REPORT

TRANS MOUNTAIN PUMP STATION EXPANSION PROJECT
PHASE II ENVIRONMENTAL SITE INVESTIGATION
Proposed Finn Pump Station, BC

SEACOR PROJECT NO: 212.06117.02

TRANS MOUNTAIN PUMP STATION EXPANSION PROJECT
PHASE II ENVIRONMENTAL SITE INVESTIGATION
PROPOSED FINN PUMP STATION, BRITISH COLUMBIA

SEACOR PROJECT: 212.06117.02

Submitted by
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for
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NOTICE

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EXECUTIVE SUMMARY

SEACOR Environmental Inc. (SEACOR) was retained by Terasen Pipelines Inc. (Terasen) to conduct a Phase II Environmental Site Investigation (ESI) for the Trans Mountain Pump Station Expansion Project, at the proposed Finn Pump Station, in British Columbia. The Phase II ESI was conducted in October 2005 to assess current subsurface environmental conditions at the site and in support of an application to the National Energy Board (NEB) for the Trans Mountain Pump Station Expansion Project.

The Phase II ESI field program was conducted on October 18 and 20, 2005, and included drilling six boreholes (BH101 through BH106) to approximately 3.0 metres (m) to 6.1 m depth, with one borehole completed as a monitor well.

The site stratigraphy observed during the October 20, 2005, drilling program generally consisted of a medium-grained sand which extended to the maximum depth of investigation at the site of 6.1 m. Gravel was encountered in two boreholes above the sand up to a maximum depth of 1.1 m. The maximum combustible soil vapour concentration measured in soil samples ranged from 35 ppm in BH106 to 90 ppm in BH101. A total of 11 soil samples were submitted to ALS Environmental (ALS) in Calgary, Alberta, for various physical and chemical analyses of hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), metals and grain size.

The groundwater elevation in the monitor well installed at the site was measured on October 20, 2005. Groundwater at the site was encountered at a depth of 3.1 m below ground surface (mbgs). One groundwater sample was submitted to ALS for chemical analysis of hydrocarbons, PAHs, VOCs and dissolved metals.

The results of the investigation indicated all soil sample hydrocarbons, PAHs, VOCs and metals analytical results were below the applicable standards or comparative criteria. The results of the groundwater sampling program indicated the one groundwater sample analytical results were above the comparative CCME criteria for dissolved aluminum and iron. All remaining analytical results for hydrocarbons, PAHs, VOCs and other dissolved metals were below the applicable standards/criteria. Elevated aluminum and iron concentrations in groundwater are considered representative of naturally occurring background groundwater concentrations. No further site assessment is recommended.

SEACOR ENVIRONMENTAL INC.

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1.0 INTRODUCTION

1.1 General

SEACOR Environmental Inc. (SEACOR) was retained by Terasen Pipelines Inc. (Terasen) to conduct a Phase II Environmental Site Investigation (ESI) for the Trans Mountain Pump Station Expansion Project, at the proposed Finn Pump Station, in British Columbia (Figure 1). The Phase II ESI was conducted in October 2005 to assess current subsurface environmental conditions at the site and in support of an application to the National Energy Board (NEB) for the Trans Mountain Pump Station Expansion Project. This report summarizes the investigation methods, field observations and results of the investigation. Site plans follow the text for reference. Borehole logs, analytical reports and a data quality review are included in Appendices A, B and C, respectively. The field investigation was completed on October 18, 2005, and groundwater monitoring and sampling programs were completed on October 20, 2005.

1.2 Background

The proposed Finn facility is located approximately 16 kilometres (km) north of Avola, BC on the east side of Highway No. 5 and is described as a portion of District Lot 3262, Kamloops Division Yale District. The site is currently a vegetation-cleared area within a larger Crown land parcel, surrounded by a natural, forested area. A Phase I Environmental Site Assessment (ESA) conducted at the site in April 2005 identified three potential areas of environmental concern in relation to the previous on-site usage and chemical storage/spills (Ministry of Transportation highway yard/gravel reserve), including:

- The presence of four abandoned above ground storage tanks (ASTs) on the site and the potential for associated hydrocarbon impacts;
- The presence of oily surface staining in two areas and of a significant enough aerial extent to indicate that the surface spillage involved more than minor drips and the potential for associated hydrocarbon impacts; and,
- The presence of a soil/debris pile containing asphalt rubble and the potential for associated tar/resin hydrocarbon impacts.

It was recommended to conduct a Phase II ESI at the site to determine potential environmental liabilities prior to purchasing the property.

1.3 Objectives

The objectives of the investigation were to:

- Characterize soil and groundwater conditions, and
- Identify the presence or absence of hydrocarbon impact relating to the potential areas of concern previously identified in the Phase I ESA.

1.4 Scope of Work

The scope of work for the investigation was approved by Mr. Howard Heffler, on behalf of Terasen, and was carried out in accordance with SEACOR's standard field investigative procedures. The final scope of work for the project included the following items:

- Preparation of a Health and Safety Plan;
- Identification of all public and private underground utilities. Public and private utilities were identified by Locates Unlimited and the Trans Mountain Pipeline right-of-way was identified and marked by a Terasen representative;
- Completion of six boreholes to approximate depths ranging from 3.0 m below ground surface (mbgs) to 6.1 mbgs (BH101 through BH106), with one borehole completed as a monitor well. All boreholes were completed utilizing solid stem augers and a truck mounted auger drill rig;
- Completion of field screening of all soil samples for combustible vapour levels and organic vapour levels;
- Analysis of a total of 11 soil samples for various analyses including hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), metals and grain size;
- Completion of a groundwater monitoring and sampling program of the one monitor well. This included measuring the combustible standpipe vapour concentration, organic vapour concentration, the presence/absence of light non-aqueous phase liquid (LNAPL) and the depth to the groundwater surface;
- Collection of one groundwater sample for analysis of hydrocarbons, PAHs, VOCs and dissolved metals;
- Completion of a vertical and horizontal survey of the elevations of all boreholes and the installed monitor well; and
- Preparation of a Phase II ESI report.

1.5 Surrounding Land Use

SEACOR completed a land use assessment within a radius of approximately 100 m of the subject site. The Thompson-Nicola Regional District Zoning Bylaw No. 940 and land use district maps were used to determine the zoning designations for the subject site and surrounding properties. The site currently is zoned Recreational (P-1) and is surrounded by undeveloped, natural areas (P-1 zoned) to the north and west of the site (across the adjacent Highway 5). East of the site the undeveloped area is zoned Rural (RL-1) as well as immediately south of the site, followed by the P-1 zoning further south.

Table 1 provides a summary of the zoning for surrounding properties located within a radius of approximately 100 m of the subject site.

1.6 Water Well Search Information

SEACOR conducted a water well search within a 1.5 km radius of the site using the web-based British Columbia Water Resources Atlas. The search did not identify any water well records within the search radius. In addition, an aerial photograph review conducted as part of the Phase I ESA did not identify any nearby homes, which could potentially have unregistered water wells, as there is no distribution system in the area.

1.7 Surface Water

The closest surface water bodies are Finn Creek and the North Thompson River, located to the west of the site at approximately 200 m and 1.6 km, respectively.

1.8 Nearby Underground Structures

Underground utilities/facilities on, or in the vicinity of, the subject site included the Trans Mountain Pipeline. The underground facilities are presented in Figure 2.

2.0 SUBSURFACE INVESTIGATION METHODOLOGY

2.1 Drilling Investigation and Soil Sampling

Prior to conducting the drilling program, all underground and overhead utilities were identified and marked at the site. The BC One Call primary utility locating services, Terasen representatives, private utility locators and any other utility owners were contacted to identify and mark all potential utilities. The utility locating was conducted on October 17, 2005.

The Phase II ESI was conducted on October 18, 2005, utilizing a B61 truck mounted drill rig equipped with 150-millimetre (mm) diameter solid stem augers supplied and operated by Beck

Drilling and Environmental Services Ltd. of Edmonton, Alberta. Six boreholes (BH101 through BH106) were drilled during the investigation, to depths ranging from 3.0 m to 6.1 m, with one borehole (BH105) completed as a monitor well. Borehole and monitor well locations are presented on Figure 2.

Field procedures were implemented to minimize the potential of cross contamination between sampling locations. Sample handling protocols were established to track and maintain the integrity of the samples. Field handling of soil samples was minimized by transferring samples directly into containers, when possible. Where handling was required, disposable nitrile gloves were used at all times and were changed between samples.

Soil samples were collected directly from the auger flights at ground surface and at approximately 0.8 m depth intervals or stratigraphic changes and sealed in plastic bags. After the samples had been warmed to approximately 20ºC, the available headspace was sampled for combustible hydrocarbon vapour concentrations using an Eagle RKI hydrocarbon vapour analyzer calibrated to a hexane standard with methane elimination enabled. Volatile organic vapour concentrations (not detectable with Eagle RKI) were measured using a Mini Rae Photo Ionization Device (PID) calibrated with isobutylene. Duplicate samples filled with minimal headspace were collected in 125 mL glass jars supplied by the laboratory and fitted with Teflon-lined lids. The jarred soil samples were held in cold storage until selected samples were submitted to ALS Environmental (ALS) in Calgary, AB.

2.2 Monitor Well Installation

All boreholes at which monitor wells were not installed were backfilled with drill cuttings and/or silica sand and sealed with a bentonite chip plug to ground surface. A monitor well was installed in BH105 for characterization of groundwater quality and to confirm the presence or absence of light non-aqueous phase liquid (LNAPL). The monitor well was constructed of 50 mm diameter Schedule 40 polyvinyl chloride (PVC) pipe with threaded joints. The screened portion of the well was comprised of 0.25 mm horizontal slots (010 slot) and the annulus was backfilled with silica sand from the bottom of the screen to approximately 0.3 m above the top of the screen. A hydrated bentonite chip seal was placed around the annulus of the solid section of pipe above the screened section to within approximately 0.5 m of ground surface. A 50 mm diameter slip cap was placed on the bottom of the well and a 50 mm diameter threaded cap with coupler was placed on the top of the monitor well. A flush mount 200 mm diameter steel protective cover with a bolt down lid was concreted in place above the top of the monitor wells. The monitor well construction details are provided in the borehole logs presented in Appendix A.

2.3 Groundwater Monitoring and Sampling

Groundwater monitoring and sampling was performed on October 20, 2005. The well was monitored for standpipe combustible vapour levels, organic vapour levels, depth to groundwater and apparent

light non-aqueous phase liquid (LNAPL) thickness. Monitor well standpipe combustible hydrocarbon vapour level monitoring was conducted using an Eagle RKI hydrocarbon vapour analyzer calibrated to a hexane standard and using methane elimination and volatile organic vapour monitoring was conducted using a Mini Rae PID calibrated with isobutylene. Depth to groundwater and apparent LNAPL thickness was measured using a Heron Interface Probe. Prior to sampling, the monitor well was purged of groundwater using a dedicated disposable polyethylene bailer. The groundwater purging was performed by removing a minimum of three well volumes from the well (or until dry). The water sample was collected from the monitor well using a dedicated disposable polyethylene bailer after at least 75 percent (%) of the original well volume had recovered. The groundwater sample was collected in the appropriate sample bottles provided by the laboratory and any necessary preservatives were added. All containers were filled to capacity with no headspace. The groundwater sample was held in cold storage until sample submission to ALS in Calgary, AB, under a chain-of-custody documentation for various analyses.

2.4 Laboratory Program

2.4.1 Soil Analysis

Soil samples were selected for laboratory analysis based on combustible vapour levels and/or visual or olfactory evidence of hydrocarbon impact. A total of 11 soil samples and one field duplicate were selected and submitted to ALS, for analysis of various physical and chemical parameters including hydrocarbons, PAHs, VOCs, metals and grain size. The laboratory analysis reports and chain of custody documents are presented in Appendix B.

2.4.2 Groundwater Analysis

One groundwater sample from BH105 was collected and submitted to ALS for chemical analysis of hydrocarbons, PAHs, VOCs and dissolved metals. The laboratory analysis reports and chain of custody documents are presented in Appendix B.

2.5 Site Survey

All boreholes and the monitor well at the site were surveyed during the groundwater-monitoring program on October 20, 2005. Elevations were determined relative to a reference benchmark established as the top of the Trans Mountain Pipeline marker located on the north side of the site entrance access road. The temporary benchmark was assigned an elevation of 100 m. Horizontal control in locating the boreholes/monitor well was established using an x, y-coordinate system.

3.0 REGULATORY CRITERIA

Soil and groundwater laboratory results were compiled in tabular form and compared to the following federal guidelines and provincial standards:

- CCME Canadian Environmental Quality Guidelines (2004 Update) and the CCME Canada-Wide Standards for Petroleum Hydrocarbons in Soil (2001); and
- British Columbia Ministry of Environment (MOE) Contaminated Sites Regulation (2004).

The above noted criteria were used for comparison purposes to determine the relative degree of impacts at each site, if present, and to estimate both the horizontal and vertical extent of impacts if feasible. These criteria were used for preliminary assessment of investigation areas that may require additional investigation and/or remediation or site management plans during operation and/or upon site closure and final site reclamation. The guidelines/standards presented were based on current and near future site usage; however, any distant future reclamation activities may require the application of other potentially more stringent land use standards/guidelines based on the surrounding land use/zoning at that time (urban park, agricultural, residential, etc.). In order to meet expected NEB filing requirements, Terasen requested SEACOR to consider both the federal and provincial requirements. Both sets of guidelines/standards have been presented and where both federal and provincial guidelines/standards are defined, the more stringent of the two has been selected for comparison.

3.1 Applicable & Comparative Standards/Guidelines– Provincial and Federal

The Contaminated Sites Regulation (CSR) under the Environmental Management Act (EMA) is the principal regulatory document defining requirements for contaminated sites management in British Columbia. The CSR came into effect on April 1, 1997 and was amended on July 19, 1999, February 4, 2002, December 1, 2003, July 7, 2004 and March 7, 2005. The CSR and EMA provide for both numerical and risk-based approaches to managing site contamination and outline the procedures for site assessment, remediation and application for environmental closure of a property. Numerical standards are key components of the requirements in the CSR.

