



February 22, 2013

HYDROGEOLOGICAL ASSESSMENT

Mayo Solid Waste Disposal Facility

Submitted to:

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REPORT



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Executive Summary

Golder Associates Ltd. (“Golder”) was retained by the Government of Yukon Community Services Infrastructure Branch on September 28, 2011 to complete a groundwater monitoring well network installation and hydrogeological assessment program at up to 20 solid waste facilities located across the Territory. The Mayo Solid Waste Disposal Facility (the “Facility” or “Site”) is one of the sites included in the program. A multiphase approach was implemented at each Facility in order to carry out the hydrogeological assessment. The first phase completed for the program was a review of Site-specific requirements and considerations. The second phase was the preparation of a work plan and schedule. The third phase was the development and presentation of a Background Research and Facility Site Assessment Plan. The fourth phase consisted of the drill program tender specification and tender process management. The fifth phase consisted of the installation of a monitoring well network and collection of data on water levels, water quality, and aquifer parameters. The sixth and final phase resulted in a draft of this Hydrogeological Assessment Report, documenting the results of the investigation.

In summary, the information obtained during the Hydrogeological Assessment indicated the following:

- **Site Description:** The Mayo Solid Waste Disposal Facility is located in the central portion of Yukon, within the Yukon Plateau North Ecological Region, and in the Na-Cho Nyak Dun First Nation’s traditional territory, at latitude 63° 37.05” north and longitude 135° 56.10” west. The Site is accessed by a 150 m gravel road north off the Silver Trail Highway approximately 4.2 km northwest of the Village of Mayo. The Facility serves as a domestic solid waste disposal facility for the residents of Mayo, the citizens of the Na-Cho Nyak Dun living outside of the municipal boundaries, as well as other peripheral residents, businesses, contractors, Government agencies, Exploration and Mining Companies. The Facility is not authorized burn household waste; however, untreated brush and wood products are permitted to be burned at the Site. Special wastes that are authorized for storage on-Site include household special waste, waste oil, waste batteries, waste paints, waste solvents and waste fuels.
- **Site Topography:** The Facility is located within the Stewart River Plateau, which is characterized by rolling uplands with steep slopes leading into U-shaped valleys. The Facility is at an elevation of approximately 533 m (1,750 feet) above sea level and lies within the Mayo and Stewart River watersheds. The regional topography slopes south towards the Stewart River (Energy Mines and Resources Canada, 1985). The Site is located near a topographic high that divides the Stewart River and Mayo River drainages. Topography in the area surrounding the Facility slopes gently to the east and northeast towards the Mayo River.
- **Stratigraphy and Hydrogeology:**
 - Topography at the Site is dominated by quaternary surficial deposits;
 - Subsurface conditions were investigated with the installation of four monitoring wells, including MA-MW12-01, MA-MW12-02, MA-MW12-03 and MA-MW12-04, which were completed from July 19 to 21, 2012, under the supervision of Golder Associates for the establishment of a monitoring well network at the Site;



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- The Site stratigraphy was investigated to a maximum depth of 35.4 metres below grade (m bg) in MA-MW12-02, and was found to consist primarily of interbedded sand and silty sand deposits with minor gravel.
 - An unconfined aquifer was encountered during the drilling and installation of four monitoring wells at a depth of between 15.8 and 33.5 m bg;
 - A series of hydraulic response tests were performed on three of the four monitoring wells. The results of these tests indicate the hydraulic conductivity of the unconfined aquifer underlying the Site ranges from 5×10^{-6} m/s to 4×10^{-5} m/s. These values are considered reasonable for sand or silty sand;
 - The horizontal hydraulic gradient at the Site was determined, based on Site topography, to be approximately 0.05 m/m, sloping to the northeast;
 - Average linear groundwater seepage velocity in the surficial aquifer is estimated to range between approximately 7×10^{-7} m/s and 6×10^{-6} m/s (approximately 0.06 to 0.5 metres per day); and
 - Level survey precision on the monitoring wells at the Site was insufficient to determine groundwater flow direction and gradient using water level measurements. Therefore, it was not possible at this time to determine if the conditions of a minimum of two downgradient wells and one upgradient well have been met.
- Groundwater Chemistry:
- The results of a desktop study and several Site visits indicate that the Yukon Contaminated Sites Regulation (CSR) standards for freshwater aquatic life are applicable to the Site;
 - Groundwater samples were collected from monitoring wells MA-MW12-01, MA-MW12-02, MA-MW12-03 and MA-MW12-04 on September 11, 2012, and a surface water sample was collected from a small pond located approximately 2 km southeast of the Facility on September 12, 2012;
 - Chemistry in MA-MW12-02 contained detectable levels of sodium and chloride, as well as a higher ratio of sulphate to bicarbonate when compared to the rest of the samples, indicating possible influence from landfill leachate; and
 - Low levels of petroleum hydrocarbons EPHw₁₉₋₃₂ and HEPHw were detected in three of the monitoring well samples. These are not naturally occurring, and are consistent influence by landfill leachate on groundwater underlying the Site. It is possible that the presence of these hydrocarbons may be a result of the drilling method used to install the well.

The following recommendations are made, based on the results of the 2012 hydrogeological assessment presented in this report:

- As required by the Facility's Waste Management Permit, future groundwater monitoring should be conducted twice a year (spring and late summer);
- Monitoring well location, elevation for ground surface, and the elevation of the top of the PVC standpipe (measuring point) should be surveyed for each well by a professional land surveyor prior to the next monitoring event;



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- Groundwater quality at the Facility should be re-evaluated following an additional round of groundwater monitoring to determine if there are any potential impacts present from landfill leachate; and
- Since the groundwater flow direction may change seasonally, flow direction should be re-evaluated next spring to affirm whether or not the conditions for one upgradient and two downgradient monitoring wells have been met.



Study Limitations

This report was prepared for the Government of Yukon, Community Services Infrastructure Development Branch.

The inferences concerning the Mayo Solid Waste Disposal Facility contained in this report are based on information obtained during the assessment conducted by Golder personnel, and are based solely on the condition of the property at the time of the Site reconnaissance, installation of monitoring wells, and groundwater monitoring events, supplemented by historical and interview information obtained by Golder, as described in this report.

This report was prepared, based in part, on information obtained from historic information sources. In evaluating the subject Site, Golder has relied in good faith on information provided. We accept no responsibility for deficiency or inaccuracy contained in this report as a result of our reliance on the aforementioned information.

The findings and conclusions documented in this report have been prepared for the specific application to this project, and have been developed in a manner consistent with that level of care normally exercised by environmental professionals currently practicing under similar conditions in the jurisdiction.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

With respect to regulatory compliance issues, regulatory statutes are subject to interpretation. These interpretations may change over time, and should be reviewed.

If new information is discovered during future work, Golder should be requested to re-evaluate the conclusions of this report and to provide amendments, as required, prior to any reliance upon the information presented herein.



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1.0 INTRODUCTION

1.1 Background

Golder Associates Ltd. (“Golder”) was retained by the Government of Yukon Community Services Infrastructure Branch on September 28, 2011 to complete a groundwater monitoring well network installation and hydrogeological assessment program at up to 20 solid waste facilities located across the Territory. The Mayo Solid Waste Disposal Facility (the “Facility” or the “Site”) is one of the sites included in the program. This report presents the findings of our investigation.

These works have been performed in accordance with the approved scope of work detailed in Golder’s proposal (P1-1436-0073) dated August 29, 2011, accepted by Yukon Government Community Services on October 7, 2011, and additional works detailed in our letter dated April 26, 2012 and accepted April 30, 2012.

1.2 Purpose and Objectives

A phased approach is typically implemented in order to develop a Site-specific groundwater monitoring program. The following objectives are included in the development of the program:

- Develop a conceptual hydrogeological model of the Site using existing data that identifies potential contaminant source(s), pathways, and receptors;
- Visit the Site to confirm the hydrogeological model, assess Site conditions, and identify monitoring well locations;
- Design a monitoring well network and drilling program;
- Install groundwater monitoring wells in accordance with the plan;
- Sample the groundwater and, if applicable, surface water;
- Analyze the data and identify potential impacts;
- With the new data, re-evaluate the conceptual hydrogeological model and groundwater monitoring program; and
- Provide recommendations, if needed, to further assess potential impacts to groundwater quality.

1.3 Scope and Sequence of Work

The following scope of work was proposed to develop the conceptual hydrogeological model for the Site and installation of a monitoring well network. This work was performed in accordance with the Waste Management Permit (Permit No. 80-006 effective August 11, 2011 to December 31, 2011), relevant Environment Yukon Protocols, and in accordance with the Yukon Environmental and Socioeconomic Assessment Act (YESAA) Decision Document issued for the Site (Document Number 2011-0290-30-1).



In summary, the work completed at the Facility included the following six phases:

- Phase 1 assessed the needs for special considerations at the Site;
- Phase 2 outlined a work plan and schedule;
- Phase 3 consisted of background research;
- Phase 4 consisted of the drill program tender specification and tender process management;
- Phase 5 consisted of the installation of a monitoring well network and collection of data on water levels, water quality, and aquifer parameters; and
- Phase 6 comprised the preparation of a draft of this Hydrogeological Assessment Report, documenting the results of this investigation.

1.4 Qualifications of Assessors

Project Manager

The role of Project Manager was filled by Gary Hamilton, P. Geo., of Golder's Burnaby, BC office. Mr. Hamilton is a senior contaminant Hydrogeologist and Principal with Golder Associates. He has over 25 years of experience, has completed landfill monitoring projects locally, and is very familiar with Yukon environmental regulations. Mr. Hamilton conducted the initial Site inspections, coordinated the drilling work, and reviewed this assessment report.

Project Director

The role of Project Director was filled by Guy Patrick, P. Eng., of Golder's Victoria, BC office. Mr. Patrick is a senior Hydrogeologist and a Principal with Golder Associates. He is a Professional Engineer registered with the Association of Professional Engineers of the Yukon Territory. Mr. Patrick has over 30 years of experience in the field of environmental and hydrogeological assessments.

Field Hydrogeologist-Engineer

The role of Project Hydrogeologist was filled by Calvin Beebe of Golder's Nelson, BC office. Mr. Beebe has a M.Sc. degree in Hydrogeology from Saint Francis Xavier University (2012). He has completed numerous projects as a Hydrogeologist with Golder Associates including work on contaminated sites, and works with senior personnel on a regular basis.

Mr. Beebe was assisted by Ms. Andrea Badger, who joined Golder in May 2012. She obtained a B.Sc. in Civil Engineering with an Environmental Option, from the University of Alberta, Edmonton (2012) and a Diploma of Northern Studies and Outdoor and Environmental Studies at Yukon College, Whitehorse (2007). She has been involved with monitoring well drilling, development, testing, and sampling at landfills across the Yukon since beginning work at Golder. She has also been involved with surface water monitoring at a construction site in Northern British Columbia.



1.5 Authorization

Written authorization and a signed contract to proceed with the work outlined in our proposal dated August 29, 2011 was received by Ms. Laura Prentice, Program Manager, on October 7, 2011. Golder received e-mail authorization to proceed with additional work detailed in our letter dated April 26, 2012 on April 30, 2012. The Change Order for the work was attached to the e-mail message.

2.0 SITE DESCRIPTION AND HISTORY

2.1 Site Location

The Mayo Solid Waste Disposal Facility is located in the central portion of Yukon, within the Yukon Plateau North Ecological Region, and in the Na-Cho Nyak Dun First Nation's traditional territory, at latitude 63° 37.05" north and longitude 135° 56.10" west. The Site is accessed by a 150 m gravel road north off the Silver Trail Highway, approximately 4.2 km northwest of the Village of Mayo (Figure 1).

2.2 Site History

The landfill was reportedly developed in the early 1980s by the Government of Yukon. Since 1984 the Village of Mayo has been operating the Site. A review of historical aerial photographs for the area indicates that the land was undeveloped prior to its use as a landfill. Historically, waste was segregated into domestic, commercial and demolition waste, and was burned weekly. The accumulated burned waste was buried when required.

3.0 METHODOLOGY

3.1 Preliminary Hydrogeological Assessment

The preliminary hydrogeological assessment involved a desktop review and interpretation of existing information, and an inspection of the Facility. The initial inspection of the Facility was conducted in October 2011, and a follow up inspection was conducted on July 19, 2012. The purpose of the preliminary hydrogeological assessment was to identify the appropriate drilling methods, equipment, and potential well locations for the installation of a monitoring well network. This portion of the work included the following three tasks:

- Compilation and review of available information;
- Assessment and interpretation of available hydrogeological data; and
- Development of a conceptual hydrogeological model.

3.1.1 Data Sources

Data used to complete the hydrogeological assessment was obtained from the following sources:



- Bouwer, H. and R.C. Rice, 1976. *A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells*, Water Resources Research, vol. 12, no. 3, pp. 423-428.
- Environment Canada, Meteorological Service of Canada Last Modified 2012-05-29, Website: [http://www.climate.weatheroffice.ec.gc.ca/climate_normals/Canadian Climate Normals or Averages 1971-2000](http://www.climate.weatheroffice.ec.gc.ca/climate_normals/Canadian_Climat_Normals_or_Averages_1971-2000).
- Fetter, C. W., *Applied Hydrogeology*, Third Edition, PRENTICE HALL, New Jersey. 1994.
- Government of Yukon. Environment Act Contaminated Sites Regulation. O.I.C. 2002/171, *Schedule 3 - Generic Numerical Water Standards*.
- Government of Yukon, Yukon Environment, *Protocol for the Contaminated Sites Regulation Under the Environment Act*. 2011.
- Government of Yukon, Yukon Geological Survey, YGS MapMaker Online Website: <http://maps.gov.yk.ca/imf.jsp?site=YGS>
- Government of Yukon, Yukon Mining and Lands Viewer Website: <http://maps.gov.yk.ca/imf.jsp?site=miningLands>
- Government of Yukon, Yukon Water, Water Data Catalogue Website: <http://yukonwater.ca/MonitoringYukonWater/WaterDataCatalogue/>
- Government of Yukon, Department of Environment, Compiled from The Yukon Water Well Registry *Summary of Yukon Water Wells*, May 11, 2006- Website: <http://www.env.gov.yk.ca/monitoringenvironment/hydrology.php>
- Mayo, Village of, *Solid Waste Management Plan*. Prepared for the Department of Environment. 2003.
- Natural Resources Canada, Groundwater Information Network Website: http://ngwd-bdnes.cits.nrcan.gc.ca/service/api_ngwds:gin/en/wmc/aquifermap.html
- Hughes, O. L., 1979. *Surficial Geology and Geomorphology, Janet Lake, Yukon Territory*, Geological Survey of Canada, Map 4-1982, scale 1:100,000.
- Site inspections of October 19, 2011 and July 19, 2012.
- Surveys and Mapping Branch, Department of Energy, Mines, and Resources. The Atlas of Canada Website: <http://atlas.nrcan.gc.ca/site/english/maps/topo/map> Map 105 M/12, scale 1:50,000.

3.1.2 Site Inspections

Prior to the Facility reconnaissance, Golder developed a Facility-specific health and safety plan (HASP) for implementation during the field work. The HASP included a description of the potential hazards that could be encountered during the Facility reconnaissance and proposed mitigation. Site inspections were conducted on October 19, 2011 and July 19, 2012. The initial Site visit was conducted to review the layout of the Facility and confirm geological and topographic information obtained from the review of background data.



Proposed monitoring well locations were also reviewed for access constraints. During the second Site visit, the monitoring wells were drilled and installed. Selected photographs of the Facility were taken during the reconnaissance and are presented in Appendix A.

3.1.3 Background Geological Information Sources

Geological information was obtained through a review of topographic and geological maps from the Department of Energy, Mines, and Resources Canada, and through the Canadian Geological Survey. Additional data on the subsurface of the surrounding area was obtained through the online Groundwater Information Network (GIN), provided by Natural Resources Canada (NRCAN), and the Yukon Water Well Registry. A search of the Yukon Water online Data Catalogue did not identify water testing results within the vicinity of the Facility.

3.1.4 Contaminated Sites Registry

On October 10, 2012 Golder contacted Ms. Bethany Peters, an Environmental Protection Analyst with Environment Yukon, to conduct a Contaminated Site Registry search for the Mayo Facility. The search indicated that petroleum hydrocarbon contaminated soil originating from the Stewart River Dike Project was taken to the Mayo landfill in 2007. 280m³ of the approximately 1000 m³ original stockpile was relocated to a land treatment facility, but the remainder of the contaminated stockpile stayed at the landfill. No other contaminated site files or spill reports were located for the Mayo Solid Waste Disposal Facility; however, it was noted that the Facility was largely unmonitored, and that there may have been opportunity for improper disposal and potentially unreported spillage of contaminants during its operation.

3.1.5 Review of Solid Waste Disposal Facility Permit and Waste Management Plan

Waste Management Permit No. 80-006 was issued on August 11, 2012 for the Facility. It states that the Facility is to be closed in compliance with any applicable requirements in federal, territorial, and municipal legislation including the Environment Act and Solid Waste Regulations.

Monitoring requirements set out in Waste Management Permit 80-006 include:

- Monitoring water levels and collecting water samples from groundwater monitoring wells at the Facility twice a year (spring and late summer);
- Sampling of downgradient surface water bodies concurrently with the groundwater sampling;
- Analyze surface water and groundwater samples for the parameters outlined in Section 3.3;



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- Analyze water samples at a laboratory that is accredited as conforming to ISO/IEC 17025 by an accrediting body that conforms to ISO/IEC 17011 standards; and
- Submitting monitoring results to Environment Yukon by January 31 each year.

A summary of the Facility permits and groundwater monitoring requirements for the Site are summarized in Table 1 below.

Table 1: Summary of Waste Disposal Facility Permits and Groundwater Monitoring Requirements

Site	Waste Disposal Facility Permit Number	Permit Type	Solid Waste Management Plan	Required Groundwater Monitoring
Mayo Solid Waste Disposal Facility	80-006	Solid Waste; Special Waste; and Air Emissions	Village of Mayo (2003)	Twice Per Year

3.1.6 Review of Environment Yukon Information

Golder reviewed documents pertaining to the Mayo Facility on the Yukon Environment and Socioeconomic Board (YESAB) online registry on November 19, 2012. Documents reviewed included: the most current Waste Facility Permit issued for the Facility, the most current Solid Waste Operation Plan, and the Yukon Environmental and Socioeconomic Act Decision Document.

3.2 Field Investigations

3.2.1 Scope of Field Investigations

The scope of the field investigations included the following:

- Four on-Site monitoring wells were drilled by Midnight Sun Drilling, under the supervision of Golder Associates from July 19 to 21, 2012;
- Monitoring wells were developed and sampled by Golder on September 11, 2012. The water level at each well was measured prior to purging and sampling, and physiochemical parameters were monitored at each well during development and sampling. Groundwater samples were sent to ALS Environmental's laboratory in Whitehorse, YT;
- Slug tests were carried out on all four newly installed monitoring wells to assess horizontal hydraulic conductivity and linear groundwater velocity at the Site; and
- Results of field and laboratory data are summarized and interpreted in this report.



3.2.2 Groundwater Monitoring Well Network

Groundwater monitoring well installation was undertaken in general accordance with Yukon Contaminated Site Regulation Protocol (Yukon Environment, 2011).

Four (4) groundwater monitoring wells were proposed for installation at the Site to characterize groundwater conditions underlying the waste disposal Facility. A Site plan showing the monitoring well locations and key Site features is provided in Figure 2. MA-MW12-04 was intended to characterize upgradient groundwater conditions, while MA-MW12-01, MA-MW12-02, and MA-MW12-03 were intended to assess groundwater conditions downgradient of the landfill. Locations of the monitoring wells (Figure 2) were selected based on aerial photography, review of Site history, Site topography, suspected groundwater flow direction, and a Site inspection.

Specifics for each well are listed below:

- MA-MW12-01 was installed in the southeast corner of the Site, and advanced to a depth of 34.7 m bg;
- MA-MW12-02 was installed in the center of the east edge of the Site, and advanced to a depth of 34.1 m bg;
- MA-MW12-03 was installed on the northeast corner of the Site, and advanced to a depth of 35.4 m bg; and
- MA-MW12-04 was installed on the west edge of the Site, and advanced to a depth of 20.4 m bg.

Wells were installed using a Driltech Marlin 5 truck-mounted air rotary drill rig.

Grab samples of drill cuttings were taken at regular intervals to log the stratigraphy encountered in each borehole. Borehole logs, documenting observed stratigraphy, along with well construction details, are provided in Appendix B. A summary of the stratigraphy and well construction details is provided in Table 2.

Each monitoring well was completed with the top of the well screen installed as close as possible to the interval where the moisture content of the formation appeared to be transitioning from unsaturated to saturated conditions.

Installation details are included on the borehole logs in Appendix B. Typical completion details are:

- Monitoring wells were completed with 50 mm, flush threaded Schedule 40 PVC casing;
- A 3 m long PVC, factory-slotted well screen (10-slot) was installed in all three monitoring wells;
- PVC casing was installed above the well screen to about 0.90 m above grade;



- A silica sand filter pack was used to fill the annulus between the PVC well screen and the borehole wall. The sand pack was extended approximately 1 m above the top of the screened interval;
- A bentonite chip seal, approximately 1 m thick, was placed directly above the sand pack. The remainder of the annulus was filled with bentonite grout;
- Each well was covered with a PVC end-cap, and a lockable steel protective casing was installed to protect the wellhead; and
- All wells were developed by removing a minimum of three well volumes using dedicated Waterra™ tubing and a Hydrolift™ pump or hand bailer. Development logs are provided in Appendix C.

Table 2: Well Construction Details

Well ID	Drilled Depth (m bg)	Aquifer Unit Monitored	Casing Diameter (mm)	Screened Interval (m bg)	Filter Pack Interval (m bg)
MA-MW12-01	34.7	Silty SAND	50	31.7 – 34.7	30.8 – 34.7
MA-MW12-02	34.1	Silty SAND	50	31.1 – 34.1	30.5 – 34.1
MA-MW12-03	35.4	Silty SAND	50	32.3 – 35.4	29.6 – 35.4
MA-MW12-04	20.4	Silty SAND	50	17.4 – 20.4	16.2 – 20.4

3.2.3 Monitoring Well Surveying

Golder carried out a level survey to determine the vertical elevation to the top of the PVC wellhead (measuring point) for each well on July 21, 2012. Initial absolute elevation was obtained using a Trimble hand-held GPS instrument with a vertical accuracy of ± 0.6 m. Table 3 presents a summary of survey data and water level measurements (recorded on September 11, 2012). Horizontal position of all wells was obtained by GPS with a precision of ± 0.5 m or better.

Table 3: Monitoring Well Locations and Groundwater Elevations September 11, 2012

Well ID	UTM Coordinates (Zone 8 North)	Top of PVC Casing Elevation (masl)	Standing Water Level (mbtoc)	Groundwater Elevation (masl)
MA-MW12-01	7054724.7 m N 453609.7 m E	532.85	32.19	500.66
MA-MW12-02	7054778.0 m N 453635.5 m E	533.35	32.08	501.27
MA-MW12-03	7054839.3 m N 453631.5 m E	533.30	31.68	501.62
MA-MW12-04	7054796.4 m N 453523.2 m E	518.10	17.65	500.45



3.2.4 Groundwater Monitoring Event

Golder developed the four monitoring wells on September 11, 2012. Due to logistical constraints these wells could not be developed immediately following installation.

All four wells were purged and sampled on September 11, 2012. The procedure used for sampling followed Contaminated Sites Regulation Protocol No. 7. Prior to purging each well, the water level was first measured with an electronic measuring tape. Approximately five well volumes were then purged from each well, using 5/8 inch high density polyethylene (HDPE) Waterra™ tubing, a foot valve, and a Hydrolift™ pump. During purging, physiochemical parameters (pH, temperature, EC) were collected at regular intervals using a Hanna Instruments HI 991300 meter, and purging was continued until field parameters were stable before sampling. Groundwater development and sampling datasheets are presented in Appendix C. In addition to the four groundwater monitoring wells that were sampled, a surface water sample was collected from the Mayo River, approximately 2 km southeast of the Site.

Sample containers and appropriate preservatives were obtained from ALS's Whitehorse laboratory. Samples for dissolved metals were field filtered using 0.45-micron, in-line filters and preserved with nitric acid. Samples were kept in coolers with ice packs prior to their delivery, and were delivered within appropriate holding times. ALS is certified by the Canadian Association for Laboratory Accreditation, and is accredited as conforming to ISO/IEC 17025.

3.2.5 Rising Head Hydraulic Response Tests

Hydraulic response (slug) tests were performed on September 12, 2012, to assess the hydraulic conductivity of the surficial aquifer underlying the Site. Tests were performed using a 1.0 m long, solid 38 mm diameter PVC slug and a Solinst Levelogger pressure transducer set to measure head fluctuations at one-second intervals. Manual water level measurements were also recorded throughout the tests.

A summary of the analysis of these tests is provided in Section 4.5.

3.3 Laboratory Analysis

Parameters included in the laboratory testing of groundwater samples are summarized in Table 4. The parameter list complies with the Facility's Waste Management Permit (Permit No. 80-006).

Sampling and analysis were undertaken in general accordance with Yukon CSR Protocols 2 and 5 (Government of Yukon, 2011).



Table 4: Parameters Analyzed in September 2012

Sample ID	General Parameters	Nutrients	Dissolved Metals	PAH, BTEX, DOC	VOCs
MA-MW12-01	√	√	√	√	√
MA-MW12-02	√	√	√	√	√
MA-MW12-03	√	√	√	√	√
MA-MW12-04	√	√	√	√	√
Mayo Surface Water	√	√	√	√	√

3.4 Quality Assurance / Quality Control

Table 5 provides a detailed summary of the Quality Assurance (QA) and Quality Control (QC) measures taken by Golder to ensure the accuracy and integrity of groundwater quality sample analysis.

Table 5: Review of QA/QC Procedures Taken

QA/QC Aspect	Evidence and Evaluation
Data Representativeness	
Sample Integrity	All samples were kept at the appropriate temperature and delivered to the laboratory within the appropriate holding times.
Background Samples	Groundwater flow direction could not be established due to lack of vertical survey precision of the monitoring well network. Estimated groundwater flow direction based on topography indicates that MA-MW12-04 is upgradient of the Facility.
Field Procedures	Monitoring wells were purged/developed and sampled using dedicated tubing. Equipment used in sampling more than one well was decontaminated using soap (Alconox™) and distilled water. Surface water samples were collected using one-time-use syringes.
Calibration of Field Equipment	Calibration of field equipment was undertaken daily, prior to sampling wells.
Data Precision and Accuracy	
Blind Duplicate	One blind duplicate was collected from FA-MW12-04 (Report #1114360073-1100) during the August/September 2012 groundwater monitoring event. Of the 110 analyte pairs tested, RPD values could not be calculated for 89 of the pairs, as both values in each pair were below the laboratory method detection limit (MDL). Of the remaining analyte pairs tested, 1 exceeded the RPD acceptance criteria of $\pm 30\%$ and only 2 were above 5%.
Trip Blanks	A trip blank was not collected during the August 2012 groundwater monitoring event.



QA/QC Aspect	Evidence and Evaluation
Laboratory Internal QA/QC	Laboratory QA/QC is detailed in the primary laboratory report (Appendix E). Overall, the lab report showed acceptable testing frequency and acceptable results for the method blanks, laboratory duplicates and matrix spikes.
Holding Times	Samples were delivered outside the acceptable (24 hour) hold time for physical parameters; however, field parameters were taken during sample collection to compensate. Laboratory analysis for Volatile Organic Carbons took place one day outside the recommended three day hold time.
Laboratory Detection Limit	Laboratory reports indicate that detection limits were below the standards applicable to this assessment.
Completeness of test program	Wells were sampled in accordance with the Site Assessment and Work Plan criteria.
Validity of Data Set	The data quality review indicates no significant systematic errors in the data collection or analysis process for groundwater. The results of laboratory internal QA/QC and analysis of blind duplicates were acceptable, and therefore, the data set is considered valid and complete for use as the basis for groundwater assessment.

3.5 Application of Applicable Water Quality Standards

In accordance with the Government of Yukon’s solid waste facility monitoring requirements, groundwater wells and a downgradient surface water receptor were sampled and tested for the following parameters:

- Major ions (Ca, Mg, Na, K, Cl, SO₄, N, NO₂, NO₃ and P)
- Bicarbonate
- Chemical oxygen demand
- Dissolved Metals
- pH
- Total Kjeldahl Nitrogen
- Mercury
- Total dissolved solids
- EPH_{w10-32} & VH_{w6-10}
- Hardness
- Ammonia
- BTEX
- Alkalinity
- Dissolved organic carbon
- PAHs
- Carbonate
- VOCs

Groundwater and surface water analytical results were compared to the Yukon CSR water quality standards or to the Canadian Environmental Quality Guidelines for constituents where no Yukon standards were available.

The four types of water uses outlined in the CSR, the relevant water quality standards, and their applicability to this assessment are presented in Table 6.



Table 6: Applicable Water Quality Standards

Water Use	Applicable Water Quality Standard	Applicable Plume Radius (km)	Applicability to Assessment
Aquatic Life	Schedule 3 – Contaminated Sites Regulation (O.I.C. 2002/171)	1.0	Applicable
Drinking Water	Schedule 3 – Contaminated Sites Regulation (O.I.C. 2002/171)	1.5	Not Applicable
Irrigation	Schedule 3 – Contaminated Sites Regulation (O.I.C. 2002/171)	1.5	Not Applicable
Livestock	Schedule 3 – Contaminated Sites Regulation (O.I.C. 2002/171)	1.5	Not Applicable

The following discusses the applicability of each water quality standard to the Facility.

Aquatic Life

A search of the Yukon LandsViewer website and Google Earth images from 2012, conducted by Golder November 20, 2012, showed that the Mayo River falls within a 1 km radius of the Site under which aquatic life standards are applied, as specified in the CSR. It was therefore determined that aquatic life standards were **applicable** for the Mayo Facility.

Drinking Water

A search of drinking water wells on the Groundwater Information Network website and the Yukon Water Data Catalogue (accessed November 20, 2012) showed no drinking water wells located along the predicted downgradient direction between the Site and the Mayo River, nor in any other area within a 1.5 km radius of the Site. It was deemed that CSR drinking water standards were **not applicable** for the Mayo Facility.

Irrigation

A review of the Summary of Yukon Water Wells, compiled from The Yukon Water Well Registry, reviewed by Golder on November 20, 2012, showed no irrigation wells on record for the Mayo area. It should be noted that this is not a complete record of all wells in the Yukon, and it is possible that there are irrigation wells in the area. A review of Google Earth Images from 2012, conducted by Golder on November 20, 2012, as well as several visits to the Facility conducted in July and September 2012 showed no agricultural land within 1.5 km of the Facility. It was therefore considered that CSR water quality standards for irrigation are **not applicable** to the Mayo Facility.



Livestock

A review of the Summary of Yukon Water Wells, compiled from The Yukon Water Well Registry, reviewed by Golder on November 20, 2012, showed no wells on record as being for livestock use in the Mayo area. It was therefore considered that CSR standards for livestock are **not applicable** to the Facility. It should be noted that this is not a complete record of all wells in the Yukon and that it is possible that livestock facilities exist in the area.

4.0 CONCEPTUAL HYDROGEOLOGICAL MODEL

4.1 Setting

The Facility is at an elevation of approximately 535 m (1,755 feet) above sea level, and lies within the Mayo River and Stewart River watersheds. A cleared area of approximately 24,000 square meters, that is generally flat, is present at the Site. Local topography is characteristic glaciofluvial outwash plain deposits and was found to be gently sloping to the northeast at the Site. The regional hydraulic gradient near the Site is expected to follow the regional topography, which slopes northeast towards the Mayo River.

4.2 Climate

Climate at the Site is likely similar to that at the Mayo Airport climate station (Climate ID 2101700), located approximately 3 kilometres east of the Facility at an elevation of approximately 502 m above sea level. Average monthly precipitation reported at the Mayo Airport station ranges from a low average of 9.2 mm in April to a high average of 54.4 mm in July. The average annual precipitation is approximately 312.9 mm, including 147 cm as snowfall. Temperature ranges from a low average of -25.7°C in January to a high average of 16.0°C in July. (Environment Canada, 2012, Canadian Climate Normals 1971 to 2000).

Annual precipitation is relatively low (approximately 300 mm per year). This suggests that the amount of infiltration of water through buried waste at the Site and into the subsurface soils is relatively low. With a significant portion of the precipitation occurring in the form of snow, and the relatively cold climate, little infiltration would be expected during the winter months. The greatest potential for infiltration of water through the waste is during the spring snow melt; however, a significant portion of the water from snow melt would typically occur as surface runoff during this period.



4.3 Geology and Hydrogeology

4.3.1 Geological Framework

The central Yukon, including the Mayo area, has undergone several episodes of glaciation. During glaciation, sediments such as glacial till, glaciofluvial, and glaciolacustrine sediments were deposited, especially in low elevation areas such as the Stewart River Valley, located downgradient of the Site.

The Mayo area is mapped as being underlain primarily glaciofluvial, alluvial and lacustrine plain sediments of quaternary origin. Ablation till, colluvial glacial debris, morainal deposits, and bedrock exposures are found at higher elevations in the mountains to the north and west of the Site.

Surficial geology maps published by the Yukon Geological Survey (YGS) indicate natural surficial materials at the Site are characteristic of gently sloping glaciofluvial plain deposits. In general, deposits consist of well compacted to non-compacted sediments that are primarily gravel, with some sand, and a thin veneer of silt or fine sand. The thickness of the unconsolidated sediments was estimated to be between 2 and 50 m thick (Hughes, 1979).

4.3.2 Principal Aquifer

As shown in Figure 4, it is inferred that groundwater at the Site occurs in a shallow, unconfined aquifer composed primarily of unconsolidated sand and gravel, with minor silt, and cobbles. For the purpose of this report, this aquifer has been named the Surficial Aquifer (Table 7).

Table 7: Aquifer Units Encountered at the Site

Aquifer Name	Location	Aquifer Type	Comments
Surficial Aquifer	MA-MW12-01 MA-MW12-02 MA-MW12-03 MA-MW12-04	Unconfined; unconsolidated porous media	<ul style="list-style-type: none">▪ Silty SAND▪ Shallow aquifer▪ Unconfined

4.4 Groundwater Flow Systems

4.4.1 Regional Groundwater Flow

Regional groundwater flow is assumed to follow topographic gradient and to be primarily to the south, discharging to the Stewart River. Shallow groundwater likely discharges first to the Mayo River, before flowing into the Stewart River.

4.4.2 Local Groundwater Flow

The Site is located near a topographic high that divides the Stewart River and Mayo River drainages. Topography in the area surrounding the Facility slopes gently to the east and northeast towards the Mayo River (elevation 520 m amsl). Groundwater flow is inferred to be to the northeast following local topography, with discharge to the Mayo River.



Golder used the groundwater depth data from September 11, 2012 and well survey elevation information collected in July 2012 to calculate the groundwater elevation at each monitoring well. Elevations of TOC for each well were not obtained with sufficient precision to determine the direction of groundwater flow at the Site. The water level measurements and groundwater elevations are presented in Table 3.

The horizontal hydraulic gradient at the Site is estimated, based on topographic gradient, to be a maximum of approximately 0.05 m/m.

4.5 Hydraulic Response Tests

Golder Associates conducted slug tests on three of the four newly installed monitoring wells at the Facility. The slug tests were analyzed using AQTESOLV version 4.5, and the results are included in Appendix D. Table 8 provides a summary of the findings.

Table 8: Estimated Hydraulic Conductivity

Monitoring Well ID	Primary Hydrogeological Unit	Solution Used	Calculated Hydraulic Conductivity (m/s)
MA-MW12-01	Silty SAND	Bouwer-Rice (1976)	4×10^{-5}
MA-MW12-02	Silty SAND	Bouwer-Rice (1976)	5×10^{-6}
MA-MW12-03	Silty SAND	Bouwer-Rice (1976)	2×10^{-5}

4.6 Estimated Linear Groundwater Velocity

As determined from the slug tests summarized in Table 8, the hydraulic conductivity of the shallow aquifer underlying the Site is ranges between 5×10^{-6} m/s and 4×10^{-5} m/s. The horizontal hydraulic gradient across the Site was assessed, using the monitoring well network, to be approximately 0.05 m/m to the east. A range of reasonable linear groundwater velocities is calculated using the following equation:

$$V = (Ki)/n$$

Where:

- V: is the groundwater velocity in meters per second (m/s);
- K: is the hydraulic conductivity in m/s as determined by slug testing;
- i: is the horizontal hydraulic gradient (m/m); and
- n: is the porosity which is estimated to be approximately 0.35 (Fetter, 1994) silty SAND.

The resulting groundwater velocity is estimated to be from 7×10^{-7} m/s to 6×10^{-6} m/s and (approximately 0.06 to 0.5 metres per day). Groundwater at the Site may travel faster or slower than these estimates due to inaccuracies, heterogeneities, or seasonal variations in these parameters.



4.7 Potential Contamination of Groundwater and Transport Mechanisms

Potential sources and transport mechanisms of groundwater contamination are evaluated based on the Site history, Site inspections, hydrogeological investigation, and contaminant transport principals. Potential sources include:

- Leachate from present and former domestic waste, commercial waste, metals, wood, construction debris, and any other potential waste disposed of at the Facility. Potential contaminates leaching from these sources include: heavy metals, nutrients (NO₃, NH₃), organic hydrocarbons (Fuels, PAH's, chlorinated hydrocarbons), and salts; and
- Leakage and spillage from on-Site hydrocarbon storage areas.

Transport mechanisms that may act on these sources of contamination and cause potential contamination of downgradient receptors include:

- Percolation of precipitation from the surface, through the unsaturated zone, and into the saturated zone.
- Transport of contaminants within the saturated zone (aquifer) to other downgradient locations.

5.0 GROUNDWATER IMPACT ASSESSMENT

5.1 Review of Groundwater Chemistry

As discussed in section 3.2.4, one round of groundwater monitoring was conducted on the four newly installed monitoring wells at the Mayo Solid Waste Disposal Facility on September 11, 2012 and one surface water sampling location downgradient from the Site on September 12, 2012. Chain of custody forms for the groundwater samples collected, the complete groundwater chemistry results, and QA/QC data can be found in Appendix E. Table 9 summarizes parameters from the groundwater chemistry results, which are used to identify potential leachate contamination.

Table 9: Important Groundwater Chemistry Results

Sample Location	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Ammonia (mg/L)	Sulphate (mg/L)	DOC (mg/L)	Sodium (mg/L)
MA-MW12-01	364	<0.50	0.0306	104	1.24	<2.0
MA-MW12-02	4270	5.1	0.420	633	4.09	<2.0
MA-MW12-03	743	<0.50	0.322	54.7	0.92	166.0
MA-MW12-04	1001	<0.50	0.0090	83.7	0.74	<2.0
Surface Water	145	<0.50	<0.0050	29.9	2.77	<2.0



Total Dissolved Solids

Total dissolved solids (TDS) is a measurement of the total amount of dissolved organic and inorganic material contained within a liquid. Elevated TDS can indicate the presence of groundwater contamination caused by, for example, landfill leachate. Typically, major ions that comprise TDS include: NO_3 , NH_3 , Na, K, Mg, Ca, SO_4 , Cl, and HCO_3 . Values of TDS in the monitoring well samples ranged from 364 mg/L to 4270 mg/L. Levels in MA-MW12-02 (4270 mg/L) and MA-MW12-04 (1001 mg/L) were higher than normal for naturally occurring groundwater and are consistent with influence from landfill leachate. The remainder of samples were within the normal range for naturally occurring groundwater. The TDS concentration in the surface water sample was slightly lower than the groundwater samples (145 mg/L), as is typically expected for surface water.

Dissolved Organic Carbon

Dissolved organic carbon (DOC) concentrations can be elevated by the presence of leachate originating from decomposed organic matter. Levels associated with landfill leachate can be in the hundreds or thousands of mg/L. DOC levels from all monitoring wells at the Mayo Site were within the normal range for naturally occurring groundwater. The level of DOC detected in the surface water sample (2.77 mg/L) was within the range associated with naturally occurring surface water. DOC concentrations in both groundwater and surface water samples do not show evidence of influence from landfill leachate.

Chloride

Chloride is often used as a tracer for anthropogenic influence on groundwater. Elevated chloride levels are associated with a number of sources including sewage, leachate, and road salting. In the case of landfills, elevated chloride might be expected due to degradation of waste with a high chloride concentration. The level of chloride in the sample taken from MA-MW12-02 was 5.1 mg/L. Chloride levels in the remainder of the samples were below detectable limits. These levels are considered to be in the low end of the range expected in naturally occurring waters.

Ammonia

Ammonia is a typical landfill leachate indicator. Ammonia concentrations in the groundwater samples ranged from 0.0090 mg/L in MA-MW12-04 to 0.420 mg/L in MA-MW12-02. These levels are well below the lowest CSR standard for ammonia, and do not indicate influence from landfill leachate.

Metals

Metals concentrations in surface water and groundwater samples were within the range expected in naturally occurring waters. No metals concentrations exceeded any standards set by the Yukon CSR standards for aquatic life.



Organics

Detectable levels of organic constituents are often a sign of leachate contamination. Samples were analyzed for BTEX, PAH, EPH_{w10-32} & VH_{w6-10} , and chlorinated hydrocarbons. Detectable level of EPH_{w19-32} and HEPHw were above detectable levels in MA-MW12-01, MA-MW12-03, and MA-MW12-04. As these chemicals are not found in naturally occurring groundwater, their presence suggests influence from landfill leachate.

5.2 Interpretation of Groundwater Chemistry

Factors that may affect natural groundwater quality include:

- The source and chemical composition of recharge water;
- The lithological and hydrological properties of the geologic unit;
- The various chemical processes occurring within the geologic unit; and
- The amount of time the water has remained in contact with the geologic unit (residence time).

These factors may affect the type and quantities of dissolved constituents in groundwater. The ionic composition of water can be used to classify the water into ionic types based on the dominant dissolved cation and anion, expressed in milliequivalents per litre (meq/L). These can be compared for different water samples using various types of plots.

The ionic compositions of samples from the Site were compared to identify differences in water chemistry by plotting the meq/L concentrations of the samples on three types of diagrams: a Schoeller plot (Figure 7), a Piper diagram (Figure 8), and a Stiff diagram (Figure 9).

