February 23, 2013

HYDROGEOLOGICAL ASSESSMENT

Town of Faro
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 Town of Faro 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 Site Assessment indicated the following:

- Site Description: The Town of Faro Solid Waste Disposal Facility is located in the southeast portion of the Yukon, within the Yukon Plateau Ecological Region, and in Kaska Dena First Nation's traditional territory, at latitude 62º12' north, and longitude 133º22' west. The Site is accessed by a gravel road off the east side of Mitchell Road, approximately 9.3 km north of the Robert Campbell Highway, and 180 km east of the Village of Carmacks. The Facility serves as a solid waste disposal facility for the Town of Faro and the surrounding area, accepting domestic and commercial waste including: appliances, automotive waste, household hazardous waste, metals, and waste oil. No evidence of spills or discharges was observed during the Site reconnaissance. A salvage yard and a materials (metals) recovery site are both located approximately 350 m to the northeast and upgradient of the Facility.
- Site Topography: The Facility is at an elevation of approximately 700 m (2,300 feet) above sea level and lies within the Pelly River watershed. A cleared area of approximately 25,000 square meters is present at the Facility, which was constructed out of a glacially formed kettle depression. Local surficial geology is mapped as a glaciofluvial complex, forming kettles, eskers, and crevasse-fill ridges. The regional hydraulic gradient near the Site is expected to follow the regional topography, which slopes south towards the Pelly River.
- Stratigraphy and Hydrogeology:
  - Surface expression at the Site is dominated by quaternary surficial deposits;
  - Subsurface conditions were investigated with the installation of four monitoring wells including: FA-MW12-01, FA-MW12-02, FA-MW12-03, and FA-MW12-04, which were completed from July 10 through 12, 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 17.4 m in FA-MW12-01, and was found to consist primarily of stratified sand and gravel deposits with minor silt;

- An unconfined aquifer was encountered during the drilling of all four monitoring wells at between approximately 13 m and 17 m below grade (bg);
- Hydraulic response tests were performed on two of the four monitoring wells. The results of these tests indicate the hydraulic conductivity of the unconfined aquifer underlying the Site ranges from 2 x 10^{-4} m/s and 3 x 10^{-4} m/s. These values are considered reasonable for the sand units encountered in the screened section of each of these wells during installation;
- The local, horizontal hydraulic gradient at the Site was assessed, using groundwater elevation data, to be approximately 0.008 m/m, sloping to the southwest;
- Groundwater velocity in the surficial aquifer is estimated to range between 5 x 10^{-6} m/s and 7 x 10^{-6} m/s (approximately 0.4 to 0.6 metres per day); and
- Based on the groundwater flow direction, it was determined that both FA-MW12-01 and FA-MW12-02 are downgradient of the Site, FA-MW12-04 is upgradient of the Site, and FA-MW12-03 is on a side-gradient to the Site; therefore, the minimum requirements for one upgradient and two downgradient wells at the Site have been met.

- Groundwater Chemistry:
  - The results of a desktop study and several Site visits indicate that the Yukon Contaminated Sites Regulation (CSR) criteria for freshwater aquatic life and drinking water are applicable at the Site;
  - Groundwater samples were collected from monitoring wells FA-MW12-01, FA-MW12-03, and FA-MW12-04 on August 31, 2012, and a surface water sample was collected from a small pond approximately 200 m southeast of the Facility on September 1, 2012, in order to complete the initial monitoring event at the Facility;
  - Iron and manganese exceeded the CSR drinking water standard in all three monitoring well samples;
  - Magnesium exceeded the CSR drinking water standard in the sample taken from FA-MW12-01;
  - Barium exceeded the CSR drinking water standard in the sample taken from FA-MW12-04; and
  - Chromium exceeded the CSR standard for freshwater aquatic life in samples taken from FA-MW12-03 and FA-MW12-04.
  - Elevated metals in both upgradient and downgradient monitoring wells suggest that contamination may not be sourced from the Site.

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;
- As risk of contamination from landfill leachate is low, groundwater quality at the Facility should be revaluated following two rounds of groundwater monitoring to determine if there are any potential impacts present from landfill leachate; and
- Particular attention should be given to the analytes exceeding Yukon CSR standards, and an effort should be made to identify sources of groundwater contamination.

Study Limitations

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

The inferences concerning the Town of Faro 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.

Table of Contents

1.0 INTRODUCTION 1

1.1 Background 1

1.2 Purpose and Objectives 1

1.3 Scope and Sequence of Work 1

1.4 Qualifications of Assessors 2

1.5 Authorization 3

2.0 SITE DESCRIPTION AND HISTORY 3

2.1 Site Location 3

2.2 Site History 3

3.0 METHODOLOGY 3

3.1 Preliminary Hydrogeological Assessment 3

3.1.1 Data sources 4

3.1.2 Site Inspections 5

3.1.3 Background Geological Information Sources 5

3.1.4 Contaminated Sites Registry 5

3.1.5 Review of Solid Waste Disposal Facility Permit and Waste Management Plan 5

3.1.6 Review of Environment Yukon Information 6

3.2 Field Investigations 6

3.2.1 Scope of Field Investigations 6

3.2.2 Groundwater Monitoring Well Network 7

3.2.3 Monitoring Well Surveying 8

3.2.4 Groundwater Monitoring Event 8

3.2.5 Rising Head Hydraulic Response Tests 9

3.3 Laboratory Analysis 9

3.4 Quality Assurance / Quality Control 10

3.5 Application of Applicable Water Quality Standards 11

4.0 CONCEPTUAL HYDROGEOLOGICAL MODEL 12

4.1 Setting 12

4.2 Climate 13
4.3 Geology and Hydrogeology 13
4.3.1 Geological Framework 13
4.3.2 Principal Aquifer 13
4.4 Groundwater Flow Systems 14
4.4.1 Regional Groundwater Flow 14
4.4.2 Local Groundwater Flow 14
4.5 Hydraulic Response Tests 14
4.6 Estimated Linear Groundwater Velocity 14
4.7 Potential Contamination of Groundwater and Transport Mechanisms 15
5.0 GROUNDWATER IMPACT ASSESSMENT 15
5.1 Review of Groundwater Chemistry 15
5.2 Interpretation of Groundwater Chemistry 17
6.0 CONCLUSIONS 18
7.0 RECOMMENDATIONS 19
8.0 CLOSURE 20

TABLES

Table 1: Summary of Waste Disposal Facility Permits and Groundwater Monitoring Requirements 6
Table 2: Well Construction Details 8
Table 3: Monitoring Well Locations and Groundwater Elevations from the Monitoring Event on August 31, 2012 8
Table 4: Parameters Analyzed in August – September 2012 9
Table 5: Review of QA/QC procedures taken. 10
Table 6: Applicable Water Quality Standards 11
Table 7 Aquifer Units Encountered at the Site 13
Table 8: Estimated Hydraulic Conductivity 14
Table 9: Important Groundwater Chemistry Results 16

FIGURES

Figure 1: Key Plan
Figure 2: Site Plan and Cross-Section Location
Figure 3: Regional Surficial Geology
Figure 4: Cross Section A-A'
Figure 5: Regional Drainage and Land Zoning
Figure 6: Monitoring Well Location Map and Groundwater Elevation
Figure 7: Schoeller Plot
Figure 8: Piper Plot
Figure 9: Stiff Diagram

APPENDICES

APPENDIX A
Site Photographs

APPENDIX B
Well Construction Logs

APPENDIX C
Well Development and Sampling Sheets

APPENDIX D
Slug Test Data

APPENDIX E
Analytical Reports and Chain of Custody Forms

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 Faro 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. 80-007 effective January 1, 2012 to December 31, 2014), relevant Environment Yukon Protocols, and in accordance with the Yukon Environmental and Socioeconomic Assessment Act (YESAA) Decision Document issued for the Site (Document Number 2011-0234-26-1).

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 and finalization of a draft of the Site Assessment Plan;
- 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 resulted in 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 an M.Sc. degree in Hydrogeology from Saint Francis Xavier University (2012) and 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, 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 out 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 Town of Faro Solid Waste Disposal Facility is in the southeast portion of Yukon at latitude 62º 12' north and longitude 133º 21' west. The Site is accessed by a 800 m gravel road off the west side of Mitchell Road, approximately 10 km north of the Robert Campbell Highway, and 180 km east of the Village of Carmacks.

2.2 Site History

The population of Faro has fluctuated, from a population of just less than 2000 in 1981, to a current population of approximately 400 inhabitants. The Town of Faro currently operates the Facility. According to the Town of Faro Solid Waste Management Plan (2003) the present disposal pit and materials handling areas were laid out in 1977. A wildlife program was implemented in the mid 1990s to eliminate risk to bears and other wildlife. Since 2008 waste has been buried, instead of burned, due to territory wide concerns raised about open burning. A review of historical aerial photographs for the area indicates that the land was undeveloped prior to its use as a landfill. The approximate area landfilled is included on Figure 2.

3.0 METHODOLOGY

3.1 Preliminary Hydrogeological Assessment

The preliminary hydrogeological assessment involved a desktop review, interpretation of existing information, and an inspection of the Facility. The initial inspection of the Facility was conducted on October 20, 2011, and a follow up inspection was conducted on July 10, 2012 coinciding with the beginning of the monitoring well drilling program. The purpose of the preliminary hydrogeological assessment was to identify the appropriate drilling methods and 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*.
- 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
- Natural Resources Canada, Groundwater Information Network Website: http://ngwd-bdnes.cits.nrcan.gc.ca/service/api_ngwds:gin/en/wmc/aquifermap.html
- Jackson, L.E., 1981-1982. *Surficial Geology, Bruce Lake, Yukon Territory*, Geological Survey of Canada, Map 1791A, scale 1:100,000.
- Site inspections of October 20, 2011 and July 10, 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 155 K/03, scale 1:50,000.
- Town of Faro, 2003. *Town of Faro Solid Waste Management Plan*.

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 health and safety plan included a description of the potential hazards that could be encountered during the Facility reconnaissance and proposed mitigation. Site inspections were conducted on October 20, 2011 and July 10, 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 Yukon Department of Energy Mines and Resources, 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), the Yukon Water Well Registry, and a search of the Yukon Water online Data Catalogue.

3.1.4 Contaminated Sites Registry

A Contaminated Site Registry search was conducted by Yukon Environment on December 1, 2011. The search identified a report stating that approximately 60 m^3 of contaminated soil, from a heating fuel spill at the Del Van Gorder school, was relocated to the Faro landfill October 9, 2007, then moved back to the school sometime in early 2008. No confirmatory sampling was obtained at the landfill. Soil samples taken from the stockpile tested had detectable levels of EPH_{10-19} and EPH_{19-32}. It was also noted that the Facility is open and unmonitored 24 hours a day 7 days a week, and that there was ample opportunity for improper disposal of waste and unreported spills.

In addition to the Contaminated Site Registry search for the Facility, one conducted for the surrounding area on November 6, 2012 identified several reports on the Anvil Mine Complex, located approximately 12 km upgradient of the Facility. The Contaminated Site Registry search did not turn up any groundwater quality reports from this Site.

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

Waste Management Permit No. 80-007 was issued on January 1, 2012 for the Facility. It states that the Facility is to be operated 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 80-007 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 3.5;
- 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 31st 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	Site Disposal Facility Permit Number	Permit Type	Solid Waste Management Plan	Required Groundwater Monitoring
Faro Solid Waste Disposal Facility	80-007	Landfill	Town of Faro (2003)	Twice Per Year

3.1.6 Review of Environment Yukon Information

Golder reviewed documents pertaining to the Faro Facility on the Yukon Environment and Socioeconomic Board (YESAB) online registry, and from several other sources, on October 19, 2012. Documents reviewed included: the most current waste facility permit issued for the Facility, the most current Solid Waste Management 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 (4) on-Site monitoring wells were completed by Midnight Sun Drilling under the supervision of Golder Associates from July 10 through 12, 2012;
- Monitoring wells FA-MW12-01, FA-MW12-03, and FA-MW12-04 were developed and sampled by Golder on August 31, 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. At the time whem the well development and sampling was conducted well FA-MW12-02 was frozen;
- A surface water sample was taken from a small pond, located approximately 200 m southeast of the Site, on September 2, 2012;
- Groundwater and surface water samples were sent to ALS Environmental laboratory in Whitehorse, YT;
- Slug tests were carried out on FA-MW12-01, FA-MW12-03 and FA-MW12-04, on September 2, 2012 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 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. FA-MW12-04 was intended to characterize upgradient groundwater conditions, while FA-MW12-01, FA-MW12-03 and FA-MW12-03 were intended to assess groundwater conditions downgradient of the landfill. Locations of the monitoring wells 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:

- FA-MW12-01 was installed in the northeast corner of the Site, about halfway between the center and the northeast corner, and advanced to a depth of 17.4 m below grade (bg);
- FA-MW12-02 was installed on the west edge of the Site, and advanced to a depth of 17.1 m bg;
- FA-MW12-03 was installed near the southwest corner of the Site, and advanced to a depth of 17.1 m bg; and
- FA-MW12-04 was installed near the southeast corner of the Site, and advanced to a depth of 14.7 m bg.

All 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 each of the monitoring wells;
- PVC casing was installed above the well screen to between 0.6 m and 1.0 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
- Wells were developed by removing a minimum of 3 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)
FA-MW12-01	17.4	SAND with some gravel	50	14.3 – 17.4	13.4 – 17.4
FA-MW12-02	17.1	Silty SAND	50	14.0 – 17.1	13.1 – 17.1
FA-MW12-03	17.1	SAND with some gravel	50	14.0 – 17.1	12.2 – 17.1
FA-MW12-04	14.7	Fine SAND	50	10.7 – 14.7	10.1 – 14.7

3.2.3 Monitoring Well Surveying

Golder carried out a level survey to determine the vertical elevation of the top of the PVC wellhead (measuring point) for each well on July 12, 2012. Initial absolute elevation was surveyed relative to the top of PVC pipe at FA-MW12-01, which was obtained using a Trimble hand-held GPS instrument with a vertical accuracy of ± 0.7 m. However, relative elevation between wells, as determined from the level survey, has a precision of ± 1 cm. Table 3 presents a summary of survey data and water level measurements (recorded on August 31, 2012).

Table 3: Monitoring Well Locations and Groundwater Elevations from the Monitoring Event on August 31, 2012

Well ID	UTM Coordinates (Zone 8 North)	Top of PVC Casing Elevation (masl)	Standing Water Level (mbtoc)	Groundwater Elevation (masl)
FA-MW12-01	6901552.3 m N 584450.1 m E	698.47	14.14	684.32
FA-MW12-02	6901522.3 m N 584476.9 m E	698.19	Frozen @ 13.76	Frozen @ 684.43
FA-MW12-03	6901515.8 m N 584603.1 m E	698.64	13.95	684.69
FA-MW12-04	~ 6901641 m N ~ 584575 m E	697.14	11.63	685.51

3.2.4 Groundwater Monitoring Event

Monitoring wells FA-MW12-01, FA-MW12-03, and FA-MW12-04 were purged and sampled by Golder on August 31, 2012. FA-MW12-02 was iced over or blocked, and could not be purged or sampled during this monitoring event. 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 four well volumes were then purged from each well, using 5/8" 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 continued until field parameters were stable before sampling. Groundwater development and sampling datasheets are presented in Appendix C. In addition to the three groundwater monitoring wells that were sampled, a surface water sample was collected from a small pond located approximately 200 metres southwest 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. All 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 FA-MW12-01, FA-MW12-03, and FA-MW12-04 on September 1, 2012, to assess the hydraulic conductivity of the surficial aquifer underlying the Site. Tests were performed using a 1.5 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.

Multiple rising head tests were completed for each well. 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. 80-007).

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

Table 4: Parameters Analyzed in August – September 2012

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

3.4 Quality Assurance / Quality Control

Table 5 provides a detailed description 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	FA-MW12-04 was established as an upgradient well at the Site and is used to characterize background groundwater conditions in the surficial aquifer underlying the Site.
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 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[1] acceptance criteria of ±30% and only 2 exceeded 5%.
Trip Blanks	A trip blank was not collected during the August 2012 groundwater monitoring event.
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. Analysis of nitrate and nitrite took place 1 day outside the 3 day recommended holding time.
Laboratory Detection Limit	Laboratory reports indicate that detection limits were below the standards applicable to this assessment.
Charge Balance	Charge balance was calculated on each of the samples analyzed by the laboratory. Percent error in charge balance for all samples was below 5.2%.
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 significant discrepancy between the FDA and the FD. No significant systematic errors in the analysis process for groundwater were found. 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.

[1] RPD calculations are presented in Appendix E of Golder's draft report entitled Beaver Creek Solid Waste Disposal Facility Hydrogeological Assessment" dated August 10, 2012

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, SO_4, N, NO_2, NO_3 and P)
- Dissolved Metals
- Mercury
- Hardness
- Alkalinity
- Carbonate
- Bicarbonate
- pH
- Total dissolved solids
- Ammonia
- Dissolved organic carbon
- VOCs
- Chemical oxygen demand
- Total Kjeldahl Nitrogen
- EPH_{w10-32} & VH_{w6-10}
- BTEX
- PAHs

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	Applicable
Drinking Water	Schedule 3 – Contaminated Sites Regulation (O.I.C. 2002/171)	1.5	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 Lands viewer website and Google Earth Images, conducted by Golder October 23, 2012, showed several small ponds and Vangorda Creek falling within a 1 km radius of the Site, as specified in the CSR, under which aquatic life standards are applied. The nearest body of water was determined to be a small, unnamed pond located approximately 60 m southeast of the Site. It was therefore determined that aquatic life standards were **applicable** to the Facility.

Drinking Water

A search of drinking water wells on the Groundwater Information Network website and the Yukon Water Data Catalogue (accessed October 23, 2012) showed several drinking water wells, located within the Town of Faro, within the 1.5 km radius of the Site, specified by the Yukon CSR, under which drinking water guidelines are applied. The Town's municipal wells are just outside the 1.5 km radius from the Site. It was therefore deemed that CSR drinking water standards were **applicable** to the Facility.

Irrigation

A review of the Summary of Yukon Water Wells, compiled from The Yukon Water Well Registry, reviewed by Golder on October 23, 2012, showed no irrigation wells on record for the Faro 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 October 23, 2012, as well as the Site visit in July 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 Facility.

Livestock

A review of the Summary of Yukon Water Wells, compiled from The Yukon Water Well Registry, reviewed by Golder on October 23, 2012, showed no wells on record as being for livestock use in the Faro area. It should be noted that this is not a complete record of all wells in the Yukon. A review of the Solid Waste Operation Plan (Government of Yukon, 2011) as well as several Site visits also did not indicate the presence of livestock in the vicinity of the Facility. It was therefore considered that CSR standards for livestock are **not applicable** to the Facility.

4.0 CONCEPTUAL HYDROGEOLOGICAL MODEL

4.1 Setting

The Town of Faro Solid Waste Disposal Facility is in the southeast portion of Yukon, within the Yukon Plateau Ecological Region, and is located in Kaska Dena First Nation's traditional territory. The Facility is at an elevation of approximately 700 m (2,300 ft) within the Pelly River Watershed. The Site is situated in a topographic low that is a glacially formed feature known as a kettle depression. A cleared area of approximately 25,000 square meters is present at the Site. A salvage yard and a materials (metals) recovery site are both located approximately 350 m to the northeast and upgradient of the Facility.

4.2 Climate

Precipitation at the Site is likely the same as the precipitation at the Faro climate station (Climate ID 2100517), located approximately 2.38 kilometres southeast of the Site at an elevation of approximately 716.60 m above sea level. Average monthly precipitation ranges from a low average of 8 mm in April to a high average of 58.8 mm in July. The average annual precipitation reported at the Faro station is approximately 316 mm including 111.6 cm of snowfall. Temperature at the Site ranges from a low average of -21.5^{o}C in January to a high average of 15^{o}C in July (Environment Canada, 2011).

Annual precipitation is relatively low (approximately 316 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 southern Yukon, including the Faro area, has undergone several episodes of glaciation, the most recent being the Quaternary McConnell glaciation. During that period, sediments such as glacial till, glaciofluvial, and glaciolacustrine sediments were deposited, especially in low elevation areas such as the Pelly River Valley, located downgradient of the Site.

The Faro area is mapped as being underlain primarily by till and alluvium, with minor glaciolacustrine sediments of Quaternary origin. Ablation till, colluvial glacial debris, morainal deposits, and bedrock exposures are found at higher elevations in the mountains to the northeast of the Site.

Surficial geology maps published by the Yukon Geological Survey (YGS) indicate natural surficial materials at the Site are part a glaciofluvial complex of outwash, glaciolacustrine, and minor till deposits, deposited in an ice contact environment. Deposits are poorly to well sorted; sand and gravel with minor silt and clay; greater than 5 m thick. Kame and kettle topography is associated with this setting (Jackson, 1993).

4.3.2 Principal Aquifer

As shown in Figure 4, it is inferred that groundwater at the Site occurs in a shallow, unconfined, surficial 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	FA-MW12-01 FA-MW12-02 FA-MW12-03 FA-MW12-04	Unconfined; unconsolidated porous media	▪ Sand and Gravel ▪ Shallow aquifer ▪ High hydraulic conductivity

4.4 Groundwater Flow Systems

4.4.1 Regional Groundwater Flow

Topography in the area surrounding the Facility slopes from the mountain range, located to the northeast of the Site (elevation approximately 1200 m amsl), southwest towards the Pelly River (elevation 625 m amsl). Regional hydraulic gradient is inferred to be a subdued replica of this topographic gradient, so that regional groundwater flow is primarily to the southwest, discharging to the Pelly River.

4.4.2 Local Groundwater Flow

Golder used the groundwater depth data from August 31, 2012 and well survey elevation information collected in July 2012 to calculate the groundwater elevation at each monitoring well. The water level measurements and groundwater elevations are presented in Table 3.

Local groundwater flow direction at the Site is inferred, using groundwater elevation data, to be approximately 0.008 m/m, sloping to the southwest.

4.5 Hydraulic Response Tests

Golder Associates conducted slug tests on two 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)
FA-MW12-01	Sand, some gravel	Bouwer-Rice (1976)	3×10^{-4}
FA-MW12-04	Fine Sand	Bouwer-Rice (1976)	2×10^{-4}

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 2×10^{-4} m/s and 3×10^{-4} m/s. The horizontal hydraulic gradient across the Site was assessed, using the monitoring well network, to be 0.008 m/m to the southwest. A range of reasonable linear groundwater velocity 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) in sand and gravel.

The resulting groundwater velocity is estimated to be between 5 x 10^{-6} m/s and 7 x 10^{-6} m/s (approximately 0.4 to 0.6 metres per day). Groundwater at the Site may travel faster or slower than these estimates due to inaccuracies 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 (NO_3, NH_3), organic hydrocarbons (Fuels, PAH's, chlorinated hydrocarbons), and salts;
- Leakage and spillage from on-Site hydrocarbon storage areas; and
- Transport of contaminated water from upgradient locations.

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; and
- 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 two of the three monitoring wells at the Facility on August 31, 2012, and one surface water location downgradient from the Site on September 2, 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 important 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)	Magnesium (mg/L)
FA-MW12-01	1140	94.4	0.370	347	8.44	108.00
FA-MW12-02	-	-	-	-	-	-
FA-MW12-03	933	<0.5	0.205	3.6	3.66	83.0
FA-MW12-04	1420	349	1.49	163	167	58.1
Surface Water	131	14.3	0.0138	<0.50	22.0	5.66

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. TDS in the monitoring well samples ranged from 933 mg/L to 1420 mg/L, and was 131 mg/L in the surface water sample. Groundwater typically has a higher TDS than surface water, and TDS for the monitoring wells is considered to be within normal range for groundwater.

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 the monitoring well samples at the Site ranged from 3.66 mg/L in the sample from FA-MW12-02 to 167 mg/L in the sample from FA-MW12-04. The difference between samples is considered significant, and is consistent with landfill leachate influence. There is no CSR standard for DOC.

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. Chloride levels from the monitoring well network ranged from non-detect in FA-MW12-01, to 449 mg/L in FA-MW12-04, while the chloride concentration measured in the surface water sample was 14.3 mg/L. Levels in FA-MW12-04 are considered to be outside the range expected in naturally occurring waters and exceed CSR drinking water standard of 250 mg/L. Chloride levels in FA-MW12-04 are consistent with landfill leachate influence.

Ammonia

Ammonia is a typical landfill leachate indicator. Ammonia concentrations in the groundwater samples ranged from 0.205 mg/L to 1.49 mg/L in the monitoring well samples, and lower (0.0138 mg/L) in the surface water sample. All levels were within the normal range for naturally occurring waters, and no concentrations exceeded the applicable CSR standard for freshwater aquatic life.

Metals

Monitoring well samples contained several metals that exceeded CSR guidelines; barium exceeded the CSR drinking water guideline in FA-MW12-04; cobalt exceeded the CSR aquatic life standard in FA-MW12-03 and FA-MW12-04; iron exceeded the CSR drinking water guideline in FA-MW12-01, FA-MW12-03, and FA-MW12-04; magnesium exceeded CSR drinking water guidelines at in FA-MW12-01; manganese exceeded CSR drinking water guidelines in FA-MW12-01, FA-MW12-03, and FA-MW12-04. The CSR drinking water standards for iron, magnesium, and manganese are intended to protect against odour and taste concerns. Elevated metals are often associated with landfill leachate influence.

Organics

Detectable levels of organic constituents are often a sign of leachate contamination. Of the hydrocarbons analyzed (BTEX, PAH, EPH_{w10-32} & VH_{w6-10}, and chlorinated hydrocarbons) none were detected in any of the samples taken during this round of sampling.

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, it shows that concentrations of major ions are different for each sample. In general, concentrations of calcium, magnesium, and bicarbonate, are similar in all of the groundwater samples, while sodium, chloride, and sulphate vary considerably. In the surface water sample, concentrations of all major ions are shown to be lower, and important constituents sulphate and bicarbonate are depleted.
- Piper: The Piper diagram (Figure 8) is used to compare the ratios of major ions and can be used to identify different water types. Here the Piper diagram shows that, although the sample results are located near one another, they all have a different chemical composition. The sample from FA-MW12-01 is identified as an Mg-Ca-HCO_3-SO_4 type water; the sample from FA-MW12-03 is identified as Ca-Mg-HCO_3-SO_4 type water; the sample from FA-MW12-04 is identified as Ca-Mg-Na-Cl-HCO_3 type water; and the surface water sample is identified as Ca-Mg-HCO_3-Cl type water.
- Stiff: The stiff diagram allows for differences in groundwater chemistry to be presented and viewed spatially. Here, the stiff diagram shows that all of the samples have significantly different chemical composition. This is consistent with variations in types of waste from the landfill impacting the underlying groundwater.

None of the samples indicate conclusively that landfill leachate from the Facility is influencing groundwater or surface water chemistry.

6.0 CONCLUSIONS

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

- Stratigraphy and Hydrogeology:
  - Surface Expression at the Site is dominated by quaternary surficial deposits;
  - Subsurface conditions were investigated with the installation of four monitoring wells including: FA-MW12-01, FA-MW12-02, FA-MW12-03, and FA-MW12-04, which were completed from July 10 through 12, 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 17.4 in FA-MW12-01, and was found to consist primarily of stratified sand and gravel deposits with minor silt;
  - An unconfined aquifer was encountered during the drilling of all four monitoring wells at between approximately 13 m and 17 m below grade (bg);
  - 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 2×10^{-4} m/s and 3×10^{-4} m/s. These values are considered reasonable for the sand units encountered in the screened section of each of these wells during installation;

- The local, horizontal hydraulic gradient at the Site was assessed, using groundwater elevation data, to be approximately 0.008 m/m, sloping to the southwest;
- Groundwater velocity in the surficial aquifer is estimated to range between 5 x 10^{-6} m/s and 7 x 10^{-6} m/s (approximately 0.4 to 0.6 metres per day); and
- Based on the groundwater flow direction, it was determined that both FA-MW12-01 and FA-MW12-02 are downgradient of the Site, FA-MW12-04 is upgradient of the Site, and FA-MW12-03 is on a side-gradient to the Site; therefore, the minimum requirements for one upgradient and two downgradient wells at the Site have been met.

- Groundwater Chemistry:
  - The results of a desktop study and several Site visits indicate that the Yukon Contaminated Sites Regulation (CSR) criteria for freshwater aquatic life and drinking water are applicable at the Site;
  - Groundwater samples were collected from monitoring wells FA-MW12-01, FA-MW12-03, and FA-MW12-04 on August 31, 2012, and a surface water sample was collected from a small pond approximately 200 m southeast of the Facility on September 1, 2012, in order to complete the initial monitoring event at the Facility;
  - Iron and manganese exceeded the CSR drinking water standard in all three monitoring well samples;
  - Magnesium exceeded the CSR drinking water standard in the sample taken from FA-MW12-01;
  - Barium exceeded the CSR drinking water standard in the sample taken from FA-MW12-04;
  - Chromium exceeded the CSR standard for freshwater aquatic life in samples taken from FA-MW12-03 and FA-MW12-04; and
  - Elevated metals in both upgradient and downgradient monitoring wells suggest that contamination may not be sourced from the Site.

7.0 RECOMMENDATIONS

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;
- Groundwater quality at the Facility should be revaluated following two rounds of groundwater monitoring to determine if there are any potential impacts present from landfill leachate; and
- Particular attention should be given to the analytes exceeding Yukon CSR standards, and an effort should be made to identify sources of groundwater contamination.

