9 *	50.2	271	832
Cyanides	Cyanide, Weak Acid Diss (mg/L)		<0.0050	<0.0050		<0.0050
	Cyanide, Total (mg/L)		0.0104	<0.0050		<0.0050
	Cyanate (CNO) (mg/L)		<0.50	<0.50		<0.50
	Thiocyanate (SCN) (mg/L)	0.82	5.8	1.03	0.93	1.16
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	1.27	23.3	26.2	4.62	3.67
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	1.39	0.0980	<0.0050	<0.010	<0.025
	Antimony (Sb)-Dissolved (mg/L)	<0.0050	<0.00050	<0.00050	0.0023	0.102
	Arsenic (As)-Dissolved (mg/L)	<0.0050	0.284	0.0239	0.187	0.0391
	Barium (Ba)-Dissolved (mg/L)	<0.020	0.126	0.311	<0.020	<0.020
	Beryllium (Be)-Dissolved (mg/L)	<0.010	<0.0010	<0.0010	<0.0020	<0.0050
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B)-Dissolved (mg/L)	<0.10	<0.10	<0.10	<0.10	0.19
	Cadmium (Cd)-Dissolved (mg/L)	0.436	<0.000017	0.000038	0.000758	0.0419
	Calcium (Ca)-Dissolved (mg/L)	336	30.9	65.5	158	273
	Chromium (Cr)-Dissolved (mg/L)	<0.010	<0.0020	<0.0010	<0.0020	<0.0050
	Cobalt (Co)-Dissolved (mg/L)	0.0144	0.00147	0.00096	0.00076	<0.0015
	Copper (Cu)-Dissolved (mg/L)	0.550	<0.0010	<0.0010	<0.0020	0.0105
	Iron (Fe)-Dissolved (mg/L)	11.6	40.7	1.52	1.58	0.331
	Lead (Pb)-Dissolved (mg/L)	0.0114	<0.00050	<0.00050	0.0059	0.0284
	Lithium (Li)-Dissolved (mg/L)	<0.050	<0.0050	<0.0050	<0.010	<0.025
	Magnesium (Mg)-Dissolved (mg/L)	66.4	5.45	45.8	44.5	120
	Manganese (Mn)-Dissolved (mg/L)	10.5	2.32	1.42	0.681	0.208
	Mercury (Hg)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Molybdenum (Mo)-Dissolved (mg/L)	<0.010	<0.0010	0.0079	<0.0020	<0.0050
	Nickel (Ni)-Dissolved (mg/L)	0.014	<0.0010	0.0027	<0.0020	<0.0050
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	2.1	<2.0	4.2	<2.0	6.4

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

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L814853-6	L814853-7	L814853-8	L814853-9	L814853-10
	Description					
	Sampled Date	01-SEP-09	01-SEP-09	01-SEP-09	01-SEP-09	01-SEP-09
	Sampled Time					
	Client ID	MW09-17	MW09-18	TRIP BLANK	MW09-19	MW09-21
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	2570	2670	<2.0	2470	1790
	Hardness (as CaCO3) (mg/L)	1840	1920	<1.1	1750	838
	pH (pH)	7.42	7.47	5.66	7.16	6.67
	Total Dissolved Solids (mg/L)	2430	2560	<10	2370	1420
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	39.9	31.9	<1.0	45.7	143
	Alkalinity, Total (as CaCO3) (mg/L)	434	426	<2.0	389	231
	Ammonia as N (mg/L)	<0.020	0.021	<0.020	2.24	17.9
	Bromide (Br) (mg/L)	<1.0	<1.0	<0.050	<1.0	<1.0
	Chloride (Cl) (mg/L)	<10	<10	<0.50	<10	<10
	Fluoride (F) (mg/L)	<0.40	<0.40	<0.020	<0.40	<0.40
	Nitrate (as N) (mg/L)	0.30	<0.10	<0.0050	<0.10	<0.10
	Nitrite (as N) (mg/L)	<0.020	<0.020	<0.0010	<0.020	<0.020
	Sulfate (SO4) (mg/L)	1400	1490	<0.50	1340	818
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	0.0169
	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	0.0146	0.0293
	Cyanate (CNO) (mg/L)	<0.50	<0.50	<0.50	5.75	20.7
	Thiocyanate (SCN) (mg/L)	1.35	1.23	<0.50	1.25	1.98
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	5.01	2.89	<0.50	80.8	42.5
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	<0.025	<0.050	<0.0050	<0.025	0.152
	Antimony (Sb)-Dissolved (mg/L)	<0.0025	<0.0050	<0.00050	<0.0025	<0.0025
	Arsenic (As)-Dissolved (mg/L)	0.0128	0.0526	<0.00050	0.0834	0.0443
	Barium (Ba)-Dissolved (mg/L)	<0.020	<0.020	<0.020	0.077	0.426
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.010	<0.0010	<0.0050	<0.0050
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B)-Dissolved (mg/L)	0.16	<0.10	<0.10	0.40	<0.10
	Cadmium (Cd)-Dissolved (mg/L)	<0.000085	<0.00017	<0.000017	<0.000085	0.000162
	Calcium (Ca)-Dissolved (mg/L)	350	375	<0.10	373	293
	Chromium (Cr)-Dissolved (mg/L)	<0.0050	<0.010	<0.0010	<0.0050	<0.0050
	Cobalt (Co)-Dissolved (mg/L)	<0.0015	<0.0030	<0.00030	<0.0015	0.0260
	Copper (Cu)-Dissolved (mg/L)	<0.0050	<0.010	<0.0010	<0.0050	<0.0050
	Iron (Fe)-Dissolved (mg/L)	<0.030	<0.030	<0.030	30.4	66.4
	Lead (Pb)-Dissolved (mg/L)	<0.0025	<0.0050	<0.00050	<0.0025	<0.0025
	Lithium (Li)-Dissolved (mg/L)	<0.025	<0.050	<0.0050	<0.025	<0.025
	Magnesium (Mg)-Dissolved (mg/L)	235	240	<0.10	200	26.1
	Manganese (Mn)-Dissolved (mg/L)	0.0096	0.427	<0.00030	1.97	6.73
	Mercury (Hg)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Molybdenum (Mo)-Dissolved (mg/L)	<0.0050	<0.010	<0.0010	<0.0050	<0.0050
	Nickel (Ni)-Dissolved (mg/L)	<0.0050	<0.010	<0.0010	<0.0050	<0.0050
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	0.41	<0.30
	Potassium (K)-Dissolved (mg/L)	7.5	7.1	<2.0	4.9	9.4

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

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L814853-11	L814853-12	L814853-13	L814853-14	
	Description					
	Sampled Date	01-SEP-09	01-SEP-09	01-SEP-09	01-SEP-09	
	Sampled Time					
	Client ID	MW09-22	MW09-23	MW09-24	MW09-26	
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	543	1890	378	666	
	Hardness (as CaCO3) (mg/L)	244	1030	197	355	
	pH (pH)	6.92	7.30	7.69	7.85	
	Total Dissolved Solids (mg/L)	378	1610	255	434	
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	27.2	24.4	5.9	9.1	
	Alkalinity, Total (as CaCO3) (mg/L)	122	247	107	317	
	Ammonia as N (mg/L)	4.37	8.73	<0.020	2.43	
	Bromide (Br) (mg/L)	<0.50	<0.50	<0.050	0.050	
	Chloride (Cl) (mg/L)	<5.0	<5.0	<0.50	4.96	
	Fluoride (F) (mg/L)	<0.20	<0.20	0.032	0.711	
	Nitrate (as N) (mg/L)	<0.050	<0.050	2.52	0.544	
	Nitrite (as N) (mg/L)	<0.010	<0.010	0.0016	0.0271	
	Sulfate (SO4) (mg/L)	156	916	81.7	51.4	
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	0.0190	<0.0050	<0.0050	
	Cyanide, Total (mg/L)	0.0102	0.0324	0.0119	0.0074	
	Cyanate (CNO) (mg/L)	1.14	2.34	<0.50	<0.50	
	Thiocyanate (SCN) (mg/L)	1.20	3.72	<0.50	1.04	
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	13.7	18.8	4.18	26.8	
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0982	0.037	<0.0050	<0.0050	
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.0025	<0.00050	<0.00050	
	Arsenic (As)-Dissolved (mg/L)	0.0368	0.0137	0.00102	0.0235	
	Barium (Ba)-Dissolved (mg/L)	0.115	0.064	0.056	0.315	
	Beryllium (Be)-Dissolved (mg/L)	<0.0010	<0.0050	<0.0010	<0.0010	
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	<0.20	<0.20	
	Boron (B)-Dissolved (mg/L)	<0.10	0.14	<0.10	<0.10	
	Cadmium (Cd)-Dissolved (mg/L)	0.000077	0.000126	0.000034	0.000035	
	Calcium (Ca)-Dissolved (mg/L)	89.9	332	60.4	65.8	
	Chromium (Cr)-Dissolved (mg/L)	<0.0020	<0.0050	<0.0010	<0.0010	
	Cobalt (Co)-Dissolved (mg/L)	0.0123	0.0171	0.00063	0.00097	
	Copper (Cu)-Dissolved (mg/L)	0.0015	<0.0050	0.0057	<0.0010	
	Iron (Fe)-Dissolved (mg/L)	14.6	7.93	<0.030	1.45	
	Lead (Pb)-Dissolved (mg/L)	<0.00050	<0.0025	<0.00050	<0.00050	
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.025	<0.0050	<0.0050	
	Magnesium (Mg)-Dissolved (mg/L)	4.84	47.8	11.3	46.4	
	Manganese (Mn)-Dissolved (mg/L)	3.20	6.06	0.00267	1.38	
	Mercury (Hg)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	
	Molybdenum (Mo)-Dissolved (mg/L)	<0.0010	<0.0050	<0.0010	0.0078	
	Nickel (Ni)-Dissolved (mg/L)	0.0092	<0.0050	<0.0010	0.0028	
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	
	Potassium (K)-Dissolved (mg/L)	4.4	14.4	<2.0	4.3	

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

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L814853-1	L814853-2	L814853-3	L814853-4	L814853-5
	Description					
	Sampled Date	01-SEP-09	01-SEP-09	02-SEP-09	01-SEP-09	01-SEP-09
	Sampled Time					
	Client ID	GLL07-03	MW09-08	MW09-11	MW09-15	MW09-16
Grouping	**Analyte**					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	<0.010	<0.0010	<0.0010	<0.0020	<0.0050
	Silicon (Si)-Dissolved (mg/L)	4.92	8.72	6.03	6.32	5.28
	Silver (Ag)-Dissolved (mg/L)	<0.00020	<0.000020	<0.000020	<0.000040	<0.00010
	Sodium (Na)-Dissolved (mg/L)	8.0	3.8	20.1	6.9	9.0
	Strontium (Sr)-Dissolved (mg/L)	0.354	0.140	0.637	1.32	0.596
	Thallium (Tl)-Dissolved (mg/L)	<0.0020	<0.00020	<0.00020	<0.00040	<0.0010
	Tin (Sn)-Dissolved (mg/L)	<0.0050	<0.00050	<0.00050	<0.0010	<0.0025
	Titanium (Ti)-Dissolved (mg/L)	0.014	<0.010	<0.010	0.011	0.013
	Uranium (U)-Dissolved (mg/L)	<0.0020	<0.00020	0.00346	0.0128	0.0029
	Vanadium (V)-Dissolved (mg/L)	<0.010	0.0048	0.0018	<0.0020	<0.0050
	Zinc (Zn)-Dissolved (mg/L)	23.2	0.0117	<0.0050	0.233	3.66

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

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L814853-6	L814853-7	L814853-8	L814853-9	L814853-10
	Description					
	Sampled Date	01-SEP-09	01-SEP-09	01-SEP-09	01-SEP-09	01-SEP-09
	Sampled Time					
	Client ID	MW09-17	MW09-18	TRIP BLANK	MW09-19	MW09-21
Grouping	**Analyte**					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	<0.0050	<0.010	<0.0010	<0.0050	<0.0050
	Silicon (Si)-Dissolved (mg/L)	4.75	4.85	<0.050	7.60	5.69
	Silver (Ag)-Dissolved (mg/L)	<0.00010	<0.00020	<0.000020	<0.00010	<0.00010
	Sodium (Na)-Dissolved (mg/L)	11.0	10.5	<2.0	14.0	73.1
	Strontium (Sr)-Dissolved (mg/L)	0.990	1.01	<0.0050	1.01	1.00
	Thallium (Tl)-Dissolved (mg/L)	<0.0010	<0.0020	<0.00020	<0.0010	<0.0010
	Tin (Sn)-Dissolved (mg/L)	<0.0025	<0.0050	<0.00050	<0.0025	<0.0025
	Titanium (Ti)-Dissolved (mg/L)	0.014	0.014	<0.010	0.015	0.019
	Uranium (U)-Dissolved (mg/L)	0.0070	0.0075	<0.00020	<0.0010	0.0010
	Vanadium (V)-Dissolved (mg/L)	<0.0050	<0.010	<0.0010	<0.0050	0.0064
	Zinc (Zn)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	0.0076

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L814853-11	L814853-12	L814853-13	L814853-14	
	Description					
	Sampled Date	01-SEP-09	01-SEP-09	01-SEP-09	01-SEP-09	
	Sampled Time					
	Client ID	MW09-22	MW09-23	MW09-24	MW09-26	
Grouping	**Analyte**					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	<0.0010	<0.0050	<0.0010	<0.0010	
	Silicon (Si)-Dissolved (mg/L)	5.51	5.69	5.62	6.06	
	Silver (Ag)-Dissolved (mg/L)	<0.000020	<0.00010	<0.000020	<0.000020	
	Sodium (Na)-Dissolved (mg/L)	15.4	56.9	8.7	20.3	
	Strontium (Sr)-Dissolved (mg/L)	0.286	0.698	0.295	0.645	
	Thallium (Tl)-Dissolved (mg/L)	<0.00020	<0.0010	<0.00020	<0.00020	
	Tin (Sn)-Dissolved (mg/L)	<0.00050	<0.0025	<0.00050	<0.00050	
	Titanium (Ti)-Dissolved (mg/L)	0.011	0.016	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.00071	0.0015	0.00058	0.00341	
	Vanadium (V)-Dissolved (mg/L)	0.0044	<0.0050	<0.0010	0.0017	
	Zinc (Zn)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjustment For Sample Matrix Effects

Samples with Qualifiers for Individual Parameters as listed above:

Sample Number	Client Sample ID	Parameters	Qualifier
L814853-2	MW09-08	Nitrate (as N) Sulfate (SO4) Bromide (Br) Chloride (Cl) Nitrite (as N) Fluoride (F)	DLM

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2

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

ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

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)".