- Schoeller: The Schoeller semi-logarithmic diagram (Figure 7) shows total concentrations of major cations and anions, and may be used to identify different water types. Here, the Schoeller plot indicates that the samples have similar ratios of major ions with different concentrations in each sample. The exception to this is the sample from MA-MW12-02, which is the only sample that contains detectable levels of sodium and chloride.
- Piper: The Piper diagram (Figure 8) is used to compare the ratios of major ions and can be used to identify different water types. The Piper diagram illustrates that most of the samples have similar ratios of major ions, the exception being MA-MW12-02, which is enriched in sulphate and sodium plus potassium compared to the rest of the samples. MA-MW12-02 is classified as Na-Ca-SO₄-HCO₃ type water, while the remainder of samples are classified as Ca-Mg-HCO₃-SO₄ type water.
- Stiff: The stiff diagram allows for differences in groundwater chemistry to be presented and viewed spatially. Here, the stiff diagram shows that dominant MA-MW12-01, MA-MW12-03, MA-MW12-04, and the surface water sample all consist of calcium and bicarbonate. In MA-MW12-02 the dominant ions are sulphate and sodium.



6.0 CONCLUSIONS

The following conclusions are made based on the results of the 2012 hydrogeological assessment:

■ Stratigraphy and Hydrogeology:

- Topography at the Site is dominated by quaternary surficial deposits;
- Subsurface conditions were investigated with the installation of four monitoring wells, including MA-MW12-01, MA-MW12-02, MA-MW12-03 and MA-MW12-04, which were completed from July 19 to 21, 2012, under the supervision of Golder Associates for the establishment of a monitoring well network at the Site;
- The Site stratigraphy was investigated to a maximum depth of 35.4 metres below grade (m bg) in MA-MW12-02, and was found to consist primarily of interbedded sand and silty sand deposits with minor gravel.
- An unconfined aquifer was encountered during the drilling and installation of four monitoring wells at a depth of between 15.8 and 33.5 m bg;
- A series of hydraulic response tests were performed on three of the four monitoring wells. The results of these tests indicate the hydraulic conductivity of the unconfined aquifer underlying the Site ranges from 5×10^{-6} m/s to 4×10^{-5} m/s. These values are considered reasonable for sand or silty sand;
- The horizontal hydraulic gradient at the Site was determined, based on Site topography, to be approximately 0.05 m/m, sloping to the northeast;
- Average linear groundwater seepage velocity in the surficial aquifer is estimated to range between approximately 7×10^{-7} m/s and 6×10^{-6} m/s (approximately 0.06 to 0.5 metres per day); and
- Level survey precision on the monitoring wells at the Site was insufficient to determine groundwater flow direction and gradient using water level measurements. Therefore, it was not possible at this time to determine if the conditions of a minimum of two downgradient wells and one upgradient well have been met.

■ Groundwater Chemistry:

- The results of a desktop study and several Site visits indicate that the Yukon Contaminated Sites Regulation (CSR) standards for freshwater aquatic life are applicable to the Site;
- Groundwater samples were collected from monitoring wells MA-MW12-01, MA-MW12-02, MA-MW12-03 and MA-MW12-04 on September 11, 2012, and a surface water sample was collected from a small pond located approximately 2 km southeast of the Facility on September 12, 2012;
- Chemistry in MA-MW12-02 contained detectable levels of sodium and chloride, as well as a higher ratio of sulphate to bicarbonate when compared to the rest of the samples, indicating possible influence from landfill leachate; and
- Low levels of petroleum hydrocarbons EPHw₁₉₋₃₂ and HEPHw were detected in three of the monitoring well samples. These are not naturally occurring, and are consistent influence by landfill leachate on groundwater underlying the Site. It is possible that the presence of these hydrocarbons may be a result of the drilling method used to install the well.



7.0 RECOMMENDATIONS

The following recommendations are made based on the results of the hydrogeological assessment presented in this report:

- As required by the Facility's Waste Management Permit, future groundwater monitoring should be conducted twice a year (spring and late summer);
- Monitoring well location, elevation for ground surface, and the elevation of the top of the PVC standpipe (measuring point) should be surveyed for each well by a professional land surveyor prior to the next monitoring event;
- Groundwater quality at the Facility should be reevaluated following an additional round of groundwater monitoring to determine if there are any potential impacts present from landfill leachate; and
- Since the groundwater flow direction may change seasonally, flow direction should be re-evaluated next spring to affirm whether or not the conditions for one upgradient and two downgradient monitoring wells have been met.

8.0 CLOSURE

We trust that this draft report is adequate for your current needs. Should you have any questions or require any additional information, please contact the undersigned at your convenience.

GOLDER ASSOCIATES LTD.

ORIGINAL SIGNED

Calvin Beebe, M.Sc.
Environmental Scientist

Reviewed By:

ORIGINAL SIGNED

Gary Hamilton, P. Geo.
Principal Hydrogeologist

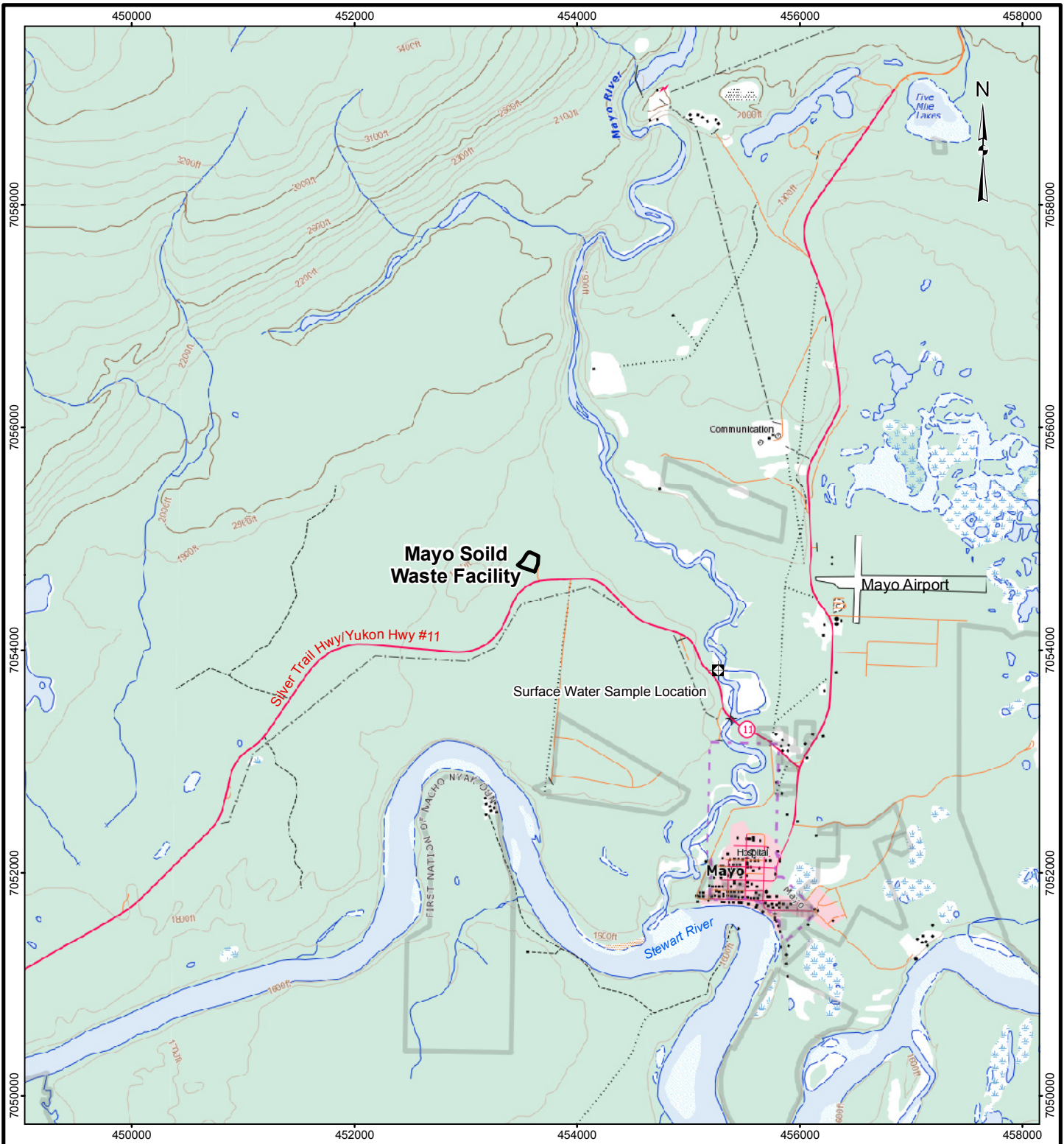
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Guy C. Patrick, P.Eng.
Principal Senior Hydrogeologist

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LEGEND

- FACILITY
- + SURFACE WATER SAMPLE LOCATION



REFERENCE

BASEDATA OBTAINED FROM GEOGRATIS (NATURAL RESOURCES CANADA).
 DATUM: NAD83 PROJECTION: UTM ZONE 8

PROJECT YUKON GOVERNMENT - COMMUNITY SERVICES
 SOLID WASTE DISPOSAL FACILITY
 MAYO, YUKON

TITLE

KEY PLAN

Golder Associates Greater Vancouver Office, B.C.	PROJECT No. 11-1436-0073		PHASE No. 1200	
	DESIGN	CB	2 Oct. 2012	SCALE AS SHOWN
	GIS	DSC	4 Oct. 2012	REV. 0
	CHECK			
REVIEW				

FIGURE: 1



LEGEND

 MONITORING WELL LOCATION

REFERENCES / SPECIFICATIONS

1. SITE PLAN IS NOT CONSISTENT WITH OBSERVED CONDITION DURING DRILLING, BUT IS INTENDED TO SHOW LOCATIONS OF NEWLY INSTALLED MONITORING WELLS IN RELATION TO BURIED STRUCTURES.

NOTES



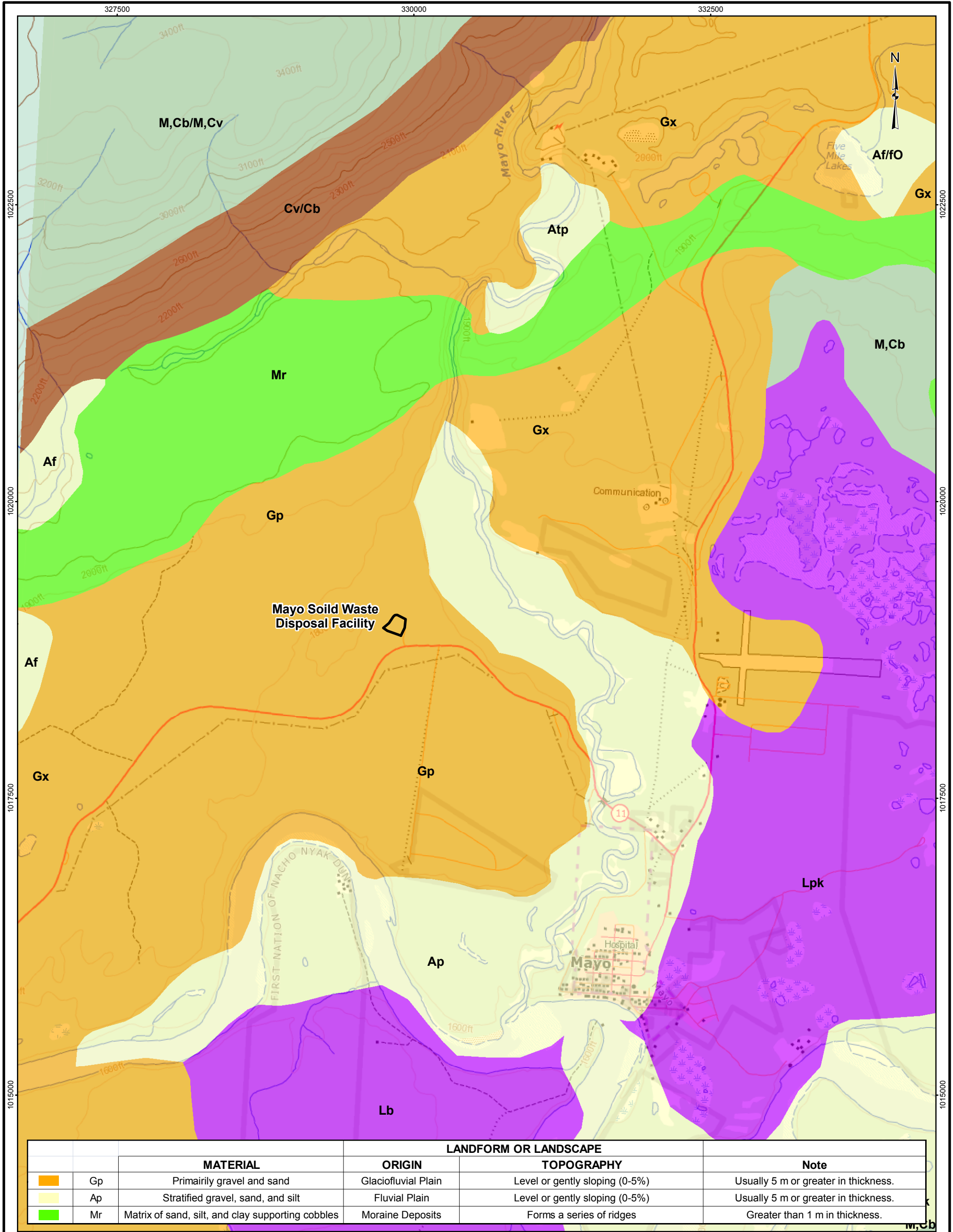
PROJECT GOVERNMENT OF YUKON, DEPARTMENT OF COMMUNITY SERVICES
SOLID WASTE DISPOSAL FACILITY
MAYO, YUKON

TITLE **SITE PLAN AND CROSS SECTION LOCATION**



PROJECT No.	1114360073-1200-1260		FILE No.	14360073-1200-1260-FIG_02
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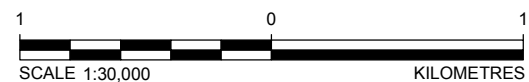
FIGURE 2



		LANDFORM OR LANDSCAPE			
		MATERIAL	ORIGIN	TOPOGRAPHY	Note
	Gp	Primarily gravel and sand	Glaciofluvial Plain	Level or gently sloping (0-5%)	Usually 5 m or greater in thickness.
	Ap	Stratified gravel, sand, and silt	Fluvial Plain	Level or gently sloping (0-5%)	Usually 5 m or greater in thickness.
	Mr	Matrix of sand, silt, and clay supporting cobbles	Moraine Deposits	Forms a series of ridges	Greater than 1 m in thickness.

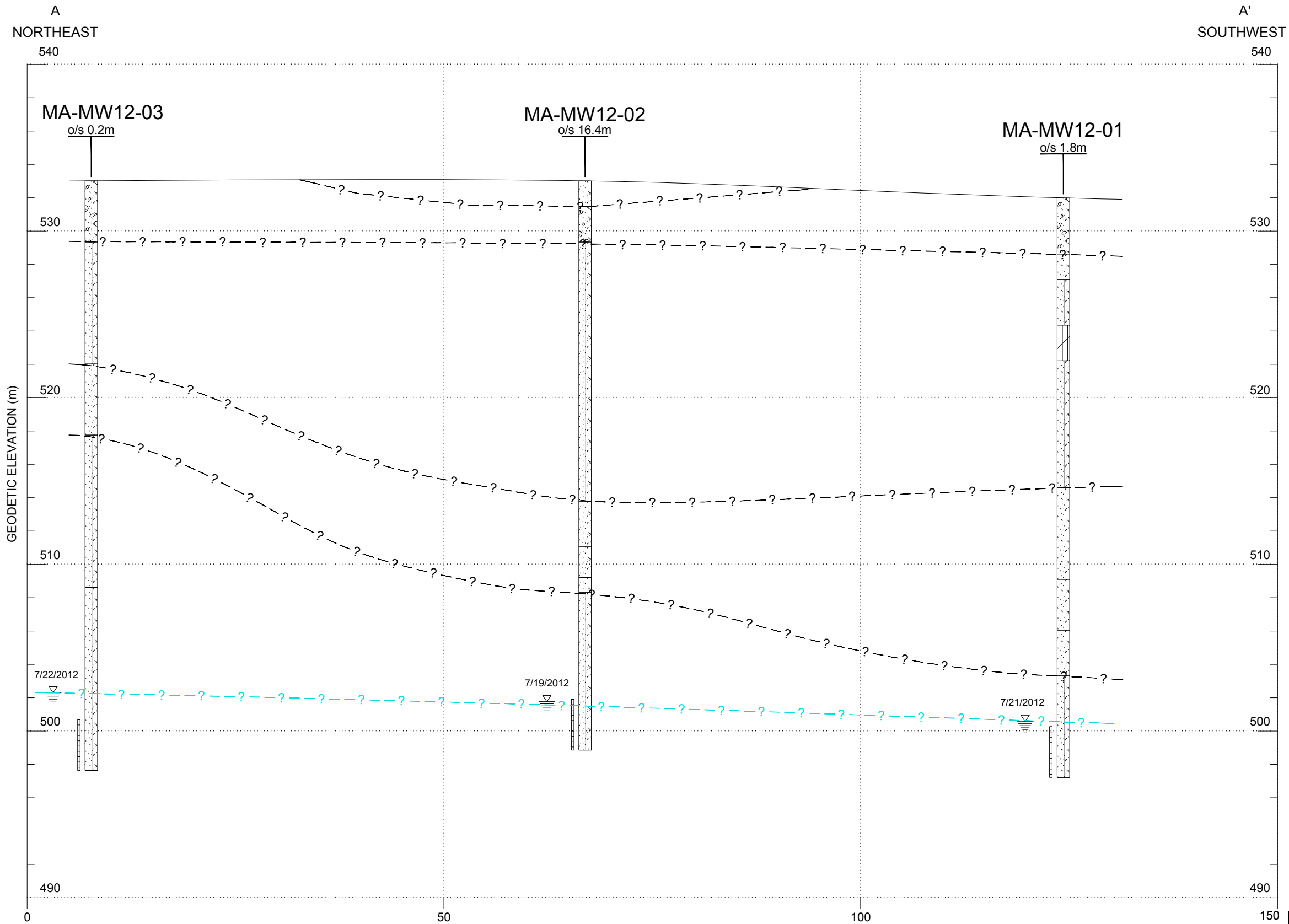
- LEGEND**
- FACILITY
 - BUILDING
 - MAJOR ROAD
 - WATERCOURSE
 - WATERBODY

REFERENCE
 BASEDATA OBTAINED FROM GEOGRATIS (NATURAL RESOURCES CANADA).
 SURFICIAL GEOLOGY DATA OBTAINED FROM THE YUKON GOVERNMENT, ENERGY, MINES AND RESOURCES.
 DATUM: NAD83 PROJECTION: ALBERS



PROJECT					
YUKON GOVERNMENT - COMMUNITY SERVICES SOLID WASTE DISPOSAL FACILITY MAYO, YUKON					
TITLE					
REGIONAL SURFICIAL GEOLOGY					
 Greater Vancouver Office, B.C.	PROJECT No.	11-1436-0073	PHASE No.	1200	
	DESIGN	CB	2 Oct. 2012	SCALE AS SHOWN	
	GIS	DSC	4 Oct. 2012	REV.	0
	CHECK				
	REVIEW				
FIGURE: 3					

N:\Bur-Graphics\Projects\2011\1436\1-1436-0073\Drafting\Phase 1200\Task 1260\figures\114360073-1200-1260-04.dwg | Layout FIGURE 4 | Modified: JHLee 01/02/2013 12:49 PM | Plotted: JHLee 01/02/2013



LEGEND
 TEST HOLE LOCATION SHOWING INFERRED STRATIGRAPHIC DATA. FOR DETAILED STRATIGRAPHY REFER TO RECORD OF TEST HOLE LOGS IN APPENDIX ?).

- TEST HOLE
o/s - OFFSET
- FILL
- PEAT
- SILT
- SAND
- CLAY
- GRAVEL
- WATER LEVEL
- SCREEN INTERVAL
- APPROXIMATE GROUND SURFACE
- INFERRED STRATIGRAPHIC BOUNDARY
- INFERRED GROUNDWATER (mASL)

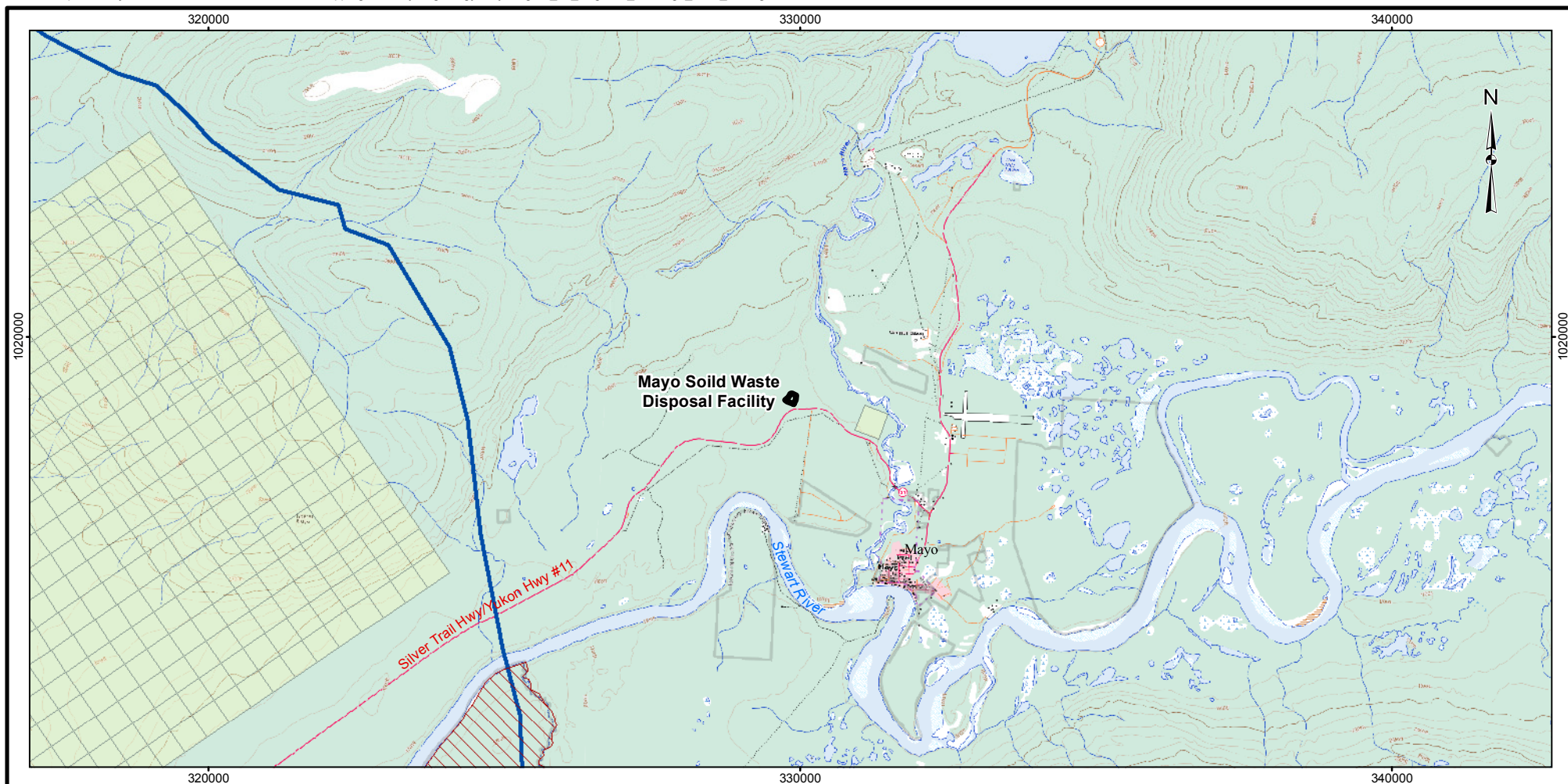







SPECIAL NOTE: DATA CONCERNING THE VARIOUS STRATA HAVE BEEN OBTAINED AT TEST HOLE LOCATIONS ONLY. THE SOIL STRATIGRAPHY BETWEEN TEST HOLES HAS BEEN INFERRED FROM GEOLOGICAL EVIDENCE AND MAY VARY FROM THAT SHOWN.

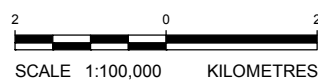
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TITLE		CONCEPTUAL HYDROGEOLOGICAL CROSS - SECTION A-A'	
PROJECT No.	11-1436-0073/1200	FILE No.	1114360073-1200-1260-04
DESIGN	GJH 31DEC12	SCALE	AS SHOWN
CADD	JHL 02JAN13		
CHECK			
REVIEW			



FIGURE 4



- LEGEND**
-  FACILITY
 -  MAJOR HIGHWAY
 -  FIRST NATIONS LANDS
 -  QUARTZ CLAIM
 -  WATERSHED BOUNDARY



REFERENCE

FEATURE DATA OBTAINED FROM THE YUKON GOVERNMENT YGS MAPMAKER ONLINE. BASEDATA OBTAINED FROM GEOGRATIS (NATURAL RESOURCES CANADA).
 DATUM: NAD83 PROJECTION: UTM ZONE 08

PROJECT YUKON GOVERNMENT - COMMUNITY SERVICES
 SOLID WASTE DISPOSAL FACILITY
 MAYO, YUKON

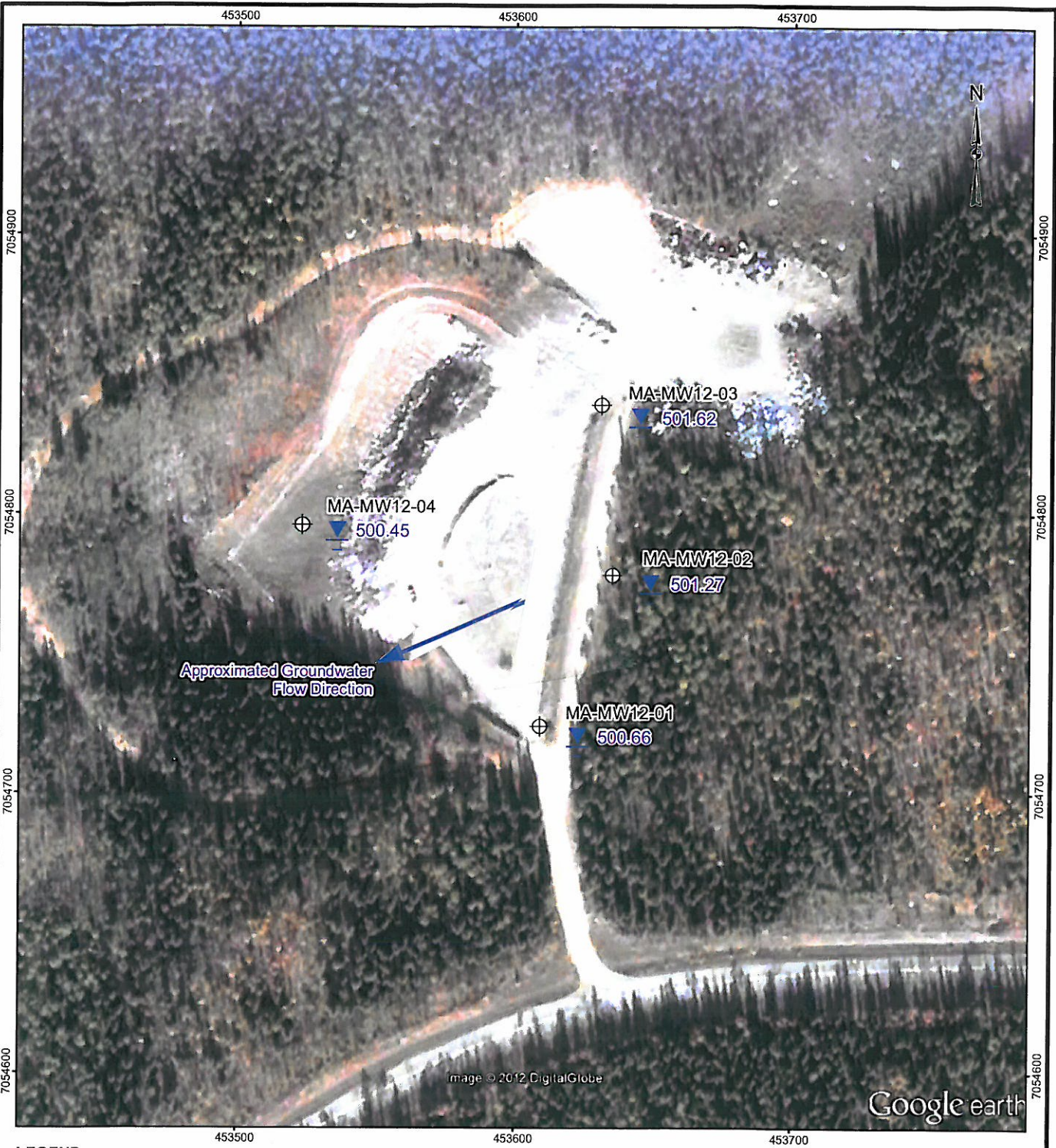
TITLE

REGIONAL DRAINAGE & LAND ZONING



PROJECT No.		11-1436-0073		PHASE No. 1200	
DESIGN	CB	2 Oct. 2012		SCALE AS SHOWN	REV. 0
GIS	DSC	4 Oct. 2012			
CHECK					
REVIEW					

FIGURE: 5



LEGEND

- MONITORING WELL
- GROUNDWATER ELEVATION (MEASURED ON 11/12 SEPT. 2012)
- GROUNDWATER FLOW DIRECTION



REFERENCE

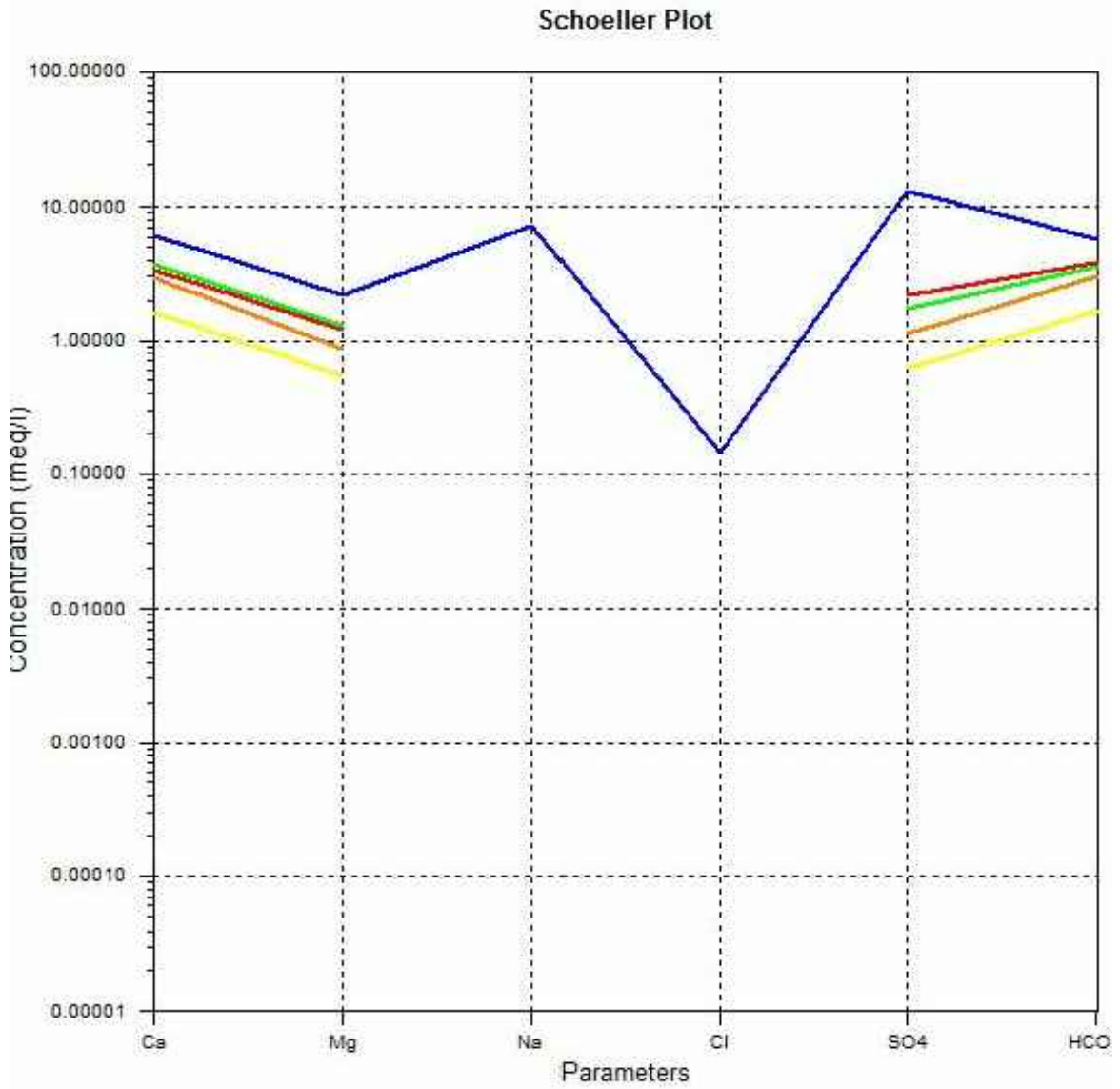
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DATUM: NAD83 PROJECTION: UTM ZONE 8

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DESIGN	CB	2 Oct. 2012	SCALE AS SHOWN	REV.	0
GIS	DSC	4 Oct. 2012			
CHECK					
REVIEW					
Golder Associates Greater Vancouver Office, B.C.				FIGURE: 6	

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LEGEND

Sample Data
Summer 2012

- MA-MW12-01
- MA-MW12-02
- MA-MW12-03
- MA-MW12-04
- MA-Surface Water

PROJECT YUKON GOVERNMENT - COMMUNITY SERVICES
SOLID WASTE DISPOSAL FACILITY
MAYO, YUKON

TITLE

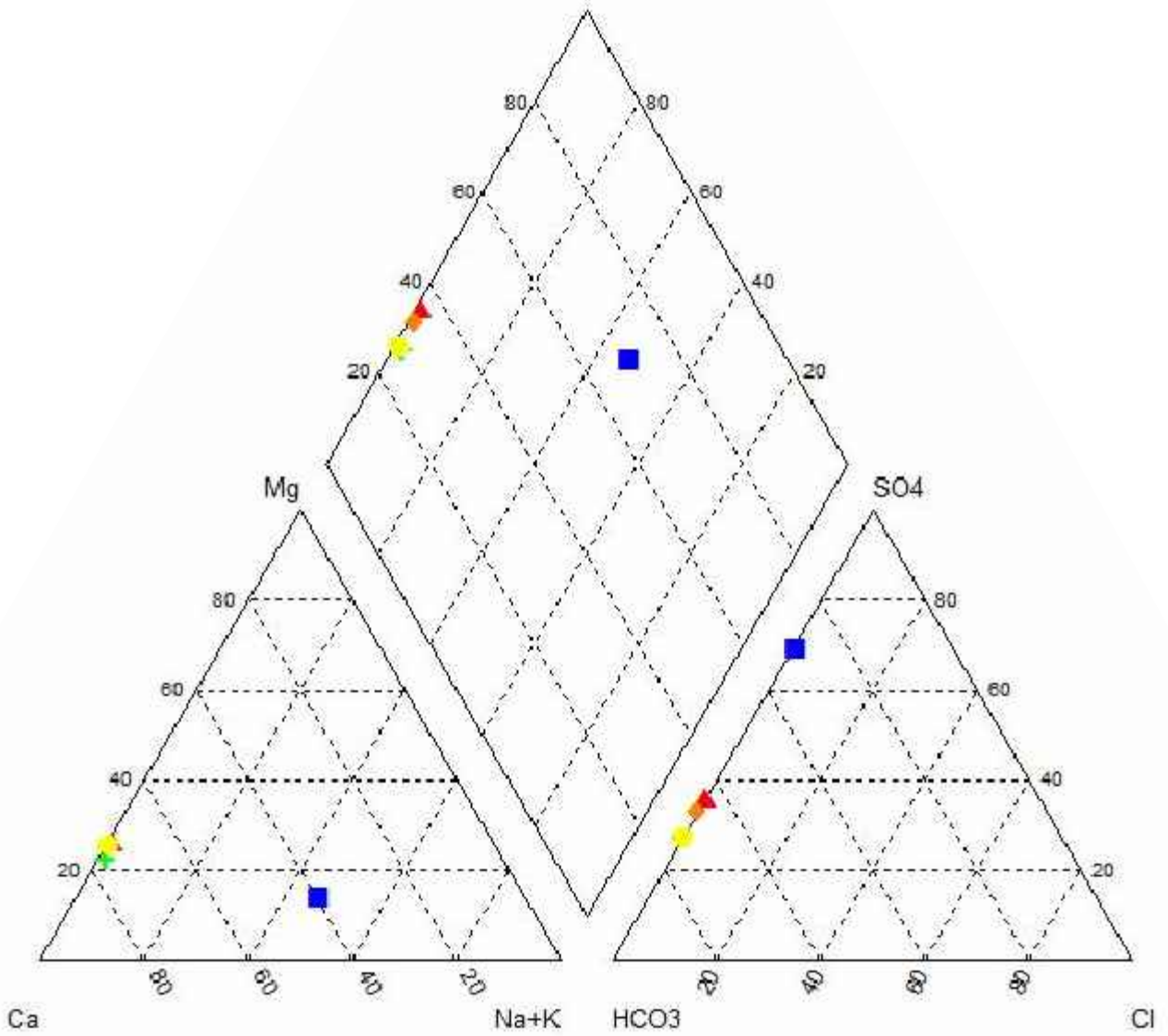
SCHOELLER PLOT



PROJECT No.	11-1436-0073	FILE No.	1114360073-1200-1260-FIG_07
DESIGN		SCALE	NOT TO SCALE
CADD	JD	16NOV12	
CHECK			
REVIEW			

FIGURE 7

N:\Bur-Graphics\Projects\2011\1436\11-1436-0073\Drafting\Phase 1200\Task 1260\figures\1114360073-1200-1260-FIG_08.dwg | Layout: ANSL_A_FIG 8 | Modified: jdeol 11/16/2012 2:21 PM | Plotted: jdeol 11/16/2012



LEGEND

Sample Data
Summer 2012

- ▲ MA-MW12-01
- MA-MW12-02
- ✚ MA-MW12-03
- ◆ MA-MW12-04
- MA-Surface Water

PROJECT YUKON GOVERNMENT - COMMUNITY SERVICES
SOLID WASTE DISPOSAL FACILITY
MAYO, YUKON

TITLE

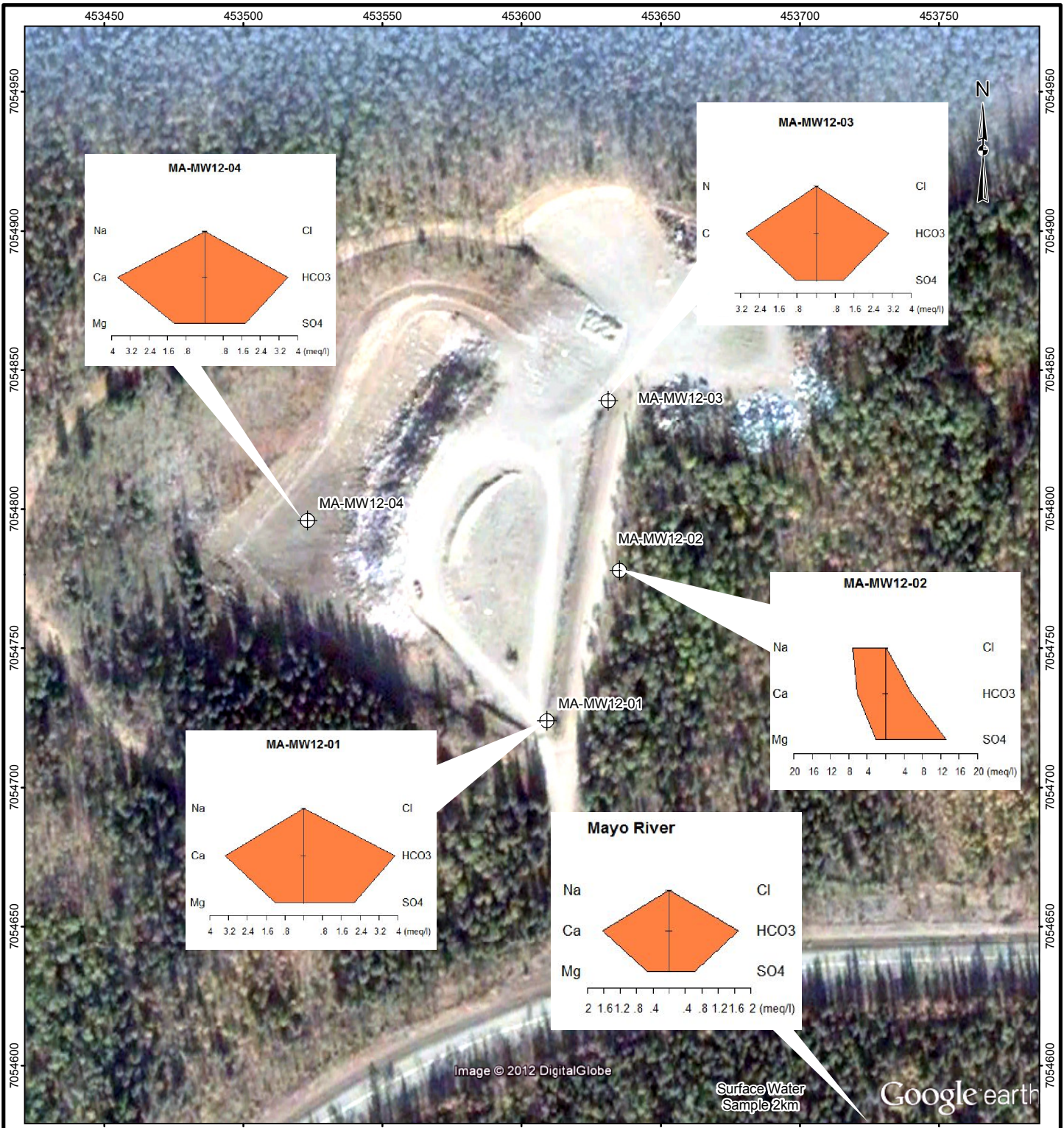
PIPER PLOT



PROJECT No.	11-1436-0073	FILE No.	1114360073-1200-1260-FIG_08
DESIGN		SCALE	NOT TO SCALE
CADD	JD	16NOV12	
CHECK			
REVIEW			

FIGURE 8

\\golder.gts\gait\Burnaby\CAD-GIS\Bur-Graphics\Projects\201111436\11-1436-0073\GIS\Mapping\MXD\Hydrogeology\Mayo\Figure_09_Stiff_Diagrams.mxd



LEGEND

⊕ MONITORING WELL

REFERENCE

IMAGE OBTAINED FROM GOOGLE EARTH, USED UNDER LICENSE.
 IMAGERY DATE: SEPTEMBER 9 2004. GOOGLE EARTH IMAGE IS NOT TO SCALE.
 DATUM: NAD83 PROJECTION: UTM ZONE 8

PROJECT YUKON GOVERNMENT - COMMUNITY SERVICES
 SOLID WASTE DISPOSAL FACILITY
 MAYO, YUKON

TITLE

STIFF DIAGRAMS


 <p>Golder Associates Greater Vancouver Office, B.C.</p>	PROJECT No.	11-1436-0073	PHASE No.	1200
	DESIGN	CB	2 Oct. 2012	SCALE AS SHOWN
	GIS	CD	12 Nov. 2012	REV. 0
	CHECK			
REVIEW				

FIGURE: 9



APPENDIX A

Site Photographs



APPENDIX A Site Photographs



Photograph 1: Mayo Facility Drilling Well MA-MW12-03; looking northwest.