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

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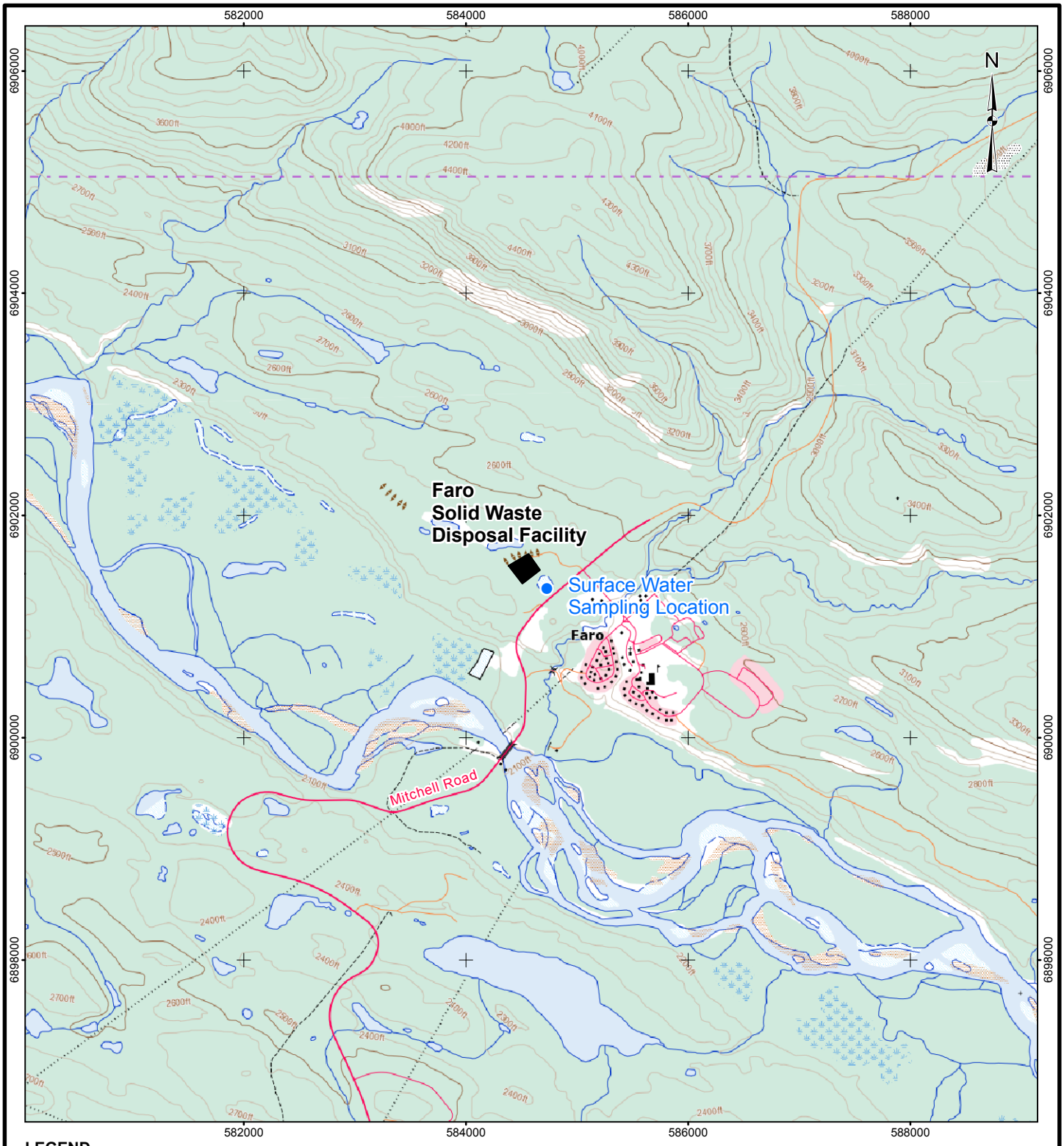

LEGEND

- SURFACE WATER SAMPLING LOCATION
- FACILITY

1 0 1

SCALE 1:50,000 KILOMETRES

REFERENCE

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

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

TITLE

KEY PLAN

Golder Associates
Greater Vancouver Office, B.C.

PROJECT No.	11-1436-0073		PHASE No. 1100		
DESIGN	CB	20 Sept 2012	SCALE AS SHOWN	REV.	0
GIS	CD	21 Sept 2012			
CHECK					
REVIEW					

FIGURE: 1

\\golder.gds\gal\Burnaby\CAD-GIS\Bur-Graphics\Projects\2011\1436\11-1436-0073\GIS\Mapping\MXD\Hydrogeology\Faro\Figure_01_Key_Plan.mxd

LEGEND

- MONITORING WELL
- SURFACE WATER SAMPLING LOCATION
- CROSS SECTION
- FACILITY

40 0 40

SCALE (APPROX.) METRES

REFERENCE

IMAGE OBTAINED FROM GOOGLE EARTH, IMAGE DATE: OCTOBER 17, 2012

DATUM: NAD83 PROJECTION: UTM ZONE 8

PROJECT: YUKON GOVERNMENT - COMMUNITY SERVICES
SOLID WASTE DISPOSAL FACILITY
FARO, YUKON

TITLE

SITE PLAN & CROSS SECTION LOCATION

Golder Associates
Greater Vancouver Office, B.C.

PROJECT No.	11-1436-0073		PHASE No. 1100	
DESIGN	CB	09 Oct 2012	SCALE AS SHOWN	REV. 0
GIS	CD	08 Nov. 2012		
CHECK				
REVIEW				

FIGURE: 2

\\golder.gds\gal\Burnaby\CAD-GIS\Bur-Graphics\Projects\2011\1436\11-1436-0073\GIS\Mapping\MXD\Hydrogeology\Faro\Figure_02_SitePlan_Cross_Section.mxd

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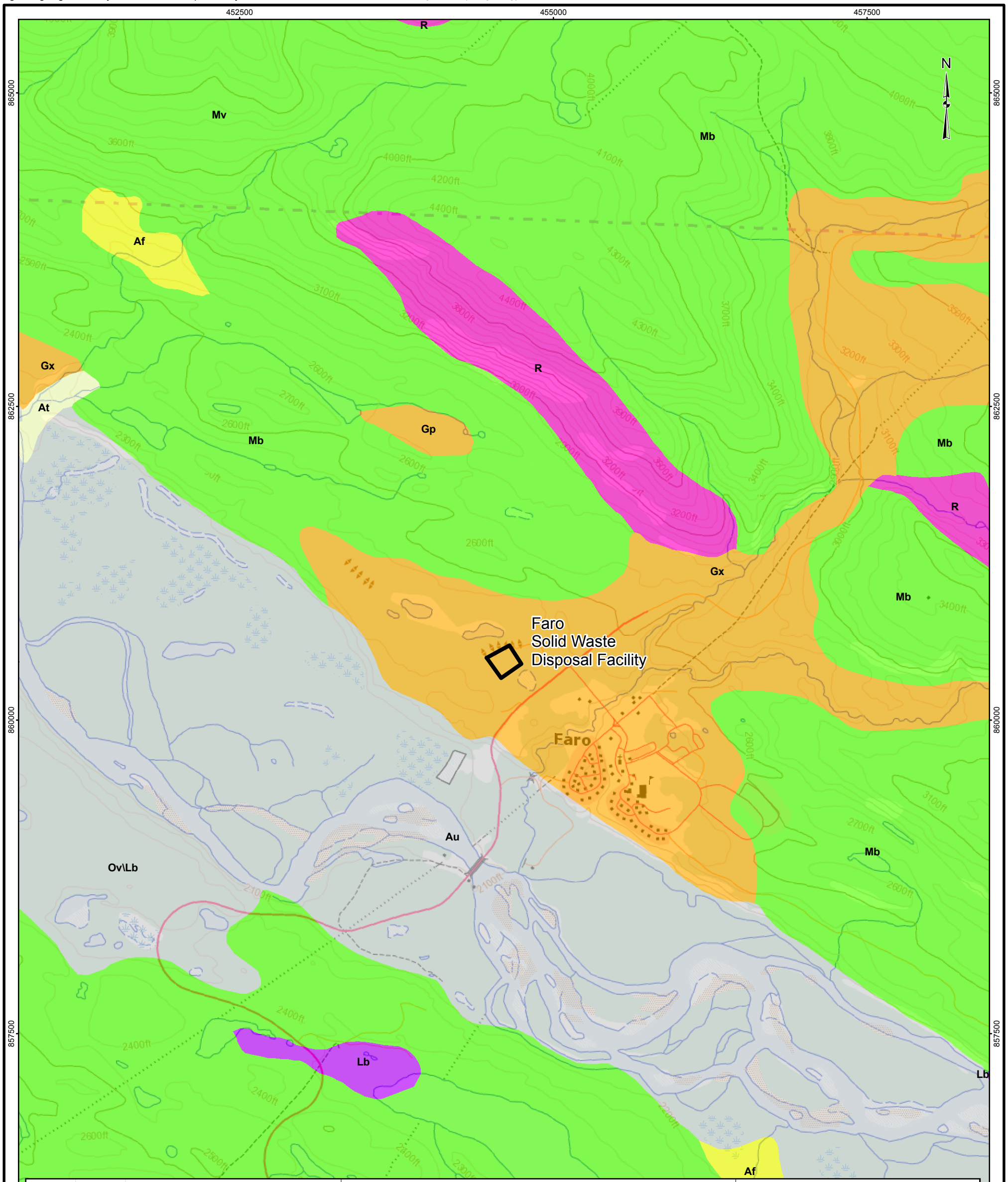

		LANDFORM OR LANDSCAPE			
		MATERIAL	ORIGIN	TOPOGRAPHY	Thickness
	Gx	Sand, gravel, and diamicton. Minor silts and clays.	Glaciofluvial Complex	Forming kettles, eskers, and crevasse-fill ridges	Usually 5 m or greater in thickness.
	Mb	generally a silty, sandy matrix containing gravel, cobbles, and boulders.	Till Blanket	Conforms closely to bedrock topography.	Greater than 1 m in thickness.
	Au	Gravel and sand with minor silt.	Aluvial Sediments	Plains, fans, and terrraces.	Up to 10 m or more in thickness.

LEGEND

- FACILITY
- BUILDING
- MAJOR ROAD
- WATERCOURSE
- WATERBODY

1 0 1
SCALE 1:30,000 KILOMETRES

REFERENCE

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

PROJECT
SWIFT RIVER SOLID WASTE FACILITY HYDROGEOLOGICAL ASSESSMENT
GOVERNMENT OF YUKON, DEPARTMENT OF COMMUNITY SERVICES
FARO, YUKON

TITLE

REGIONAL SURFICIAL GEOLOGY

Golder Associates
Greater Vancouver Office, B.C.

PROJECT No.	11-1436-0073		PHASE No. 1100		
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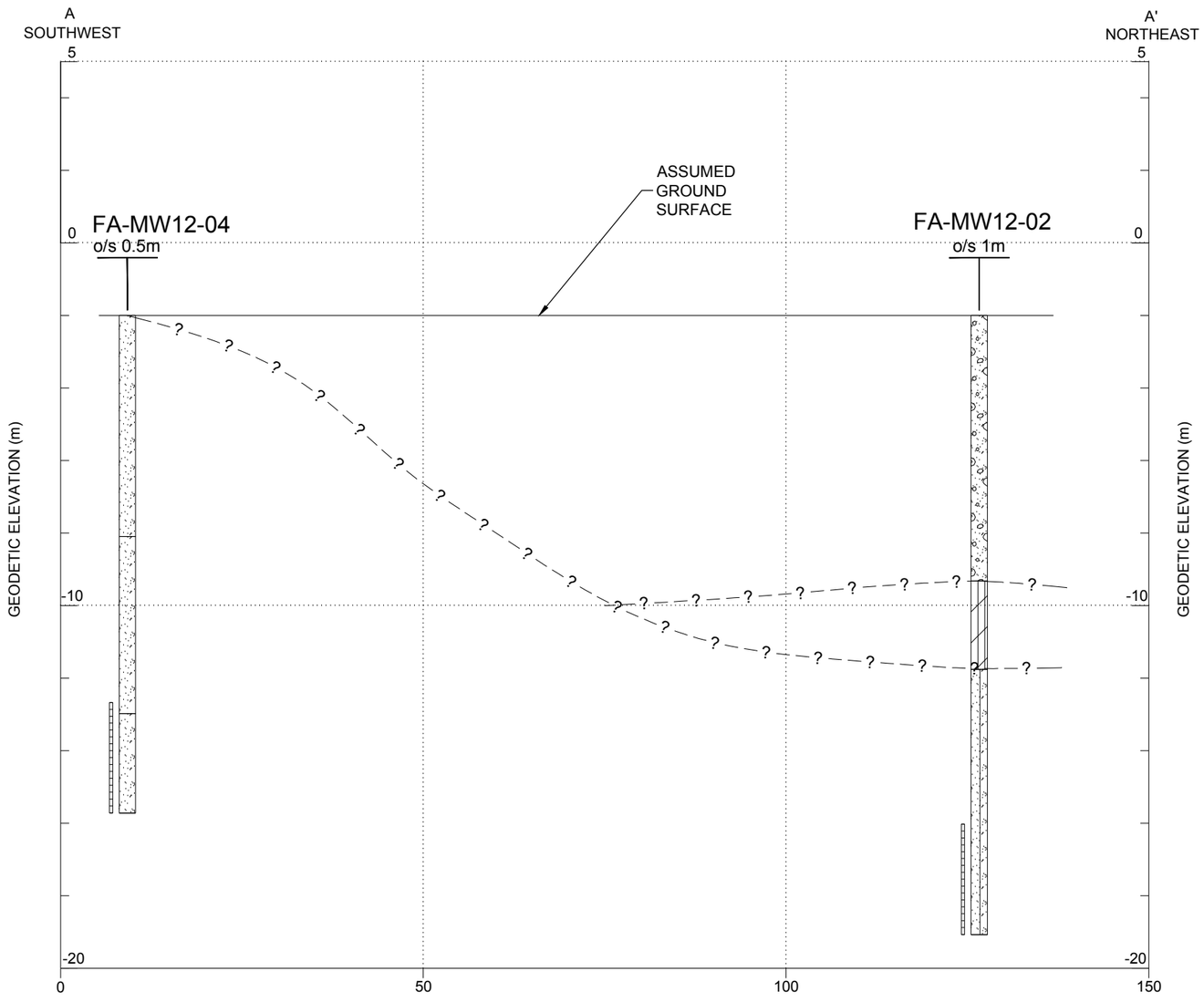
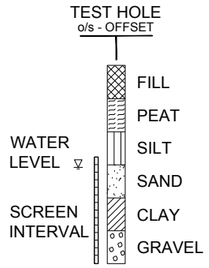
GIS	JW	09 Oct 2012			
CHECK					
REVIEW					

FIGURE: 3



LEGEND

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



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.

0 15 30 45m

1:750

VERTICAL SCALE EXAGGERATION 5.0X

PROJECT

GOVERNMENT OF YUKON,
DEPARTMENT OF COMMUNITY SERVICES
FARO, Y.T.

TITLE

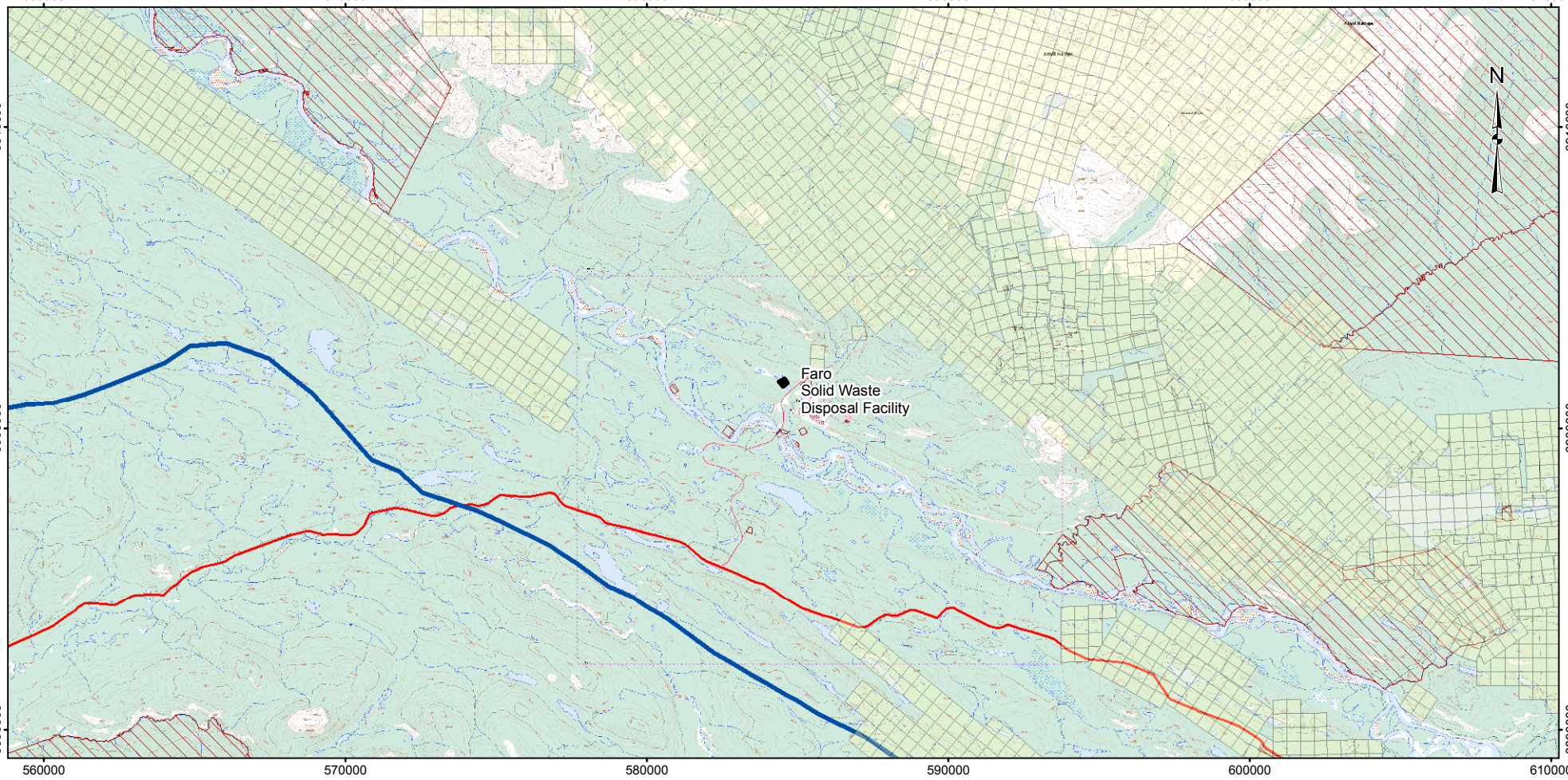
CONCEPTUAL HYDROGEOLOGICAL CROSS - SECTION A-A'

Golder Associates

PROJECT No.	11-1436-0073/1100		FILE No.	1114360073-1100-1160-04
DESIGN	GJH	31DEC12	SCALE	AS SHOWN
CADD	JHL	03JAN13		
CHECK				
REVIEW				

FIGURE 4

N:\Bur-Graphics\Projects\2011\1436\11-1436-0073\GIS\Mapping\MXD\Hydrogeology\Swift_River\Figure_05_Regional_Drainage_Land_Zoning.mxd



LEGEND

- MAJOR HIGHWAY
- FIRST NATIONS LANDS
- QUARTZ CLAIM
- WATERSHED BOUNDARY

5 0 5

SCALE 1:200,000 KILOMETRES

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
SWIFT RIVER SOLID WASTE FACILITY HYDROGEOLOGICAL ASSESSMENT
GOVERNMENT OF YUKON, DEPARTMENT OF COMMUNITY SERVICES
FARO, YUKON

TITLE

REGIONAL DRAINAGE & LAND ZONING

Golder Associates
Greater Vancouver Office, B.C.

PROJECT No.		11-1436-0073	PHASE No. 1100	
DESIGN	CB	09 Oct 2012	SCALE AS SHOWN	REV. 0
GIS	JW	09 Oct 2012		
CHECK				
REVIEW				

FIGURE: 5

LEGEND

- MONITORING WELL
- SURFACE WATER SAMPLING LOCATION
- GROUND WATER ELEVATION (MASL) - MEASURED ON ????, 2012
- GROUNDWATER CONTOUR
- GROUNDWATER FLOW DIRECTION
- i HYDRAULIC GRADIENT

40 0 40

SCALE (APPROX.) METRES

REFERENCE

IMAGE OBTAINED FROM GOOGLE EARTH, IMAGE DATE: OCTOBER 17, 2012

DATUM: NAD83 PROJECTION: UTM ZONE 8

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

TITLE

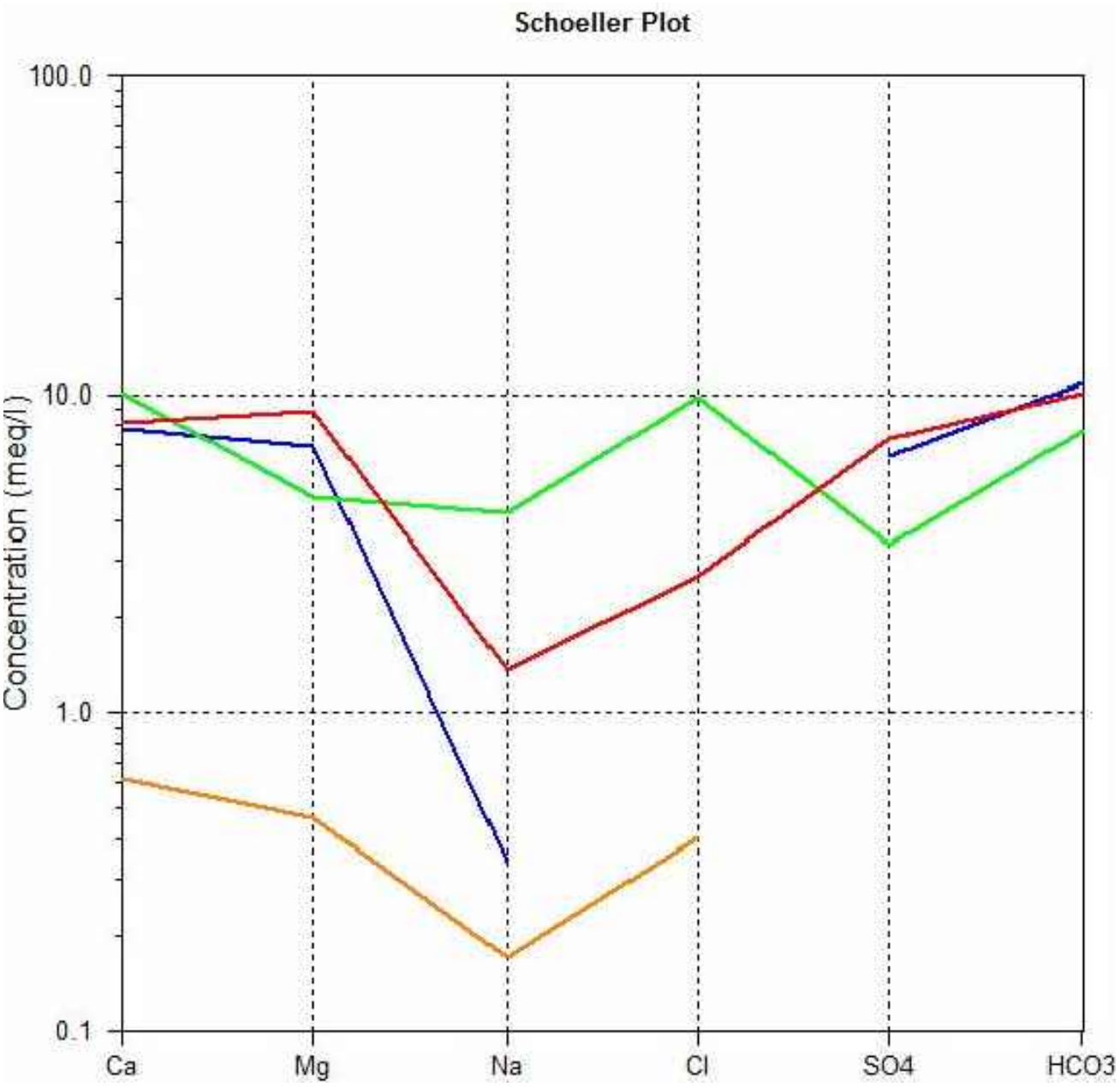
MONITORING WELL LOCATION MAP AND GROUNDWATER ELEVATION

Golder Associates
Greater Vancouver Office, B.C.

PROJECT No.	11-1436-0073		PHASE No. 1100	
DESIGN	CB	09 Oct 2012	SCALE AS SHOWN	REV. 0
GIS	CD	09 Oct 2012		
CHECK				
REVIEW				

FIGURE: 6

\\golder.gds\gal\Burnaby\CAD-GIS\Bur-Graphics\Projects\2011\1436\11-1436-0073\GIS\Mapping\MXD\Hydrogeology\Faro\Figure_06_Borehole_location.mxd



LEGEND

Fall 2012
Analysis Results

- FA-MW12-01
- FA-MW12-03
- FA-MW12-04
- Faro Surface Water

NOTES

1. LINES OVERLAP AND ARE NOT VISIBLE DUE TO SIMILARITY IN CHEMISTRY OF SAMPLES.

PROJECT: YUKON GOVERNMENT-COMMUNITY SERVICES
FARO. SOLID WASTE DISPOSAL FACILITY
FARO, YUKON

TITLE

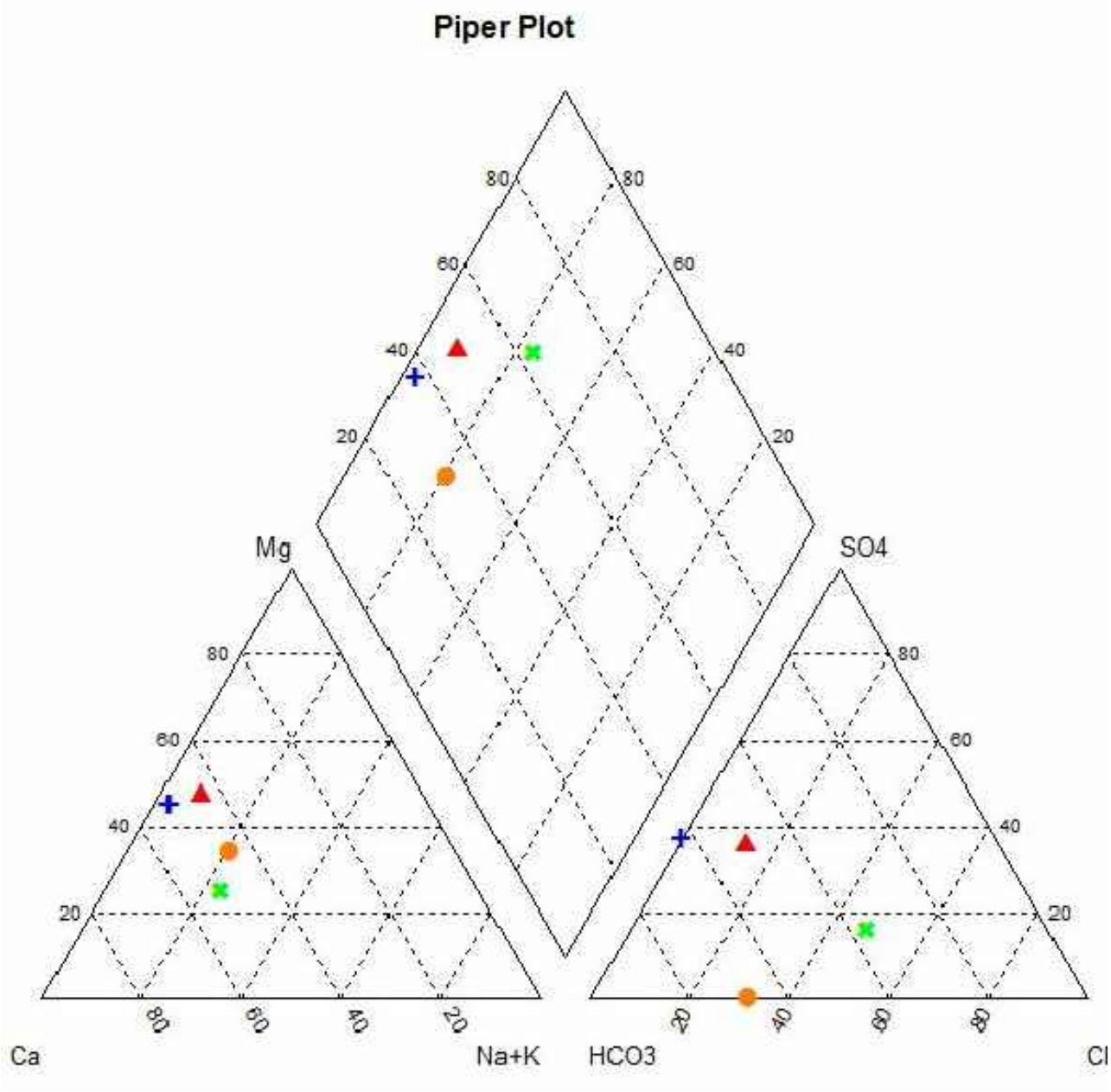
SCHOELLER PLOT

Golder Associates
Greater Vancouver Office, BC

PROJECT No. 11-1436-0073			PHASE No.	1100-1160
DESIGN	CB	30OCT12	SCALE NTS	REV.
CADD	TS	31OCT12		
CHECK				
REVIEW				

FIGURE 7

FILENAME|LAYOUT|MODIFIED|PLOTTED|OFFICE



LEGEND

Summer 2012

Sampling Results

- FA-MW12-01
- FA-MW12-03
- FA-MW12-04
- Faro Surface Water

PROJECT: YUKON GOVERNMENT-COMMUNITY SERVICES
FARO. SOLID WASTE DISPOSAL FACILITY
FARO, YUKON

TITLE

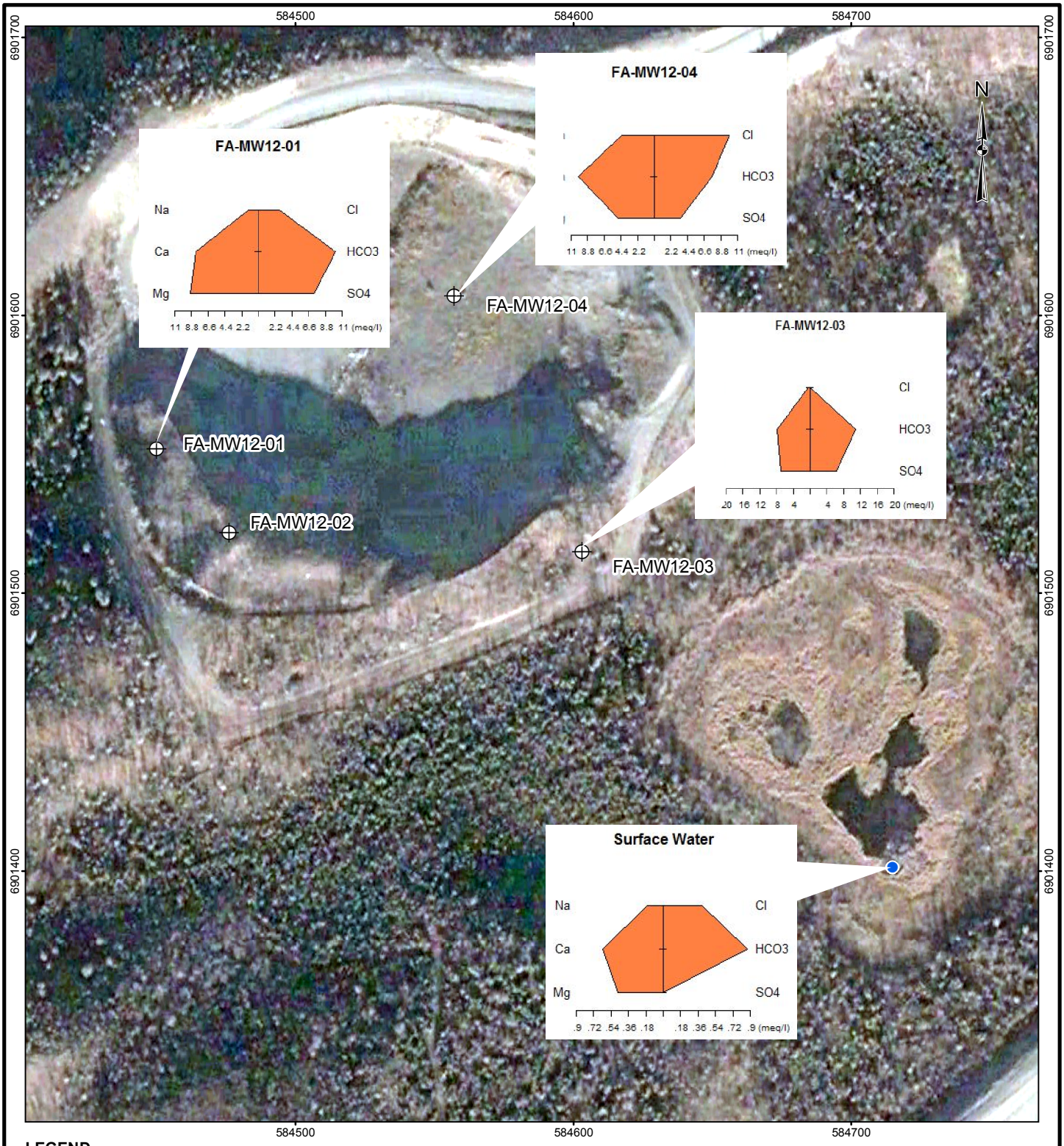
PIPER PLOT

Golder Associates
Greater Vancouver Office, BC

PROJECT No. 11-1436-0073			PHASE No.	1100-1160
DESIGN	CB	30OCT12	SCALE NTS	REV.
CADD	TS	31OCT12		
CHECK				
REVIEW				

FIGURE 8

FILENAME\LAYOUT\MODIFIED\PLOTTED\OFFICE



LEGEND

- MONITORING WELL
- SURFACE WATER SAMPLING LOCATION

40 0 40

SCALE (APPROX.) METRES

REFERENCE

IMAGE OBTAINED FROM GOOGLE EARTH, IMAGE DATE: OCTOBER 17, 2012

DATUM: NAD83 PROJECTION: UTM ZONE 8

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

TITLE

STIFF DIAGRAM

Golder Associates
Greater Vancouver Office, B.C.