3.2 Soil and Groundwater Numerical Standards

Numerical standards for investigating and remediating soils are presented in three CSR schedules. Generic Numerical Soil Standards for a variety of inorganic and organic substances are presented in Schedule 4 under five classes of land use: Agricultural (AL), Urban Park (PL), Residential (RL), Commercial (CL) and Industrial (IL). Matrix Numerical Soil Standards are presented in Schedule 5 for a number of contaminants and provide both land use and exposure pathway perspectives. As with Generic Numerical Soil Standards, land uses are agricultural, urban park, residential, commercial and industrial. Several mandatory and potentially applicable site-specific factors are used to indicate exposure. Mandatory site-specific factors include: human intake of contaminated soil; and, toxicity to soil invertebrates and plants. Commonly used potentially applicable site-specific factors include:

groundwater used for drinking water and, groundwater flow to surface water used by aquatic life (freshwater or marine). The third set of numerical soil standards used in the remediation of soils is presented in Schedule 10 and generally applies to substances, which are not presented in either Schedule 4 or Schedule 5. Soil must be remediated to either the applicable land use soil standard (i.e. Agricultural/Urban Park/Residential Soil Standard or Commercial/ Industrial Soil Standard) or to the Practical Quantification Limit (PQL) for the substance.
Numerical standards for water in the CSR are presented in two schedules. Schedule 6 references four classes of water use (Aquatic Life, Irrigation, Livestock, Drinking Water) and corresponding water use standards (i.e. AWF, IW, LW, DW). MOE guidelines dictate that AW standards apply if receiving waters used by aquatic life occur within 1 km of a site and DW standards apply if wells used for drinking water occur within 1.5 km of the site. If detailed evaluation of groundwater travel times shows that travel time from the site to the nearest aquatic receiving environment is more than 50 years, or travel time to the nearest drinking water well is more than 100 years, then the default 1 km and 1.5 km distances need not be applied. The Schedule 6 water quality standards for volatile hydrocarbons and extractable hydrocarbons (VHw_{6-10} and $EPHw_{10-19}$, respectively) apply at all sites in BC irrespective of water use. Additional numerical water standards are presented in Schedule 10 for substances which are not included in Schedule 6. Water must be remediated to either the applicable water use standard (i.e. Drinking Water standard) or to the PQL for the substance.

The federal Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (2004 Update) were used to evaluate the current petroleum hydrocarbons, PAHs, VOCs and metals concentrations in soil and groundwater at the site. The guidelines provide different concentrations in soil for varying land uses (Agricultural, Residential/Parkland, Commercial and Industrial), with the BTEX and petroleum hydrocarbon fraction parameters including different concentrations for varying exposure pathways for surface and subsurface soils. The guidelines provide different concentrations in groundwater for varying water uses (Drinking Water, Aquatic Life, Agriculture, Water for Recreation and aesthetic objectives). The CCME guidelines have been presented in conjunction with all BC standards and have been used for comparison where the CCME guidelines are more stringent.

3.3 Applicable Standards for the Site

On the basis of current and reasonable potential future land and groundwater use/pathways, the following are considered to apply at the site:

- CSR - Generic Numerical Soil Standards for industrial land use (IL);
- CSR - Matrix Numerical Soil Standards for industrial land use (IL) under the most conservative of the mandatory site-specific factors: toxicity to soil invertebrates and

plants and human intake of contaminated soil, as well as the site-specific factor: groundwater flow to surface water used for freshwater aquatic life (AWF);

- CSR – Generic Numerical Water Standards for AWF;
- CCME - Industrial Land Use Criteria for Coarse-Grained Surface Soil Texture (where applicable), under the most conservative of the applicable site-specific factors: soil ingestion, soil dermal contact, ecological soil contact or freshwater aquatic life; and
- CCME - Freshwater Aquatic Life Criteria for groundwater.

A land use assessment was conducted to determine the applicable receptors, land use and exposure pathways for each of the sites. The land use assessment and applicable assessment standards/criteria are summarized in Table 1.

4.0 DISCUSSION OF RESULTS

4.1 Geology

4.1.1 Regional Geology

[1]The surficial geology in the area consists of glaciofluvial sediments deposited during the Holocene epoch. The surficial deposits are composed of undulating gravel, sand and minor till, with variable topography.

4.1.2 Site Stratigraphy

The site stratigraphy observed during the October 18, 2005, drilling program generally consisted of a medium-grained sand extending to the maximum depth of investigation at the site of 6.1 m. Gravel was encountered above the sand in two locations and a layer of clay was encountered in one borehole. One representative grain size analyses indicating 85 % of particles were > 75 µm in diameter confirmed the coarse-grained nature of the soils. Borehole logs are presented in Appendix A.

4.2 Hydrogeology

4.2.1 Regional Hydrogeology

The BC Water Resources Atlas did not include aquifer classification information for the site location. Based on the topography of the local area, the regional direction of groundwater flow was inferred towards the west.

1 Geological Survey of Canada Map 1609A, Surficial Geology of Seymour Arm.

4.2.2 Site Hydrogeology

The groundwater elevation in the monitor well installed at the site was measured on October 20, 2005. Results of the groundwater monitoring program are provided in Table 6. Groundwater at the site was encountered at approximately 3.1 mbgs.

4.3 Soil Results

4.3.1 Headspace Vapour Screening

Maximum headspace vapour concentrations measured in soil samples ranged from 35 ppm in BH106 to 90 ppm in BH101.

4.3.2 Soil Analytical Results

All soil samples analyzed indicated concentrations of hydrocarbon parameters, PAHs, VOCs and metals below the applicable standards/guidelines. Analytical results are summarized in Tables 2, 3, 4 and 5. Laboratory soil analytical reports are presented in Appendix B.

4.4 Groundwater Results

4.4.1 Light Non- Aqueous Phase Liquids (LNAPL)

No LNAPL was detected in the monitor well during the visit.

4.4.2 Standpipe Vapours

Standpipe vapour levels measured in the monitor well (BH105) was 260 ppm and the volatile organic vapour level was 0.8 ppm.

4.4.3 Groundwater Analytical Results

One groundwater sample from BH105 indicated dissolved aluminium and iron concentrations above the comparative CCME Freshwater Aquatic Life criteria. There are no standards listed for the CSR under the Freshwater Aquatic Life. All remaining laboratory analytical results indicated hydrocarbons, PAHs, VOCs and dissolved metals concentrations below the applicable standards/guidelines. Analytical results are summarized in Tables 7, 8, 9 and 10. Laboratory groundwater analytical reports are presented in Appendix B.

The BC Ministry of Environment does not provide any freshwater aquatic life standards for aluminum or iron and as the aquifers in the area have not been classified there are no background water quality concentrations for reference in the site area. Based on the previous site usage and associated potential contaminants of concern (Ministry of Transportation highway yard/gravel reserve) elevated aluminum and iron concentrations in the groundwater are considered representative

of naturally occurring background groundwater concentrations. No further site assessment is recommended.

4.5 Quality Assurance/Quality Control

A total of three field duplicate soil samples (FN10, FN25 and FN36) were collected during the drilling program. Based on the headspace vapour concentrations, duplicate sample FN10 (BH102 at 1.5 m) was selected for laboratory analysis. The relative percent differences (RPDs) could not be calculated for the individual hydrocarbon constituents analysed as the results were all below the laboratory method detection limit (MDL). A duplicate groundwater sample was not collected as only one monitor well was installed.

ALS conducts a program of quality control analyses for every batch of samples. Quality control samples include calibration and verification standards, standard reference materials, matrix spikes, duplicates, method and reagent blanks, storage blanks, and glassware proofs. A review of the laboratory performed QA/QC items was completed upon receipt of the analytical results. The summary of the QA/QC data evaluation is provided in Appendix C.

5.0 SUMMARY

SEACOR conducted a Phase II ESI at the proposed Finn Pump Station located north of Avola, BC. The Phase II ESI was conducted in October 2005 to assess current subsurface environmental conditions at the site and is summarized below:

- Six boreholes were drilled (BH101 through BH106) to a maximum depth of 6.1 mbgs, with one borehole completed as a monitor well.
- The maximum combustible soil vapour concentrations measured in soil samples from each borehole ranged from 35 ppm to 90 ppm. Eleven soil samples were submitted to ALS for chemical analyses of hydrocarbons, PAHs, VOCs and metals.
- Groundwater at the site was encountered at a depth of 3.1 mbgs. One groundwater sample was submitted to ALS for chemical analysis of hydrocarbons, PAHs, VOCs and dissolved metals.
- All soil samples submitted for analyses were below the applicable standards/criteria. The one groundwater sample submitted for laboratory analysis had dissolved aluminium and iron concentrations above the comparative CCME Freshwater Aquatic Life criteria.
- Elevated metals concentrations in the groundwater are considered representative of naturally occurring background groundwater concentrations. No further site assessment is recommended.

6.0 STATEMENT OF LIMITATIONS

This report has been prepared and the work referred to in this report has been undertaken by SEACOR for Terasen Pipelines (Trans Mountain) Inc. It is intended for the sole and exclusive use of Terasen Pipelines (Trans Mountain) Inc. and its authorized agents for the purpose(s) set out in this report. Any use of, reliance on, or decision made based on this report by any person other than Terasen Pipelines (Trans Mountain) Inc. for any purpose, or by Terasen Pipelines (Trans Mountain) Inc. for a purpose other than the purpose(s) set out in this report, is the sole responsibility of such other person or Terasen Pipelines (Trans Mountain) Inc. Terasen Pipelines (Trans Mountain) Inc. and SEACOR make no representation or warranty to any other person with regard to this report and the work referred to in this report, and they accept no duty of care to any other person or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, any decision made or any action taken based on this report or the work referred to in this report.

The investigation undertaken by SEACOR with respect to this report and any conclusions or recommendations made in this report reflect SEACOR's judgment based on the sites' conditions observed at the time of the sites' inspection on the date(s) set out in this report, on information available at the time of preparation of this report, on the interpretation of data collected from the field investigation, and on the results of laboratory analyses, which were limited to the quantification in select samples of those substances specifically identified in the report. This report has been prepared for specific application to these sites and it is based, in part upon visual observation of the sites, subsurface investigation at discrete locations and depths, and specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future sites' conditions, portions of the sites that were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters, materials or analysis which were not addressed. Substances other than those addressed by the investigation described in this report may exist within the sites; substances addressed by the investigation may exist in areas of the site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken. SEACOR expresses no warranty with respect to the accuracy of the laboratory analyses, methodologies used, or presentation of analytical results by the laboratory. Actual concentrations of the substances identified in the samples submitted may vary according to the extraction and testing procedures used.

As the evaluation and conclusions reported herein do not preclude the existence of other chemical compounds and/or that variations of conditions within the sites may be possible, this report should be used for informational purposes only and should absolutely not be construed as a comprehensive hydrogeological or chemical characterization of the sites. If the sites' conditions change or if any

additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary.

Nothing in this report is intended to constitute or provide a legal opinion. SEACOR makes no representation as to the requirements of or compliance with environmental laws, rules, regulations or policies established by federal, provincial or local government bodies. Revisions to the regulatory standards referred to in this report may be expected over time. As a result, modifications to the findings, conclusions and recommendations in this report may be necessary.

Other than by Terasen Pipelines (Trans Mountain) Inc. and as set out herein, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of SEACOR.

Terasen Pipelines (Trans Mountain) Inc. may submit this report to the British Columbia Ministry of Environment and/or to related federal environmental regulatory authorities or persons for review and comment purposes.

TABLES

Terasen Pipelines (Trans Mountain) Inc.
Trans Mountain Pump Station Expansion Project
Proposed Finn Pump Station, British Columbia
SEACOR Project #: 212.06117.02

TABLE 1: LAND USE ASSESSMENT			
	ASSESSMENT ITEM	**DESCRIPTION/COMMENTS**	**RANKING**
LAND USE	**Site**		**Applicable Current Land Use:** Industrial
	Historic	BC Ministry of Transportation gravel reserve/highway yard	
	Current	Inactive storage area	
	By-Law Zoning	Recreational (P-1) Thompson-Nicola Regional District, Zoning Bylaw No. 940, 2001	
	Surrounding Site		**Most Sensitive Adjacent Land Use:** Undeveloped, natural area
	North:	Undeveloped, natural forested area (P-1)	
	West:	Highway 5, followed by undeveloped, natural forested area (P-1)	
	South:	Undeveloped, patchy treed area (RL-1, Rural Zone), followed by clear-cut, logged area (P-1)	
	East:	Undeveloped, natural forested area (RL-1)	
SOIL CONDITIONS	**Soils**		**Soil Texture:** Coarse grained
	Stratigraphy	0.0 m to 6.1 m – Fine to medium-grained sand, with some gravel noted in BH101 and BH102 up to 1.0 m thick. A 0.6 m thick clay layer was present in BH102.	
	Grain Size	One-grain size analysis conducted on sample FN29 (BH105 @ 3.0 m) indicated 85 percent (%) of the particles were greater than 75 µm in diameter thus indicating a coarse-grained soil texture.	
	Groundwater		
	Depth	Depth to groundwater measured in BH105 was at 3.1 metres below ground surface during the October 2005 monitoring.	
	Direction of Flow	Unknown.	
	Hydraulic Conductivity	Hydraulic conductivity testing has not been conducted at the site.	
	Nearby Underground Facilities	Terasen (Trans Mountain) Pipeline	
	Nearby Underground Utilities	None.	
WATER USAGE	**Groundwater**		
	On Site	None.	
	Water Wells (within 1.5 km)	A search of the BC Water Resources Atlas indicated no water wells located within 1.5 km of the site. In addition, an aerial photograph review previously conducted by SEACOR did not indicate any nearby homes, which could potentially have unregistered water well, as there is no distribution system in the area.	
	Potable Water		
	On Site	None.	
	Surrounding Site	No Regional District or Community system in place in the area.	
	Surface Water		
	Drainage	Surface drainage direction appears to be towards the west.	
	Nearest Surface Water Body (within 1.0 km)	Finn Creek is located approximately 200 m west of the site and the North Thompson River is located approximately 1.6 km west of the site.	
EXPOSURE PATHWAYS	**Human Health Protection**		
	Intake of contaminated soil (mandatory)	Applicable – Surface soil exposed over majority of the site.	
	Groundwater Used for Drinking Water	Not Applicable – No water wells present within 1.5 km.	
	Environmental Protection		
	Toxicity to Soil Invertebrates and Plants (mandatory)	Applicable – Surface soil exposed over majority of the site.	
	Protection of Groundwater to Surface Water used by Aquatic Life (Freshwater)	Applicable – Surface water body located within 1.0 km of the site. If detailed evaluation of groundwater travel times shows that travel time from the site to the nearest aquatic receiving environment is more than 50 years then the default 1 km distance need not be applied.	

RECOMMENDED CURRENT SITE ASSESSMENT STANDARDS:

SOIL: BC CSR - Generic Numerical Soil Standards for industrial land use (IL), Matrix Numerical Soil Standards for industrial land use under the most conservative of the mandatory site-specific factors: toxicity to soil invertebrates and plants and human intake of contaminated soil, as well as the site-specific factor(s): groundwater flow to surface water used by freshwater aquatic life (AWF). Where criteria are more stringent, the CCME Industrial Land Use with Coarse-Grained Surface Soil Texture (where applicable) criteria have been applied for comparison purposes.