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CN-SCN-VA	Water	Thiocyanate by Colour	APHA 4500-CN "CYANIDE"

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide and weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method. Cyanate is determined by the cyanate hydrolysis method using an ammonia selective electrode. Thiocyanate is determined by the ferric nitrate colourimetric method.

CN-SCN-VA	Water	Thiocyanate by Colour	APHA 4500-CN CYANIDE

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide and weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method. Cyanate is determined by the cyanate hydrolysis method using an ammonia selective electrode. Thiocyanate is determined by the ferric nitrate colourimetric method.

CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN "Cyanide"

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN Cyanide

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

CN-WAD-MID-COL-VA	Water	Weak Acid Cyanide by Colorimetric	APHA 4500-CN "Cyanide"

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

CN-WAD-MID-COL-VA	Water	Weak Acid Cyanide by Colorimetric	APHA 4500-CN Cyanide

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

CNO-SIE-VA	Water	Cyanate by SIE	APHA 4500-CN Cyanide

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Cyanate is determined by the cyanate hydrolysis method using an ammonia selective electrode.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-DIS-CCME-CVAFS-VA	Water	Diss. Mercury in Water by CVAFS (CCME)	EPA 3005A/245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-CCME-ICP-VA	Water	Diss. Metals in Water by ICPOES (CCME)	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).

MET-DIS-CCME-MS-VA	Water	Diss. Metals in Water by ICPMS (CCME)	EPA SW-846 3005A/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 either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (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-SIE-VA	Water	Ammonia by SIE	APHA 4500 D. - NH3 NITROGEN (AMMONIA)

This analysis is carried out, on sulphuric acid preserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using an ammonia selective electrode.

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.

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.

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

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

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

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

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.

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
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.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
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COC # _____

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Report to:	**Report Format / Distribution**	**Service Requested:**
Company: AECOM (GAR200)	☑ Standard ☐ Other	☑ Regular Service (Default)
Contact: Ryan Mills	☑ PDF ☑ Excel ☐ Fax	☐ Rush Service (2-3 Days)
Address: 275 - 3001 WAYBURNE DR, Burnaby BC	Email 1: Ryan.Mills@aecom.com	☐ Priority Service (1 Day or ASAP)
	Email 2: Marc-Andre.Lavigne@aecom.com	☐ Emergency Service (<1 Day / Wkend) - Contact ALS
Phone: Fax:		**Analysis Request**
Invoice To: ☑ Same as Report	Indicate Bottles: Filtered / Preserved (F/P) →→	F/P
Company:	**Client / Project Information:**	
Contact:	Job #: 112359	
Address:	PO/AFE:	
Sample	Legal Site Description: Mt Nansen Mine, YT	
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only): L814853	ALS Contact: NatashaMM	Sampler (Initials): MAL/JF

Sample #	Sample Identification (This description will appear on the report)	Date dd-mmm-yy	Time hh:mm	Sample Type (Select from drop-down list)	MET-DIS-CCME+ICP-VA	PH, EC, TDS, SCN	Acidity	Alkalinity-T	Anion Scan	Tot-CN	WAD-CN	CNO	TOC	Ammonia	Hazardous?	Highly Contaminated?	Number of Containers
										P	P	P	P				
	GLL07-03	01-Sep-09		Water	X	X	X	X	X				X	X			4
	MW09-08	01-Sep-09		Water	X	X	X	X	X	X	X	X	X	X			5
	MW09-11	02-Sep-09		Water	X	X	X	X	X	X	X	X	X	X			5
	MW09-15	01-Sep-09		Water	X	X	X	X	X				X	X			4
	MW09-16	01-Sep-09		Water	X	X	X	X	X	X	X	X	X	X			5
	MW09-17	01-Sep-09		Water	X	X	X	X	X	X	X	X	X	X			5
	MW09-18	01-Sep-09		Water	X	X	X	X	X	X	X	X	X	X			5

Guidelines / Regulations

Special Instructions / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the adjacent worksheet.

Relinquished By:	Date & Time:	Received By:	Date & Time:
Marc-André Lavigne	02/09/09		9/9/3 1pm
Relinquished By:	Date & Time:	Received By:	Date & Time:

Sample Condition (lab use only)

Temperature	Samples Received in Good Condition? Y/N (if no provided details)
5	

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form
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www.alsglobal.com

COC # _____

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Report to:	**Report Format / Distribution**	**Service Requested:**
Company: AECOM (GAR200)	☑ Standard ☐ Other	☑ Regular Service (Default)
Contact: Ryan Mills	☑ PDF ☑ Excel ☐ Fax	☐ Rush Service (2-3 Days)
Address: 275 - 3001 WAYBURNE DR, Burnaby BC	Email 1: Ryan.Mills@aecom.com	☐ Priority Service (1 Day or ASAP)
	Email 2: Marc-Andre.Lavigne@aecom.com	☐ Emergency Service (<1 Day / Wkend) - Contact ALS
Phone: Fax:		**Analysis Request**
Invoice To: ☑ Same as Report	Indicate Bottles: Filtered / Preserved (F/P) →	F/P: P P P P
Company:	**Client / Project Information:**	
Contact:	Job #: 112359	
Address:	PO/AFE:	
Sample	Legal Site Description: Mt Nansen Mine, YT	
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only)	**ALS Contact:** NatashaMM	**Sampler** (Initials): MAL / JF

Sample #	Sample Identification (This description will appear on the report)	Date dd-mmm-yy	Time hh:mm	Sample Type (Select from drop-down list)	MET-DIS-CCME+ICP-VA	PH, EC, TDS, SCN	Acidity	Alkalinity-T	Anion Scan	Tot-CN	WAD-CN	CNO	TOC	Ammonia	Hazardous?	Highly Contaminated?	Number of Containers
	TRIP BLANK	02-SEP-09		WATER	X	X	X	X	X	X	X	X	X	X			5
	MW09-19	01-Sep-09		Water	X	X	X	X	X	X	X	X	X	X			5
	MW09-21	02-Sep-09		Water	X	X	X	X	X	X	X	X	X	X			5
	MW09-22	02-Sep-09		Water	X	X	X	X	X	X	X	X	X	X			5
	MW09-23	01-Sep-09		Water	X	X	X	X	X	X	X	X	X	X			5
	MW09-24	01-Sep-09		Water	X	X	X	X	X	X	X	X	X	X			5
	MW09-26	02-Sep-09		Water	X	X	X	X	X	X	X	X	X	X			5

Guidelines / Regulations

Special Instructions / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the adjacent worksheet.

Relinquished By:	Date & Time:	Received By:	Date & Time:
[signature]	02/09/09		9/9/09
Relinquished By:	Date & Time:	Received By:	Date & Time:

Sample Condition (lab use only)

Temperature:	Samples Received in Good Condition? Y / N (if no provided details)
5	

Certificate of Analysis

LORAX ENVIRONMENTAL SERVICES
ATTN: SKYA FAWCETT
2289 BURRARD STREET
VANCOUVER BC V6J 3H9

Report Date: 16-SEP-09 13:32 (MT)
Version: FINAL

Lab Work Order #: **L815006** **Date Received:** **04-SEP-09**

Project P.O. #: NOT SUBMITTED
Job Reference: 907-2 MT.NANSEN
Legal Site Desc:
CofC Numbers: 08-038864, 08-038865

Other Information:

Comments:

Andre Langlais
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L815006-1	L815006-2	L815006-3	L815006-4	L815006-5
	Description					
	Sampled Date	02-SEP-09	02-SEP-09	02-SEP-09	02-SEP-09	03-SEP-09
	Sampled Time					
	Client ID	MP09-09	MP09-10	MP09-11	MP09-12	MW09-1
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	382	196	607	668	943
Anions and Nutrients	Ammonia as N (mg/L)	8.50	2.65	1.60	1.98	13.5
	Bromide (Br) (mg/L)	<0.50	<0.50	<0.50	<0.50	<5.0
	Chloride (Cl) (mg/L)	6.5	<5.0	8.5	6.3	<50
	Fluoride (F) (mg/L)	0.64	1.67	0.218	0.20	0.076
	Nitrate (as N) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.50
	Nitrite (as N) (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.10
	Sulfate (SO4) (mg/L)	179	237	<5.0	59.9	531
Cyanides	Cyanide, Weak Acid Diss (mg/L)	0.0335	0.964	0.0099	<0.0050	0.0209
	Cyanide, Total (mg/L)	0.125	2.96	0.0747	0.0387	0.0525
	Cyanate (CNO) (mg/L)	<0.60	0.54	0.54	<0.50	5.1
	Thiocyanate (SCN) (mg/L)	1.96	3.20	4.46	2.89	27.1
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	35.4	48.5	142	55.9	66.8
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0023	<0.010	0.0244	0.0052	0.0812
	Antimony (Sb)-Dissolved (mg/L)	0.109	0.178	0.00098	0.0707	0.00404
	Arsenic (As)-Dissolved (mg/L)	5.73	24.2	1.33	9.27	0.215
	Barium (Ba)-Dissolved (mg/L)	0.0130	0.00361	0.158	0.0470	0.163
	Beryllium (Be)-Dissolved (mg/L)	<0.0010	<0.0050	<0.0010	<0.0025	<0.0025
	Bismuth (Bi)-Dissolved (mg/L)	<0.0010	<0.0050	<0.0010	<0.0025	<0.0025
	Boron (B)-Dissolved (mg/L)	<0.020	<0.10	0.027	0.114	0.051
	Cadmium (Cd)-Dissolved (mg/L)	0.000166	0.00089	0.000229	0.000546	<0.000085
	Calcium (Ca)-Dissolved (mg/L)	115	76.0	129	185	293
	Chromium (Cr)-Dissolved (mg/L)	<0.0010	<0.0050	<0.0070	<0.0025	<0.0070
	Cobalt (Co)-Dissolved (mg/L)	0.00954	0.0896	0.00276	0.00208	0.0110
	Copper (Cu)-Dissolved (mg/L)	<0.015	0.725	0.00075	0.00102	<0.00050
	Iron (Fe)-Dissolved (mg/L)	0.160	0.496	8.10	1.03	66.4
	Lead (Pb)-Dissolved (mg/L)	0.00077	0.00311	0.00023	0.00404	0.00044
	Lithium (Li)-Dissolved (mg/L)	<0.010	<0.050	<0.010	<0.025	<0.025
	Magnesium (Mg)-Dissolved (mg/L)	23.0	1.49	69.0	50.1	51.7
	Manganese (Mn)-Dissolved (mg/L)	0.679	0.260	2.03	3.30	6.05
	Molybdenum (Mo)-Dissolved (mg/L)	0.0151	0.0123	0.0246	0.0235	0.00121
	Nickel (Ni)-Dissolved (mg/L)	0.0084	0.0367	0.0160	0.0133	0.0033
	Phosphorus (P)-Dissolved (mg/L)	0.68	0.54	0.41	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	32.0	12.6	2.5	6.6	9.0
	Selenium (Se)-Dissolved (mg/L)	0.00060	0.00259	0.00111	0.00065	<0.00050
	Silicon (Si)-Dissolved (mg/L)	22.7	15.9	12.0	16.7	6.65
	Silver (Ag)-Dissolved (mg/L)	0.000079	0.0285	0.000068	<0.000050	<0.000050
	Sodium (Na)-Dissolved (mg/L)	36.8	106	39.1	40.1	81.9
	Strontium (Sr)-Dissolved (mg/L)	0.731	0.233	0.582	0.633	1.03
	Thallium (Tl)-Dissolved (mg/L)	<0.00020	<0.0010	<0.00020	<0.00050	<0.00050