Photograph 2: Mayo Facility Drilling Well MA-MW12-02; looking north.



APPENDIX A

Site Photographs



Photograph 3: Mayo Facility Drilling Well MA-MW12-04; looking southwest.



Photograph 4: Mayo Facility Drilling Well MA-12-04; looking southwest.



APPENDIX A Site Photographs



Photograph 5: Mayo Facility Drilling Well MA-MW12-01; looking north.



Photograph 6: Mayo Facility Waste Material; looking west to south.

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APPENDIX B

Well Construction Logs

PROJECT No.: 11-1436-0073 (1200)

RECORD OF MONITORING WELL: MA-MW12-01

SHEET 1 OF 4
DATUM: Local

CLIENT: Yukon Government Community Services
PROJECT: Yukon Landfill Assessment
LOCATION: Mayo

DRILLING DATE: July 19, 2012
DRILLING CONTRACTOR: Midnight Sun Drilling

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES					WATER CONTENT PERCENT				ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION		
		DESCRIPTION	STRATA PLOT ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	PID ppm	5	10	15			20	Wp
0		Ground Surface (SP) fine SAND, some gravel, light brown, moist.	0.00													
1.52		(SW-GW) SAND and GRAVEL, light brown, moist.	1.52													
3.66		(SM) SILTY SAND, trace gravel, dark brown, moist.	3.66													
5	M6 Drilltech Truck Mounted Auger Drill Rig Air Rotary															Bentonite Seal
10																

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DEPTH SCALE
1 : 50



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CHECKED: **DRAFT**

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES				PID ppm				ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION	
		DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	5	10	15			20
			ELEV. DEPTH (m)										Wp W Wi	
								50	100	150	200		10 20 30 40	
10	M5 Drilltech Truck Mounted Auger Drill Rig Air Rotary	(SM) SILTY SAND, trace gravel, dark brown, moist. (continued)												
11														
12														
13														
14														
15														
16														
17			- gravel layer at 17.07m depth.											
18														
19														
20		(SW) SAND, trace gravel, red-brown, moist.		19.20										
		CONTINUED NEXT PAGE												

Bentonite Seal

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RECORD OF MONITORING WELL: MA-MW12-01

CLIENT: Yukon Government Community Services
PROJECT: Yukon Landfill Assessment
LOCATION: Mayo

DRILLING DATE: July 19, 2012
DRILLING CONTRACTOR: Midnight Sun Drilling

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DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES				PID ppm		WATER CONTENT PERCENT Wp ----- W ----- WI	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION									
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %				5	10	15	20					
20	M5 Drilltech Truck Mounted Auger Drill Rig Air Rotary	(SW) SAND, trace gravel, red-brown, moist. <i>(continued)</i>																			
21																					
22		(SP) fine SAND, some gravel, some silt, dark brown, moist.		21.95																	
23																					
24		(SW) SAND, some gravel, grey, moist.		23.77																	
25		(SM) SILTY SAND, dark brown, moist.		24.69																	
26																					
27																					
28																					
29																					
30																					
CONTINUED NEXT PAGE																					

Bentonite Seal

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES				PID ppm		WATER CONTENT PERCENT Wp W Wi	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %			
30	M5 Drillech Truck Mounted Auger Drill Rig Air Rotary	(SM) SILTY SAND, dark brown, moist. <i>(continued)</i>										Bentonite Seal 10/20 Silica Sand 51mm Slotted PVC Pipe
31												
32												
33												
34		- grey and wet at 33.53m depth.										
34		End of Monitoring Well.		34.14								
35												
36												
37												
38												
39												
40												

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PROJECT No.: 11-1436-0073 (1200)

RECORD OF MONITORING WELL: MA-MW12-02

CLIENT: Yukon Government Community Services
 PROJECT: Yukon Landfill Assessment
 LOCATION: Mayo

DRILLING DATE: July 20, 2012
 DRILLING CONTRACTOR: Midnight Sun Drilling

SHEET 1 OF 3
 DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES				PID ppm				ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION				
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	5	10			15	20	WATER CONTENT PERCENT Wp W Wi	
0	M5 Drilltech Truck Mounted Auger Drill Rig Air Rotary	Ground Surface		0.00													Stickup = 0.95m
		(SP) fine SAND, dark grey, wet.															
1		(SP) fine SAND, some gravel, dark brown, moist.		0.61													
4		(SM) SILTY SAND, dark brown, moist.		3.66													
5		(SW) SAND, some gravel, some silt, dark grey, brown, moist.		4.88													Bentonite Seal
6																	
7																	
8																	
9																	
10																	
		CONTINUED NEXT PAGE															

DEPTH SCALE

1 : 50



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PROJECT No.: 11-1436-0073 (1200)

RECORD OF MONITORING WELL: MA-MW12-02

SHEET 2 OF 3
DATUM: Local

CLIENT: Yukon Government Community Services
PROJECT: Yukon Landfill Assessment
LOCATION: Mayo

DRILLING DATE: July 20, 2012
DRILLING CONTRACTOR: Midnight Sun Drilling

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES				PID				WATER CONTENT PERCENT Wp W Wi	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION											
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	5	10				15	20									
10	M5 Drilltech Truck Mounted Auger Drill Rig Air Rotary	(SW) SAND, some gravel, some silt, dark grey, brown, moist. <i>(continued)</i>																							
11																									
12																									
13																								Bentonite Seal	
14																									
15																									
16																									- wet at 15.85m depth.
17																									10/20 Silica Sand
18																									
19																									
20																									

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DEPTH SCALE
1 : 50



LOGGED: AB
CHECKED: **DRAFT**

PROJECT No.: 11-1436-0073 (1200)

RECORD OF MONITORING WELL: MA-MW12-02

SHEET 3 OF 3
DATUM: Local

CLIENT: Yukon Government Community Services
PROJECT: Yukon Landfill Assessment
LOCATION: Mayo

DRILLING DATE: July 20, 2012
DRILLING CONTRACTOR: Midnight Sun Drilling

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES				WATER CONTENT PERCENT				ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION					
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	PID ppm	PID ppm			Wp	W	Wi		
20	Air Rotary	(SW) SAND, some gravel, some silt, dark grey, brown, moist. <i>(continued)</i>																51mm Slotted PVC Pipe
20.42		End of Monitoring Well.																
21																		
22																		
23																		
24																		
25																		
26																		
27																		
28																		
29																		
30																		

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DEPTH SCALE
1 : 50



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CHECKED: **DRAFT**

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DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES				PID ppm		WATER CONTENT PERCENT				ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION				
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	5	10	15	20			Wp	W	Wi	
0	M5 Drilltech Truck Mounted Auger Drill Rig Air Rotary	Ground Surface (GW-SW) GRAVEL and SAND, trace silt, dark brown, wet.		0.00															
3.35		(SW) SAND, some gravel, trace silt, dark brown, moist.		3.35															
4.88		(SM) SILTY SAND, red-brown, moist.		4.88															
7.62		(ML) CLAYEY SILT, dark grey, moist.		7.62															
9.75		(SM) SILTY SAND, some gravel, red-brown, moist.		9.75															
		CONTINUED NEXT PAGE																	

Stickup = 0.88m

Bentonite Seal

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES				PID ppm		WATER CONTENT PERCENT Wp — W — WI	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION												
		DESCRIPTION	STRATA PLOT ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	5				10	15	20									
10	M5 Driltech Truck Mounted Auger Drill Rig Air Rotary	(SM) SILTY SAND, some gravel, red-brown, moist. (continued)																						
11		- dark grey from 11.28m - 13.72m depth.																						
12																								
13																								
14																								
15																								
16																								
17																								
18		(SP) fine SAND, dark grey, moist.		17.37																				
19																								
20																								
		CONTINUED NEXT PAGE																						

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CLIENT: Yukon Government Community Services
PROJECT: Yukon Landfill Assessment
LOCATION: Mayo

DRILLING DATE: July 21, 2012
DRILLING CONTRACTOR: Midnight Sun Drilling

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES				PID ppm				ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION					
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	5	10			15	20	WATER CONTENT PERCENT		
									PID ppm ⊕ 50 100 150 200				Wp ----- W ----- WI 10 20 30 40					
20		(SP) fine SAND, dark grey, moist. <i>(continued)</i>																
21																		
22																		
23		(SP) fine SAND, some gravel, dark grey, moist.		22.86														
24																		
25	M5 Drilltech Truck Mounted Auger Drill Rig Air Rotary															Bentonite Seal		
26		(SW) ????????, some gravel, grey, moist.		25.91														
27																		
28																		
29		(SM) SILTY SAND, red-brown, moist.		28.65														
30		CONTINUED NEXT PAGE																

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PROJECT No.: 11-1436-0073 (1200)

RECORD OF MONITORING WELL: MA-MW12-03

SHEET 4 OF 4
 DATUM: Local

CLIENT: Yukon Government Community Services
 PROJECT: Yukon Landfill Assessment
 LOCATION: Mayo

DRILLING DATE: July 21, 2012
 DRILLING CONTRACTOR: Midnight Sun Drilling

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES				PID ppm		WATER CONTENT PERCENT Wp W Wi	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %			
30	MS Driltech Truck Mounted Auger Drill Rig Air Rotary	(SM) SILTY SAND, red-brown, moist. <i>(continued)</i>										
31		- grey and wet at 31.09m depth.										
32												
33												
34												
35		End of Monitoring Well.		34.75								
36												
37												
38												
39												
40												

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DEPTH SCALE
 1 : 50



LOGGED: AB
 CHECKED: **DRAFT**

RECORD OF MONITORING WELL: MA-MW12-04

CLIENT: Yukon Government Community Services
PROJECT: Yukon Landfill Assessment
LOCATION: Mayo

DRILLING DATE: July 22, 2012
DRILLING CONTRACTOR: Midnight Sun Drilling

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES				PID ppm		WATER CONTENT PERCENT		ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION		
		DESCRIPTION	STRATA PLOT ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	5	10	15			20	Wp
0	M5 Drilltech Truck Mounted Auger Drill Rig Air Rotary	Ground Surface (SW-GW) SAND and GRAVEL, dark brown, moist.	0.00												Stickup = 0.95m
3.66		(SM) SILTY SAND, some gravel, red-brown, moist.													
5															Bentonite Seal
6															
7															
8															
9															
10															

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PROJECT No.: 11-1436-0073 (1200)

RECORD OF MONITORING WELL: MA-MW12-04

SHEET 2 OF 4
DATUM: Local

CLIENT: Yukon Government Community Services
PROJECT: Yukon Landfill Assessment
LOCATION: Mayo

DRILLING DATE: July 22, 2012
DRILLING CONTRACTOR: Midnight Sun Drilling

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES				PID ppm		WATER CONTENT PERCENT Wp W Wi	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION												
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %				5	10	15	20								
10	M5 Drilltech Truck Mounted Auger Drill Rig Air Rotary	(SM) SILTY SAND, some gravel, red-brown, moist. <i>(continued)</i>																						
11		(SW) SAND, some gravel, trace silt, dark grey, moist.		10.97																				
15		(SM) SILTY SAND, some gravel, red-brown, moist.		15.24																				
16																								
17																								
18																								
19																								
20																								

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DEPTH SCALE
1 : 50



LOGGED: AB
CHECKED: **DRAFT**

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES				PID ppm		WATER CONTENT PERCENT Wp W Wi	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION	
		DESCRIPTION	STRATA PLOT ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	5				10
20	M5 Drilltech Truck Mounted Auger Drill Rig Air Rotary	(SM) SILTY SAND, some gravel, red-brown, moist. (continued) - orange-red from 20.12m - 20.42m depth.											
24		(SM) SILTY SAND, red-brown, moist.	24.38										
25													Bentonite Seal
26													
27													
28													
29													
30													

CONTINUED NEXT PAGE

PROJECT No.: 11-1436-0073 (1200)

RECORD OF MONITORING WELL: MA-MW12-04

SHEET 4 OF 4
 DATUM: Local

CLIENT: Yukon Government Community Services
 PROJECT: Yukon Landfill Assessment
 LOCATION: Mayo

DRILLING DATE: July 22, 2012
 DRILLING CONTRACTOR: Midnight Sun Drilling

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES						WATER CONTENT PERCENT		ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	PID ppm	PID ppm	Wp			W
5	10									15	20	50	100	150	200
30	M5 Driltech Truck Mounted Auger Drill Rig Air Rotary	(SM) SILTY SAND, red-brown, moist. <i>(continued)</i>													10/20 Silica Sand 51mm Slotted PVC Pipe
31		- grey and wet at 31.39m depth.													
32															
33															
34															
35		End of Monitoring Well.		35.36											
36															
37															
38															
39															
40															

DEPTH SCALE
 1 : 50



LOGGED: AB

CHECKED: **DRAFT**

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APPENDIX C

Well Development and Sampling Sheets

GROUNDWATER DEVELOPMENT AND PURGING/SAMPLING DATA SHEET

Development
 Purging/Sampling

Well No.: MA-MW12-01 Project No.: 11-1436-0073/1200
 Location: MAYO Date: 11-SEP-12 Time: 10:00
 Weather: CLEAR Temperature: 0°C Completed by: A BRUGER

MONITORING WELL INFORMATION

Time of Measurement: 10:00 Tidally Influenced: Yes No
 Depth to product: _____ Product thickness: _____ One well volume: _____
 Depth to water Below Top of Casing: 32.19 metres (B-A)*2.0 = 2.3 32 6.64 litres - for a 51 mm (2.0 inch) diameter well
 Depth to Bottom of Well Below Top of Casing: 35.51 metres (B-A)*1.1 = _____ litres - for a 38 mm (1.5 inch) diameter well
 Diameter Standpipe: C mm Sample intake depth: _____ metres

EQUIPMENT LIST

YSI 556 MPS
 pH and Temp. Meter: Model _____ Serial No. _____ Calibration Buffers: 4 7 10
 Conductivity Meter: Model _____ Serial No. _____ Calibration Solution: 1413
 Dissolved Oxygen Meter: Model _____ Serial No. _____ D.O. Chemet Ampoule
 Pump: None Watterra Peristaltic Submersible Bailer Type: _____
 Pump Details: _____

WELL DEVELOPMENT/PURGING

Purge Volume: Well Vol. X 4.6.64 = 28 litres
 Avg. Flow Rate: _____ L/min. Start: 10:08 Finish: 10:45

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Cond. (uS/cm)	Redox (mV)	Diss. O ₂ (mg/L) or %	Water Level (m)	Remarks
10:10	1	3.52	6.40	1118				
10:15	7	2.79	6.81	1046				
10:23	15	2.75	6.91	1092			32.20	
10:30	20	2.89	7.16	1101				
10:36	25	2.91	7.19	1109			32.19	
10:44	30	2.90	7.23	1116			32.19	SAMPLE COLLECTED

Comments:

Odour: Yes No If yes _____
 Sheen: Yes No If yes _____ Hydrocarbon-like OR Metallic-like
 Turbidity: Clear ||||| (1) ||||| Very Silty

Analysis	Type	Container Size						Filtered	Preservatives
		40 mL	100 mL	250 mL	500 mL	1 L	2 L		
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass							<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass							<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass							<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass							<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass							<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass							<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass							<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass							<input type="checkbox"/> Yes <input type="checkbox"/> No	

SCN No. _____ Consumables: Watterra Tubing _____ HDPE/Teflon Tubing _____ Groundwater Filter _____
 Field Dup. _____ Silicon Tubing _____ D.O. Ampoules _____

GROUNDWATER DEVELOPMENT AND PURGING/SAMPLING DATA SHEET

Development
 Purging/Sampling

Well No.: MA-MWR-02 Project No.: 11-1436-0073/1200
 Location: MAYO Date: 11-SEP-12 Time: 11:15
 Weather: CLEAR Temperature: 1°C Completed by: A BADGER

MONITORING WELL INFORMATION

Time of Measurement: 11:18
 Depth to product: _____ Product thickness: _____ Tidally Influenced: Yes No
 Depth to water Below Top of Casing: A 32.08 metres One well volume: _____
 Depth to Bottom of Well Below Top of Casing: B 23.30 metres (B-A)*2.0 = 1.22 * 2.44 litres - for a 51 mm (2.0 inch) diameter well
 Diameter Standpipe: C _____ mm (B-A)*1.1 = _____ litres - for a 38 mm (1.5 inch) diameter well
 Sample intake depth: _____ metres

EQUIPMENT LIST

YSI 556 MPS

pH and Temp. Meter: Model _____ Serial No. _____ Calibration Buffers: 4 7 10
 Conductivity Meter: Model _____ Serial No. _____ Calibration Solution: 113
 Dissolved Oxygen Meter: Model _____ Serial No. _____ D.O. Chemet Ampoule
 Pump: None Waterra Peristaltic Submersible Bailer Type: _____
 Pump Details: _____

WELL DEVELOPMENT/PURGING

Purge Volume: Well Vol. X 2.44 = 10 litres
 Avg. Flow Rate: _____ L/min. Start: 11:30 Finish: 12:25

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Cond. (uS/cm)	Redox (mV)	Diss. O ₂ (mg/L) or %	Water Level (m)	Remarks
11:35	1							SOME SEDIMENT PURGED FROM WELL
12:10	1	3.91	6.33	1791			31.51	~10L WATER/SANDS.
12:19	3	3.68	6.77	1520				TUBING CHANGED.
12:25	6	3.78	6.79	2366				SAMPLE COLLECTED
			7.12					SILT IN WATER THREATENING TO CLOG TUBING SO SAMPLE COLLECTED
								TUBING CHANGED BEFORE SAMPLE COLLECTION (TOTAL 3 LENGTHS USED)
								FOR 35.70 - 12:30

Comments:

Odour: Yes No If yes _____
 Sheen: Yes No If yes _____ Hydrocarbon-like OR Metallic-like
 Turbidity: Clear Very Silty

Analysis	Type	Container Size							Filtered		Preservatives
		40 mL	100 mL	250 mL	500 mL	1 L	2 L	4 L	Yes	No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes	<input type="checkbox"/> No	

SCN No. _____ Consumables: Waterra Tubing _____ HDPE/Teflon Tubing _____ Groundwater Filter _____
 Field Dup. _____ Silicon Tubing _____ D.O. Ampoules _____

GROUNDWATER DEVELOPMENT AND PURGING/SAMPLING DATA SHEET

Development
 Purging/Sampling

Well No.: MA-MW12.03 Project No.: 11-1436-0073 / 1200
 Location: MAYO Date: 11-SEP-12 Time: 13:35
 Weather: CLEAR Temperature: 5°C Completed by: A BRADGER

MONITORING WELL INFORMATION

Time of Measurement: 13:35 Tidally Influenced: Yes No
 Depth to product: _____ Product thickness: _____ One well volume: _____
 Depth to water Below Top of Casing: A 31.69 metres (B-A)*2.0 = 23.75 = 25 litres - for a 51 mm (2.0 inch) diameter well
 Depth to Bottom of Well Below Top of Casing: B 35.43 metres (B-A)*1.1 = _____ litres - for a 38 mm (1.5 inch) diameter well
 Diameter Standpipe: C _____ mm Sample intake depth: _____ metres

EQUIPMENT LIST

pH and Temp. Meter: Model _____ Serial No. _____ Calibration Buffers: 4 7 10
 Conductivity Meter: Model _____ Serial No. _____ Calibration Solution: 1413
 Dissolved Oxygen Meter: Model _____ Serial No. _____ D.O. Chemet Ampoule
 Pump: None Watterra Peristaltic Submersible Bailor Type: _____
 Pump Details: _____

WELL DEVELOPMENT/PURGING

Purge Volume: Well Vol. X 3.75 = 22.5 litres
 Avg. Flow Rate: _____ L/min. Start: 13:43 Finish: 14:12

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Cond. (uS/cm)	Redox (mV)	Diss. O ₂ (mg/L) or %	Water Level (m)	Remarks
13:45	0.5	4.97	6.99	769				
13:52	7	4.34	7.21	354				
13:59	15	3.50	7.39	339				
14:03	20	3.65	7.42	747				
14:12	23	3.56	7.41	7.43			<u>31.70</u>	<u>SAMPLE COLLECTED</u>
								<u>NO STOPS DURING PURGING TO PREVENT SETTLING SEDIMENT IN TUBING. -> NO WATER LEVELS RECORDED</u>

Comments:

Odour: Yes No If yes _____
 Sheen: Yes No If yes _____ Hydrocarbon-like OR Metallic-like
 Turbidity: Clear ||||| Very Silty

Analysis	Type	Container Size							Filtered		Preservatives
		40 mL	100 mL	250 mL	500 mL	1 L	2 L	4 L	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes	<input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes	<input type="checkbox"/> No	

SCN No. _____ Consumables: Watterra Tubing _____ HDPE/Teflon Tubing _____ Groundwater Filter _____
 Field Dup. _____ Silicon Tubing _____ D.O. Ampoules _____



GROUNDWATER DEVELOPMENT AND PURGING/SAMPLING DATA SHEET

Development
 Purging/Sampling

Well No.: MA-MWR-04 Project No.: 11-1436-0073/1200
 Location: MAYO Date: 11-SEP-12 Time: 14:45
 Weather: OVERCAST Temperature: 40C Completed by: A. BADNER

MONITORING WELL INFORMATION

Time of Measurement: _____ Tidally Influenced: Yes No
 Depth to product: _____ Product thickness: _____ One well volume: _____
 Depth to water Below Top of Casing: A 17.65 metres (B-A)*2.0 = 3.73 7.5 litres - for a 51 mm (2.0 inch) diameter well
 Depth to Bottom of Well Below Top of Casing: B 21.38 metres (B-A)*1.1 = _____ litres - for a 38 mm (1.5 inch) diameter well
 Diameter Standpipe: C _____ mm Sample intake depth: _____ metres

EQUIPMENT LIST

YSE 556 MPS

pH and Temp. Meter: Model _____ Serial No. _____ Calibration Buffers: 4 7 10
 Conductivity Meter: Model _____ Serial No. _____ Calibration Solution: 1413
 Dissolved Oxygen Meter: Model _____ Serial No. _____ D.O. Chemet Ampoule
 Pump: None Waterra Peristaltic Submersible Bailer Type: _____
 Pump Details: _____

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 2.5 = 22.5 litres
 Avg. Flow Rate: _____ L/min. Start: 14:54 Finish: 15:09

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Cond. (uS/cm)	Redox (mV)	Diss. O ₂ (mg/L) or %	Water Level (m)	Remarks
14:56	0.5	3.27	6.55	1012				
15:00	B	2.82	6.93	992				
15:03	15	2.54	7.08	1002			17.66	
15:06	20	2.47	7.14	1003				
15:09	25	2.57	7.19	1001				SAMPLE COLLECTED
								10 CM CUT FROM STICKWTP - NEW HEIGHT 0.90M

Comments:

Odour: Yes No If yes _____
 Sheen: Yes No If yes _____ Hydrocarbon-like OR Metallic-like
 Turbidity: Clear Very Silty

Analysis	Type	Container Size							Filtered		Preservatives
		40 mL	100 mL	250 mL	500 mL	1 L	2 L	4 L	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass								<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

SCN No. _____ Consumables: Waterra Tubing _____ HDPE/Teflon Tubing _____ Groundwater Filter _____
 Field Dup. _____ Silicon Tubing _____ D.O. Ampoules _____

Surface Water Sampling Data Sheet

- Field Characterization
 Sampling

Sample Number: MA SURFACE / Project No. 11-1436-0073 / 1200
 Location: OBV 045525Z 7053736 Completed By: A BADGER
 Weather: OVERCAST Date: 12 SEP. 12
 Temperature: 4°C Time: 18:30
 Reviewed By: _____

EQUIPMENT LIST YSI 556 MPS

pH and Temp. Meter: Model _____ Serial No. _____ Calibration Buffers: 4 7 10
 Conductivity Meter: Model _____ Serial No. _____ Calibration Solution: 1413
 Dissolved Oxygen Meter: Model _____ Serial No. _____ D.O. Chemet Ampoule
 Pump: None Waterra Peristaltic Submersible Bailer: None Stainless Steel Teflon PVC
 Sample Depth: SURFACE

SURFACE WATER SAMPLING

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Cond. (uS/cm)	Redox (mV)	Diss. O ₂ (mg/L) or %	Remarks
<u>18:30</u>		<u>8.71</u>	<u>7.29</u>	<u>493</u>			

Comments: _____

Odour: Yes No If yes _____

Sheen: Yes No If yes _____

Turbidity: Clear [|||||] Very Silty

Other: _____

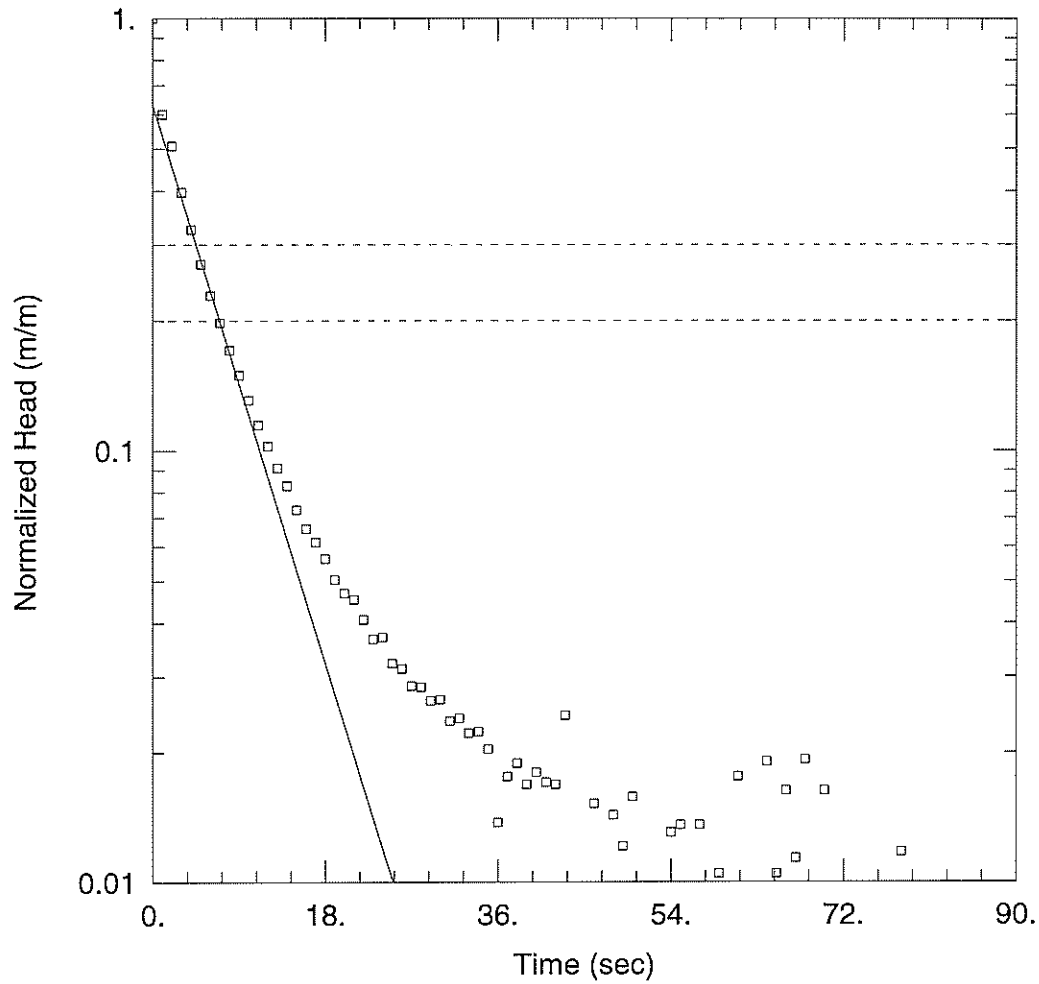
Analysis	Type		Container Size						Filtered		Preservatives
			40 mL	100 mL	250 mL	500 mL	1 L	2 L	4 L	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass									<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass									<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass									<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass									<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass									<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass									<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass									<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass									<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Plastic <input type="checkbox"/> Glass									<input type="checkbox"/> Yes <input type="checkbox"/> No	

SCN No. _____ Consumables: D.O. Ampoules Alkalinity Test Other _____



APPENDIX D

Slug Test Data



WELL TEST ANALYSIS

Data Set: \\...\MA-MW12-01 Test 1.aqt
 Date: 11/22/12

Time: 13:03:20

PROJECT INFORMATION

Test Well: MA-MW12-01
 Test Date: 12-September-12

AQUIFER DATA

Saturated Thickness: 3.25 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MA-MW12-01)

Initial Displacement: 0.545 m
 Total Well Penetration Depth: 3.25 m
 Casing Radius: 0.025 m

Static Water Column Height: 3.25 m
 Screen Length: 3.05 m
 Well Radius: 0.092 m
 Gravel Pack Porosity: 0.3

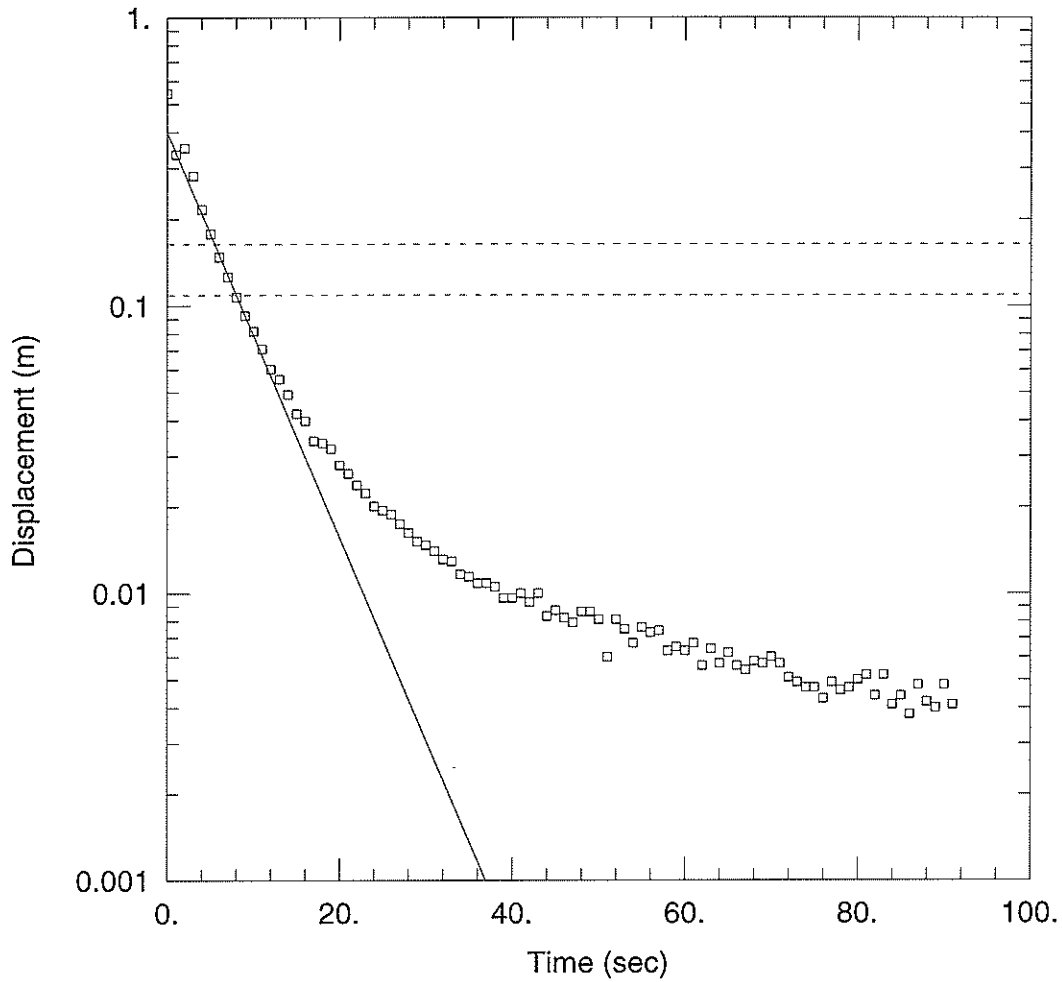
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 0.0002178 m/sec

y0 = 0.3443 m



WELL TEST ANALYSIS

Data Set: \\...\MA-MW12-01 Test 2.agt
 Date: 11/22/12

Time: 13:03:32

PROJECT INFORMATION

Test Well: MA-MW12-01
 Test Date: 12-September-12

AQUIFER DATA

Saturated Thickness: 3.25 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.545 m
 Total Well Penetration Depth: 3.25 m
 Casing Radius: 0.025 m

Static Water Column Height: 3.25 m
 Screen Length: 3.05 m
 Well Radius: 0.092 m

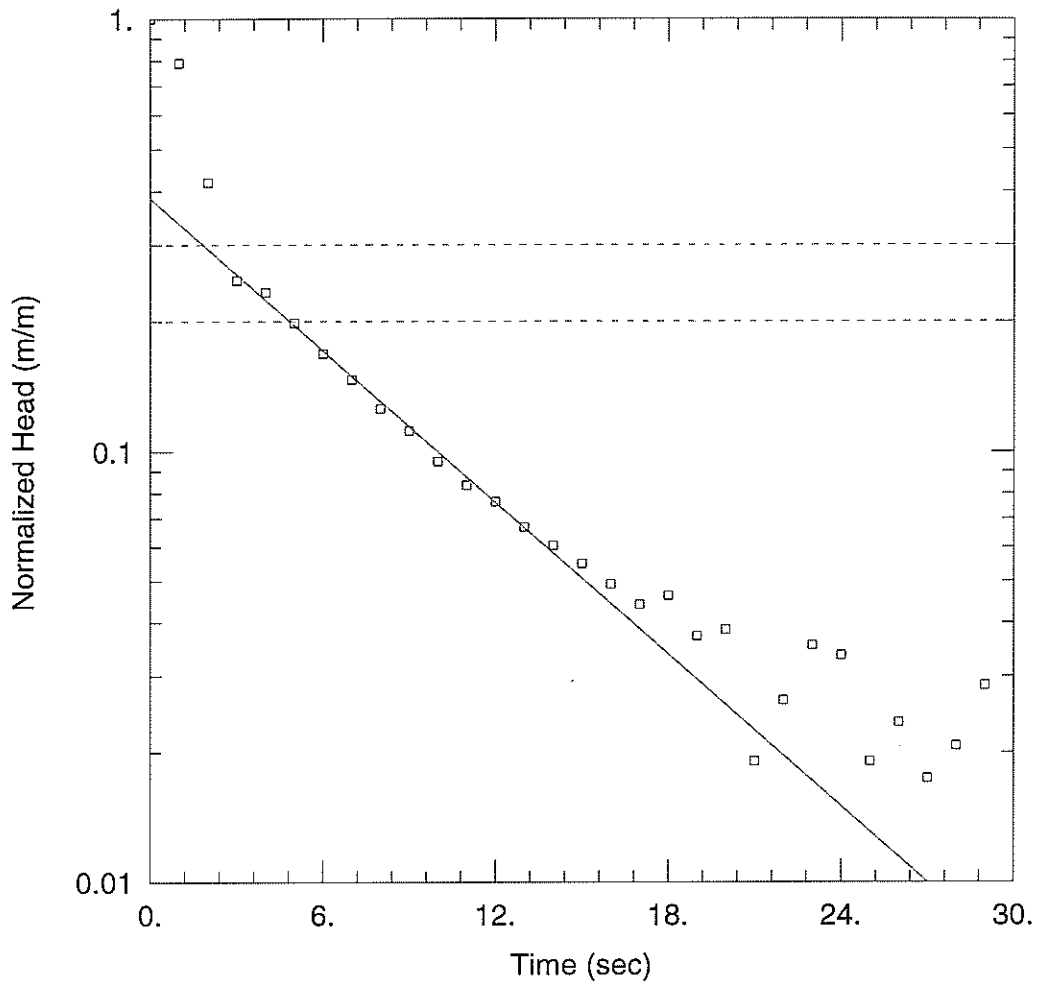
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 4.488E-5 m/sec

y0 = 0.3995 m



WELL TEST ANALYSIS

Data Set: \\...\MA-MW12-01 Test 3 FH.agt
 Date: 11/22/12

Time: 13:03:42

PROJECT INFORMATION

Test Well: MA-MW12-01
 Test Date: 12-September-12

AQUIFER DATA

Saturated Thickness: 3.25 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MA-MW12-01)

Initial Displacement: 0.545 m
 Total Well Penetration Depth: 3.25 m
 Casing Radius: 0.025 m

Static Water Column Height: 3.25 m
 Screen Length: 3.05 m
 Well Radius: 0.092 m

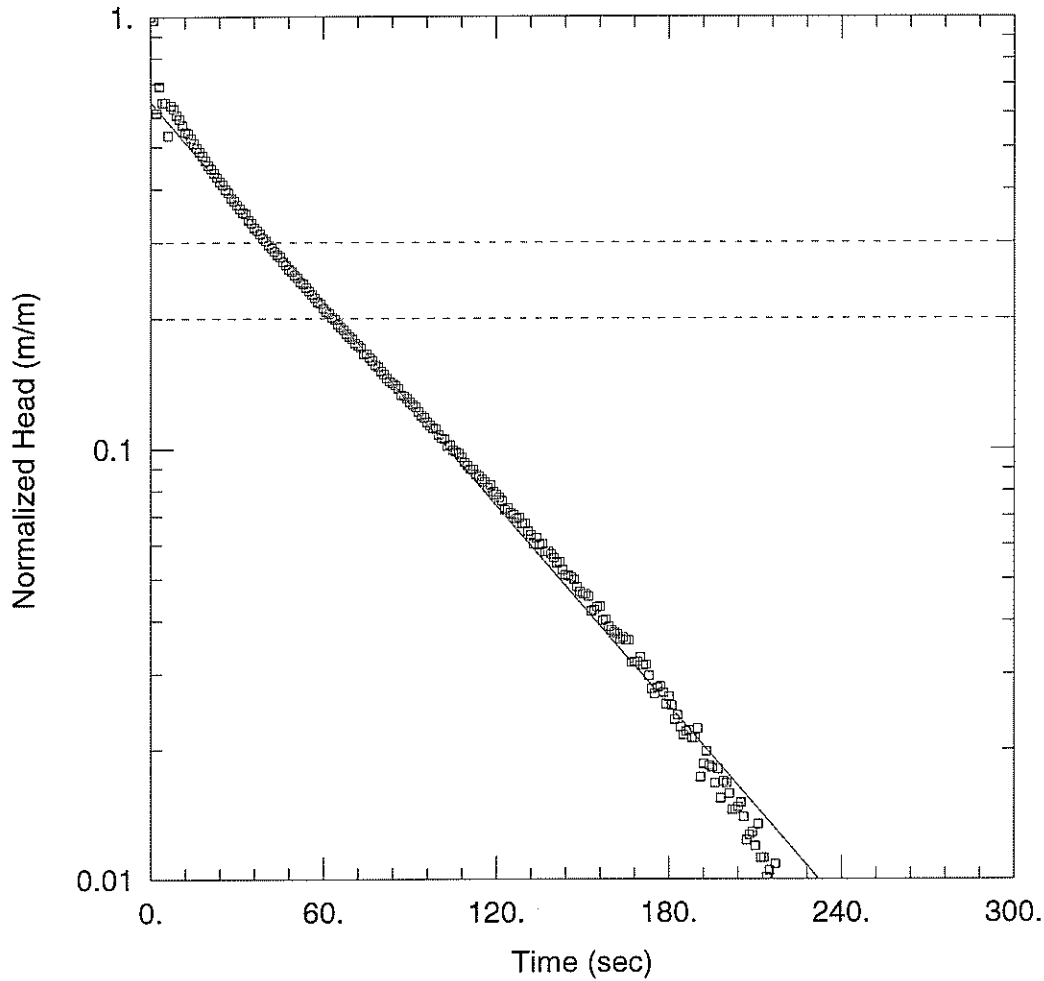
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 3.733E-5 m/sec

y0 = 0.2096 m



WELL TEST ANALYSIS

Data Set: \\...MA-MW12-02 FH.aqt
 Date: 11/22/12

Time: 13:04:37

PROJECT INFORMATION

Test Well: MA-MW12-02
 Test Date: 12-September-12

AQUIFER DATA

Saturated Thickness: 3.05 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (MA-MW12-02)

Initial Displacement: 0.545 m
 Total Well Penetration Depth: 3.05 m
 Casing Radius: 0.025 m

Static Water Column Height: 3.05 m
 Screen Length: 3.05 m
 Well Radius: 0.092 m

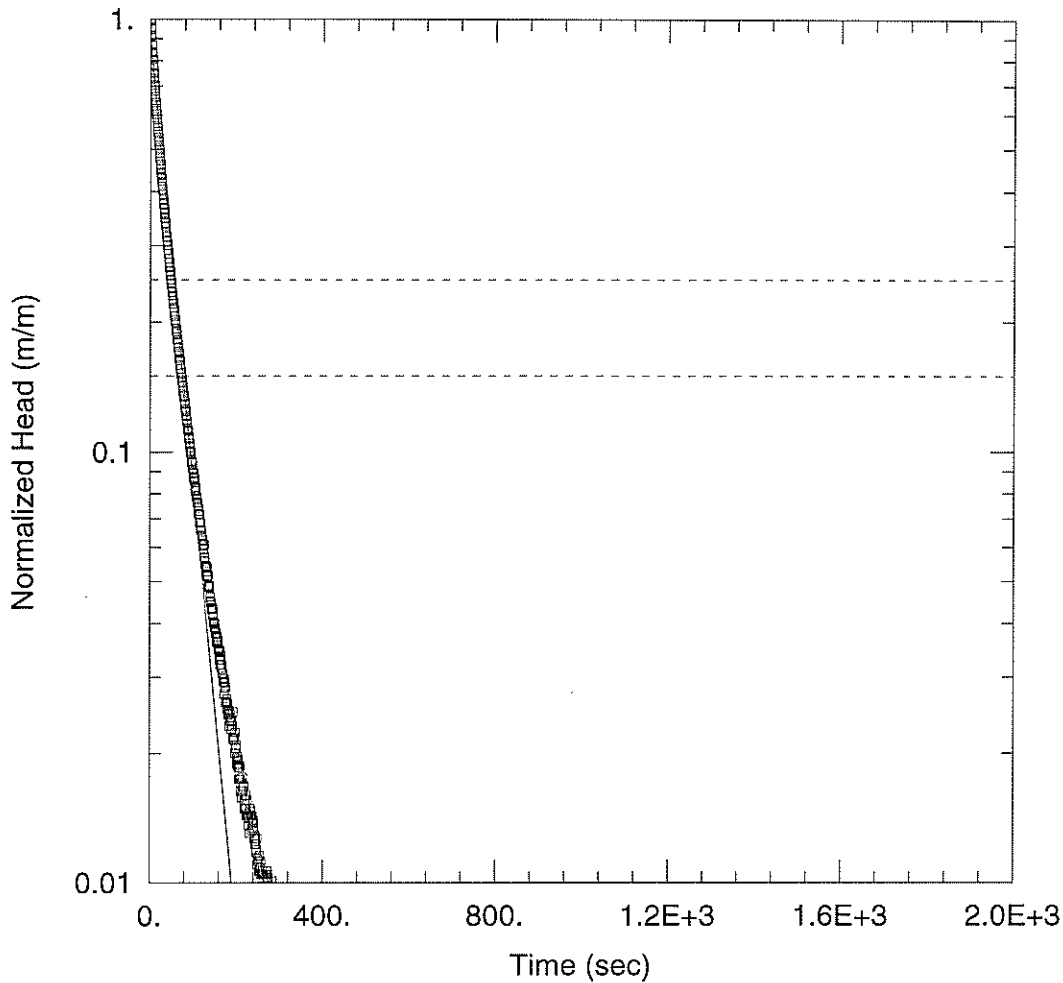
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 4.867E-6$ m/sec