GROUNDWATER: BC CSR – Generic Numerical Water Standards under the most conservative of the site-specific factor(s): groundwater flow to surface water used by freshwater aquatic life (AWF). Where criteria are more stringent, the CCME Freshwater Aquatic Life criteria have been applied for comparison purposes.

Notes: Completed in accordance with the British Columbia Environmental Management Act, Contaminated Sites Regulation (2005).

TABLE 2: SOIL ANALYTICAL RESULTS - HYDROCARBONS															
Sample ID	**Sample Location**	**Date**	**Depth (m)**	**Soil Vapour Concentration Eagle/PID (ppm)***	**Benzene**	**Ethylbenzene**	**Toluene**	**Xylene**	**Styrene**	**MTBE**	**VPH (C_{6-10})**	**EPH (C_{10-19})**	**LEPH (C_{10-19})**	**EPH (C_{19-32})**	**HEPH (C_{10-19})**
FN4	BH101	18-Oct-05	2.3	90 / 4.5	<0.040	<0.050	<0.10	<0.071	<0.050	--	<100	<200	--	<200	--
FN9	BH102	18-Oct-05	1.5	50 / 16.0	<0.040	<0.050	<0.10	<0.071	<0.050	--	<100	<200	--	<200	--
FN10	Filed duplicate of FN9				<0.040	<0.050	<0.10	<0.071	<0.050	--	<100	<200	--	<200	--
FN14	BH103	18-Oct-05	0.8	50 / 2.4	<0.040	<0.050	<0.10	<0.071	<0.050	--	<100	<200	--	10600	--
FN20	BH104	18-Oct-05	0.8	40 / 8.2	<0.040	<0.050	<0.10	<0.071	<0.050	--	<100	<200	<200	<200	<200
FN24	BH105	18-Oct-05	0.3	70 / 45.6	<0.040	0.055	<0.10	0.531	<0.050	<0.20	--	--	--	--	--
FN31	BH105	18-Oct-05	4.5	45 / 38.9	<0.040	<0.050	<0.10	<0.071	<0.050	--	<100	<200	--	<200	--
FN33	BH106	18-Oct-05	1.5	35 / 10.8	<0.040	<0.050	<0.10	<0.071	<0.050	--	<100	<200	--	<200	--
PROVINCIAL - CSR IL					10[b]	**20[c]**	25[c]	50[c]	**50[a]**	**360[e]**	**200[a]**	ns	**2000[a]**	ns	**5000[a]**
FEDERAL - CCME ILCG					**1.0[f]**	50[f]	**0.10[f]**	**37[f]**	50	ns	ns	ns	ns	ns	ns

Notes:
m - metres
mg/kg - all results in milligrams per dry kilogram unless otherwise indicated
ppm - parts per million
* Soil vapour concentrations measured with an Eagle RKI hydrocarbon vapour analyzer calibrated to hexane with methane response disabled and organic vapour concentrations measured with a MiniRae PID calibrated to isobutylene
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
VPH - volatile petroleum hydrocarbons (C6-10), excluding benzene, ethylbenzene, toluene, xylenes
EPH - extractable petroleum hydrocarbons (C10-19) and (C19-32)
LEPH - light extractable petroleum hydrocarbons (C10-19), excluding nine specific polycyclic aromatic hydrocarbon parameters
HEPH - heavy extractable petroleum hydrocarbons (C19-32), excluding nine specific polycyclic aromatic hydrocarbon parameters
MTBE - methyl tertiary-butyl ether
ns - no standard listed
CSR IL - BC Contaminated Sites Regulation, Industrial standards
CCME IL - Canadian Council of Ministers of the Environment Soil Quality Guidelines Industrial Land Use (Coarse Grained Surface Soil, wher applicable)
[a] - CSR, Schedule 4 Generic Numerical Soil Standards
[b] - CSR, Schedule 5 Matrix Numerical Soil Standards - aquatic life standards to protect freshwater aquatic life
[c] - CSR, Schedule 5 Matrix Numerical Soil Standards - toxicity to soil invertebrates and plants
[d] - CSR, Schedule 5 Matrix Numerical Soil Standards - intake of contaminated soil
[e] - CSR, Schedule 10 Generic Numerical Soil and Water Standards - Commercial & Industrial Soil Standard
[f] - CCME Soil Quality Guideline - Aquatic life
BOLD - Exceeds **most stringent** industrial **standard/guideline also shown in BOLD**

TABLE 3: SOIL ANALYTICAL RESULTS - PAHs			
Sample ID **Date** **Location** **Depth (m)**	**FN20** **18-Oct-05** **BH104** **0.8**	**PROVINCIAL CSR IL**	**FEDERAL CCME IL**
Acenaphthene	<0.040	ns	ns
Acenaphthylene	<0.050	ns	ns
Anthracene	<0.050	ns	ns
Benz(a)anthracene	<0.050	**10[a]**	10
Benzo(a)pyrene	<0.050	10[b]	**0.7**
Benzo(b)fluoranthene	<0.050	**10[a]**	10
Benzo(g,h,i)perylene	<0.050	ns	ns
Benzo(k)fluoranthene	<0.050	**10[a]**	10
Chrysene	<0.050	ns	ns
Dibenz(a,h)anthracene	<0.050	**10[a]**	10
Fluoranthene	<0.050	ns	ns
Fluorene	<0.050	ns	ns
Indeno(1,2,3-c,d)pyrene	<0.050	**10[a]**	10
2-Methylnaphthalene	<0.050	ns	ns
Naphthalene	<0.050	50[a]	**22**
Phenanthrene	<0.050	**50[a]**	50
Pyrene	<0.050	**100[a]**	100

Notes:
m - metres
mg/kg - all results in milligrams per dry kilogram unless otherwise indicated
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
PAH - polycyclic aromatic hydrocarbons
ns - no standard listed
CSR IL - BC Contaminated Sites Regulation, Industrial standards
CCME IL - Canadian Council of Ministers of the Environment Soil Quality Guidelines Industrial Land Use
[a] - CSR, Schedule 4 Generic Numerical Soil Standards
[b] - CSR, Schedule 5 Matrix Numerical Soil Standards - toxicity to soil invertebrates and plants
BOLD - Exceeds **most stringent** industrial **standard/guideline also shown in BOLD**

TABLE 4: SOIL ANALYTICAL RESULTS - VOCs			
Sample ID **Date** **Location** **Depth (m)**	**FN24** **18-Oct-05** **BH105** **0.3**	**PROVINCIAL CSR IL**	**FEDERAL CCME IL**
Bromodichloromethane	< 0.050	**18**[c]	ns
Bromoform (Tribromomethane)	< 0.050	**2200**[c]	ns
Carbon Tetrachloride	< 0.050	**50**[a]	50
Chlorobenzene	< 0.050	**10**[a]	10
Chloroethane	< 0.1	**65**[c]	ns
Chloroform	< 0.1	**50**[a]	50
Chloromethane	< 0.1	**26**[c]	ns
Dibromochloromethane	< 0.050	**26**[c]	ns
1,2-Dichlorobenzene	< 0.050	**10**[a]	10
1,3-Dichlorobenzene	< 0.050	**10**[a]	10
1,4-Dichlorobenzene	< 0.050	**10**[a]	10
1,1-Dichloroethane	< 0.050	**50**[a]	50
1,2-Dichloroethane	< 0.050	**50**[a]	50
1,1-Dichloroethylene	< 0.050	**50**[a]	50
cis-1,2-Dichloroethylene	< 0.050	**50**[a]	50
trans-1,2-Dichloroethylene	< 0.050	**50**[a]	50
Dichloromethane	<0.5	**50**[a]	50
1,2-Dichloropropane	< 0.050	**50**[a]	50
cis-1,3-Dichloropropylene	< 0.050	**50**[a]	ns
trans-1,3-Dichloropropylene	< 0.050	**50**[a]	ns
1,1,2,2-Tetrachloroethane	0.057	**9.3**[c]	50
1,1,1,2-Tetrachloroethane	<0.050	**73**[c]	ns
Tetrachloroethylene	<0.050	5[b]	**0.6**
1,1,1-Trichloroethane	<0.050	**50**[a]	50
1,1,2-Trichloroethane	<0.050	**50**[a]	50
Trichloroethylene	<0.050	**0.65**[b]	31
Trichlorofluoromethane	< 0.10	**2000**[c]	ns
Vinyl chloride	< 0.10	**7.5**[c]	ns

Notes:
m - metres
mg/kg - all results in milligrams per dry kilogram unless otherwise indicated
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
VOC - volatile organic compounds
ns - no standard listed
CSR IL - BC Contaminated Sites Regulation, Industrial standards
CCME IL - Canadian Council of Ministers of the Environment Soil Quality Guidelines Industrial Land Use
[a] - CSR, Schedule 4 Generic Numerical Soil Standards
[b] - CSR, Schedule 5 Matrix Numerical Soil Standards - aquatic life standards to protect freshwater aquatic life
[c] - CSR, Schedule 10 Generic Numerical Soil and Water Standards - Commercial & Industrial Soil Standard
BOLD - Exceeds **most stringent** industrial **standard/guideline also shown in BOLD**

TABLE 5: SOIL ANALYTICAL RESULTS - METALS					
Sample ID **Date** **Location** **Depth (m)**	**FN8** **18-Oct-05** **BH102** **0.8**	**FN21** **18-Oct-05** **BH104** **1.5**	**FN32** **18-Oct-05** **BH106** **0.8**	**PROVINCIAL** **CSR IL**	**FEDERAL** **CCME IL**
pH	6.06	6.39	**5.98**	ns	**6-8**
Antimony	<10	<10	<10	**40**[a]	40
Arsenic	<5.0	<5.0	<5.0	20[b]	**12**
Barium	20.3	34.1	28.8	**2000**[a]	2000
Beryllium	<0.50	<0.50	<0.50	**8**[a]	8
Cadmium	<0.50	<0.50	<0.50	**2**[b]	22
Chromium (total)	5.0	6.2	13.2	**60**[b]	87
Cobalt	<2.0	2.4	2.5	**300**[a]	300
Copper	5.5	6.7	8.0	200[b] for pH<6.0, 250[c] for pH>6.0	**91**
Lead	<50	<50	<50	**250**[b] for pH<6.0, 2000[b,c] for pH>6.0	600
Mercury	<0.050	<0.050	<0.050	150[c]	**50**
Molybdenum	<4.0	<4.0	<4.0	**40**[a]	40
Nickel	<5.0	<5.0	5.2	500[a]	**50**
Selenium	<2.0	<2.0	<2.0	10[a]	**3.9**
Silver	<2.0	<2.0	<2.0	**40**[a]	40
Tin	<5.0	<5.0	<5.0	**300**[a]	300
Vanadium	10.8	12.3	11.6	ns	**130**
Zinc	15.4	19.4	20.2	**150**[b] for pH<6.0, 600[c] for pH>6.0	**360**

Notes:
m - metres
mg/kg - all results in milligrams per dry kilogram unless otherwise indicated
< - less than analytical detection limit indicated
'---' - sample not analyzed for parameter indicated
ns - no standard listed
CSR IL - BC Contaminated Sites Regulation, Industrial standards
CCME IL - Canadian Council of Ministers of the Environment Soil Quality Guidelines Industrial Land Use
[a] - CSR, Schedule 4 Generic Numerical Soil Standards
[b] - CSR, Schedule 5 Matrix Numerical Soil Standards - aquatic life standards to protect freshwater aquatic life
[c] - CSR, Schedule 5 Matrix Numerical Soil Standards - toxicity to soil invertebrates and plants
BOLD - Exceeds **most stringent** industrial **standard/guideline also shown in BOLD**

TABLE 6: SUMMARY OF GROUNDWATER MONITORING							
Monitor Well	**Date (mm/dd/yy)**	**TOP Elevation* (m)**	**Standpipe Vapour Concentration** Eagle/PID (ppm)**	**Apparent LNAPL Thickness*** (mm)**	**Depth to Groundwater (mBTOP)**	**Groundwater Elevation**** (m)**	**Analyses Requested**
BH105	October 20, 2005	99.75	260/0.8	0	3.04	96.71	BTEX, VOCs, VPH, EPH, LEPH & CSR dissolved metals

Notes:

* TOP Elevation is relative to a temporary benchmark with assumed elevation of 100.000 m.

** Standpipe vapour concentrations measured with an Eagle RKI hydrocarbon vapour analyzer calibrated to hexane with methane response disabled and organic vapour concentrations measured with a MiniRae PID calibrated to isobutylene.

*** Apparent LNAPL thickness was measured using a Heron interface probe.

**** Groundwater Elevation is corrected for LNAPL thickness with an assumed specific gravity of 0.8 kg/L.

TOC - Top of Pipe

m - metres

LNAPL - Light Non-Aqueous Phase Liquid

mBTOP - meters Below Top of Pipe

TABLE 7: GROUNDWATER ANALYTICAL RESULTS - HYDROCARBONS												
Sample ID	**Date**	**Benzene**	**Ethylbenzene**	**Toluene**	**Xylenes**	**Styrene**	**VPHw**	**VHw**	**EPHw (C_{10}-$_{19}$)**	**LEPHw (C_{10}-$_{19}$)**	**EPHw (C_{19}-$_{32}$)**	**HEPHw (C_{19}-$_{32}$)**
BH105	20-Oct-05	<0.00050	<0.00050	<0.0010	<0.0010	<0.00050	<0.10	<0.10	<0.3	<0.30	<1.0	<1.0
PROVINCIAL - CSR AWF		4	2	0.39	ns	0.72	**1.5**	**15**	**5**	**0.5**	ns	ns
FEDERAL - CCME AWF		**0.37**	**0.09**	**0.002**	ns	**0.072**	ns	ns	ns	ns	ns	ns

Notes:
mg/L - all results in milligrams per litre unless otherwise indicated
< - less than analytical detection limit indicated
'---'- sample not analyzed for parameter indicated
ns - no standard listed
VPHw - volatile petroleum hydrocarbons (C6-10), excluding benzene, ethylbenzene, toluene and xylenes
VHw - volatile petroleum hydrocarbons (C6-10), including benzene, ethylbenzene, toluene and xylenes
EPHw - light extractable petroleum hydrocarbons (C10-19), including polycyclic aromatic hydrocarbon parameters
EPHw - light extractable petroleum hydrocarbons (C19-32), including polycyclic aromatic hydrocarbon parameters
LEPH - light extractable petroleum hydrocarbons (C10-19), excluding six specific polycyclic aromatic hydrocarbon parameters
HEPH - heavy extractable petroleum hydrocarbons (C19-32), excluding four specific polycyclic aromatic hydrocarbon parameters
CSR - Contaminated Sites Regulation
CSR AWF - Schedule 6 Generic Numerical Water Standards - Freshwater Aquatic Life Standard
CCME AWF - Canadian Council of Ministers of the Environment Freshwater Aquatic Life Guidelines
See laboratory report for detection limits, testing protocols and QA/QC procedures.
BOLD - Exceeds **most stringent** industrial **standard/guideline also shown in BOLD**