PROJECT No.	11-1436-0073		PHASE No. 1100	
DESIGN	CB	09 Oct 2012	SCALE AS SHOWN	REV. 0
GIS	CD	09 Oct 2012		
CHECK				
REVIEW				

FIGURE: 9

\\golder.gds\gal\Burnaby\CAD-GIS\Bur-Graphics\Projects\2011\1436\11-1436-0073\GIS\Mapping\MXD\Hydrogeology\Faro\Figure_06_Borehole_location.mxd

APPENDIX A

Site Photographs

Photograph 1: A view from the access road of the Site on the north edge of the Site looking south at the landfill and waste segregation areas.

Photograph 2: Tires receiving area.

Photograph 3: Derelict vehicles, metals, and waste oil storage area.

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APPENDIX B

Well Construction Logs

PROJECT No.: 11-1436-0073 (1100)

RECORD OF MONITORING WELL: FA-MW12-01

SHEET 1 OF 2
DATUM:

CLIENT: Yukon Government Community Services
PROJECT: Yukon Landfill Assessment
LOCATION: Town of Faro

DRILLING DATE: July 10, 2012
DRILLING CONTRACTOR: Midnight Sun Drilling

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	PID ppm (5 10 15 20)	PID ppm (50 100 150 200)	WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface												
0	M5 Drillech Truck Mounted Auger Drill Rig Air Rotary	(SM) SILTY SAND, some gravel, dark brown, moist.		0.00										
		(GW-SW) GRAVEL and SAND, dark grey, moist.		0.30										
1														
2														
3														
4														
5														Bentonite Seal
6														
7														
8														
9														
10		(SP) fine SAND, dark brown, moist.		9.45										
		CONTINUED NEXT PAGE												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AB
CHECKED: DRAFT

PROJECT No.: 11-1436-0073 (1100)

RECORD OF MONITORING WELL: FA-MW12-01

SHEET 2 OF 2
DATUM:

CLIENT: Yukon Government Community Services
PROJECT: Yukon Landfill Assessment
LOCATION: Town of Faro

DRILLING DATE: July 10, 2012
DRILLING CONTRACTOR: Midnight Sun Drilling

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	PID ppm (5 10 15 20)	PID ppm (50 100 150 200)	WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10		(SP) fine SAND, dark brown, moist. *(continued)*												
11														Bentonite Seal
12														
13	M5 Driltech Truck Mounted Auger Drill Rig, Air Rotary	(SW) SAND, some gravel, trace silt, dark grey, moist.		12.19										
14		- water at 13.72m depth.												10/20 Silica Sand
15														
16														51mm Slotted PVC Pipe
17														
		End of Monitoring Well.		17.37										
18														
19														
20														

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AB
CHECKED: DRAFT

File:N:\BUR-GRAPHICS\PROJECTS\2011\1436\11-1436-0073\DRAFTING\GINT\11-1436-0073 (1100 FA).GPJ Output Form:BC_BOREHOLE (ENVIRO) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB bdrozdiak 09/13/12

PROJECT No.: 11-1436-0073 (1100)

RECORD OF MONITORING WELL: FA-MW12-02

SHEET 1 OF 2
DATUM:

CLIENT: Yukon Government Community Services
PROJECT: Yukon Landfill Assessment
LOCATION: Town of Faro

DRILLING DATE: July 11, 2012
DRILLING CONTRACTOR: Midnight Sun Drilling

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	PID ppm (5 10 15 20)	PID ppm (50 100 150 200)	WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface												
0	M5 Drillech Truck Mounted Auger Drill Rig Air Rotary	(SW-GW) SAND and GRAVEL, dark grey-brown, moist.		0.00										
1														
2														
3														
4														
5														Bentonite Seal
6														
7														
		(ML) CLAYEY SILT, some sand, trace gravel, dark grey, wet.		7.32										
8														
9														
10		(SM) SILTY SAND, trace gravel, dark grey-brown, moist.		9.75										
		CONTINUED NEXT PAGE												

DEPTH SCALE
1 : 50

LOGGED: AB
CHECKED: DRAFT

PROJECT No.: 11-1436-0073 (1100)

RECORD OF MONITORING WELL: FA-MW12-02

SHEET 2 OF 2
DATUM:

CLIENT: Yukon Government Community Services
PROJECT: Yukon Landfill Assessment
LOCATION: Town of Faro

DRILLING DATE: July 11, 2012
DRILLING CONTRACTOR: Midnight Sun Drilling

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	PID ppm (5 10 15 20)	PID ppm (50 100 150 200)	WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10		(SM) SILTY SAND, trace gravel, dark grey-brown, moist. *(continued)*												
11														Bentonite Seal
12														
13	M5 Drilltech Truck Mounted Auger Drill Rig													
14	Air Rotary													10/20 Silica Sand
15														
16														51mm Slotted PVC Pipe
17		- water and increased gravel content at 16.46m depth.												
		End of Monitoring Well.		17.07										
18														
19														
20														

DEPTH SCALE
1 : 50

LOGGED: AB
CHECKED: DRAFT

File:N:\BUR-GRAPHICS\PROJECTS\2011\1436\11-1436-0073\DRAFTING\GINT\11-1436-0073 (1100 FA).GPJ Output Form:BC_BOREHOLE (ENVIRO) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB bdrozdiak 09/13/12

PROJECT No.: 11-1436-0073 (1100)

RECORD OF MONITORING WELL: FA-MW12-03

SHEET 1 OF 2
DATUM:

CLIENT: Yukon Government Community Services
PROJECT: Yukon Landfill Assessment
LOCATION: Town of Faro

DRILLING DATE: July 11, 2012
DRILLING CONTRACTOR: Midnight Sun Drilling

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	PID ppm (5 10 15 20)	PID ppm (50 100 150 200)	WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface												
0	M5 Drillech Truck Mounted Auger Drill Rig Air Rotary	(SW) SAND, trace gravel, dark brown, moist.		0.00										
1														
2														
3														
4														
5														Bentonite Seal
6														
7														
8														
		(SP) fine SAND, trace gravel, dark grey, moist.		8.23										
9														
		(SW) SAND, some gravel, dark brown, moist.		9.45										
10		*CONTINUED NEXT PAGE*												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AB
CHECKED: DRAFT

PROJECT No.: 11-1436-0073 (1100)

RECORD OF MONITORING WELL: FA-MW12-03

SHEET 2 OF 2
DATUM:

CLIENT: Yukon Government Community Services
PROJECT: Yukon Landfill Assessment
LOCATION: Town of Faro

DRILLING DATE: July 11, 2012
DRILLING CONTRACTOR: Midnight Sun Drilling

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SAMPLES: CORE No.	SAMPLES: CORE RECOVERY %	PID ppm (5 10 15 20) / PID ppm (50 100 150 200)	WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	M5 Drilltech Truck Mounted Auger Drill Rig Air Rotary	(SW) SAND, some gravel, dark brown, moist. *(continued)*											Bentonite Seal
11													
12													
13													10/20 Silica Sand
14													
15		- water and increased gravel content at 14.63m depth.											
16													51mm Slotted PVC Pipe
17													
		End of Monitoring Well.		17.07									
18													
19													
20													

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AB
CHECKED: DRAFT

PROJECT No.: 11-1436-0073 (1100)

RECORD OF MONITORING WELL: FA-MW12-04

SHEET 1 OF 2

CLIENT: Yukon Government Community Services
PROJECT: Yukon Landfill Assessment
LOCATION: Town of Faro

DRILLING DATE: July 11, 2012
DRILLING CONTRACTOR: Midnight Sun Drilling

DATUM:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	PID ppm (5 10 15 20)	PID ppm (50 100 150 200)	WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface												
0	M5 Drillech Truck Mounted Auger Drill Rig Air Rotary	(SP) fine SAND, trace gravel, dark brown-grey, moist.		0.00										
6		(SW) SAND, trace gravel, dark brown, moist.		6.10										Bentonite Seal
10		*CONTINUED NEXT PAGE*												

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AB
CHECKED: DRAFT

PROJECT No.: 11-1436-0073 (1100)

RECORD OF MONITORING WELL: FA-MW12-04

CLIENT: Yukon Government Community Services
PROJECT: Yukon Landfill Assessment
LOCATION: Town of Faro

DRILLING DATE: July 11, 2012
DRILLING CONTRACTOR: Midnight Sun Drilling

DATUM:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	PID ppm (5 10 15 20)	PID ppm (50 100 150 200)	WATER CONTENT PERCENT (Wp W Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	M5 Driltech Truck Mounted Auger Drill Rig, Air Rotary	(SW) SAND, trace gravel, dark brown, moist. *(continued)*												10/20 Silica Sand
11		(SP) fine SAND, dark grey, wet.		10.97										51mm Slotted PVC Pipe
12		- water at 13.41m depth.												
13														
14		End of Monitoring Well.		13.72										
15														
16														
17														
18														
19														
20														

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: AB
CHECKED:

APPENDIX C

Well Development and Sampling Sheets

GROUNDWATER DEVELOPMENT AND PURGING/SAMPLING DATA SHEET

☑ Development
☑ Purging/Sampling

Well No.: FA-MW-R-01 Project No.: 11-1436-0073/1100
Location: FARO Date: 31-AUG-12 Time: 15:00
Weather: OVERCAST Temperature: 15°C Completed by: A BADGER

MONITORING WELL INFORMATION

Time of Measurement: 15:00 Tidally Influenced: ☐ Yes ☒ No
Depth to product: ____ Product thickness: ____ One well volume: ____
Depth to water Below Top of Casing: A 14.14 metres (B-A)*2.0 = 2.4.24 8.5 litres - for a 51 mm (2.0 inch) diameter well
Depth to Bottom of Well Below Top of Casing: B 18.38 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

pH and Temp. Meter: Model HANNA Serial No. HI 98300 Calibration Buffers: ☑ 4 ☑ 7 ☐ 10
Conductivity Meter: Model ____ Serial No. ____ Calibration Solution: ____
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 8.5.4 = 36 litres
Avg. Flow Rate: ____ L/min. Start: 15:03 Finish: 15:25

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Cond. (uS/cm)	Redox (mV)	Diss. O_2 (mg/L) or %		Water Level (m)	Remarks
15:03	1	10.2	7.16						
15:10	9	4.9	7.13					14.14	
15:15	20	2.4	7.07					14.15	
15:20	30	2.1	7.16						
15:25	36	1.9	7.17					14:14	SAMPLE COLLECTED AND DUPLICATE

Comments:

Odour: ☐ Yes ☐ No If yes ____
Sheen: ☐ Yes ☐ No If yes Hydrocarbon-like ☐ OR Metallic-like ☐
Turbidity: Clear I I I I I I I I I I I I I I I I I I (I) I I I I I I I I I I I I Very Silty

Analysis	Type		40 mL	100 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
			Container Size									
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ 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.: FA-MW12-02 Project No.: 11-1436-0073/1100
Location: FATRO Date: 31 AUG 12 Time: 16:15
Weather: OVERCAST Temperature: 15°C Completed by: A BADGER

MONITORING WELL INFORMATION

Time of Measurement: 16:15 Tidally Influenced: ☐ Yes ☒ No
Depth to product: ____ Product thickness: ____ One well volume: ____
Depth to water Below Top of Casing: A ____ metres (B-A)*2.0 = ____ litres - for a 51 mm (2.0 inch) diameter well
Depth to Bottom of Well Below Top of Casing: B 13.76 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: ____
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 ____ = ____ litres
Avg. Flow Rate: ____ L/min. Start: ____ Finish: ____

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Cond. (uS/cm)	Redox (mV)	Diss. O_2 (mg/L) or %		Water Level (m)	Remarks
									DRY
									STICKUP 1.03M

Comments:
Odour: ☐ Yes ☐ No If yes ____
Sheen: ☐ Yes ☐ No If yes Hydrocarbon-like ☐ OR Metallic-like ☐
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		40 mL	100 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
			Container Size									
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ 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.: FA-MW12-03
Location: FARO
Weather: OVERCAST Temperature: 15°C
Project No.: 11-1436-0073/1100
Date: 31 AUG 12 Time: 16:30
Completed by: A BADGER

MONITORING WELL INFORMATION

Time of Measurement: 16:45
Depth to product: ____ Product thickness: ____
Depth to water Below Top of Casing: A 13.95 metres
Depth to Bottom of Well Below Top of Casing: B 18.03 metres
Diameter Standpipe: C ____ mm
Tidally influenced: ☐ Yes ☒ No
One well volume:
(B-A)*2.0 = 4.08·2 8.16 litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ____ litres - for a 38 mm (1.5 inch) diameter well
Sample intake depth: ____ metres

EQUIPMENT LIST

HANNA HI-98300

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

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 8.6·4 = ≈35 litres
Avg. Flow Rate: ____ L/min. Start: 16:47 Finish: 17:09

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Cond. (uS/cm)	Redox (mV)	Diss. O_2 (mg/L) or %		Water Level (m)	Remarks
16:50	1	9.6	6.86						11 CM of WELL
16:52	8	6.3	6.90					13.55	CASING CUT OFF
16:57	16	3.9	6.92					13.95	STICKUP. NEW
17:02	24	3.7	6.95						STICKUP HEIGHT
17:06	30	3.5	6.98						0.77M
17:09	35	3.7	6.96					13.96	SAMPLE COLLECTED

Comments:
Odour: ☐ Yes ☐ No If yes ____
Sheen: ☐ Yes ☐ No If yes Hydrocarbon-like ☐ OR Metallic-like ☐
Turbidity: Clear I I I I I I I I (I) I I I I I I I I I I I I I I I I I I I I I I Very Silty

Analysis	Type		40 mL	100 mL	250 mL	500 mL	1 L	2 L	4 L	Filtered		Preservatives
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

(Container Size spans 40 mL through 4 L.)

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.: FA-MW12-04
Location: FARO
Weather: CLEAR
Temperature: 16°C
Project No.: 11-1436-0073/1100
Date: 31 AUG. 12
Time: 17:45
Completed by: A. BADGER

MONITORING WELL INFORMATION

Time of Measurement: 17:45
Depth to product: ______ Product thickness: ______
Depth to water Below Top of Casing: A 11.63 metres
Depth to Bottom of Well Below Top of Casing: B 15.35 metres
Diameter Standpipe: C ______ mm

Tidally Influenced: ☐ Yes ☒ No
One well volume: ______
(B-A)*2.0 = 3.72.2 7.48 litres - for a 51 mm (2.0 inch) diameter well
(B-A)*1.1 = ______ litres - for a 38 mm (1.5 inch) diameter well
Sample intake depth: ______ metres

EQUIPMENT LIST

HANNA HI 991300

pH and Temp. Meter: Model ______ Serial No. ______
Conductivity Meter: Model ______ Serial No. ______
Dissolved Oxygen Meter: Model ______ Serial No. ______
Pump: ☐ None ☐ Waterra ☐ Peristaltic ☐ Submersible
Pump Details: ______

Calibration Buffers: ☑ 4 ☑ 7 ☐ 10
Calibration Solution: ______
☐ D.O. Chemet Ampoule
☐ Bailer Type: ______

WELL DEVELOPMENT/PURGING

Purge Volume: Well. Vol. X 7.48·4 = 30 litres
Avg. Flow Rate: ______ L/min. Start: 17:50 Finish: 18:08

Time	Volume Removed (L)	Temp. (°C)	pH (Units)	Cond. (uS/cm)	Redox (mV)	Diss. O_2 (mg/L) or %		Water Level (m)	Remarks
17:51	1	8.6	6.85						
17:55	8	6.2	6.76					11.62	
18:00	15	5.3	6.75						
18:02	20	5.0	6.78						
18:05	25	4.8	6.79						
18:08	30	5.0	6.80					14.65	SAMPLE COLLECTED

Comments:

Odour: ☐ Yes ☐ No If yes ______
Sheen: ☐ Yes ☐ No If yes Hydrocarbon-like ☐ OR Metallic-like ☐
Turbidity: Clear I I I I I I I I I I I I I I I I I I I I I I I I I I I I (I) I I Very Silty

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	100 mL	250 mL	500 mL	1 L	2 L	4 L			
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ 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:	FA SURFACE	**Project No.**	11-1436-0073/1100
Location:	08 V 0584728 6901343	**Completed By:**	A BADGER
Weather:	OVERCAST	**Date:**	02-SEP-12
Temperature:	10°C	**Time:**	12:00
		Reviewed By:	

EQUIPMENT LIST

HANNA HI 991300

pH and Temp. Meter: Model ______ Serial No. ______ Calibration Buffers: ☑ 4 ☑ 7 ☐ 10
Conductivity Meter: Model ______ Serial No. ______ Calibration Solution: ______
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
12:00		10.8	6.50				

Comments:

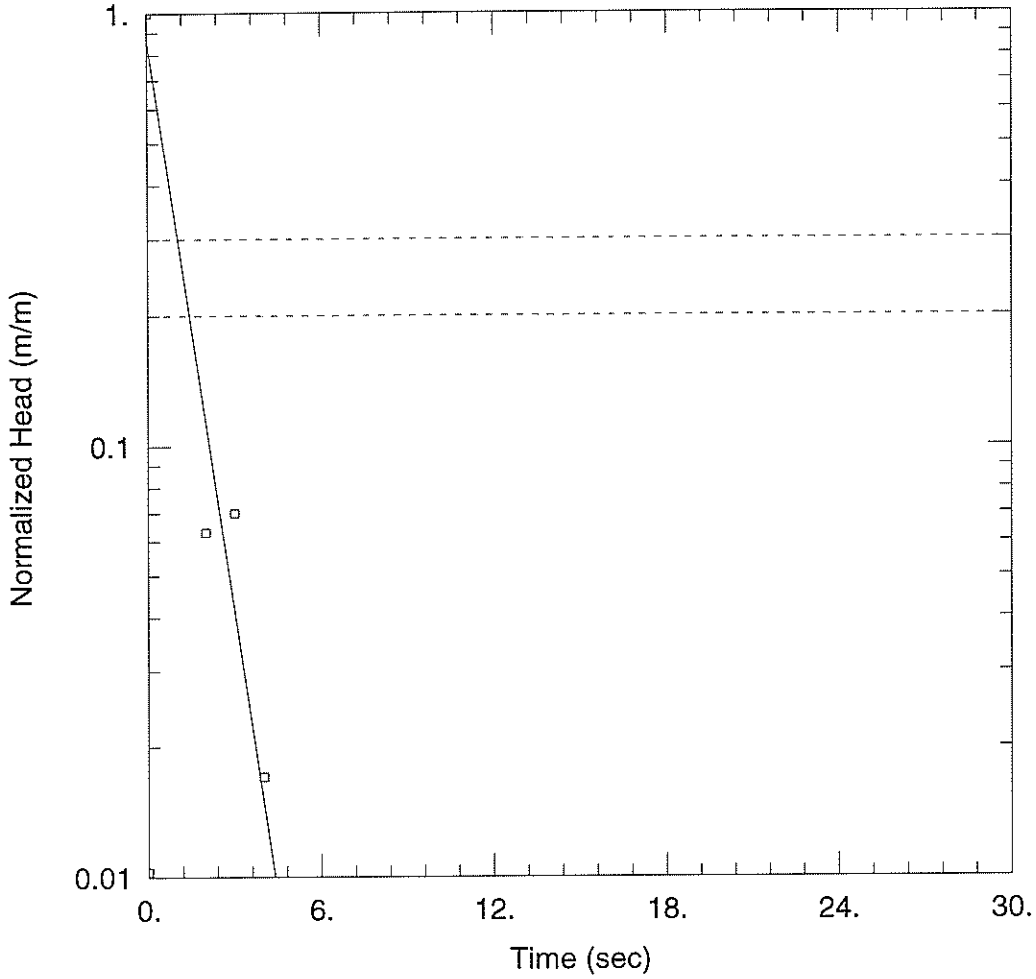
Odour: ☐ Yes ☐ No If yes ______
Sheen: ☐ Yes ☐ No If yes ______
Turbidity: Clear | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Very Silty
Other: ______

Analysis	Type		Container Size							Filtered		Preservatives
			40 mL	100 mL	250 mL	500 mL	1 L	2 L	4 L			
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	
	☐ Plastic	☐ Glass								☐ Yes	☐ No	

SCN No. Consumables: ☐ D.O. Ampoules ______ ☐ Alkalinity Test ______ ☐ Other ______

APPENDIX D

Slug Test Data



WELL TEST ANALYSIS

Data Set: \...\FA-MW12-01 Test_1.aqt
Date: 11/07/12 Time: 11:10:16

PROJECT INFORMATION

Test Well: FA-MW-12-01
Test Date: 31-August-12

AQUIFER DATA

Saturated Thickness: 4.26 m Anisotropy Ratio (Kz/Kr): 1.

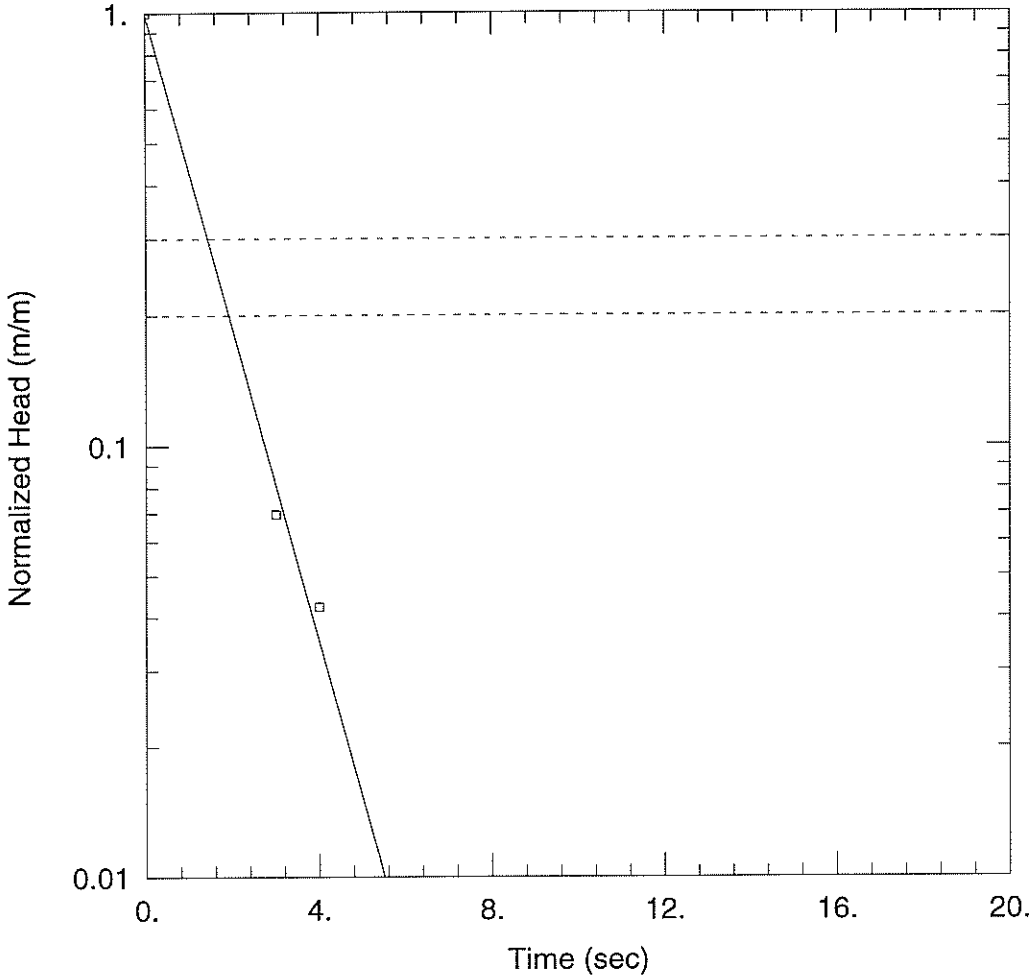
WELL DATA (MW12-01)

Initial Displacement: 0.82 m
Total Well Penetration Depth: 4.25 m
Casing Radius: 0.025 m
Static Water Column Height: 4.26 m
Screen Length: 3.04 m
Well Radius: 0.092 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0003104 m/sec
y0 = 0.7074 m



WELL TEST ANALYSIS

Data Set: \...\FA-MW12-01 Test_2.aqt
Date: 11/07/12 Time: 11:10:37

PROJECT INFORMATION

Test Well: FA-MW-12-01
Test Date: 31-August-12

AQUIFER DATA

Saturated Thickness: 4.26 m Anisotropy Ratio (Kz/Kr): 1.

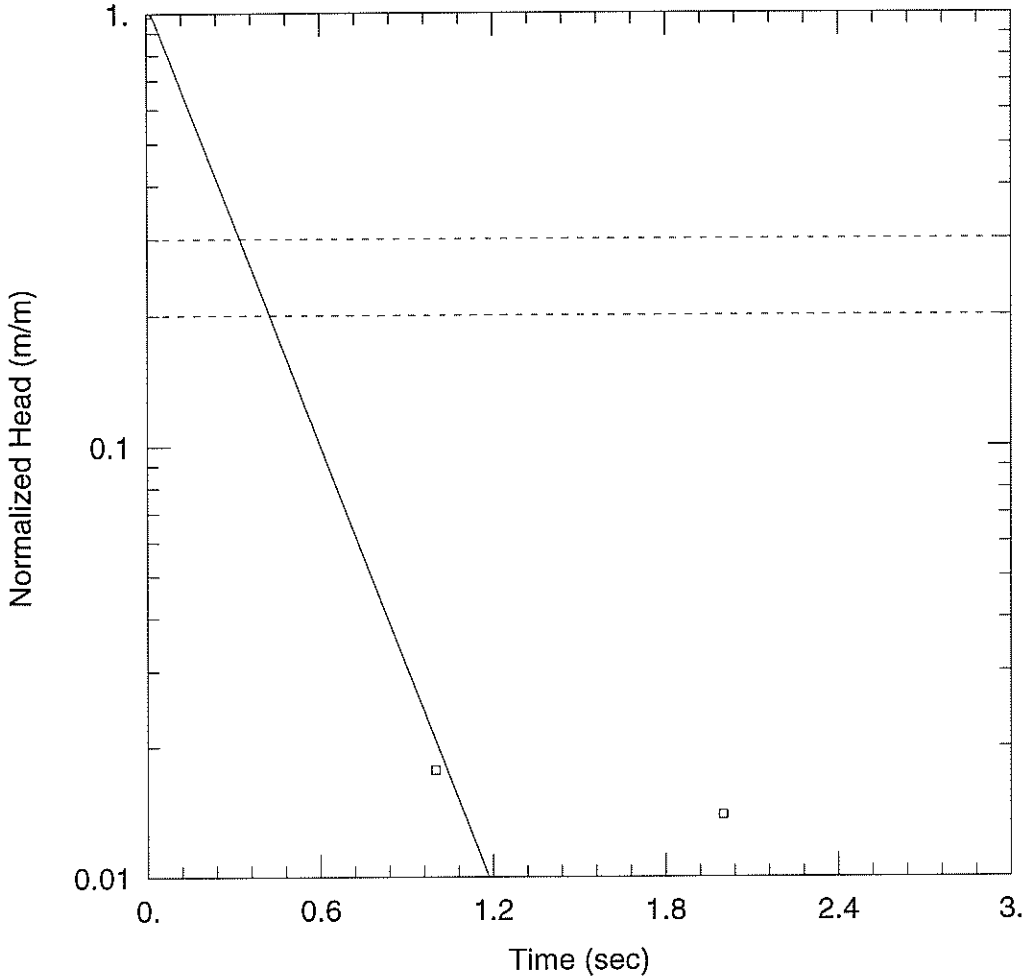
WELL DATA (MW12-01)

Initial Displacement: 0.82 m
Total Well Penetration Depth: 4.25 m
Casing Radius: 0.025 m
Static Water Column Height: 4.26 m
Screen Length: 3.04 m
Well Radius: 0.092 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.000255 m/sec y0 = 0.8104 m



WELL TEST ANALYSIS

Data Set: \...\FA-MW12-03 Test_1.aqt
Date: 11/07/12 Time: 11:12:01

PROJECT INFORMATION

Test Well: FA-MW-12-03
Test Date: 31-August-12

AQUIFER DATA

Saturated Thickness: 4.08 m Anisotropy Ratio (Kz/Kr): 1.