$y_0 = 0.3448$ m



WELL TEST ANALYSIS

Data Set: \\...\MA-MW12-02.aqt

Date: 11/22/12

Time: 13:04:53

PROJECT INFORMATION

Test Well: MA-MW12-02

Test Date: 12-September-12

AQUIFER DATA

Saturated Thickness: 3.05 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MA-MW12-02)

Initial Displacement: 0.545 m

Static Water Column Height: 3.05 m

Total Well Penetration Depth: 3.05 m

Screen Length: 3.05 m

Casing Radius: 0.025 m

Well Radius: 0.092 m

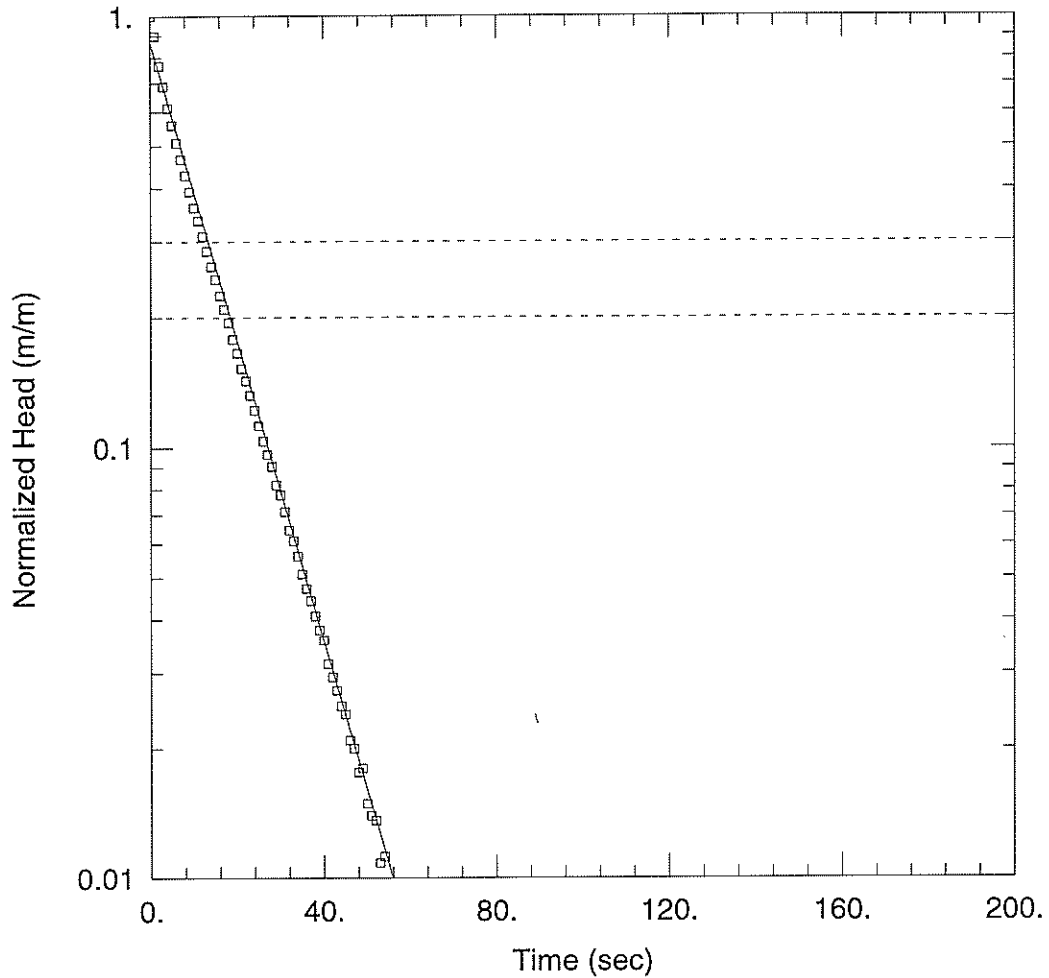
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 1.28E-5 m/sec

y0 = 0.4759 m



WELL TEST ANALYSIS

Data Set: \...\MA-MW12-03 Test 1.aqt
 Date: 11/22/12

Time: 13:05:07

PROJECT INFORMATION

Test Well: MA-MW12-03
 Test Date: 12-September-12

AQUIFER DATA

Saturated Thickness: 3.38 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MA-MW12-03)

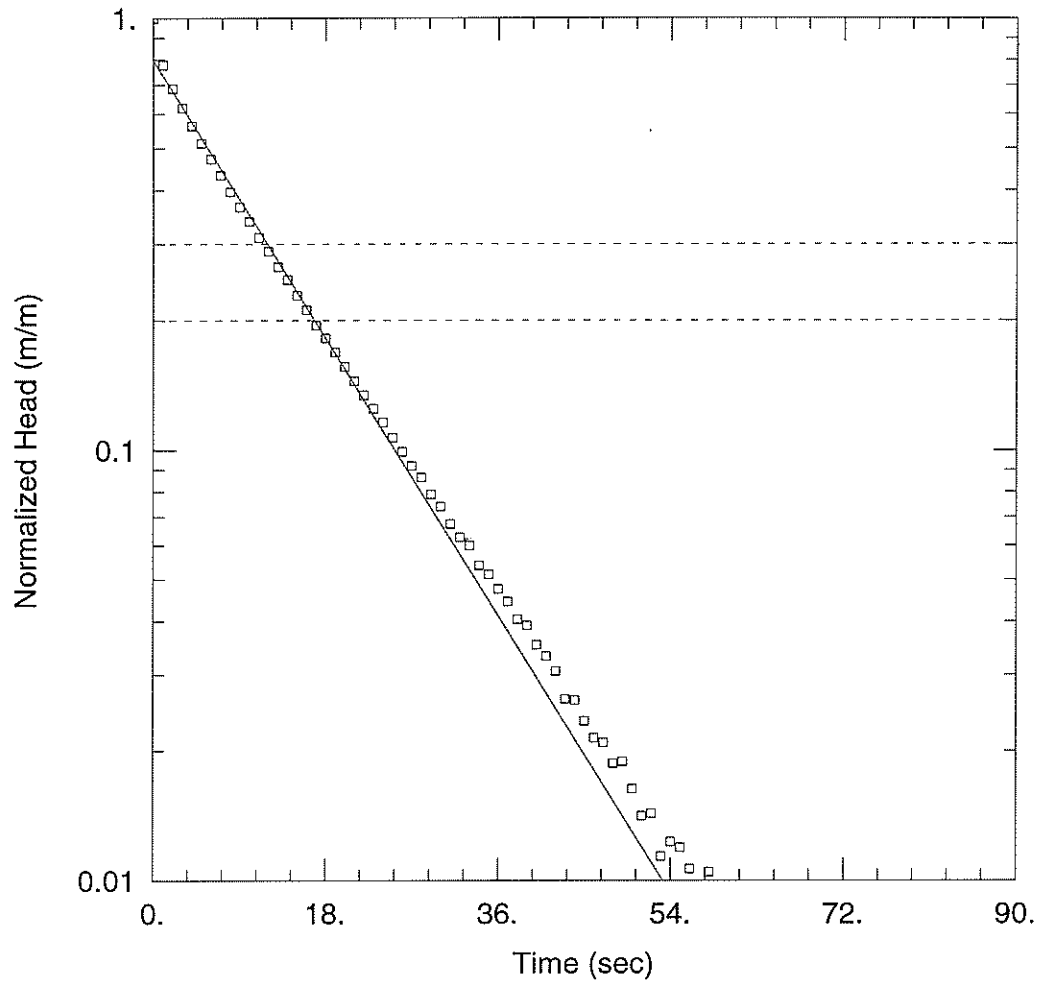
Initial Displacement: 0.545 m
 Total Well Penetration Depth: 3.38 m
 Casing Radius: 0.025 m

Static Water Column Height: 3.38 m
 Screen Length: 3.05 m
 Well Radius: 0.092 m

SOLUTION

Aquifer Model: Unconfined
 K = 2.229E-5 m/sec

Solution Method: Bouwer-Rice
 y0 = 0.4754 m



WELL TEST ANALYSIS

Data Set: \\...\MA-MW12-03 Test 2.aqt
 Date: 11/22/12

Time: 13:05:21

PROJECT INFORMATION

Test Well: MA-MW12-03
 Test Date: 12-September-12

AQUIFER DATA

Saturated Thickness: 3.38 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.545 m
 Total Well Penetration Depth: 3.38 m
 Casing Radius: 0.025 m

Static Water Column Height: 3.38 m
 Screen Length: 3.05 m
 Well Radius: 0.092 m

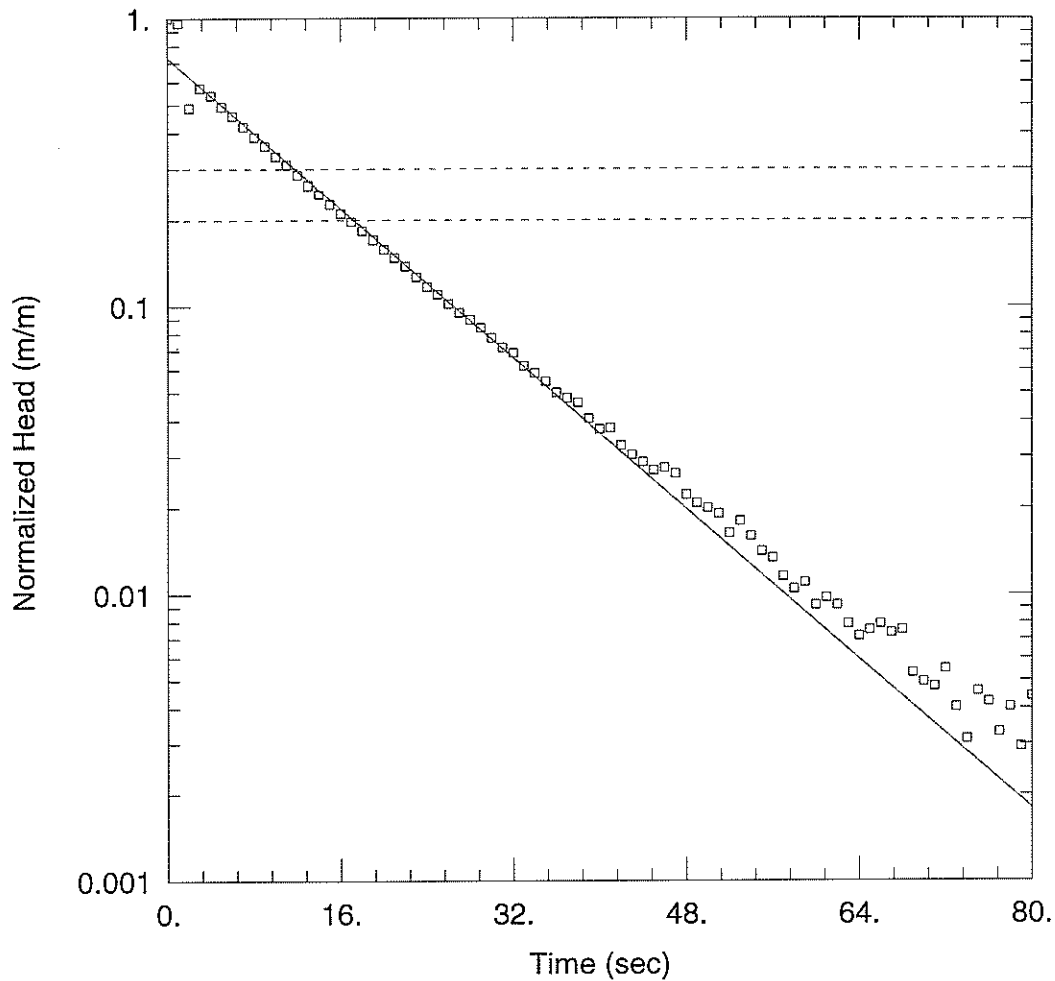
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 2.294E-5 m/sec

y0 = 0.4346 m



WELL TEST ANALYSIS

Data Set: \...\MA-MW12-03 Test 3 FH.aqt

Date: 11/22/12

Time: 13:06:01

PROJECT INFORMATION

Test Well: MA-MW12-03

Test Date: 12-September-12

AQUIFER DATA

Saturated Thickness: 3.38 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MA-MW12-03)

Initial Displacement: 0.545 m

Static Water Column Height: 3.38 m

Total Well Penetration Depth: 3.38 m

Screen Length: 3.05 m

Casing Radius: 0.025 m

Well Radius: 0.092 m

SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 2.092E-5 m/sec

y0 = 0.3964 m



APPENDIX E

Analytical Reports and Chain of Custody Forms

**Table E-1
Results of Water Analyses - Metals
[YTG Landfill Monitoring, Mayo, Yukon]**

SCN Location QA/QC Date	Aquatic Life CSR-AW (freshwater)	Notes	L1209363-14	L1209363-10	L1209363-11	L1209363-12	L1209363-13
			MA SURFACE 12-SEP-12	MA-MW12-01 11-SEP-12	MA-MW12-02 11-SEP-12	MA-MW12-03 11-SEP-12	MA-MW12-04 11-SEP-12
Parameters							
pH (field)			7.29	7.23	7.12	7.41	7.19
Temperature °C			8.71	2.90	3.78	3.56	2.57
Conductivity (uS/cm)			493	1116	2366	743	1001
Dissolved Oxygen (mg/L)			-	-	-	-	-
Laboratory Parameters							
pH (laboratory)			8.16	8.07	7.94	8.02	8.04
Hardness (as CaCO3)			108	229	419	191	252
total dissolved solids			145	364	4270	263	325
Aggregate Organics							
COD			<20	53	77	146	20
dissolved organic carbon			2.77	1.24	4.09	0.92	0.74
Bacteriological							
Coliform Bacteria - Fecal			-	-	-	-	-
Dissolved Metals							
aluminum			0.026	<0.010	0.194	0.016	<0.010
antimony	0.2		<0.00050	<0.00050	0.00588	0.00847	<0.00050
arsenic	0.05		0.00225	0.00377	0.00236	0.00245	0.00306
barium	10		0.056	0.050	0.041	0.093	0.061
beryllium	0.053		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
bismuth			<0.20	<0.20	<0.20	<0.20	<0.20
boron			<0.10	<0.10	<1.0	<0.10	<1.0
cadmium	0.0001 - 0.0006	H	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
calcium			32.4	67.3	124	59.2	75.1
chromium	0.010 ^{VI} , 0.090 ^{III}	V	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
cobalt	0.009		<0.010	<0.010	<0.010	<0.0010	<0.0010
copper	0.020 - 0.090	H	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
iron			<0.030	0.597	0.221	<0.030	0.089
lead	0.040 - 0.160	H	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
lithium			<0.010	<0.010	0.023	<0.010	<0.010
magnesium			6.68	14.8	26.5	10.4	15.8
manganese			0.0102	0.482	0.859	0.271	0.319
mercury	0.001		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
molybdenum	10		<0.030	<0.030	<0.030	<0.030	<0.030
nickel	0.250 - 1.5	H	<0.050	<0.050	<0.050	<0.050	<0.050
phosphorus			<0.30	<0.30	<0.30	<0.30	<0.30
potassium			0.50	1.77	4.10	2.50	1.76
selenium	0.01		<0.0010	<0.0010	<0.0012	<0.0010	<0.0010
silicon			2.08	2.40	4.69	2.61	2.91
silver	0.0005 - 0.015	H	<0.010	<0.010	<0.010	<0.010	<0.010
sodium			<2.0	<2.0	166.0	<2.0	<2.0
strontium			0.163	0.396	1.02	0.276	0.325
thallium	0.003		<0.20	<0.20	<0.20	<0.20	<0.20
tin			<0.030	<0.030	<0.030	<0.030	<0.030
titanium	1		<0.010	0.012	0.022	<0.010	0.010
uranium	3		0.00071	0.00271	0.0542	0.0190	0.00454
vanadium			<0.030	<0.030	<0.030	<0.030	<0.030
zinc	0.075 - 2.4	H	<0.050	<0.050	<0.050	<0.050	<0.050
Other Inorganics							
bicarbonate (CaCO3)			84.2	195	287	154	180
carbonate (CaCO3)			<2.0	<2.0	<1.0	<1.0	<2.0
hydroxide (CaCO3)			<2.0	<2.0	<1.0	<1.0	<2.0
total alkalinity (CaCO3)			84.2	195	287	154	180
ammonia	1.31 - 18.5	pH	<0.0050	0.0306	0.420	0.322	0.0090
bromide (free)			<0.50	<0.50	5.1	<0.50	<0.50
chloride			<0.50	<0.50	5.1	<0.50	<0.50
fluoride	2 - 3	H	0.061	0.077	0.23	0.074	0.057
nitrate (as N)	400		0.0553	0.0126	0.161	0.0135	0.0137
nitrite (as N)	0.2 - 2	CL	<0.0010	<0.0010	0.020	<0.0010	<0.0010
total Kjeldahl nitrogen			0.122	0.77	8.19	7.36	0.27
sulphate	1000		29.9	104	633	54.7	83.7

Notes:

All concentrations in milligrams per litre (mg/L), unless otherwise noted.
Standards from the Yukon Contaminated Sites Regulation (CSR), from the Environment Act (O.I.C. 2002/171) its associated Schedules.
Land Use abbreviations: AW (Aquatic Life) and DW (Drinking Water).
H = standard is Hardness dependent
CL = standard is chloride dependent
pH = standard is pH dependent
V = Standard is valence dependent VI refers to chromium VI and III refers to chromium III
T = standard varies with temperature
MCS = Most Conservative Standard
FDA = field duplicate available
FD = field duplicate
QA/QC = quality assurance/quality control
SCN = sample control number
Italics indicates standard is below detection limit.
Yellow highlight and box= Exceeds CSR freshwater aquatic life (AW) standards; AW standards assume minimum 1:10 dilution is available.
Bold= Exceeds CSR Drinking water (DW) standard.
COC = Chain of Custody

Results of Water Analyses - Hydrocarbons
[YTG Landfill Monitoring, Mayo, Yukon]

SCN Location QA/QC Date	Aquatic Life CSR-AW (freshwater)	Notes	L1209363-14	L1209363-10	L1209363-11	L1209363-12	L1209363-13
			MA SURFACE	MA-MW12-01	MA-MW12-02	MA-MW12-03	MA-MW12-04
			12-SEP-12	11-SEP-12	11-SEP-12	11-SEP-12	11-SEP-12
Monoaromatic Hydrocarbons							
benzene	4		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
ethylbenzene	2		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
styrene	0.72		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
toluene	0.390		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
ortho-xylene			<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
meta- & para-xylene			<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
total xylene			<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
VHw ₆₋₁₀	15		<0.10	<0.10	<0.10	<0.10	<0.10
VPHw	1.5		<0.10	<0.10	<0.10	<0.10	<0.10
Polycyclic Aromatic Hydrocarbons							
acenaphthene			<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
acenaphthylene			<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
acridine	0.0005		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
anthracene	0.001		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
benzo(a)anthracene	0.001		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
benzo(a)pyrene	0.0001		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
benzo(b)fluoranthene			<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
benzo(g,h,i)perylene			<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
benzo(k)fluoranthene			<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
chrysene			<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
dibenzo(a,h)anthracene			<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
fluoranthene	0.002		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
fluorene	0.12		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
indeno(1,2,3-c,d)pyrene			<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
naphthalene	0.01		<0.000050	<0.000050	<0.000050	0.000051	<0.000050
phenanthrene	0.003		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
pyrene	0.0002		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
quinoline	0.034		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Other Hydrocarbons							
EPHw ₁₀₋₁₉	5		<0.25	<0.25	<0.25	<0.25	<0.25
EPHw ₁₉₋₃₂			<0.25	0.51	<0.25	0.78	0.50
LEPHw	0.5		<0.25	<0.25	<0.25	<0.25	<0.25
HEPHw			<0.25	0.51	<0.25	0.78	0.50
Miscellaneous Organics							
methyl tertiary butyl ether (MTBE)			<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

Notes:

All concentrations in milligrams per litre (mg/L), unless otherwise noted.

Standards from the Yukon Contaminated Sites Regulation (CSR), from the Environment Act (O.I.C. 2002/171) its associated Schedules.

Land Use abbreviations: DW (Drinking Water) and AW (Aquatic Life).

FDA = field duplicate available

FD = field duplicate

QA/QC = quality assurance/quality control

SCN = sample control number

COC = Chain of Custody

EPHw₁₀₋₁₉ = extractable petroleum hydrocarbons, carbon range 10-19

LEPHw = light extractable petroleum hydrocarbons

Where water use for the protection of aquatic life applies, the standards for EPHw₁₀₋₁₉ is equivalent to LEPHw, when no LEPHw analysis is undertaken.

VPHw = volatile petroleum hydrocarbons

VHw₆₋₁₀ = volatile hydrocarbons, carbon range 6-10

Where water use for the protection of aquatic life applies, the standards for VHw₆₋₁₀ equivalent to VPHw, when no VPHw analysis is undertaken.

PAH = polycyclic aromatic hydrocarbon

Italics indicates standard is below detection limit.

Yellow highlight and box= Exceeds CSR freshwater aquatic life (AW) standards; AW standards assume minimum 1:10 dilution is available.



GOLDER ASSOCIATES LTD.
ATTN: Andrea Badger
201B, 170 Titanium Way
Whitehorse YT Y1A 0G1

Date Received: 14-SEP-12
Report Date: 27-SEP-12 10:35 (MT)
Version: FINAL

Client Phone: 867-633-6076

Certificate of Analysis

Lab Work Order #: L1209363
Project P.O. #: NOT SUBMITTED
Job Reference: 11-1436-0073/1200,2200,2400,2700
C of C Numbers:
Legal Site Desc:

Amber Springer
Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1209363-1 groundwater 09-SEP-12 15:40 PC-MW12-01	L1209363-2 groundwater 10-SEP-12 10:20 PC-MW12-02	L1209363-3 groundwater 10-SEP-12 11:30 PC-MW12-03	L1209363-4 surface water 13-SEP-12 13:30 PC SURFACE	L1209363-5 groundwater 12-SEP-12 10:40 SX-MW12-01	
Grouping	Analyte					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	5720	2500	3010	2350	681
	pH (pH)	7.83	7.93	7.87	8.13	7.78
	Total Dissolved Solids (mg/L)	8890	3970	4690	3870	1470
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	447	288	270	344	107
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0	<2.0	<2.0	<1.0	<2.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0	<2.0	<2.0	<1.0	<2.0
	Alkalinity, Total (as CaCO3) (mg/L)	447	288	270	344	107
	Ammonia, Total (as N) (mg/L)	1.84	1.54	1.80	0.342	0.0122
	Chloride (Cl) (mg/L)	109	90	105	76	431
	Fluoride (F) (mg/L)	<0.40 ^{DLM}	<0.40 ^{DLM}	<0.40 ^{DLM}	0.48	<0.20 ^{DLM}
	Nitrate (as N) (mg/L)	<0.25 ^{DLA}	<0.10 ^{DLA}	<0.10 ^{DLA}	<0.10 ^{DLA}	<0.050 ^{DLA}
	Nitrite (as N) (mg/L)	<0.050 ^{DLA}	<0.020 ^{DLA}	<0.020 ^{DLA}	<0.020 ^{DLA}	<0.010 ^{DLA}
	Total Kjeldahl Nitrogen (mg/L)	4.04	2.54	3.07	3.95	0.179
Sulfate (SO4) (mg/L)	5840	2520	2900	2140	63.0	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	33.8	17.2	18.1	68.6	3.32
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	LAB	FIELD
	Aluminum (Al)-Dissolved (mg/L)	<0.10 ^{DLA}	<0.050 ^{DLA}	<0.050 ^{DLA}	<0.050 ^{DLA}	<0.050 ^{DLA}
	Antimony (Sb)-Dissolved (mg/L)	<0.0050 ^{DLA}	<0.0025 ^{DLA}	<0.0025 ^{DLA}	<0.0025 ^{DLA}	<0.0025 ^{DLA}
	Arsenic (As)-Dissolved (mg/L)	0.0083 ^{DLA}	0.00855 ^{DLA}	0.00699 ^{DLA}	0.00134 ^{DLA}	0.00060 ^{DLA}
	Barium (Ba)-Dissolved (mg/L)	<0.20 ^{DLA}	<0.10 ^{DLA}	<0.10 ^{DLA}	<0.10 ^{DLA}	<0.10 ^{DLA}
	Beryllium (Be)-Dissolved (mg/L)	<0.010 ^{DLA}	<0.0050 ^{DLA}	<0.0050 ^{DLA}	<0.0050 ^{DLA}	<0.0050 ^{DLA}
	Bismuth (Bi)-Dissolved (mg/L)	<0.40 ^{DLA}	<0.20 ^{DLA}	<0.20 ^{DLA}	<0.20 ^{DLA}	<0.20 ^{DLA}
	Boron (B)-Dissolved (mg/L)	<1.0 ^{DLA}	<0.50 ^{DLA}	<0.50 ^{DLA}	<0.50 ^{DLA}	<0.50 ^{DLA}
	Cadmium (Cd)-Dissolved (mg/L)	<0.0020 ^{DLA}	<0.0010 ^{DLA}	<0.0010 ^{DLA}	<0.0010 ^{DLA}	0.0016 ^{DLA}
	Calcium (Ca)-Dissolved (mg/L)	372 ^{DLA}	213 ^{DLA}	263 ^{DLA}	278 ^{DLA}	218 ^{DLA}
	Chromium (Cr)-Dissolved (mg/L)	<0.020 ^{DLA}	<0.010 ^{DLA}	<0.010 ^{DLA}	<0.010 ^{DLA}	<0.010 ^{DLA}
	Cobalt (Co)-Dissolved (mg/L)	<0.020 ^{DLA}	<0.010 ^{DLA}	<0.010 ^{DLA}	<0.010 ^{DLA}	0.025 ^{DLA}
	Copper (Cu)-Dissolved (mg/L)	<0.010 ^{DLA}	<0.0050 ^{DLA}	<0.0050 ^{DLA}	<0.0050 ^{DLA}	<0.0050 ^{DLA}
	Iron (Fe)-Dissolved (mg/L)	0.463 ^{DLA}	0.475 ^{DLA}	0.297 ^{DLA}	0.079 ^{DLA}	<0.030 ^{DLA}
	Lead (Pb)-Dissolved (mg/L)	<0.0050 ^{DLA}	<0.0025 ^{DLA}	<0.0025 ^{DLA}	<0.0025 ^{DLA}	<0.0025 ^{DLA}
	Lithium (Li)-Dissolved (mg/L)	0.025	0.021	0.035	0.031	0.021
	Magnesium (Mg)-Dissolved (mg/L)	1160	477	571	403	32.9
	Manganese (Mn)-Dissolved (mg/L)	0.691	0.377	0.400	0.042	1.28
	Mercury (Hg)-Dissolved (mg/L)	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.00020 ^{DLA}	<0.00020 ^{DLA}
	Molybdenum (Mo)-Dissolved (mg/L)	<0.060 ^{DLA}	<0.030 ^{DLA}	<0.030 ^{DLA}	<0.030 ^{DLA}	<0.030 ^{DLA}
Nickel (Ni)-Dissolved (mg/L)	<0.10 ^{DLA}	<0.050 ^{DLA}	<0.050 ^{DLA}	<0.050 ^{DLA}	0.106 ^{DLA}	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1209363-6	L1209363-7	L1209363-8	L1209363-9	L1209363-10
		Description	groundwater	groundwater	groundwater	surface water	groundwater
		Sampled Date	10-SEP-12	10-SEP-12	10-SEP-12	12-SEP-12	11-SEP-12
		Sampled Time	16:30	17:45	16:30	13:20	10:45
		Client ID	SX-MW12-02	SX-MW12-03	SX-MW12-04	SX SURFACE	MA-MW12-01
Grouping	Analyte						
WATER							
Physical Tests	Hardness (as CaCO3) (mg/L)		3120	189	3040	127	229
	pH (pH)		7.70	8.05	7.78	7.90	8.07
	Total Dissolved Solids (mg/L)		6260	227	6390	160	364
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		247	198	246	120	195
	Alkalinity, Carbonate (as CaCO3) (mg/L)		<2.0	<2.0	<2.0	<2.0	<2.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)		<2.0	<2.0	<2.0	<2.0	<2.0
	Alkalinity, Total (as CaCO3) (mg/L)		247	198	246	120	195
	Ammonia, Total (as N) (mg/L)		<0.0050	<0.0050	<0.0050	0.0110	0.0306
	Chloride (Cl) (mg/L)		2010	0.97	1970	<0.50	<0.50
	Fluoride (F) (mg/L)		<0.40 ^{DLM}	0.377	<0.40 ^{DLM}	0.193	0.077
	Nitrate (as N) (mg/L)		3.47 ^{DLA}	0.167	2.38	<0.10 ^{DLA}	0.0126
	Nitrite (as N) (mg/L)		<0.050 ^{TKNI}	<0.0010	<0.0010 ^{TKNI}	<0.020 ^{DLA}	<0.0010
	Total Kjeldahl Nitrogen (mg/L)		0.156 ^{TKNI}	0.079	0.137 ^{TKNI}	0.169	0.77
Sulfate (SO4) (mg/L)		83	12.0	82	18.6	104	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)		4.12	2.93	3.85	4.26	1.24
Dissolved Metals	Dissolved Metals Filtration Location		FIELD ^{DLA}	FIELD	FIELD ^{DLA}	LAB	FIELD
	Aluminum (Al)-Dissolved (mg/L)		<0.10 ^{DLA}	<0.010	<0.10 ^{DLA}	<0.010	<0.010
	Antimony (Sb)-Dissolved (mg/L)		<0.0050 ^{DLA}	<0.00050	<0.0050 ^{DLA}	<0.00050	<0.00050
	Arsenic (As)-Dissolved (mg/L)		<0.0010 ^{DLA}	0.00029	<0.0010 ^{DLA}	0.00086	0.00377
	Barium (Ba)-Dissolved (mg/L)		<0.20 ^{DLA}	0.021	<0.20 ^{DLA}	0.094	0.050
	Beryllium (Be)-Dissolved (mg/L)		<0.010 ^{DLA}	<0.0050	<0.010 ^{DLA}	<0.0050	<0.0050
	Bismuth (Bi)-Dissolved (mg/L)		<0.40 ^{DLA}	<0.20	<0.40 ^{DLA}	<0.20	<0.20
	Boron (B)-Dissolved (mg/L)		<1.0 ^{DLA}	<0.10	<1.0 ^{DLA}	<0.10	<0.10
	Cadmium (Cd)-Dissolved (mg/L)		<0.0020 ^{DLA}	<0.00020	<0.0020 ^{DLA}	<0.00020	<0.00020
	Calcium (Ca)-Dissolved (mg/L)		1200 ^{DLA}	61.2	1170 ^{DLA}	39.6	67.3
	Chromium (Cr)-Dissolved (mg/L)		<0.020 ^{DLA}	<0.0020	<0.020 ^{DLA}	<0.0020	<0.0020
	Cobalt (Co)-Dissolved (mg/L)		<0.020 ^{DLA}	<0.010	<0.020 ^{DLA}	<0.010	<0.010
	Copper (Cu)-Dissolved (mg/L)		<0.010 ^{DLA}	<0.0010	<0.010 ^{DLA}	<0.0010	<0.0010
	Iron (Fe)-Dissolved (mg/L)		<0.060 ^{DLA}	<0.030	<0.060 ^{DLA}	0.194	0.597
	Lead (Pb)-Dissolved (mg/L)		<0.0050 ^{DLA}	<0.00050	<0.0050 ^{DLA}	<0.00050	<0.00050
	Lithium (Li)-Dissolved (mg/L)		0.032	0.012	0.032	<0.010	<0.010
	Magnesium (Mg)-Dissolved (mg/L)		29.5 ^{DLA}	8.68	29.5 ^{DLA}	6.95	14.8
	Manganese (Mn)-Dissolved (mg/L)		<0.020 ^{DLA}	0.113	<0.020 ^{DLA}	0.129	0.482
	Mercury (Hg)-Dissolved (mg/L)		<0.00020 ^{DLA}	<0.00020	<0.00020 ^{DLA}	<0.00020	<0.00020
	Molybdenum (Mo)-Dissolved (mg/L)		<0.060 ^{DLA}	<0.030	<0.060 ^{DLA}	<0.030	<0.030
	Nickel (Ni)-Dissolved (mg/L)		<0.10 ^{DLA}	<0.050	<0.10 ^{DLA}	<0.050	<0.050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1209363-11	L1209363-12	L1209363-13	L1209363-14	L1209363-15
		Description	groundwater	groundwater	groundwater	surface water	groundwater
		Sampled Date	11-SEP-12	11-SEP-12	11-SEP-12	12-SEP-12	13-SEP-12
		Sampled Time	12:30	14:15	15:15	17:30	09:25
		Client ID	MA-MW12-02	MA-MW12-03	MA-MW12-04	MA SURFACE	KE-MW12-01
Grouping	Analyte						
WATER							
Physical Tests	Hardness (as CaCO3) (mg/L)		419	191	252	108	719
	pH (pH)		7.94	8.02	8.04	8.16	7.69
	Total Dissolved Solids (mg/L)		4270	263	325	145	968
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		287	154	180	84.2	373
	Alkalinity, Carbonate (as CaCO3) (mg/L)		<1.0	<1.0	<2.0	<2.0	<2.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)		<1.0	<1.0	<2.0	<2.0	<2.0
	Alkalinity, Total (as CaCO3) (mg/L)		287	154	180	84.2	373
	Ammonia, Total (as N) (mg/L)		0.420	0.322	0.0090	<0.0050	0.0877
	Chloride (Cl) (mg/L)		5.1	<0.50	<0.50	<0.50	<5.0 ^{DLM}
	Fluoride (F) (mg/L)		0.23	0.074	0.057	0.061	<0.20 ^{DLM}
	Nitrate (as N) (mg/L)		0.161	0.0135	0.0137	0.0553	<0.050 ^{DLA}
	Nitrite (as N) (mg/L)		0.020	<0.0010	<0.0010	<0.0010	<0.010 ^{DLA}
	Total Kjeldahl Nitrogen (mg/L)		8.19	7.36	0.27	0.122	0.572
Sulfate (SO4) (mg/L)		633	54.7	83.7	29.9	408	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)		4.09	0.92	0.74	2.77	5.57
Dissolved Metals	Dissolved Metals Filtration Location		LAB	LAB	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)		0.194	0.016	<0.010	0.026	0.058
	Antimony (Sb)-Dissolved (mg/L)		0.00588	0.00847	<0.00050	<0.00050	0.0019
	Arsenic (As)-Dissolved (mg/L)		0.00236	0.00245	0.00306	0.00225	0.00058
	Barium (Ba)-Dissolved (mg/L)		0.041	0.093	0.061	0.056	<0.040 ^{DLA}
	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	<0.10	<0.10	<0.10	<0.20 ^{DLA}
	Cadmium (Cd)-Dissolved (mg/L)		<0.00020	<0.00020	<0.00020	<0.00020	0.00142
	Calcium (Ca)-Dissolved (mg/L)		124	59.2	75.1	32.4	209
	Chromium (Cr)-Dissolved (mg/L)		<0.0020	<0.0020	<0.0020	<0.0020	<0.0040 ^{DLA}
	Cobalt (Co)-Dissolved (mg/L)		<0.010	<0.010	<0.010	<0.010	0.076
	Copper (Cu)-Dissolved (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0020 ^{DLA}
	Iron (Fe)-Dissolved (mg/L)		0.221	<0.030	0.089	<0.030	0.183
	Lead (Pb)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00050	<0.00050	<0.0010 ^{DLA}
	Lithium (Li)-Dissolved (mg/L)		0.023	<0.010	<0.010	<0.010	0.016
	Magnesium (Mg)-Dissolved (mg/L)		26.5	10.4	15.8	6.68	47.9
	Manganese (Mn)-Dissolved (mg/L)		0.859	0.271	0.319	0.0102	2.86
	Mercury (Hg)-Dissolved (mg/L)		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Molybdenum (Mo)-Dissolved (mg/L)		<0.030	<0.030	<0.030	<0.030	<0.030
Nickel (Ni)-Dissolved (mg/L)		<0.050	<0.050	<0.050	<0.050	0.141	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1209363-16	L1209363-17
		Description	groundwater	surface water
		Sampled Date	13-SEP-12	11-SEP-12
		Sampled Time	09:55	19:15
		Client ID	KE-MW12-03	KE SURFACE
Grouping	Analyte			
WATER				
Physical Tests	Hardness (as CaCO3) (mg/L)	1790	95.5	
	pH (pH)	7.55	7.86	
	Total Dissolved Solids (mg/L)	2710	133	
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	408	41.1	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0	<2.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0	<2.0	
	Alkalinity, Total (as CaCO3) (mg/L)	408	41.1	
	Ammonia, Total (as N) (mg/L)	0.0442	0.0085	
	Chloride (Cl) (mg/L)	24	0.76	
	Fluoride (F) (mg/L)	<0.40 ^{DLM}	0.058	
	Nitrate (as N) (mg/L)	<0.10 ^{DLA}	0.127	
	Nitrite (as N) (mg/L)	0.062	<0.0010	
	Total Kjeldahl Nitrogen (mg/L)	0.520	0.186	
	Sulfate (SO4) (mg/L)	1540	52.9	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	5.04	1.33	
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	
	Aluminum (Al)-Dissolved (mg/L)	<0.050 ^{DLA}	0.042	
	Antimony (Sb)-Dissolved (mg/L)	<0.0025 ^{DLA}	<0.00050	
	Arsenic (As)-Dissolved (mg/L)	0.00081	0.00090	
	Barium (Ba)-Dissolved (mg/L)	<0.10 ^{DLA}	0.052	
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.0050	
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	
	Boron (B)-Dissolved (mg/L)	<0.50 ^{DLA}	<0.10	
	Cadmium (Cd)-Dissolved (mg/L)	0.0020	<0.00020	
	Calcium (Ca)-Dissolved (mg/L)	571	30.1	
	Chromium (Cr)-Dissolved (mg/L)	<0.010 ^{DLA}	<0.0020	
	Cobalt (Co)-Dissolved (mg/L)	0.092	<0.010	
	Copper (Cu)-Dissolved (mg/L)	<0.0050 ^{DLA}	<0.0010	
	Iron (Fe)-Dissolved (mg/L)	0.475	0.036	
	Lead (Pb)-Dissolved (mg/L)	<0.0025 ^{DLA}	<0.00050	
	Lithium (Li)-Dissolved (mg/L)	0.071	<0.010	
	Magnesium (Mg)-Dissolved (mg/L)	88.8	4.95	
	Manganese (Mn)-Dissolved (mg/L)	4.20	0.0047	
	Mercury (Hg)-Dissolved (mg/L)	<0.00020	<0.00020	
	Molybdenum (Mo)-Dissolved (mg/L)	<0.030	<0.030	
	Nickel (Ni)-Dissolved (mg/L)	0.277	<0.050	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1209363-1 groundwater 09-SEP-12 15:40 PC-MW12-01	L1209363-2 groundwater 10-SEP-12 10:20 PC-MW12-02	L1209363-3 groundwater 10-SEP-12 11:30 PC-MW12-03	L1209363-4 surface water 13-SEP-12 13:30 PC SURFACE	L1209363-5 groundwater 12-SEP-12 10:40 SX-MW12-01
Grouping	Analyte				
WATER					
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.60 ^{DLA}	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	27.5	28.2	32.7	15.3
	Selenium (Se)-Dissolved (mg/L)	<0.010 ^{DLA}	<0.0050 ^{DLA}	<0.0050 ^{DLA}	<0.0050 ^{DLA}
	Silicon (Si)-Dissolved (mg/L)	6.37	6.51	7.69	8.51
	Silver (Ag)-Dissolved (mg/L)	<0.020 ^{DLA}	<0.010	<0.010	<0.010
	Sodium (Na)-Dissolved (mg/L)	231	113	125	103
	Strontium (Sr)-Dissolved (mg/L)	4.06	2.20	2.84	1.49
	Thallium (Tl)-Dissolved (mg/L)	<0.40 ^{DLA}	<0.20	<0.20	<0.20
	Tin (Sn)-Dissolved (mg/L)	<0.060 ^{DLA}	<0.030	<0.030	<0.030
	Titanium (Ti)-Dissolved (mg/L)	<0.020 ^{DLA}	0.018	0.020	0.020
	Uranium (U)-Dissolved (mg/L)	0.0639	0.00731	0.00886	0.203
	Vanadium (V)-Dissolved (mg/L)	<0.060 ^{DLA}	<0.030	<0.030	<0.030
	Zinc (Zn)-Dissolved (mg/L)	<0.50 ^{DLA}	<0.25 ^{DLA}	<0.25 ^{DLA}	<0.25 ^{DLA}
Aggregate Organics	COD (mg/L)	123	56	81	218
Volatile Organic Compounds	Benzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050
	Bromodichloromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	Bromoform (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	Carbon Tetrachloride (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050
	Chlorobenzene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	Dibromochloromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	Chloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	Chloroform (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	Chloromethane (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050
	1,2-Dichlorobenzene (mg/L)	<0.00070	<0.00070	<0.00070	<0.00070
	1,3-Dichlorobenzene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	1,4-Dichlorobenzene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	1,1-Dichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	1,2-Dichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	1,1-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	cis-1,2-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	trans-1,2-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	1,3-Dichloropropene (cis & trans) (mg/L)	<0.0014	<0.0014	<0.0014	<0.0014
	Dichloromethane (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050
	1,2-Dichloropropane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	cis-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	trans-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1209363-6 groundwater 10-SEP-12 16:30 SX-MW12-02	L1209363-7 groundwater 10-SEP-12 17:45 SX-MW12-03	L1209363-8 groundwater 10-SEP-12 16:30 SX-MW12-04	L1209363-9 surface water 12-SEP-12 13:20 SX SURFACE	L1209363-10 groundwater 11-SEP-12 10:45 MA-MW12-01	
Grouping	Analyte					
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.60 ^{DLA}	<0.30	<0.60 ^{DLA}	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	1.2	0.49	1.3	1.09	1.77
	Selenium (Se)-Dissolved (mg/L)	<0.010 ^{DLA}	<0.0010	<0.010 ^{DLA}	<0.0010	<0.0010
	Silicon (Si)-Dissolved (mg/L)	4.80	4.93	4.84	4.08	2.40
	Silver (Ag)-Dissolved (mg/L)	<0.020 ^{DLA}	<0.010	<0.020 ^{DLA}	<0.010	<0.010
	Sodium (Na)-Dissolved (mg/L)	32.3	6.6	32.8	2.4	<2.0
	Strontium (Sr)-Dissolved (mg/L)	2.10	0.215	2.17	0.206	0.396
	Thallium (Tl)-Dissolved (mg/L)	<0.40 ^{DLA}	<0.20	<0.40 ^{DLA}	<0.20	<0.20
	Tin (Sn)-Dissolved (mg/L)	<0.060 ^{DLA}	<0.030	<0.060 ^{DLA}	<0.030	<0.030
	Titanium (Ti)-Dissolved (mg/L)	<0.020 ^{DLA}	<0.010	<0.020 ^{DLA}	<0.010	0.012
	Uranium (U)-Dissolved (mg/L)	0.204	0.0180	0.196	0.00086	0.00271
	Vanadium (V)-Dissolved (mg/L)	<0.060 ^{DLA}	<0.030	<0.060 ^{DLA}	<0.030	<0.030
	Zinc (Zn)-Dissolved (mg/L)	<0.50 ^{DLA}	<0.050	<0.50 ^{DLA}	<0.050	<0.050
	Aggregate Organics	COD (mg/L)	81	<20	88	<20
Volatile Organic Compounds	Benzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bromodichloromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Bromoform (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Carbon Tetrachloride (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Chlorobenzene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Dibromochloromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Chloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Chloroform (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Chloromethane (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	1,2-Dichlorobenzene (mg/L)	<0.00070	<0.00070	<0.00070	<0.00070	<0.00070
	1,3-Dichlorobenzene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,4-Dichlorobenzene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,1-Dichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,2-Dichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,1-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	cis-1,2-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	trans-1,2-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,3-Dichloropropene (cis & trans) (mg/L)	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014
	Dichloromethane (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	1,2-Dichloropropane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cis-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
trans-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1209363-11	L1209363-12	L1209363-13	L1209363-14	L1209363-15
		Description	groundwater	groundwater	groundwater	surface water	groundwater
		Sampled Date	11-SEP-12	11-SEP-12	11-SEP-12	12-SEP-12	13-SEP-12
		Sampled Time	12:30	14:15	15:15	17:30	09:25
		Client ID	MA-MW12-02	MA-MW12-03	MA-MW12-04	MA SURFACE	KE-MW12-01
Grouping	Analyte						
WATER							
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	4.10	2.50	1.76	0.50	1.52	
	Selenium (Se)-Dissolved (mg/L)	0.0012	<0.0010	<0.0010	<0.0010	<0.0020	DLA
	Silicon (Si)-Dissolved (mg/L)	4.69	2.61	2.91	2.08	5.77	
	Silver (Ag)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	
	Sodium (Na)-Dissolved (mg/L)	166	<2.0	<2.0	<2.0	5.4	
	Strontium (Sr)-Dissolved (mg/L)	1.02	0.276	0.325	0.163	0.510	
	Thallium (Tl)-Dissolved (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20	
	Tin (Sn)-Dissolved (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	
	Titanium (Ti)-Dissolved (mg/L)	0.022	<0.010	0.010	<0.010	0.029	
	Uranium (U)-Dissolved (mg/L)	0.0542	0.0190	0.00454	0.00071	0.00232	
	Vanadium (V)-Dissolved (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030	
	Zinc (Zn)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.10	DLA
Aggregate Organics	COD (mg/L)	77	146	20	<20	47	
Volatile Organic Compounds	Benzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bromodichloromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Bromoform (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Carbon Tetrachloride (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Chlorobenzene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Dibromochloromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Chloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Chloroform (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Chloromethane (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	1,2-Dichlorobenzene (mg/L)	<0.00070	<0.00070	<0.00070	<0.00070	<0.00070	<0.00070
	1,3-Dichlorobenzene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,4-Dichlorobenzene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,1-Dichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,2-Dichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,1-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	cis-1,2-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	trans-1,2-Dichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,3-Dichloropropene (cis & trans) (mg/L)	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014
	Dichloromethane (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	1,2-Dichloropropane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cis-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
trans-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1209363-16 groundwater 13-SEP-12 09:55 KE-MW12-03	L1209363-17 surface water 11-SEP-12 19:15 KE SURFACE		
Grouping	Analyte				
WATER					
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30		
	Potassium (K)-Dissolved (mg/L)	17.2	0.18		
	Selenium (Se)-Dissolved (mg/L)	0.0336	<0.0010		
	Silicon (Si)-Dissolved (mg/L)	9.32	2.92		
	Silver (Ag)-Dissolved (mg/L)	<0.010	<0.010		
	Sodium (Na)-Dissolved (mg/L)	26.9	<2.0		
	Strontium (Sr)-Dissolved (mg/L)	1.69	0.0880		
	Thallium (Tl)-Dissolved (mg/L)	<0.20	<0.20		
	Tin (Sn)-Dissolved (mg/L)	<0.030	<0.030		
	Titanium (Ti)-Dissolved (mg/L)	0.056	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.0412	0.00022		
	Vanadium (V)-Dissolved (mg/L)	<0.030	<0.030		
	Zinc (Zn)-Dissolved (mg/L)	<0.25 ^{DLA}	<0.050		
	Aggregate Organics	COD (mg/L)	42	<20	
Volatile Organic Compounds	Benzene (mg/L)	<0.00050	<0.00050		
	Bromodichloromethane (mg/L)	<0.0010	<0.0010		
	Bromoform (mg/L)	<0.0010	<0.0010		
	Carbon Tetrachloride (mg/L)	<0.00050	<0.00050		
	Chlorobenzene (mg/L)	<0.0010	<0.0010		
	Dibromochloromethane (mg/L)	<0.0010	<0.0010		
	Chloroethane (mg/L)	<0.0010	<0.0010		
	Chloroform (mg/L)	<0.0010	<0.0010		
	Chloromethane (mg/L)	<0.0050	<0.0050		
	1,2-Dichlorobenzene (mg/L)	<0.00070	<0.00070		
	1,3-Dichlorobenzene (mg/L)	<0.0010	<0.0010		
	1,4-Dichlorobenzene (mg/L)	<0.0010	<0.0010		
	1,1-Dichloroethane (mg/L)	<0.0010	<0.0010		
	1,2-Dichloroethane (mg/L)	<0.0010	<0.0010		
	1,1-Dichloroethylene (mg/L)	<0.0010	<0.0010		
	cis-1,2-Dichloroethylene (mg/L)	<0.0010	<0.0010		
	trans-1,2-Dichloroethylene (mg/L)	<0.0010	<0.0010		
	1,3-Dichloropropene (cis & trans) (mg/L)	<0.0014	<0.0014		
	Dichloromethane (mg/L)	<0.0050	<0.0050		
	1,2-Dichloropropane (mg/L)	<0.0010	<0.0010		
	cis-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010		
	trans-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010		