TABLE 8: GROUNDWATER ANALYTICAL RESULTS - PAHs			
Sample ID	**BH105**	**PROVINCIAL**	**FEDERAL**
Date	**20-Oct-05**	**CSR AWF**	**CCME AWF**
Acenaphthene	<0.050	60	**5.8**
Acenaphthylene	<0.050	ns	ns
Acridine	<0.050	**0.5**	4.4
Anthracene	<0.050*	1	**0.012**
Benzo(a)anthracene	<0.050*	1	**0.018**
Benzo(a)pyrene	<0.050*	0.1	**0.015**
Benzo(b)fluoranthene	<0.050	ns	ns
Benzo(g,h,i)perylene	<0.050	ns	ns
Benzo(k)fluoranthene	<0.050	ns	ns
Chrysene	<0.050	**1**	ns
Dibenz(a,h)anthracene	<0.050	ns	ns
Fluoranthene	<0.050*	2	**0.04**
Fluorene	<0.050	120	**3.0**
Indeno(1,2,3-c,d)pyrene	<0.050	ns	ns
Naphthalene	0.090	10	**1.1**
Phenanthrene	<0.050	3	**0.4**
Pyrene	<0.050*	0.2	**0.025**
Quinoline	<0.050	34	**3.4**

Notes:
ug/L -All results in micrograms per litre, unless otherwise stated
PAH - polycyclic aromatic hydrocarbons
< - less than analytical detection limit indicated
* - detection limit is greater than the most stringent standard/guideline
"---" - sample not analyzed for parameter indicated
ns - no standard listed
CSR - Contaminated Sites Regulation
CSR AWF - Schedule 6 Generic Numerical Water Standards - Freshwater Aquatic Life Standard
CCME AWF - Canadian Council of Ministers of the Environment Freshwater Aquatic Life Guidelines
See laboratory report for detection limits, testing protocols and QA/QC procedures.
BOLD - Exceeds **most stringent** industrial **standard/guideline also shown in BOLD**

TABLE 9: GROUNDWATER ANALYTICAL RESULTS - VOCs

Sample ID Date	BH105 20-Oct-05	PROVINCIAL CSR AWF	FEDERAL CCME AWF
Bromodichloromethane	<1.0	ns	ns
Bromoform	<1.0	ns	ns
Carbon Tetrachloride	<1.0	130	**13.3**
Chlorobenzene	<1.0	13	**1.3**
Chloroethane	<1.0	ns	ns
Chloroform	<1.0	20	**1.8**
Chloromethane	1.6	ns	ns
Dibromochloromethane	<1.0	ns	ns
1,2-Dichlorobenzene	<0.5	7	**0.7**
1,3-Dichlorobenzene	<1.0	1500	**150**
1,4-Dichlorobenzene	<1.0	260	**26**
1,1-Dichloroethane	<1.0	ns	ns
1,2-Dichloroethane	<1.0	1000	**100**
1,1-Dichloroethylene	<1.0	ns	ns
cis-1,2-Dichloroethylene	<1.0	ns	ns
trans-1,2-Dichloroethylene	<1.0	ns	ns
Dichloromethane	<0.5	980	**98.1**
1,2-Dichloropropane	<1.0	ns	ns
cis-1,3-Dichloropropylene	<1.0	ns	ns
trans-1,3-Dichloropropylene	<1.0	ns	ns
1,1,1,2-Tetrachloroethane	<1.0	ns	ns
1,1,2,2-Tetrachloroethane	<1.0	ns	ns
Tetrachloroethylene	<1.0	1100	**111**
1,1,1-Trichloroethane	<1.0	ns	ns
1,1,2-Trichloroethane	<1.0	ns	ns
Trichloroethylene	<1.0	200	**21**
Trichlorofluoromethane	<1.0	ns	ns
Vinyl chloride	<1.0	ns	ns

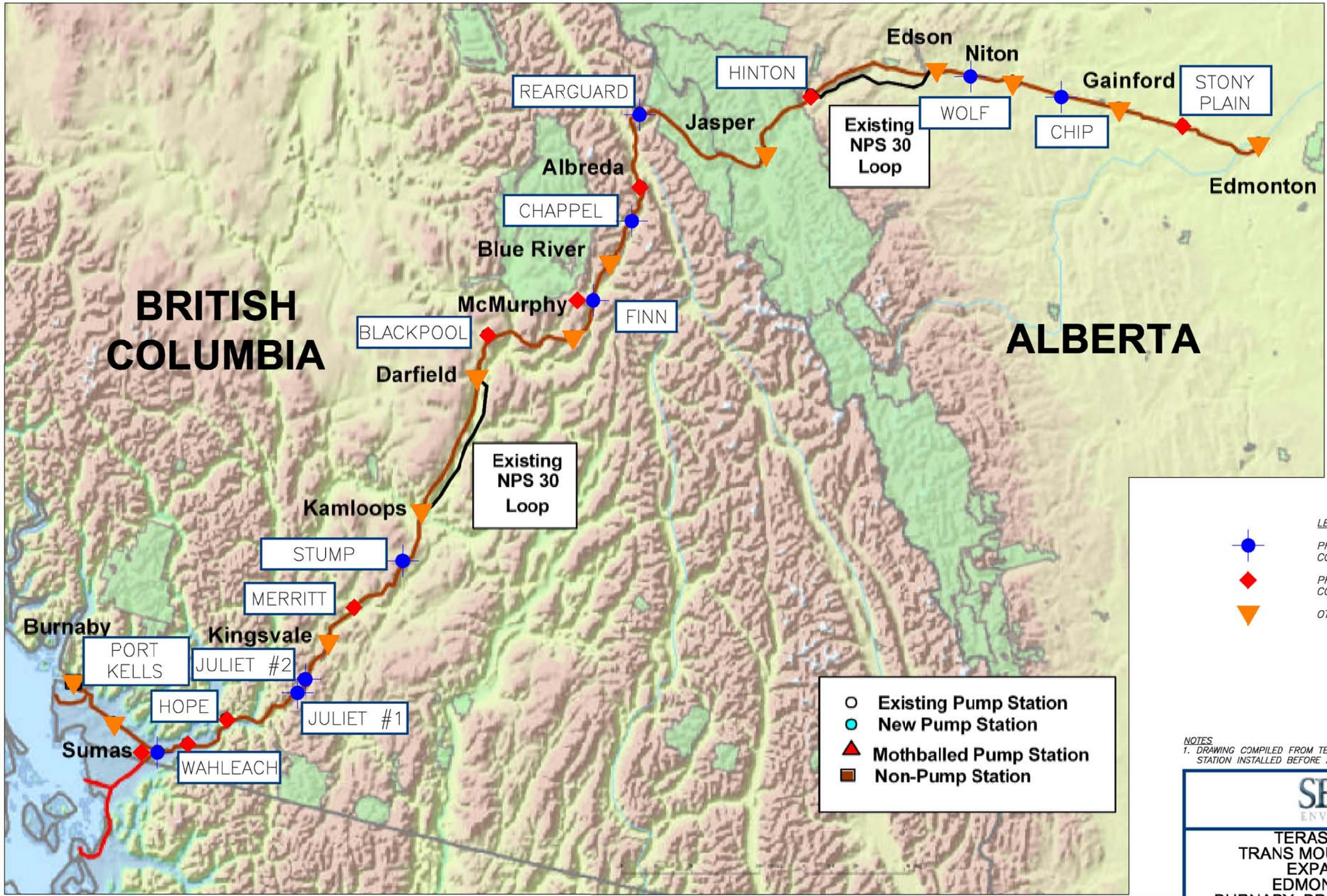
Notes:
ug/L -All results in micrograms per litre, unless otherwise stated
VOC - Volatile Organic Compounds
< - less than analytical detection limit indicated
"---" - sample not analyzed for parameter indicated
ns - no standard listed
CSR - Contaminated Sites Regulation
CSR AWF - Schedule 6 Generic Numerical Water Standards - Freshwater Aquatic Life Standard
CCME AWF - Canadian Council of Ministers of the Environment Freshwater Aquatic Life Guidelines
See laboratory report for detection limits, testing protocols and QA/QC procedures.
BOLD - Exceeds **most stringent** industrial **standard/guideline also shown in BOLD**

TABLE 10: GROUNDWATER ANALYTICAL RESULTS - DISSOLVED METALS			
Sample ID	**BH105**	**PROVINCIAL**	**FEDERAL**
Date	**20-Oct-05**	**CSR AWF**	**CCME AWF**
pH	---	ns	6.5-9.0
Hardness	226	ns	ns
Aluminum	**2.58**	ns	**0.005-0.1**
Antimony	<0.0050	**0.2**	ns
Arsenic	<0.010*	0.05	**0.005**
Barium	0.045	**10**	ns
Beryllium	<0.0050	**0.053**	ns
Boron	<0.10	**50**	ns
Cadmium	<0.00050*	0.0007[H]	**0.000017**
Calcium	18.8	ns	ns
Total Chromium	<0.0050	ns	ns
Cobalt	<0.0050	**0.04**	ns
Copper	<0.010*	0.09	**0.002-0.004**
Iron	**1.77**	ns	**0.3**
Lead	<0.010*	0.16	**0.001-0.007**
Lithium	<0.050	ns	ns
Magnesium	3.8	ns	ns
Manganese	0.208	ns	ns
Mercury	<0.00020*	0.001	**0.000026**
Molybdenum	<0.010	10	**0.073**
Nickel	<0.050	1.5	**0.025-0.15**
Selenium	<0.010*	0.01	**0.001**
Silver	<0.00050*	0.015	**0.0001**
Sodium	4.5	ns	ns
Thallium	<0.0020*	0.003	**0.0008**
Titanium	0.111	**1**	ns
Uranium	<0.0020	**3**	ns
Vanadium	<0.030	ns	ns
Zinc	0.0079	1.65	**0.03**

Notes:
mg/L -All results in milligrams per litre, unless otherwise stated
< - less than analytical detection limit indicated
* - detection limit is greater than the most stringent standard/guideline
'---' - sample not analyzed for parameter indicated
ns - no standard listed
[H] - Calculated from CSR Protocol 10 - Hardness Dependent Site-Specific Freshwater Quality Standards for Cadmium and Zinc
CSR - Contaminated Sites Regulation
CSR AWF - Schedule 6 Generic Numerical Water Standards - Freshwater Aquatic Life Standard
CCME AWF - Canadian Council of Ministers of the Environment Freshwater Aquatic Life Guidelines
See laboratory report for detection limits, testing protocols and QA/QC procedures.
BOLD - Exceeds **most stringent** industrial **standard/guideline also shown in BOLD**

FIGURES

Terasen Pipelines (Trans Mountain) Inc.
Trans Mountain Pump Station Expansion Project
Proposed Finn Pump Station, British Columbia
SEACOR Project #: 212.06117.02



NOTES
1. DRAWING COMPILED FROM TERASEN PIPELINES FILE TMx CEAA, TITLED "PUMP STATION INSTALLED BEFORE ANCHOR LOOP.

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

REV.	DESCRIPTION	DATE	MADE	CHK'D

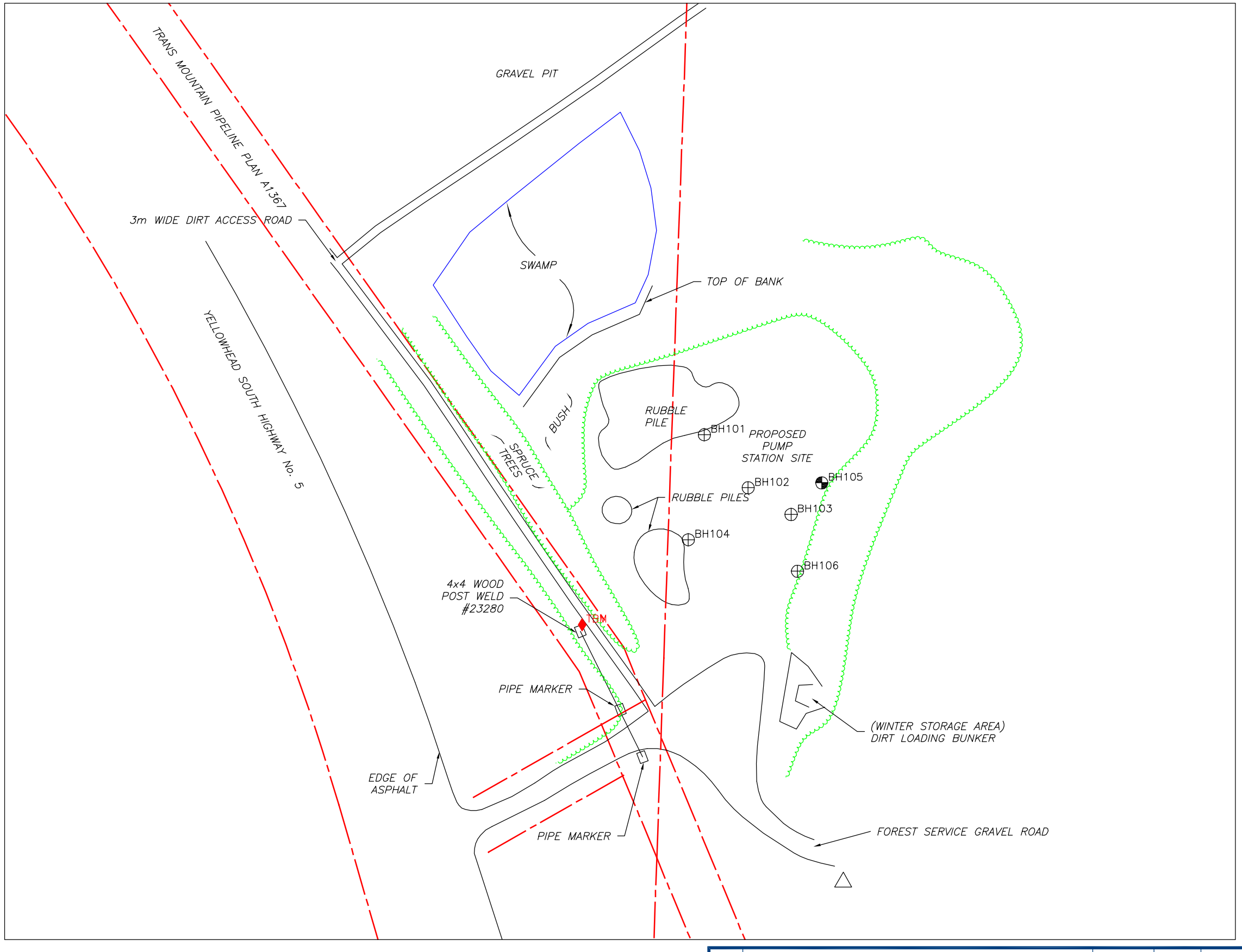
SEACOR ENVIRONMENTAL INC.