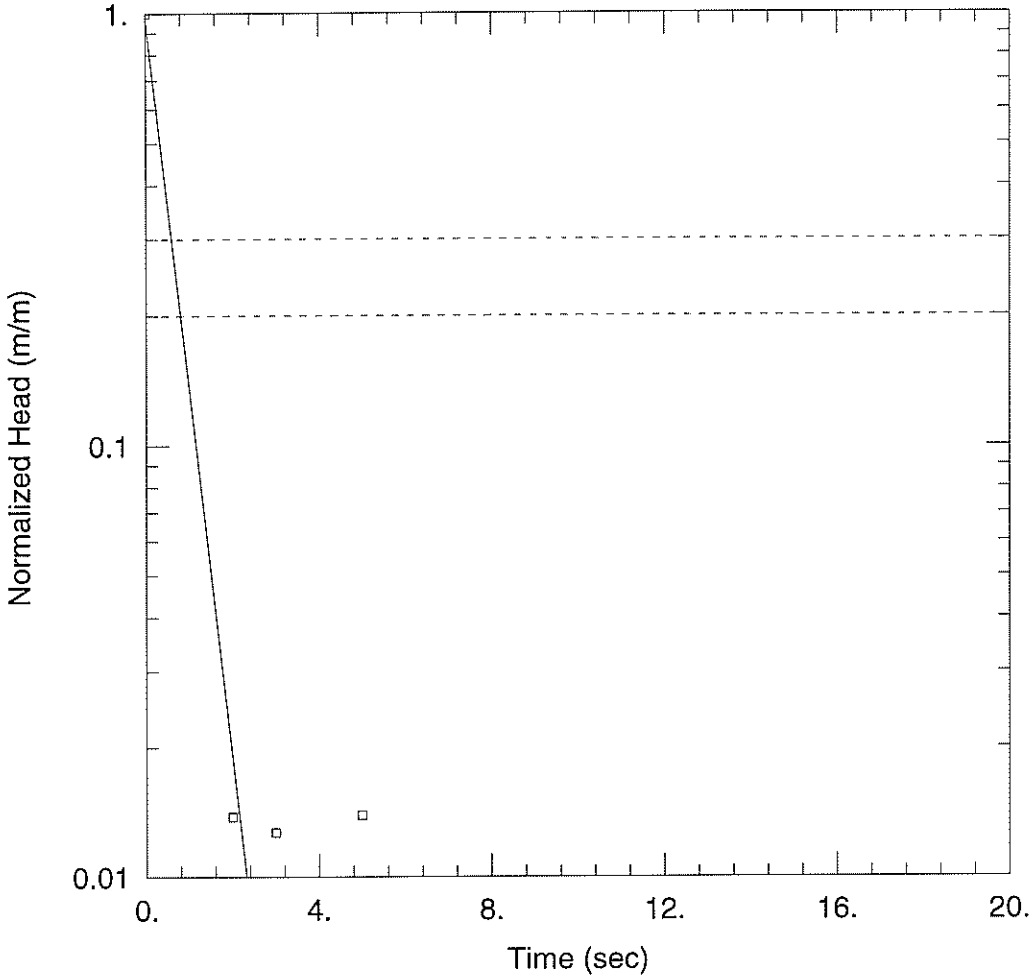
WELL DATA (MW12-03)

Initial Displacement: 0.82 m
Total Well Penetration Depth: 4.07 m
Casing Radius: 0.025 m
Static Water Column Height: 4.08 m
Screen Length: 3.04 m
Well Radius: 0.092 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.001194 m/sec
y0 = 0.878 m



WELL TEST ANALYSIS

Data Set: \...\FA-MW12-03 Test_2.aqt
Date: 11/07/12 Time: 11:12:27

PROJECT INFORMATION

Test Well: FA-MW-12-03
Test Date: 31-August-12

AQUIFER DATA

Saturated Thickness: 4.08 m
Anisotropy Ratio (Kz/Kr): 1.

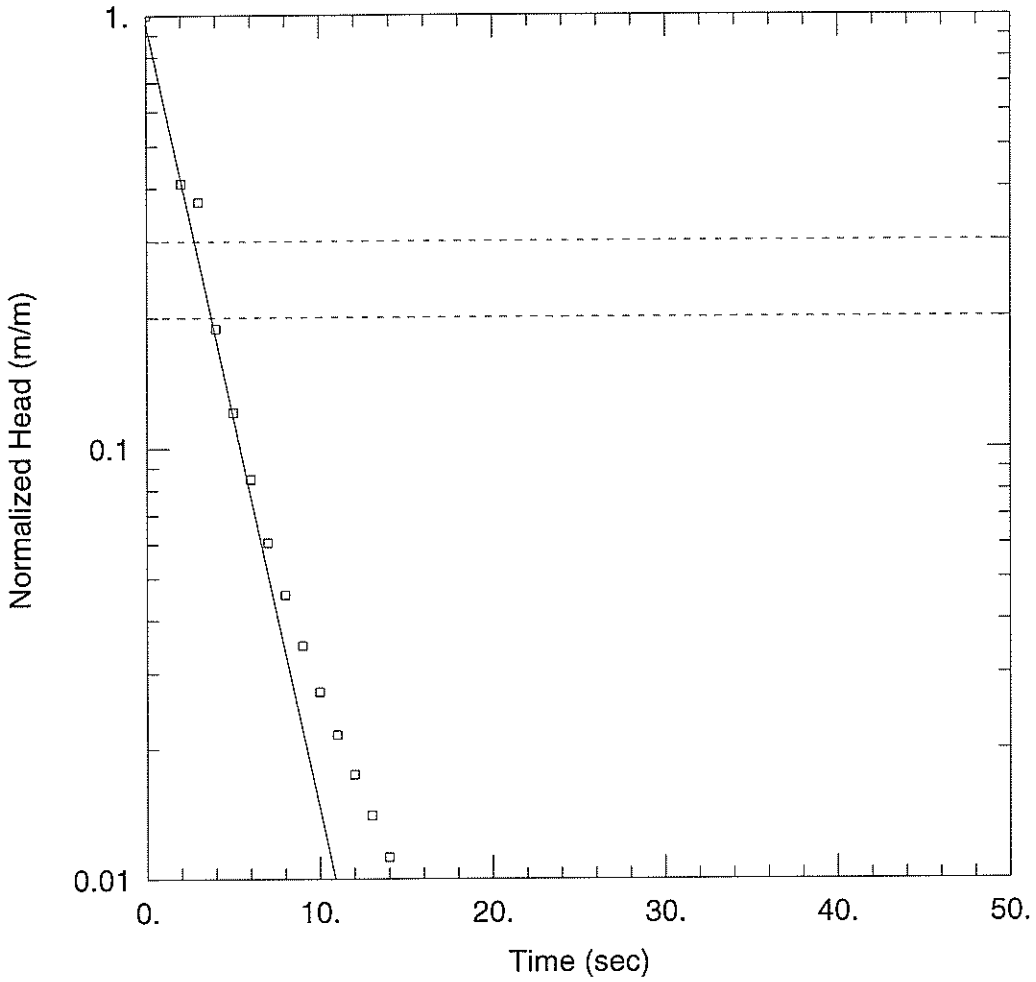
WELL DATA (New Well)

Initial Displacement: 0.82 m
Total Well Penetration Depth: 4.07 m
Casing Radius: 0.025 m
Static Water Column Height: 4.08 m
Screen Length: 3.04 m
Well Radius: 0.092 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0005986 m/sec
y0 = 0.8008 m



WELL TEST ANALYSIS

Data Set: \...\FA-MW12-04 Test_1.aqt
Date: 11/07/12 Time: 11:12:56

PROJECT INFORMATION

Test Well: FA-MW-12-04
Test Date: 31-August-12

AQUIFER DATA

Saturated Thickness: 3.7 m Anisotropy Ratio (Kz/Kr): 1.

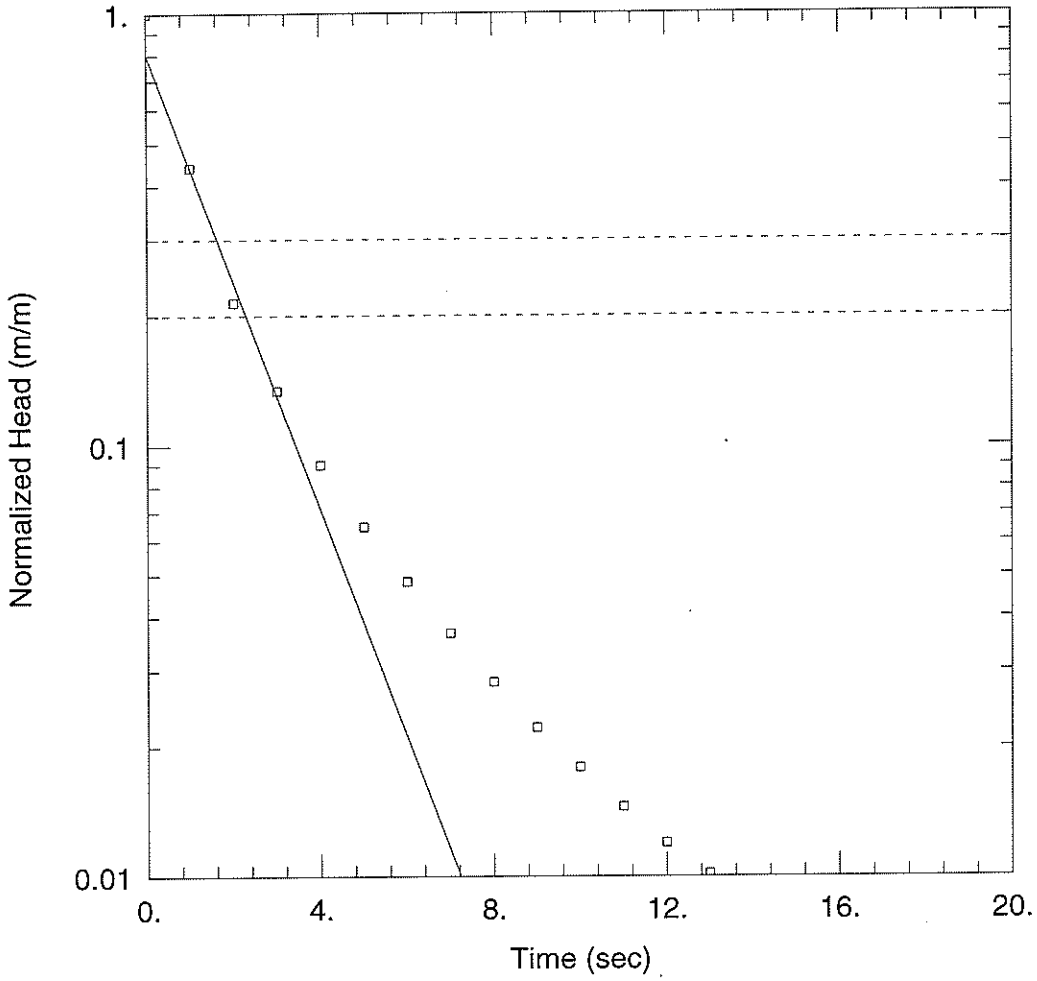
WELL DATA (MW12-04)

Initial Displacement: 0.82 m
Total Well Penetration Depth: 3.69 m
Casing Radius: 0.025 m
Static Water Column Height: 3.7 m
Screen Length: 3.04 m
Well Radius: 0.092 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001242 m/sec
y0 = 0.7852 m



WELL TEST ANALYSIS

Data Set: \...\FA-MW12-04 Test_2.aqt
Date: 11/07/12 Time: 11:13:11

PROJECT INFORMATION

Test Well: FA-MW-12-04
Test Date: 31-August-12

AQUIFER DATA

Saturated Thickness: 3.7 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.82 m
Total Well Penetration Depth: 3.69 m
Casing Radius: 0.025 m
Static Water Column Height: 3.7 m
Screen Length: 3.04 m
Well Radius: 0.092 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001798 m/sec
y0 = 0.6607 m

Single-well Response Test Data Sheet

☒ Rising Head

☒ Falling Head

Well No.: FA-MW12-01

Location: FARO

Project No.: 11-1436-0093/1100

Completed By: A BADGER

Date: 02-SEP-12

Time: 11:10

MONITORING WELL INFORMATION

Depth to water below top of casing:	14.14 meters	
Depth to bottom of well below top of casing:	18.40 meters	
Distance from top of pipe to ground surface:	0.66 meters	
Well casing diameter:	meters	(1 inch = 0.025 meters)
Borehole diameter:	meters	
Screen length:	meters	(1 foot = 0.3048 meters)
Screened unit:	(eg: sand, silt, clay)	

EQUIPMENT LIST

☒ Slug

Mass: kilograms

Length: 1.5 meters

Diameter: 0.0375 meters

☐ Bailer

Water column height: meters

Inside diameter: meters

and/or Volume of water removed: litres

Pressure transducer serial #: 0011032680

Sampling Interval: 1 (seconds) or minutes (circle one)

SINGLE-WELL RESPONSE TEST

Start time: 11:13 Finish time: 11:45

Time	Elapsed Time	Water Level (m)	Comments
11:13			TX IN 0.2m OFF BOTTOM
11:17		14.14	SLUG IN
11:22		14.14	SLUG OUT
11:27			SLUG IN
11:32			SLUG OUT
11:37			SLUG IN
11:42			SLUG OUT
11:45			TX OUT

Single-well Response Test Data Sheet

☐ Rising Head
☑ Falling Head

Well No.: FA-MW12-03
Location: FARO
Project No.: 11-1436-0073 / 1100
Completed By: A BADGER
Date: 02-SEP-12
Time: 10:25

MONITORING WELL INFORMATION

Depth to water below top of casing:	13.95	meters	
Depth to bottom of well below top of casing:	18.03	meters	
Distance from top of pipe to ground surface:	0.76	meters	
Well casing diameter:		meters	(1 inch = 0.025 meters)
Borehold diameter:		meters	
Screen length:		meters	(1 foot = 0.3048 meters)
Screened unit:			(eg: sand, silt, clay)

EQUIPMENT LIST

☒ Slug
Mass: _____ kilograms
Length: 1.5 meters
Diameter: 0.0375 meters

☐ Bailer
Water column height: _____ meters
Inside diameter: _____ meters
and/or Volume of water removed: _____ litres

Pressure transducer serial #: 0011032680
Sampling Interval: 1 seconds (or minutes) (circle one)

SINGLE-WELL RESPONSE TEST

Start time: 10:30 Finish time: 11:00

Time	Elapsed Time	Water Level (m)	Comments
10:30			~~TX SLUG~~ IN 20cm OFF BOTTOM
10:33		13.94	SLUG IN
10:38		13.95	SLUG OUT
10:43			SLUG IN
10:48			SLUG OUT
10:53			SLUG IN
10:58			SLUG OUT
11:00			TX OUT

Single-well Response Test Data Sheet

☒ Rising Head

☒ Falling Head

Well No.: FA-MW12-04

Location: FARO

Project No.: 11-1436-0073 / 1100

Completed By: A BADGER

Date: 02-SEP-12

Time: 09:30

MONITORING WELL INFORMATION

Depth to water below top of casing:	11.63	meters	
Depth to bottom of well below top of casing:	15.33	meters	
Distance from top of pipe to ground surface:	1.00	meters	
Well casing diameter:		meters	(1 inch = 0.025 meters)
Borehold diameter:		meters	
Screen length:		meters	(1 foot = 0.3048 meters)
Screened unit:		(eg: sand, silt, clay)	

EQUIPMENT LIST

☒ Slug

Mass: _____ kilograms

Length: 1.5 meters

Diameter: 0.0375 meters

☐ Bailer

Water column height: _____ meters

Inside diameter: _____ meters

and/or Volume of water removed: _____ litres

Pressure transducer serial #: 0011032680

Sampling Interval: 1 seconds or minutes (circle one)

SINGLE-WELL RESPONSE TEST

Start time: 9:29 Finish time: 10:14

Time	Elapsed Time	Water Level (m)	Comments
9:29			Tx IN 20 cm off BOTTOM
9:32		11.61	SLUG IN
9:37		11.62	
9:44		11.62	SLUG OUT
9:54			SLUG IN
10:04			SLUG OUT
10:14			Tx OUT

APPENDIX E

Analytical Reports and Chain of Custody Forms

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

SCN Location QA/QC Date	Drinking Water CSR - DW	Aquatic Life CSR-AW (freshwater)	Notes	L1203640-4 FA-MW12-01 31-AUG-12	L1203640-5 FA-MW12-03 31-AUG-12	L1203640-6 FA-MW12-04 31-AUG-12	L1203640-7 FA-MW12-04 FD 31-AUG-12	L1203640-8 FA SURFACE 02-SEP-12
Parameters								
pH (field)				7.17	6.96	6.8	7.17	6.50]
Temperature °C				1.90	3.70	5	1.90	10.80
Conductivity (uS/cm)				-	-	-	-	-
Dissolved Oxygen (mg/L)				-	-	-	-	-
Laboratory Parameters								
pH (laboratory)				7.40	7.27	6.96	7.39	7.12
Hardness (as CaCO3)				853	731	740	844	54.5
total dissolved solids				1140	993	1420	1140	131
Aggregate Organics								
COD				59	27	167	64	86
dissolved organic carbon				8.44	3.66	11.9	7.85	22.0
Dissolved Metals								
aluminum	**0.2**			<0.010	<0.010	<0.010	<0.010	0.012
antimony	**0.006**	0.2		0.00059	<0.00050	<0.00050	0.00059	<0.00050
arsenic	**0.025**	0.05		0.00604	0.00373	0.0140	0.00629	0.00060
barium	**1**	10		0.16200	0.108	**1.120**	0.166	0.050
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	**5**			<0.10	<0.10	<0.10	<0.10	<0.10
cadmium	**0.005**	0.0001 - 0.0006	H	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
calcium				164	156	201	161	12.5
chromium	**0.05**	0.010[VI], **0.090**[III]	V	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
cobalt		0.009		*<0.010*	0.016	0.012	*<0.010*	*<0.010*
copper	**1**	0.020 - 0.090	H	<0.0010	<0.0010	<0.0010	<0.0010	0.0012
iron	**0.3**			**5.720**	**10.500**	**48.300**	**5.990**	0.032
lead	**0.01**	0.040 - 0.160	H	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
lithium				0.011	0.011	<0.010	0.011	<0.010
magnesium	**100**			**108.000**	83.0	58.1	**107.000**	5.66
manganese	**0.05**			**0.474**	**3.890**	**4.240**	**0.477**	<0.0020
mercury	**0.001**	0.001		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
molybdenum	**0.25**	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				4.46	3.81	11.6	4.52	4.38
selenium	**0.01**	0.01		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
silicon				6.78	8.82	6.06	6.72	0.440
silver		0.0005 - 0.015	H	<0.010	<0.010	<0.010	<0.010	*<0.010*
sodium	**200**			31.4	7.8	97.7	32.3	3.9
strontium				0.803	0.452	0.789	0.818	0.0598
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	<0.010	<0.010	<0.010	<0.010
uranium	**0.1**	3		0.0135	0.0289	0.00711	0.0138	<0.00010
vanadium				<0.030	<0.030	<0.030	<0.030	<0.030
zinc	**5**	0.075 - 2.4	H	<0.050	<0.050	<0.050	<0.050	<0.050
Other Inorganics								
bicarbonate (CaCO3)				505	540	383	523	43.4
carbonate (CaCO3)				<1.0	<1.0	<2.0	<1.0	<1.0
hydroxide (CaCO3)				<1.0	<1.0	<2.0	<1.0	<1.0
total alkalinity (CaCO3)				505	540	383	523	43.4
ammonia		1.31 - 18.5	pH	0.370	0.205	1.49	0.387	0.0138
chloride	**250**			94.9	<5.0	349	99.5	14.3
fluoride	**1.5**	2 - 3	H	<0.20	<0.20	<0.40	<0.20	0.112
nitrate (as N)	**10**	400		<0.050	<0.050	<0.10	<0.050	<0.0050
nitrite (as N)	**3.2**	0.2 - 2	Cl	<0.010	<0.010	<0.020	<0.010	<0.0010
total Kjeldahl nitrogen				0.875	0.366	3.73	1.01	2.38
sulphate	**500**	1000		347	306	163	339	<0.50

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).
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 bold= Exceeds CSR freshwater aquatic life (AW) standards; AW standards assume minimum 1:10 dilution is available.
COC = Chain of Custody
* = Samples tested for dissolved metals were unfiltered

Table E-2
Results of Water Analyses - Hydrocarbons
[YTG Landfill Monitoring, Faro, Yukon]

SCN				L1203640-4	L1203640-5	L1203640-6	L1203640-7	L1203640-8
Location	Drinking Water CSR - DW	Aquatic Life CSR-AW (freshwater)	Notes	FA-MW12-01	FA-MW12-03	FA-MW12-04 FDA	FA-MW12-04 FD	FA SURFACE
QA/QC								
Date				31-AUG-12	31-AUG-12	31-AUG-12	31-AUG-12	02-SEP-12
Monoaromatic Hydrocarbons								
benzene	**0.005**	4		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
ethylbenzene	**0.0024**	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	**0.024**	0.39		<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	**0.3**			<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
VHw_{6-10}	**15**	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	**0.00001**	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	<0.000050	<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**	5		<0.25	<0.25	<0.25	<0.25	0.27
$EPHw_{19-32}$				<0.25	<0.25	<0.25	<0.25	0.29
LEPHw		0.5		<0.25	<0.25	<0.25	<0.25	0.27
HEPHw				<0.25	<0.25	<0.25	<0.25	0.29
Miscellaneous Organics								
methyl tertiary butyl ether (MTBE)								
Chlorinated Hydrocarbons								
bromodichloromethane (BDCM)				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
tribromomethane (bromoform)				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
tetrachloromethane (carbon tetrachloride)	**0.005**	0.13		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
monochlorobenzene (chlorobenzene)	**0.03**	0.013		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
dibromochloromethane (DBCM)				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
chloroethane (ethyl chloride)				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
trichloromethane (chloroform)	**0.1**	0.02		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
chloromethane (methyl chloride)				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2-dichlorobenzene	**0.003**			<0.00070	<0.00070	<0.00070	<0.00070	<0.00070
1,3-dichlorobenzene		1.5		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,4-dichlorobenzene	**0.001**	0.26		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-dichloroethane				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-dichloroethane	**0.005**	1		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1-dichloroethylene (1,1-dichloroethene)	**0.014**			<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-dichloroethylene (cis) (1,2-dichloroethene (cis))				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,2-dichloroethylene (trans) (1,2-dichloroethene (trans))				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,3-dichloropropene				<0.0014	<0.0014	<0.0014	<0.0014	<0.0014
dichloromethane (methylene chloride)	**0.05**	0.98		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
1,2-dichloropropane (propylene dichloride)				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cis-1,3-Dichloropropylene				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
trans-1,3-Dichloropropylene				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,1,2-tetrachloroethane				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2,2-tetrachloroethane				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
tetrachloroethylene (1,1,2,2-tetrachloroethene)	**0.03**	1.1		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,1-trichloroethane				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
1,1,2-trichloroethane				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
trichloroethylene (1,1,2-trichloroethene)	**0.05**	0.2		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
trichlorofluromethane (freon 11)				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
vinyl chloride (chloroethene)	**0.002**			<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

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).
Italics indicates standard is below detection limit.
Yellow highlight and bold= Exceeds CSR freshwater aquatic life (AW) standards; AW standards assume minimum 1:10 dilution is available.
FDA = field duplicate available
FD = field duplicate
QA/QC = quality assurance/quality control
SCN = sample control number
COC = Chain of Custody
$EPHw_{10-19}$ = 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 $EPHw_{10-19}$ is equivalent to LEPHw, when no LEPHw analysis is undertaken.
VPHw = volatile petroleum hydrocarbons
VHw_{6-10} = 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

Table E-3
Results of Quality Control Analyses - Metals
[YTG Landfill Monitoring, Faro, Yukon]

	SCN	L1203640-4	L1203640-7				
	Location	FA-MW12-01	FA-MW12-04	Method Detection Limit	Mean	Relative Percent Difference	Difference Factor (DF)
	QA/QC	FDA	FD				
	Date	31-AUG-12	31-AUG-12				
Laboratory Parameters							
pH (laboratory)		7.40	7.39	0.10	7.395	0.14%	NA
Hardness (as CaCO3)		853	844	0.50	848.5	1.06%	NA
total dissolved solids		1140	1140	10	1140	0.00%	NA
Aggregate Organics							
COD		59	167	20	113	95.58%	NA
dissolved organic carbon		8.44	7.85	1.0	8.145	7.24%	NA
Dissolved Metals							
aluminum		<0.010	<0.010	0.010	NC	NC	NA
antimony		0.00059	0.00059	0.00050	NC	NC	NA
arsenic		0.00604	0.00629	0.00010	0.006165	4.06%	NA
barium		0.16200	0.166	0.020	0.164	2.44%	NA
beryllium		<0.0050	<0.0050	0.0050	NC	NC	NA
bismuth		<0.20	<0.20	0.20	NC	NC	NA
boron		<0.10	<0.10	0.10	NC	NC	NA
cadmium		<0.00020	<0.00020	0.00020	NC	NC	NA
calcium		164	161	0.10	162.5	1.85%	NA
chromium		<0.0020	<0.0020	0.0020	NC	NC	NA
cobalt		*<0.010*	*<0.010*	0.010	NC	NC	NA
copper		<0.0010	<0.0010	0.0010	NC	NC	NA
iron		5.72	5.99	0.030	5.855	4.61%	NA
lead		<0.00050	<0.00050	0.00050	NC	NC	NA
lithium		0.011	0.011	0.010	NC	NC	NA
magnesium		108	107	0.10	107.5	0.93%	NA
manganese		0.474	0.477	0.0020	0.4755	0.63%	NA
mercury		<0.00020	<0.00020	0.00020	NC	NC	NA
molybdenum		<0.030	<0.030	0.030	NC	NC	NA
nickel		<0.050	<0.050	0.050	NC	NC	NA
phosphorus		<0.30	<0.30	0.30	NC	NC	NA
potassium		4.46	4.52	0.10	4.49	1.34%	NA
selenium		<0.0010	<0.0010	0.0010	NC	NC	NA
silicon		6.78	6.72	0.050	6.75	0.89%	NA
silver		<0.010	<0.010	0.010	NC	NC	NA
sodium		31.4	32.3	2.0	31.85	2.83%	NA
strontium		0.803	0.818	0.0050	0.8105	1.85%	NA
thallium		*<0.20*	*<0.20*	0.20	NC	NC	NA
tin		<0.030	<0.030	0.030	NC	NC	NA
titanium		<0.010	<0.010	0.010	NC	NC	NA
uranium		0.0135	0.0138	0.00010	0.01365	2.20%	NA
vanadium		<0.030	<0.030	0.030	NC	NC	NA
zinc		<0.050	<0.050	0.050	NC	NC	NA
Other Inorganics							
bicarbonate (CaCO3)		505	523	2.0	514	3.50%	NA
carbonate (CaCO3)		<1.0	<1.0	2.0	NC	NC	NA
hydroxide (CaCO3)		<1.0	<1.0	2.0	NC	NC	NA
total alkalinity (CaCO3)		505	523	2.0	514	3.50%	NA
ammonia		0.370	0.387	0.0050	0.3785	4.49%	NA
chloride		94.9	99.5	5.0	97.2	4.73%	NA
fluoride		<0.20	<0.20	0.20	NC	NC	NA
nitrate (as N)		<0.050	<0.050	0.050	NC	NC	NA
nitrite (as N)		<0.010	<0.010	0.010	NC	NC	NA
total Kjeldahl nitrogen		0.875	1.01	0.25	0.9425	NA	0.07
sulphate		347	339	5.0	343	2.33%	NA

Notes:
All concentrations in milligrams per litre (mg/L), unless otherwise noted.
Method Detection Limit indicates the minimum concentration that could be measured by laboratory instrumentation for a specific sample.
Mean indicates the mean or average value calculated of a field duplicate pair (the FDA and the FD).
Relative Percent Difference is calculated when the mean value is greater than five times the method detection limit; Golder's internal QA/QC target is less than 35%.
Difference Factor is calculated when the mean value is less than five times the method detection limit; Golder's internal QA/QC target is less than 2.
NC = Not Calculated
NA = not applicable
FDA = field duplicate available
FD = field duplicate
QA/QC = quality assurance/quality control
SCN = sample control number
COC = Chain of Custody
BOLD font indicates the parameter analysed exceeds Golder's internal QA/QC targets.