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L815006-6	L815006-7	L815006-8	L815006-9	L815006-10
	Description					
	Sampled Date	03-SEP-09	03-SEP-09	03-SEP-09	03-SEP-09	03-SEP-09
	Sampled Time					
	Client ID	MW09-2	MW09-3	MW09-4	MW09-6	MW09-23
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	1440	1510	1480	1550	1070
Anions and Nutrients	Ammonia as N (mg/L)	14.0	10.7	14.7	1.96	9.27
	Bromide (Br) (mg/L)	<2.5	<1.0	<1.0	<1.0	<1.0
	Chloride (Cl) (mg/L)	<25	<10	<10	<10	<10
	Fluoride (F) (mg/L)	0.729	0.56	0.68	<0.40	<0.40
	Nitrate (as N) (mg/L)	<0.25	7.15	<0.10	<0.10	<0.10
	Nitrite (as N) (mg/L)	<0.050	1.14	<0.020	<0.020	<0.020
	Sulfate (SO4) (mg/L)	1690	1570	1610	1450	976
Cyanides	Cyanide, Weak Acid Diss (mg/L)	0.0281	0.0107	0.0239	<0.0050	0.0583
	Cyanide, Total (mg/L)	0.361	0.298	0.0425	<0.0050	0.0729
	Cyanate (CNO) (mg/L)	4.7	1.74	5.9	<0.50	3.0
	Thiocyanate (SCN) (mg/L)	3.11	1.10	1.21	0.71	5.86
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	6.23	8.80	5.16	6.05	18.1
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	0.0390
	Antimony (Sb)-Dissolved (mg/L)	0.0068	0.439	0.484	0.591	<0.00050
	Arsenic (As)-Dissolved (mg/L)	15.3	3.29	4.06	0.868	0.00912
	Barium (Ba)-Dissolved (mg/L)	0.0138	0.0523	0.00834	0.00564	0.0683
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0025
	Bismuth (Bi)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0025
	Boron (B)-Dissolved (mg/L)	<0.10	0.28	0.23	0.36	0.152
	Cadmium (Cd)-Dissolved (mg/L)	0.00019	0.00018	<0.00017	0.00827	0.000132
	Calcium (Ca)-Dissolved (mg/L)	488	493	489	548	353
	Chromium (Cr)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0025
	Cobalt (Co)-Dissolved (mg/L)	0.0122	0.0091	0.0051	0.0038	0.0170
	Copper (Cu)-Dissolved (mg/L)	<0.0010	0.0018	<0.0010	0.0045	<0.00050
	Iron (Fe)-Dissolved (mg/L)	9.46	0.126	<0.030	<0.030	5.55
	Lead (Pb)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	0.00087	<0.00025
	Lithium (Li)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.025
	Magnesium (Mg)-Dissolved (mg/L)	53.2	69.0	62.7	44.0	47.2
	Manganese (Mn)-Dissolved (mg/L)	23.7	0.761	3.32	14.0	6.88
	Molybdenum (Mo)-Dissolved (mg/L)	0.00974	0.0128	0.0105	0.00899	0.00252
	Nickel (Ni)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	0.0059	<0.0025
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	51.8	31.0	44.0	11.4	15.6
	Selenium (Se)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Silicon (Si)-Dissolved (mg/L)	5.36	5.29	9.61	7.43	5.33
	Silver (Ag)-Dissolved (mg/L)	0.00014	0.00012	<0.00010	<0.00010	0.00128
	Sodium (Na)-Dissolved (mg/L)	123	72.7	55.9	28.4	80.9
	Strontium (Sr)-Dissolved (mg/L)	1.08	1.18	1.14	1.02	0.752
	Thallium (Tl)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050

ALS LABORATORY GROUP ANALYTICAL REPORT

		Sample ID	L815006-11	L815006-12	L815006-13		
		Description					
		Sampled Date	03-SEP-09	03-SEP-09	03-SEP-09		
		Sampled Time					
		Client ID	MP09-5	MW09-200	TS		
Grouping	**Analyte**						
WATER							
Physical Tests	Hardness (as CaCO3) (mg/L)		693	1470	1760		
Anions and Nutrients	Ammonia as N (mg/L)		8.06	15.4	0.0197		
	Bromide (Br) (mg/L)		<0.50	<1.0	<1.0		
	Chloride (Cl) (mg/L)		6.6	<10	<10		
	Fluoride (F) (mg/L)		<0.20	0.64	0.121		
	Nitrate (as N) (mg/L)		5.70	<0.10	0.31		
	Nitrite (as N) (mg/L)		0.119	<0.020	<0.020		
	Sulfate (SO4) (mg/L)		530	1750	1750		
Cyanides	Cyanide, Weak Acid Diss (mg/L)		0.0171	0.128			
	Cyanide, Total (mg/L)		0.0219	0.857			
	Cyanate (CNO) (mg/L)		3.42	<1.8			
	Thiocyanate (SCN) (mg/L)		1.62	2.67	0.54		
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)		24.3	6.76			
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)		0.0198	<0.010	<0.010		
	Antimony (Sb)-Dissolved (mg/L)		<0.00050	0.0045	0.0500		
	Arsenic (As)-Dissolved (mg/L)		0.00355	13.5	0.0026		
	Barium (Ba)-Dissolved (mg/L)		0.0440	0.0142	0.0513		
	Beryllium (Be)-Dissolved (mg/L)		<0.0025	<0.0050	<0.0050		
	Bismuth (Bi)-Dissolved (mg/L)		<0.0025	<0.0050	<0.0050		
	Boron (B)-Dissolved (mg/L)		0.071	<0.10	<0.10		
	Cadmium (Cd)-Dissolved (mg/L)		0.00239	<0.00017	0.0114		
	Calcium (Ca)-Dissolved (mg/L)		232	504	522		
	Chromium (Cr)-Dissolved (mg/L)		<0.0025	<0.0050	<0.0050		
	Cobalt (Co)-Dissolved (mg/L)		0.0211	0.0117	0.0296		
	Copper (Cu)-Dissolved (mg/L)		0.0324	<0.0010	<0.0013		
	Iron (Fe)-Dissolved (mg/L)		0.346	8.12	<0.030		
	Lead (Pb)-Dissolved (mg/L)		<0.00025	<0.00050	<0.00050		
	Lithium (Li)-Dissolved (mg/L)		<0.025	<0.050	<0.050		
	Magnesium (Mg)-Dissolved (mg/L)		28.0	50.6	112		
	Manganese (Mn)-Dissolved (mg/L)		9.04	20.0	5.62		
	Molybdenum (Mo)-Dissolved (mg/L)		0.00034	0.0108	0.00053		
	Nickel (Ni)-Dissolved (mg/L)		0.0097	<0.0050	0.0792		
	Phosphorus (P)-Dissolved (mg/L)		<0.30	<0.30	<0.30		
	Potassium (K)-Dissolved (mg/L)		7.4	49.6	8.5		
	Selenium (Se)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00050		
	Silicon (Si)-Dissolved (mg/L)		5.07	4.88	6.26		
	Silver (Ag)-Dissolved (mg/L)		<0.000050	<0.00010	<0.00010		
	Sodium (Na)-Dissolved (mg/L)		79.0	158	6.4		
	Strontium (Sr)-Dissolved (mg/L)		0.679	1.03	1.24		
	Thallium (Tl)-Dissolved (mg/L)		<0.00050	<0.0010	<0.0010		

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L815006-1	L815006-2	L815006-3	L815006-4	L815006-5
	Description					
	Sampled Date	02-SEP-09	02-SEP-09	02-SEP-09	02-SEP-09	03-SEP-09
	Sampled Time					
	Client ID	MP09-09	MP09-10	MP09-11	MP09-12	MW09-1
Grouping	**Analyte**					
WATER						
Dissolved Metals	Tin (Sn)-Dissolved (mg/L)	<0.00020	<0.0010	<0.00020	<0.00050	<0.00050
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.00337	0.00077	0.000211	0.00384	0.00120
	Vanadium (V)-Dissolved (mg/L)	<0.0020	<0.010	0.0507	<0.0050	0.0125
	Zinc (Zn)-Dissolved (mg/L)	0.0044	0.033	0.0048	0.0380	0.0094

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L815006-6	L815006-7	L815006-8	L815006-9	L815006-10
	Description					
	Sampled Date	03-SEP-09	03-SEP-09	03-SEP-09	03-SEP-09	03-SEP-09
	Sampled Time					
	Client ID	MW09-2	MW09-3	MW09-4	MW09-6	MW09-23
Grouping	**Analyte**					
WATER						
Dissolved Metals	Tin (Sn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.00048	0.00513	0.00015	0.00309	0.00157
	Vanadium (V)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.0050
	Zinc (Zn)-Dissolved (mg/L)	0.462	<0.010	<0.010	0.121	<0.0050

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L815006-11	L815006-12	L815006-13		
	Description					
	Sampled Date	03-SEP-09	03-SEP-09	03-SEP-09		
	Sampled Time					
	Client ID	MP09-5	MW09-200	TS		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Tin (Sn)-Dissolved (mg/L)	<0.00050	<0.0010	<0.0010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.00133	0.00042	0.00019		
	Vanadium (V)-Dissolved (mg/L)	<0.0050	<0.010	<0.010		
	Zinc (Zn)-Dissolved (mg/L)	0.0354	0.244	0.952		

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.

ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

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)".

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CN-SCN-VA	Water	Thiocyanate by Colour	APHA 4500-CN "CYANIDE"

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide and weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method. Cyanate is determined by the cyanate hydrolysis method using an ammonia selective electrode. Thiocyanate is determined by the ferric nitrate colourimetric method.

CN-SCN-VA	Water	Thiocyanate by Colour	APHA 4500-CN CYANIDE

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide and weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method. Cyanate is determined by the cyanate hydrolysis method using an ammonia selective electrode. Thiocyanate is determined by the ferric nitrate colourimetric method.

CN-T-L-MAC-HH-COL-VA	Water	Total Cyanide- Low Level by HH Distillat	APHA 4500-CN CYANIDE

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN "Cyanide"

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN Cyanide

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

CN-WAD-MID-COL-VA	Water	Weak Acid Cyanide by Colorimetric	APHA 4500-CN "Cyanide"

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

CN-WAD-MID-COL-VA	Water	Weak Acid Cyanide by Colorimetric	APHA 4500-CN Cyanide

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

CNO-SIE-VA	Water	Cyanate by SIE	APHA 4500-CN Cyanide

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Cyanate is determined by the cyanate hydrolysis method using an ammonia selective electrode.

F-SIE-VA	Water	Fluoride by SIE	APHA 4500-F "Fluoride"

This analysis is carried out using procedures adapted from APHA Method 4500-F "Fluoride". Fluoride is determined using a selective ion electrode. This method has a significant negative interference (i.e. results could be biased low) when Al3+ is present in the sample at a concentration greater than 2.5 mg/L.

F-SIE-VA	Water	Fluoride by SIE	APHA 4500-F Fluoride

This analysis is carried out using procedures adapted from APHA Method 4500-F "Fluoride". Fluoride is determined using a selective ion electrode. This method has a significant negative interference (i.e. results could be biased low) when Al3+ is present in the sample at a concentration greater than 2.5 mg/L.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA	Water	Dissolved Metals in Water by ICPMS(Low)	EPA SW-846 3005A/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 involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA	Water	Diss. Metals in Water by ICPMS (Ultra)	EPA SW-846 3005A/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 involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-COL-VA	Water	Ammonia by Colour	APHA 4500-NH3 "Nitrogen (Ammonia)"

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
		This analysis is carried out, on unpreserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using the phenate colourimetric method.	
NH3-COL-VA	Water	Ammonia by Colour	APHA 4500-NH3 Nitrogen (Ammonia)
		This analysis is carried out, on unpreserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using the phenate colourimetric method.	
NH3-SIE-VA	Water	Ammonia by SIE	APHA 4500 D. - NH3 NITROGEN (AMMONIA)
		This analysis is carried out, on sulphuric acid preserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using an ammonia selective electrode.	
SE-D-HVAF-VA	Water	Dissolved Selenium in Water by HVAFS	APHA 3030B&E/ISO/CD 17378&9-1 2006:DRAFT
		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 "Water Quality - Determination of As/Se/Sb, Part 1 - Hydride Generation Atomic Fluorescence Spectrometry (HG-AFS)", by the International Organization for Standardization (ISO). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by atomic fluorescence spectrophotometry (ISO/CD 17378&9-1 2006: DRAFT).	