TERASEN PIPELINES INC.
TRANS MOUNTAIN PUMP STATION EXPANSION PROJECT
EDMONTON, ALBERTA TO BURNABY, BRITISH COLUMBIA PIPELINE

ENVIRONMENTAL SITE ASSESSMENT/INVESTIGATIONS

PROJECT SITE LOCATION OVERVIEW

SCALE	DATE	FILE NAME	JOB No.	CHK'D	MADE	FIG
AS SHOWN	11/23/05	212-06117-02-A1	212-06117-02	ELK	KDT	1



N
W E
S

LEGEND

- BH — BOREHOLE LOCATION
- MW — BOREHOLE LOCATION COMPLETED AS A MONITOR WELL
- PROPERTY BOUNDARY
- SITE LOCATION
- TREE LINE
- TBM — TEMPORARY BENCHMARK

NOTES

1. DRAWING COMPILED FROM TERASEN PIPELINES DRAWING FILE.
2. LEGAL DESCRIPTION:
   PORTION OF DISTRICT LOT 3262, KAMLOOPS DIVISION YALE DISTRICT
3. TEMPORARY BENCHMARK:
   THE TOP OF THE 4x4 WOOD POST MARKER.
   ELEVATION = 100.000m (ASSUMED)

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

0 50 100 m

REV.	DESCRIPTION	DATE	MADE	CHK'D

SEACOR ENVIRONMENTAL INC.

TERASEN PIPELINES INC.
TRANS MOUNTAIN PUMP STATION EXPANSION PROJECT
FINN FACILITY
NEAR AVOLA, BRITISH COLUMBIA

PHASE II ENVIRONMENTAL SITE INVESTIGATION

MONITOR WELL LOCATION PLAN

SCALE	DATE	FILE NAME	JOB No.	CHK'D	MADE	FIG
AS SHOWN	11/23/05	212-06117-02-A1	212-06117-02	ELK	KDT	2

PHOTOGRAPHS

Terasen Pipelines (Trans Mountain) Inc.
Trans Mountain Pump Station Expansion Project
Proposed Finn Pump Station, British Columbia
SEACOR Project #: 212.06117.02

SITE PHOTOGRAPHS

Photo 1: View of staked out locations for BH101 and BH102 near former logging equipment storage and oily staining.

Photo 2: View of BH104 near adjacent mixed asphalt/soil pile.

Photo 3: View oily surface staining at BH102.

Photo 4: View of rig setting up at east side of site for BH105 on oily stained area.

Photo 5: View BH106 in progress (location of former abandoned ASTs).

Photo 6: View of staked out location for BH103 and oily staining.

APPENDIX A
Borehole Logs/Monitor Well Construction Details

Terasen Pipelines (Trans Mountain) Inc.
Trans Mountain Pump Station Expansion Project
Proposed Finn Pump Station, British Columbia
SEACOR Project #: 212.06117.02

SEACOR ENVIRONMENTAL INC.

SEACOR JOB NO: 212.06117.02

CLIENT: **Terasen Pipelines Inc.**
PROJECT: **Pump Station Site Assessment**
Part of DL 3262, KDYD
Finn, British Columbia

BOREHOLE LOG

BOREHOLE NO: BH101
SURFACE ELEVATION: 99.16 m
UTM COORDINATES: 5743882 N, 340467 E

DEPTH (m)	SAMPLE TYPE	MOISTURE CONTENT (%)	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv)	BOREHOLE COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0	FN1			**GRAVEL** Sandy, trace silt, trace clay, trace cobbles, dark brown, moist, compact, trace organics	40				99
				@ 0.3 m: Light brown				bentonite seal	
	FN2				20				
1				**SAND** Fine-grained, trace silt, light brown, moist, compact					98
	FN3				60				
				@ 1.7 m: Silty, some fine sand, wet					
2									
	FN4 (LAB)	19		@ 2.3 m: Coarse sand, some silt, dense, moist	90			backfilled with drill cuttings	97
3	FN5				15				
				@ 3.2 m: Wet					96
	FN6				10				
4									95
				@ 4.3 m: Auger refusal End of borehole at 4.3 m					

DRILLING METHOD: Solid Stem Auger Drilling

DRILL DATE: October 18, 2005 LOGGED BY: RS

Notes: ■ GRAB SAMPLE

SEACOR ENVIRONMENTAL INC.

SEACOR JOB NO: 212.06117.02

CLIENT: **Terasen Pipelines Inc.**
PROJECT: **Pump Station Site Assessment**
Part of DL 3262, KDYD
Finn, British Columbia

BOREHOLE LOG

BOREHOLE NO: BH102
SURFACE ELEVATION: 99.17 m
UTM COORDINATES: 5753858 N, 340470 E

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	MOISTURE CONTENT (%)	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv)	BOREHOLE COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
		FN7			**GRAVEL** Sandy, trace silt, olive brown, moist, dense, trace organics	5				99
					SAND Medium-grained, trace pebbles and cobbles, light olive brown, moist, dense				bentonite seal	
		FN8 (LAB)				40				
1										98
		FN9/ FN10 (LAB)	21		**CLAY** Sandy, silty, dark brown, wet, firm	50				
					SAND Medium-grained, light olive brown, moist				backfilled with drill cuttings	
2		FN11			@ 2.4 m: Grey	30				97
		FN12				30				
3					End of borehole at 3 m					

DRILLING METHOD: Solid Stem Auger Drilling

DRILL DATE: October 18, 2005 LOGGED BY: RS

Notes: ■ GRAB SAMPLE

SEACOR ENVIRONMENTAL INC.

SEACOR JOB NO: 212.06117.02

CLIENT: **Terasen Pipelines Inc.**
PROJECT: **Pump Station Site Assessment**
Part of DL 3262, KDYD
Finn, British Columbia

BOREHOLE LOG

BOREHOLE NO: BH103
SURFACE ELEVATION: 99.02 m
UTM COORDINATES: 5753842 N, 340476 E

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	MOISTURE CONTENT (%)	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv)	BOREHOLE COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
		FN13			**SAND** Medium-grained, trace silt, trace clay, trace gravel, light olive brown, moist, dense, organic odor	45			bentonite seal	
		FN14 (LAB)	7			50				
1		FN15				25				98
					@ 1.8 m: Tree roots, organics					
2		FN16				15			backfilled with drill cuttings	97
3		FN17				20				96
		FN18				20				
4		FN19				20				95
					@ 4.6 m: Some gravel and cobbles End of borehole at 4.6 m					

DRILLING METHOD: Solid Stem Auger Drilling

DRILL DATE: October 18, 2005 LOGGED BY: RS

Notes: ■ GRAB SAMPLE

SEACOR ENVIRONMENTAL INC.

SEACOR JOB NO: 212.06117.02

CLIENT: **Terasen Pipelines Inc.**
PROJECT: **Pump Station Site Assessment**
Part of DL 3262, KDYD
Finn, British Columbia

BOREHOLE LOG

BOREHOLE NO: BH104
SURFACE ELEVATION: 98.23 m
UTM COORDINATES: 5753852 N, 340438 E

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	MOISTURE CONTENT (%)	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	BOREHOLE COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					SAND Medium-grained, trace gravel, trace cobbles, olive brown, moist, dense				bentonite seal	98
		FN20 (LAB)	4			40				
1					@ 0.8 m: Fine-grained, trace gravel, light olive brown					
		FN21 (LAB)				50				97
									backfilled with drill cuttings	
2		FN22			@ 2.1 m: Some cobbles	35				96
		FN23				35				
3					End of borehole at 3 m					

DRILLING METHOD: Solid Stem Auger Drilling

DRILL DATE: October 18, 2005 LOGGED BY: RS

Notes: ■ GRAB SAMPLE

SEACOR ENVIRONMENTAL INC.

SEACOR JOB NO: 212.06117.02

CLIENT: **Terasen Pipelines Inc.**
PROJECT: **Pump Station Site Assessment**
Part of DL 3262, KDYD
Finn, British Columbia

BOREHOLE LOG

BOREHOLE NO: BH105
SURFACE ELEVATION: 99.83 m
UTM COORDINATES: 5753853 N, 340494 E

DEPTH (m)	SAMPLE TYPE		MOISTURE CONTENT (%)	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv)	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0		FN24/ FN25 (LAB)	10		**SAND** Fine-grained, some clay, trace silt, dark olive brown, moist, dense, organic odor	70			roadbox, screw cap cement	
		FN26			@ 0.8 m: Coarse-grained, olive brown, no odor	30				99
1					@ 1.2 m: Some gravel, some cobbles				bentonite seal	
		FN27				20				98
2									silica sand	
		FN28			@ 2.3 m: Organic odor	50				97
3		FN29 (LAB)				60		▼	GW = 3.14 mbg (Oct 20, 2005)	
					@ 3.4 m: Some silt, wet					
		FN30				60				96
4					@ 4.0 m: Moist					
		FN31 (LAB)	9			45				
5									50 mm 010 slot PVC pipe	95
									slough	
6										94
					End of borehole at 6.1 m Well Completion Details: Screened interval from 2.3 m to 5.3 m below surface Elevation at top of pipe (TOP) = 99.749 m Groundwater Information: Depth to groundwater from TOP = 3.06 m (Oct 20, 2005)					

DRILLING METHOD: Solid Stem Auger Drilling

DRILL DATE: October 18, 2005 LOGGED BY: RS

Notes: ■ GRAB SAMPLE
□ NO RECOVERY

SEACOR ENVIRONMENTAL INC.

SEACOR JOB NO: 212.06117.02

CLIENT: **Terasen Pipelines Inc.**
PROJECT: **Pump Station Site Assessment**
Part of DL 3262, KDYD
Finn, British Columbia

BOREHOLE LOG

BOREHOLE NO: BH106
SURFACE ELEVATION: 98.91 m
UTM COORDINATES: 5753845 N, 340480 E

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	MOISTURE CONTENT (%)	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	BOREHOLE COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0					**SAND** Coarse-grained, some gravel, some cobbles, olive brown, moist, dense				bentonite seal	
		FN32 (LAB)				30				
1										98
		FN33 (LAB)	9		@ 1.2 m: Dark olive brown	35				
					@ 1.8 m: Olive brown				backfilled with drill cuttings	97
2		FN34				25				
		FN35/ FN36				30				96
3					End of borehole at 3 m					

DRILLING METHOD: Solid Stem Auger Drilling

DRILL DATE: October 18, 2005 LOGGED BY: RS

Notes: ■ GRAB SAMPLE

APPENDIX B
Laboratory Analytical Reports

Terasen Pipelines (Trans Mountain) Inc.
Trans Mountain Pump Station Expansion Project
Proposed Finn Pump Station, British Columbia
SEACOR Project #: 212.06117.02

ALS Environmental

CERTIFICATE OF ANALYSIS

Date:	November 7, 2005
ALS File No.	CC500323r
Report On:	212.06117.02 Finn ALSEQ05-127.2 Soil Samples
Report To:	**SEACOR Environmental Inc.** 6940 Roper Road Edmonton, AB T6B 3H9
Attention:	**Ms. Emma Kirsh**
Received:	October 25, 2005

ALS ENVIRONMENTAL
per:

Monica Gibson

Monica Gibson, M.Sc. - Project Chemist
Brent Whitehead, B.Sc. - Operations Supervisor

REMARKS

This report for ALS file CC500323r supercedes CC500323, reported dissolved metals for BH105.

File No. CC500323r

RESULTS OF ANALYSIS - Sediment/Soil [1]

Sample ID		FN4	FN9	FN8	FN10	FN14
Sample Date		05-10-18	05-10-18	05-10-18	05-10-18	05-10-18
Sample Time		10:45	11:30	11:15	11:40	12:15
ALS ID		*1*	*2*	*3*	*4*	*5*
Physical Tests						
Moisture	%	19.0	20.7	-	20.8	6.97
pH		-	-	6.06	-	-
Total Metals						
Antimony	T-Sb	-	-	<10	-	-
Arsenic	T-As	-	-	<5.0	-	-
Barium	T-Ba	-	-	20.3	-	-
Beryllium	T-Be	-	-	<0.50	-	-
Cadmium	T-Cd	-	-	<0.50	-	-
Chromium	T-Cr	-	-	5.0	-	-
Cobalt	T-Co	-	-	<2.0	-	-
Copper	T-Cu	-	-	5.5	-	-
Lead	T-Pb	-	-	<50	-	-
Mercury	T-Hg	-	-	<0.050	-	-
Molybdenum	T-Mo	-	-	<4.0	-	-
Nickel	T-Ni	-	-	<5.0	-	-
Selenium	T-Se	-	-	<2.0	-	-
Silver	T-Ag	-	-	<2.0	-	-
Tin	T-Sn	-	-	<5.0	-	-
Vanadium	T-V	-	-	10.8	-	-
Zinc	T-Zn	-	-	15.4	-	-

Remarks regarding the analyses appear at the beginning of this report.
VPH = Volatile Petroleum Hydrocarbons.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per dry kilogram except where noted.

File No. CC500323r

RESULTS OF ANALYSIS - Sediment/Soil [1]

Sample ID	FN4	FN9	FN10	FN14
Sample Date	05-10-18	05-10-18	05-10-18	05-10-18
Sample Time	10:45	11:30	11:40	12:15
ALS ID	*1*	*2*	*4*	*5*
Non-Halogenated Volatiles				
Benzene	<0.040	<0.040	<0.040	<0.040
Ethylbenzene	<0.050	<0.050	<0.050	<0.050
Methyl t-butyl ether (MTBE)	-	-	-	-
Styrene	<0.050	<0.050	<0.050	<0.050
Toluene	<0.10	<0.10	<0.10	<0.10
meta- & para-Xylene	<0.050	<0.050	<0.050	<0.050
ortho-Xylene	<0.050	<0.050	<0.050	<0.050
Total Xylenes	<0.071	<0.071	<0.071	<0.071
Volatile Hydrocarbons (VH6-10)	<100	<100	<100	<100
VPH	<100	<100	<100	<100

Remarks regarding the analyses appear at the beginning of this report.
VPH = Volatile Petroleum Hydrocarbons.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per dry kilogram except where noted.

File No. CC500323r

RESULTS OF ANALYSIS - Sediment/Soil [1]

Sample ID	FN4	FN9	FN10	FN14
Sample Date	05-10-18	05-10-18	05-10-18	05-10-18
Sample Time	10:45	11:30	11:40	12:15
ALS ID	*1*	*2*	*4*	*5*
Extractable Hydrocarbons				
EPH10-19	<200	<200	<200	<200
EPH19-32	<200	<200	<200	10600
LEPH	-	-	-	-
HEPH	-	-	-	-

Remarks regarding the analyses appear at the beginning of this report.
VPH = Volatile Petroleum Hydrocarbons.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per dry kilogram except where noted.