Table E-4
Results of Quality Control Analyses - Hydrocarbons
[YTG Landfill Monitoring, Faro, Yukon]

	SCN	L1203640-4	L1203640-7				
	Location	FA-MW12-01	FA-MW12-04	Method Detection Limit	Mean	Relative Percent Difference	Difference Factor (DF)
	QA/QC	FDA	FD				
	Date	31-AUG-12	31-AUG-12				
Monoaromatic Hydrocarbons							
benzene		<0.00050	<0.00050	0.00050	NC	NC	NA
ethylbenzene		<0.00050	<0.00050	0.00050	NC	NC	NA
styrene		<0.00050	<0.00050	0.00050	NC	NC	NA
toluene		<0.00050	<0.00050	0.00050	NC	NC	NA
ortho-xylene		<0.00050	<0.00050	0.00050	NC	NC	NA
meta- & para-xylene		<0.00050	<0.00050	0.00050	NC	NC	NA
total xylene		<0.00075	<0.00075	0.00075	NC	NC	NA
VHw_{6-10}		<0.10	<0.10	0.10	NC	NC	NA
VPHw		<0.10	<0.10	0.10	NC	NC	NA
Polycyclic Aromatic Hydrocarbons							
acenaphthene		<0.000050	<0.000050	0.000050	NC	NC	NA
acenaphthylene		<0.000050	<0.000050	0.000050	NC	NC	NA
acridine		<0.000050	<0.000050	0.000050	NC	NC	NA
anthracene		<0.000050	<0.000050	0.000050	NC	NC	NA
benzo(a)anthracene		<0.000050	<0.000050	0.000050	NC	NC	NA
benzo(a)pyrene		<0.000010	<0.000010	0.000010	NC	NC	NA
benzo(b)fluoranthene		<0.000050	<0.000050	0.000050	NC	NC	NA
benzo(g,h,i)perylene		<0.000050	<0.000050	0.000050	NC	NC	NA
benzo(k)fluoranthene		<0.000050	<0.000050	0.000050	NC	NC	NA
chrysene		<0.000050	<0.000050	0.000050	NC	NC	NA
dibenzo(a,h)anthracene		<0.000050	<0.000050	0.000050	NC	NC	NA
fluoranthene		<0.000050	<0.000050	0.000050	NC	NC	NA
fluorene		<0.000050	<0.000050	0.000050	NC	NC	NA
indeno(1,2,3-c,d)pyrene		<0.000050	<0.000050	0.000050	NC	NC	NA
naphthalene		<0.000050	<0.000050	0.000050	NC	NC	NA
phenanthrene		<0.000050	<0.000050	0.000050	NC	NC	NA
pyrene		<0.000050	<0.000050	0.000050	NC	NC	NA
quinoline		<0.000050	<0.000050	0.00020	NC	NC	NA
Other Hydrocarbons							
$EPHw_{10-19}$		<0.25	<0.25	0.25	NC	NC	NA
$EPHw_{19-32}$		<0.25	<0.25	0.25	NC	NC	NA
LEPHw		<0.25	<0.25	0.25	NC	NC	NA
HEPHw		<0.25	<0.25	0.25	NC	NC	NA
Miscellaneous Organics							
methyl tertiary butyl ether (MTBE)				0.00050	NC	NC	NA
Chlorinated Hydrocarbons							
bromodichloromethane (BDCM)		<0.0010	<0.0010	0.0010	NC	NC	NA
tribromomethane (bromoform)		<0.0010	<0.0010	0.0010	NC	NC	NA
tetrachloromethane (carbon tetrachloride)		<0.00050	<0.00050	0.00050	NC	NC	NA
monochlorobenzene (chlorobenzene)		<0.0010	<0.0010	0.0010	NC	NC	NA
dibromochloromethane (DBCM)		<0.0010	<0.0010	0.0010	NC	NC	NA
chloroethane (ethyl chloride)		<0.0010	<0.0010	0.0010	NC	NC	NA
trichloromethane (chloroform)		<0.0010	<0.0010	0.0010	NC	NC	NA
chloromethane (methyl chloride)		<0.0050	<0.0050	0.0050	NC	NC	NA
1,2-dichlorobenzene		<0.00070	<0.00070	0.00070	NC	NC	NA
1,3-dichlorobenzene		<0.0010	<0.0010	0.0010	NC	NC	NA
1,4-dichlorobenzene		<0.0010	<0.0010	0.0010	NC	NC	NA
1,1-dichloroethane		<0.0010	<0.0010	0.0010	NC	NC	NA
1,2-dichloroethane		<0.0010	<0.0010	0.0010	NC	NC	NA
1,1-dichloroethylene (1,1-dichloroethene)		<0.0010	<0.0010	0.0010	NC	NC	NA
1,2-dichloroethylene (cis) (1,2-dichloroethene (cis))		<0.0010	<0.0010	0.0010	NC	NC	NA
1,2-dichloroethylene (trans) (1,2-dichloroethene (trans))		<0.0010	<0.0010	0.0010	NC	NC	NA
1,3-dichloropropene		<0.0014	<0.0014	0.0014	NC	NC	NA
dichloromethane (methylene chloride)		<0.0050	<0.0050	0.0050	NC	NC	NA
1,2-dichloropropane (propylene dichloride)		<0.0010	<0.0010	0.0010	NC	NC	NA
cis-1,3-Dichloropropylene		<0.0010	<0.0010	0.0010	NC	NC	NA
trans-1,3-Dichloropropylene		<0.0010	<0.0010	0.0010	NC	NC	NA
1,1,1,2-tetrachloroethane		<0.0010	<0.0010	0.0010	NC	NC	NA
1,1,2,2-tetrachloroethane		<0.0010	<0.0010	0.0010	NC	NC	NA
tetrachloroethylene (1,1,2,2-tetrachloroethene)		<0.0010	<0.0010	0.0010	NC	NC	NA
1,1,1-trichloroethane		<0.0010	<0.0010	0.0010	NC	NC	NA
1,1,2-trichloroethane		<0.0010	<0.0010	0.0010	NC	NC	NA
trichloroethylene (1,1,2-trichloroethene)		<0.0010	<0.0010	0.0010	NC	NC	NA
trichlorofluromethane (freon 11)		<0.0010	<0.0010	0.0010	NC	NC	NA
vinyl chloride (chloroethene)		<0.0010	<0.0010	0.0010	NC	NC	NA

Notes:
All concentrations in milligrams per litre (mg/L), unless otherwise noted.
Method Detection Limit indicates the minimum concentration that could be measured by laboratory instrumentation for a specific sample.
Mean indicates the mean or average value calculated of a field duplicate pair (the FDA and the FD).
Relative Percent Difference is calculated when the mean value is greater than five times the method detection limit; Golder's internal QA/QC target is less than 35%.
Difference Factor is calculated when the mean value is less than five times the method detection limit; Golder's internal QA/QC target is less than 2.
NC = Not Calculated
NA = not applicable
FDA = field duplicate available
FD = field duplicate
QA/QC = quality assurance/quality control
SCN = sample control number
COC = Chain of Custody
BOLD font indicates the parameter analysed exceeds Golder's internal QA/QC targets.

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

Date Received: 04-SEP-12
Report Date: 17-SEP-12 12:37 (MT)
Version: FINAL

Client Phone: 867-633-6076

Certificate of Analysis

Lab Work Order #: L1203640

Project P.O. #: NOT SUBMITTED
Job Reference: 11-1436-0073/1100, 2500, 2800
C of C Numbers:
Legal Site Desc:

Amber Springer
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1203640-1	L1203640-2	L1203640-3	L1203640-4	L1203640-5
Description	Ground Water	Ground Water	surface water	Ground Water	Ground Water
Sampled Date	31-AUG-12	31-AUG-12	01-SEP-12	31-AUG-12	31-AUG-12
Sampled Time	10:50	13:20	11:10	15:30	17:40
Client ID	RR NUMBER 1	RR NUMBER 2	RR SURFACE	FA-MW12-01	FA-MW12-03
Grouping / **Analyte**					
WATER					
Physical Tests Hardness (as CaCO3) (mg/L)	3910	3320	739	853	731
pH (pH)	7.36	7.38	8.42	7.40	7.27
Total Dissolved Solids (mg/L)	5590	4580	1330	1140	993
Turbidity (NTU)	319	12500	198	393	169
Anions and Nutrients Alkalinity, Bicarbonate (as CaCO3) (mg/L)	496	321	115	505	540
Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3) (mg/L)	496	321	115	505	540
Ammonia, Total (as N) (mg/L)	0.169	0.484	0.0354	0.370	0.205
Chloride (Cl) (mg/L)	62	54	30.7	94.9	<5.0 DLA
Fluoride (F) (mg/L)	<0.40 DLA	<0.40 DLA	<0.20 DLA	<0.20 DLA	<0.20 DLA
Nitrate (as N) (mg/L)	1.02	1.27	<0.050 DLA	<0.050 DLA	<0.050 DLA
Nitrite (as N) (mg/L)	<0.020 DLA	<0.020 DLA	<0.010 DLA	<0.010 DLA	<0.010 DLA
Total Kjeldahl Nitrogen (mg/L)	1.10	7.23	2.02	0.875	0.366
Sulfate (SO4) (mg/L)	3370	2830	804	347	306
Organic / Inorganic Carbon Dissolved Organic Carbon (mg/L)	19.0	14.8	26.1	8.44	3.66
Dissolved Metals Dissolved Metals Filtration Location	FIELD	FIELD	LAB	FIELD	FIELD
Aluminum (Al)-Dissolved (mg/L)	<0.050 DLA	<0.050 DLA	<0.010	<0.010	<0.010
Antimony (Sb)-Dissolved (mg/L)	<0.0025 DLA	<0.0025 DLA	0.00077	0.00059	<0.00050
Arsenic (As)-Dissolved (mg/L)	0.00091	0.00070	0.00587	0.00604	0.00373
Barium (Ba)-Dissolved (mg/L)	<0.10 DLA	<0.10 DLA	0.044	0.162	0.108
Beryllium (Be)-Dissolved (mg/L)	<0.010 DLA	<0.010 DLA	<0.0050	<0.0050	<0.0050
Bismuth (Bi)-Dissolved (mg/L)	<0.40 DLA	<0.40 DLA	<0.20	<0.20	<0.20
Boron (B)-Dissolved (mg/L)	<0.50 DLA	<0.50 DLA	<0.10	<0.10	<0.10
Cadmium (Cd)-Dissolved (mg/L)	<0.0010 DLA	<0.0010 DLA	<0.00020	<0.00020	<0.00020
Calcium (Ca)-Dissolved (mg/L)	459	445	96.3	164	156
Chromium (Cr)-Dissolved (mg/L)	<0.010 DLA	<0.010 DLA	<0.0020	<0.0020	<0.0020
Cobalt (Co)-Dissolved (mg/L)	<0.020 DLA	<0.020 DLA	<0.010	<0.010	0.016
Copper (Cu)-Dissolved (mg/L)	<0.0050 DLA	<0.0050 DLA	<0.0010	<0.0010	<0.0010
Iron (Fe)-Dissolved (mg/L)	<0.060 DLA	<0.060 DLA	<0.030	5.72	10.5
Lead (Pb)-Dissolved (mg/L)	<0.0025 DLA	<0.0025 DLA	<0.00050	<0.00050	<0.00050
Lithium (Li)-Dissolved (mg/L)	0.029	0.024	0.012	0.011	0.011
Magnesium (Mg)-Dissolved (mg/L)	672	537	121	108	83.0
Manganese (Mn)-Dissolved (mg/L)	2.00	3.52	0.0053	0.474	3.89
Mercury (Hg)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Molybdenum (Mo)-Dissolved (mg/L)	<0.060 DLA	<0.060 DLA	<0.030	<0.030	<0.030

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1203640-6 Ground Water 31-AUG-12 18:15 FA-MW12-04	L1203640-7 Ground Water 31-AUG-12 15:30 FA-MW12-05	L1203640-8 Surface Water 02-SEP-12 12:00 FA SURFACE	L1203640-9 Ground Water 01-SEP-12 15:20 DC NUMBER 1	L1203640-10 Ground Water 01-SEP-12 16:20 DC NUMBER 2
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	740	844	54.5	489	600
	pH (pH)	6.96	7.39	7.12	7.22	7.82
	Total Dissolved Solids (mg/L)	1420	1140	131	627	828
	Turbidity (NTU)	1290	539	16.3	3240	13900
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	383	523	43.4	488	499
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0	<1.0	<1.0	<2.0	<2.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0	<1.0	<1.0	<2.0	<2.0
	Alkalinity, Total (as CaCO3) (mg/L)	383	523	43.4	488	499
	Ammonia, Total (as N) (mg/L)	1.49	0.387	0.0138	0.128	0.180
	Chloride (Cl) (mg/L)	349	99.5	14.3	18.0	61.9
	Fluoride (F) (mg/L)	<0.40 DLA	<0.20 DLA	0.112	<0.10 DLA	<0.20 DLA
	Nitrate (as N) (mg/L)	<0.10 DLA	<0.050 DLA	<0.0050	2.12	0.921
	Nitrite (as N) (mg/L)	<0.020 DLA	<0.010 DLA	<0.0010	<0.0050 DLA	0.012
	Total Kjeldahl Nitrogen (mg/L)	3.73	1.01	2.38	3.57	7.13
	Sulfate (SO4) (mg/L)	163	339	<0.50	79.3	129
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	11.9	7.85	22.0	3.40	2.20
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	LAB	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	<0.010	<0.010	0.012	<0.010	<0.010
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	0.00059	<0.00050	<0.00050	<0.00050
	Arsenic (As)-Dissolved (mg/L)	0.0140	0.00629	0.00060	0.00177	0.00095
	Barium (Ba)-Dissolved (mg/L)	1.12	0.166	0.050	0.118	0.117
	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	<0.10
	Cadmium (Cd)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Calcium (Ca)-Dissolved (mg/L)	201	161	12.5	118	113
	Chromium (Cr)-Dissolved (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Cobalt (Co)-Dissolved (mg/L)	0.012	<0.010	<0.010	<0.010	<0.010
	Copper (Cu)-Dissolved (mg/L)	<0.0010	<0.0010	0.0012	<0.0010	<0.0010
	Iron (Fe)-Dissolved (mg/L)	48.3	5.99	0.032	0.392	<0.030
	Lead (Pb)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Lithium (Li)-Dissolved (mg/L)	<0.010	0.011	<0.010	<0.010	0.011
	Magnesium (Mg)-Dissolved (mg/L)	58.1	107	5.66	47.2	77.4
	Manganese (Mn)-Dissolved (mg/L)	4.24	0.477	<0.0020	0.0911	0.0875
	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

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1203640-11	L1203640-12			
	Description	Ground Water	Surface Water			
	Sampled Date	01-SEP-12	02-SEP-12			
	Sampled Time	17:15	14:50			
	Client ID	DC NUMBER 3	DC SURFACE			
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	437	120			
	pH (pH)	7.82	8.23			
	Total Dissolved Solids (mg/L)	510	157			
	Turbidity (NTU)	2170	2.89			
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	445	111			
	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)	445	111			
	Ammonia, Total (as N) (mg/L)	0.0409	<0.0050			
	Chloride (Cl) (mg/L)	<2.5 DLA	<0.50			
	Fluoride (F) (mg/L)	<0.10 DLA	0.047			
	Nitrate (as N) (mg/L)	0.089	0.0567			
	Nitrite (as N) (mg/L)	<0.0050 DLA	<0.0010			
	Total Kjeldahl Nitrogen (mg/L)	0.83	0.113			
	Sulfate (SO4) (mg/L)	65.7	26.0			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.25	2.39			
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	<0.010	<0.010			
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.00050			
	Arsenic (As)-Dissolved (mg/L)	0.00402	0.00033			
	Barium (Ba)-Dissolved (mg/L)	0.107	0.068			
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.0050			
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20			
	Boron (B)-Dissolved (mg/L)	<0.10	<0.10			
	Cadmium (Cd)-Dissolved (mg/L)	<0.00020	<0.00020			
	Calcium (Ca)-Dissolved (mg/L)	92.0	32.6			
	Chromium (Cr)-Dissolved (mg/L)	<0.0020	<0.0020			
	Cobalt (Co)-Dissolved (mg/L)	<0.010	<0.010			
	Copper (Cu)-Dissolved (mg/L)	<0.0010	<0.0010			
	Iron (Fe)-Dissolved (mg/L)	0.121	<0.030			
	Lead (Pb)-Dissolved (mg/L)	<0.00050	<0.00050			
	Lithium (Li)-Dissolved (mg/L)	<0.010	<0.010			
	Magnesium (Mg)-Dissolved (mg/L)	50.4	9.28			
	Manganese (Mn)-Dissolved (mg/L)	0.175	<0.0020			
	Mercury (Hg)-Dissolved (mg/L)	<0.00020	<0.00020			
	Molybdenum (Mo)-Dissolved (mg/L)	<0.030	<0.030			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1203640-1	L1203640-2	L1203640-3	L1203640-4	L1203640-5
Description	Ground Water	Ground Water	surface water	Ground Water	Ground Water
Sampled Date	31-AUG-12	31-AUG-12	01-SEP-12	31-AUG-12	31-AUG-12
Sampled Time	10:50	13:20	11:10	15:30	17:40
Client ID	RR NUMBER 1	RR NUMBER 2	RR SURFACE	FA-MW12-01	FA-MW12-03
Grouping / **Analyte**					
WATER					
Dissolved Metals Nickel (Ni)-Dissolved (mg/L)	<0.10 DLA	<0.10 DLA	<0.050	<0.050	<0.050
Phosphorus (P)-Dissolved (mg/L)	<0.60 DLA	<0.60 DLA	<0.30	<0.30	<0.30
Potassium (K)-Dissolved (mg/L)	8.84	8.16	14.4	4.46	3.81
Selenium (Se)-Dissolved (mg/L)	0.0060	<0.0050 DLA	<0.0010	<0.0010	<0.0010
Silicon (Si)-Dissolved (mg/L)	7.67	5.96	3.36	6.78	8.82
Silver (Ag)-Dissolved (mg/L)	<0.020 DLA	<0.020 DLA	<0.010	<0.010	<0.010
Sodium (Na)-Dissolved (mg/L)	44.3	68.9	84.7	31.4	7.8
Strontium (Sr)-Dissolved (mg/L)	1.34	1.62	0.571	0.803	0.452
Thallium (Tl)-Dissolved (mg/L)	<0.40 DLA	<0.40 DLA	<0.20	<0.20	<0.20
Tin (Sn)-Dissolved (mg/L)	<0.060 DLA	<0.060 DLA	<0.030	<0.030	<0.030
Titanium (Ti)-Dissolved (mg/L)	<0.020 DLA	<0.020 DLA	<0.010	<0.010	<0.010
Uranium (U)-Dissolved (mg/L)	0.0709	0.0346	0.00042	0.0135	0.0289
Vanadium (V)-Dissolved (mg/L)	<0.060 DLA	<0.060 DLA	<0.030	<0.030	<0.030
Zinc (Zn)-Dissolved (mg/L)	<0.25 DLA	<0.25 DLA	<0.050	<0.050	<0.050
Aggregate Organics COD (mg/L)	75	270	91	59	27
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

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1203640-6	L1203640-7	L1203640-8	L1203640-9	L1203640-10
Description	Ground Water	Ground Water	Surface Water	Ground Water	Ground Water
Sampled Date	31-AUG-12	31-AUG-12	02-SEP-12	01-SEP-12	01-SEP-12
Sampled Time	18:15	15:30	12:00	15:20	16:20
Client ID	FA-MW12-04	FA-MW12-05	FA SURFACE	DC NUMBER 1	DC NUMBER 2
Grouping / **Analyte**					
WATER					
Dissolved Metals Nickel (Ni)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved (mg/L)	11.6	4.52	4.38	3.30	4.53
Selenium (Se)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silicon (Si)-Dissolved (mg/L)	6.06	6.72	0.440	6.93	6.37
Silver (Ag)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Sodium (Na)-Dissolved (mg/L)	97.7	32.3	3.9	16.2	30.4
Strontium (Sr)-Dissolved (mg/L)	0.789	0.818	0.0598	0.838	1.08
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)	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Dissolved (mg/L)	0.00711	0.0138	<0.00010	0.00907	0.0185
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	<0.050
Aggregate Organics COD (mg/L)	167	64	86	153	196
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

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1203640-11	L1203640-12			
	Description	Ground Water	Surface Water			
	Sampled Date	01-SEP-12	02-SEP-12			
	Sampled Time	17:15	14:50			
	Client ID	DC NUMBER 3	DC SURFACE			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Nickel (Ni)-Dissolved (mg/L)	<0.050	<0.050			
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30			
	Potassium (K)-Dissolved (mg/L)	2.99	0.80			
	Selenium (Se)-Dissolved (mg/L)	<0.0010	<0.0010			
	Silicon (Si)-Dissolved (mg/L)	6.52	3.80			
	Silver (Ag)-Dissolved (mg/L)	<0.010	<0.010			
	Sodium (Na)-Dissolved (mg/L)	8.4	<2.0			
	Strontium (Sr)-Dissolved (mg/L)	0.833	0.139			
	Thallium (Tl)-Dissolved (mg/L)	<0.20	<0.20			
	Tin (Sn)-Dissolved (mg/L)	<0.030	<0.030			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.0131	0.00161			
	Vanadium (V)-Dissolved (mg/L)	<0.030	<0.030			
	Zinc (Zn)-Dissolved (mg/L)	<0.050	<0.050			
Aggregate Organics	COD (mg/L)	<20	<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			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1203640-1	L1203640-2	L1203640-3	L1203640-4	L1203640-5
Description	Ground Water	Ground Water	surface water	Ground Water	Ground Water
Sampled Date	31-AUG-12	31-AUG-12	01-SEP-12	31-AUG-12	31-AUG-12
Sampled Time	10:50	13:20	11:10	15:30	17:40
Client ID	RR NUMBER 1	RR NUMBER 2	RR SURFACE	FA-MW12-01	FA-MW12-03
Grouping / **Analyte**					
WATER					
Volatile Organic Compounds / trans-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ethylbenzene (mg/L)	<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
Styrene (mg/L)	<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
1,1,2,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Tetrachloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Toluene (mg/L)	<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
1,1,2-Trichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Trichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Trichlorofluoromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Vinyl Chloride (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
ortho-Xylene (mg/L)	<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
Xylenes (mg/L)	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
Surrogate: 4-Bromofluorobenzene (SS) (%)	90.0	87.2	87.9	86.9	86.5
Surrogate: 1,4-Difluorobenzene (SS) (%)	92.0	92.0	91.4	92.1	93.3
Hydrocarbons / EPH10-19 (mg/L)	0.35	0.49	<0.25	<0.25	<0.25
EPH19-32 (mg/L)	0.32	0.28	<0.25	<0.25	<0.25
LEPH (mg/L)	0.35	0.49	<0.25	<0.25	<0.25
HEPH (mg/L)	0.32	0.28	<0.25	<0.25	<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) (%)	118.2	80.1	94.0	85.8	85.3
Polycyclic Aromatic Hydrocarbons / Acenaphthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<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	L1203640-6	L1203640-7	L1203640-8	L1203640-9	L1203640-10
Description	Ground Water	Ground Water	Surface Water	Ground Water	Ground Water
Sampled Date	31-AUG-12	31-AUG-12	02-SEP-12	01-SEP-12	01-SEP-12
Sampled Time	18:15	15:30	12:00	15:20	16:20
Client ID	FA-MW12-04	FA-MW12-05	FA SURFACE	DC NUMBER 1	DC NUMBER 2
Grouping / **Analyte**					
WATER					
Volatile Organic Compounds / trans-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Ethylbenzene (mg/L)	<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
Styrene (mg/L)	<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
1,1,2,2-Tetrachloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Tetrachloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Toluene (mg/L)	<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
1,1,2-Trichloroethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Trichloroethylene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Trichlorofluoromethane (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	0.0014
Vinyl Chloride (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
ortho-Xylene (mg/L)	<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
Xylenes (mg/L)	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
Surrogate: 4-Bromofluorobenzene (SS) (%)	87.9	86.3	86.5	84.5	84.9
Surrogate: 1,4-Difluorobenzene (SS) (%)	91.5	92.2	91.8	91.5	91.7
Hydrocarbons / EPH10-19 (mg/L)	<0.25	<0.25	0.27	<0.25	<0.25
EPH19-32 (mg/L)	<0.25	<0.25	0.29	<0.25	<0.25
LEPH (mg/L)	<0.25	<0.25	0.27	<0.25	<0.25
HEPH (mg/L)	<0.25	<0.25	0.29	<0.25	<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) (%)	89.1	86.6	101.7	76.6	78.5
Polycyclic Aromatic Hydrocarbons / Acenaphthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<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	L1203640-11	L1203640-12			
	Description	Ground Water	Surface Water			
	Sampled Date	01-SEP-12	02-SEP-12			
	Sampled Time	17:15	14:50			
	Client ID	DC NUMBER 3	DC SURFACE			
Grouping	**Analyte**					
WATER						
Volatile Organic Compounds	trans-1,3-Dichloropropylene (mg/L)	<0.0010	<0.0010			
	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)	<0.00050	<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)	<0.00050	<0.00050			
	Xylenes (mg/L)	<0.00075	<0.00075			
	Surrogate: 4-Bromofluorobenzene (SS) (%)	84.8	86.3			
	Surrogate: 1,4-Difluorobenzene (SS) (%)	90.8	91.0			
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) (%)	80.0	91.4			
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

Grouping	Analyte	L1203640-1 Ground Water 31-AUG-12 10:50 RR NUMBER 1	L1203640-2 Ground Water 31-AUG-12 13:20 RR NUMBER 2	L1203640-3 surface water 01-SEP-12 11:10 RR SURFACE	L1203640-4 Ground Water 31-AUG-12 15:30 FA-MW12-01	L1203640-5 Ground Water 31-AUG-12 17:40 FA-MW12-03
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Polycyclic Aromatic Hydrocarbons	Fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Fluorene (mg/L)	<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
	Naphthalene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Phenanthrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Pyrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Quinoline (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Surrogate: Acenaphthene d10 (%)	86.8	86.3	85.9	82.8	88.0
	Surrogate: Acridine d9 (%)	87.8	86.6	88.4	85.1	89.1
	Surrogate: Chrysene d12 (%)	80.5	80.1	84.1	81.3	87.0
	Surrogate: Naphthalene d8 (%)	84.2	90.9	82.0	80.1	86.4
	Surrogate: Phenanthrene d10 (%)	89.3	88.8	90.4	87.0	92.8

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1203640-6 Ground Water 31-AUG-12 18:15 FA-MW12-04	L1203640-7 Ground Water 31-AUG-12 15:30 FA-MW12-05	L1203640-8 Surface Water 02-SEP-12 12:00 FA SURFACE	L1203640-9 Ground Water 01-SEP-12 15:20 DC NUMBER 1	L1203640-10 Ground Water 01-SEP-12 16:20 DC NUMBER 2
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Polycyclic Aromatic Hydrocarbons	Fluoranthene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Fluorene (mg/L)	<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
	Naphthalene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Phenanthrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Pyrene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Quinoline (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Surrogate: Acenaphthene d10 (%)	88.1	86.4	89.8	92.7	88.0
	Surrogate: Acridine d9 (%)	91.9	90.2	91.2	95.1	90.7
	Surrogate: Chrysene d12 (%)	84.0	84.7	81.7	86.8	85.3
	Surrogate: Naphthalene d8 (%)	90.9	85.4	85.8	91.2	86.3
	Surrogate: Phenanthrene d10 (%)	91.5	91.8	91.8	97.3	93.4

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1203640-11	L1203640-12			
	Description	Ground Water	Surface Water			
	Sampled Date	01-SEP-12	02-SEP-12			
	Sampled Time	17:15	14:50			
	Client ID	DC NUMBER 3	DC 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)	<0.000050	<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 (%)	96.3	89.3			
	Surrogate: Acridine d9 (%)	98.2	91.5			
	Surrogate: Chrysene d12 (%)	91.9	85.0			
	Surrogate: Naphthalene d8 (%)	93.6	87.0			
	Surrogate: Phenanthrene d10 (%)	100.8	94.5			

* 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	Aluminum (Al)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Antimony (Sb)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Cadmium (Cd)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Chromium (Cr)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Lead (Pb)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Selenium (Se)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Zinc (Zn)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Aluminum (Al)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Antimony (Sb)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Boron (B)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Chromium (Cr)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Copper (Cu)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Lead (Pb)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Zinc (Zn)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Fluoride (F)	DLA	L1203640-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nitrite (as N)	DLA	L1203640-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Beryllium (Be)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Cobalt (Co)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Iron (Fe)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Molybdenum (Mo)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Nickel (Ni)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Phosphorus (P)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Silver (Ag)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Thallium (Tl)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Tin (Sn)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Titanium (Ti)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Vanadium (V)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Cadmium (Cd)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Chromium (Cr)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Lead (Pb)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Duplicate	Zinc (Zn)-Dissolved	DLA	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Boron (B)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Potassium (K)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Boron (B)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Potassium (K)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Boron (B)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9

Reference Information

	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1203640-1, -10, -11, -12, -2, -4, -5, -6, -7, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"

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

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

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

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

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
OR
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

ANIONS-CL-IC-WR	Water	Chloride by Ion Chromatography	EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

ANIONS-F-IC-WR	Water	Fluoride by Ion Chromatography	EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

ANIONS-NO2-IC-WR	Water	Nitrite Nitrogen by Ion Chromatography	EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

ANIONS-NO3-IC-WR	Water	Nitrate Nitrogen by Ion Chromatography	EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-WR	Water	Sulphate by Ion Chromatography	EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

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

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

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

Reference Information

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by 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 ICPOES EPA SW-846 3005A/6010B

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

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

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-MAN-WR Water pH by Meter APHA 4500-H (B)

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

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.