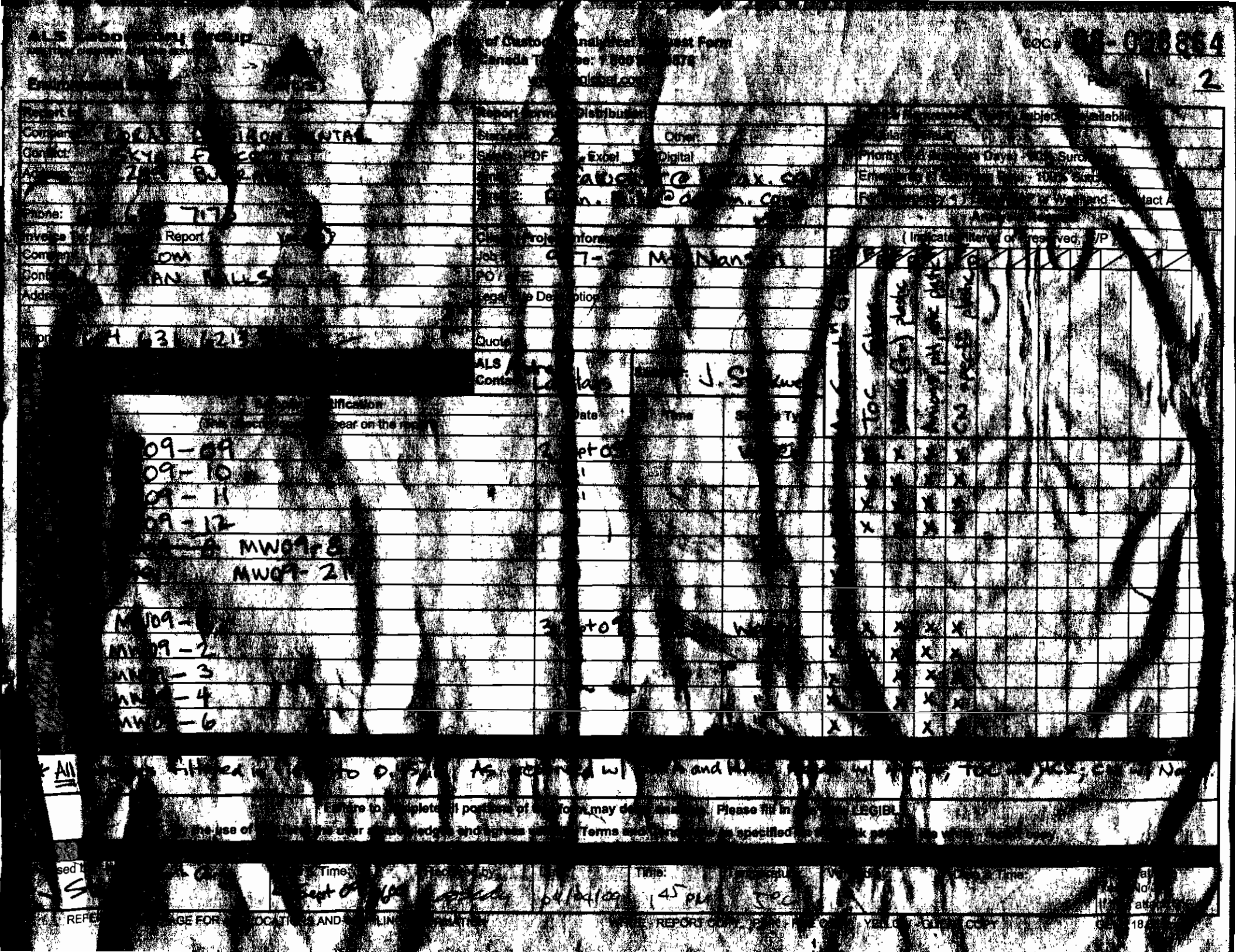
** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

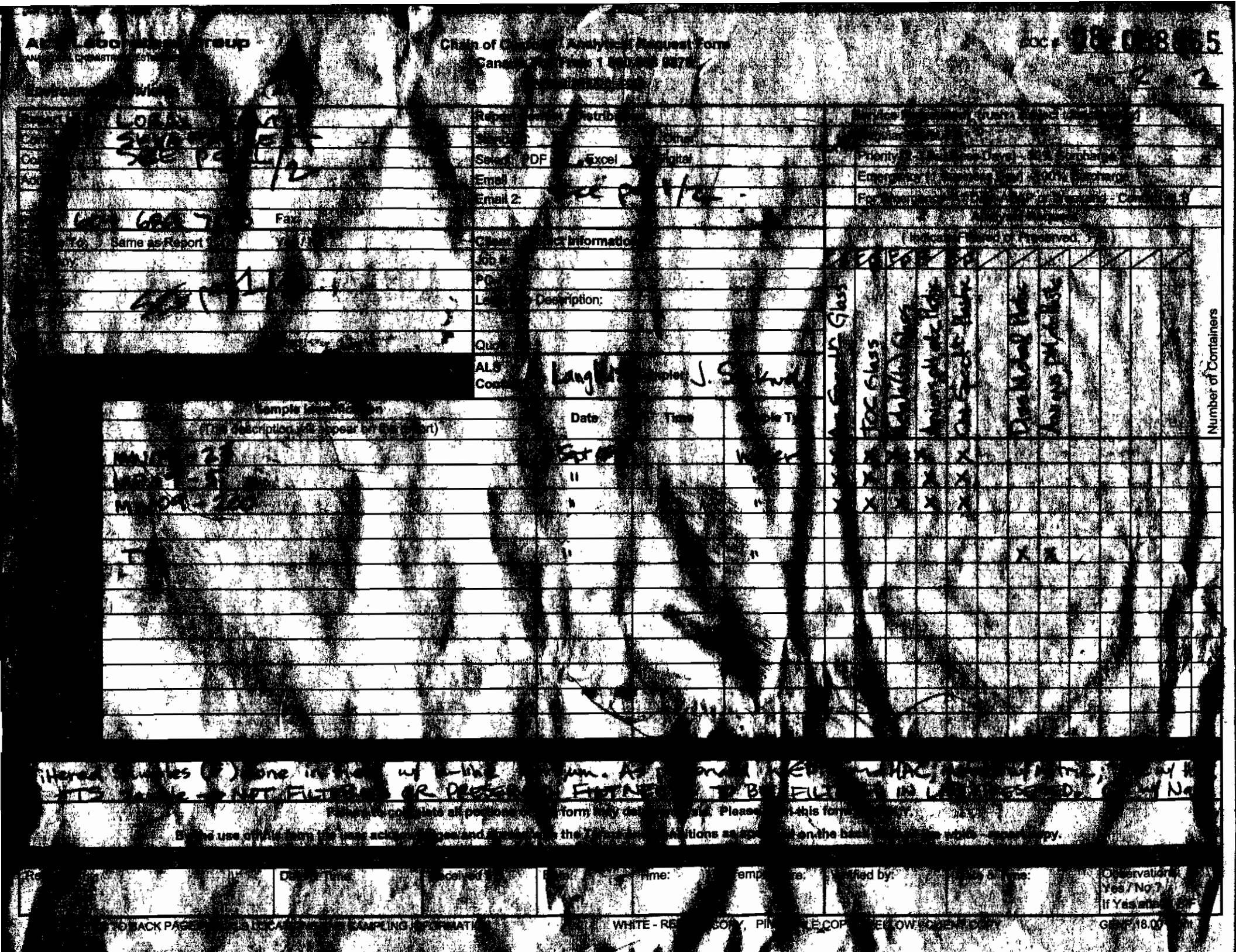
Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

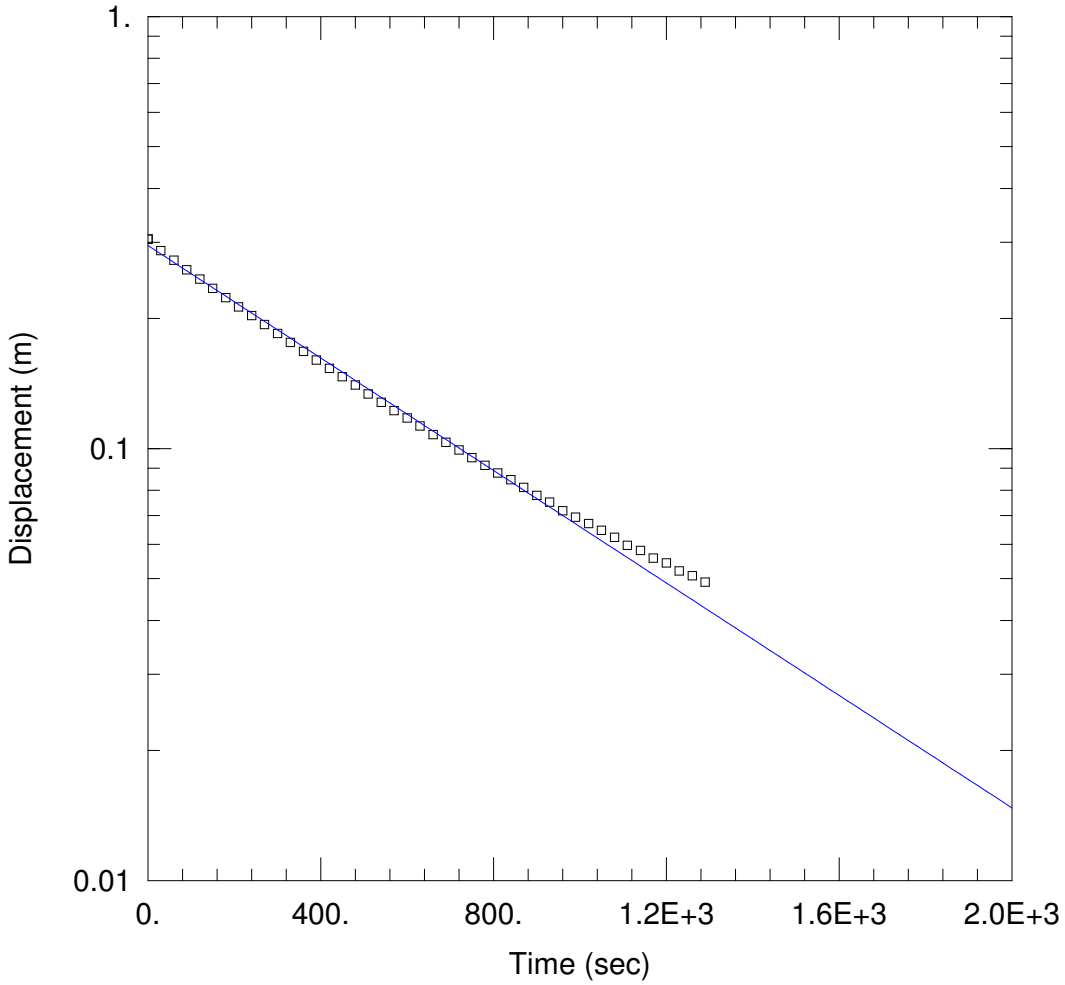
GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
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.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.







WELL TEST ANALYSIS

Data Set: Y:\...\MW09-02.aqt
Date: 12/03/09 Time: 12:45:56

PROJECT INFORMATION

Company: AECOM
Client: Mt. Nansen
Project: 112349

AQUIFER DATA

Saturated Thickness: 2.28 m Anisotropy Ratio (Kz/Kr): 1.

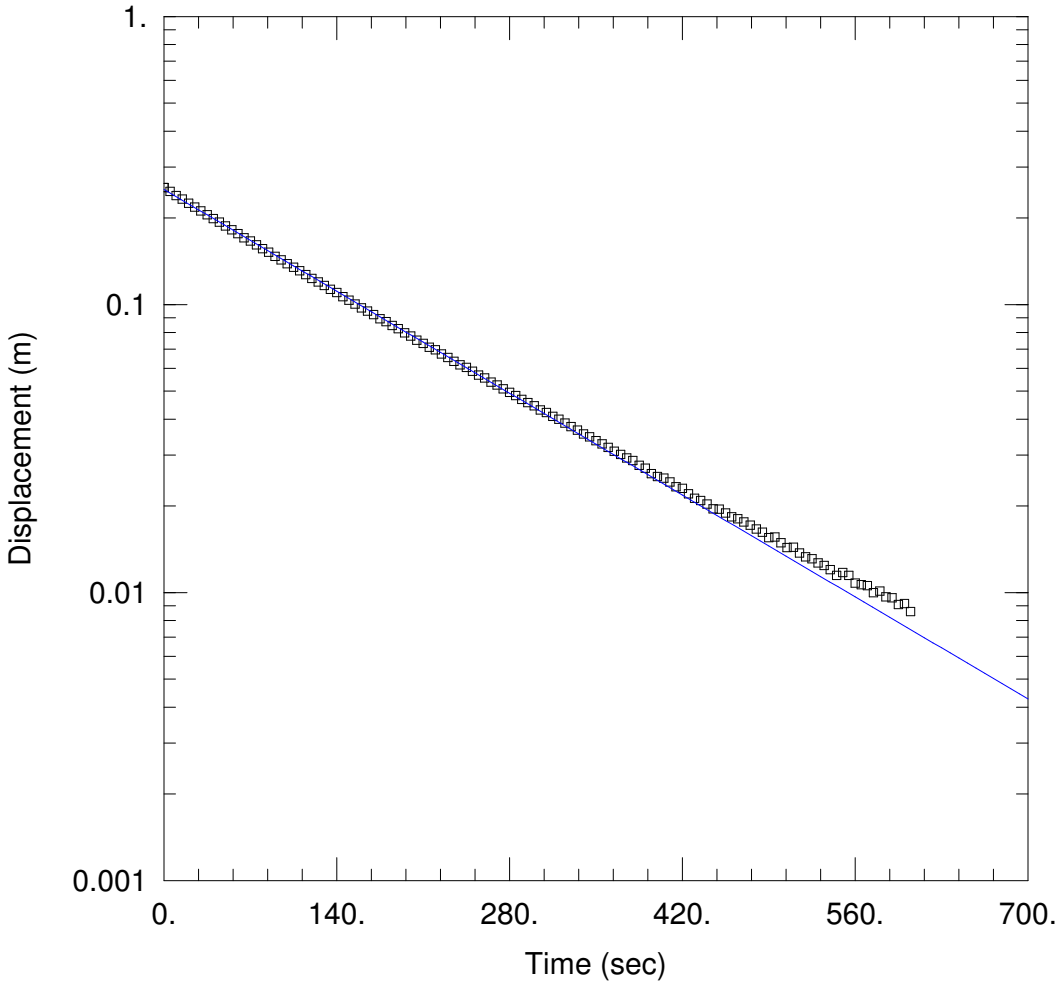
WELL DATA (MW09-02)

Initial Displacement: 0.3053 m
Total Well Penetration Depth: 2.284 m
Casing Radius: 0.0254 m
Static Water Column Height: 2.28 m
Screen Length: 1.524 m
Well Radius: 0.03 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.035E-6 m/sec
y0 = 0.295 m



WELL TEST ANALYSIS

Data Set: Y:\...\MW09-03.aqt
Date: 12/03/09 Time: 12:48:21

PROJECT INFORMATION

Company: AECOM
Client: Mt. Nansen
Project: 112349

AQUIFER DATA

Saturated Thickness: 0.91 m Anisotropy Ratio (Kz/Kr): 1.