File No. CC500323r

RESULTS OF ANALYSIS - Sediment/Soil [1]

Sample ID		FN21	FN20	FN24	FN31	FN33
Sample Date		05-10-18	05-10-18	05-10-18	05-10-18	05-10-18
Sample Time		12:35	12:30	13:00	14:40	15:10
ALS ID		*6*	*7*	*8*	*9*	*10*
Physical Tests						
Moisture	%	-	4.33	10.1	8.56	8.74
pH		6.39	-	-	-	-
Total Metals						
Antimony	T-Sb	<10	-	-	-	-
Arsenic	T-As	<5.0	-	-	-	-
Barium	T-Ba	34.1	-	-	-	-
Beryllium	T-Be	<0.50	-	-	-	-
Cadmium	T-Cd	<0.50	-	-	-	-
Chromium	T-Cr	6.2	-	-	-	-
Cobalt	T-Co	2.4	-	-	-	-
Copper	T-Cu	6.7	-	-	-	-
Lead	T-Pb	<50	-	-	-	-
Mercury	T-Hg	<0.050	-	-	-	-
Molybdenum	T-Mo	<4.0	-	-	-	-
Nickel	T-Ni	<5.0	-	-	-	-
Selenium	T-Se	<2.0	-	-	-	-
Silver	T-Ag	<2.0	-	-	-	-
Tin	T-Sn	<5.0	-	-	-	-
Vanadium	T-V	12.3	-	-	-	-
Zinc	T-Zn	19.4	-	-	-	-

Remarks regarding the analyses appear at the beginning of this report.
VPH = Volatile Petroleum Hydrocarbons.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per dry kilogram except where noted.

File No. CC500323r

RESULTS OF ANALYSIS - Sediment/Soil [1]

Sample ID	FN24
Sample Date	05-10-18
Sample Time	13:00
ALS ID	*8*

Halogenated Volatiles

Bromodichloromethane	<0.050
Bromoform	<0.050
Carbon Tetrachloride	<0.050
Chlorobenzene	<0.050
Chloroethane	<0.10
Chloroform	<0.10
Chloromethane	<0.10
Dibromochloromethane	<0.050
1,2-Dichlorobenzene	<0.050
1,3-Dichlorobenzene	<0.050
1,4-Dichlorobenzene	<0.050
1,1-Dichloroethane	<0.050
1,2-Dichloroethane	<0.050
cis-1,2-Dichloroethylene	<0.050
trans-1,2-Dichloroethylene	<0.050
1,1-Dichloroethylene	<0.050
Dichloromethane	<0.50
1,2-Dichloropropane	<0.050
cis-1,3-Dichloropropylene	<0.050
trans-1,3-Dichloropropylene	<0.050
1,1,1,2-Tetrachloroethane	<0.050
1,1,2,2-Tetrachloroethane	0.057
Tetrachloroethylene	<0.050
1,1,1-Trichloroethane	<0.050
1,1,2-Trichloroethane	<0.050
Trichloroethylene	<0.050
Trichlorofluoromethane	<0.10
Vinyl Chloride	<0.10

Remarks regarding the analyses appear at the beginning of this report.
VPH = Volatile Petroleum Hydrocarbons.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per dry kilogram except where noted.

File No. CC500323r

RESULTS OF ANALYSIS - Sediment/Soil [1]

Sample ID	FN20	FN24	FN31	FN33
Sample Date	05-10-18	05-10-18	05-10-18	05-10-18
Sample Time	12:30	13:00	14:40	15:10
ALS ID	*7*	*8*	*9*	*10*
Non-Halogenated Volatiles				
Benzene	<0.040	<0.040	<0.040	<0.040
Ethylbenzene	<0.050	0.055	<0.050	<0.050
Methyl t-butyl ether (MTBE)	-	<0.20	-	-
Styrene	<0.050	<0.050	<0.050	<0.050
Toluene	<0.10	<0.10	<0.10	<0.10
meta- & para-Xylene	<0.050	0.375	<0.050	<0.050
ortho-Xylene	<0.050	0.156	<0.050	<0.050
Total Xylenes	<0.071	0.531	<0.071	<0.071
Volatile Hydrocarbons (VH6-10)	<100	-	<100	<100
VPH	<100	-	<100	<100
Polycyclic Aromatic Hydrocarbons				
Acenaphthene	<0.040	-	-	-
Acenaphthylene	<0.050	-	-	-
Anthracene	<0.050	-	-	-
Benz(a)anthracene	<0.050	-	-	-
Benzo(a)pyrene	<0.050	-	-	-
Benzo(b)fluoranthene	<0.050	-	-	-
Benzo(g,h,i)perylene	<0.050	-	-	-
Benzo(k)fluoranthene	<0.050	-	-	-
Chrysene	<0.050	-	-	-
Dibenz(a,h)anthracene	<0.050	-	-	-
Fluoranthene	<0.050	-	-	-
Fluorene	<0.050	-	-	-
Indeno(1,2,3-c,d)pyrene	<0.050	-	-	-
2-Methylnaphthalene	<0.050	-	-	-
Naphthalene	<0.050	-	-	-
Phenanthrene	<0.050	-	-	-
Pyrene	<0.050	-	-	-

Remarks regarding the analyses appear at the beginning of this report.
VPH = Volatile Petroleum Hydrocarbons.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per dry kilogram except where noted.

File No. CC500323r

RESULTS OF ANALYSIS - Sediment/Soil [1]

Sample ID	FN20	FN31	FN33
Sample Date	05-10-18	05-10-18	05-10-18
Sample Time	12:30	14:40	15:10
ALS ID	*7*	*9*	*10*
Extractable Hydrocarbons			
EPH10-19	<200	<200	<200
EPH19-32	<200	<200	<200
LEPH	<200	-	-
HEPH	<200	-	-

Remarks regarding the analyses appear at the beginning of this report.
VPH = Volatile Petroleum Hydrocarbons.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per dry kilogram except where noted.

File No. CC500323r

RESULTS OF ANALYSIS - Sediment/Soil [1]

Sample ID		FN32
Sample Date		05-10-18
Sample Time		15:00
ALS ID		*11*
Physical Tests		
Moisture	%	-
pH		5.98
Total Metals		
Antimony	T-Sb	<10
Arsenic	T-As	<5.0
Barium	T-Ba	28.8
Beryllium	T-Be	<0.50
Cadmium	T-Cd	<0.50
Chromium	T-Cr	13.2
Cobalt	T-Co	2.5
Copper	T-Cu	8.0
Lead	T-Pb	<50
Mercury	T-Hg	<0.050
Molybdenum	T-Mo	<4.0
Nickel	T-Ni	5.2
Selenium	T-Se	<2.0
Silver	T-Ag	<2.0
Tin	T-Sn	<5.0
Vanadium	T-V	11.6
Zinc	T-Zn	20.2

Remarks regarding the analyses appear at the beginning of this report.
VPH = Volatile Petroleum Hydrocarbons.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per dry kilogram except where noted.

File No. CC500323r

RESULTS OF ANALYSIS - Sediment/Soil [1]

Sample ID	FN29
Sample Date	05-10-18
Sample Time	13:15
ALS ID	*12*

Particle Size

< 0.075 mm %	14.6
> 0.075 mm %	85.4

Remarks regarding the analyses appear at the beginning of this report.
VPH = Volatile Petroleum Hydrocarbons.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per dry kilogram except where noted.

File No. CC500323r

RESULTS OF ANALYSIS - Water[1]

Sample ID		BH105
Sample Date		05-10-18
Sample Time		11:30
ALS ID		*13*
Physical Tests		
Hardness	CaCO3	226

Remarks regarding the analyses appear at the beginning of this report.
VPH = Volatile Petroleum Hydrocarbons.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per litre except where noted.

File No. CC500323r

RESULTS OF ANALYSIS - Water[1]

Sample ID		BH105
Sample Date		05-10-18
Sample Time		11:30
ALS ID		*13*
Dissolved Metals		
Aluminum	D-Al	2.58
Antimony	D-Sb	<0.0050
Arsenic	D-As	<0.010
Barium	D-Ba	0.045
Beryllium	D-Be	<0.0050
Boron	D-B	<0.10
Cadmium	D-Cd	<0.00050
Calcium	D-Ca	18.8
Chromium	D-Cr	<0.0050
Cobalt	D-Co	<0.0050
Copper	D-Cu	<0.010
Iron	D-Fe	1.77
Lead	D-Pb	<0.010
Lithium	D-Li	<0.050
Magnesium	D-Mg	3.80
Manganese	D-Mn	0.208
Mercury	D-Hg	<0.00020
Molybdenum	D-Mo	<0.010
Nickel	D-Ni	<0.050
Selenium	D-Se	<0.010
Silver	D-Ag	<0.00050
Sodium	D-Na	4.5
Thallium	D-Tl	<0.0020
Titanium	D-Ti	0.111
Uranium	D-U	<0.0020
Vanadium	D-V	<0.030
Zinc	D-Zn	0.0079

Remarks regarding the analyses appear at the beginning of this report.
VPH = Volatile Petroleum Hydrocarbons.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per litre except where noted.

File No. CC500323r

RESULTS OF ANALYSIS - Water[1]

Sample ID	BH105
Sample Date	05-10-18
Sample Time	11:30
ALS ID	*13*

Halogenated Volatiles	
Bromodichloromethane	<0.0010
Bromoform	<0.0010
Carbon Tetrachloride	<0.0010
Chlorobenzene	<0.0010
Chloroethane	<0.0010
Chloroform	<0.0010
Chloromethane	0.0016
Dibromochloromethane	<0.0010
1,2-Dichlorobenzene	<0.00050
1,3-Dichlorobenzene	<0.0010
1,4-Dichlorobenzene	<0.0010
1,1-Dichloroethane	<0.0010
1,2-Dichloroethane	<0.0010
cis-1,2-Dichloroethylene	<0.0010
trans-1,2-Dichloroethylene	<0.0010
1,1-Dichloroethylene	<0.0010
Dichloromethane	<0.0050
1,2-Dichloropropane	<0.0010
cis-1,3-Dichloropropylene	<0.0010
trans-1,3-Dichloropropylene	<0.0010
1,1,1,2-Tetrachloroethane	<0.0010
1,1,2,2-Tetrachloroethane	<0.0010
Tetrachloroethylene	<0.0010
1,1,1-Trichloroethane	<0.0010
1,1,2-Trichloroethane	<0.0010
Trichloroethylene	<0.0010
Trichlorofluoromethane	<0.0010
Vinyl Chloride	<0.0010

Remarks regarding the analyses appear at the beginning of this report.
VPH = Volatile Petroleum Hydrocarbons.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per litre except where noted.

File No. CC500323r

RESULTS OF ANALYSIS - Water[1]

Sample ID	BH105
Sample Date	05-10-18
Sample Time	11:30
ALS ID	*13*

Non-Halogenated Volatiles

Benzene	<0.00050
Ethylbenzene	<0.00050
Methyl t-butyl ether (MTBE)	<0.0010
Styrene	<0.00050
Toluene	<0.0010
meta- & para-Xylene	<0.00050
ortho-Xylene	<0.00050
Total Xylenes	<0.0010
Volatile Hydrocarbons (VH6-10)	<0.10
VPH	<0.10

Polycyclic Aromatic Hydrocarbons

Acenaphthene	<0.000050
Acenaphthylene	<0.000050
Acridine	<0.000050
Anthracene	<0.000050
Benz(a)anthracene	<0.000050
Benzo(a)pyrene	<0.000050
Benzo(b)fluoranthene	<0.000050
Benzo(g,h,i)perylene	<0.000050
Benzo(k)fluoranthene	<0.000050
Chrysene	<0.000050
Dibenz(a,h)anthracene	<0.000050
Fluoranthene	<0.000050
Fluorene	<0.000050
Indeno(1,2,3-c,d)pyrene	<0.000050
Naphthalene	0.000090
Phenanthrene	<0.000050
Pyrene	<0.000050
Quinoline	<0.000050

Remarks regarding the analyses appear at the beginning of this report.
VPH = Volatile Petroleum Hydrocarbons.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per litre except where noted.

File No. CC500323r

RESULTS OF ANALYSIS - Water[1]

Sample ID	BH105
Sample Date	05-10-18
Sample Time	11:30
ALS ID	*13*

Extractable Hydrocarbons

EPH10-19	<0.30
EPH19-32	<1.0
LEPH	<0.30
HEPH	<1.0

Remarks regarding the analyses appear at the beginning of this report.
VPH = Volatile Petroleum Hydrocarbons.
< = Less than the detection limit indicated.
[1]Results are expressed as milligrams per litre except where noted.

Appendix 1 - QUALITY CONTROL - Replicates

Sediment/Soil [1]	FN33	FN33
	05-10-18 15:10	QC # 26745
Non-Halogenated Volatiles		
Benzene	<0.040	<0.040
Ethylbenzene	<0.050	<0.050
Styrene	<0.050	<0.050
Toluene	<0.10	<0.10
meta- & para-Xylene	<0.050	<0.050
ortho-Xylene	<0.050	<0.050
Total Xylenes	<0.071	<0.071
Volatile Hydrocarbons (VH6-10)	<100	<100
VPH	<100	<100
Extractable Hydrocarbons		
EPH10-19	<200	<200
EPH19-32	<200	<200

Remarks regarding the analyses appear at the beginning of this report.
VPH = Volatile Petroleum Hydrocarbons.
< = Less than the detection limit indicated.
Results are expressed as milligrams per dry kilogram except where noted.