TURBIDITY-WR Water Turbidity by Nephelometer APHA 2130

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

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 transfered 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 transfered 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)

Reference Information

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

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 R2431168								
WG1540768-10 CRM		**VA-ALK-PCT-CONTROL**						
Alkalinity, Total (as CaCO3)			105.0		%		85-115	06-SEP-12
WG1540768-11 CRM		**VA-ALK-PCT-CONTROL**						
Alkalinity, Total (as CaCO3)			105.0		%		85-115	06-SEP-12
WG1540768-12 CRM		**VA-ALK-PCT-CONTROL**						
Alkalinity, Total (as CaCO3)			104.7		%		85-115	06-SEP-12
WG1540768-13 CRM		**VA-ALK-PCT-CONTROL**						
Alkalinity, Total (as CaCO3)			104.9		%		85-115	06-SEP-12
WG1540768-14 CRM		**VA-ALK-PCT-CONTROL**						
Alkalinity, Total (as CaCO3)			102.3		%		85-115	06-SEP-12
WG1540768-15 CRM		**VA-ALK-PCT-CONTROL**						
Alkalinity, Total (as CaCO3)			105.5		%		85-115	06-SEP-12
WG1540768-16 CRM		**VA-ALK-PCT-CONTROL**						
Alkalinity, Total (as CaCO3)			105.7		%		85-115	06-SEP-12
WG1540768-9 CRM		**VA-ALK-PCT-CONTROL**						
Alkalinity, Total (as CaCO3)			104.8		%		85-115	06-SEP-12
WG1540768-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	06-SEP-12
WG1540768-2 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	06-SEP-12
WG1540768-3 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	06-SEP-12
WG1540768-4 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	06-SEP-12
WG1540768-5 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	06-SEP-12

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-PCT-VA	**Water**							
Batch	**R2431168**							
WG1540768-5	**MB**							
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	06-SEP-12
WG1540768-6	**MB**							
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	06-SEP-12
WG1540768-7	**MB**							
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	06-SEP-12
WG1540768-8	**MB**							
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	06-SEP-12
Batch	**R2434619**							
WG1543738-2	**MB**							
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	11-SEP-12
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	11-SEP-12
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	11-SEP-12
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	11-SEP-12
WG1543738-3	**MB**							
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	11-SEP-12
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	11-SEP-12
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	11-SEP-12
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	11-SEP-12
WG1543738-4	**MB**							
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	11-SEP-12
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	11-SEP-12
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	11-SEP-12
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	11-SEP-12
WG1543738-5	**MB**							
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	11-SEP-12

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-PCT-VA	**Water**							
Batch R2434619								
WG1543738-5 MB								
Alkalinity, Bicarbonate (as CaCO3)			<1.0		mg/L		1	11-SEP-12
Alkalinity, Carbonate (as CaCO3)			<1.0		mg/L		1	11-SEP-12
Alkalinity, Hydroxide (as CaCO3)			<1.0		mg/L		1	11-SEP-12
ALK-SCR-VA	**Water**							
Batch R2430884								
WG1540548-2 CRM		**VA-ALKL-CONTROL**						
Alkalinity, Total (as CaCO3)			94.8		%		85-115	05-SEP-12
WG1540548-5 CRM		**VA-ALKM-CONTROL**						
Alkalinity, Total (as CaCO3)			105.3		%		85-115	05-SEP-12
WG1540548-13 DUP		**L1203640-10**						
Alkalinity, Total (as CaCO3)		499	499		mg/L	0.1	20	05-SEP-12
WG1540548-1 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	05-SEP-12
WG1540548-4 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	05-SEP-12
WG1540548-7 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	05-SEP-12
ANIONS-CL-IC-WR	**Water**							
Batch R2434365								
WG1544199-3 DUP		**L1203640-1**						
Chloride (Cl)		62	61		mg/L	0.9	20	04-SEP-12
WG1544199-2 LCS								
Chloride (Cl)			101.2		%		85-115	04-SEP-12
WG1544199-6 LCS								
Chloride (Cl)			101.4		%		85-115	04-SEP-12
WG1544199-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	04-SEP-12
WG1544199-5 MB								
Chloride (Cl)			<0.50		mg/L		0.5	04-SEP-12
WG1544199-4 MS		**L1203640-8**						
Chloride (Cl)			99.5		%		75-125	04-SEP-12
WG1544199-8 MS		**L1203929-2**						
Chloride (Cl)			101.4		%		75-125	04-SEP-12
ANIONS-F-IC-WR	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-F-IC-WR	**Water**							
Batch R2434365								
WG1544199-3 DUP		**L1203640-1**						
Fluoride (F)		<0.40	<0.40	RPD-NA	mg/L	N/A	20	04-SEP-12
WG1544199-2 LCS								
Fluoride (F)			90.3		%		85-115	04-SEP-12
WG1544199-6 LCS								
Fluoride (F)			93.4		%		85-115	04-SEP-12
WG1544199-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	04-SEP-12
WG1544199-5 MB								
Fluoride (F)			<0.020		mg/L		0.02	04-SEP-12
WG1544199-4 MS		**L1203640-8**						
Fluoride (F)			97.6		%		75-125	04-SEP-12
WG1544199-8 MS		**L1203929-2**						
Fluoride (F)			86.1		%		75-125	04-SEP-12
ANIONS-NO2-IC-WR	**Water**							
Batch R2434365								
WG1544199-3 DUP		**L1203640-1**						
Nitrite (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	04-SEP-12
WG1544199-2 LCS								
Nitrite (as N)			100.9		%		85-115	04-SEP-12
WG1544199-6 LCS								
Nitrite (as N)			102.3		%		85-115	04-SEP-12
WG1544199-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	04-SEP-12
WG1544199-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	04-SEP-12
WG1544199-4 MS		**L1203640-8**						
Nitrite (as N)			102.3		%		75-125	04-SEP-12
WG1544199-8 MS		**L1203929-2**						
Nitrite (as N)			93.5		%		75-125	04-SEP-12
ANIONS-NO3-IC-WR	**Water**							
Batch R2434365								
WG1544199-3 DUP		**L1203640-1**						
Nitrate (as N)		1.02	1.02		mg/L	0.3	20	04-SEP-12
WG1544199-2 LCS								
Nitrate (as N)			102.0		%		85-115	04-SEP-12
WG1544199-6 LCS								
Nitrate (as N)			102.5		%		85-115	04-SEP-12

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ANIONS-NO3-IC-WR	**Water**							
Batch R2434365								
WG1544199-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	04-SEP-12
WG1544199-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	04-SEP-12
WG1544199-4 MS		**L1203640-8**						
Nitrate (as N)			101.4		%		75-125	04-SEP-12
WG1544199-8 MS		**L1203929-2**						
Nitrate (as N)			101.5		%		75-125	04-SEP-12
ANIONS-SO4-IC-WR	**Water**							
Batch R2434365								
WG1544199-3 DUP		**L1203640-1**						
Sulfate (SO4)		3370	3370		mg/L	0.1	20	04-SEP-12
WG1544199-2 LCS								
Sulfate (SO4)			102.6		%		85-115	04-SEP-12
WG1544199-6 LCS								
Sulfate (SO4)			102.8		%		85-115	04-SEP-12
WG1544199-1 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	04-SEP-12
WG1544199-5 MB								
Sulfate (SO4)			<0.50		mg/L		0.5	04-SEP-12
WG1544199-4 MS		**L1203640-8**						
Sulfate (SO4)			102.4		%		75-125	04-SEP-12
WG1544199-8 MS		**L1203929-2**						
Sulfate (SO4)			102.6		%		75-125	04-SEP-12
CARBONS-DOC-VA	**Water**							
Batch R2431932								
WG1541373-2 CRM		**VA-DOC-C-CAFFEINE**						
Dissolved Organic Carbon			94.6		%		80-120	06-SEP-12
WG1541373-4 CRM		**VA-DOC-C-CAFFEINE**						
Dissolved Organic Carbon			93.8		%		80-120	06-SEP-12
WG1541373-6 CRM		**VA-DOC-C-CAFFEINE**						
Dissolved Organic Carbon			87.0		%		80-120	06-SEP-12
WG1541373-8 CRM		**VA-DOC-C-CAFFEINE**						
Dissolved Organic Carbon			89.0		%		80-120	06-SEP-12
WG1541373-9 DUP		**L1203640-10**						
Dissolved Organic Carbon		2.20	2.02		mg/L	8.5	20	06-SEP-12
WG1541373-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	06-SEP-12

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CARBONS-DOC-VA	**Water**							
Batch R2431932								
WG1541373-3 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	06-SEP-12
WG1541373-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	06-SEP-12
WG1541373-7 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	06-SEP-12
WG1541373-11 MS		**L1204272-5**						
Dissolved Organic Carbon			91.6		%		70-130	06-SEP-12
Batch R2433044								
WG1542922-3 DUP		**L1203640-8**						
Dissolved Organic Carbon		22.0	22.1		mg/L	0.3	20	09-SEP-12
WG1542922-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	09-SEP-12
COD-COL-VA	**Water**							
Batch R2430967								
WG1540889-2 LCS								
COD			103.9		%		85-115	06-SEP-12
WG1540889-6 LCS								
COD			103.3		%		85-115	06-SEP-12
WG1540889-1 MB								
COD			<20		mg/L		20	06-SEP-12
WG1540889-5 MB								
COD			<20		mg/L		20	06-SEP-12
WG1540889-4 MS		**L1203698-2**						
COD			103.1		%		75-125	06-SEP-12
EPH-SF-FID-VA	**Water**							
Batch R2430872								
WG1541190-1 MB								
EPH10-19			<0.25		mg/L		0.25	10-SEP-12
EPH19-32			<0.25		mg/L		0.25	10-SEP-12
Batch R2432840								
WG1541190-3 MB								
EPH10-19			<0.25		mg/L		0.25	10-SEP-12
EPH19-32			<0.25		mg/L		0.25	10-SEP-12
HG-DIS-CVAFS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-DIS-CVAFS-VA	**Water**							
Batch R2431074								
WG1540537-1 MB								
Mercury (Hg)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-12
Batch R2431952								
WG1540537-17 DUP		**L1203640-1**						
Mercury (Hg)-Dissolved		<0.00020	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-12
WG1540537-19 DUP		**L1203640-10**						
Mercury (Hg)-Dissolved		<0.00020	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-12
WG1542219-2 LCS								
Mercury (Hg)-Dissolved			88.6		%		80-120	07-SEP-12
WG1541038-1 MB								
Mercury (Hg)-Dissolved			<0.000050		mg/L		0.00005	07-SEP-12
WG1542219-1 MB								
Mercury (Hg)-Dissolved			<0.000050		mg/L		0.00005	07-SEP-12
WG1540537-18 MS		**L1203640-2**						
Mercury (Hg)-Dissolved			85.6		%		70-130	07-SEP-12
WG1540537-20 MS		**L1203640-12**						
Mercury (Hg)-Dissolved			83.3		%		70-130	07-SEP-12
Batch R2433082								
WG1540537-32 MS		**L1204697-1**						
Mercury (Hg)-Dissolved			76.8		%		70-130	10-SEP-12
WG1540537-38 MS		**L1204824-3**						
Mercury (Hg)-Dissolved			83.5		%		70-130	10-SEP-12
MET-DIS-ICP-VA	**Water**							
Batch R2430733								
WG1540537-2 CRM		**VA-HIGH-WATRM**						
Beryllium (Be)-Dissolved			98.8		%		80-120	04-SEP-12
Bismuth (Bi)-Dissolved			101.3		%		80-120	04-SEP-12
Cobalt (Co)-Dissolved			95.8		%		80-120	04-SEP-12
Iron (Fe)-Dissolved			99.5		%		80-120	04-SEP-12
Lithium (Li)-Dissolved			101.5		%		80-120	04-SEP-12
Molybdenum (Mo)-Dissolved			99.2		%		80-120	04-SEP-12
Nickel (Ni)-Dissolved			97.1		%		80-120	04-SEP-12
Phosphorus (P)-Dissolved			101.9		%		80-120	04-SEP-12
Silicon (Si)-Dissolved			106.2		%		80-120	04-SEP-12
Silver (Ag)-Dissolved			100.4		%		80-120	04-SEP-12
Sodium (Na)-Dissolved			97.3		%		80-120	04-SEP-12

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA	**Water**							
Batch R2430733								
WG1540537-2 CRM		**VA-HIGH-WATRM**						
Strontium (Sr)-Dissolved			98.3		%		80-120	04-SEP-12
Thallium (Tl)-Dissolved			98.7		%		80-120	04-SEP-12
Tin (Sn)-Dissolved			98.8		%		80-120	04-SEP-12
Titanium (Ti)-Dissolved			104.7		%		80-120	04-SEP-12
Vanadium (V)-Dissolved			99.1		%		80-120	04-SEP-12
WG1540537-1 MB								
Beryllium (Be)-Dissolved			<0.0050		mg/L		0.005	04-SEP-12
Bismuth (Bi)-Dissolved			<0.20		mg/L		0.2	04-SEP-12
Cobalt (Co)-Dissolved			<0.010		mg/L		0.01	04-SEP-12
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	04-SEP-12
Lithium (Li)-Dissolved			<0.010		mg/L		0.01	04-SEP-12
Molybdenum (Mo)-Dissolved			<0.030		mg/L		0.03	04-SEP-12
Nickel (Ni)-Dissolved			<0.050		mg/L		0.05	04-SEP-12
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	04-SEP-12
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	04-SEP-12
Silver (Ag)-Dissolved			<0.010		mg/L		0.01	04-SEP-12
Sodium (Na)-Dissolved			<2.0		mg/L		2	04-SEP-12
Strontium (Sr)-Dissolved			<0.0050		mg/L		0.005	04-SEP-12
Thallium (Tl)-Dissolved			<0.20		mg/L		0.2	04-SEP-12
Tin (Sn)-Dissolved			<0.030		mg/L		0.03	04-SEP-12
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	04-SEP-12
Vanadium (V)-Dissolved			<0.030		mg/L		0.03	04-SEP-12
Batch R2431723								
WG1541038-4 CRM		**VA-HIGH-WATRM**						
Beryllium (Be)-Dissolved			91.6		%		80-120	06-SEP-12
Bismuth (Bi)-Dissolved			96.5		%		80-120	06-SEP-12
Cobalt (Co)-Dissolved			91.7		%		80-120	06-SEP-12
Iron (Fe)-Dissolved			96.5		%		80-120	06-SEP-12
Lithium (Li)-Dissolved			96.5		%		80-120	06-SEP-12
Molybdenum (Mo)-Dissolved			93.3		%		80-120	06-SEP-12
Nickel (Ni)-Dissolved			94.8		%		80-120	06-SEP-12
Phosphorus (P)-Dissolved			97.3		%		80-120	06-SEP-12
Silicon (Si)-Dissolved			98.4		%		80-120	06-SEP-12
Silver (Ag)-Dissolved			94.5		%		80-120	06-SEP-12
Sodium (Na)-Dissolved			96.5		%		80-120	06-SEP-12

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA	**Water**							
Batch R2431723								
WG1541038-4 CRM		**VA-HIGH-WATRM**						
Strontium (Sr)-Dissolved			96.1		%		80-120	06-SEP-12
Thallium (Tl)-Dissolved			94.4		%		80-120	06-SEP-12
Tin (Sn)-Dissolved			95.2		%		80-120	06-SEP-12
Titanium (Ti)-Dissolved			100.4		%		80-120	06-SEP-12
Vanadium (V)-Dissolved			94.7		%		80-120	06-SEP-12
WG1541038-1 MB								
Beryllium (Be)-Dissolved			<0.0050		mg/L		0.005	06-SEP-12
Bismuth (Bi)-Dissolved			<0.20		mg/L		0.2	06-SEP-12
Cobalt (Co)-Dissolved			<0.010		mg/L		0.01	06-SEP-12
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	06-SEP-12
Lithium (Li)-Dissolved			<0.010		mg/L		0.01	06-SEP-12
Molybdenum (Mo)-Dissolved			<0.030		mg/L		0.03	06-SEP-12
Nickel (Ni)-Dissolved			<0.050		mg/L		0.05	06-SEP-12
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	06-SEP-12
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	06-SEP-12
Silver (Ag)-Dissolved			<0.010		mg/L		0.01	06-SEP-12
Sodium (Na)-Dissolved			<2.0		mg/L		2	06-SEP-12
Strontium (Sr)-Dissolved			<0.0050		mg/L		0.005	06-SEP-12
Thallium (Tl)-Dissolved			<0.20		mg/L		0.2	06-SEP-12
Tin (Sn)-Dissolved			<0.030		mg/L		0.03	06-SEP-12
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	06-SEP-12
Vanadium (V)-Dissolved			<0.030		mg/L		0.03	06-SEP-12
Batch R2432807								
WG1540537-40 MS		**L1203761-10**						
Iron (Fe)-Dissolved			95.5		%		70-130	09-SEP-12
Sodium (Na)-Dissolved			106.4		%		70-130	09-SEP-12
Titanium (Ti)-Dissolved			106.1		%		70-130	09-SEP-12
Batch R2433031								
WG1540537-19 DUP		**L1203640-10**						
Beryllium (Be)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	09-SEP-12
Bismuth (Bi)-Dissolved		<0.20	<0.20	RPD-NA	mg/L	N/A	20	09-SEP-12
Cobalt (Co)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	09-SEP-12
Iron (Fe)-Dissolved		<0.030	<0.030	RPD-NA	mg/L	N/A	20	09-SEP-12
Lithium (Li)-Dissolved		0.011	0.012		mg/L	6.7	20	09-SEP-12
Molybdenum (Mo)-Dissolved		<0.030	<0.030	RPD-NA	mg/L	N/A	20	09-SEP-12

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA	**Water**							
Batch R2433031								
WG1540537-19 DUP		**L1203640-10**						
Nickel (Ni)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	09-SEP-12
Phosphorus (P)-Dissolved		<0.30	<0.30	RPD-NA	mg/L	N/A	20	09-SEP-12
Silicon (Si)-Dissolved		6.37	6.29		mg/L	1.3	20	09-SEP-12
Silver (Ag)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	09-SEP-12
Sodium (Na)-Dissolved		30.4	30.4		mg/L	0.1	20	09-SEP-12
Strontium (Sr)-Dissolved		1.08	1.07		mg/L	0.6	20	09-SEP-12
Thallium (Tl)-Dissolved		<0.20	<0.20	RPD-NA	mg/L	N/A	20	09-SEP-12
Tin (Sn)-Dissolved		<0.030	<0.030	RPD-NA	mg/L	N/A	20	09-SEP-12
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	09-SEP-12
Vanadium (V)-Dissolved		<0.030	<0.030	RPD-NA	mg/L	N/A	20	09-SEP-12
WG1540537-20 MS		**L1203640-12**						
Iron (Fe)-Dissolved			95.0		%		70-130	09-SEP-12
Sodium (Na)-Dissolved			103.6		%		70-130	09-SEP-12
Titanium (Ti)-Dissolved			103.6		%		70-130	09-SEP-12
Batch R2433107								
WG1540537-32 MS		**L1204697-1**						
Iron (Fe)-Dissolved			92.6		%		70-130	10-SEP-12
Sodium (Na)-Dissolved			98.5		%		70-130	10-SEP-12
Titanium (Ti)-Dissolved			100.3		%		70-130	10-SEP-12
WG1540537-38 MS		**L1204824-3**						
Iron (Fe)-Dissolved			97.4		%		70-130	10-SEP-12
Sodium (Na)-Dissolved			N/A	MS-B	%		-	10-SEP-12
Titanium (Ti)-Dissolved			101.4		%		70-130	10-SEP-12
Batch R2433175								
WG1540537-31 MS		**L1204708-2**						
Iron (Fe)-Dissolved			93.1		%		70-130	07-SEP-12
Sodium (Na)-Dissolved			92.1		%		70-130	07-SEP-12
Titanium (Ti)-Dissolved			100.3		%		70-130	07-SEP-12
WG1541038-5 MS		**L1204276-3**						
Iron (Fe)-Dissolved			88.9		%		70-130	07-SEP-12
Sodium (Na)-Dissolved			86.6		%		70-130	07-SEP-12
Titanium (Ti)-Dissolved			97.4		%		70-130	07-SEP-12

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-ICP-VA	**Water**							
Batch R2433700								
WG1540537-10 MS		**L1204272-13**						
Iron (Fe)-Dissolved			96.2		%		70-130	10-SEP-12
Sodium (Na)-Dissolved			102.5		%		70-130	10-SEP-12
Titanium (Ti)-Dissolved			103.2		%		70-130	10-SEP-12
WG1540537-8 MS		**L1204272-3**						
Iron (Fe)-Dissolved			95.3		%		70-130	10-SEP-12
Sodium (Na)-Dissolved			101.9		%		70-130	10-SEP-12
Titanium (Ti)-Dissolved			101.8		%		70-130	10-SEP-12
Batch R2434379								
WG1540537-17 DUP		**L1203640-1**						
Beryllium (Be)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	11-SEP-12
Bismuth (Bi)-Dissolved		<0.40	<0.40	RPD-NA	mg/L	N/A	20	11-SEP-12
Cobalt (Co)-Dissolved		<0.020	<0.020	RPD-NA	mg/L	N/A	20	11-SEP-12
Iron (Fe)-Dissolved		<0.060	<0.060	RPD-NA	mg/L	N/A	20	11-SEP-12
Lithium (Li)-Dissolved		0.029	0.028		mg/L	1.5	20	11-SEP-12
Molybdenum (Mo)-Dissolved		<0.060	<0.060	RPD-NA	mg/L	N/A	20	11-SEP-12
Nickel (Ni)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	11-SEP-12
Phosphorus (P)-Dissolved		<0.60	<0.60	RPD-NA	mg/L	N/A	20	11-SEP-12
Silicon (Si)-Dissolved		7.67	7.55		mg/L	1.6	20	11-SEP-12
Silver (Ag)-Dissolved		<0.020	<0.020	RPD-NA	mg/L	N/A	20	11-SEP-12
Sodium (Na)-Dissolved		44.3	42.9		mg/L	3.2	20	11-SEP-12
Strontium (Sr)-Dissolved		1.34	1.30		mg/L	3.1	20	11-SEP-12
Thallium (Tl)-Dissolved		<0.40	<0.40	RPD-NA	mg/L	N/A	20	11-SEP-12
Tin (Sn)-Dissolved		<0.060	<0.060	RPD-NA	mg/L	N/A	20	11-SEP-12
Titanium (Ti)-Dissolved		<0.020	<0.020	RPD-NA	mg/L	N/A	20	11-SEP-12
Vanadium (V)-Dissolved		<0.060	<0.060	RPD-NA	mg/L	N/A	20	11-SEP-12
MET-DIS-LOW-MS-VA	**Water**							
Batch R2431675								
WG1540537-1 MB								
Aluminum (Al)-Dissolved			<0.0030		mg/L		0.003	06-SEP-12
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-12
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-12
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-12
Boron (B)-Dissolved			<0.010		mg/L		0.01	06-SEP-12
Cadmium (Cd)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-12
Calcium (Ca)-Dissolved			<0.020		mg/L		0.02	06-SEP-12

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-LOW-MS-VA	**Water**							
Batch	**R2431675**							
WG1540537-1	**MB**							
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	06-SEP-12
Copper (Cu)-Dissolved			<0.00050		mg/L		0.0005	06-SEP-12
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-12
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	06-SEP-12
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-12
Potassium (K)-Dissolved			<0.050		mg/L		0.05	06-SEP-12
Selenium (Se)-Dissolved			<0.0010		mg/L		0.001	06-SEP-12
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-12
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	06-SEP-12
WG1541038-1	**MB**							
Aluminum (Al)-Dissolved			<0.0030		mg/L		0.003	06-SEP-12
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-12
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-12
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-12
Boron (B)-Dissolved			<0.010		mg/L		0.01	06-SEP-12
Cadmium (Cd)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-12
Calcium (Ca)-Dissolved			<0.020		mg/L		0.02	06-SEP-12
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	06-SEP-12
Copper (Cu)-Dissolved			<0.00050		mg/L		0.0005	06-SEP-12
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-12
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	06-SEP-12
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-12
Potassium (K)-Dissolved			<0.050		mg/L		0.05	06-SEP-12
Selenium (Se)-Dissolved			<0.0010		mg/L		0.001	06-SEP-12
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-12
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	06-SEP-12
Batch	**R2432716**							
WG1540537-19	**DUP**	**L1203640-10**						
Aluminum (Al)-Dissolved		<0.010	<0.0030	RPD-NA	mg/L	N/A	20	08-SEP-12
Antimony (Sb)-Dissolved		<0.00050	0.00020		mg/L	6.7	20	08-SEP-12
Arsenic (As)-Dissolved		0.00095	0.00101		mg/L	5.8	20	08-SEP-12
Barium (Ba)-Dissolved		0.117	0.114		mg/L	2.2	20	08-SEP-12
Boron (B)-Dissolved		<0.10	0.033		mg/L	5.3	20	08-SEP-12
Cadmium (Cd)-Dissolved		<0.00020	0.000057		mg/L	3.3	20	08-SEP-12
Calcium (Ca)-Dissolved		113	117		mg/L	3.4	20	08-SEP-12

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-LOW-MS-VA	**Water**							
Batch	**R2432716**							
WG1540537-19 DUP		**L1203640-10**						
Chromium (Cr)-Dissolved		<0.0020	<0.00050	RPD-NA	mg/L	N/A	20	08-SEP-12
Copper (Cu)-Dissolved		<0.0010	0.00061		mg/L	1.0	20	08-SEP-12
Lead (Pb)-Dissolved		<0.00050	<0.000050	RPD-NA	mg/L	N/A	20	08-SEP-12
Magnesium (Mg)-Dissolved		77.4	75.7		mg/L	2.2	20	08-SEP-12
Manganese (Mn)-Dissolved		0.0875	0.0887		mg/L	1.4	20	08-SEP-12
Potassium (K)-Dissolved		4.53	4.56		mg/L	0.8	20	08-SEP-12
Selenium (Se)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	08-SEP-12
Uranium (U)-Dissolved		0.0185	0.0184		mg/L	0.6	20	08-SEP-12
Zinc (Zn)-Dissolved		<0.050	<0.0030	RPD-NA	mg/L	N/A	20	08-SEP-12
Batch	**R2433051**							
WG1540537-2 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Dissolved			99.9		%		80-120	07-SEP-12
Antimony (Sb)-Dissolved			106.5		%		80-120	07-SEP-12
Arsenic (As)-Dissolved			103.0		%		80-120	07-SEP-12
Barium (Ba)-Dissolved			102.9		%		80-120	07-SEP-12
Boron (B)-Dissolved			93.2		%		80-120	07-SEP-12
Cadmium (Cd)-Dissolved			102.5		%		80-120	07-SEP-12
Calcium (Ca)-Dissolved			99.7		%		80-120	07-SEP-12
Chromium (Cr)-Dissolved			103.6		%		80-120	07-SEP-12
Copper (Cu)-Dissolved			98.8		%		80-120	07-SEP-12
Lead (Pb)-Dissolved			101.9		%		80-120	07-SEP-12
Magnesium (Mg)-Dissolved			100.1		%		80-120	07-SEP-12
Manganese (Mn)-Dissolved			98.8		%		80-120	07-SEP-12
Potassium (K)-Dissolved			97.3		%		80-120	07-SEP-12
Selenium (Se)-Dissolved			101.9		%		80-120	07-SEP-12
Uranium (U)-Dissolved			103.4		%		80-120	07-SEP-12
Zinc (Zn)-Dissolved			98.7		%		80-120	07-SEP-12
WG1541038-4 CRM		**VA-HIGH-WATRM**						
Aluminum (Al)-Dissolved			98.0		%		80-120	07-SEP-12
Antimony (Sb)-Dissolved			103.9		%		80-120	07-SEP-12
Arsenic (As)-Dissolved			99.4		%		80-120	07-SEP-12
Barium (Ba)-Dissolved			96.2		%		80-120	07-SEP-12
Boron (B)-Dissolved			88.1		%		80-120	07-SEP-12
Cadmium (Cd)-Dissolved			100.1		%		80-120	07-SEP-12
Calcium (Ca)-Dissolved			95.8		%		80-120	07-SEP-12

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-LOW-MS-VA	**Water**							
Batch	**R2433051**							
WG1541038-4 CRM		**VA-HIGH-WATRM**						
Chromium (Cr)-Dissolved			99.9		%		80-120	07-SEP-12
Copper (Cu)-Dissolved			95.4		%		80-120	07-SEP-12
Lead (Pb)-Dissolved			95.1		%		80-120	07-SEP-12
Magnesium (Mg)-Dissolved			94.9		%		80-120	07-SEP-12
Manganese (Mn)-Dissolved			96.7		%		80-120	07-SEP-12
Potassium (K)-Dissolved			96.5		%		80-120	07-SEP-12
Selenium (Se)-Dissolved			98.2		%		80-120	07-SEP-12
Uranium (U)-Dissolved			96.2		%		80-120	07-SEP-12
Zinc (Zn)-Dissolved			93.9		%		80-120	07-SEP-12
Batch	**R2433805**							
WG1540537-38 MS		**L1204824-3**						
Aluminum (Al)-Dissolved			93.0		%		70-130	10-SEP-12
Antimony (Sb)-Dissolved			100.4		%		70-130	10-SEP-12
Arsenic (As)-Dissolved			106.2		%		70-130	10-SEP-12
Barium (Ba)-Dissolved			N/A	MS-B	%		-	10-SEP-12
Boron (B)-Dissolved			N/A	MS-B	%		-	10-SEP-12
Cadmium (Cd)-Dissolved			98.8		%		70-130	10-SEP-12
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	10-SEP-12
Chromium (Cr)-Dissolved			91.9		%		70-130	10-SEP-12
Copper (Cu)-Dissolved			90.4		%		70-130	10-SEP-12
Lead (Pb)-Dissolved			87.0		%		70-130	10-SEP-12
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	10-SEP-12
Manganese (Mn)-Dissolved			91.3		%		70-130	10-SEP-12
Potassium (K)-Dissolved			N/A	MS-B	%		-	10-SEP-12
Selenium (Se)-Dissolved			98.5		%		70-130	10-SEP-12
Uranium (U)-Dissolved			90.5		%		70-130	10-SEP-12
Zinc (Zn)-Dissolved			92.6		%		70-130	10-SEP-12
Batch	**R2433912**							
WG1540537-17 DUP		**L1203640-1**						
Aluminum (Al)-Dissolved		<0.050	<0.015	RPD-NA	mg/L	N/A	20	11-SEP-12
Antimony (Sb)-Dissolved		<0.0025	<0.00050	RPD-NA	mg/L	N/A	20	11-SEP-12
Arsenic (As)-Dissolved		0.00091	0.00094		mg/L	3.7	20	11-SEP-12
Barium (Ba)-Dissolved		<0.10	0.0280		mg/L	2.9	20	11-SEP-12
Boron (B)-Dissolved		<0.50	<0.050	RPD-NA	mg/L	N/A	20	11-SEP-12

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-LOW-MS-VA	**Water**							
Batch	**R2433912**							
WG1540537-17 DUP		**L1203640-1**						
Cadmium (Cd)-Dissolved		<0.0010	0.00055		mg/L	7.7	20	11-SEP-12
Calcium (Ca)-Dissolved		459	444		mg/L	3.3	20	11-SEP-12
Chromium (Cr)-Dissolved		<0.010	<0.0025	RPD-NA	mg/L	N/A	20	11-SEP-12
Copper (Cu)-Dissolved		<0.0050	<0.0025	RPD-NA	mg/L	N/A	20	11-SEP-12
Lead (Pb)-Dissolved		<0.0025	<0.00025	RPD-NA	mg/L	N/A	20	11-SEP-12
Magnesium (Mg)-Dissolved		672	645		mg/L	4.1	20	11-SEP-12
Manganese (Mn)-Dissolved		2.00	1.98		mg/L	0.9	20	11-SEP-12
Potassium (K)-Dissolved		8.84	8.63		mg/L	2.3	20	11-SEP-12
Selenium (Se)-Dissolved		0.0060	0.0060		mg/L	1.0	20	11-SEP-12
Uranium (U)-Dissolved		0.0709	0.0721		mg/L	1.7	20	11-SEP-12
Zinc (Zn)-Dissolved		<0.25	<0.015	RPD-NA	mg/L	N/A	20	11-SEP-12
WG1540537-20 MS		**L1203640-12**						
Aluminum (Al)-Dissolved			99.7		%		70-130	11-SEP-12
Antimony (Sb)-Dissolved			106.9		%		70-130	11-SEP-12
Arsenic (As)-Dissolved			106.8		%		70-130	11-SEP-12
Barium (Ba)-Dissolved			N/A	MS-B	%		-	11-SEP-12
Boron (B)-Dissolved			92.3		%		70-130	11-SEP-12
Cadmium (Cd)-Dissolved			103.4		%		70-130	11-SEP-12
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	11-SEP-12
Chromium (Cr)-Dissolved			96.8		%		70-130	11-SEP-12
Copper (Cu)-Dissolved			103.2		%		70-130	11-SEP-12
Lead (Pb)-Dissolved			101.1		%		70-130	11-SEP-12
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	11-SEP-12
Manganese (Mn)-Dissolved			103.2		%		70-130	11-SEP-12
Potassium (K)-Dissolved			101.5		%		70-130	11-SEP-12
Selenium (Se)-Dissolved			104.5		%		70-130	11-SEP-12
Uranium (U)-Dissolved			102.5		%		70-130	11-SEP-12
Zinc (Zn)-Dissolved			97.8		%		70-130	11-SEP-12
Batch	**R2433950**							
WG1540537-32 MS		**L1204697-1**						
Aluminum (Al)-Dissolved			100.6		%		70-130	11-SEP-12
Antimony (Sb)-Dissolved			111.6		%		70-130	11-SEP-12
Arsenic (As)-Dissolved			110.5		%		70-130	11-SEP-12
Barium (Ba)-Dissolved			N/A	MS-B	%		-	11-SEP-12