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1209363-1	L1209363-2	L1209363-3	L1209363-4	L1209363-5
		Description	groundwater	groundwater	groundwater	surface water	groundwater
		Sampled Date	09-SEP-12	10-SEP-12	10-SEP-12	13-SEP-12	12-SEP-12
		Sampled Time	15:40	10:20	11:30	13:30	10:40
		Client ID	PC-MW12-01	PC-MW12-02	PC-MW12-03	PC SURFACE	SX-MW12-01
Grouping	Analyte						
WATER							
Volatile Organic Compounds	Ethylbenzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Methyl t-butyl ether (MTBE) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Styrene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	1,1,1,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,1,2,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Tetrachloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Toluene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	1,1,1-Trichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,1,2-Trichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Trichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Trichlorofluoromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Vinyl Chloride (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	ortho-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	meta- & para-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Xylenes (mg/L)	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	77.8	79.3	80.7	79.6	79.1	
	Surrogate: 1,4-Difluorobenzene (SS) (%)	83.2	83.0	82.5	83.1	82.9	
Hydrocarbons	EPH10-19 (mg/L)	<0.25	<0.25	<0.25	0.47	<0.25	
	EPH19-32 (mg/L)	<0.25	<0.25	<0.25	0.54	<0.25	
	LEPH (mg/L)	<0.25	<0.25	<0.25	0.47	<0.25	
	HEPH (mg/L)	<0.25	<0.25	<0.25	0.54	<0.25	
	Volatile Hydrocarbons (VH6-10) (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10	
	VPH (C6-C10) (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	69.0	80.1	76.0	81.9	85.7	
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000070 ^{DLM}	<0.000050	
	Acenaphthylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
	Acridine (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
	Anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
	Benz(a)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
	Benzo(a)pyrene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
	Benzo(b)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
	Benzo(g,h,i)perylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
	Benzo(k)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
	Chrysene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
	Dibenz(a,h)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1209363-6	L1209363-7	L1209363-8	L1209363-9	L1209363-10
		Description	groundwater	groundwater	groundwater	surface water	groundwater
		Sampled Date	10-SEP-12	10-SEP-12	10-SEP-12	12-SEP-12	11-SEP-12
		Sampled Time	16:30	17:45	16:30	13:20	10:45
		Client ID	SX-MW12-02	SX-MW12-03	SX-MW12-04	SX SURFACE	MA-MW12-01
Grouping	Analyte						
WATER							
Volatile Organic Compounds	Ethylbenzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Methyl t-butyl ether (MTBE) (mg/L)	0.00148	<0.00050	0.00148	<0.00050	<0.00050	<0.00050
	Styrene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	1,1,1,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,1,2,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Tetrachloroethylene (mg/L)	0.0011	<0.0010	0.0010	<0.0010	<0.0010	<0.0010
	Toluene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	1,1,1-Trichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,1,2-Trichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Trichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Trichlorofluoromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Vinyl Chloride (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	ortho-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	meta- & para-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Xylenes (mg/L)	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	77.1	77.8	78.2	76.2	78.6	
	Surrogate: 1,4-Difluorobenzene (SS) (%)	82.9	83.0	83.3	83.1	83.5	
Hydrocarbons	EPH10-19 (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
	EPH19-32 (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25	0.51
	LEPH (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
	HEPH (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25	0.51
	Volatile Hydrocarbons (VH6-10) (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	VPH (C6-C10) (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	78.8	77.7	77.7	70.5	76.5	
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Acenaphthylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Acridine (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benz(a)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(a)pyrene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Benzo(b)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(g,h,i)perylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(k)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Chrysene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Dibenz(a,h)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1209363-11	L1209363-12	L1209363-13	L1209363-14	L1209363-15
		Description	groundwater	groundwater	groundwater	surface water	groundwater
		Sampled Date	11-SEP-12	11-SEP-12	11-SEP-12	12-SEP-12	13-SEP-12
		Sampled Time	12:30	14:15	15:15	17:30	09:25
		Client ID	MA-MW12-02	MA-MW12-03	MA-MW12-04	MA SURFACE	KE-MW12-01
Grouping	Analyte						
WATER							
Volatile Organic Compounds	Ethylbenzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Methyl t-butyl ether (MTBE) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Styrene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	1,1,1,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,1,2,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Tetrachloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Toluene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	1,1,1-Trichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	1,1,2-Trichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Trichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Trichlorofluoromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Vinyl Chloride (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	ortho-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	meta- & para-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Xylenes (mg/L)	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	78.2	79.6	79.7	78.1	78.8	
	Surrogate: 1,4-Difluorobenzene (SS) (%)	83.0	83.2	83.1	83.1	83.6	
Hydrocarbons	EPH10-19 (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
	EPH19-32 (mg/L)	<0.25	0.78	0.50	<0.25	0.54	
	LEPH (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25	
	HEPH (mg/L)	<0.25	0.78	0.50	<0.25	0.54	
	Volatile Hydrocarbons (VH6-10) (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10	
	VPH (C6-C10) (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10	
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	71.3	83.0	75.8	78.8	75.4	
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Acenaphthylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Acridine (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benz(a)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(a)pyrene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Benzo(b)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(g,h,i)perylene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Benzo(k)fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Chrysene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Dibenz(a,h)anthracene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1209363-16 groundwater 13-SEP-12 09:55 KE-MW12-03	L1209363-17 surface water 11-SEP-12 19:15 KE SURFACE		
Grouping	Analyte				
WATER					
Volatile Organic Compounds	Ethylbenzene (mg/L)	<0.00050	<0.00050		
	Methyl t-butyl ether (MTBE) (mg/L)	<0.00050	<0.00050		
	Styrene (mg/L)	<0.00050	<0.00050		
	1,1,1,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010		
	1,1,2,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010		
	Tetrachloroethylene (mg/L)	<0.0010	<0.0010		
	Toluene (mg/L)	0.00159	<0.00050		
	1,1,1-Trichloroethane (mg/L)	<0.0010	<0.0010		
	1,1,2-Trichloroethane (mg/L)	<0.0010	<0.0010		
	Trichloroethylene (mg/L)	<0.0010	<0.0010		
	Trichlorofluoromethane (mg/L)	<0.0010	<0.0010		
	Vinyl Chloride (mg/L)	<0.0010	<0.0010		
	ortho-Xylene (mg/L)	<0.00050	<0.00050		
	meta- & para-Xylene (mg/L)	0.00063	<0.00050		
	Xylenes (mg/L)	<0.00075	<0.00075		
	Surrogate: 4-Bromofluorobenzene (SS) (%)	78.3	79.8		
Surrogate: 1,4-Difluorobenzene (SS) (%)	81.9	82.8			
Hydrocarbons	EPH10-19 (mg/L)	<0.25	<0.25		
	EPH19-32 (mg/L)	<0.25	<0.25		
	LEPH (mg/L)	<0.25	<0.25		
	HEPH (mg/L)	<0.25	<0.25		
	Volatile Hydrocarbons (VH6-10) (mg/L)	<0.10	<0.10		
	VPH (C6-C10) (mg/L)	<0.10	<0.10		
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	73.8	81.8		
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/L)	<0.000050	<0.000050		
	Acenaphthylene (mg/L)	<0.000050	<0.000050		
	Acridine (mg/L)	<0.000050	<0.000050		
	Anthracene (mg/L)	<0.000050	<0.000050		
	Benz(a)anthracene (mg/L)	<0.000050	<0.000050		
	Benzo(a)pyrene (mg/L)	<0.000010	<0.000010		
	Benzo(b)fluoranthene (mg/L)	<0.000050	<0.000050		
	Benzo(g,h,i)perylene (mg/L)	<0.000050	<0.000050		
	Benzo(k)fluoranthene (mg/L)	<0.000050	<0.000050		
	Chrysene (mg/L)	<0.000050	<0.000050		
	Dibenz(a,h)anthracene (mg/L)	<0.000050	<0.000050		

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1209363-1	L1209363-2	L1209363-3	L1209363-4	L1209363-5
		Description	groundwater	groundwater	groundwater	surface water	groundwater
		Sampled Date	09-SEP-12	10-SEP-12	10-SEP-12	13-SEP-12	12-SEP-12
		Sampled Time	15:40	10:20	11:30	13:30	10:40
		Client ID	PC-MW12-01	PC-MW12-02	PC-MW12-03	PC SURFACE	SX-MW12-01
Grouping	Analyte						
WATER							
Polycyclic Aromatic Hydrocarbons	Fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Fluorene (mg/L)	<0.000050	<0.000050	<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	<0.000050	<0.000050
	Naphthalene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Phenanthrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Pyrene (mg/L)	0.000098	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Quinoline (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Surrogate: Acenaphthene d10 (%)	86.1	91.8	93.5	102.1	94.4	
	Surrogate: Acridine d9 (%)	89.4	96.4	97.1	103.3	101.1	
	Surrogate: Chrysene d12 (%)	80.2	87.6	86.6	83.0	85.4	
	Surrogate: Naphthalene d8 (%)	90.2	93.6	91.6	98.4	94.4	
	Surrogate: Phenanthrene d10 (%)	88.9	93.4	95.9	95.0	96.3	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1209363-6	L1209363-7	L1209363-8	L1209363-9	L1209363-10
		Description	groundwater	groundwater	groundwater	surface water	groundwater
		Sampled Date	10-SEP-12	10-SEP-12	10-SEP-12	12-SEP-12	11-SEP-12
		Sampled Time	16:30	17:45	16:30	13:20	10:45
		Client ID	SX-MW12-02	SX-MW12-03	SX-MW12-04	SX SURFACE	MA-MW12-01
Grouping	Analyte						
WATER							
Polycyclic Aromatic Hydrocarbons	Fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Fluorene (mg/L)	<0.000050	<0.000050	<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	<0.000050	<0.000050
	Naphthalene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Phenanthrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Pyrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Quinoline (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Surrogate: Acenaphthene d10 (%)	99.8	90.1	90.2	95.7	94.4	
	Surrogate: Acridine d9 (%)	106.9	95.4	94.6	100.1	93.6	
	Surrogate: Chrysene d12 (%)	93.7	85.2	85.5	89.5	86.4	
	Surrogate: Naphthalene d8 (%)	100.7	90.3	89.7	95.2	93.9	
	Surrogate: Phenanthrene d10 (%)	103.0	92.2	91.2	97.9	95.4	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1209363-11	L1209363-12	L1209363-13	L1209363-14	L1209363-15
		Description	groundwater	groundwater	groundwater	surface water	groundwater
		Sampled Date	11-SEP-12	11-SEP-12	11-SEP-12	12-SEP-12	13-SEP-12
		Sampled Time	12:30	14:15	15:15	17:30	09:25
		Client ID	MA-MW12-02	MA-MW12-03	MA-MW12-04	MA SURFACE	KE-MW12-01
Grouping	Analyte						
WATER							
Polycyclic Aromatic Hydrocarbons	Fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Fluorene (mg/L)	<0.000050	<0.000050	<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	<0.000050	<0.000050
	Naphthalene (mg/L)	<0.000050	0.000051	<0.000050	<0.000050	<0.000050	0.000059
	Phenanthrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Pyrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Quinoline (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Surrogate: Acenaphthene d10 (%)	89.7	89.6	98.3	92.0	104.8	
	Surrogate: Acridine d9 (%)	96.3	90.7	99.3	97.7	101.0	
	Surrogate: Chrysene d12 (%)	86.7	75.9	89.1	78.7	87.4	
	Surrogate: Naphthalene d8 (%)	89.8	88.9	97.8	92.5	88.0	
	Surrogate: Phenanthrene d10 (%)	92.3	91.3	99.6	93.7	96.5	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1209363-16 groundwater 13-SEP-12 09:55 KE-MW12-03	L1209363-17 surface water 11-SEP-12 19:15 KE SURFACE		
Grouping	Analyte				
WATER					
Polycyclic Aromatic Hydrocarbons	Fluoranthene (mg/L)	<0.000050	<0.000050		
	Fluorene (mg/L)	<0.000050	<0.000050		
	Indeno(1,2,3-c,d)pyrene (mg/L)	<0.000050	<0.000050		
	Naphthalene (mg/L)	0.000065	<0.000050		
	Phenanthrene (mg/L)	<0.000050	<0.000050		
	Pyrene (mg/L)	<0.000050	<0.000050		
	Quinoline (mg/L)	<0.000050	<0.000050		
	Surrogate: Acenaphthene d10 (%)	106.9	89.3		
	Surrogate: Acridine d9 (%)	91.2	87.3		
	Surrogate: Chrysene d12 (%)	78.1	75.5		
	Surrogate: Naphthalene d8 (%)	88.8	89.6		
Surrogate: Phenanthrene d10 (%)	88.4	88.3			

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Nitrite (as N)	DLA	L1209363-1, -10, -11, -12, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrate (as N)	DLA	L1209363-1, -10, -11, -12, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Aluminum (Al)-Dissolved	DLA	L1209363-1, -10, -13, -14, -15, -16, -2, -3, -5, -6, -7, -8
Duplicate	Boron (B)-Dissolved	DLA	L1209363-1, -10, -13, -14, -15, -16, -2, -3, -5, -6, -7, -8
Duplicate	Cadmium (Cd)-Dissolved	DLA	L1209363-1, -10, -13, -14, -15, -16, -2, -3, -5, -6, -7, -8
Duplicate	Chromium (Cr)-Dissolved	DLA	L1209363-1, -10, -13, -14, -15, -16, -2, -3, -5, -6, -7, -8
Duplicate	Copper (Cu)-Dissolved	DLA	L1209363-1, -10, -13, -14, -15, -16, -2, -3, -5, -6, -7, -8
Duplicate	Lead (Pb)-Dissolved	DLA	L1209363-1, -10, -13, -14, -15, -16, -2, -3, -5, -6, -7, -8
Duplicate	Selenium (Se)-Dissolved	DLA	L1209363-1, -10, -13, -14, -15, -16, -2, -3, -5, -6, -7, -8
Duplicate	Zinc (Zn)-Dissolved	DLA	L1209363-1, -10, -13, -14, -15, -16, -2, -3, -5, -6, -7, -8
Duplicate	Fluoride (F)	DLM	L1209363-1, -10, -11, -12, -13, -14, -15, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Manganese (Mn)-Dissolved	MB-LOR	L1209363-11, -12, -4, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1209363-1, -10, -13, -14, -15, -16, -2, -3, -5, -6, -7, -8
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1209363-1, -10, -13, -14, -15, -16, -2, -3, -5, -6, -7, -8
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1209363-1, -10, -13, -14, -15, -16, -2, -3, -5, -6, -7, -8
Matrix Spike	Potassium (K)-Dissolved	MS-B	L1209363-1, -10, -13, -14, -15, -16, -2, -3, -5, -6, -7, -8
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1209363-1, -10, -13, -14, -15, -16, -2, -3, -5, -6, -7, -8
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1209363-1, -10, -13, -14, -15, -16, -2, -3, -5, -6, -7, -8

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
DLM	Detection Limit Adjusted For Sample Matrix Effects
MB-LOR	Method Blank exceeds ALS DQO. LORs adjusted for samples with positive hits below 5 times blank level. Please contact ALS if re-analysis is required.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
SURR-ND	Surrogate recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.
TKNI	TKN result is likely biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"
		This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.	
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 Alkalinity
		This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.	
ALK-SCR-VA	Water	Alkalinity by colour or titration	EPA 310.2 OR APHA 2320
		This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method. OR This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.	
ANIONS-CL-IC-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-WR	Water	Nitrite Nitrogen by Ion Chromatography	EPA 300.1
		This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.	

Reference Information

ANIONS-NO3-IC-WR	Water	Nitrate Nitrogen by Ion Chromatography	EPA 300.1
This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.			
ANIONS-SO4-IC-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-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.			
COD-COL-VA	Water	Chemical Oxygen Demand by Colorimetric	APHA 5220 D. CHEMICAL OXYGEN DEMAND
This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.			
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).			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
HG-DIS-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS	EPA SW-846 3005A & EPA 245.7
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).			
LEPH/HEPH-CALC-VA	Water	LEPHs and HEPHs	BC MOE LABORATORY MANUAL (2005)
Light and Heavy Extractable Petroleum Hydrocarbons in water. 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 Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, 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 Water by GC/FID" (Version 2.1, July 20, 1999).			
MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICP-OES	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 procedure involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).			
NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
PAH-SF-MS-VA	Water	PAH in Water by GCMS	EPA 3510, 8270
The entire water sample is extracted with dichloromethane, prior to analysis by gas chromatography with mass spectrometric detection (GC/MS). Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.			
PAH-SURR-MS-VA	Water	PAH Surrogates for Waters	EPA 3510, 8270
Analysed as per the corresponding PAH test method. Known quantities of surrogate compounds are added prior to analysis to each sample to demonstrate analytical accuracy.			
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			

Reference Information

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

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.

TKN-F-VA Water TKN in Water by Fluorescence APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

VH-HSFID-VA Water VH in Water by Headspace GCFID B.C. MIN. OF ENV. LAB. MAN. (2009)

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Compounds eluting between n-hexane and n-decane are measured and summed together using flame-ionization detection.

VH-SURR-FID-VA Water VH Surrogates for Waters B.C. MIN. OF ENV. LAB. MAN. (2009)

VOC-HSMS-VA Water VOCs in water by Headspace GCMS EPA8260B, 5021

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

VOC7-HSMS-VA Water BTEX/MTBE/Styrene by Headspace GCMS EPA8260B, 5021

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

VOC7/VOC-SURR-MS-VA Water VOC7 and/or VOC Surrogates for Waters EPA8260B, 5021

VPH-CALC-VA Water VPH is VH minus select aromatics BC MOE LABORATORY MANUAL (2005)

These results are determined according to the British Columbia Ministry of Environment Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water". The concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, Xylenes and, in solids, Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10).

XYLENES-CALC-VA Water Sum of Xylene Isomer Concentrations CALCULATION

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

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

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

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

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

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

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

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



Quality Control Report

Workorder: L1209363

Report Date: 27-SEP-12

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Client: GOLDER ASSOCIATES LTD.
 # 201B, 170 Titanium Way
 Whitehorse YT Y1A 0G1
 Contact: Andrea Badger

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-PCT-VA		Water						
Batch	R2440917							
WG1551094-10	CRM	VA-ALK-PCT-CONTROL						
Alkalinity, Total (as CaCO3)			105.2		%		85-115	21-SEP-12
WG1551094-11	CRM	VA-ALK-PCT-CONTROL						
Alkalinity, Total (as CaCO3)			102.5		%		85-115	21-SEP-12
WG1551094-12	CRM	VA-ALK-PCT-CONTROL						
Alkalinity, Total (as CaCO3)			105.5		%		85-115	21-SEP-12
WG1551094-13	CRM	VA-ALK-PCT-CONTROL						
Alkalinity, Total (as CaCO3)			105.2		%		85-115	21-SEP-12
WG1551094-14	CRM	VA-ALK-PCT-CONTROL						
Alkalinity, Total (as CaCO3)			103.6		%		85-115	21-SEP-12
WG1551094-15	CRM	VA-ALK-PCT-CONTROL						
Alkalinity, Total (as CaCO3)			103.8		%		85-115	21-SEP-12
WG1551094-16	CRM	VA-ALK-PCT-CONTROL						
Alkalinity, Total (as CaCO3)			106.1		%		85-115	21-SEP-12
WG1551094-9	CRM	VA-ALK-PCT-CONTROL						
Alkalinity, Total (as CaCO3)			107.8		%		85-115	21-SEP-12
WG1551094-34	DUP	L1209363-12						
Alkalinity, Total (as CaCO3)		154	155		mg/L	0.2	20	21-SEP-12
Alkalinity, Bicarbonate (as CaCO3)		154	155		mg/L	0.2	20	21-SEP-12
Alkalinity, Carbonate (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	25	21-SEP-12
Alkalinity, Hydroxide (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	21-SEP-12
WG1551094-2	MB							
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	21-SEP-12
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	21-SEP-12
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	21-SEP-12
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	21-SEP-12
WG1551094-4	MB							
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	21-SEP-12
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	21-SEP-12
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	21-SEP-12
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	21-SEP-12
WG1551094-5	MB							
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	21-SEP-12
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	21-SEP-12
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	21-SEP-12
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	21-SEP-12
WG1551094-6	MB							
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	21-SEP-12



Quality Control Report

Workorder: L1209363

Report Date: 27-SEP-12

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-PCT-VA		Water						
Batch R2440917								
WG1551094-6 MB								
	Alkalinity, Bicarbonate (as CaCO3)		<1.0		mg/L		1	21-SEP-12
	Alkalinity, Carbonate (as CaCO3)		<1.0		mg/L		1	21-SEP-12
	Alkalinity, Hydroxide (as CaCO3)		<1.0		mg/L		1	21-SEP-12
WG1551094-7 MB								
	Alkalinity, Total (as CaCO3)		<1.0		mg/L		1	21-SEP-12
	Alkalinity, Bicarbonate (as CaCO3)		<1.0		mg/L		1	21-SEP-12
	Alkalinity, Carbonate (as CaCO3)		<1.0		mg/L		1	21-SEP-12
	Alkalinity, Hydroxide (as CaCO3)		<1.0		mg/L		1	21-SEP-12
Batch R2443112								
WG1553049-10 CRM		VA-ALK-PCT-CONTROL						
	Alkalinity, Total (as CaCO3)		104.1		%		85-115	25-SEP-12
WG1553049-11 CRM		VA-ALK-PCT-CONTROL						
	Alkalinity, Total (as CaCO3)		104.3		%		85-115	25-SEP-12
WG1553049-12 CRM		VA-ALK-PCT-CONTROL						
	Alkalinity, Total (as CaCO3)		104.1		%		85-115	25-SEP-12
WG1553049-13 CRM		VA-ALK-PCT-CONTROL						
	Alkalinity, Total (as CaCO3)		102.9		%		85-115	25-SEP-12
WG1553049-14 CRM		VA-ALK-PCT-CONTROL						
	Alkalinity, Total (as CaCO3)		102.5		%		85-115	25-SEP-12
WG1553049-15 CRM		VA-ALK-PCT-CONTROL						
	Alkalinity, Total (as CaCO3)		105.2		%		85-115	25-SEP-12
WG1553049-16 CRM		VA-ALK-PCT-CONTROL						
	Alkalinity, Total (as CaCO3)		102.1		%		85-115	25-SEP-12
WG1553049-9 CRM		VA-ALK-PCT-CONTROL						
	Alkalinity, Total (as CaCO3)		104.5		%		85-115	25-SEP-12
WG1553049-8 MB								
	Alkalinity, Total (as CaCO3)		<1.0		mg/L		1	25-SEP-12
	Alkalinity, Bicarbonate (as CaCO3)		<1.0		mg/L		1	25-SEP-12
	Alkalinity, Carbonate (as CaCO3)		<1.0		mg/L		1	25-SEP-12
	Alkalinity, Hydroxide (as CaCO3)		<1.0		mg/L		1	25-SEP-12
ALK-SCR-VA		Water						
Batch R2440701								
WG1550572-2 CRM		VA-ALKL-CONTROL						
	Alkalinity, Total (as CaCO3)		97.4		%		85-115	20-SEP-12
WG1550572-5 CRM		VA-ALKM-CONTROL						
	Alkalinity, Total (as CaCO3)		106.3		%		85-115	20-SEP-12
WG1550572-10 DUP		L1209363-10						



Quality Control Report

Workorder: L1209363

Report Date: 27-SEP-12

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-SCR-VA								
	Water							
Batch	R2440701							
WG1550572-10	DUP	L1209363-10						
Alkalinity, Total (as CaCO3)		195	194		mg/L	0.4	20	20-SEP-12
WG1550572-1	MB							
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	20-SEP-12
WG1550572-4	MB							
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	20-SEP-12
WG1550572-7	MB							
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	20-SEP-12
ANIONS-CL-IC-VA								
	Water							
Batch	R2439735							
WG1549122-3	DUP	L1209363-12						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	19-SEP-12
WG1549122-15	LCS							
Chloride (Cl)			97.9		%		85-115	19-SEP-12
WG1549122-2	LCS							
Chloride (Cl)			97.8		%		85-115	19-SEP-12
WG1549122-1	MB							
Chloride (Cl)			<0.50		mg/L		0.5	19-SEP-12
WG1549122-10	MB							
Chloride (Cl)			<0.50		mg/L		0.5	19-SEP-12
WG1549122-13	MB							
Chloride (Cl)			<0.50		mg/L		0.5	19-SEP-12
WG1549122-4	MB							
Chloride (Cl)			<0.50		mg/L		0.5	19-SEP-12
WG1549122-7	MB							
Chloride (Cl)			<0.50		mg/L		0.5	19-SEP-12
WG1549122-11	MS	L1209564-7						
Chloride (Cl)			101.1		%		75-125	19-SEP-12
WG1549122-14	MS	L1209704-1						
Chloride (Cl)			100.7		%		75-125	19-SEP-12
WG1549122-5	MS	L1209363-7						
Chloride (Cl)			100.5		%		75-125	19-SEP-12
WG1549122-8	MS	L1209433-3						
Chloride (Cl)			100.5		%		75-125	19-SEP-12
ANIONS-F-IC-VA								
	Water							



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-F-IC-VA								
Water								
Batch	R2439735							
WG1549122-3	DUP	L1209363-12						
Fluoride (F)		0.074	0.074		mg/L	0.0	20	19-SEP-12
WG1549122-15	LCS							
Fluoride (F)			101.9		%		85-115	19-SEP-12
WG1549122-2	LCS							
Fluoride (F)			101.6		%		85-115	19-SEP-12
WG1549122-1	MB							
Fluoride (F)			<0.020		mg/L		0.02	19-SEP-12
WG1549122-10	MB							
Fluoride (F)			<0.020		mg/L		0.02	19-SEP-12
WG1549122-13	MB							
Fluoride (F)			<0.020		mg/L		0.02	19-SEP-12
WG1549122-4	MB							
Fluoride (F)			<0.020		mg/L		0.02	19-SEP-12
WG1549122-7	MB							
Fluoride (F)			<0.020		mg/L		0.02	19-SEP-12
WG1549122-11	MS	L1209564-7						
Fluoride (F)			100.4		%		75-125	19-SEP-12
WG1549122-14	MS	L1209704-1						
Fluoride (F)			104.6		%		75-125	19-SEP-12
WG1549122-5	MS	L1209363-7						
Fluoride (F)			100.5		%		75-125	19-SEP-12
WG1549122-8	MS	L1209433-3						
Fluoride (F)			104.0		%		75-125	19-SEP-12
ANIONS-NO2-IC-WR								
Water								
Batch	R2439214							
WG1549682-3	DUP	L1209363-1						
Nitrite (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	14-SEP-12
WG1549682-2	LCS							
Nitrite (as N)			104.8		%		85-115	14-SEP-12
WG1549682-6	LCS							
Nitrite (as N)			104.0		%		85-115	14-SEP-12
WG1549682-1	MB							
Nitrite (as N)			<0.0010		mg/L		0.001	14-SEP-12
WG1549682-5	MB							
Nitrite (as N)			<0.0010		mg/L		0.001	14-SEP-12
WG1549682-4	MS	L1209363-7						
Nitrite (as N)			97.1		%		75-125	14-SEP-12
WG1549682-8	MS	L1209430-2						

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-NO2-IC-WR								
Batch	R2439214							
WG1549682-8	MS	L1209430-2	102.8		%		75-125	14-SEP-12
Nitrite (as N)								
ANIONS-NO3-IC-WR								
Batch	R2439214							
WG1549682-3	DUP	L1209363-1	<0.25	RPD-NA	mg/L	N/A	20	14-SEP-12
Nitrate (as N)								
WG1549682-2	LCS		104.2		%		85-115	14-SEP-12
Nitrate (as N)								
WG1549682-6	LCS		104.5		%		85-115	14-SEP-12
Nitrate (as N)								
WG1549682-1	MB		<0.0050		mg/L		0.005	14-SEP-12
Nitrate (as N)								
WG1549682-5	MB		<0.0050		mg/L		0.005	14-SEP-12
Nitrate (as N)								
WG1549682-4	MS	L1209363-7	99.6		%		75-125	14-SEP-12
Nitrate (as N)								
WG1549682-8	MS	L1209430-2	100.7		%		75-125	14-SEP-12
Nitrate (as N)								
ANIONS-SO4-IC-VA								
Batch	R2439735							
WG1549122-3	DUP	L1209363-12	54.7		mg/L	0.0	20	19-SEP-12
Sulfate (SO4)								
WG1549122-15	LCS		101.1		%		85-115	19-SEP-12
Sulfate (SO4)								
WG1549122-2	LCS		100.9		%		85-115	19-SEP-12
Sulfate (SO4)								
WG1549122-1	MB		<0.50		mg/L		0.5	19-SEP-12
Sulfate (SO4)								
WG1549122-10	MB		<0.50		mg/L		0.5	19-SEP-12
Sulfate (SO4)								
WG1549122-13	MB		<0.50		mg/L		0.5	19-SEP-12
Sulfate (SO4)								
WG1549122-4	MB		<0.50		mg/L		0.5	19-SEP-12
Sulfate (SO4)								
WG1549122-7	MB		<0.50		mg/L		0.5	19-SEP-12
Sulfate (SO4)								
WG1549122-11	MS	L1209564-7						

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-SO4-IC-VA								
	Water							
Batch	R2439735							
WG1549122-11	MS	L1209564-7						
Sulfate (SO4)			102.9		%		75-125	19-SEP-12
WG1549122-14	MS	L1209704-1						
Sulfate (SO4)			102.5		%		75-125	19-SEP-12
WG1549122-5	MS	L1209363-7						
Sulfate (SO4)			101.2		%		75-125	19-SEP-12
WG1549122-8	MS	L1209433-3						
Sulfate (SO4)			97.9		%		75-125	19-SEP-12
CARBONS-DOC-VA								
	Water							
Batch	R2439116							
WG1549198-2	CRM	VA-DOC-C-CAFFEINE						
Dissolved Organic Carbon			100.2		%		80-120	18-SEP-12
WG1549198-4	CRM	VA-DOC-C-CAFFEINE						
Dissolved Organic Carbon			98.0		%		80-120	18-SEP-12
WG1549198-1	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	18-SEP-12
WG1549198-3	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	18-SEP-12
WG1549198-7	MS	L1209483-3						
Dissolved Organic Carbon			90.6		%		70-130	18-SEP-12
Batch	R2439195							
WG1548363-10	CRM	VA-DOC-C-CAFFEINE						
Dissolved Organic Carbon			97.7		%		80-120	17-SEP-12
WG1548363-2	CRM	VA-DOC-C-CAFFEINE						
Dissolved Organic Carbon			99.5		%		80-120	17-SEP-12
WG1548363-4	CRM	VA-DOC-C-CAFFEINE						
Dissolved Organic Carbon			94.2		%		80-120	17-SEP-12
WG1548363-6	CRM	VA-DOC-C-CAFFEINE						
Dissolved Organic Carbon			95.6		%		80-120	17-SEP-12
WG1548363-8	CRM	VA-DOC-C-CAFFEINE						
Dissolved Organic Carbon			95.8		%		80-120	17-SEP-12
WG1548363-13	DUP	L1209363-16						
Dissolved Organic Carbon		5.04	4.95		mg/L	1.8	20	17-SEP-12
WG1548363-1	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	17-SEP-12
WG1548363-3	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	17-SEP-12
WG1548363-5	MB							



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CARBONS-DOC-VA								
	Water							
Batch	R2439195							
WG1548363-5	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	17-SEP-12
WG1548363-7	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	17-SEP-12
WG1548363-9	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	17-SEP-12
WG1548363-14	MS	L1209478-2						
Dissolved Organic Carbon			96.4		%		70-130	17-SEP-12
Batch	R2439946							
WG1550152-2	CRM	VA-DOC-C-CAFFEINE						
Dissolved Organic Carbon			98.1		%		80-120	19-SEP-12
WG1550152-4	CRM	VA-DOC-C-CAFFEINE						
Dissolved Organic Carbon			94.2		%		80-120	19-SEP-12
WG1550152-6	CRM	VA-DOC-C-CAFFEINE						
Dissolved Organic Carbon			90.1		%		80-120	19-SEP-12
WG1550152-8	CRM	VA-DOC-C-CAFFEINE						
Dissolved Organic Carbon			90.4		%		80-120	19-SEP-12
WG1550152-1	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	19-SEP-12
WG1550152-3	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	19-SEP-12
WG1550152-5	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	19-SEP-12
WG1550152-7	MB							
Dissolved Organic Carbon			<0.50		mg/L		0.5	19-SEP-12
WG1550152-10	MS	L1210319-11						
Dissolved Organic Carbon			100.4		%		70-130	19-SEP-12
COD-COL-VA								
	Water							
Batch	R2437967							
WG1548328-10	LCS							
COD			104.4		%		85-115	18-SEP-12
WG1548328-2	LCS							
COD			104.5		%		85-115	18-SEP-12
WG1548328-6	LCS							
COD			102.1		%		85-115	18-SEP-12
WG1548328-1	MB							
COD			<20		mg/L		20	18-SEP-12
WG1548328-5	MB							



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
COD-COL-VA								
	Water							
Batch	R2437967							
WG1548328-5	MB							
COD			<20		mg/L		20	18-SEP-12
WG1548328-9	MB							
COD			<20		mg/L		20	18-SEP-12
WG1548328-4	MS	L1209045-1						
COD			103.7		%		75-125	18-SEP-12
WG1548328-8	MS	L1209491-2						
COD			96.7		%		75-125	18-SEP-12
EPH-SF-FID-VA								
	Water							
Batch	R2439979							
WG1549364-1	MB							
EPH10-19			<0.25		mg/L		0.25	20-SEP-12
EPH19-32			<0.25		mg/L		0.25	20-SEP-12
Batch	R2440082							
WG1549364-3	MB							
EPH10-19			<0.25		mg/L		0.25	21-SEP-12
EPH19-32			<0.25		mg/L		0.25	21-SEP-12
Batch	R2442176							
WG1550411-1	MB							
EPH10-19			<0.25		mg/L		0.25	24-SEP-12
EPH19-32			<0.25		mg/L		0.25	24-SEP-12
WG1550411-3	MB							
EPH10-19			<0.25		mg/L		0.25	24-SEP-12
EPH19-32			<0.25		mg/L		0.25	24-SEP-12
HG-DIS-CVAFS-VA								
	Water							
Batch	R2438056							
WG1548035-3	LCS							
Mercury (Hg)-Dissolved			91.4		%		80-120	18-SEP-12
WG1548035-1	MB							
Mercury (Hg)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-12
Batch	R2439159							
WG1548683-10	LCS							
Mercury (Hg)-Dissolved			95.4		%		80-120	19-SEP-12
WG1548683-11	LCS							
Mercury (Hg)-Dissolved			99.3		%		80-120	19-SEP-12
WG1548683-1	MB							
Mercury (Hg)-Dissolved			<0.000050		mg/L		0.00005	19-SEP-12