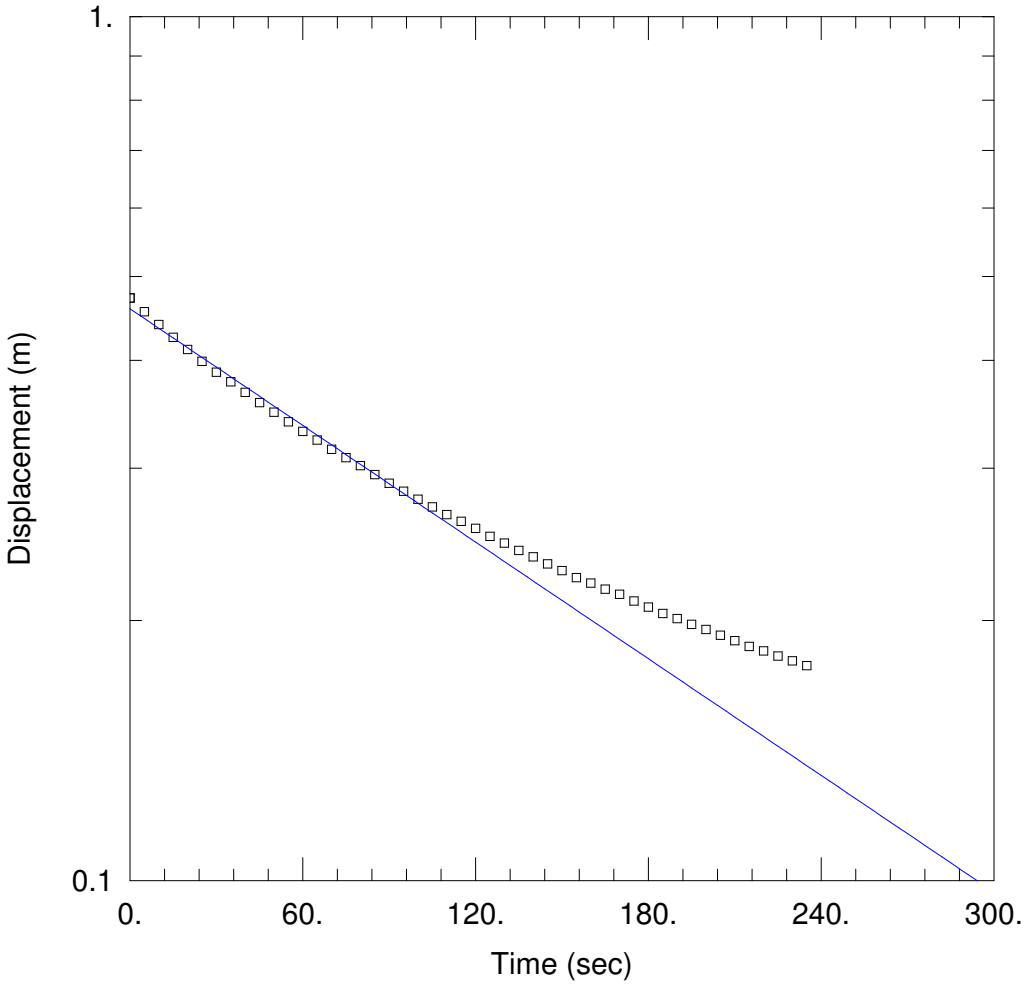
WELL DATA (MW09-03)

Initial Displacement: 0.255 m
Total Well Penetration Depth: 1.067 m
Casing Radius: 0.0254 m
Static Water Column Height: 0.91 m
Screen Length: 1.067 m
Well Radius: 0.03 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 5.525E-6 m/sec
y0 = 0.251 m



WELL TEST ANALYSIS

Data Set: Y:\...\MW09-06.aqt
Date: 12/03/09 Time: 12:48:32

PROJECT INFORMATION

Company: AECOM
Client: Mt. Nansen
Project: 112349

AQUIFER DATA

Saturated Thickness: 2.91 m Anisotropy Ratio (Kz/Kr): 1.

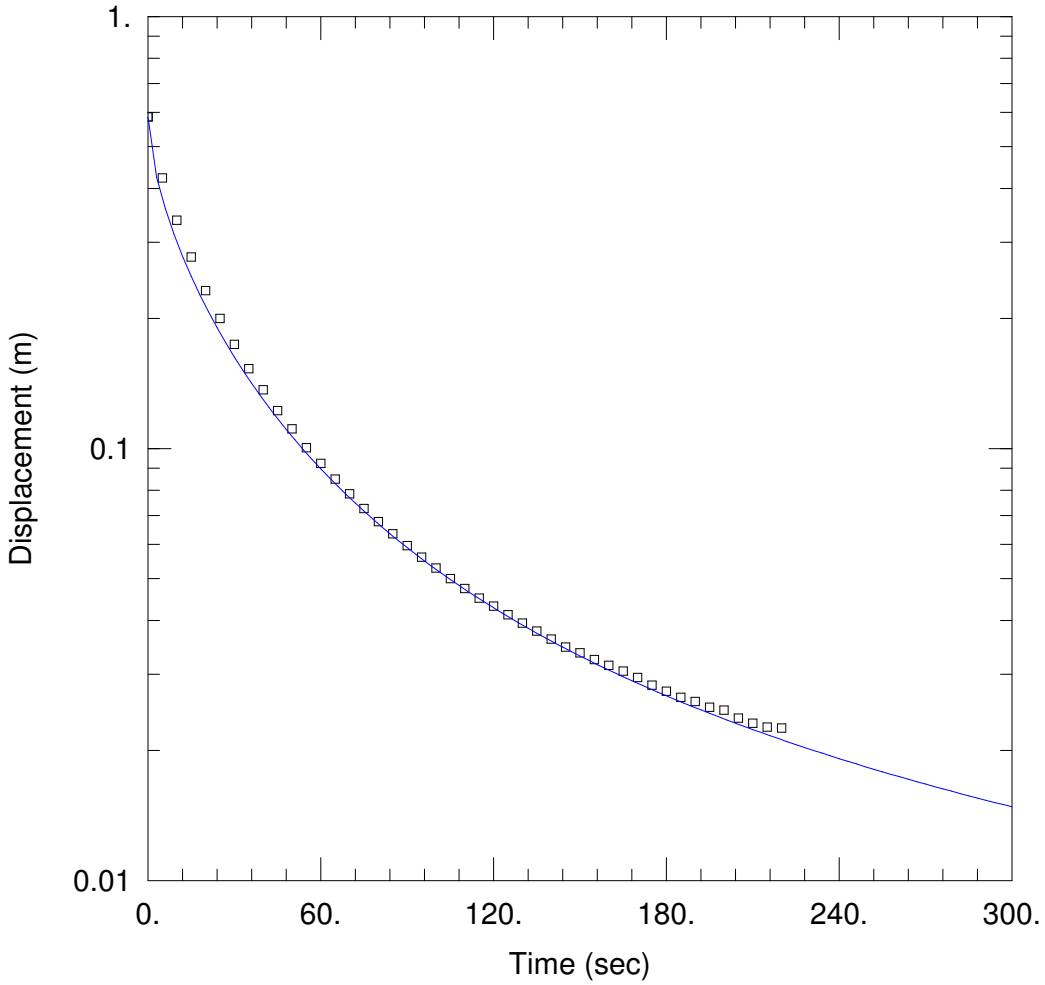
WELL DATA (MW09-06)

Initial Displacement: 0.4723 m
Total Well Penetration Depth: 3.048 m
Casing Radius: 0.0254 m
Static Water Column Height: 2.91 m
Screen Length: 3.048 m
Well Radius: 0.03 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 2.039E-6 m/sec
y0 = 0.4589 m



WELL TEST ANALYSIS

Data Set: Y:\...\MW09-15_Fracture.aqt
Date: 12/03/09 Time: 12:48:57

PROJECT INFORMATION

Company: AECOM
Client: Mt. Nansen
Project: 112349

AQUIFER DATA

Saturated Thickness: 21.17 m Anisotropy Ratio (Kz/Kr): 1.

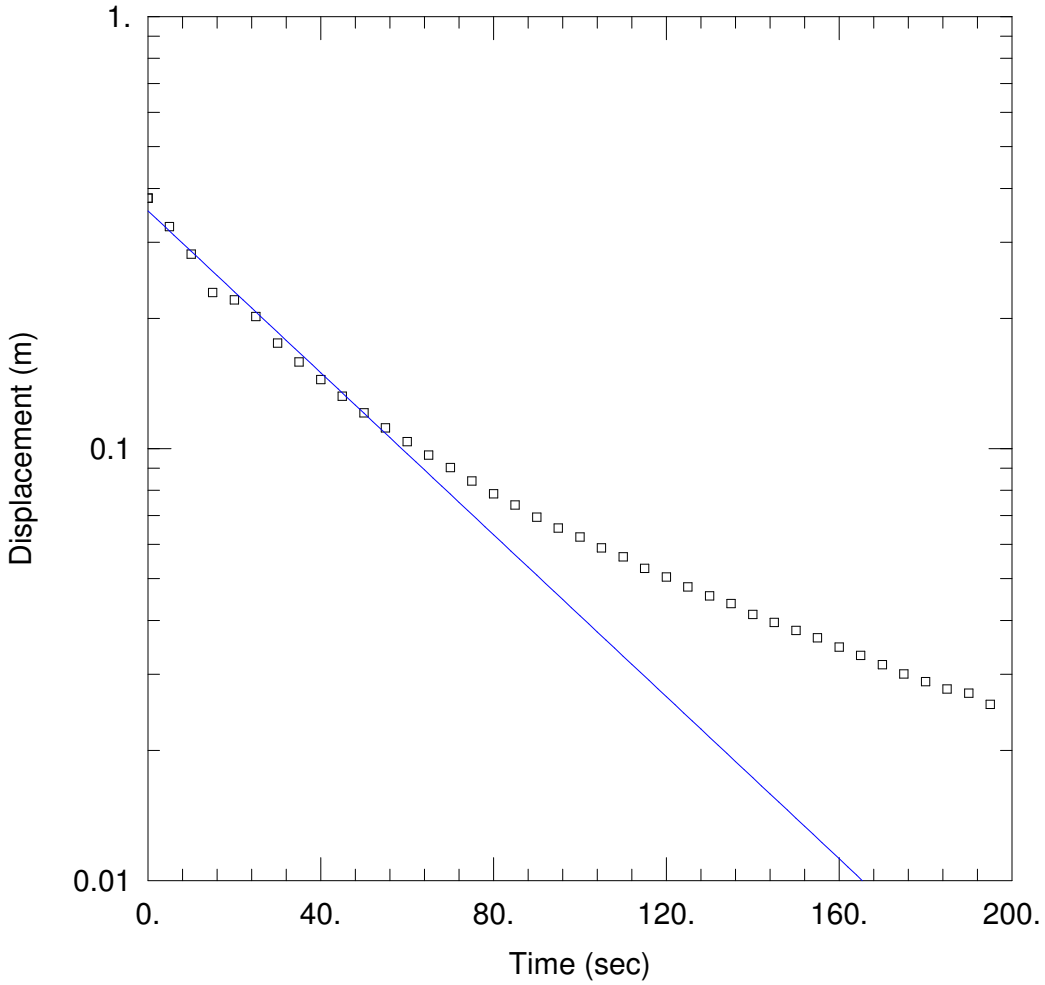
WELL DATA (MW09-15)

Initial Displacement: 0.5858 m
Total Well Penetration Depth: 21.17 m
Casing Radius: 0.0254 m
Static Water Column Height: 21.17 m
Screen Length: 3.048 m
Well Radius: 0.04604 m

SOLUTION

Aquifer Model: Fractured
Solution Method: Barker-Black

T = 2.538E-5 m^2/sec
K' = 1.0E-9 m/sec
S = 0.03
Ss' = 1.0E-6 m^{-1}



WELL TEST ANALYSIS

Data Set: Y:\...\MW09-23.aqt
Date: 12/03/09 Time: 12:49:14

PROJECT INFORMATION

Company: AECOM
Client: Mt. Nansen
Project: 112349

AQUIFER DATA

Saturated Thickness: 2.46 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW09-23)

Initial Displacement: 0.3799 m
Total Well Penetration Depth: 2.46 m
Casing Radius: 0.0254 m
Static Water Column Height: 2.46 m
Screen Length: 1.52 m
Well Radius: 0.05398 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.287E-5 m/sec
y0 = 0.3551 m

MEMORANDUM

August 21, 2009

To: Diane Lister

From: Robert Stroshein

Re: Geological Considerations at the Brown-McDade Open Pit

The Brown-McDade open pit mine occurs in a major structurally weak zone that began with the emplacement of the felsic dykes that host the mineralization. There have been multiple episodes of faulting since the emplacement of the deposit. The geology of the pit area is controlled by the structural weakness of the generally northwest trending zone.