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-LOW-MS-VA	**Water**							
Batch R2433950								
WG1540537-32 MS		**L1204697-1**						
Boron (B)-Dissolved			N/A	MS-B	%		-	11-SEP-12
Cadmium (Cd)-Dissolved			98.9		%		70-130	11-SEP-12
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	11-SEP-12
Chromium (Cr)-Dissolved			97.2		%		70-130	11-SEP-12
Copper (Cu)-Dissolved			94.2		%		70-130	11-SEP-12
Lead (Pb)-Dissolved			92.9		%		70-130	11-SEP-12
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	11-SEP-12
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	11-SEP-12
Potassium (K)-Dissolved			N/A	MS-B	%		-	11-SEP-12
Selenium (Se)-Dissolved			114.1		%		70-130	11-SEP-12
Uranium (U)-Dissolved			92.7		%		70-130	11-SEP-12
Zinc (Zn)-Dissolved			93.2		%		70-130	11-SEP-12
Batch R2434404								
WG1540537-12 MS		**L1204732-3**						
Aluminum (Al)-Dissolved			91.5		%		70-130	11-SEP-12
Antimony (Sb)-Dissolved			98.9		%		70-130	11-SEP-12
Arsenic (As)-Dissolved			N/A	MS-B	%		-	11-SEP-12
Barium (Ba)-Dissolved			97.8		%		70-130	11-SEP-12
Boron (B)-Dissolved			N/A	MS-B	%		-	11-SEP-12
Cadmium (Cd)-Dissolved			101.7		%		70-130	11-SEP-12
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	11-SEP-12
Chromium (Cr)-Dissolved			95.1		%		70-130	11-SEP-12
Copper (Cu)-Dissolved			89.7		%		70-130	11-SEP-12
Lead (Pb)-Dissolved			95.2		%		70-130	11-SEP-12
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	11-SEP-12
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	11-SEP-12
Potassium (K)-Dissolved			89.5		%		70-130	11-SEP-12
Selenium (Se)-Dissolved			106.9		%		70-130	11-SEP-12
Uranium (U)-Dissolved			N/A	MS-B	%		-	11-SEP-12
Zinc (Zn)-Dissolved			91.2		%		70-130	11-SEP-12
NH3-F-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-F-VA	**Water**							
Batch R2432042								
WG1541509-10 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			97.9		%		85-115	07-SEP-12
WG1541509-2 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			102.4		%		85-115	07-SEP-12
WG1541509-4 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			100.1		%		85-115	07-SEP-12
WG1541509-6 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			88.8		%		85-115	07-SEP-12
WG1541509-8 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			97.6		%		85-115	07-SEP-12
WG1541509-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	07-SEP-12
WG1541509-3 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	07-SEP-12
WG1541509-5 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	07-SEP-12
WG1541509-7 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	07-SEP-12
WG1541509-9 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	07-SEP-12
WG1541509-12 MS		**L1203418-30**						
Ammonia, Total (as N)			105.5		%		75-125	07-SEP-12
Batch R2432481								
WG1542715-10 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			106.2		%		85-115	09-SEP-12
WG1542715-2 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			101.1		%		85-115	09-SEP-12
WG1542715-4 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			99.2		%		85-115	09-SEP-12
WG1542715-6 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			99.0		%		85-115	09-SEP-12
WG1542715-8 CRM		**VA-NH3-F**						
Ammonia, Total (as N)			101.7		%		85-115	09-SEP-12
WG1542715-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	09-SEP-12
WG1542715-3 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	09-SEP-12
WG1542715-5 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	09-SEP-12

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-F-VA	**Water**							
Batch R2432481								
WG1542715-7 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	09-SEP-12
WG1542715-9 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	09-SEP-12
WG1542715-12 MS		**L1205539-1**						
Ammonia, Total (as N)			97.8		%		75-125	09-SEP-12
WG1542715-14 MS		**L1203698-9**						
Ammonia, Total (as N)			106.4		%		75-125	09-SEP-12
PAH-SF-MS-VA	**Water**							
Batch R2431312								
WG1541190-2 LCS								
Acenaphthene			96.8		%		60-130	07-SEP-12
Acenaphthylene			95.7		%		60-130	07-SEP-12
Acridine			97.0		%		60-130	07-SEP-12
Anthracene			102.4		%		60-130	07-SEP-12
Benz(a)anthracene			92.9		%		60-130	07-SEP-12
Benzo(a)pyrene			94.5		%		60-130	07-SEP-12
Benzo(b)fluoranthene			96.9		%		60-130	07-SEP-12
Benzo(g,h,i)perylene			94.9		%		60-130	07-SEP-12
Benzo(k)fluoranthene			104.2		%		60-130	07-SEP-12
Chrysene			96.5		%		60-130	07-SEP-12
Dibenz(a,h)anthracene			100.6		%		60-130	07-SEP-12
Fluoranthene			99.8		%		60-130	07-SEP-12
Fluorene			97.4		%		60-130	07-SEP-12
Indeno(1,2,3-c,d)pyrene			98.3		%		60-130	07-SEP-12
Naphthalene			89.9		%		50-130	07-SEP-12
Phenanthrene			102.4		%		60-130	07-SEP-12
Pyrene			99.0		%		60-130	07-SEP-12
Quinoline			95.0		%		60-130	07-SEP-12
WG1541190-1 MB								
Acenaphthene			<0.000050		mg/L		0.00005	07-SEP-12
Acenaphthylene			<0.000050		mg/L		0.00005	07-SEP-12
Acridine			<0.000050		mg/L		0.00005	07-SEP-12
Anthracene			<0.000050		mg/L		0.00005	07-SEP-12
Benz(a)anthracene			<0.000050		mg/L		0.00005	07-SEP-12
Benzo(a)pyrene			<0.000010		mg/L		0.00001	07-SEP-12

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-SF-MS-VA	**Water**							
Batch R2431312								
WG1541190-1 MB								
Benzo(b)fluoranthene			<0.000050		mg/L		0.00005	07-SEP-12
Benzo(g,h,i)perylene			<0.000050		mg/L		0.00005	07-SEP-12
Benzo(k)fluoranthene			<0.000050		mg/L		0.00005	07-SEP-12
Chrysene			<0.000050		mg/L		0.00005	07-SEP-12
Dibenz(a,h)anthracene			<0.000050		mg/L		0.00005	07-SEP-12
Fluoranthene			<0.000050		mg/L		0.00005	07-SEP-12
Fluorene			<0.000050		mg/L		0.00005	07-SEP-12
Indeno(1,2,3-c,d)pyrene			<0.000050		mg/L		0.00005	07-SEP-12
Naphthalene			<0.000050		mg/L		0.00005	07-SEP-12
Phenanthrene			<0.000050		mg/L		0.00005	07-SEP-12
Pyrene			<0.000050		mg/L		0.00005	07-SEP-12
Quinoline			<0.000050		mg/L		0.00005	07-SEP-12
Batch R2431882								
WG1541190-3 MB								
Acenaphthene			<0.000050		mg/L		0.00005	12-SEP-12
Acenaphthylene			<0.000050		mg/L		0.00005	12-SEP-12
Acridine			<0.000050		mg/L		0.00005	12-SEP-12
Anthracene			<0.000050		mg/L		0.00005	12-SEP-12
Benz(a)anthracene			<0.000050		mg/L		0.00005	12-SEP-12
Benzo(a)pyrene			<0.000010		mg/L		0.00001	12-SEP-12
Benzo(b)fluoranthene			<0.000050		mg/L		0.00005	12-SEP-12
Benzo(g,h,i)perylene			<0.000050		mg/L		0.00005	12-SEP-12
Benzo(k)fluoranthene			<0.000050		mg/L		0.00005	12-SEP-12
Chrysene			<0.000050		mg/L		0.00005	12-SEP-12
Dibenz(a,h)anthracene			<0.000050		mg/L		0.00005	12-SEP-12
Fluoranthene			<0.000050		mg/L		0.00005	12-SEP-12
Fluorene			<0.000050		mg/L		0.00005	12-SEP-12
Indeno(1,2,3-c,d)pyrene			<0.000050		mg/L		0.00005	12-SEP-12
Naphthalene			<0.000050		mg/L		0.00005	12-SEP-12
Phenanthrene			<0.000050		mg/L		0.00005	12-SEP-12
Pyrene			<0.000050		mg/L		0.00005	12-SEP-12
Quinoline			<0.000050		mg/L		0.00005	12-SEP-12
PH-MAN-WR	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-MAN-WR	**Water**							
Batch R2432843								
WG1541397-1 LCS								
pH			100.0		%		70-130	06-SEP-12
TDS-VA	**Water**							
Batch R2432580								
WG1542235-2 LCS								
Total Dissolved Solids			101.6		%		85-115	07-SEP-12
WG1542235-5 LCS								
Total Dissolved Solids			102.1		%		85-115	07-SEP-12
WG1542235-8 LCS								
Total Dissolved Solids			100.9		%		85-115	07-SEP-12
WG1542235-1 MB								
Total Dissolved Solids			<10		mg/L		10	07-SEP-12
WG1542235-4 MB								
Total Dissolved Solids			<10		mg/L		10	07-SEP-12
WG1542235-7 MB								
Total Dissolved Solids			<10		mg/L		10	07-SEP-12
TKN-F-VA	**Water**							
Batch R2433109								
WG1540620-3 DUP		**L1203640-12**						
Total Kjeldahl Nitrogen		0.113	0.108		mg/L	3.7	20	10-SEP-12
WG1540620-2 LCS								
Total Kjeldahl Nitrogen			101.7		%		75-125	10-SEP-12
WG1540620-5 LCS								
Total Kjeldahl Nitrogen			101.6		%		75-125	10-SEP-12
WG1540620-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	10-SEP-12
WG1540620-4 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	10-SEP-12
TURBIDITY-WR	**Water**							
Batch R2433599								
WG1542241-3 DUP		**L1203640-10**						
Turbidity		13900	13800		NTU	0.7	15	07-SEP-12
WG1542241-2 LCS								
Turbidity			104.4		%		85-115	07-SEP-12
WG1542241-1 MB								
Turbidity			<0.10		NTU		0.1	07-SEP-12
VH-HSFID-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VH-HSFID-VA	**Water**							
Batch R2427652								
WG1542764-2 LCS								
Volatile Hydrocarbons (VH6-10)			86.9		%		70-130	12-SEP-12
WG1542764-1 MB								
Volatile Hydrocarbons (VH6-10)			<0.10		mg/L		0.1	12-SEP-12
VOC-HSMS-VA	**Water**							
Batch R2426011								
WG1542764-2 LCS								
Bromodichloromethane			85.2		%		70-130	09-SEP-12
Bromoform			77.5		%		70-130	09-SEP-12
Carbon Tetrachloride			93.6		%		70-130	09-SEP-12
Chlorobenzene			91.8		%		70-130	09-SEP-12
Dibromochloromethane			87.3		%		70-130	09-SEP-12
Chloroethane			88.7		%		60-140	09-SEP-12
Chloroform			87.3		%		70-130	09-SEP-12
Chloromethane			78.3		%		60-140	09-SEP-12
1,2-Dichlorobenzene			93.7		%		70-130	09-SEP-12
1,3-Dichlorobenzene			100.3		%		70-130	09-SEP-12
1,4-Dichlorobenzene			98.5		%		70-130	09-SEP-12
1,1-Dichloroethane			84.8		%		70-130	09-SEP-12
1,2-Dichloroethane			81.2		%		70-130	09-SEP-12
1,1-Dichloroethylene			75.3		%		70-130	09-SEP-12
cis-1,2-Dichloroethylene			86.4		%		70-130	09-SEP-12
trans-1,2-Dichloroethylene			84.5		%		70-130	09-SEP-12
Dichloromethane			79.1		%		60-140	09-SEP-12
1,2-Dichloropropane			86.5		%		70-130	09-SEP-12
cis-1,3-Dichloropropylene			78.7		%		70-130	09-SEP-12
trans-1,3-Dichloropropylene			82.0		%		70-130	09-SEP-12
1,1,1,2-Tetrachloroethane			91.2		%		70-130	09-SEP-12
1,1,2,2-Tetrachloroethane			74.6		%		70-130	09-SEP-12
Tetrachloroethylene			99.1		%		70-130	09-SEP-12
1,1,1-Trichloroethane			92.2		%		70-130	09-SEP-12
1,1,2-Trichloroethane			89.8		%		70-130	09-SEP-12
Trichloroethylene			92.0		%		70-130	09-SEP-12
Trichlorofluoromethane			100.8		%		60-140	09-SEP-12
Vinyl Chloride			90.0		%		60-140	09-SEP-12
WG1542764-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-HSMS-VA	**Water**							
Batch R2426011								
WG1542764-1 MB								
Bromodichloromethane			<0.0010		mg/L		0.001	09-SEP-12
Bromoform			<0.0010		mg/L		0.001	09-SEP-12
Carbon Tetrachloride			<0.00050		mg/L		0.0005	09-SEP-12
Chlorobenzene			<0.0010		mg/L		0.001	09-SEP-12
Dibromochloromethane			<0.0010		mg/L		0.001	09-SEP-12
Chloroethane			<0.0010		mg/L		0.001	09-SEP-12
Chloroform			<0.0010		mg/L		0.001	09-SEP-12
Chloromethane			<0.0050		mg/L		0.005	09-SEP-12
1,2-Dichlorobenzene			<0.00070		mg/L		0.0007	09-SEP-12
1,3-Dichlorobenzene			<0.0010		mg/L		0.001	09-SEP-12
1,4-Dichlorobenzene			<0.0010		mg/L		0.001	09-SEP-12
1,1-Dichloroethane			<0.0010		mg/L		0.001	09-SEP-12
1,2-Dichloroethane			<0.0010		mg/L		0.001	09-SEP-12
1,1-Dichloroethylene			<0.0010		mg/L		0.001	09-SEP-12
cis-1,2-Dichloroethylene			<0.0010		mg/L		0.001	09-SEP-12
trans-1,2-Dichloroethylene			<0.0010		mg/L		0.001	09-SEP-12
Dichloromethane			<0.0050		mg/L		0.005	09-SEP-12
1,2-Dichloropropane			<0.0010		mg/L		0.001	09-SEP-12
cis-1,3-Dichloropropylene			<0.0010		mg/L		0.001	09-SEP-12
trans-1,3-Dichloropropylene			<0.0010		mg/L		0.001	09-SEP-12
1,1,1,2-Tetrachloroethane			<0.0010		mg/L		0.001	09-SEP-12
1,1,2,2-Tetrachloroethane			<0.0010		mg/L		0.001	09-SEP-12
Tetrachloroethylene			<0.0010		mg/L		0.001	09-SEP-12
1,1,1-Trichloroethane			<0.0010		mg/L		0.001	09-SEP-12
1,1,2-Trichloroethane			<0.0010		mg/L		0.001	09-SEP-12
Trichloroethylene			<0.0010		mg/L		0.001	09-SEP-12
Trichlorofluoromethane			<0.0010		mg/L		0.001	09-SEP-12
Vinyl Chloride			<0.0010		mg/L		0.001	09-SEP-12
VOC7-HSMS-VA	**Water**							
Batch R2426011								
WG1542764-2 LCS								
Benzene			87.1		%		70-130	09-SEP-12
Ethylbenzene			100.3		%		70-130	09-SEP-12
Methyl t-butyl ether (MTBE)			92.9		%		70-130	09-SEP-12

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC7-HSMS-VA	**Water**							
Batch R2426011								
WG1542764-2 LCS								
Styrene			96.5		%		70-130	09-SEP-12
Toluene			95.3		%		70-130	09-SEP-12
meta- & para-Xylene			101.4		%		70-130	09-SEP-12
ortho-Xylene			98.7		%		70-130	09-SEP-12
WG1542764-1 MB								
Benzene			<0.00050		mg/L		0.0005	09-SEP-12
Ethylbenzene			<0.00050		mg/L		0.0005	09-SEP-12
Methyl t-butyl ether (MTBE)			<0.00050		mg/L		0.0005	09-SEP-12
Styrene			<0.00050		mg/L		0.0005	09-SEP-12
Toluene			<0.00050		mg/L		0.0005	09-SEP-12
meta- & para-Xylene			<0.00050		mg/L		0.0005	09-SEP-12
ortho-Xylene			<0.00050		mg/L		0.0005	09-SEP-12

Legend:

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH by Meter							
	1	31-AUG-12 10:50	06-SEP-12 16:57	24	150	hours	EHTR
	2	31-AUG-12 13:20	06-SEP-12 16:57	24	148	hours	EHTR
	3	01-SEP-12 11:10	06-SEP-12 16:57	24	126	hours	EHTR
	4	31-AUG-12 15:30	06-SEP-12 16:57	24	145	hours	EHTR
	5	31-AUG-12 17:40	06-SEP-12 16:57	24	143	hours	EHTR
	6	31-AUG-12 18:15	06-SEP-12 16:57	24	143	hours	EHTR
	7	31-AUG-12 15:30	06-SEP-12 16:57	24	145	hours	EHTR
	8	02-SEP-12 12:00	06-SEP-12 16:57	24	101	hours	EHTR
	9	01-SEP-12 15:20	06-SEP-12 16:57	24	122	hours	EHTR
	10	01-SEP-12 16:20	06-SEP-12 16:57	24	121	hours	EHTR
	11	01-SEP-12 17:15	06-SEP-12 16:57	24	120	hours	EHTR
	12	02-SEP-12 14:50	06-SEP-12 16:57	24	98	hours	EHTR
Anions and Nutrients							
Nitrate Nitrogen by Ion Chromatography							
	1	31-AUG-12 10:50	04-SEP-12 15:20	3	4	days	EHTR
	2	31-AUG-12 13:20	04-SEP-12 15:20	3	4	days	EHTR
	4	31-AUG-12 15:30	04-SEP-12 15:20	3	4	days	EHTR
	5	31-AUG-12 17:40	04-SEP-12 15:20	3	4	days	EHTR
	6	31-AUG-12 18:15	04-SEP-12 15:20	3	4	days	EHTR
	7	31-AUG-12 15:30	04-SEP-12 15:20	3	4	days	EHTR
Nitrite Nitrogen by Ion Chromatography							
	1	31-AUG-12 10:50	04-SEP-12 15:20	3	4	days	EHTR
	2	31-AUG-12 13:20	04-SEP-12 15:20	3	4	days	EHTR
	4	31-AUG-12 15:30	04-SEP-12 15:20	3	4	days	EHTR
	5	31-AUG-12 17:40	04-SEP-12 15:20	3	4	days	EHTR
	6	31-AUG-12 18:15	04-SEP-12 15:20	3	4	days	EHTR
	7	31-AUG-12 15:30	04-SEP-12 15:20	3	4	days	EHTR

Legend & Qualifier Definitions:

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

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1203640 were received on 04-SEP-12 10:10.

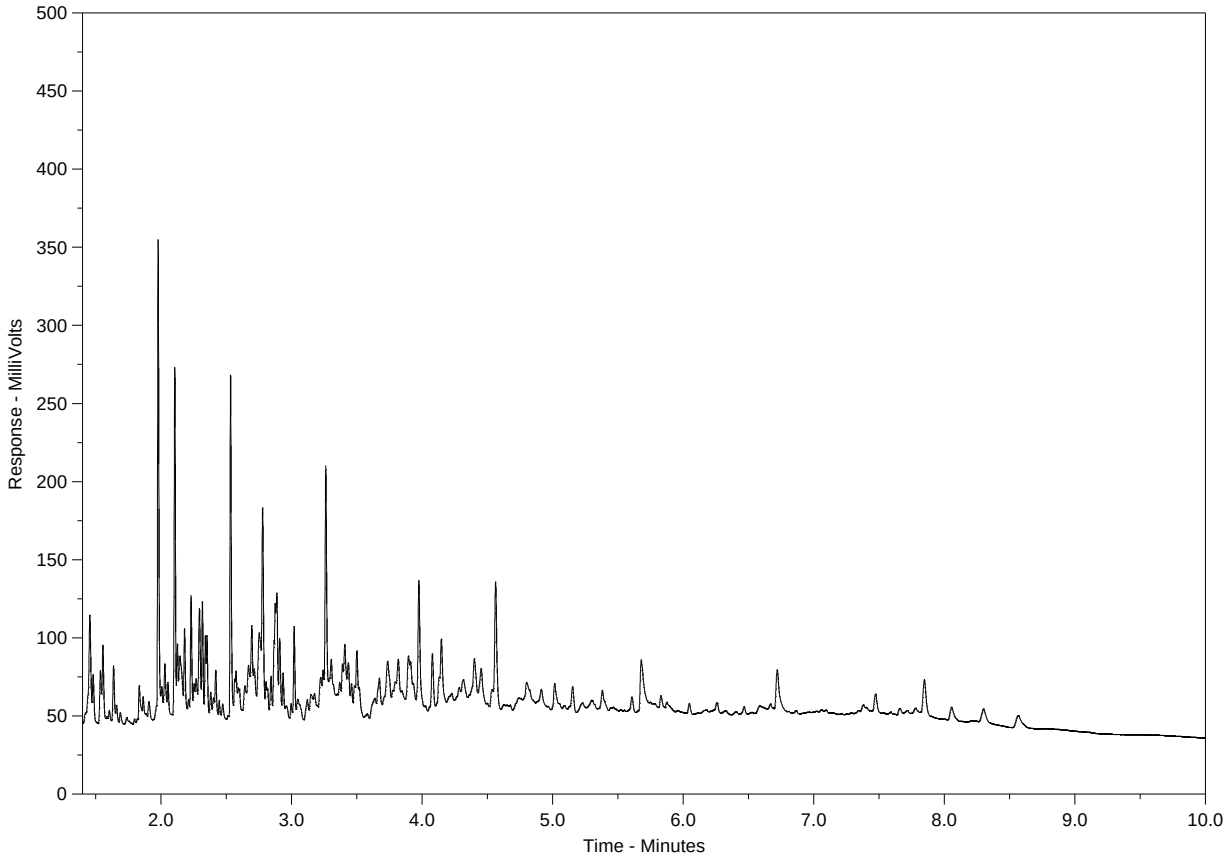
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where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

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

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

Hydrocarbon Distribution Report

ALS Sample ID: L1203640-1
Client Sample ID: RR NUMBER 1



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.

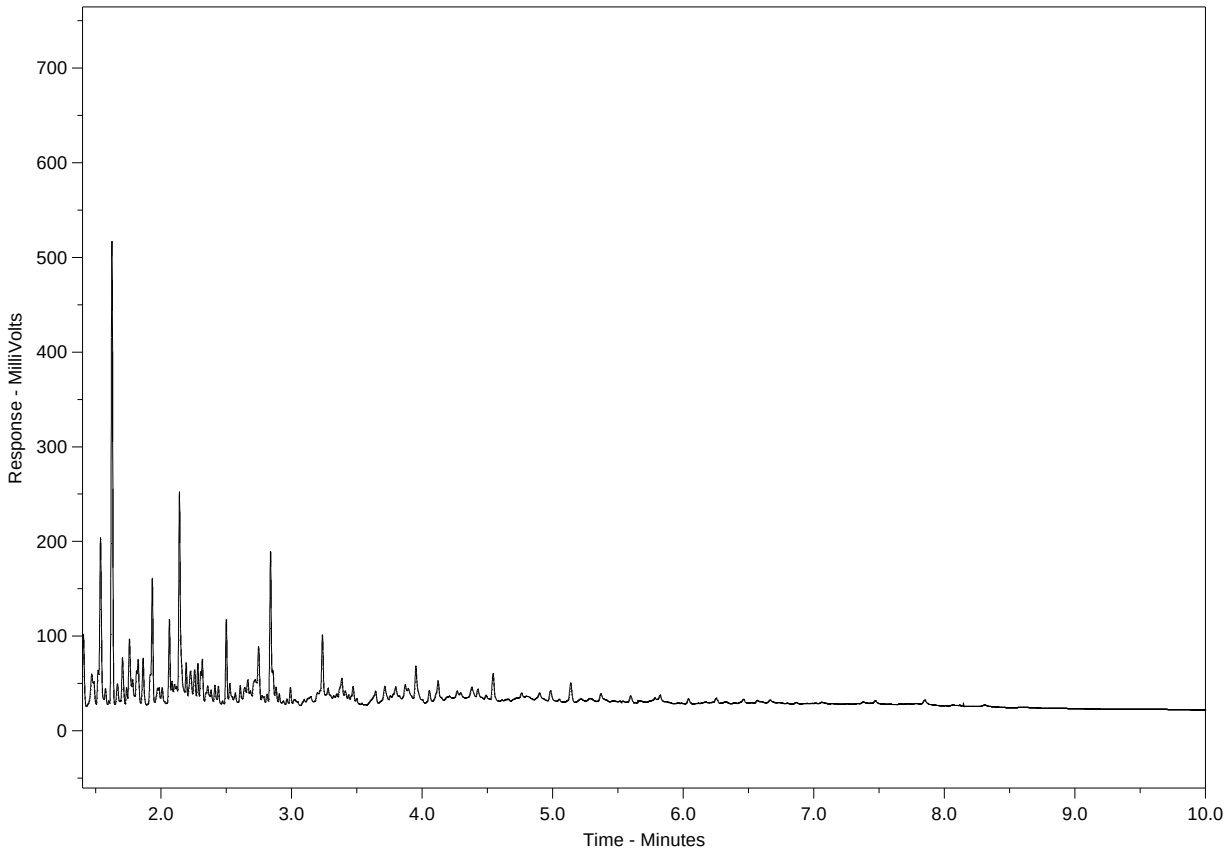
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1203640-2
Client Sample ID: RR NUMBER 2



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

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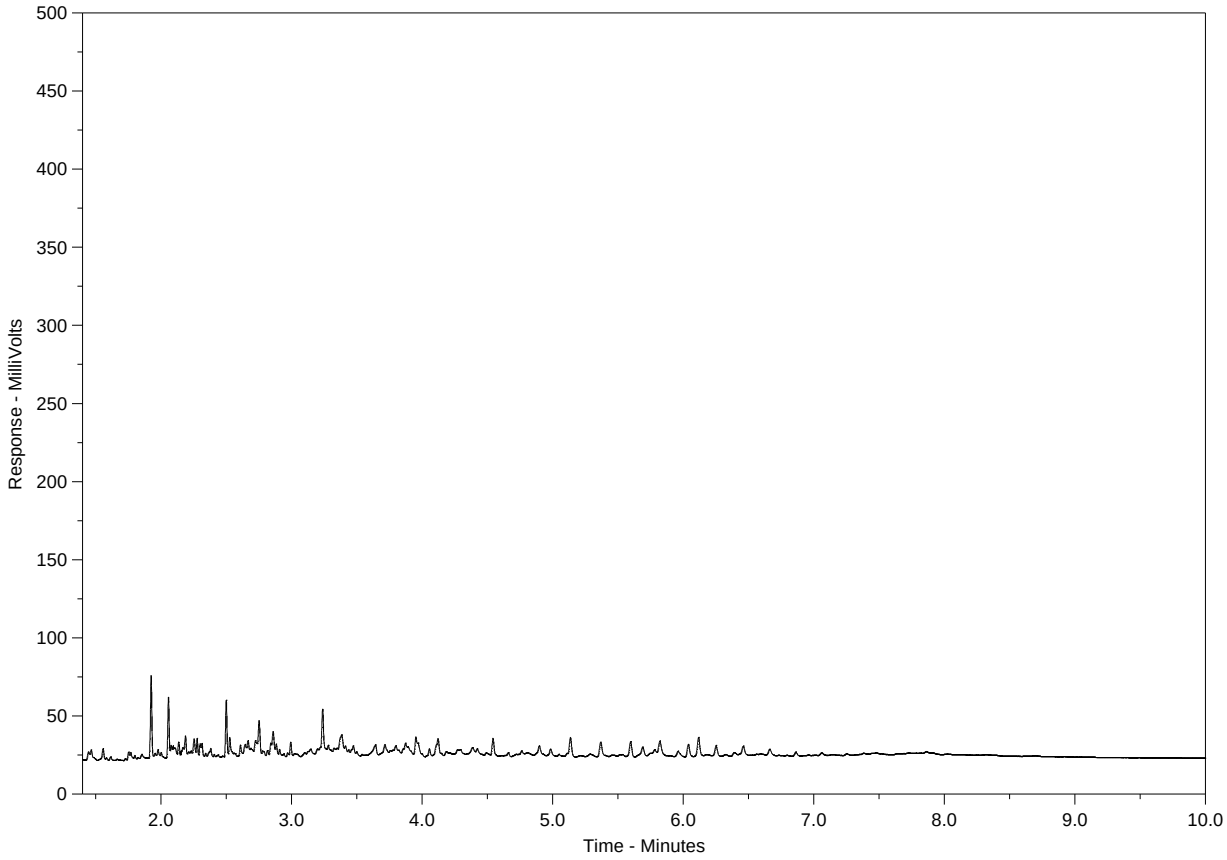
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1203640-3
Client Sample ID: RR 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 →		

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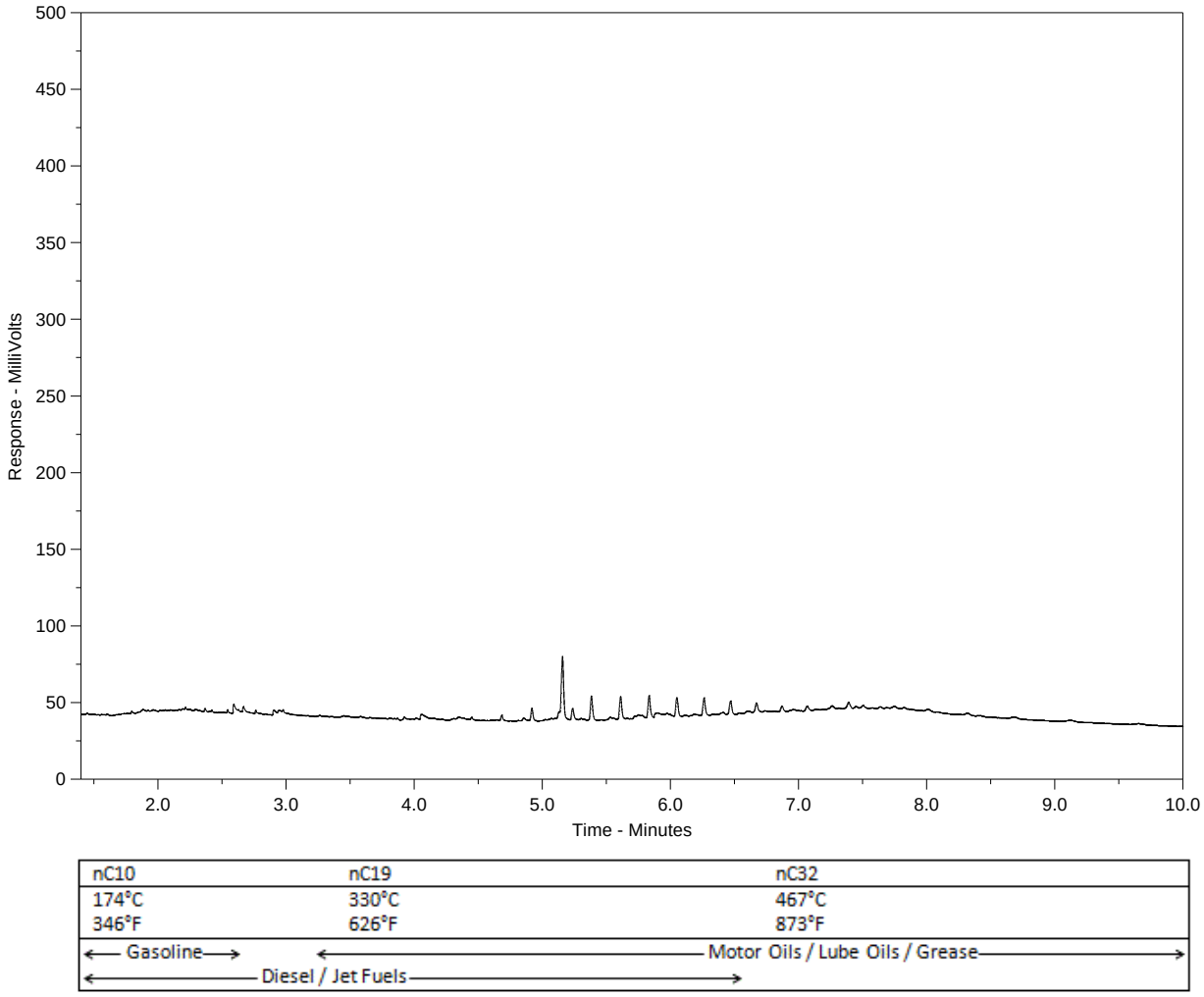
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1203640-4
Client Sample ID: FA-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.