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-DIS-CVAFS-VA								
Water								
Batch	R2439159							
WG1548683-7 MB								
Mercury (Hg)-Dissolved			<0.000050		mg/L		0.00005	19-SEP-12
Batch	R2440928							
WG1548035-18 DUP		L1209363-2						
Mercury (Hg)-Dissolved		<0.00020	<0.000050	RPD-NA	mg/L	N/A	20	21-SEP-12
WG1548035-19 MS		L1209363-3						
Mercury (Hg)-Dissolved			87.1		%		70-130	21-SEP-12
Batch	R2442023							
WG1552509-8 MB								
Mercury (Hg)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-12
Batch	R2443000							
WG1552509-14 LCS								
Mercury (Hg)-Dissolved			89.5		%		80-120	25-SEP-12
WG1552509-15 LCS								
Mercury (Hg)-Dissolved			90.8		%		80-120	25-SEP-12
WG1552509-7 LCS								
Mercury (Hg)-Dissolved			89.9		%		80-120	25-SEP-12
WG1552509-1 MB								
Mercury (Hg)-Dissolved			<0.000050		mg/L		0.00005	25-SEP-12
WG1552509-9 MB								
Mercury (Hg)-Dissolved			<0.000050		mg/L		0.00005	25-SEP-12
MET-DIS-ICP-VA								
Water								
Batch	R2437951							
WG1548035-2 CRM		VA-HIGH-WATRM						
Beryllium (Be)-Dissolved			95.2		%		80-120	17-SEP-12
Bismuth (Bi)-Dissolved			99.6		%		80-120	17-SEP-12
Cobalt (Co)-Dissolved			95.0		%		80-120	17-SEP-12
Iron (Fe)-Dissolved			97.4		%		80-120	17-SEP-12
Lithium (Li)-Dissolved			100.2		%		80-120	17-SEP-12
Molybdenum (Mo)-Dissolved			96.4		%		80-120	17-SEP-12
Nickel (Ni)-Dissolved			96.3		%		80-120	17-SEP-12
Phosphorus (P)-Dissolved			101.7		%		80-120	17-SEP-12
Silicon (Si)-Dissolved			103.7		%		80-120	17-SEP-12
Silver (Ag)-Dissolved			93.8		%		80-120	17-SEP-12
Sodium (Na)-Dissolved			99.7		%		80-120	17-SEP-12

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MET-DIS-ICP-VA		Water						
Batch	R2437951							
WG1548035-2 CRM		VA-HIGH-WATRM						
Strontium (Sr)-Dissolved			99.3		%		80-120	17-SEP-12
Thallium (Tl)-Dissolved			96.9		%		80-120	17-SEP-12
Tin (Sn)-Dissolved			98.9		%		80-120	17-SEP-12
Titanium (Ti)-Dissolved			96.9		%		80-120	17-SEP-12
Vanadium (V)-Dissolved			96.2		%		80-120	17-SEP-12
WG1548035-1 MB								
Beryllium (Be)-Dissolved			<0.0050		mg/L		0.005	17-SEP-12
Bismuth (Bi)-Dissolved			<0.20		mg/L		0.2	17-SEP-12
Cobalt (Co)-Dissolved			<0.010		mg/L		0.01	17-SEP-12
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	17-SEP-12
Lithium (Li)-Dissolved			<0.010		mg/L		0.01	17-SEP-12
Molybdenum (Mo)-Dissolved			<0.030		mg/L		0.03	17-SEP-12
Nickel (Ni)-Dissolved			<0.050		mg/L		0.05	17-SEP-12
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	17-SEP-12
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	17-SEP-12
Silver (Ag)-Dissolved			<0.010		mg/L		0.01	17-SEP-12
Sodium (Na)-Dissolved			<2.0		mg/L		2	17-SEP-12
Strontium (Sr)-Dissolved			<0.0050		mg/L		0.005	17-SEP-12
Thallium (Tl)-Dissolved			<0.20		mg/L		0.2	17-SEP-12
Tin (Sn)-Dissolved			<0.030		mg/L		0.03	17-SEP-12
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	17-SEP-12
Vanadium (V)-Dissolved			<0.030		mg/L		0.03	17-SEP-12
Batch	R2438999							
WG1548683-4 CRM		VA-HIGH-WATRM						
Beryllium (Be)-Dissolved			94.1		%		80-120	18-SEP-12
Bismuth (Bi)-Dissolved			99.0		%		80-120	18-SEP-12
Cobalt (Co)-Dissolved			96.0		%		80-120	18-SEP-12
Iron (Fe)-Dissolved			98.2		%		80-120	18-SEP-12
Lithium (Li)-Dissolved			100.0		%		80-120	18-SEP-12
Molybdenum (Mo)-Dissolved			97.0		%		80-120	18-SEP-12
Nickel (Ni)-Dissolved			96.4		%		80-120	18-SEP-12
Phosphorus (P)-Dissolved			99.1		%		80-120	18-SEP-12
Silicon (Si)-Dissolved			102.3		%		80-120	18-SEP-12
Silver (Ag)-Dissolved			95.2		%		80-120	18-SEP-12
Sodium (Na)-Dissolved			99.1		%		80-120	18-SEP-12

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA		Water						
Batch	R2438999							
WG1548683-4 CRM		VA-HIGH-WATRM						
Strontium (Sr)-Dissolved			100.1		%		80-120	18-SEP-12
Thallium (Tl)-Dissolved			97.6		%		80-120	18-SEP-12
Tin (Sn)-Dissolved			97.6		%		80-120	18-SEP-12
Titanium (Ti)-Dissolved			100.9		%		80-120	18-SEP-12
Vanadium (V)-Dissolved			96.4		%		80-120	18-SEP-12
WG1548683-8 CRM		VA-HIGH-WATRM						
Beryllium (Be)-Dissolved			92.8		%		80-120	18-SEP-12
Bismuth (Bi)-Dissolved			99.0		%		80-120	18-SEP-12
Cobalt (Co)-Dissolved			96.4		%		80-120	18-SEP-12
Iron (Fe)-Dissolved			97.0		%		80-120	18-SEP-12
Lithium (Li)-Dissolved			98.3		%		80-120	18-SEP-12
Molybdenum (Mo)-Dissolved			97.1		%		80-120	18-SEP-12
Nickel (Ni)-Dissolved			96.8		%		80-120	18-SEP-12
Phosphorus (P)-Dissolved			99.0		%		80-120	18-SEP-12
Silicon (Si)-Dissolved			101.3		%		80-120	18-SEP-12
Silver (Ag)-Dissolved			94.9		%		80-120	18-SEP-12
Sodium (Na)-Dissolved			98.3		%		80-120	18-SEP-12
Strontium (Sr)-Dissolved			98.4		%		80-120	18-SEP-12
Thallium (Tl)-Dissolved			98.5		%		80-120	18-SEP-12
Tin (Sn)-Dissolved			98.2		%		80-120	18-SEP-12
Titanium (Ti)-Dissolved			100.1		%		80-120	18-SEP-12
Vanadium (V)-Dissolved			95.0		%		80-120	18-SEP-12
WG1548683-1 MB								
Beryllium (Be)-Dissolved			<0.0050		mg/L		0.005	18-SEP-12
Bismuth (Bi)-Dissolved			<0.20		mg/L		0.2	18-SEP-12
Cobalt (Co)-Dissolved			<0.010		mg/L		0.01	18-SEP-12
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	18-SEP-12
Lithium (Li)-Dissolved			<0.010		mg/L		0.01	18-SEP-12
Molybdenum (Mo)-Dissolved			<0.030		mg/L		0.03	18-SEP-12
Nickel (Ni)-Dissolved			<0.050		mg/L		0.05	18-SEP-12
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	18-SEP-12
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	18-SEP-12
Silver (Ag)-Dissolved			<0.010		mg/L		0.01	18-SEP-12
Sodium (Na)-Dissolved			<2.0		mg/L		2	18-SEP-12
Strontium (Sr)-Dissolved			<0.0050		mg/L		0.005	18-SEP-12



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA								
	Water							
Batch	R2438999							
WG1548683-1	MB							
Thallium (Tl)-Dissolved			<0.20		mg/L		0.2	18-SEP-12
Tin (Sn)-Dissolved			<0.030		mg/L		0.03	18-SEP-12
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	18-SEP-12
Vanadium (V)-Dissolved			<0.030		mg/L		0.03	18-SEP-12
WG1548683-7	MB							
Beryllium (Be)-Dissolved			<0.0050		mg/L		0.005	18-SEP-12
Bismuth (Bi)-Dissolved			<0.20		mg/L		0.2	18-SEP-12
Cobalt (Co)-Dissolved			<0.010		mg/L		0.01	18-SEP-12
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	18-SEP-12
Lithium (Li)-Dissolved			<0.010		mg/L		0.01	18-SEP-12
Molybdenum (Mo)-Dissolved			<0.030		mg/L		0.03	18-SEP-12
Nickel (Ni)-Dissolved			<0.050		mg/L		0.05	18-SEP-12
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	18-SEP-12
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	18-SEP-12
Silver (Ag)-Dissolved			<0.010		mg/L		0.01	18-SEP-12
Sodium (Na)-Dissolved			<2.0		mg/L		2	18-SEP-12
Strontium (Sr)-Dissolved			<0.0050		mg/L		0.005	18-SEP-12
Thallium (Tl)-Dissolved			<0.20		mg/L		0.2	18-SEP-12
Tin (Sn)-Dissolved			<0.030		mg/L		0.03	18-SEP-12
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	18-SEP-12
Vanadium (V)-Dissolved			<0.030		mg/L		0.03	18-SEP-12
Batch	R2439886							
WG1548035-17	MS	L1208829-3						
Iron (Fe)-Dissolved			93.9		%		70-130	20-SEP-12
Sodium (Na)-Dissolved			100.1		%		70-130	20-SEP-12
Titanium (Ti)-Dissolved			106.0		%		70-130	20-SEP-12
Batch	R2440104							
WG1548035-11	MS	L1209483-3						
Iron (Fe)-Dissolved			96.0		%		70-130	19-SEP-12
Sodium (Na)-Dissolved			102.0		%		70-130	19-SEP-12
Titanium (Ti)-Dissolved			105.4		%		70-130	19-SEP-12
Batch	R2441032							
WG1548683-6	MS	L1209093-4						
Iron (Fe)-Dissolved			90.8		%		70-130	20-SEP-12
Sodium (Na)-Dissolved			103.3		%		70-130	20-SEP-12

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA								
	Water							
Batch	R2441032							
WG1548683-6 MS		L1209093-4						
Titanium (Ti)-Dissolved			103.7		%		70-130	20-SEP-12
Batch								
	R2442122							
WG1552509-10 CRM		VA-HIGH-WATRM						
Beryllium (Be)-Dissolved			98.6		%		80-120	24-SEP-12
Bismuth (Bi)-Dissolved			102.1		%		80-120	24-SEP-12
Cobalt (Co)-Dissolved			97.5		%		80-120	24-SEP-12
Iron (Fe)-Dissolved			100.2		%		80-120	24-SEP-12
Lithium (Li)-Dissolved			100.9		%		80-120	24-SEP-12
Molybdenum (Mo)-Dissolved			100.1		%		80-120	24-SEP-12
Nickel (Ni)-Dissolved			98.1		%		80-120	24-SEP-12
Phosphorus (P)-Dissolved			102.2		%		80-120	24-SEP-12
Silicon (Si)-Dissolved			102.1		%		80-120	24-SEP-12
Silver (Ag)-Dissolved			101.9		%		80-120	24-SEP-12
Sodium (Na)-Dissolved			102.2		%		80-120	24-SEP-12
Strontium (Sr)-Dissolved			101.8		%		80-120	24-SEP-12
Thallium (Tl)-Dissolved			100.1		%		80-120	24-SEP-12
Tin (Sn)-Dissolved			98.6		%		80-120	24-SEP-12
Titanium (Ti)-Dissolved			105.0		%		80-120	24-SEP-12
Vanadium (V)-Dissolved			101.3		%		80-120	24-SEP-12
WG1552509-8 MB								
Beryllium (Be)-Dissolved			<0.0050		mg/L		0.005	24-SEP-12
Bismuth (Bi)-Dissolved			<0.20		mg/L		0.2	24-SEP-12
Cobalt (Co)-Dissolved			<0.010		mg/L		0.01	24-SEP-12
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	24-SEP-12
Lithium (Li)-Dissolved			<0.010		mg/L		0.01	24-SEP-12
Molybdenum (Mo)-Dissolved			<0.030		mg/L		0.03	24-SEP-12
Nickel (Ni)-Dissolved			<0.050		mg/L		0.05	24-SEP-12
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	24-SEP-12
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	24-SEP-12
Silver (Ag)-Dissolved			<0.010		mg/L		0.01	24-SEP-12
Sodium (Na)-Dissolved			<2.0		mg/L		2	24-SEP-12
Strontium (Sr)-Dissolved			<0.0050		mg/L		0.005	24-SEP-12
Thallium (Tl)-Dissolved			<0.20		mg/L		0.2	24-SEP-12
Tin (Sn)-Dissolved			<0.030		mg/L		0.03	24-SEP-12

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA								
	Water							
Batch	R2442122							
WG1552509-8	MB							
	Titanium (Ti)-Dissolved		<0.010		mg/L		0.01	24-SEP-12
	Vanadium (V)-Dissolved		<0.030		mg/L		0.03	24-SEP-12
Batch	R2442237							
WG1548035-27	MS	L1209469-4						
	Iron (Fe)-Dissolved		95.2		%		70-130	21-SEP-12
	Sodium (Na)-Dissolved		104.9		%		70-130	21-SEP-12
	Titanium (Ti)-Dissolved		105.2		%		70-130	21-SEP-12
Batch	R2442242							
WG1548035-18	DUP	L1209363-2						
	Beryllium (Be)-Dissolved	<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	21-SEP-12
	Bismuth (Bi)-Dissolved	<0.20	<0.20	RPD-NA	mg/L	N/A	20	21-SEP-12
	Cobalt (Co)-Dissolved	<0.010	<0.010	RPD-NA	mg/L	N/A	20	21-SEP-12
	Iron (Fe)-Dissolved	0.475	0.481		mg/L	1.4	20	21-SEP-12
	Lithium (Li)-Dissolved	0.021	0.021		mg/L	0.4	20	21-SEP-12
	Molybdenum (Mo)-Dissolved	<0.030	<0.030	RPD-NA	mg/L	N/A	20	21-SEP-12
	Nickel (Ni)-Dissolved	<0.050	<0.050	RPD-NA	mg/L	N/A	20	21-SEP-12
	Phosphorus (P)-Dissolved	<0.30	<0.30	RPD-NA	mg/L	N/A	20	21-SEP-12
	Silicon (Si)-Dissolved	6.51	6.58		mg/L	1.1	20	21-SEP-12
	Silver (Ag)-Dissolved	<0.010	<0.010	RPD-NA	mg/L	N/A	20	21-SEP-12
	Sodium (Na)-Dissolved	113	113		mg/L	0.1	20	21-SEP-12
	Strontium (Sr)-Dissolved	2.20	2.22		mg/L	0.7	20	21-SEP-12
	Thallium (Tl)-Dissolved	<0.20	<0.20	RPD-NA	mg/L	N/A	20	21-SEP-12
	Tin (Sn)-Dissolved	<0.030	<0.030	RPD-NA	mg/L	N/A	20	21-SEP-12
	Titanium (Ti)-Dissolved	0.018	0.019		mg/L	2.7	20	21-SEP-12
	Vanadium (V)-Dissolved	<0.030	<0.030	RPD-NA	mg/L	N/A	20	21-SEP-12
WG1548035-19	MS	L1209363-3						
	Iron (Fe)-Dissolved		104.2		%		70-130	21-SEP-12
	Sodium (Na)-Dissolved		N/A	MS-B	%		-	21-SEP-12
	Titanium (Ti)-Dissolved		113.9		%		70-130	21-SEP-12
Batch	R2442243							
WG1548035-25	MS	L1209711-3						
	Iron (Fe)-Dissolved		94.5		%		70-130	22-SEP-12
	Sodium (Na)-Dissolved		97.7		%		70-130	22-SEP-12
	Titanium (Ti)-Dissolved		99.3		%		70-130	22-SEP-12

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA								
	Water							
Batch	R2442493							
WG1548035-29 MS		L1210039-13						
Iron (Fe)-Dissolved			93.3		%		70-130	22-SEP-12
Sodium (Na)-Dissolved			101.6		%		70-130	22-SEP-12
Titanium (Ti)-Dissolved			107.9		%		70-130	22-SEP-12
WG1548035-31 MS		L1210039-31						
Iron (Fe)-Dissolved			93.9		%		70-130	22-SEP-12
Sodium (Na)-Dissolved			98.5		%		70-130	22-SEP-12
Titanium (Ti)-Dissolved			104.9		%		70-130	22-SEP-12
Batch	R2442899							
WG1552509-11 CRM		VA-HIGH-WATRM						
Beryllium (Be)-Dissolved			95.7		%		80-120	24-SEP-12
Bismuth (Bi)-Dissolved			99.1		%		80-120	24-SEP-12
Cobalt (Co)-Dissolved			95.6		%		80-120	24-SEP-12
Iron (Fe)-Dissolved			98.1		%		80-120	24-SEP-12
Lithium (Li)-Dissolved			101.3		%		80-120	24-SEP-12
Molybdenum (Mo)-Dissolved			97.6		%		80-120	24-SEP-12
Nickel (Ni)-Dissolved			97.2		%		80-120	24-SEP-12
Phosphorus (P)-Dissolved			100.4		%		80-120	24-SEP-12
Silicon (Si)-Dissolved			100.8		%		80-120	24-SEP-12
Silver (Ag)-Dissolved			102.4		%		80-120	24-SEP-12
Sodium (Na)-Dissolved			97.1		%		80-120	24-SEP-12
Strontium (Sr)-Dissolved			100.0		%		80-120	24-SEP-12
Thallium (Tl)-Dissolved			96.9		%		80-120	24-SEP-12
Tin (Sn)-Dissolved			99.0		%		80-120	24-SEP-12
Titanium (Ti)-Dissolved			102.1		%		80-120	24-SEP-12
Vanadium (V)-Dissolved			100.9		%		80-120	24-SEP-12
WG1552509-5 CRM		VA-HIGH-WATRM						
Beryllium (Be)-Dissolved			96.5		%		80-120	24-SEP-12
Bismuth (Bi)-Dissolved			99.1		%		80-120	24-SEP-12
Cobalt (Co)-Dissolved			95.4		%		80-120	24-SEP-12
Iron (Fe)-Dissolved			98.7		%		80-120	24-SEP-12
Lithium (Li)-Dissolved			106.5		%		80-120	24-SEP-12
Molybdenum (Mo)-Dissolved			99.3		%		80-120	24-SEP-12
Nickel (Ni)-Dissolved			97.5		%		80-120	24-SEP-12
Phosphorus (P)-Dissolved			100.9		%		80-120	24-SEP-12
Silicon (Si)-Dissolved			102.7		%		80-120	24-SEP-12

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MET-DIS-ICP-VA		Water						
Batch	R2442899							
WG1552509-5 CRM		VA-HIGH-WATRM						
Silver (Ag)-Dissolved			104.3		%		80-120	24-SEP-12
Sodium (Na)-Dissolved			98.4		%		80-120	24-SEP-12
Strontium (Sr)-Dissolved			101.8		%		80-120	24-SEP-12
Thallium (Tl)-Dissolved			97.9		%		80-120	24-SEP-12
Tin (Sn)-Dissolved			97.7		%		80-120	24-SEP-12
Titanium (Ti)-Dissolved			103.0		%		80-120	24-SEP-12
Vanadium (V)-Dissolved			101.6		%		80-120	24-SEP-12
WG1552509-1 MB								
Beryllium (Be)-Dissolved			<0.0050		mg/L		0.005	24-SEP-12
Bismuth (Bi)-Dissolved			<0.20		mg/L		0.2	24-SEP-12
Cobalt (Co)-Dissolved			<0.010		mg/L		0.01	24-SEP-12
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	24-SEP-12
Lithium (Li)-Dissolved			<0.010		mg/L		0.01	24-SEP-12
Molybdenum (Mo)-Dissolved			<0.030		mg/L		0.03	24-SEP-12
Nickel (Ni)-Dissolved			<0.050		mg/L		0.05	24-SEP-12
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	24-SEP-12
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	24-SEP-12
Silver (Ag)-Dissolved			<0.010		mg/L		0.01	24-SEP-12
Sodium (Na)-Dissolved			<2.0		mg/L		2	24-SEP-12
Strontium (Sr)-Dissolved			<0.0050		mg/L		0.005	24-SEP-12
Thallium (Tl)-Dissolved			<0.20		mg/L		0.2	24-SEP-12
Tin (Sn)-Dissolved			<0.030		mg/L		0.03	24-SEP-12
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	24-SEP-12
Vanadium (V)-Dissolved			<0.030		mg/L		0.03	24-SEP-12
WG1552509-9 MB								
Beryllium (Be)-Dissolved			<0.0050		mg/L		0.005	24-SEP-12
Bismuth (Bi)-Dissolved			<0.20		mg/L		0.2	24-SEP-12
Cobalt (Co)-Dissolved			<0.010		mg/L		0.01	24-SEP-12
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	24-SEP-12
Lithium (Li)-Dissolved			<0.010		mg/L		0.01	24-SEP-12
Molybdenum (Mo)-Dissolved			<0.030		mg/L		0.03	24-SEP-12
Nickel (Ni)-Dissolved			<0.050		mg/L		0.05	24-SEP-12
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	24-SEP-12
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	24-SEP-12
Silver (Ag)-Dissolved			<0.010		mg/L		0.01	24-SEP-12

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MET-DIS-ICP-VA								
	Water							
Batch	R2442899							
WG1552509-9	MB							
Sodium (Na)-Dissolved			<2.0		mg/L		2	24-SEP-12
Strontium (Sr)-Dissolved			<0.0050		mg/L		0.005	24-SEP-12
Thallium (Tl)-Dissolved			<0.20		mg/L		0.2	24-SEP-12
Tin (Sn)-Dissolved			<0.030		mg/L		0.03	24-SEP-12
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	24-SEP-12
Vanadium (V)-Dissolved			<0.030		mg/L		0.03	24-SEP-12
Batch	R2443052							
WG1548035-9	MS	L1209492-46						
Iron (Fe)-Dissolved			100.2		%		70-130	25-SEP-12
Sodium (Na)-Dissolved			101.8		%		70-130	25-SEP-12
Titanium (Ti)-Dissolved			109.3		%		70-130	25-SEP-12
Batch	R2443115							
WG1548035-5	MS	L1209555-18						
Iron (Fe)-Dissolved			99.9		%		70-130	25-SEP-12
Sodium (Na)-Dissolved			114.6		%		70-130	25-SEP-12
Titanium (Ti)-Dissolved			112.7		%		70-130	25-SEP-12
WG1548035-7	MS	L1209555-29						
Iron (Fe)-Dissolved			101.7		%		70-130	25-SEP-12
Sodium (Na)-Dissolved			109.8		%		70-130	25-SEP-12
Titanium (Ti)-Dissolved			112.0		%		70-130	25-SEP-12
Batch	R2443141							
WG1548035-15	MS	L1209537-4						
Iron (Fe)-Dissolved			96.5		%		70-130	23-SEP-12
Sodium (Na)-Dissolved			101.9		%		70-130	23-SEP-12
Titanium (Ti)-Dissolved			106.4		%		70-130	23-SEP-12
Batch	R2443782							
WG1548035-13	MS	L1209540-7						
Iron (Fe)-Dissolved			87.8		%		70-130	25-SEP-12
Sodium (Na)-Dissolved			97.3		%		70-130	25-SEP-12
Titanium (Ti)-Dissolved			94.9		%		70-130	25-SEP-12
Batch	R2444051							
WG1548035-33	MS	L1209581-2						
Iron (Fe)-Dissolved			100.4		%		70-130	24-SEP-12
Sodium (Na)-Dissolved			108.6		%		70-130	24-SEP-12
Titanium (Ti)-Dissolved			111.1		%		70-130	24-SEP-12



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MET-DIS-LOW-MS-VA								
	Water							
Batch	R2438088							
WG1548035-1	MB							
Aluminum (Al)-Dissolved			<0.0030		mg/L		0.003	18-SEP-12
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-12
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-12
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-12
Boron (B)-Dissolved			<0.010		mg/L		0.01	18-SEP-12
Cadmium (Cd)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-12
Calcium (Ca)-Dissolved			<0.020		mg/L		0.02	18-SEP-12
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	18-SEP-12
Copper (Cu)-Dissolved			<0.00050		mg/L		0.0005	18-SEP-12
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-12
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	18-SEP-12
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-12
Potassium (K)-Dissolved			<0.050		mg/L		0.05	18-SEP-12
Selenium (Se)-Dissolved			<0.0010		mg/L		0.001	18-SEP-12
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	18-SEP-12
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	18-SEP-12
Batch	R2438189							
WG1548683-4	CRM	VA-HIGH-WATRM						
Aluminum (Al)-Dissolved			112.9		%		80-120	18-SEP-12
Antimony (Sb)-Dissolved			107.1		%		80-120	18-SEP-12
Arsenic (As)-Dissolved			112.9		%		80-120	18-SEP-12
Barium (Ba)-Dissolved			114.2		%		80-120	18-SEP-12
Cadmium (Cd)-Dissolved			113.0		%		80-120	18-SEP-12
Calcium (Ca)-Dissolved			108.0		%		80-120	18-SEP-12
Chromium (Cr)-Dissolved			111.6		%		80-120	18-SEP-12
Copper (Cu)-Dissolved			108.3		%		80-120	18-SEP-12
Lead (Pb)-Dissolved			107.6		%		80-120	18-SEP-12
Magnesium (Mg)-Dissolved			111.6		%		80-120	18-SEP-12
Manganese (Mn)-Dissolved			110.1		%		80-120	18-SEP-12
Potassium (K)-Dissolved			110.9		%		80-120	18-SEP-12
Selenium (Se)-Dissolved			101.4		%		80-120	18-SEP-12
Uranium (U)-Dissolved			104.0		%		80-120	18-SEP-12
Zinc (Zn)-Dissolved			102.4		%		80-120	18-SEP-12
WG1548683-7	MB							
Aluminum (Al)-Dissolved			<0.0030		mg/L		0.003	18-SEP-12



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-LOW-MS-VA								
	Water							
Batch	R2438189							
WG1548683-7	MB							
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-12
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-12
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-12
Boron (B)-Dissolved			<0.010		mg/L		0.01	18-SEP-12
Cadmium (Cd)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-12
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	18-SEP-12
Copper (Cu)-Dissolved			<0.00050		mg/L		0.0005	18-SEP-12
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-12
Potassium (K)-Dissolved			<0.050		mg/L		0.05	18-SEP-12
Selenium (Se)-Dissolved			<0.0010		mg/L		0.001	18-SEP-12
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	18-SEP-12
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	18-SEP-12
Batch	R2438609							
WG1548683-1	MB							
Aluminum (Al)-Dissolved			<0.0030		mg/L		0.003	18-SEP-12
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-12
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-12
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-12
Boron (B)-Dissolved			<0.010		mg/L		0.01	18-SEP-12
Cadmium (Cd)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-12
Calcium (Ca)-Dissolved			<0.020		mg/L		0.02	18-SEP-12
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	18-SEP-12
Copper (Cu)-Dissolved			<0.00050		mg/L		0.0005	18-SEP-12
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-12
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	18-SEP-12
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-12
Potassium (K)-Dissolved			<0.050		mg/L		0.05	18-SEP-12
Selenium (Se)-Dissolved			<0.0010		mg/L		0.001	18-SEP-12
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	18-SEP-12
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	18-SEP-12
Batch	R2439752							
WG1548035-2	CRM	VA-HIGH-WATRM						
Aluminum (Al)-Dissolved			103.1		%		80-120	19-SEP-12
Antimony (Sb)-Dissolved			100.6		%		80-120	19-SEP-12

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-LOW-MS-VA								
	Water							
Batch	R2439752							
WG1548035-2	CRM	VA-HIGH-WATRM						
Arsenic (As)-Dissolved			103.3		%		80-120	19-SEP-12
Barium (Ba)-Dissolved			105.0		%		80-120	19-SEP-12
Boron (B)-Dissolved			108.1		%		80-120	19-SEP-12
Cadmium (Cd)-Dissolved			103.0		%		80-120	19-SEP-12
Calcium (Ca)-Dissolved			97.7		%		80-120	19-SEP-12
Chromium (Cr)-Dissolved			102.6		%		80-120	19-SEP-12
Copper (Cu)-Dissolved			97.1		%		80-120	19-SEP-12
Lead (Pb)-Dissolved			101.3		%		80-120	19-SEP-12
Magnesium (Mg)-Dissolved			99.2		%		80-120	19-SEP-12
Manganese (Mn)-Dissolved			101.8		%		80-120	19-SEP-12
Potassium (K)-Dissolved			99.6		%		80-120	19-SEP-12
Selenium (Se)-Dissolved			100.4		%		80-120	19-SEP-12
Uranium (U)-Dissolved			101.5		%		80-120	19-SEP-12
Zinc (Zn)-Dissolved			94.6		%		80-120	19-SEP-12
WG1548683-8	CRM	VA-HIGH-WATRM						
Aluminum (Al)-Dissolved			99.8		%		80-120	19-SEP-12
Antimony (Sb)-Dissolved			104.3		%		80-120	19-SEP-12
Arsenic (As)-Dissolved			100.7		%		80-120	19-SEP-12
Barium (Ba)-Dissolved			103.6		%		80-120	19-SEP-12
Boron (B)-Dissolved			110.7		%		80-120	19-SEP-12
Cadmium (Cd)-Dissolved			102.1		%		80-120	19-SEP-12
Calcium (Ca)-Dissolved			100.5		%		80-120	19-SEP-12
Chromium (Cr)-Dissolved			100.7		%		80-120	19-SEP-12
Copper (Cu)-Dissolved			96.1		%		80-120	19-SEP-12
Lead (Pb)-Dissolved			105.2		%		80-120	19-SEP-12
Magnesium (Mg)-Dissolved			98.2		%		80-120	19-SEP-12
Manganese (Mn)-Dissolved			101.9		%		80-120	19-SEP-12
Potassium (K)-Dissolved			97.7		%		80-120	19-SEP-12
Selenium (Se)-Dissolved			100.6		%		80-120	19-SEP-12
Uranium (U)-Dissolved			109.6		%		80-120	19-SEP-12
Zinc (Zn)-Dissolved			93.4		%		80-120	19-SEP-12
Batch	R2440035							
WG1548683-7	MB							
Calcium (Ca)-Dissolved			<0.020		mg/L		0.02	20-SEP-12
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	20-SEP-12



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-LOW-MS-VA		Water						
Batch	R2440035							
WG1548683-7	MB							
Manganese (Mn)-Dissolved			0.000077	MB-LOR	mg/L		0.00005	20-SEP-12
Batch		R2441054						
WG1548035-18	DUP							
		L1209363-2						
Aluminum (Al)-Dissolved		<0.050	<0.015	RPD-NA	mg/L	N/A	20	20-SEP-12
Antimony (Sb)-Dissolved		<0.0025	0.00061		mg/L	1.2	20	20-SEP-12
Arsenic (As)-Dissolved		0.00855	0.00861		mg/L	0.7	20	20-SEP-12
Barium (Ba)-Dissolved		<0.10	0.0123		mg/L	0.3	20	20-SEP-12
Boron (B)-Dissolved		<0.50	<0.050	RPD-NA	mg/L	N/A	20	20-SEP-12
Cadmium (Cd)-Dissolved		<0.0010	<0.00025	RPD-NA	mg/L	N/A	20	20-SEP-12
Calcium (Ca)-Dissolved		213	213		mg/L	0.0	20	20-SEP-12
Chromium (Cr)-Dissolved		<0.010	<0.0025	RPD-NA	mg/L	N/A	20	20-SEP-12
Copper (Cu)-Dissolved		<0.0050	<0.0025	RPD-NA	mg/L	N/A	20	20-SEP-12
Lead (Pb)-Dissolved		<0.0025	<0.00025	RPD-NA	mg/L	N/A	20	20-SEP-12
Magnesium (Mg)-Dissolved		477	482		mg/L	1.2	20	20-SEP-12
Manganese (Mn)-Dissolved		0.377	0.385		mg/L	2.1	20	20-SEP-12
Potassium (K)-Dissolved		28.2	28.9		mg/L	2.3	20	20-SEP-12
Selenium (Se)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	20-SEP-12
Uranium (U)-Dissolved		0.00731	0.00741		mg/L	1.4	20	20-SEP-12
Zinc (Zn)-Dissolved		<0.25	<0.015	RPD-NA	mg/L	N/A	20	20-SEP-12
WG1548035-19	MS							
		L1209363-3						
Aluminum (Al)-Dissolved			91.6		%		70-130	20-SEP-12
Arsenic (As)-Dissolved			112.8		%		70-130	20-SEP-12
Cadmium (Cd)-Dissolved			93.0		%		70-130	20-SEP-12
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	20-SEP-12
Chromium (Cr)-Dissolved			94.6		%		70-130	20-SEP-12
Copper (Cu)-Dissolved			87.6		%		70-130	20-SEP-12
Lead (Pb)-Dissolved			101.2		%		70-130	20-SEP-12
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	20-SEP-12
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	20-SEP-12
Potassium (K)-Dissolved			N/A	MS-B	%		-	20-SEP-12
Uranium (U)-Dissolved			N/A	MS-B	%		-	20-SEP-12
Zinc (Zn)-Dissolved			80.7		%		70-130	20-SEP-12



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-LOW-MS-VA								
	Water							
Batch	R2442159							
WG1552509-8	MB							
Aluminum (Al)-Dissolved			<0.0030		mg/L		0.003	24-SEP-12
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-12
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-12
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-12
Boron (B)-Dissolved			<0.010		mg/L		0.01	24-SEP-12
Cadmium (Cd)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-12
Calcium (Ca)-Dissolved			<0.020		mg/L		0.02	24-SEP-12
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	24-SEP-12
Copper (Cu)-Dissolved			<0.00050		mg/L		0.0005	24-SEP-12
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-12
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	24-SEP-12
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-12
Potassium (K)-Dissolved			<0.050		mg/L		0.05	24-SEP-12
Selenium (Se)-Dissolved			<0.0010		mg/L		0.001	24-SEP-12
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	24-SEP-12
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	24-SEP-12
WG1548035-19	MS	L1209363-3						
Antimony (Sb)-Dissolved			126.6		%		70-130	24-SEP-12
Boron (B)-Dissolved			127.0		%		70-130	24-SEP-12
Batch	R2442738							
WG1552509-1	MB							
Aluminum (Al)-Dissolved			<0.0030		mg/L		0.003	24-SEP-12
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-12
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-12
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-12
Boron (B)-Dissolved			<0.010		mg/L		0.01	24-SEP-12
Cadmium (Cd)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-12
Calcium (Ca)-Dissolved			<0.020		mg/L		0.02	24-SEP-12
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	24-SEP-12
Copper (Cu)-Dissolved			<0.00050		mg/L		0.0005	24-SEP-12
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-12
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	24-SEP-12
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-12
Potassium (K)-Dissolved			<0.050		mg/L		0.05	24-SEP-12
Selenium (Se)-Dissolved			<0.0010		mg/L		0.001	24-SEP-12



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-LOW-MS-VA		Water						
Batch	R2442738							
WG1552509-1 MB								
	Uranium (U)-Dissolved		<0.000010		mg/L		0.00001	24-SEP-12
	Zinc (Zn)-Dissolved		<0.0030		mg/L		0.003	24-SEP-12
WG1552509-9 MB								
	Aluminum (Al)-Dissolved		<0.0030		mg/L		0.003	24-SEP-12
	Antimony (Sb)-Dissolved		<0.00010		mg/L		0.0001	24-SEP-12
	Arsenic (As)-Dissolved		<0.00010		mg/L		0.0001	24-SEP-12
	Barium (Ba)-Dissolved		<0.000050		mg/L		0.00005	24-SEP-12
	Boron (B)-Dissolved		<0.010		mg/L		0.01	24-SEP-12
	Cadmium (Cd)-Dissolved		<0.000050		mg/L		0.00005	24-SEP-12
	Calcium (Ca)-Dissolved		<0.020		mg/L		0.02	24-SEP-12
	Chromium (Cr)-Dissolved		<0.00050		mg/L		0.0005	24-SEP-12
	Copper (Cu)-Dissolved		<0.00050		mg/L		0.0005	24-SEP-12
	Lead (Pb)-Dissolved		<0.000050		mg/L		0.00005	24-SEP-12
	Magnesium (Mg)-Dissolved		<0.0050		mg/L		0.005	24-SEP-12
	Manganese (Mn)-Dissolved		<0.000050		mg/L		0.00005	24-SEP-12
	Potassium (K)-Dissolved		<0.050		mg/L		0.05	24-SEP-12
	Selenium (Se)-Dissolved		<0.0010		mg/L		0.001	24-SEP-12
	Uranium (U)-Dissolved		<0.000010		mg/L		0.00001	24-SEP-12
	Zinc (Zn)-Dissolved		<0.0030		mg/L		0.003	24-SEP-12
Batch	R2443662							
WG1552509-10 CRM		VA-HIGH-WATRM						
	Aluminum (Al)-Dissolved		104.6		%		80-120	25-SEP-12
	Antimony (Sb)-Dissolved		106.7		%		80-120	25-SEP-12
	Arsenic (As)-Dissolved		102.2		%		80-120	25-SEP-12
	Barium (Ba)-Dissolved		102.5		%		80-120	25-SEP-12
	Boron (B)-Dissolved		91.1		%		80-120	25-SEP-12
	Cadmium (Cd)-Dissolved		103.9		%		80-120	25-SEP-12
	Calcium (Ca)-Dissolved		99.3		%		80-120	25-SEP-12
	Chromium (Cr)-Dissolved		100.1		%		80-120	25-SEP-12
	Copper (Cu)-Dissolved		98.5		%		80-120	25-SEP-12
	Lead (Pb)-Dissolved		102.2		%		80-120	25-SEP-12
	Magnesium (Mg)-Dissolved		101.5		%		80-120	25-SEP-12
	Manganese (Mn)-Dissolved		102.0		%		80-120	25-SEP-12
	Potassium (K)-Dissolved		102.0		%		80-120	25-SEP-12
	Selenium (Se)-Dissolved		102.5		%		80-120	25-SEP-12



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-LOW-MS-VA	Water							
Batch	R2443662							
WG1552509-10 CRM		VA-HIGH-WATRM						
Uranium (U)-Dissolved			103.1		%		80-120	25-SEP-12
Zinc (Zn)-Dissolved			97.0		%		80-120	25-SEP-12
WG1552509-11 CRM		VA-HIGH-WATRM						
Aluminum (Al)-Dissolved			104.9		%		80-120	25-SEP-12
Antimony (Sb)-Dissolved			106.5		%		80-120	25-SEP-12
Arsenic (As)-Dissolved			101.2		%		80-120	25-SEP-12
Barium (Ba)-Dissolved			101.0		%		80-120	25-SEP-12
Boron (B)-Dissolved			91.4		%		80-120	25-SEP-12
Cadmium (Cd)-Dissolved			102.0		%		80-120	25-SEP-12
Calcium (Ca)-Dissolved			99.7		%		80-120	25-SEP-12
Chromium (Cr)-Dissolved			102.1		%		80-120	25-SEP-12
Copper (Cu)-Dissolved			98.5		%		80-120	25-SEP-12
Lead (Pb)-Dissolved			97.8		%		80-120	25-SEP-12
Magnesium (Mg)-Dissolved			105.0		%		80-120	25-SEP-12
Manganese (Mn)-Dissolved			102.5		%		80-120	25-SEP-12
Potassium (K)-Dissolved			101.3		%		80-120	25-SEP-12
Selenium (Se)-Dissolved			99.6		%		80-120	25-SEP-12
Uranium (U)-Dissolved			99.7		%		80-120	25-SEP-12
Zinc (Zn)-Dissolved			97.3		%		80-120	25-SEP-12
WG1552509-5 CRM		VA-HIGH-WATRM						
Aluminum (Al)-Dissolved			106.5		%		80-120	25-SEP-12
Antimony (Sb)-Dissolved			105.9		%		80-120	25-SEP-12
Arsenic (As)-Dissolved			102.8		%		80-120	25-SEP-12
Barium (Ba)-Dissolved			102.5		%		80-120	25-SEP-12
Boron (B)-Dissolved			93.2		%		80-120	25-SEP-12
Cadmium (Cd)-Dissolved			103.4		%		80-120	25-SEP-12
Calcium (Ca)-Dissolved			101.6		%		80-120	25-SEP-12
Chromium (Cr)-Dissolved			101.2		%		80-120	25-SEP-12
Copper (Cu)-Dissolved			99.2		%		80-120	25-SEP-12
Lead (Pb)-Dissolved			103.4		%		80-120	25-SEP-12
Magnesium (Mg)-Dissolved			103.1		%		80-120	25-SEP-12
Manganese (Mn)-Dissolved			101.9		%		80-120	25-SEP-12
Potassium (K)-Dissolved			103.2		%		80-120	25-SEP-12
Selenium (Se)-Dissolved			101.3		%		80-120	25-SEP-12
Uranium (U)-Dissolved			103.8		%		80-120	25-SEP-12



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-F-VA								
	Water							
Batch	R2442196							
WG1552459-1	MB							
Ammonia, Total (as N)			<0.0050		mg/L		0.005	24-SEP-12
WG1552459-3	MB							
Ammonia, Total (as N)			<0.0050		mg/L		0.005	24-SEP-12
WG1552459-5	MB							
Ammonia, Total (as N)			<0.0050		mg/L		0.005	24-SEP-12
WG1552459-7	MB							
Ammonia, Total (as N)			<0.0050		mg/L		0.005	24-SEP-12
WG1552459-9	MB							
Ammonia, Total (as N)			<0.0050		mg/L		0.005	24-SEP-12
WG1552459-12	MS	L1209462-7						
Ammonia, Total (as N)			95.5		%		75-125	24-SEP-12
PAH-SF-MS-VA								
	Water							
Batch	R2438644							
WG1549364-2	LCS							
Acenaphthene			105.0		%		60-130	20-SEP-12
Acenaphthylene			104.9		%		60-130	20-SEP-12
Acridine			101.3		%		60-130	20-SEP-12
Anthracene			107.2		%		60-130	20-SEP-12
Benz(a)anthracene			101.2		%		60-130	20-SEP-12
Benzo(a)pyrene			100.3		%		60-130	20-SEP-12
Benzo(b)fluoranthene			94.7		%		60-130	20-SEP-12
Benzo(g,h,i)perylene			90.0		%		60-130	20-SEP-12
Benzo(k)fluoranthene			93.4		%		60-130	20-SEP-12
Chrysene			102.6		%		60-130	20-SEP-12
Dibenz(a,h)anthracene			98.9		%		60-130	20-SEP-12
Fluoranthene			105.4		%		60-130	20-SEP-12
Fluorene			102.7		%		60-130	20-SEP-12
Indeno(1,2,3-c,d)pyrene			104.2		%		60-130	20-SEP-12
Naphthalene			102.0		%		50-130	20-SEP-12
Phenanthrene			110.2		%		60-130	20-SEP-12
Pyrene			104.7		%		60-130	20-SEP-12
Quinoline			99.4		%		60-130	20-SEP-12
WG1549364-1	MB							
Acenaphthene			<0.000050		mg/L		0.00005	20-SEP-12
Acenaphthylene			<0.000050		mg/L		0.00005	20-SEP-12