The host rocks are a layered metamorphic sequence (LMS) in fault or intrusive contact with Cretaceous (?) aged hornblende diorite to hornblende granodiorite. The LMS is composed of metamorphosed sedimentary, volcanic and igneous rocks. The LMS appears to dip to the northat a shallow dip angle. The intrusive suite is coeval with the Mount Nansen volcanic rocks in the area. The mineralization is a late stage event related to hypabyssal rocks (felsic dykes) of the plutonic suite.

The region was unglaciated during the last period of continental glaciation and therefore the rocks a deeply weathered especially the faulted and altered sequences. The deep end of the pit was mined to the depth of weathering. There was increasing sulphide mineralization at depth in the pit. The sulphide mineralization consisted of primairily pyrite with fine grained sphalerite (Zn) and galena (Pb).

Lithologies

The lithological contacts are generally fault or intrusive related. Along the east wall of the pit diorite to granodiorite intrusive rocks are in fault contact with the metamorphic rocks that dominate the west side of the pit. There are locally thin veneers and slices of fault bounded altered and mineralized rock on the east pit wall.

The central portion of the pit is the mined out ore zone that was intensely altered and weathered. Approximately one fourth to one third of the mined material was milled and with the tailings going to the pond the remainder of the removed material was stacked in the waste piles around the pit. The oxidized and sulphide ore material was hosted by clay altered felsic dykes that have been deformed by multiple stage faulting. At the north end the breccia body has been mined below the weathered and oxidized ore and sulphides (pyrite) are exposed in the pit at and below the water level. There are local patches of interstially weathered pyrite mineralization that exhibit a white oxide coating at surface (possibly hydrozincite). Several selvages and veneers of altered and mineralized rock were left in the pit wall above the water level. There are no visible sulphides in these zones but locally also exhibit the white oxide coating.

The west side of the pit is predominantly metamorphic rocks with fault bounded blocks of ganodiorite and felsic dyke material. The dykes tend to be unaltered but locally thin segments contain mineralization. The southern half the pit wall is composed of primarily sedimentary metamorphic rocks (LMS a) with older intrusive rocks that form gneiss and schist. The northern half of the pit wall is predominantly thick bedded, white to tan weathered metamorphic

sandstones (LMS b) that form resistant quartzite. Near the north end of the pit a unit of calcareous quartzite (metamorphosed sandstone) is exposed in the pit wall.

The north end of the pit is made of light weathering grey quartzite overlain by highly weathered metamorphic rocks (unit LMS c) of gneiss and schist.

There is limited rock exposure north of the pit in the Pony Creek drainage. On the northeast side of the creek there are hornblende granodiorite rocks exposed in old exploration trenches. Within the drainage area a number of exploration diamond drill holes have been located. Examination of some of the drill holes and log records indicate the metamorphic units in fault contact with granodiorite and hornblende granodiorite. Multiple fault/shear zones occur within the drilled sequence. The fault zones are commonly coarse granular host rock to sandy with some clay content. The zones range from less than one meter to intervals of five meters and larger zones with multiple faults. The material is strongly weathered and appears to be porous and permeable. The fault zones cut all the rock units including the granodiorite.

Structural Geology

A number of fault surfaces were observed in the open pit. There are two dominant orientations to the faulting and cross cutting relationships suggest that the faulting occurred as separate episodes after the mineralization was deposited.

The most prominently defined faulting trends northwest and contains the deposit within a graben like structure. The two defining faults are exposed in the pit. The footwall (FW) fault juxtaposes unaltered granodiorite/hornblend diorite with the strongly altered rocks enclosing the mineralized zone. The hanging wall (HW) fault occurs within the altered rocks on the west side pit wall face. The FW fault dips steeply west and the HW fault dips steeply east. Slickensides on the fault surfaces indicate vertical and lateral movement along the faults. The structure defines the predominant northwest trending zone of alteration and structural weakness.

The second set of dominant faulting trends northerly and displace the northwest trending FW and HW faults. Movement along the northerly trending faults is vertical with very little lateral movement as indicated by slickensides on exposed faults. The northerly trending faults dip moderately east forming a series of steps. Drill hole intersections at the northern end of the open pit indicate a swarm of these faults cross cutting all rock types.

Summary

The Brown-McDade open pit is located and bounded by a major structural zone. The pit and the structural zone trend northwesterly. The structural zone intersects the Pony Creek drainage between 100 and 200 meters north of the pit. The structural zone is composed of multiple fault sets that intersect at acute angles. The fault zones have variable widths up to five (5) meters observed in drill hole intersections and are composed of coarse to fine granular material and clay. The intersecting faults create a network of porous and permeable channels.

The south end of the pit is poorly exposed but the structure appears to narrow and is at a higher elevation than the north end of the pit.

The quartzite unit (LMS b) is a resistant bed that does not weather readily and although it is no doubt faulted the lack of weathering the unit has a damming effect on the ground water flow. This has been observed at the north end of the pit where water cascades over the resistant quartzite beds. Photo


approximate location of seepage horizon, North end of Brown McDade pit

PARTICLE-SIZE ANALYSIS REPORT

(Test Reference: ASTM D 422)

Sieve Analysis	Sieve	Diameter (mm)	% Finer
	3"	76.2	100
	2"	50.8	100
	1"	25.4	100
	3/4"	19.1	100
	3/8"	9.5	100
	# 4	4.75	100
	# 10	2.00	100
	# 20	0.850	100
	# 40	0.425	100
	# 60	0.250	100
	# 100	0.150	100
	# 200	0.075	100
Hydrometer Analysis		0.0524	93.2
		0.0382	87.0
Dispersing agent:		0.0277	81.6
Sodium Hexametaphosphate		0.0201	75.8
		0.0148	66.6
Dosage of dispersing agent:		0.0109	63.0
40 g/L		0.0078	55.5
		0.0057	51.5
		0.0040	42.8
		0.0030	37.0
		0.0021	29.8
		0.0013	20.7

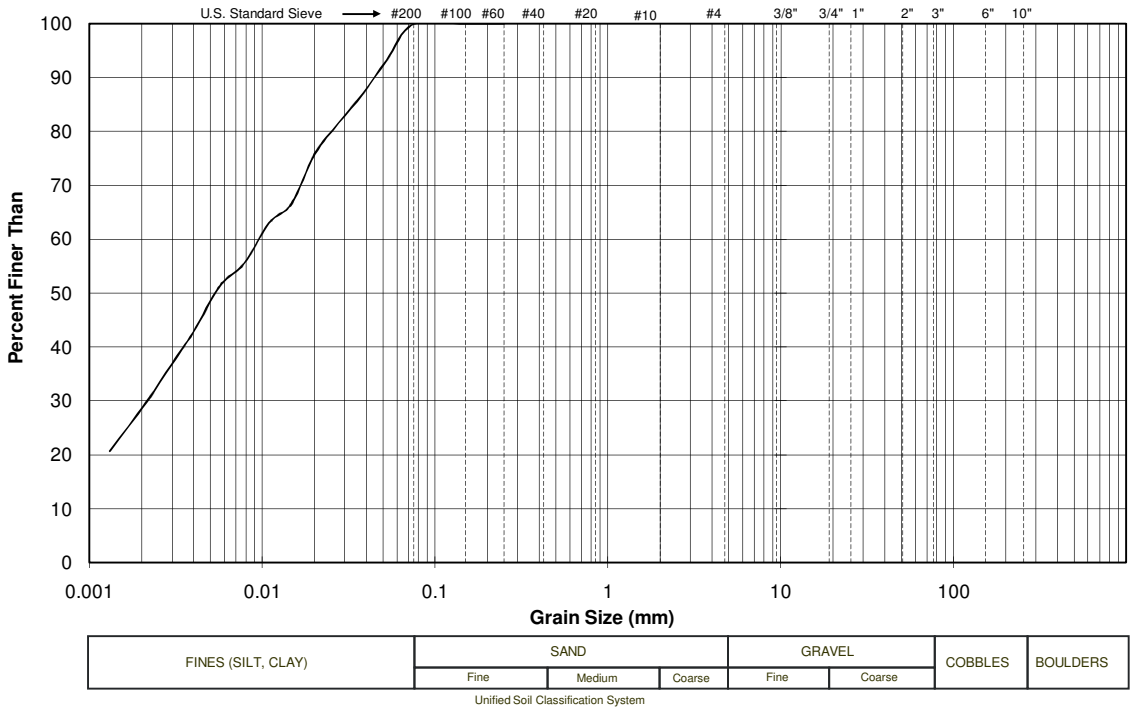
MDH ENGINEERED SOLUTIONS

CLIENT:	AECOM, Vancouver
PROJECT:	-
MDH Job No:	L1950
SAMPLE:	MW09-01
DATE:	11-Sep-09

PARTICLE SIZE DISTRIBUTION SUMMARY

% GRAVEL	
% SAND	
% FINES (SILT, CLAY)	100

COMMENTS:



The testing services reported here have been performed in accordance with accepted local industry standards.

The results presented are for the sole use of the designated client only.

This report constitutes a testing service only. It does not represent any interpretation or opinion regarding specification compliance or material suitability.

Engineering interpretation will be provided by MDH Engineered Solutions Corp upon request.

PARTICLE-SIZE ANALYSIS REPORT

(Test Reference: ASTM D 422)

Sieve Analysis	Sieve	Diameter (mm)	% Finer
	3"	76.2	100
	2"	50.8	100
	1"	25.4	100
	3/4"	19.1	100
	3/8"	9.5	100
	# 4	4.75	100
	# 10	2.00	100
	# 20	0.850	100
	# 40	0.425	100
	# 60	0.250	100
	# 100	0.150	93
	# 200	0.075	58
Hydrometer Analysis		0.0640	45.9
		0.0478	29.3
Dispersing agent:		0.0347	20.6
Sodium Hexametaphosphate		0.0251	13.2
		0.0179	9.2
Dosage of dispersing agent:		0.0106	7.7
40 g/L		0.0083	6.1
		0.0068	5.5
		0.0048	4.9
		0.0034	4.4
		0.0024	3.4
		0.0013	2.4

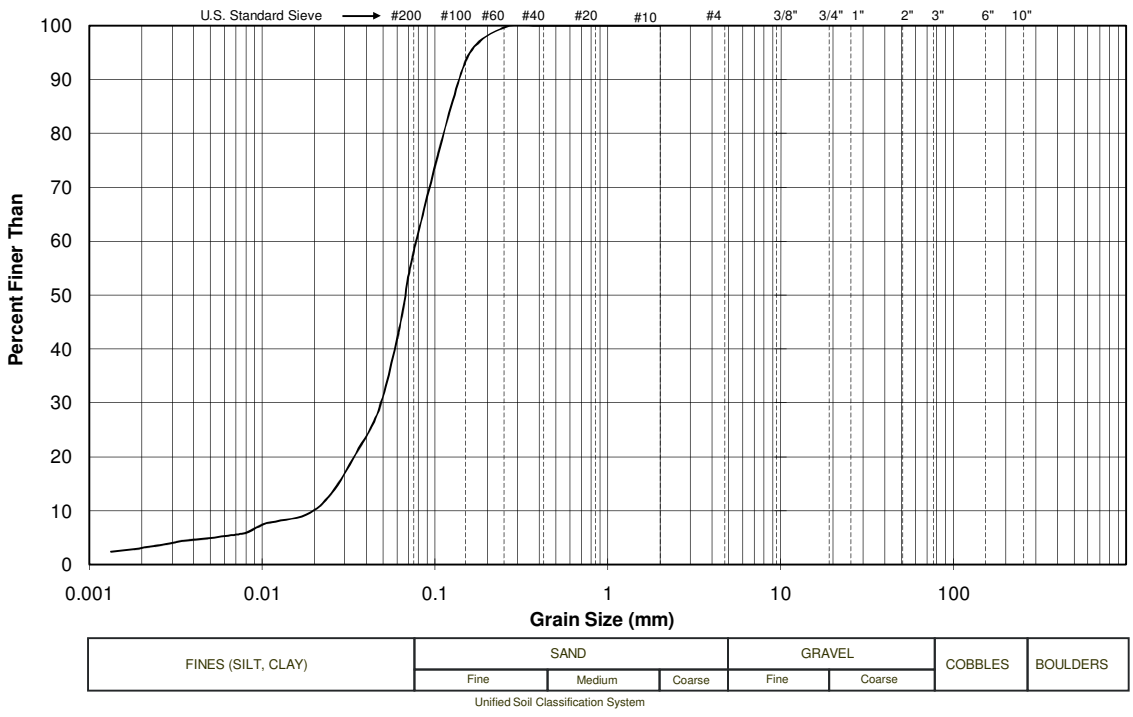
MDH ENGINEERED SOLUTIONS

CLIENT:	AECOM, Vancouver
PROJECT:	-
MDH Job No:	L1950
SAMPLE:	MW09-02
DATE:	11-Sep-09

PARTICLE SIZE DISTRIBUTION SUMMARY

% GRAVEL	
% SAND	42
% FINES (SILT, CLAY)	58

COMMENTS:



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Engineering interpretation will be provided by MDH Engineered Solutions Corp upon request.