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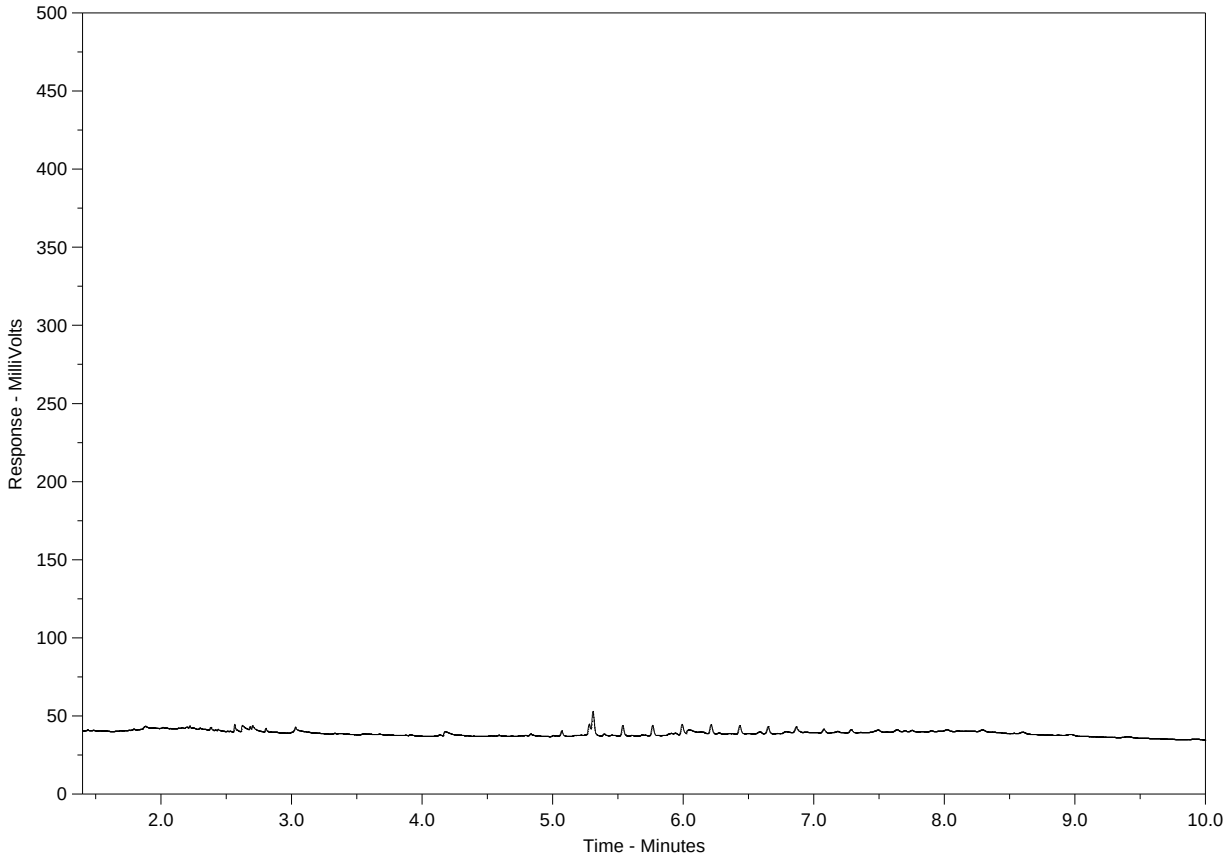
Hydrocarbon Distribution Report

ALS Sample ID: L1203640-5
Client Sample ID: FA-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.

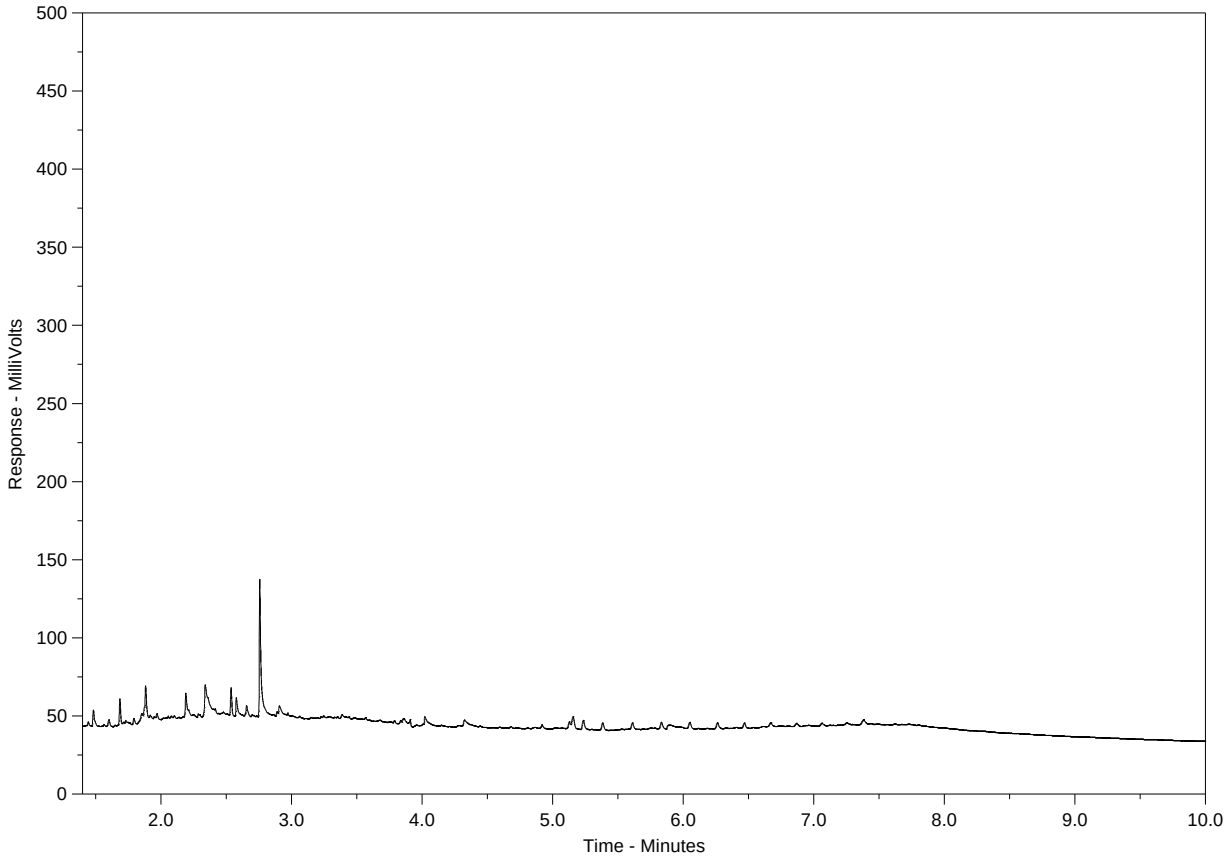
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1203640-6
Client Sample ID: FA-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.

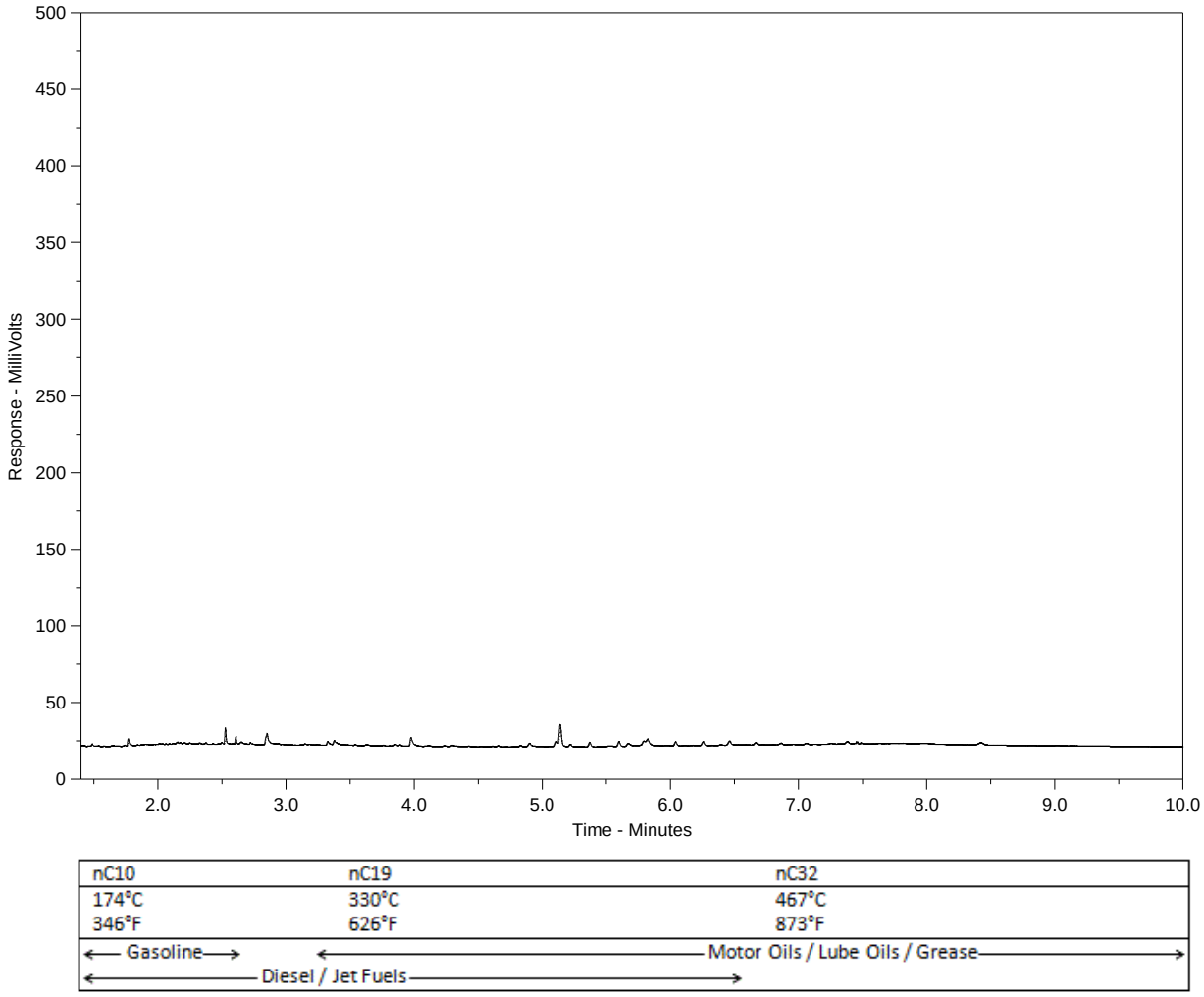
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1203640-7
Client Sample ID: FA-MW12-05



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.

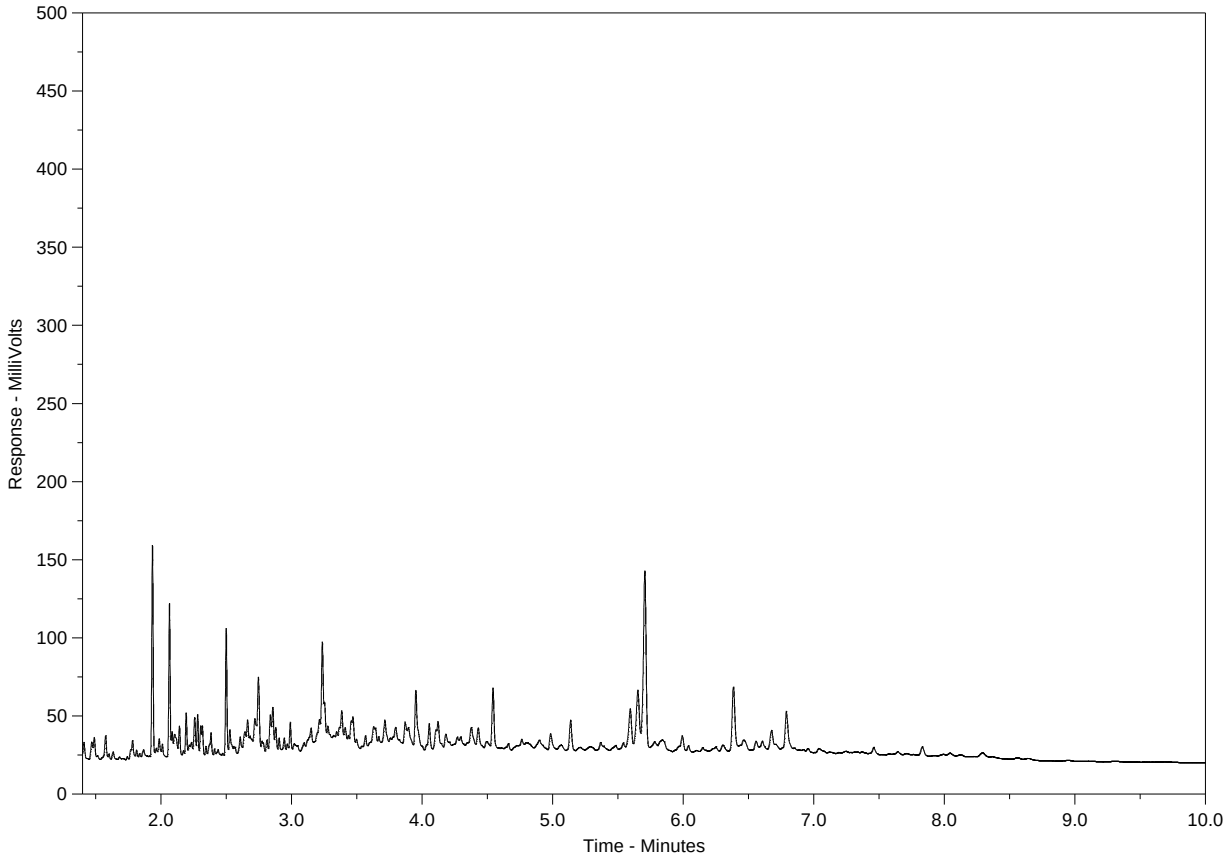
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1203640-8
Client Sample ID: FA 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.

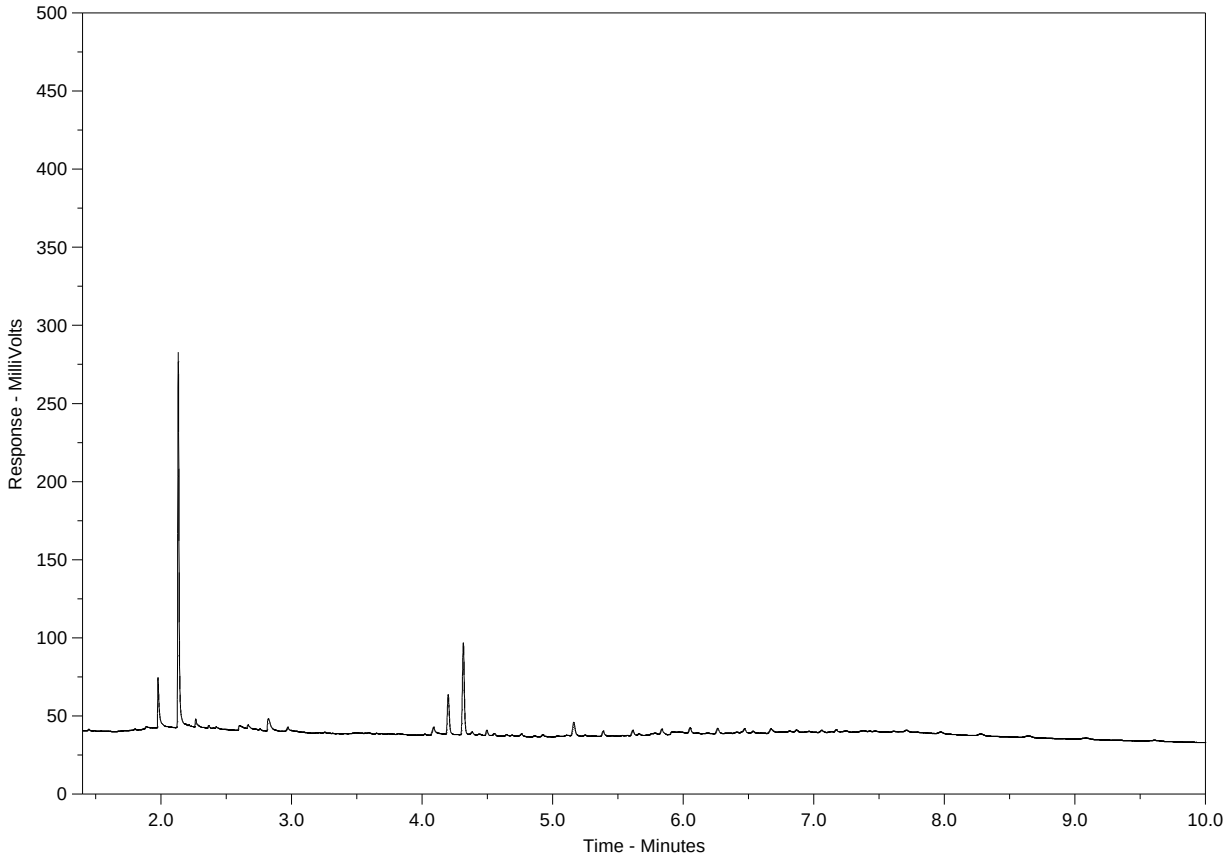
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1203640-9
Client Sample ID: DC NUMBER 1



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.

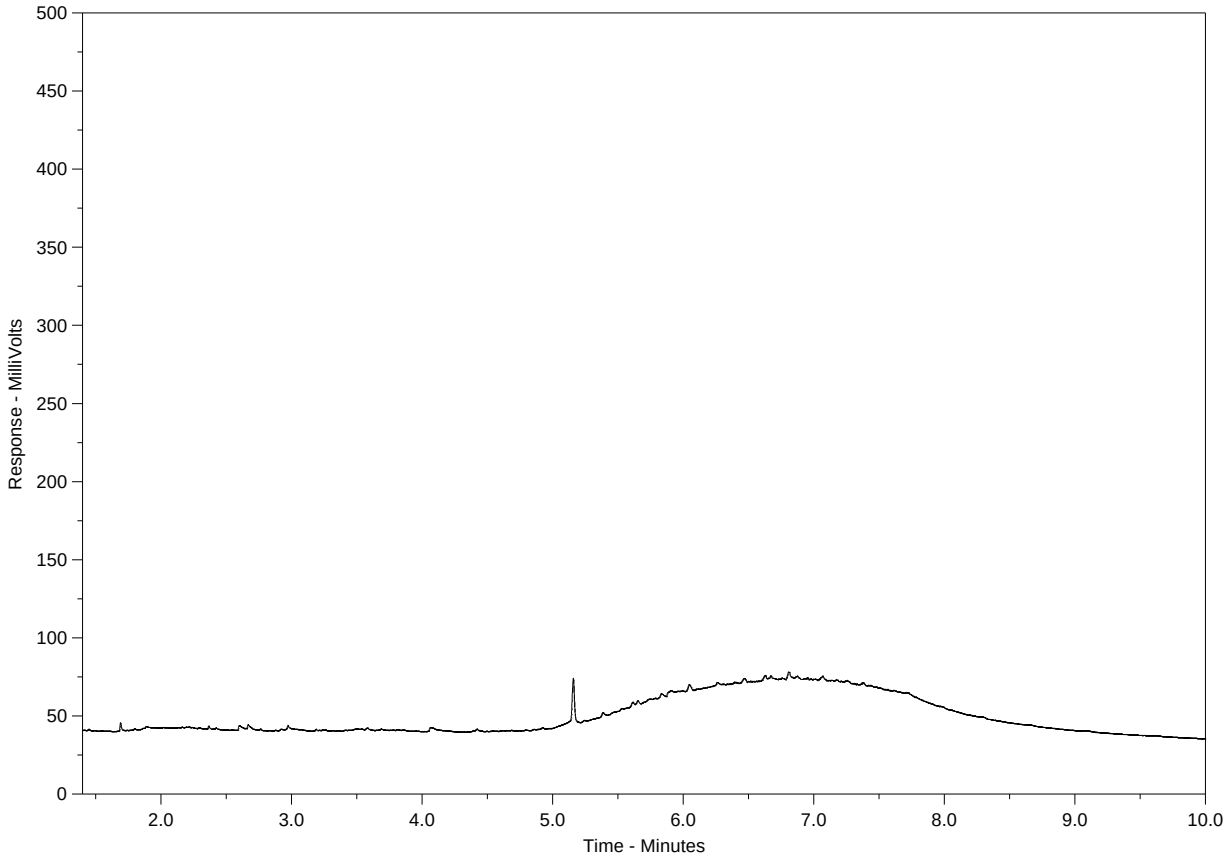
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1203640-10
Client Sample ID: DC NUMBER 2



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.

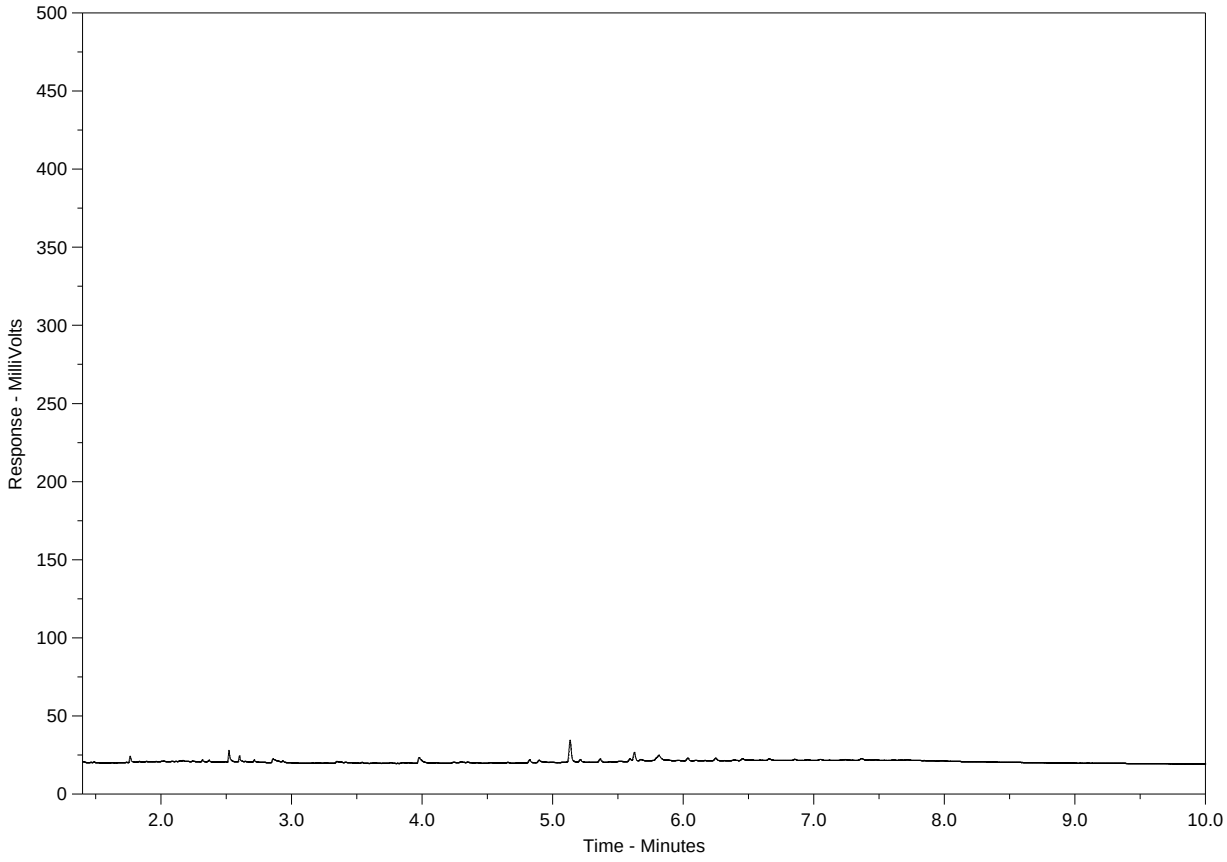
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1203640-11
Client Sample ID: DC NUMBER 3



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.

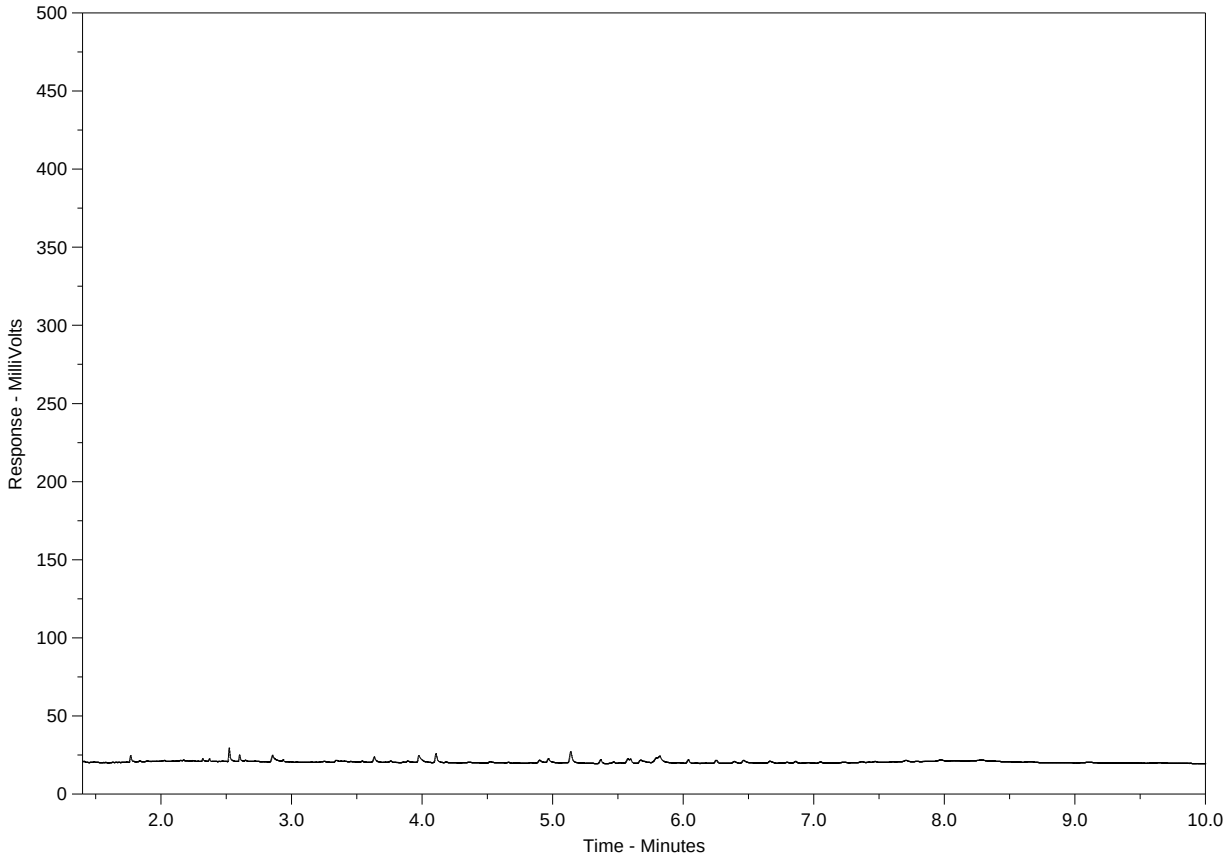
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products, and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples by as much as 0.5 minutes.

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: L1203640-12
Client Sample ID: DC 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.

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page 1 of 1

Report To				**Report Format / Distribution**				**Service Requested** (Rush for routine analysis subject to availability)
Company:	Golder Associates			☑ Standard	☐ Other			◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Andrea Badger			☑ PDF	☑ Excel	☐ Digital	☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	201B 170 Titanium Way			Email 1:	andrea_badger@golder.com			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Whitehorse, YT Y1A 0G1			Email 2:	gary_hamilton@golder.com			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	867-633-6076	Fax:		Email 3:	calvin_beebe@golder.com			**Analysis Request**
Invoice To	Same as Report ?	☑ Yes	☐ No	**Client / Project Information**				Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?		☐ Yes	☐ No	Job #:	11-1436-0073/1100, 2500, 2800			
Company:				PO / AFE:				
Contact:				LSD:				
Address:								
Phone:		Fax:		Quote #:				

Lab Work Order # (lab use only)	L1203640	**ALS Contact:**	**Sampler:**	A Badger

Sample #	**Sample Identification** (This description will appear on the report)	**Date** (dd-mmm-yy)	**Time** (hh:mm)	**Sample Type**	As per 11-1436-0072/xxxx											**Number of Containers**
	RR Number 1	31-Aug-12	10:50	Groundwater	X											8
	RR Number 2	31-Aug-12	13:20	Groundwater	X											8
	RR Surface	01-Sep-12	11:10	Surface Water	X											8
	FA-MW12-01	31-Aug-12	15:30	Groundwater	X											8
	FA-MW12-03	31-Aug-12	17:40	Groundwater	X											8
	FA-MW12-04	31-Aug-12	18:15	Groundwater	X											8
	FA-MW12-05	31-Aug-12	15:30	Groundwater	X											8
	FA Surface	02-Sep-12	12:00	Surface Water	X											8
	DC Number 1	01-Sep-12	15:20	Groundwater	X											8
	DC Number 2	01-Sep-12	16:20	Groundwater	X											8
	DC Number 3	01-Sep-12	17:15	Groundwater	X											8
	DC Surface	02-Sep-12	14:50	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

RR Surface, FA-MW12-04, FA Surface, DC Number 2, DC Number 3, DC Surface, volumes collected for DOC analysis were not filtered or preserved.
RR Surface, FA Surface, volumes collected for dissolved metlas analysis were not 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	4-Sep-12	10:00		04-Sept-12	10:10	3.1 °C				

GENF 18.01 Front

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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