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-SF-MS-VA		Water						
Batch	R2438644							
WG1549364-1	MB							
Acridine			<0.000050		mg/L		0.00005	20-SEP-12
Anthracene			<0.000050		mg/L		0.00005	20-SEP-12
Benz(a)anthracene			<0.000050		mg/L		0.00005	20-SEP-12
Benzo(a)pyrene			<0.000010		mg/L		0.00001	20-SEP-12
Benzo(b)fluoranthene			<0.000050		mg/L		0.00005	20-SEP-12
Benzo(g,h,i)perylene			<0.000050		mg/L		0.00005	20-SEP-12
Benzo(k)fluoranthene			<0.000050		mg/L		0.00005	20-SEP-12
Chrysene			<0.000050		mg/L		0.00005	20-SEP-12
Dibenz(a,h)anthracene			<0.000050		mg/L		0.00005	20-SEP-12
Fluoranthene			<0.000050		mg/L		0.00005	20-SEP-12
Fluorene			<0.000050		mg/L		0.00005	20-SEP-12
Indeno(1,2,3-c,d)pyrene			<0.000050		mg/L		0.00005	20-SEP-12
Naphthalene			<0.000050		mg/L		0.00005	20-SEP-12
Phenanthrene			<0.000050		mg/L		0.00005	20-SEP-12
Pyrene			<0.000050		mg/L		0.00005	20-SEP-12
Quinoline			<0.000050		mg/L		0.00005	20-SEP-12
WG1549364-3	MB							
Acenaphthene			<0.000050		mg/L		0.00005	20-SEP-12
Acenaphthylene			<0.000050		mg/L		0.00005	20-SEP-12
Acridine			<0.000050		mg/L		0.00005	20-SEP-12
Anthracene			<0.000050		mg/L		0.00005	20-SEP-12
Benz(a)anthracene			<0.000050		mg/L		0.00005	20-SEP-12
Benzo(a)pyrene			<0.000010		mg/L		0.00001	20-SEP-12
Benzo(b)fluoranthene			<0.000050		mg/L		0.00005	20-SEP-12
Benzo(g,h,i)perylene			<0.000050		mg/L		0.00005	20-SEP-12
Benzo(k)fluoranthene			<0.000050		mg/L		0.00005	20-SEP-12
Chrysene			<0.000050		mg/L		0.00005	20-SEP-12
Dibenz(a,h)anthracene			<0.000050		mg/L		0.00005	20-SEP-12
Fluoranthene			<0.000050		mg/L		0.00005	20-SEP-12
Fluorene			<0.000050		mg/L		0.00005	20-SEP-12
Indeno(1,2,3-c,d)pyrene			<0.000050		mg/L		0.00005	20-SEP-12
Naphthalene			<0.000050		mg/L		0.00005	20-SEP-12
Phenanthrene			<0.000050		mg/L		0.00005	20-SEP-12
Pyrene			<0.000050		mg/L		0.00005	20-SEP-12



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-SF-MS-VA		Water						
Batch	R2438644							
WG1549364-3	MB							
Quinoline			<0.000050		mg/L		0.00005	20-SEP-12
Batch		R2439714						
WG1550411-2	LCS							
Acenaphthene			91.8		%		60-130	21-SEP-12
Acenaphthylene			88.5		%		60-130	21-SEP-12
Acridine			90.0		%		60-130	21-SEP-12
Anthracene			95.8		%		60-130	21-SEP-12
Benz(a)anthracene			86.4		%		60-130	21-SEP-12
Benzo(a)pyrene			76.7		%		60-130	21-SEP-12
Benzo(b)fluoranthene			89.5		%		60-130	21-SEP-12
Benzo(g,h,i)perylene			91.9		%		60-130	21-SEP-12
Benzo(k)fluoranthene			99.4		%		60-130	21-SEP-12
Chrysene			92.6		%		60-130	21-SEP-12
Dibenz(a,h)anthracene			94.7		%		60-130	21-SEP-12
Fluoranthene			93.1		%		60-130	21-SEP-12
Fluorene			90.6		%		60-130	21-SEP-12
Indeno(1,2,3-c,d)pyrene			88.3		%		60-130	21-SEP-12
Naphthalene			86.2		%		50-130	21-SEP-12
Phenanthrene			89.2		%		60-130	21-SEP-12
Pyrene			93.5		%		60-130	21-SEP-12
Quinoline			83.5		%		60-130	21-SEP-12
WG1550411-1	MB							
Acenaphthene			<0.000050		mg/L		0.00005	21-SEP-12
Acenaphthylene			<0.000050		mg/L		0.00005	21-SEP-12
Acridine			<0.000050		mg/L		0.00005	21-SEP-12
Anthracene			<0.000050		mg/L		0.00005	21-SEP-12
Benz(a)anthracene			<0.000050		mg/L		0.00005	21-SEP-12
Benzo(a)pyrene			<0.000010		mg/L		0.00001	21-SEP-12
Benzo(b)fluoranthene			<0.000050		mg/L		0.00005	21-SEP-12
Benzo(g,h,i)perylene			<0.000050		mg/L		0.00005	21-SEP-12
Benzo(k)fluoranthene			<0.000050		mg/L		0.00005	21-SEP-12
Chrysene			<0.000050		mg/L		0.00005	21-SEP-12
Dibenz(a,h)anthracene			<0.000050		mg/L		0.00005	21-SEP-12
Fluoranthene			<0.000050		mg/L		0.00005	21-SEP-12



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-SF-MS-VA								
Water								
Batch	R2439714							
WG1550411-1	MB							
Fluorene			<0.000050		mg/L		0.00005	21-SEP-12
Indeno(1,2,3-c,d)pyrene			<0.000050		mg/L		0.00005	21-SEP-12
Naphthalene			<0.000050		mg/L		0.00005	21-SEP-12
Phenanthrene			<0.000050		mg/L		0.00005	21-SEP-12
Pyrene			<0.000050		mg/L		0.00005	21-SEP-12
Quinoline			<0.000050		mg/L		0.00005	21-SEP-12
Batch	R2440768							
WG1550411-3	MB							
Acenaphthene			<0.000050		mg/L		0.00005	21-SEP-12
Acenaphthylene			<0.000050		mg/L		0.00005	21-SEP-12
Acridine			<0.000050		mg/L		0.00005	21-SEP-12
Anthracene			<0.000050		mg/L		0.00005	21-SEP-12
Benz(a)anthracene			<0.000050		mg/L		0.00005	21-SEP-12
Benzo(a)pyrene			<0.000010		mg/L		0.00001	21-SEP-12
Benzo(b)fluoranthene			<0.000050		mg/L		0.00005	21-SEP-12
Benzo(g,h,i)perylene			<0.000050		mg/L		0.00005	21-SEP-12
Benzo(k)fluoranthene			<0.000050		mg/L		0.00005	21-SEP-12
Chrysene			<0.000050		mg/L		0.00005	21-SEP-12
Dibenz(a,h)anthracene			<0.000050		mg/L		0.00005	21-SEP-12
Fluoranthene			<0.000050		mg/L		0.00005	21-SEP-12
Fluorene			<0.000050		mg/L		0.00005	21-SEP-12
Indeno(1,2,3-c,d)pyrene			<0.000050		mg/L		0.00005	21-SEP-12
Naphthalene			<0.000050		mg/L		0.00005	21-SEP-12
Phenanthrene			<0.000050		mg/L		0.00005	21-SEP-12
Pyrene			<0.000050		mg/L		0.00005	21-SEP-12
Quinoline			<0.000050		mg/L		0.00005	21-SEP-12
PH-PCT-VA								
Water								
Batch	R2443112							
WG1553049-24	CRM	VA-PH7-BUF						
pH			7.03		pH		6.9-7.1	25-SEP-12
WG1553049-25	CRM	VA-PH7-BUF						
pH			7.03		pH		6.9-7.1	25-SEP-12
WG1553049-26	CRM	VA-PH7-BUF						
pH			7.03		pH		6.9-7.1	25-SEP-12
WG1553049-27	CRM	VA-PH7-BUF						

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-PCT-VA								
Water								
Batch	R2443112							
WG1553049-27	CRM	VA-PH7-BUF						
pH			7.02		pH		6.9-7.1	25-SEP-12
WG1553049-28	CRM	VA-PH7-BUF						
pH			7.02		pH		6.9-7.1	25-SEP-12
WG1553049-29	CRM	VA-PH7-BUF						
pH			7.01		pH		6.9-7.1	25-SEP-12
WG1553049-30	CRM	VA-PH7-BUF						
pH			7.01		pH		6.9-7.1	25-SEP-12
TDS-VA								
Water								
Batch	R2439701							
WG1548151-3	DUP	L1209363-1						
Total Dissolved Solids		8890	8750		mg/L	1.6	20	18-SEP-12
WG1548151-11	LCS							
Total Dissolved Solids			99.2		%		85-115	18-SEP-12
WG1548151-2	LCS							
Total Dissolved Solids			100.4		%		85-115	18-SEP-12
WG1548151-5	LCS							
Total Dissolved Solids			97.8		%		85-115	18-SEP-12
WG1548151-8	LCS							
Total Dissolved Solids			97.6		%		85-115	18-SEP-12
WG1548151-1	MB							
Total Dissolved Solids			<10		mg/L		10	18-SEP-12
WG1548151-10	MB							
Total Dissolved Solids			<10		mg/L		10	18-SEP-12
WG1548151-4	MB							
Total Dissolved Solids			<10		mg/L		10	18-SEP-12
WG1548151-7	MB							
Total Dissolved Solids			<10		mg/L		10	18-SEP-12
TKN-F-VA								
Water								
Batch	R2441463							
WG1549655-6	DUP	L1209363-15						
Total Kjeldahl Nitrogen		0.572	0.556		mg/L	2.8	20	23-SEP-12
WG1549655-2	LCS							
Total Kjeldahl Nitrogen			104.2		%		75-125	23-SEP-12
WG1549655-5	LCS							
Total Kjeldahl Nitrogen			112.2		%		75-125	23-SEP-12
WG1549655-1	MB							
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	23-SEP-12

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-F-VA		Water						
Batch R2441463								
WG1549655-4 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	23-SEP-12
Batch R2442141								
WG1550523-2 LCS								
Total Kjeldahl Nitrogen			93.5		%		75-125	24-SEP-12
WG1550523-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	24-SEP-12
Batch R2443047								
WG1550523-5 LCS								
Total Kjeldahl Nitrogen			98.2		%		75-125	24-SEP-12
WG1550523-4 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	24-SEP-12
VH-HSFID-VA		Water						
Batch R2441333								
WG1550775-3 DUP		L1209363-17						
Volatile Hydrocarbons (VH6-10)		<0.10	<0.10	RPD-NA	mg/L	N/A	50	22-SEP-12
WG1550775-2 LCS								
Volatile Hydrocarbons (VH6-10)			85.2		%		70-130	22-SEP-12
WG1550775-1 MB								
Volatile Hydrocarbons (VH6-10)			<0.10		mg/L		0.1	22-SEP-12
VOC-HSMS-VA		Water						
Batch R2443281								
WG1554616-2 LCS								
Bromodichloromethane			93.9		%		70-130	26-SEP-12
Bromoform			93.6		%		70-130	26-SEP-12
Carbon Tetrachloride			103.1		%		70-130	26-SEP-12
Chlorobenzene			98.5		%		70-130	26-SEP-12
Dibromochloromethane			93.9		%		70-130	26-SEP-12
Chloroethane			95.8		%		60-140	26-SEP-12
Chloroform			94.2		%		70-130	26-SEP-12
Chloromethane			96.7		%		60-140	26-SEP-12
1,2-Dichlorobenzene			99.6		%		70-130	26-SEP-12
1,3-Dichlorobenzene			103.1		%		70-130	26-SEP-12
1,4-Dichlorobenzene			100.8		%		70-130	26-SEP-12
1,1-Dichloroethane			90.6		%		70-130	26-SEP-12
1,2-Dichloroethane			85.3		%		70-130	26-SEP-12

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-HSMS-VA		Water						
Batch	R2443281							
WG1554616-2	LCS							
1,1-Dichloroethylene			80.5		%		70-130	26-SEP-12
cis-1,2-Dichloroethylene			95.2		%		70-130	26-SEP-12
trans-1,2-Dichloroethylene			88.8		%		70-130	26-SEP-12
Dichloromethane			86.3		%		60-140	26-SEP-12
1,2-Dichloropropane			90.6		%		70-130	26-SEP-12
cis-1,3-Dichloropropylene			88.1		%		70-130	26-SEP-12
trans-1,3-Dichloropropylene			88.0		%		70-130	26-SEP-12
1,1,1,2-Tetrachloroethane			100.7		%		70-130	26-SEP-12
1,1,2,2-Tetrachloroethane			84.9		%		70-130	26-SEP-12
Tetrachloroethylene			106.3		%		70-130	26-SEP-12
1,1,1-Trichloroethane			100.2		%		70-130	26-SEP-12
1,1,2-Trichloroethane			89.1		%		70-130	26-SEP-12
Trichloroethylene			101.7		%		70-130	26-SEP-12
Trichlorofluoromethane			111.4		%		60-140	26-SEP-12
Vinyl Chloride			99.8		%		60-140	26-SEP-12
WG1554616-1	MB							
Bromodichloromethane			<0.0010		mg/L		0.001	26-SEP-12
Bromoform			<0.0010		mg/L		0.001	26-SEP-12
Carbon Tetrachloride			<0.00050		mg/L		0.0005	26-SEP-12
Chlorobenzene			<0.0010		mg/L		0.001	26-SEP-12
Dibromochloromethane			<0.0010		mg/L		0.001	26-SEP-12
Chloroethane			<0.0010		mg/L		0.001	26-SEP-12
Chloroform			<0.0010		mg/L		0.001	26-SEP-12
Chloromethane			<0.0050		mg/L		0.005	26-SEP-12
1,2-Dichlorobenzene			<0.00070		mg/L		0.0007	26-SEP-12
1,3-Dichlorobenzene			<0.0010		mg/L		0.001	26-SEP-12
1,4-Dichlorobenzene			<0.0010		mg/L		0.001	26-SEP-12
1,1-Dichloroethane			<0.0010		mg/L		0.001	26-SEP-12
1,2-Dichloroethane			<0.0010		mg/L		0.001	26-SEP-12
1,1-Dichloroethylene			<0.0010		mg/L		0.001	26-SEP-12
cis-1,2-Dichloroethylene			<0.0010		mg/L		0.001	26-SEP-12
trans-1,2-Dichloroethylene			<0.0010		mg/L		0.001	26-SEP-12
Dichloromethane			<0.0050		mg/L		0.005	26-SEP-12
1,2-Dichloropropane			<0.0010		mg/L		0.001	26-SEP-12

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-HSMS-VA								
	Water							
Batch	R2443281							
WG1554616-1	MB							
cis-1,3-Dichloropropylene			<0.0010		mg/L		0.001	26-SEP-12
trans-1,3-Dichloropropylene			<0.0010		mg/L		0.001	26-SEP-12
1,1,1,2-Tetrachloroethane			<0.0010		mg/L		0.001	26-SEP-12
1,1,2,2-Tetrachloroethane			<0.0010		mg/L		0.001	26-SEP-12
Tetrachloroethylene			<0.0010		mg/L		0.001	26-SEP-12
1,1,1-Trichloroethane			<0.0010		mg/L		0.001	26-SEP-12
1,1,2-Trichloroethane			<0.0010		mg/L		0.001	26-SEP-12
Trichloroethylene			<0.0010		mg/L		0.001	26-SEP-12
Trichlorofluoromethane			<0.0010		mg/L		0.001	26-SEP-12
Vinyl Chloride			<0.0010		mg/L		0.001	26-SEP-12
VOC7-HSMS-VA								
	Water							
Batch	R2441066							
WG1550775-3	DUP	L1209363-17						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	23-SEP-12
Ethylbenzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	23-SEP-12
Methyl t-butyl ether (MTBE)		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	23-SEP-12
Styrene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	23-SEP-12
Toluene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	23-SEP-12
meta- & para-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	23-SEP-12
ortho-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	23-SEP-12
WG1550775-2	LCS							
Benzene			101.5		%		70-130	22-SEP-12
Ethylbenzene			106.6		%		70-130	22-SEP-12
Methyl t-butyl ether (MTBE)			103.4		%		70-130	22-SEP-12
Styrene			98.7		%		70-130	22-SEP-12
Toluene			101.6		%		70-130	22-SEP-12
meta- & para-Xylene			103.3		%		70-130	22-SEP-12
ortho-Xylene			104.7		%		70-130	22-SEP-12
WG1550775-1	MB							
Benzene			<0.00050		mg/L		0.0005	22-SEP-12
Ethylbenzene			<0.00050		mg/L		0.0005	22-SEP-12
Methyl t-butyl ether (MTBE)			<0.00050		mg/L		0.0005	22-SEP-12
Styrene			<0.00050		mg/L		0.0005	22-SEP-12
Toluene			<0.00050		mg/L		0.0005	22-SEP-12
meta- & para-Xylene			<0.00050		mg/L		0.0005	22-SEP-12



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC7-HSMS-VA	Water							
Batch	R2441066							
WG1550775-1	MB							
ortho-Xylene			<0.00050		mg/L		0.0005	22-SEP-12

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MB-LOR	Method Blank exceeds ALS DQO. LORs adjusted for samples with positive hits below 5 times blank level. Please contact ALS if re-analysis is required.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Total Dissolved Solids by Gravimetric							
	1	09-SEP-12 15:40	18-SEP-12 00:00	7	8	days	EHT
	2	10-SEP-12 10:20	18-SEP-12 00:00	7	8	days	EHT
	3	10-SEP-12 11:30	18-SEP-12 00:00	7	8	days	EHT
pH by Meter (Automated)							
	1	09-SEP-12 15:40	25-SEP-12 11:16	0.25	380	hours	EHTR-FM
	2	10-SEP-12 10:20	25-SEP-12 11:16	0.25	361	hours	EHTR-FM
	3	10-SEP-12 11:30	25-SEP-12 11:16	0.25	360	hours	EHTR-FM
	4	13-SEP-12 13:30	25-SEP-12 11:16	0.25	286	hours	EHTR-FM
	5	12-SEP-12 10:40	25-SEP-12 11:16	0.25	313	hours	EHTR-FM
	6	10-SEP-12 16:30	25-SEP-12 11:16	0.25	355	hours	EHTR-FM
	7	10-SEP-12 17:45	25-SEP-12 11:16	0.25	354	hours	EHTR-FM
	8	10-SEP-12 16:30	25-SEP-12 11:16	0.25	355	hours	EHTR-FM
	9	12-SEP-12 13:20	25-SEP-12 11:16	0.25	310	hours	EHTR-FM
	10	11-SEP-12 10:45	25-SEP-12 11:16	0.25	336	hours	EHTR-FM
	11	11-SEP-12 12:30	25-SEP-12 11:16	0.25	335	hours	EHTR-FM
	12	11-SEP-12 14:15	25-SEP-12 11:16	0.25	333	hours	EHTR-FM
	13	11-SEP-12 15:15	25-SEP-12 11:16	0.25	332	hours	EHTR-FM
	14	12-SEP-12 17:30	25-SEP-12 11:16	0.25	306	hours	EHTR-FM
	15	13-SEP-12 09:25	25-SEP-12 11:16	0.25	290	hours	EHTR-FM
	16	13-SEP-12 09:55	25-SEP-12 11:16	0.25	289	hours	EHTR-FM
	17	11-SEP-12 19:15	25-SEP-12 11:16	0.25	328	hours	EHTR-FM
Anions and Nutrients							
Nitrate Nitrogen by Ion Chromatography							
	1	09-SEP-12 15:40	14-SEP-12 17:19	3	5	days	EHTR
	2	10-SEP-12 10:20	14-SEP-12 17:19	3	4	days	EHTR
	3	10-SEP-12 11:30	14-SEP-12 17:19	3	4	days	EHTR
	6	10-SEP-12 16:30	14-SEP-12 17:19	3	4	days	EHTR
	7	10-SEP-12 17:45	14-SEP-12 17:19	3	4	days	EHTR
	8	10-SEP-12 16:30	14-SEP-12 17:19	3	4	days	EHTR
Nitrite Nitrogen by Ion Chromatography							
	1	09-SEP-12 15:40	14-SEP-12 17:19	3	5	days	EHTR
	2	10-SEP-12 10:20	14-SEP-12 17:19	3	4	days	EHTR
	3	10-SEP-12 11:30	14-SEP-12 17:19	3	4	days	EHTR
	6	10-SEP-12 16:30	14-SEP-12 17:19	3	4	days	EHTR
	7	10-SEP-12 17:45	14-SEP-12 17:19	3	4	days	EHTR
	8	10-SEP-12 16:30	14-SEP-12 17:19	3	4	days	EHTR
Volatile Organic Compounds							
VOCs in water by Headspace GCMS							
	1	09-SEP-12 15:40	26-SEP-12 19:41	14	17	days	EHT
	2	10-SEP-12 10:20	26-SEP-12 19:41	14	16	days	EHT
	3	10-SEP-12 11:30	26-SEP-12 19:41	14	16	days	EHT
	6	10-SEP-12 16:30	26-SEP-12 19:41	14	16	days	EHT
	7	10-SEP-12 17:45	26-SEP-12 19:41	14	16	days	EHT
	8	10-SEP-12 16:30	26-SEP-12 19:41	14	16	days	EHT
	10	11-SEP-12 10:45	26-SEP-12 19:41	14	15	days	EHT
	11	11-SEP-12 12:30	26-SEP-12 19:41	14	15	days	EHT
	12	11-SEP-12 14:15	26-SEP-12 19:41	14	15	days	EHT
	13	11-SEP-12 15:15	26-SEP-12 19:41	14	15	days	EHT
	17	11-SEP-12 19:15	26-SEP-12 19:41	14	15	days	EHT

Legend & Qualifier Definitions:

Quality Control Report

Workorder: L1209363

Report Date: 27-SEP-12

Page 37 of 37

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.

Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1209363 were received on 14-SEP-12 10:55.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

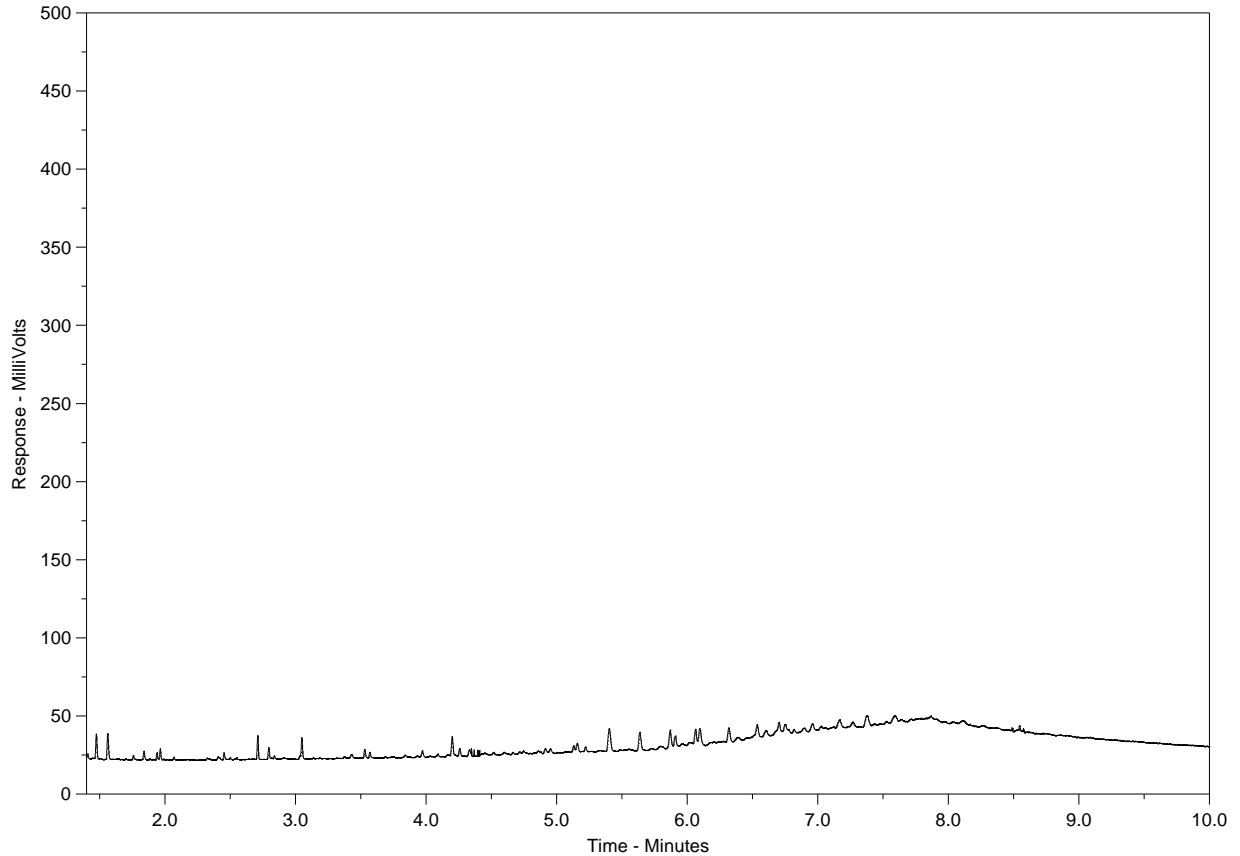
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Hydrocarbon Distribution Report



ALS Sample ID: L1209363-1
Client Sample ID: PC-MW12-01



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

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

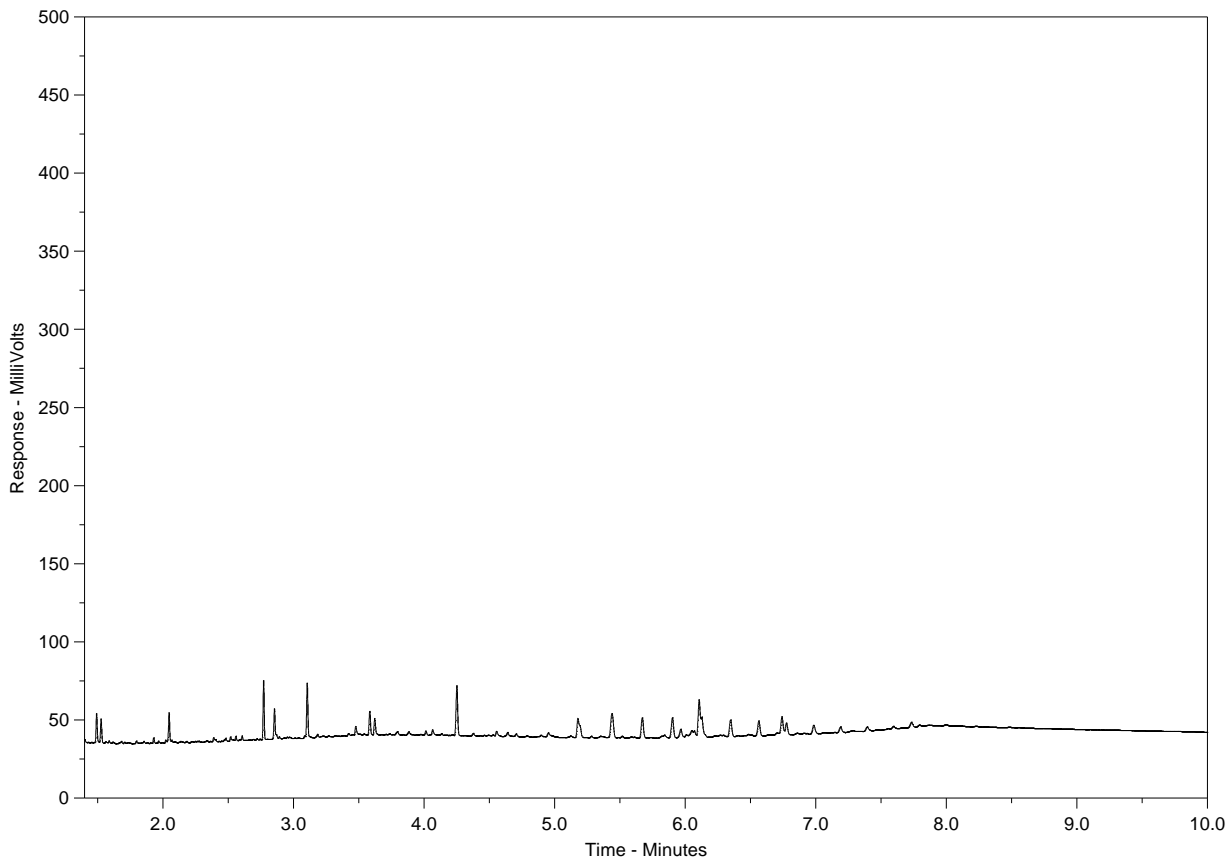
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report



ALS Sample ID: L1209363-2
Client Sample ID: PC-MW12-02



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

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

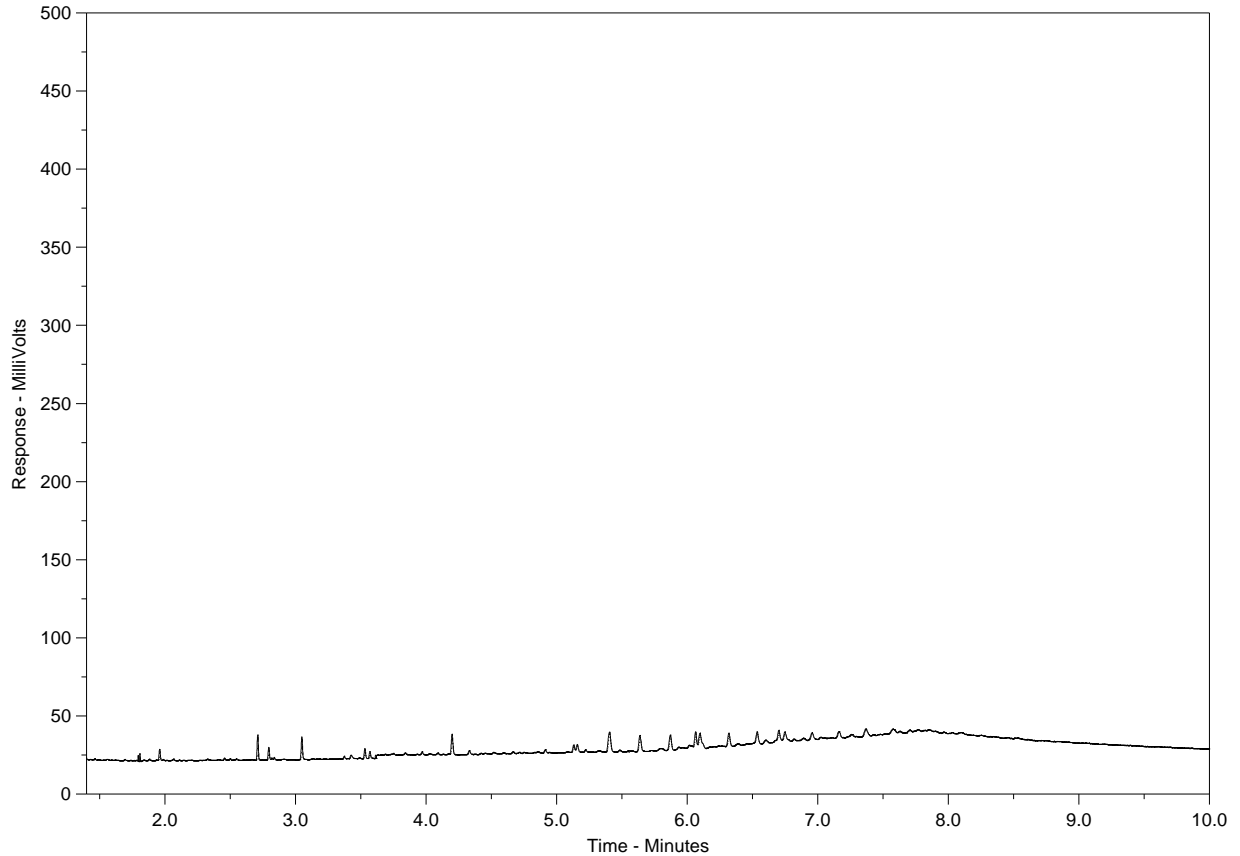
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report



ALS Sample ID: L1209363-3
Client Sample ID: PC-MW12-03



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

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

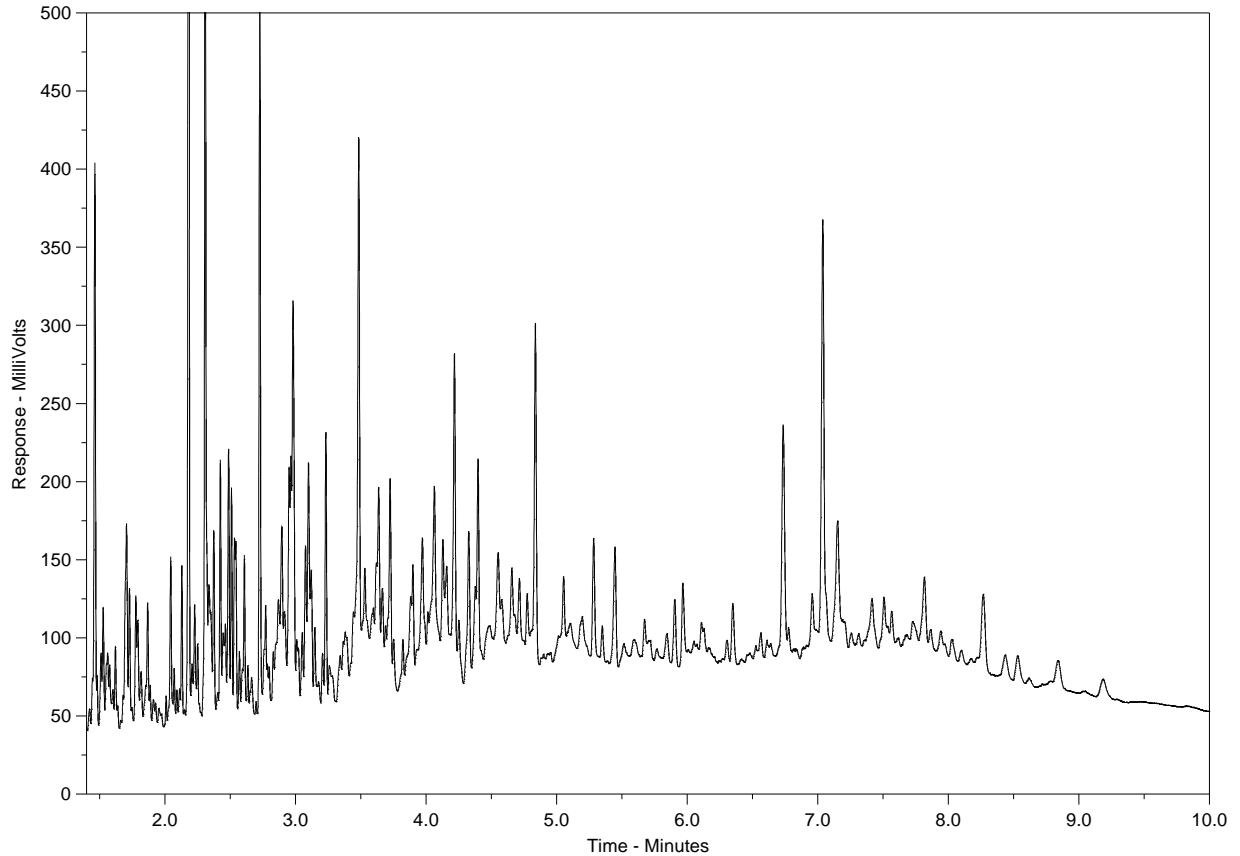
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report



ALS Sample ID: L1209363-4
 Client Sample ID: PC SURFACE



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

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

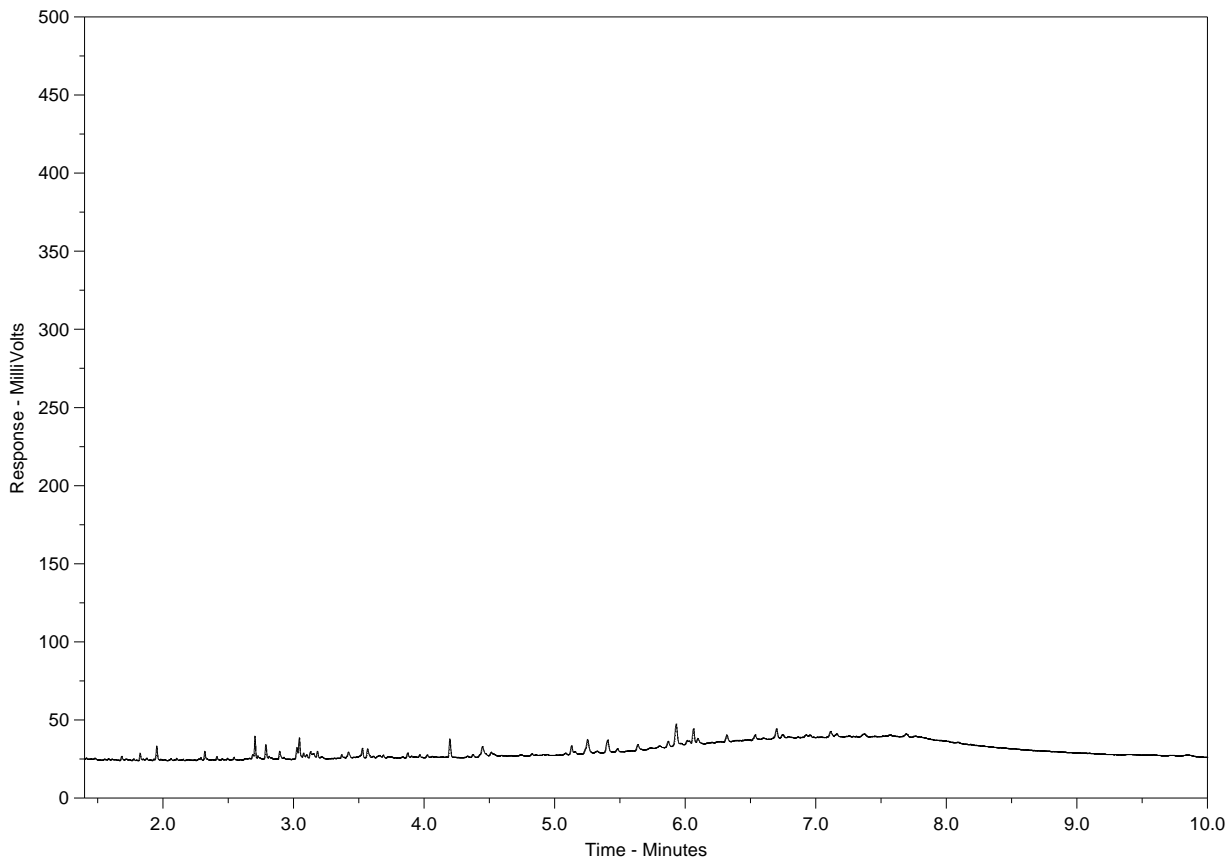
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report



ALS Sample ID: L1209363-5
Client Sample ID: SX-MW12-01



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

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

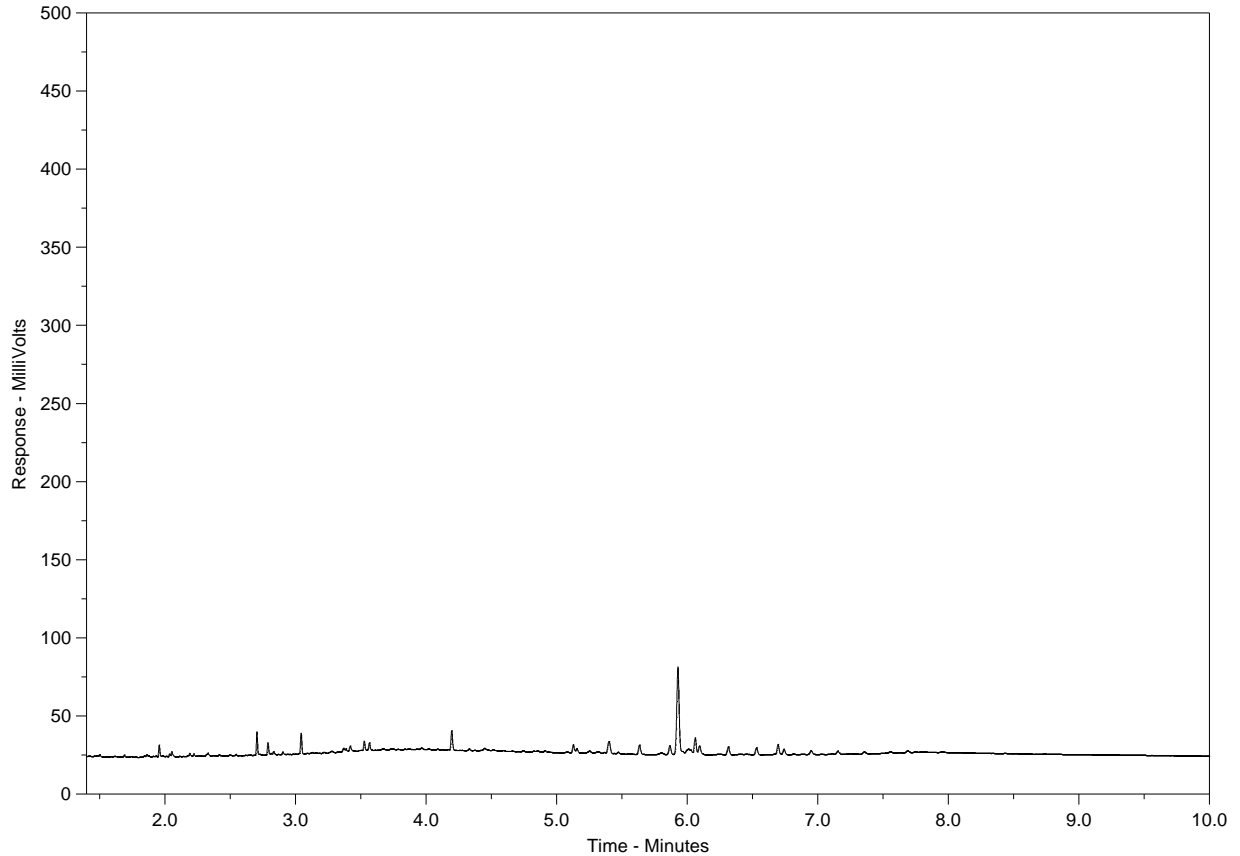
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report