PARTICLE-SIZE ANALYSIS REPORT

(Test Reference: ASTM D 422)

Sieve Analysis	Sieve	Diameter (mm)	% Finer
	3"	76.2	100
	2"	50.8	100
	1"	25.4	100
	3/4"	19.1	100
	3/8"	9.5	98
	# 4	4.75	97
	# 10	2.00	96
	# 20	0.850	93
	# 40	0.425	78
	# 60	0.250	54
	# 100	0.150	30
	# 200	0.075	5
Hydrometer Analysis		0.0727	4.3
		0.0515	3.3
Dispersing agent:		0.0365	3.1
Sodium Hexametaphosphate		0.0258	2.6
		0.0183	2.4
Dosage of dispersing agent:		0.0134	1.3
40 g/L		0.0095	1.1
		0.0067	0.1

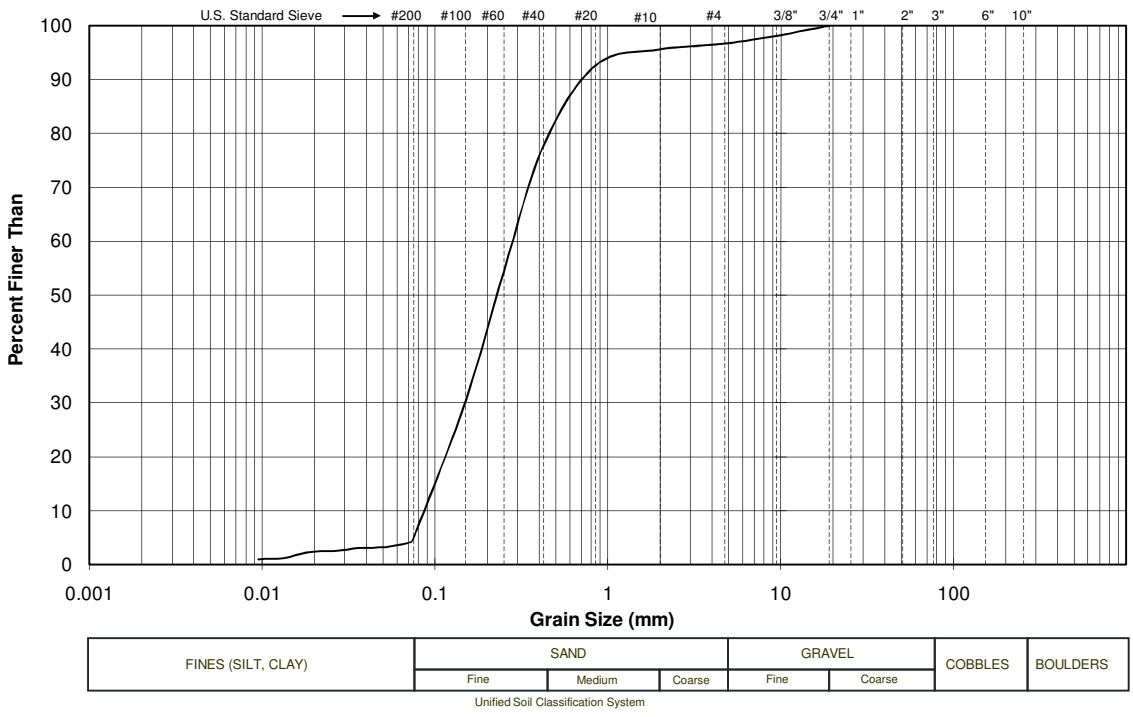
MDH ENGINEERED SOLUTIONS

CLIENT:	AECOM, Vancouver
PROJECT:	-
MDH Job No:	L1950
SAMPLE:	MW09-03
DATE:	11-Sep-09

PARTICLE SIZE DISTRIBUTION SUMMARY

% GRAVEL	3
% SAND	92
% FINES (SILT, CLAY)	5

COMMENTS:



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Engineering interpretation will be provided by MDH Engineered Solutions Corp upon request.

PARTICLE-SIZE ANALYSIS REPORT

(Test Reference: ASTM D 422)

Sieve Analysis	Sieve	Diameter (mm)	% Finer
	3"	76.2	100
	2"	50.8	100
	1"	25.4	100
	3/4"	19.1	100
	3/8"	9.5	100
	# 4	4.75	100
	# 10	2.00	100
	# 20	0.850	100
	# 40	0.425	95
	# 60	0.250	86
	# 100	0.150	69
	# 200	0.075	15
Hydrometer Analysis		0.0714	10.7
		0.0515	3.4
Dispersing agent:		0.0365	2.2
Sodium Hexametaphosphate		0.0259	1.6
		0.0183	1.4
Dosage of dispersing agent:		0.0134	1.3
40 g/L		0.0095	1.1
		0.0067	0.7
		0.0067	0.4
		0.0067	0.0

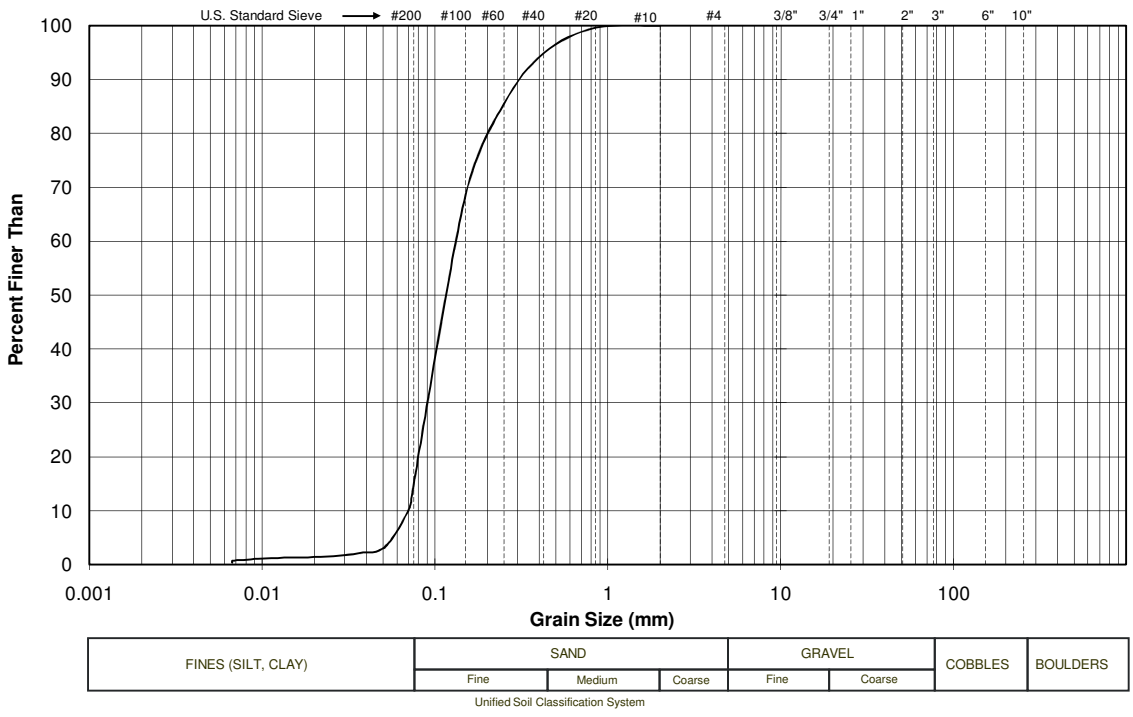
MDH ENGINEERED SOLUTIONS

CLIENT:	AECOM, Vancouver
PROJECT:	-
MDH Job No:	L1950
SAMPLE:	MW09-11
DATE:	11-Sep-09

PARTICLE SIZE DISTRIBUTION SUMMARY

% GRAVEL	
% SAND	85
% FINES (SILT, CLAY)	15

COMMENTS:



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Engineering interpretation will be provided by MDH Engineered Solutions Corp upon request.

MDH ENGINEERED SOLUTIONS

SPECIFIC GRAVITY TEST (FINE MATERIAL)

Project: AECOM, Vancouver
L1950

Technician: CEO Date: Aug 24/09

Sample: MW 09-01

PYCNOMETER DATA:

Pycnometer #: C2A
Mass of pycnometer empty & dry (g): 179.76
Mass of pycnometer with water (g): 678.63
Temperature (°C): 20.8

PRE-TEST SAMPLE INFORMATION:

Water Content (wet sample):
Tare #:
Tare Mass (g):
Wet sample + tare (g):
Dry sample + tare (g):
Water Content (%):

Wet weight (g):
Calc. Dry Weight (g): 49.84

POST-TEST INFORMATION:

Mass of pycnometer, water, & sample (g): 709.52
Temperature (°C): 21.8
Mass of dry sample (g): 49.84

Specific gravity: 2.64

Comments:

MDH ENGINEERED SOLUTIONS

SPECIFIC GRAVITY TEST (FINE MATERIAL)

Project: AECOM, Vancouver
L1950

Technician: CEO Date: Aug 24/09

Sample: MW 09-02

PYCNOMETER DATA:

Pycnometer #: C8A
Mass of pycnometer empty & dry (g): 186.78
Mass of pycnometer with water (g): 685.15
Temperature (°C): 21.1

PRE-TEST SAMPLE INFORMATION:

Water Content (wet sample):
Tare #:
Tare Mass (g):
Wet sample + tare (g):
Dry sample + tare (g):
Water Content (%):

Wet weight (g):
Calc. Dry Weight (g): 49.92

POST-TEST INFORMATION:

Mass of pycnometer, water, & sample (g): 716.71
Temperature (°C): 21.8
Mass of dry sample (g): 49.92

Specific gravity: 2.73

Comments:

WATER CONTENT/ BULK DENSITY/TOTAL ORGANIC CARBON - REPORT

MDH ENGINEERED SOLUTIONS

Client: AECOM, Vancouver
Project: -
MDH Project No: L1950
Date: 19-Aug-09

Water Content						
Sample #	MW 09-01	MW 09-02				
Tare #	DN3	M3				
Tare Mass (g)	106.59	99.29				
Wet sample + tare (g)	541.16	562.56				
Dry sample + tare (g)	393.76	462.97				
Wt. Dry sample (g)	287.17	363.68				
Water Content (%)	51.3	27.4				
Bulk Density						
Sample #						
Mass of sample in air (g):						
Mass of sample + wax in air (g):						
Mass of sample + wax in water (g):						
Wet density (kg/m^3):						
Dry density (kg/m^3):						
Specific gravity of solids						
Total porosity						
Air-filled porosity						
Degree of saturation						
Total Organic Carbon - Inorg & Total C (%)						
Sample #						
Inorganic Carbon						
Total Organic Carbon						
$CaCO_3$ Equivalent						
Total Carbon by Combustion						

Comments:

The testing services reported here have been performed in accordance with accepted local industry standards.

The results presented are for the sole use of the designated client only.

This report constitutes a testing service only. It does not represent any interpretation or opinion regarding specification compliance or material suitability.

Engineering interpretation will be provided by MDH Engineered Solutions Corp upon request.