Appendix 1 - QUALITY CONTROL - Reference Materials

Sediment/Soil

		Result	Target	Units	DL	ALSQC#	Method
NIST Montana Soil, 2711							
Total Metals							
Aluminum	T-Al	19600	65300	mg/kg	50	27327	a
Aluminum	T-Al	19600	65300	mg/kg	50	27622	a
Antimony	T-Sb	19	19	mg/kg	10	27327	a
Antimony	T-Sb	19	19	mg/kg	10	27622	a
Arsenic	T-As	101	105	mg/kg	5	27327	a
Arsenic	T-As	101	105	mg/kg	5	27622	a
Barium	T-Ba	205	726	mg/kg	1	27327	a
Barium	T-Ba	205	726	mg/kg	1	27622	a
Beryllium	T-Be	0.99	**0.98**	mg/kg	0.5	27327	a
Beryllium	T-Be	0.99	**0.98**	mg/kg	0.5	27622	a
Cadmium	T-Cd	40.3	41.7	mg/kg	0.5	27327	a
Cadmium	T-Cd	40.3	41.7	mg/kg	0.5	27622	a
Calcium	T-Ca	20400	28800	mg/kg	50	27327	a
Calcium	T-Ca	20400	28800	mg/kg	50	27622	a
Chromium	T-Cr	23.2	**47.0**	mg/kg	2	27327	a
Chromium	T-Cr	23.2	**47.0**	mg/kg	2	27622	a
Cobalt	T-Co	7.9	**10.0**	mg/kg	2	27327	a
Cobalt	T-Co	7.9	**10.0**	mg/kg	2	27622	a
Copper	T-Cu	114	114	mg/kg	1	27327	a
Copper	T-Cu	114	114	mg/kg	1	27622	a
Iron	T-Fe	23900	28900	mg/kg	50	27327	a
Iron	T-Fe	23900	28900	mg/kg	50	27622	a
Lead	T-Pb	1140	1160	mg/kg	50	27327	a
Lead	T-Pb	1140	1160	mg/kg	50	27622	a
Magnesium	T-Mg	8110	10500	mg/kg	50	27327	a
Magnesium	T-Mg	8110	10500	mg/kg	50	27622	a
Manganese	T-Mn	544	638	mg/kg	1	27327	a
Manganese	T-Mn	544	638	mg/kg	1	27622	a
Mercury	T-Hg	6.36	6.25	mg/kg	0.05	27332	b
Mercury	T-Hg	6.36	6.25	mg/kg	0.05	27627	b
Molybdenum	T-Mo	<4.0	**<4.0**	mg/kg	4	27327	a
Molybdenum	T-Mo	<4.0	**<4.0**	mg/kg	4	27622	a
Nickel	T-Ni	16.1	20.6	mg/kg	5	27327	a

Methods:
a = CSR/HCl-HNO3/ICPOES
b = CSR/HCl-HNO3/CVAFS

Appendix 1 - QUALITY CONTROL - Reference Materials

Sediment/Soil

		Result	Target	Units	DL	ALSQC#	Method
NIST Montana Soil, 2711							
Total Metals							
Nickel	T-Ni	16.1	20.6	mg/kg	5	27622	a
Selenium	T-Se	<2.0	<2.0	mg/kg	2	27327	a
Selenium	T-Se	<2.0	<2.0	mg/kg	2	27622	a
Silver	T-Ag	4.4	4.6	mg/kg	2	27327	a
Silver	T-Ag	4.4	4.6	mg/kg	2	27622	a
Sodium	T-Na	290	11400	mg/kg	200	27327	a
Sodium	T-Na	290	11400	mg/kg	200	27622	a
Thallium	T-Tl	<10	<10	mg/kg	10	27327	a
Thallium	T-Tl	<10	<10	mg/kg	10	27622	a
Tin	T-Sn	<10	**<10**	mg/kg	10	27327	a
Tin	T-Sn	<10	**<10**	mg/kg	10	27622	a
Titanium	T-Ti	375	3060	mg/kg	1	27327	a
Titanium	T-Ti	375	3060	mg/kg	1	27622	a
Vanadium	T-V	46.7	81.6	mg/kg	2	27327	a
Vanadium	T-V	46.7	81.6	mg/kg	2	27622	a
Zinc	T-Zn	321	350	mg/kg	1	27327	a
Zinc	T-Zn	321	350	mg/kg	1	27622	a
CANMET Till Reference Material, TILL-1							
Total Metals							
Aluminum	T-Al	19100	**72500**	mg/kg	50	27328	a
Aluminum	T-Al	19100	**72500**	mg/kg	50	27623	a
Antimony	T-Sb	<10	**<10**	mg/kg	10	27328	a
Antimony	T-Sb	<10	**<10**	mg/kg	10	27623	a
Arsenic	T-As	17.3	**18.0**	mg/kg	5	27328	a
Arsenic	T-As	17.3	**18.0**	mg/kg	5	27623	a
Barium	T-Ba	86.0	**702**	mg/kg	1	27328	a
Barium	T-Ba	86.0	**702**	mg/kg	1	27623	a
Beryllium	T-Be	<0.50	**2.40**	mg/kg	0.5	27328	a
Beryllium	T-Be	<0.50	**2.40**	mg/kg	0.5	27623	a
Cadmium	T-Cd	<0.50	**<0.50**	mg/kg	0.5	27328	a
Cadmium	T-Cd	<0.50	**<0.50**	mg/kg	0.5	27623	a

Methods:
a = CSR/HCl-HNO3/ICPOES

Appendix 1 - QUALITY CONTROL - Reference Materials

Sediment/Soil

		Result	Target	Units	DL	ALSQC#	Method
CANMET Till Reference Material, TILL-1							
Total Metals							
Calcium	T-Ca	3320	**19400**	mg/kg	50	27328	a
Calcium	T-Ca	3320	**19400**	mg/kg	50	27623	a
Chromium	T-Cr	29.2	**65.0**	mg/kg	2	27328	a
Chromium	T-Cr	29.2	**65.0**	mg/kg	2	27623	a
Cobalt	T-Co	12.6	**18.0**	mg/kg	2	27328	a
Cobalt	T-Co	12.6	**18.0**	mg/kg	2	27623	a
Copper	T-Cu	46.6	**47.0**	mg/kg	1	27328	a
Copper	T-Cu	46.6	**47.0**	mg/kg	1	27623	a
Iron	T-Fe	35000	**48100**	mg/kg	50	27328	a
Iron	T-Fe	35000	**48100**	mg/kg	50	27623	a
Lead	T-Pb	<50	**<50**	mg/kg	50	27328	a
Lead	T-Pb	<50	**<50**	mg/kg	50	27623	a
Lithium	T-Li	10.3	**15.0**	mg/kg	2	27328	a
Lithium	T-Li	10.3	**15.0**	mg/kg	2	27623	a
Magnesium	T-Mg	6360	**13000**	mg/kg	50	27328	a
Magnesium	T-Mg	6360	**13000**	mg/kg	50	27623	a
Manganese	T-Mn	1170	**1420**	mg/kg	1	27328	a
Manganese	T-Mn	1170	**1420**	mg/kg	1	27623	a
Mercury	T-Hg	0.106	**0.095**	mg/kg	0.05	27333	b
Mercury	T-Hg	0.106	**0.095**	mg/kg	0.05	27628	b
Molybdenum	T-Mo	<4.0	**<4.0**	mg/kg	4	27328	a
Molybdenum	T-Mo	<4.0	**<4.0**	mg/kg	4	27623	a
Nickel	T-Ni	17.6	**24.0**	mg/kg	5	27328	a
Nickel	T-Ni	17.6	**24.0**	mg/kg	5	27623	a
Selenium	T-Se	<2.0	**2.0**	mg/kg	2	27328	a
Selenium	T-Se	<2.0	**2.0**	mg/kg	2	27623	a
Silver	T-Ag	<2.0	**<2.0**	mg/kg	2	27328	a
Silver	T-Ag	<2.0	**<2.0**	mg/kg	2	27623	a
Sodium	T-Na	340	**20100**	mg/kg	200	27328	a
Sodium	T-Na	340	**20100**	mg/kg	200	27623	a
Thallium	T-Tl	<10	**10**	mg/kg	10	27328	a
Thallium	T-Tl	<10	**10**	mg/kg	10	27623	a
Tin	T-Sn	<5.0	**5.0**	mg/kg	5	27328	a

Methods:
a = CSR/HCl-HNO3/ICPOES
b = CSR/HCl-HNO3/CVAFS

Appendix 1 - QUALITY CONTROL - Reference Materials

Sediment/Soil

		Result	Target	Units	DL	ALSQC#	Method
CANMET Till Reference Material, TILL-1							
Total Metals							
Tin	T-Sn	<5.0	**5.0**	mg/kg	5	27623	a
Titanium	T-Ti	689	**5990**	mg/kg	1	27328	a
Titanium	T-Ti	689	**5990**	mg/kg	1	27623	a
Vanadium	T-V	54.5	**99.0**	mg/kg	2	27328	a
Vanadium	T-V	54.5	**99.0**	mg/kg	2	27623	a
Zinc	T-Zn	67.7	**98.0**	mg/kg	1	27328	a
Zinc	T-Zn	67.7	**98.0**	mg/kg	1	27623	a
ALS Environmental RM Soil, ARM-1							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene		0.797	**0.721**	mg/kg	0.04	26891	b
Acenaphthylene		0.770	**0.710**	mg/kg	0.05	26891	b
Anthracene		0.931	**0.993**	mg/kg	0.05	26891	b
Benz(a)anthracene		3.10	**2.84**	mg/kg	0.05	26891	b
Benzo(a)pyrene		2.29	**2.08**	mg/kg	0.05	26891	b
Benzo(b)fluoranthene		3.71	**3.18**	mg/kg	0.05	26891	b
Benzo(g,h,i)perylene		1.74	**1.52**	mg/kg	0.05	26891	b
Benzo(k)fluoranthene		1.46	**1.26**	mg/kg	0.05	26891	b
Chrysene		3.03	**2.70**	mg/kg	0.05	26891	b
Dibenz(a,h)anthracene		0.513	**0.415**	mg/kg	0.05	26891	b
Fluoranthene		7.66	**7.25**	mg/kg	0.05	26891	b
Fluorene		1.20	**1.19**	mg/kg	0.05	26891	b
Indeno(1,2,3-c,d)pyrene		2.10	**1.80**	mg/kg	0.05	26891	b
Naphthalene		4.90	**4.16**	mg/kg	0.05	26891	b
Phenanthrene		5.23	**5.11**	mg/kg	0.05	26891	b
Pyrene		6.53	**6.19**	mg/kg	0.05	26891	b
Extractable Hydrocarbons							
EPH10-19		2470	**2780**	mg/kg	200	26874	c
EPH19-32		3050	**3350**	mg/kg	200	26874	c

Methods:
a = CSR/HCl-HNO3/ICPOES
b = Soxhlet/GC-MS
c = Soxhlet/GC-FID

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
ALSEV Metals in Water - High, 4GK116							
Total Metals							
Aluminum	T-Al	1.99	2.00	mg/L	0.2	27337	a
Aluminum	T-Al	1.99	2.00	mg/L	0.2	27632	a
Aluminum	T-Al	1.98	2.00	mg/L	0.2	27635	a
Antimony	T-Sb	0.98	1.00	mg/L	0.2	27337	a
Antimony	T-Sb	0.98	1.00	mg/L	0.2	27632	a
Antimony	T-Sb	0.99	1.00	mg/L	0.2	27635	a
Arsenic	T-As	0.99	1.00	mg/L	0.2	27337	a
Arsenic	T-As	0.99	1.00	mg/L	0.2	27632	a
Arsenic	T-As	0.98	1.00	mg/L	0.2	27635	a
Barium	T-Ba	0.255	0.250	mg/L	0.01	27337	a
Barium	T-Ba	0.255	0.250	mg/L	0.01	27632	a
Barium	T-Ba	0.250	0.250	mg/L	0.01	27635	a
Beryllium	T-Be	0.0982	0.100	mg/L	0.005	27337	a
Beryllium	T-Be	0.0982	0.100	mg/L	0.005	27632	a
Beryllium	T-Be	0.0998	0.100	mg/L	0.005	27635	a
Boron	T-B	0.99	1.00	mg/L	0.1	27337	a
Boron	T-B	0.99	1.00	mg/L	0.1	27632	a
Boron	T-B	1.00	1.00	mg/L	0.1	27635	a
Cadmium	T-Cd	0.099	0.100	mg/L	0.01	27337	a
Cadmium	T-Cd	0.099	0.100	mg/L	0.01	27632	a
Cadmium	T-Cd	0.099	0.100	mg/L	0.01	27635	a
Calcium	T-Ca	49.1	50.0	mg/L	0.05	27337	a
Calcium	T-Ca	49.1	50.0	mg/L	0.05	27632	a
Calcium	T-Ca	51.6	50.0	mg/L	0.05	27635	a
Chromium	T-Cr	0.248	0.250	mg/L	0.01	27337	a
Chromium	T-Cr	0.248	0.250	mg/L	0.01	27632	a
Chromium	T-Cr	0.246	0.250	mg/L	0.01	27635	a
Cobalt	T-Co	0.247	0.250	mg/L	0.01	27337	a
Cobalt	T-Co	0.247	0.250	mg/L	0.01	27632	a
Cobalt	T-Co	0.247	0.250	mg/L	0.01	27635	a
Copper	T-Cu	0.247	0.250	mg/L	0.01	27337	a
Copper	T-Cu	0.247	0.250	mg/L	0.01	27632	a
Copper	T-Cu	0.247	0.250	mg/L	0.01	27635	a

Methods:
a = ICPOES

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
ALSEV Metals in Water - High, 4GK116							
Total Metals							
Iron	T-Fe	1.03	1.00	mg/L	0.03	27337	a
Iron	T-Fe	1.03	1.00	mg/L	0.03	27632	a
Iron	T-Fe	0.994	1.00	mg/L	0.03	27635	a
Lead	T-Pb	0.490	0.500	mg/L	0.05	27337	a
Lead	T-Pb	0.490	0.500	mg/L	0.05	27632	a
Lead	T-Pb	0.476	0.500	mg/L	0.05	27635	a
Lithium	T-Li	0.240	0.250	mg/L	0.01	27337	a
Lithium	T-Li	0.240	0.250	mg/L	0.01	27632	a
Lithium	T-Li	0.252	0.250	mg/L	0.01	27635	a
Magnesium	T-Mg	50.5	50.0	mg/L	0.1	27337	a
Magnesium	T-Mg	50.5	50.0	mg/L	0.1	27632	a
Magnesium	T-Mg	51.2	50.0	mg/L	0.1	27635	a
Manganese	T-Mn	0.243	0.250	mg/L	0.005	27337	a
Manganese	T-Mn	0.243	0.250	mg/L	0.005	27632	a
Manganese	T-Mn	0.244	0.250	mg/L	0.005	27635	a
Molybdenum	T-Mo	0.246	0.250	mg/L	0.03	27337	a
Molybdenum	T-Mo	0.246	0.250	mg/L	0.03	27632	a
Molybdenum	T-Mo	0.246	0.250	mg/L	0.03	27635	a
Nickel	T-Ni	0.492	0.500	mg/L	0.05	27337	a
Nickel	T-Ni	0.492	0.500	mg/L	0.05	27632	a
Nickel	T-Ni	0.488	0.500	mg/L	0.05	27635	a
Selenium	T-Se	0.97	1.00	mg/L	0.2	27337	a
Selenium	T-Se	0.97	1.00	mg/L	0.2	27632	a
Selenium	T-Se	1.00	1.00	mg/L	0.2	27635	a
Silver	T-Ag	0.097	0.100	mg/L	0.01	27337	a
Silver	T-Ag	0.097	0.100	mg/L	0.01	27632	a
Silver	T-Ag	0.096	0.100	mg/L	0.01	27635	a
Sodium	T-Na	50.2	50.0	mg/L	2	27337	a
Sodium	T-Na	50.2	50.0	mg/L	2	27632	a
Sodium	T-Na	50.7	50.0	mg/L	2	27635	a
Thallium	T-Tl	0.97	1.00	mg/L	0.2	27337	a
Thallium	T-Tl	0.97	1.00	mg/L	0.2	27632	a
Thallium	T-Tl	0.98	1.00	mg/L	0.2	27635	a