ALS Sample ID: L1209363-6
Client Sample ID: SX-MW12-02



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

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

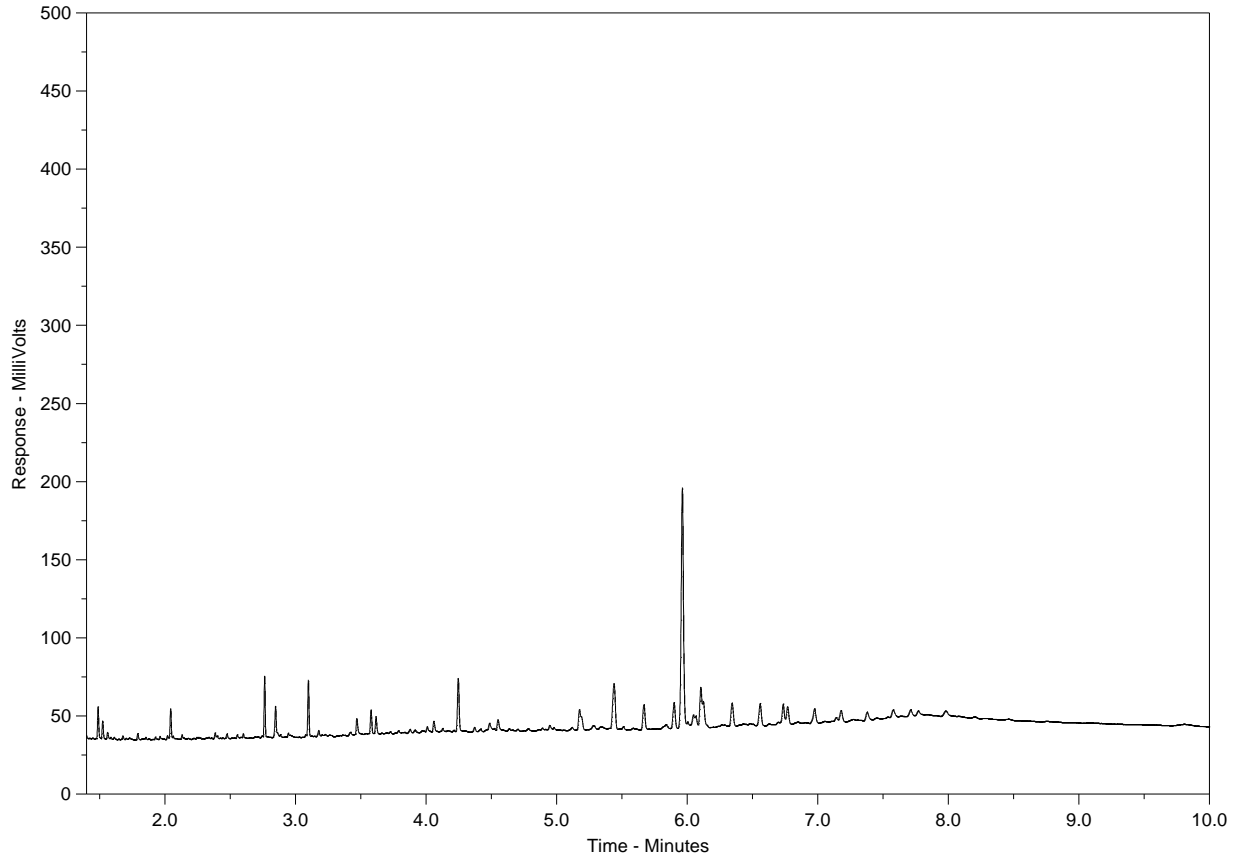
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report



ALS Sample ID: L1209363-7
Client Sample ID: SX-MW12-03



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

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

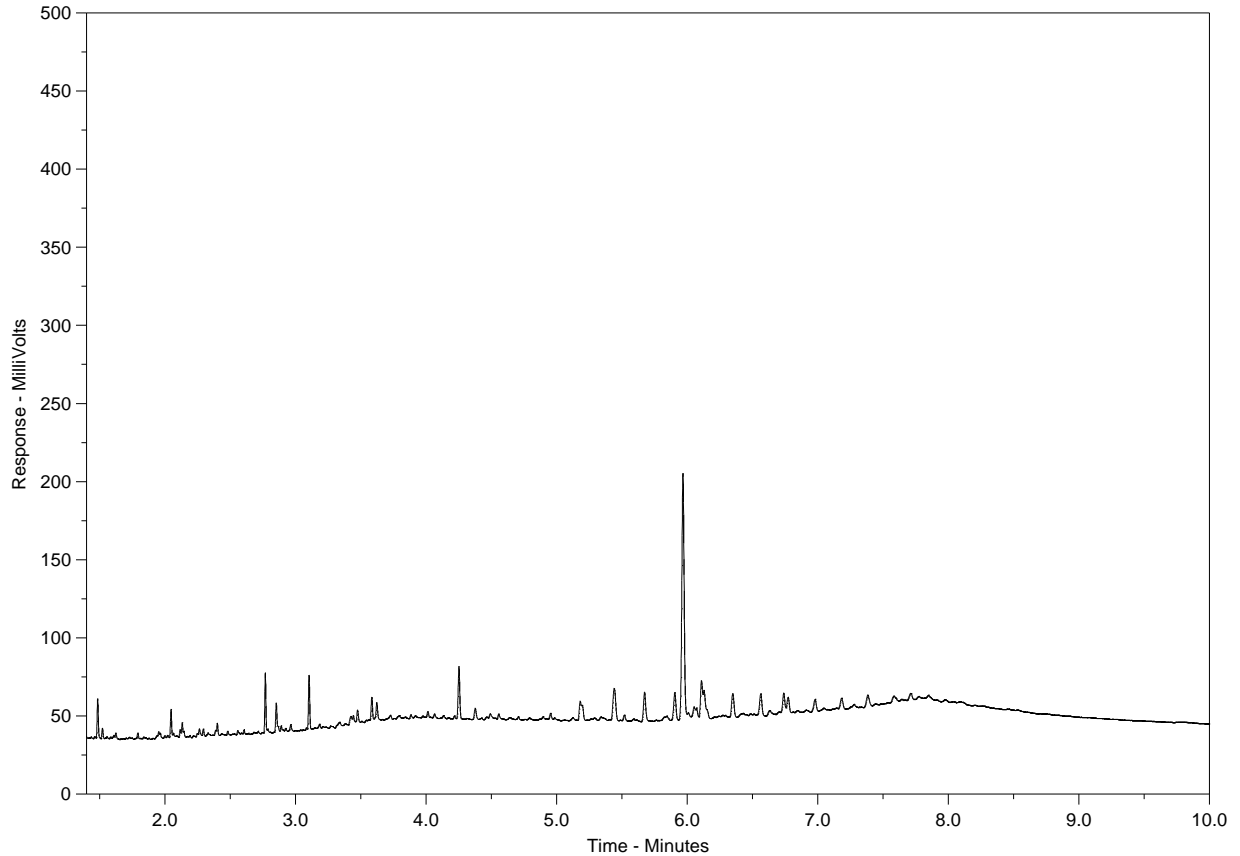
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report



ALS Sample ID: L1209363-8
Client Sample ID: SX-MW12-04



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

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

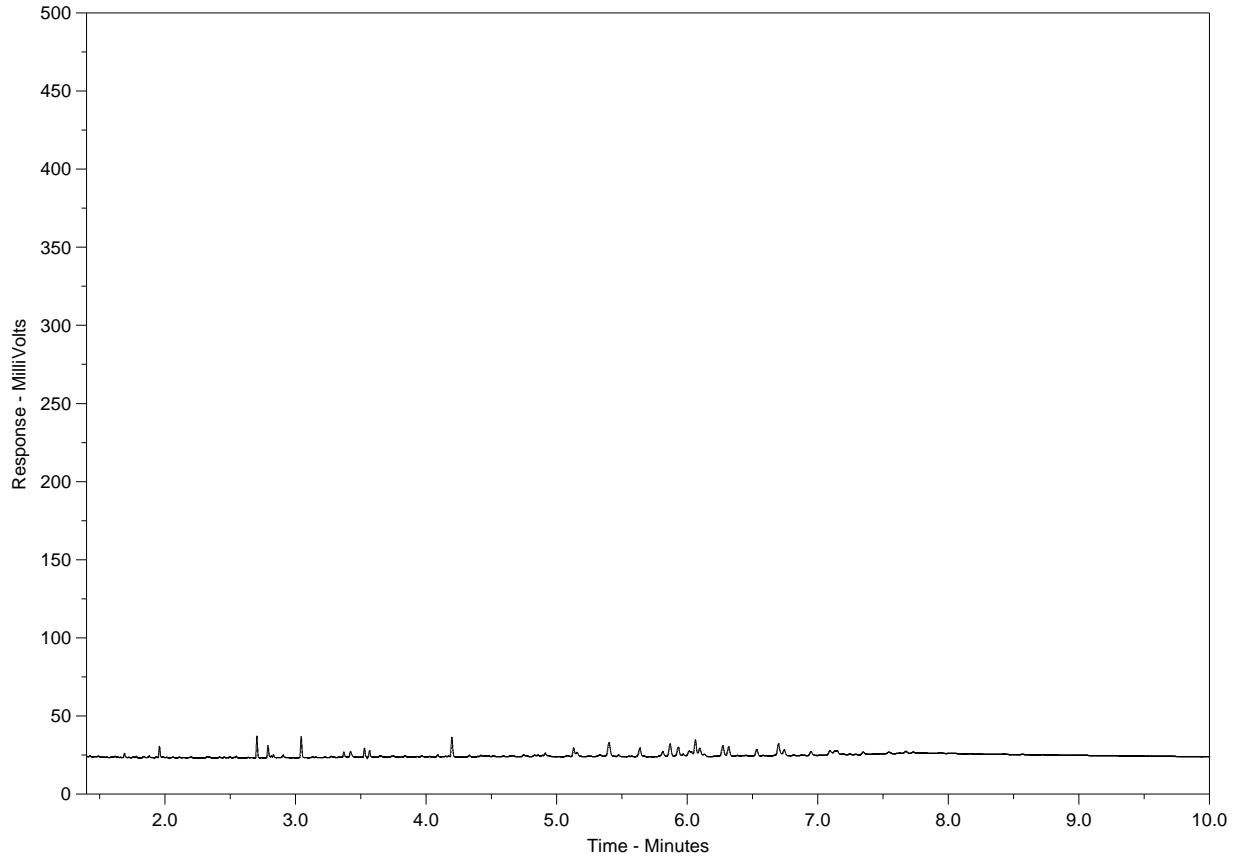
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report



ALS Sample ID: L1209363-9
Client Sample ID: SX SURFACE



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

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

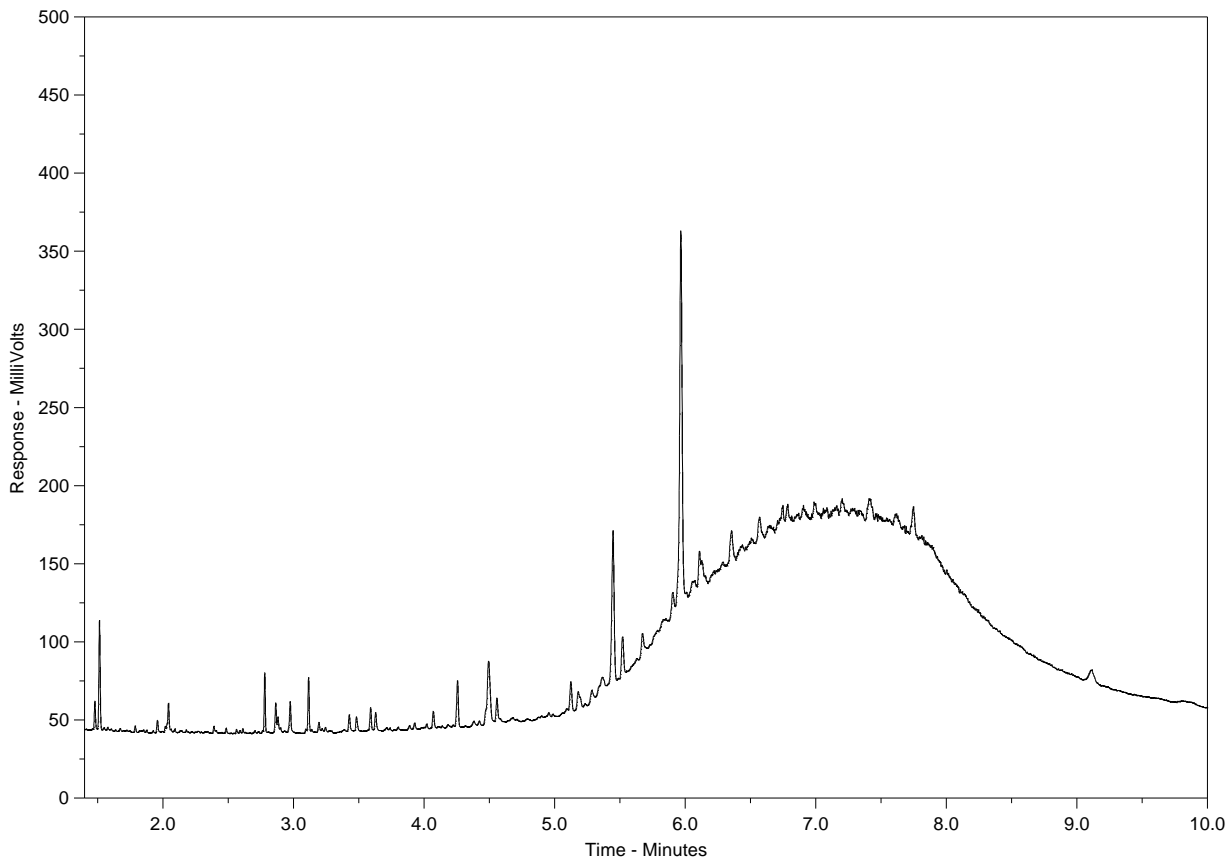
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report



ALS Sample ID: L1209363-10
Client Sample ID: MA-MW12-01



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

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

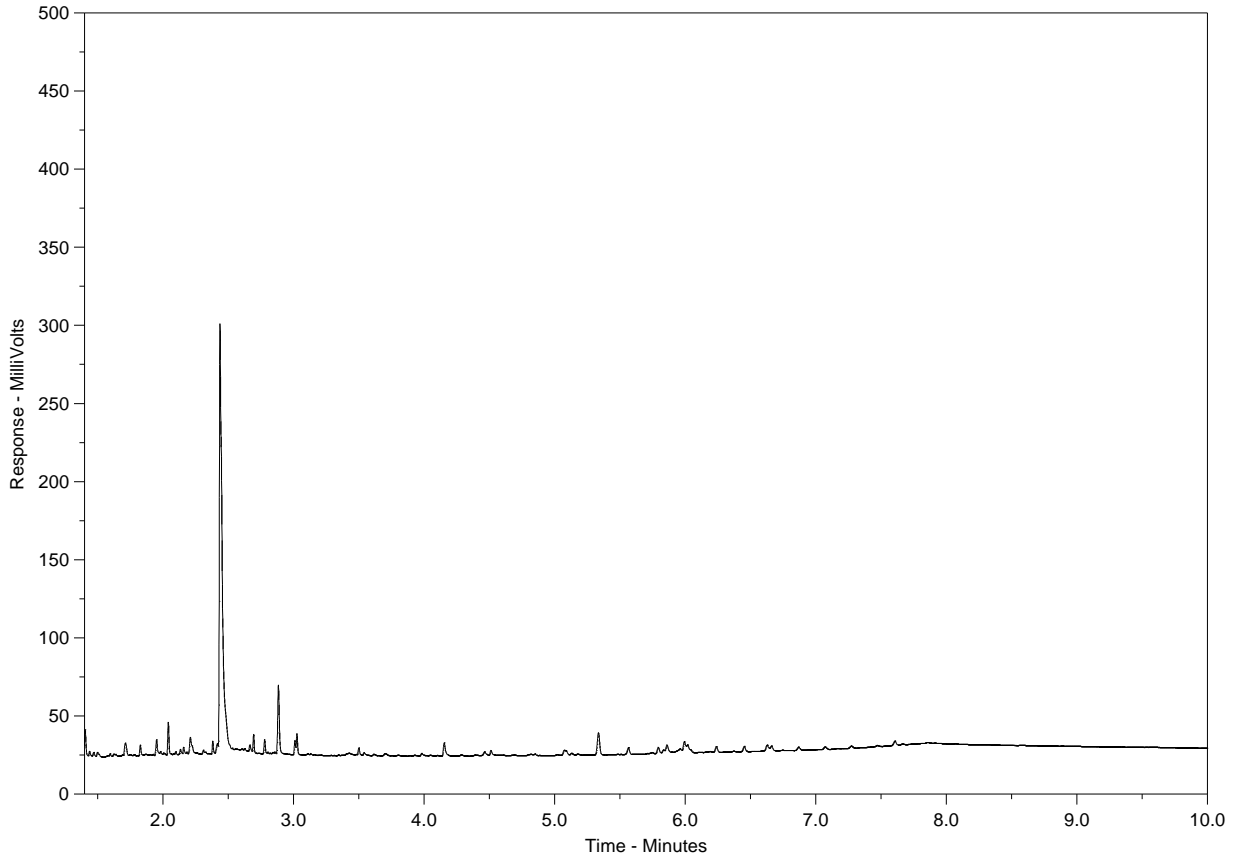
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report



ALS Sample ID: L1209363-11
Client Sample ID: MA-MW12-02



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

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

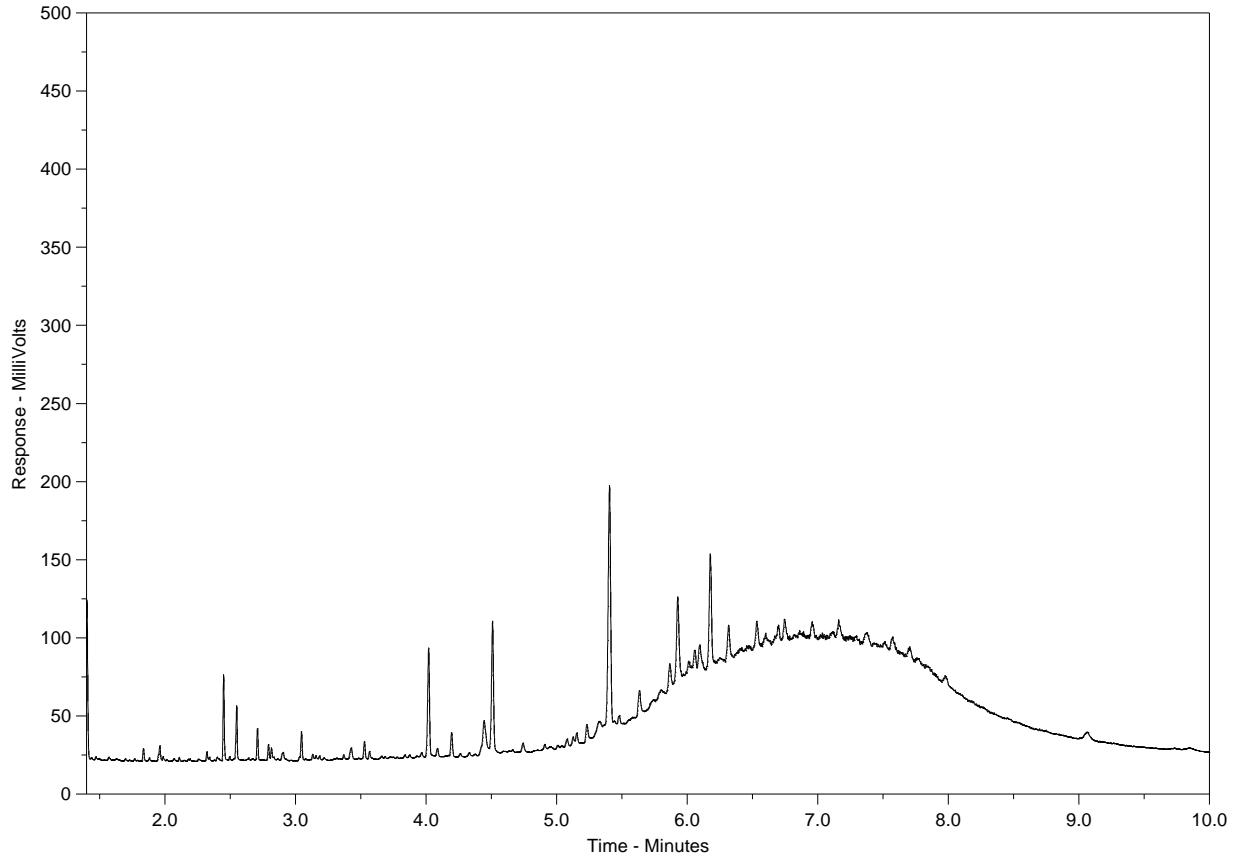
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report



ALS Sample ID: L1209363-12
Client Sample ID: MA-MW12-03



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

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

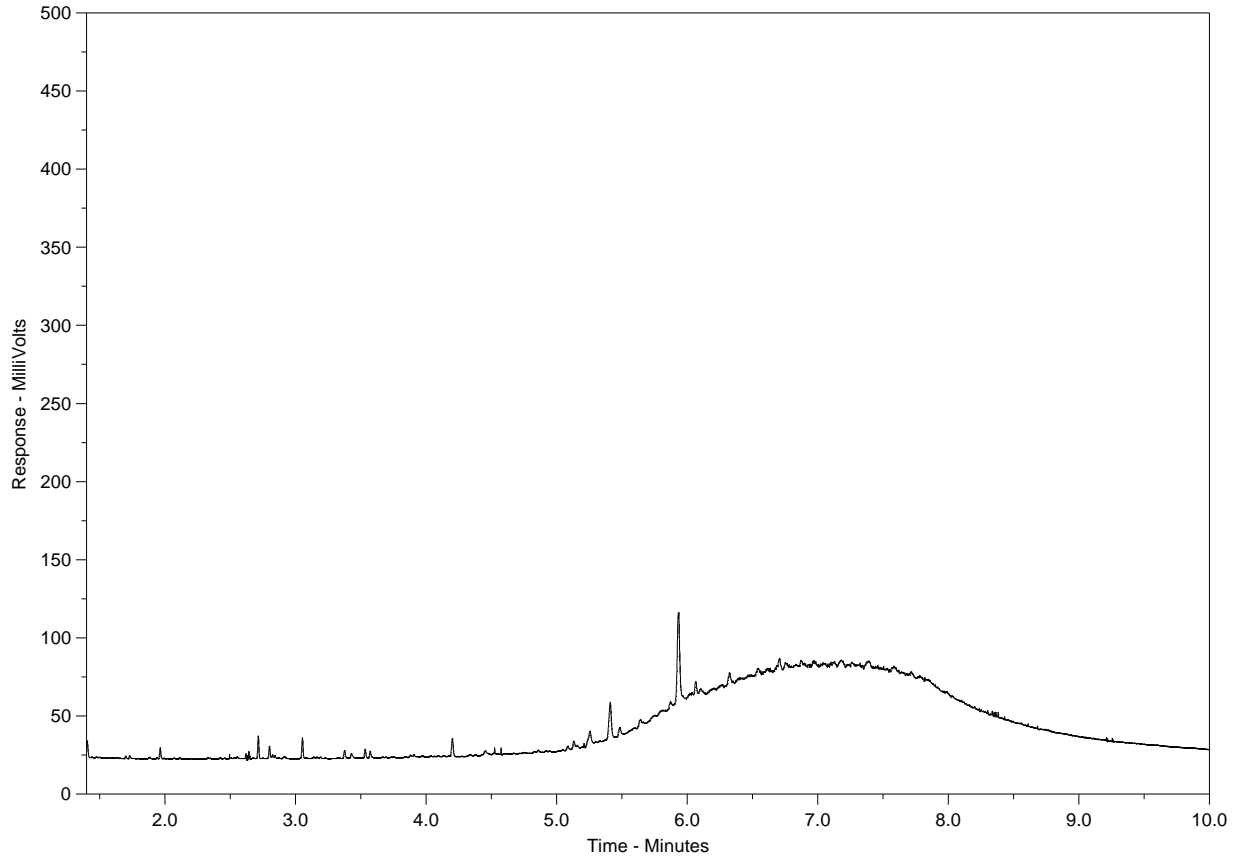
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report



ALS Sample ID: L1209363-13
Client Sample ID: MA-MW12-04



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

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

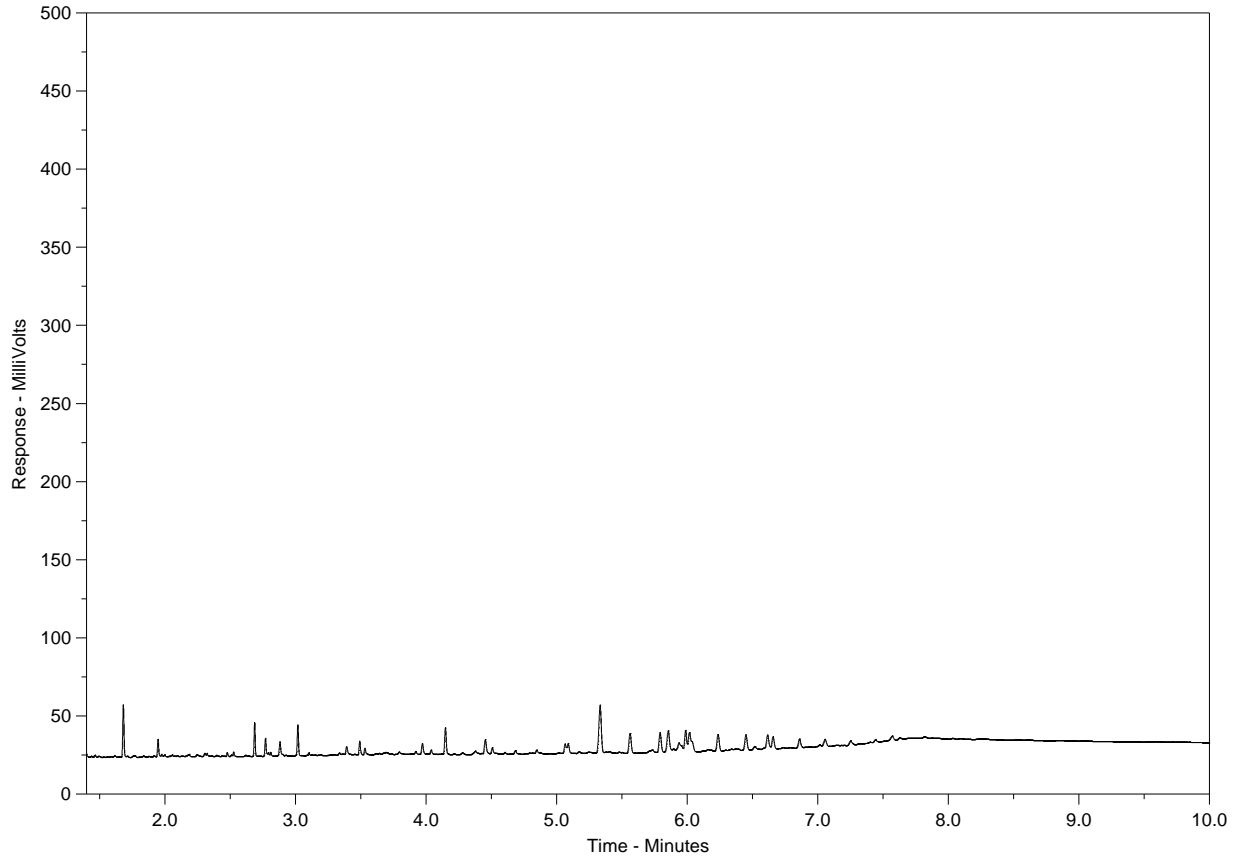
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report



ALS Sample ID: L1209363-14
Client Sample ID: MA SURFACE



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

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

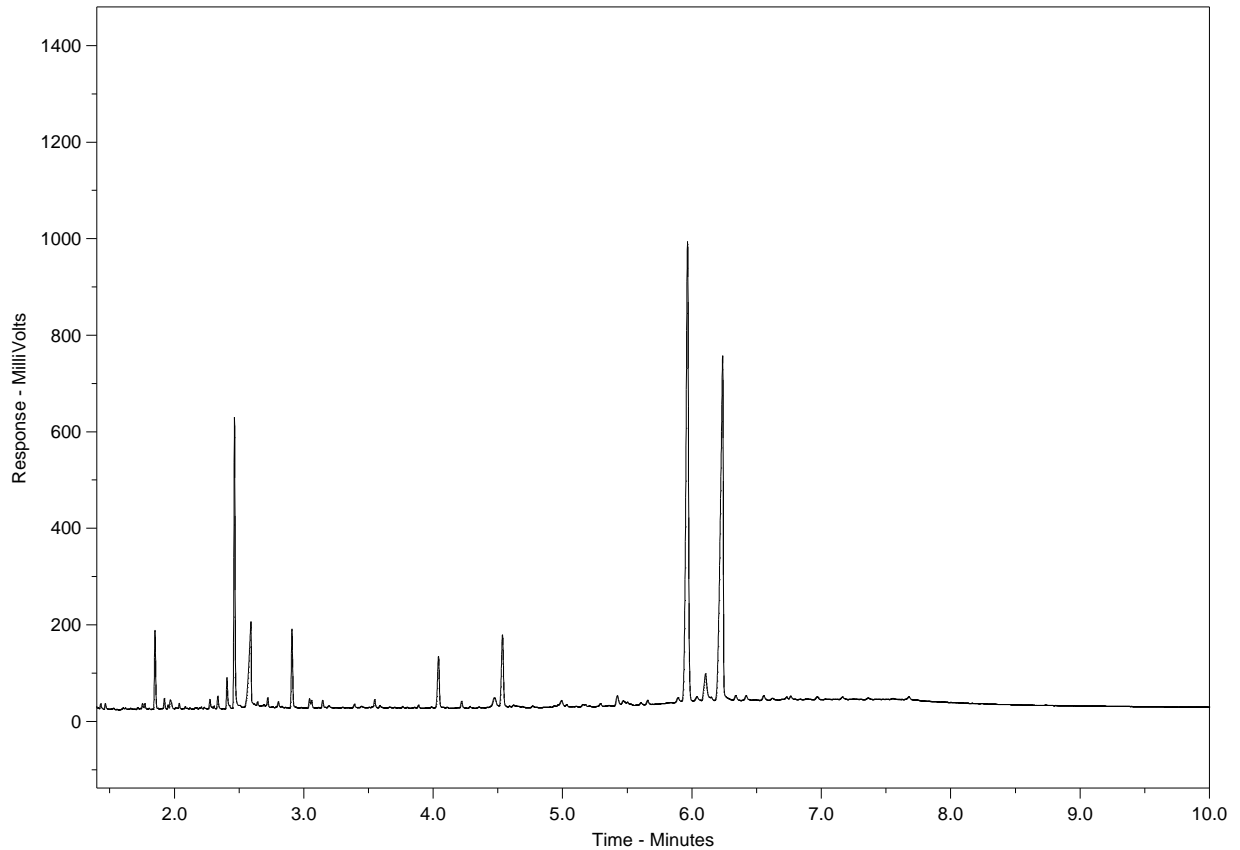
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report



ALS Sample ID: L1209363-15
Client Sample ID: KE-MW12-01



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

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

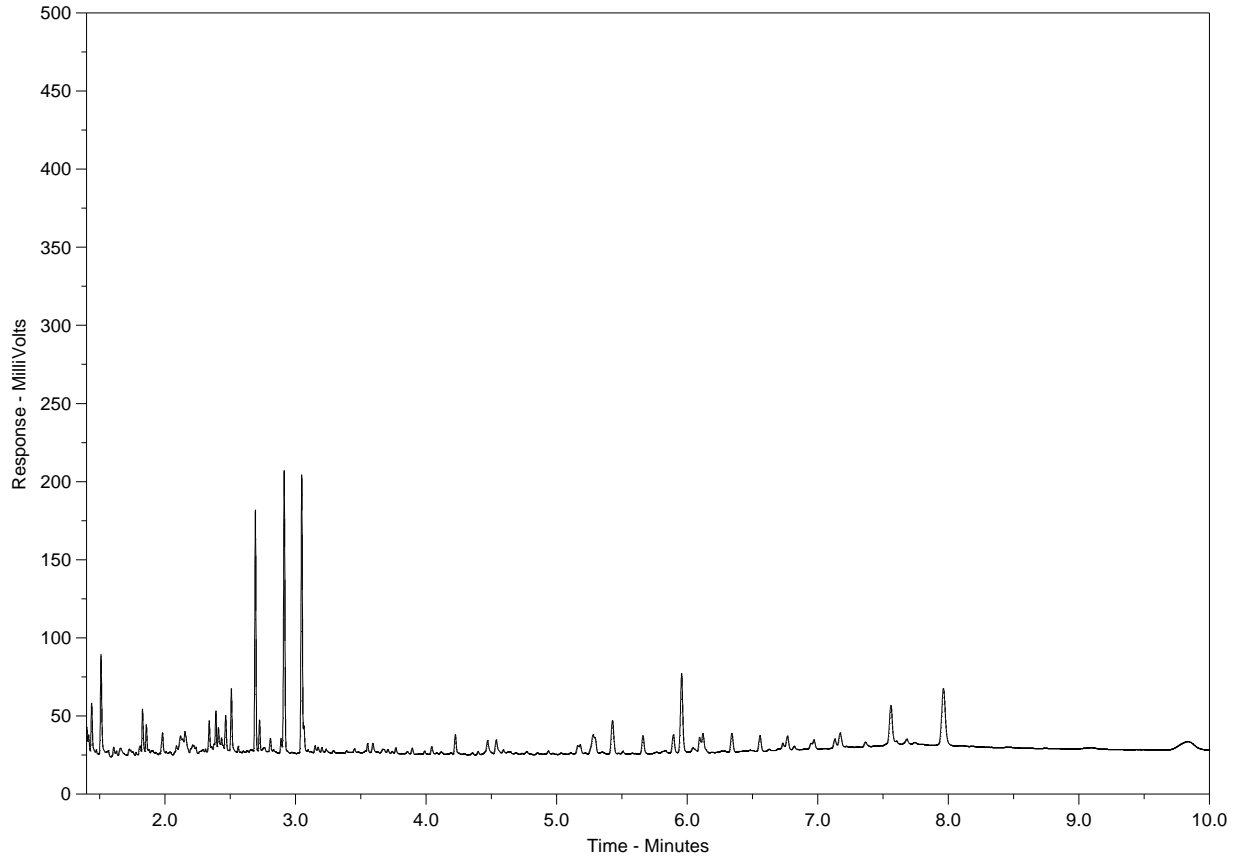
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report



ALS Sample ID: L1209363-16
 Client Sample ID: KE-MW12-03



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

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

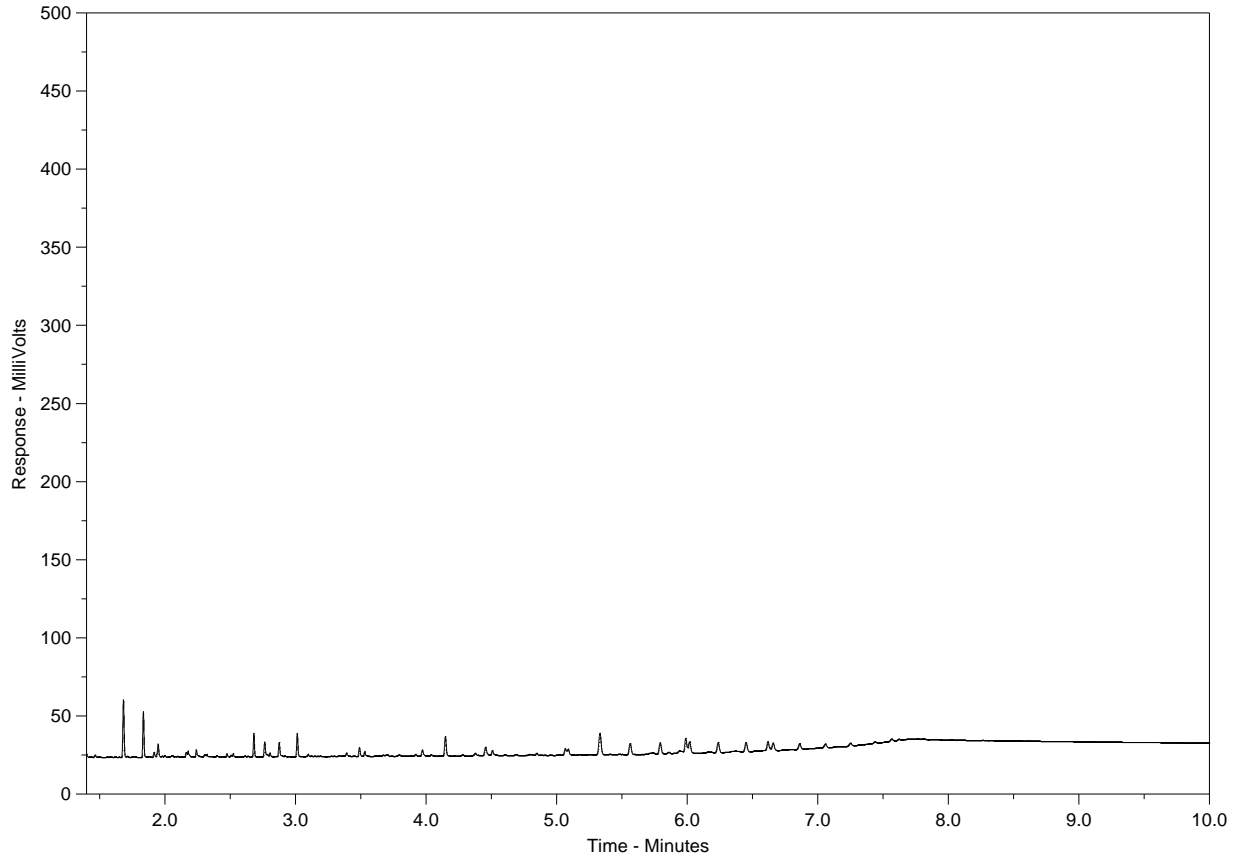
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.

Hydrocarbon Distribution Report



ALS Sample ID: L1209363-17
Client Sample ID: KE SURFACE



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

The EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample. For further interpretation, a current library of reference products is available on www.alsglobal.com or upon request.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the response scale at the left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.



Report To			Report Format / Distribution			Service Requested (Rush for routine analysis subject to availability)											
Company: Golder Associates			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)											
Contact: Andrea Badger			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT											
Address: 203 170 Titanium Way Whitehorse, YT Y1A 0G1			Email 1: andrea_badger@golder.com			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT											
Phone: 867-633-6076 Fax: _____			Email 2: gary_hamilton@golder.com			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT											
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			Client / Project Information			Analysis Request											
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No			Job #: 11-1436-0073/1200, 2200, 2400, 2700			Please indicate below Filtered, Preserved or both (F, P, F/P)											
Company: _____			PO / AFE: _____			As per 11-1436-0072/xxxx Number of Containers											
Contact: _____			LSD: _____														
Address: _____			Quote #: _____														
Phone: _____ Fax: _____			ALS Contact: _____														
Lab Work Order # (lab use only) L1209363			Sampler: A Badger														
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type													
	PC-MW12-01	09-Sep-12	15:40	Groundwater	X											8	
	PC-MW12-02	10-Sep-12	10:20	Groundwater	X											8	
	PC-MW12-03	10-Sep-12	11:30	Groundwater	X											8	
	PC Surface	13-Sep-12	13:30	Surface Water	X											8	
	SX-MW12-01	12-Sep-12	10:40	Groundwater	X											8	
	SX-MW12-02	10-Sep-12	16:30	Groundwater	X											8	
	SX-MW12-03	10-Sep-12	17:45	Groundwater	X											8	
	SX-MW12-04	10-Sep-12	16:30	Groundwater	X											8	
	SX Surface	12-Sep-12	13:20	Surface Water	X											8	
	MA-MW12-01	11-Sep-12	10:45	Groundwater	X											8	
	MA-MW12-02	11-Sep-12	12:30	Groundwater	X											8	
	MA-MW12-03	11-Sep-12	14:15	Groundwater	X											8	
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details																	
PC Surface, SX Surface, MA-MW12-02 and MA-MW12-03 samples for dissolved metals are not filtered or preserved None of the samples for DOC are filtered or preserved																	
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.																	
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.																	
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.																	
SHIPMENT RELEASE (client use)					SHIPMENT RECEPTION (lab use only)					SHIPMENT VERIFICATION (lab use only)							
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF							
Andrea Badger	14-Sep-12	10:30	<i>[Signature]</i>	14-Sep-12	10:50	3.2 °C											



Report To			Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)										
Company: Golder Associates			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other				<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)										
Contact: Andrea Badger			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax				<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT										
Address: 203 170 Titanium Way Whitehorse, YT Y1A 0G1			Email 1: andrea_badger@golder.com				<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT										
Phone: 867-633-6076 Fax: _____			Email 2: gary_hamilton@golder.com				<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT										
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			Client / Project Information				Please indicate below Filtered, Preserved or both (F, P, F/P)										
Hardcopy of invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No			Job #: 11-1436-0073/1200, 2200, 2400, 2700														
Company: _____			PO / AFE: _____				As per 11-1436-0072/xxxx										
Contact: _____			LSD: _____														
Address: _____			Quote #: _____														
Phone: _____ Fax: _____			ALS Contact: _____				Number of Containers										
Lab Work Order # (lab use only)			Sampler: A Badger														
Sample #	Sample Identification (This description will appear on the report)		Date (dd-mmm-yy)	Time (hh:mm)	Sample Type												
	MA-MW12-04		11-Sep-12	15:15	Groundwater	X										8	
	MA Surface		12-Sep-12	18:30	Surface Water	X										8	
	KE-MW12-01		13-Sep-12	9:25	Groundwater	X										8	
	KE-MW12-03		13-Sep-12	9:55	Groundwater	X										8	
	KE Surface		11-Sep-12	19:15	Surface Water	X										8	
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details																	
PC Surface, SX Surface, MA-MW12-02 and MA-MW12-03 samples for dissolved metals are not filtered or preserved None of the samples for DOC are filtered or preserved																	
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SHIPMENT RELEASE (client use)					SHIPMENT RECEPTION (lab use only)					SHIPMENT VERIFICATION (lab use only)							
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF							
Andrea Badger	14-Sep-12	10:30				°C											

At Golder Associates we strive to be the most respected global company providing consulting, design, and construction services in earth, environment, and related areas of energy. Employee owned since our formation in 1960, our focus, unique culture and operating environment offer opportunities and the freedom to excel, which attracts the leading specialists in our fields. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees who operate from offices located throughout Africa, Asia, Australasia, Europe, North America, and South America.

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