Soil-Water Characteristic Curve Test Report

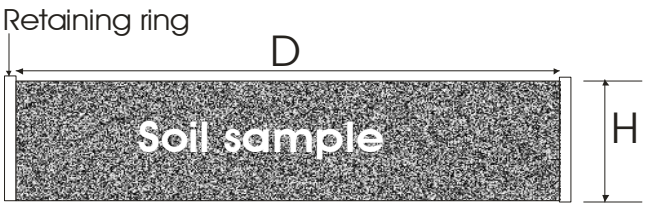
(reference standards: ASTM D6836-02)

MDH ENGINEERED SOLUTIONS

CLIENT:	AECOM, Vancouver
PROJECT:	-
MDH Job No.	L1950
DATE:	Sept. 24, 2009

Soil Identification/Sample Description: MW 09-01
Water used in test: de-aired water
Method of saturation: saturation chamber

Test sample data: Initial wet density = 1.675 g/cc
Initial water content = 51.0%



Specimen dimensions

H = 31.00 mm

D = 72.70 mm

Method A - Hanging column test

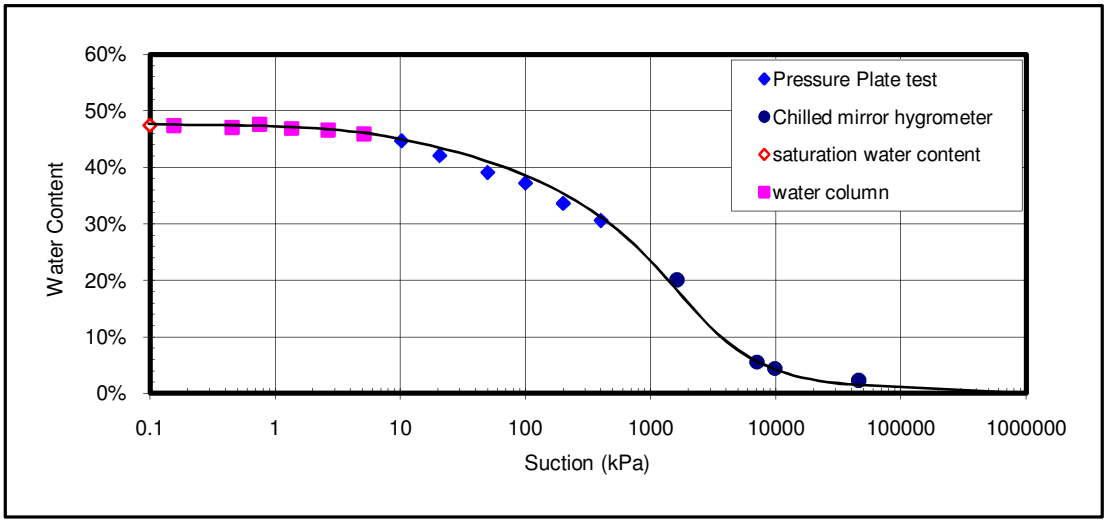
water elevation from (cm) top	water elevation from (cm) base	average suction, kPa	Gravimetric water content, %
3	0.0	0.2	47.4%
6	3.0	0.5	47.1%
9	6.0	0.8	47.7%
15	12.0	1.4	46.9%
28	25.0	2.7	46.6%
53	50.0	5.2	45.9%

Pressure Plate Test

Method	Extraction pressure, kPa	Gravimetric water content, %
C	10	44.6%
C	21	42.0%
C	50	39.0%
C	100	37.2%
C	200	33.6%
C	400	30.6%

Chilled Mirror Hygrometer Test

Method	measured suction, kPa	Gravimetric water content, %
D	1620	20.1%
D	7040	5.5%
D	9810	4.3%
D	45750	2.2%



Soil-Water Characteristic Curve Test Report

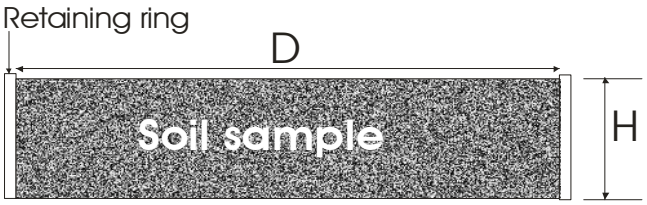
(reference standards: ASTM D6836-02)

MDH ENGINEERED SOLUTIONS

CLIENT:	AECOM, Vancouver
PROJECT:	-
MDH Job No.	L1950
DATE:	Sept. 24, 2009

Soil Identification/Sample Description: MW 09-02
Water used in test: de-aired water
Method of saturation: saturation chamber

Test sample data: Initial wet density = 1.621 g/cc
Initial water content = 27.7%



Specimen dimensions

H = 47.00 mm

D = 72.70 mm

Method A - Hanging column test

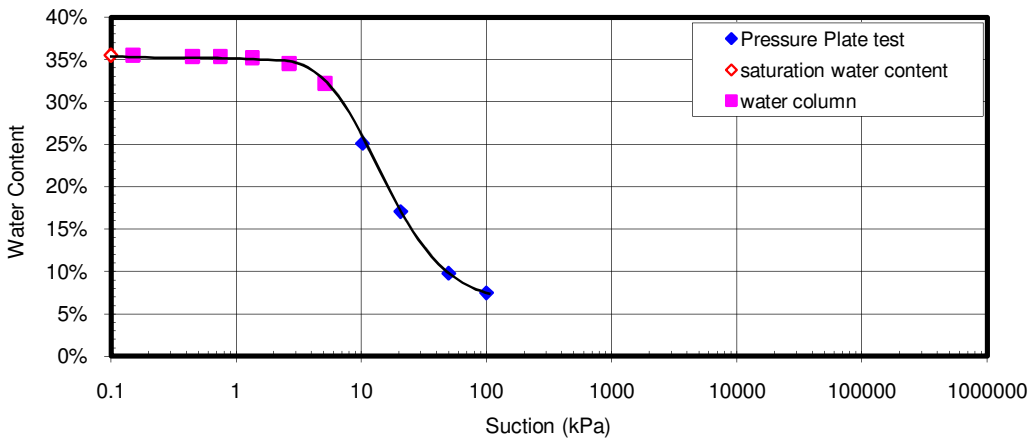
water elevation from (cm) top	water elevation from (cm) base	average suction, kPa	Gravimetric water content, %
3	0.0	0.2	35.5%
6	3.0	0.5	35.4%
9	6.0	0.8	35.3%
15	12.0	1.4	35.2%
28	25.0	2.7	34.5%
53	50.0	5.2	32.2%

Pressure Plate Test (101mm diameter cell)

Method	Extraction pressure, kPa	Gravimetric water content, %
C	10	25.1%
C	21	17.1%
C	50	9.8%
C	100	7.5%

Chilled Mirror Hygrometer Test

Method	measured suction, kPa	Gravimetric water content, %



ATTERBERG LIMITS TEST REPORT

(Test Reference: ASTM D 4318)

MDH ENGINEERED SOLUTIONS

Client:	AECOM, Vancouver
Project	-
MDH Job No:	L1950
Technician:	CEO
Date:	21-Sep-2009

Sample: MW 09-01 (air-dried)

Percentage of sample retained on 425-um (No. 40) sieve: NA

Plastic Limit

Tare #	46A	69A	
Tare Wt, g	14.17	14.37	
Wet + Tare, g	18.56	19.35	
Dry + Tare, g	17.53	18.17	average
M%	30.7%	31.1%	30.9%

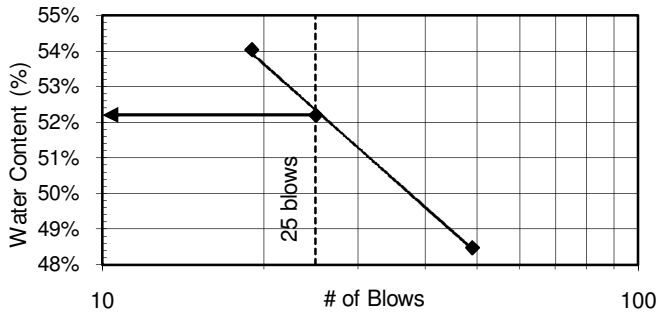
Liquid Limit (method A)

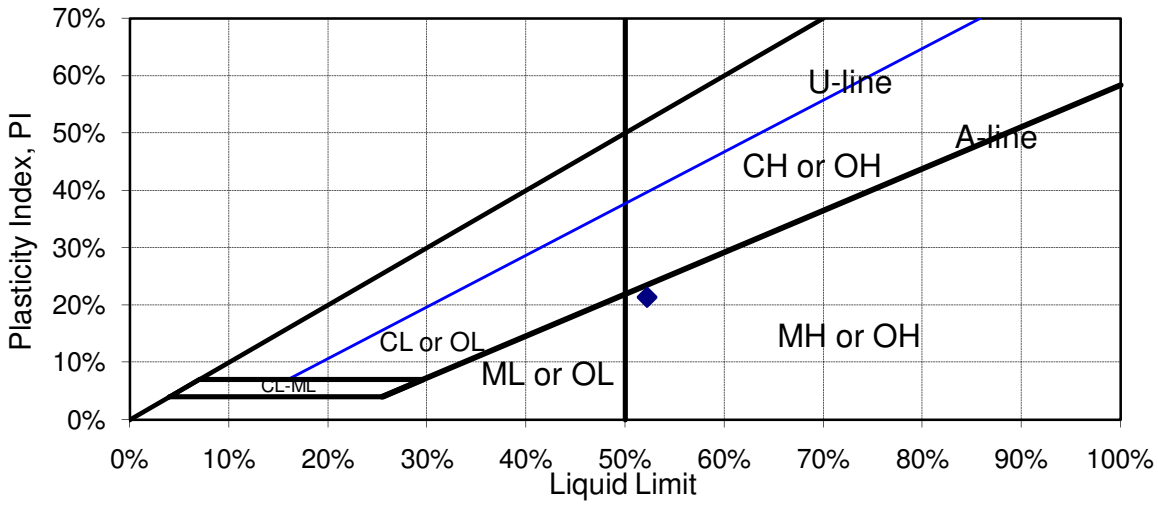
# of Blows	19	25	49
Tare #	15A	65A	9A
Tare Wt, g	14.57	14.33	14.28
Wet + tare, g	19.16	18.50	18.17
Dry + tare, g	17.55	17.07	16.90
Water content	54.0%	52.2%	48.5%

SUMMARY

Plastic Limit:	30.9%
Liquid Limit:	52.2%
Plasticity Index:	21.4%
Classification:	MH

Natural Water Content: 51.0%





Comments: -

ATTERBERG LIMITS TEST REPORT

(Test Reference: ASTM D 4318)

MDH ENGINEERED SOLUTIONS

Client:	AECOM, Vancouver
Project	-
MDH Job No:	L1950
Technician:	BC
Date:	11-Sep-2009

Sample: MW 09-02 (air-dried)

Percentage of sample retained on 425-um (No. 40) sieve: NA

Plastic Limit

Tare #	-	-	
Tare Wt, g	-	-	
Wet + Tare, g	-	-	
Dry + Tare, g	-	-	average
M%	-	-	-

Liquid Limit (method A)

# of Blows	-	-	-
Tare #	-	-	-
Tare Wt, g	-	-	-
Wet + tare, g	-	-	-
Dry + tare, g	-	-	-
Water content	-	-	-

SUMMARY

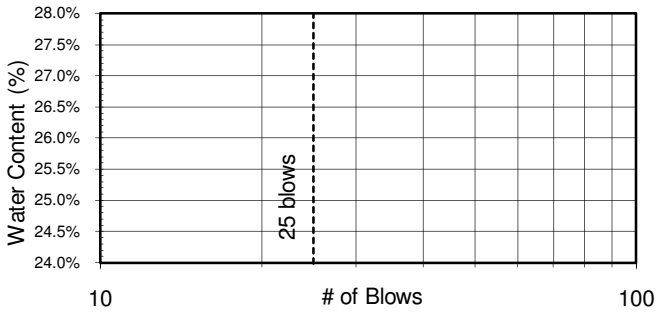
Plastic Limit: -

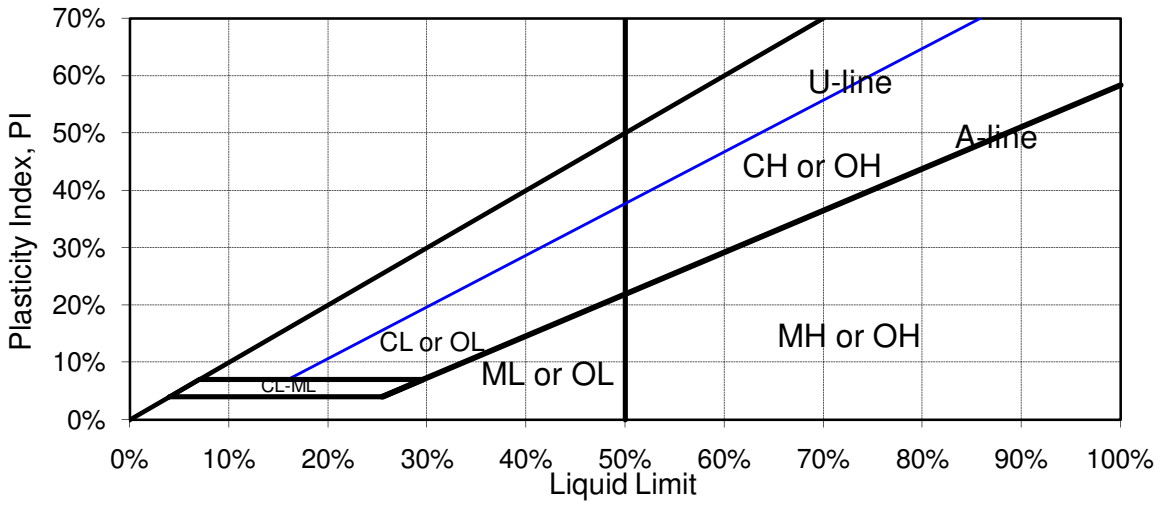
Liquid Limit: -

Plasticity Index: -

Classification: **Non Plastic**

Natural Water Content: n/a





Comments: **Material cannot be rolled. Non-plastic**