Methods:
a = ICPOES

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
ALSEV Metals in Water - High, 4GK116							
Total Metals							
Tin	T-Sn	0.479	0.500	mg/L	0.03	27337	a
Tin	T-Sn	0.479	0.500	mg/L	0.03	27632	a
Tin	T-Sn	0.478	0.500	mg/L	0.03	27635	a
Titanium	T-Ti	0.250	0.250	mg/L	0.01	27337	a
Titanium	T-Ti	0.250	0.250	mg/L	0.01	27632	a
Titanium	T-Ti	0.253	0.250	mg/L	0.01	27635	a
Vanadium	T-V	0.491	0.500	mg/L	0.03	27337	a
Vanadium	T-V	0.491	0.500	mg/L	0.03	27632	a
Vanadium	T-V	0.488	0.500	mg/L	0.03	27635	a
Zinc	T-Zn	0.495	0.500	mg/L	0.005	27337	a
Zinc	T-Zn	0.495	0.500	mg/L	0.005	27632	a
Zinc	T-Zn	0.493	0.500	mg/L	0.005	27635	a
ALSEV Metals in Water - Mid, 4GK116							
Total Metals							
Aluminum	T-Al	0.0980	0.100	mg/L	0.001	27336	b
Aluminum	T-Al	0.105	0.100	mg/L	0.001	27338	b
Aluminum	T-Al	0.0980	0.100	mg/L	0.001	27631	b
Aluminum	T-Al	0.105	0.100	mg/L	0.001	27633	b
Aluminum	T-Al	0.103	0.100	mg/L	0.001	27634	b
Antimony	T-Sb	0.0475	0.0500	mg/L	0.0001	27336	b
Antimony	T-Sb	0.0499	0.0500	mg/L	0.0001	27338	b
Antimony	T-Sb	0.0475	0.0500	mg/L	0.0001	27631	b
Antimony	T-Sb	0.0499	0.0500	mg/L	0.0001	27633	b
Antimony	T-Sb	0.0514	0.0500	mg/L	0.0001	27634	b
Arsenic	T-As	0.0479	0.0500	mg/L	0.0001	27336	b
Arsenic	T-As	0.0520	0.0500	mg/L	0.0001	27338	b
Arsenic	T-As	0.0479	0.0500	mg/L	0.0001	27631	b
Arsenic	T-As	0.0520	0.0500	mg/L	0.0001	27633	b
Arsenic	T-As	0.0517	0.0500	mg/L	0.0001	27634	b
Barium	T-Ba	0.0121	0.0125	mg/L	0.00005	27336	b
Barium	T-Ba	0.0127	0.0125	mg/L	0.00005	27338	b

Methods:
a = ICPOES
b = ICPMS

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
ALSEV Metals in Water - Mid, 4GK116							
Total Metals							
Barium	T-Ba	0.0121	0.0125	mg/L	0.00005	27631	a
Barium	T-Ba	0.0127	0.0125	mg/L	0.00005	27633	a
Barium	T-Ba	0.0128	0.0125	mg/L	0.00005	27634	a
Beryllium	T-Be	0.00500	0.00500	mg/L	0.0005	27336	a
Beryllium	T-Be	0.00536	0.00500	mg/L	0.0005	27338	a
Beryllium	T-Be	0.00500	0.00500	mg/L	0.0005	27631	a
Beryllium	T-Be	0.00536	0.00500	mg/L	0.0005	27633	a
Beryllium	T-Be	0.00524	0.00500	mg/L	0.0005	27634	a
Boron	T-B	0.048	0.050	mg/L	0.01	27336	a
Boron	T-B	0.052	0.050	mg/L	0.01	27338	a
Boron	T-B	0.048	0.050	mg/L	0.01	27631	a
Boron	T-B	0.052	0.050	mg/L	0.01	27633	a
Cadmium	T-Cd	0.00469	0.00500	mg/L	0.00005	27336	a
Cadmium	T-Cd	0.00511	0.00500	mg/L	0.00005	27338	a
Cadmium	T-Cd	0.00469	0.00500	mg/L	0.00005	27631	a
Cadmium	T-Cd	0.00511	0.00500	mg/L	0.00005	27633	a
Cadmium	T-Cd	0.00514	0.00500	mg/L	0.00005	27634	a
Calcium	T-Ca	2.46	2.50	mg/L	0.02	27336	a
Calcium	T-Ca	2.66	2.50	mg/L	0.02	27338	a
Calcium	T-Ca	2.46	2.50	mg/L	0.02	27631	a
Calcium	T-Ca	2.66	2.50	mg/L	0.02	27633	a
Calcium	T-Ca	2.63	2.50	mg/L	0.02	27634	a
Chromium	T-Cr	0.0123	0.0125	mg/L	0.0005	27336	a
Chromium	T-Cr	0.0134	0.0125	mg/L	0.0005	27338	a
Chromium	T-Cr	0.0123	0.0125	mg/L	0.0005	27631	a
Chromium	T-Cr	0.0134	0.0125	mg/L	0.0005	27633	a
Chromium	T-Cr	0.0134	0.0125	mg/L	0.0005	27634	a
Cobalt	T-Co	0.0119	0.0125	mg/L	0.0001	27336	a
Cobalt	T-Co	0.0130	0.0125	mg/L	0.0001	27338	a
Cobalt	T-Co	0.0119	0.0125	mg/L	0.0001	27631	a
Cobalt	T-Co	0.0130	0.0125	mg/L	0.0001	27633	a
Cobalt	T-Co	0.0130	0.0125	mg/L	0.0001	27634	a
Copper	T-Cu	0.0116	0.0125	mg/L	0.0001	27336	a

Methods:
a = ICPMS

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
ALSEV Metals in Water - Mid, 4GK116							
Total Metals							
Copper	T-Cu	0.0127	0.0125	mg/L	0.0001	27338	a
Copper	T-Cu	0.0116	0.0125	mg/L	0.0001	27631	a
Copper	T-Cu	0.0127	0.0125	mg/L	0.0001	27633	a
Copper	T-Cu	0.0127	0.0125	mg/L	0.0001	27634	a
Iron	T-Fe	0.05	0.05	mg/L	0.03	27336	a
Iron	T-Fe	0.05	0.05	mg/L	0.03	27338	a
Iron	T-Fe	0.05	0.05	mg/L	0.03	27631	a
Iron	T-Fe	0.05	0.05	mg/L	0.03	27633	a
Lead	T-Pb	0.0244	0.0250	mg/L	0.00005	27336	a
Lead	T-Pb	0.0247	0.0250	mg/L	0.00005	27338	a
Lead	T-Pb	0.0244	0.0250	mg/L	0.00005	27631	a
Lead	T-Pb	0.0247	0.0250	mg/L	0.00005	27633	a
Lead	T-Pb	0.0253	0.0250	mg/L	0.00005	27634	a
Lithium	T-Li	0.0122	0.0125	mg/L	0.005	27336	a
Lithium	T-Li	0.0131	0.0125	mg/L	0.005	27338	a
Lithium	T-Li	0.0122	0.0125	mg/L	0.005	27631	a
Lithium	T-Li	0.0131	0.0125	mg/L	0.005	27633	a
Magnesium	T-Mg	2.30	2.50	mg/L	0.005	27336	a
Magnesium	T-Mg	2.66	2.50	mg/L	0.005	27338	a
Magnesium	T-Mg	2.30	2.50	mg/L	0.005	27631	a
Magnesium	T-Mg	2.66	2.50	mg/L	0.005	27633	a
Magnesium	T-Mg	2.45	2.50	mg/L	0.005	27634	a
Manganese	T-Mn	0.0120	0.0125	mg/L	0.00005	27336	a
Manganese	T-Mn	0.0133	0.0125	mg/L	0.00005	27338	a
Manganese	T-Mn	0.0120	0.0125	mg/L	0.00005	27631	a
Manganese	T-Mn	0.0133	0.0125	mg/L	0.00005	27633	a
Manganese	T-Mn	0.0131	0.0125	mg/L	0.00005	27634	a
Molybdenum	T-Mo	0.0121	0.0125	mg/L	0.00005	27336	a
Molybdenum	T-Mo	0.0130	0.0125	mg/L	0.00005	27338	a
Molybdenum	T-Mo	0.0121	0.0125	mg/L	0.00005	27631	a
Molybdenum	T-Mo	0.0130	0.0125	mg/L	0.00005	27633	a
Molybdenum	T-Mo	0.0127	0.0125	mg/L	0.00005	27634	a
Nickel	T-Ni	0.0234	0.0250	mg/L	0.0005	27336	a

Methods:
a = ICPMS

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
ALSEV Metals in Water - Mid, 4GK116							
Total Metals							
Nickel	T-Ni	0.0267	0.0250	mg/L	0.0005	27338	a
Nickel	T-Ni	0.0234	0.0250	mg/L	0.0005	27631	a
Nickel	T-Ni	0.0267	0.0250	mg/L	0.0005	27633	a
Nickel	T-Ni	0.0265	0.0250	mg/L	0.0005	27634	a
Selenium	T-Se	0.0476	0.0500	mg/L	0.0005	27336	a
Selenium	T-Se	0.0520	0.0500	mg/L	0.0005	27338	a
Selenium	T-Se	0.0476	0.0500	mg/L	0.0005	27631	a
Selenium	T-Se	0.0520	0.0500	mg/L	0.0005	27633	a
Selenium	T-Se	0.0537	0.0500	mg/L	0.0005	27634	a
Silver	T-Ag	0.00481	0.00500	mg/L	0.00001	27336	a
Silver	T-Ag	0.00521	0.00500	mg/L	0.00001	27338	a
Silver	T-Ag	0.00481	0.00500	mg/L	0.00001	27631	a
Silver	T-Ag	0.00521	0.00500	mg/L	0.00001	27633	a
Silver	T-Ag	0.00503	0.00500	mg/L	0.00001	27634	a
Sodium	T-Na	2.46	2.50	mg/L	0.01	27336	a
Sodium	T-Na	2.72	2.50	mg/L	0.01	27338	a
Sodium	T-Na	2.46	2.50	mg/L	0.01	27631	a
Sodium	T-Na	2.72	2.50	mg/L	0.01	27633	a
Sodium	T-Na	2.58	2.50	mg/L	0.01	27634	a
Thallium	T-Tl	0.0477	0.0500	mg/L	0.0001	27336	a
Thallium	T-Tl	0.0494	0.0500	mg/L	0.0001	27338	a
Thallium	T-Tl	0.0477	0.0500	mg/L	0.0001	27631	a
Thallium	T-Tl	0.0494	0.0500	mg/L	0.0001	27633	a
Thallium	T-Tl	0.0507	0.0500	mg/L	0.0001	27634	a
Tin	T-Sn	0.0238	0.0250	mg/L	0.0001	27336	a
Tin	T-Sn	0.0248	0.0250	mg/L	0.0001	27338	a
Tin	T-Sn	0.0238	0.0250	mg/L	0.0001	27631	a
Tin	T-Sn	0.0248	0.0250	mg/L	0.0001	27633	a
Tin	T-Sn	0.0252	0.0250	mg/L	0.0001	27634	a
Uranium	T-U	0.000242	0.000250	mg/L	0.00001	27336	a
Uranium	T-U	0.000255	0.000250	mg/L	0.00001	27338	a
Uranium	T-U	0.000242	0.000250	mg/L	0.00001	27631	a
Uranium	T-U	0.000255	0.000250	mg/L	0.00001	27633	a

Methods:
a = ICPMS

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
ALSEV Metals in Water - Mid, 4GK116							
Total Metals							
Uranium	T-U	0.000257	0.000250	mg/L	0.00001	27634	a
Vanadium	T-V	0.0236	0.0250	mg/L	0.001	27336	a
Vanadium	T-V	0.0262	0.0250	mg/L	0.001	27338	a
Vanadium	T-V	0.0236	0.0250	mg/L	0.001	27631	a
Vanadium	T-V	0.0262	0.0250	mg/L	0.001	27633	a
Zinc	T-Zn	0.0233	0.0250	mg/L	0.001	27336	a
Zinc	T-Zn	0.0251	0.0250	mg/L	0.001	27338	a
Zinc	T-Zn	0.0233	0.0250	mg/L	0.001	27631	a
Zinc	T-Zn	0.0251	0.0250	mg/L	0.001	27633	a
Zinc	T-Zn	0.0254	0.0250	mg/L	0.001	27634	a
ALSEV Mercury in Water, 246049A							
Total Metals							
Mercury	T-Hg	0.00919	0.0100	mg/L	0.00001	27335	b
Mercury	T-Hg	0.00919	0.0100	mg/L	0.00001	27630	b

Methods:
a = ICPMS
b = CVAFS

File No. CC500323r

Appendix 1 - QUALITY CONTROL - Spikes

Sediment/Soil

	Result	Target	Units	DL	ALSQC#	Method
Halogenated Volatiles						
Bromodichloromethane	1.99	2.00	mg/kg	0.2	26963	a
Bromoform	2.04	2.00	mg/kg	0.2	26963	a
Carbon Tetrachloride	1.87	2.00	mg/kg	0.2	26963	a
Chlorobenzene	2.05	2.00	mg/kg	0.2	26963	a
Chloroethane	1.64	2.00	mg/kg	0.2	26963	a
Chloroform	1.97	2.00	mg/kg	0.2	26963	a
Chloromethane	1.56	2.00	mg/kg	0.2	26963	a
Dibromochloromethane	2.04	2.00	mg/kg	0.2	26963	a
1,2-Dichlorobenzene	2.18	2.00	mg/kg	0.2	26963	a
1,3-Dichlorobenzene	2.14	2.00	mg/kg	0.2	26963	a
1,4-Dichlorobenzene	2.14	2.00	mg/kg	0.2	26963	a
1,1-Dichloroethane	1.88	2.00	mg/kg	0.2	26963	a
1,2-Dichloroethane	1.96	2.00	mg/kg	0.2	26963	a
cis-1,2-Dichloroethylene	1.88	2.00	mg/kg	0.2	26963	a
trans-1,2-Dichloroethylene	1.77	2.00	mg/kg	0.2	26963	a
1,1-Dichloroethylene	1.73	2.00	mg/kg	0.2	26963	a
Dichloromethane	1.72	2.00	mg/kg	0.2	26963	a
1,2-Dichloropropane	1.96	2.00	mg/kg	0.2	26963	a
cis-1,3-Dichloropropylene	1.98	2.00	mg/kg	0.2	26963	a
trans-1,3-Dichloropropylene	1.95	2.00	mg/kg	0.2	26963	a
1,1,1,2-Tetrachloroethane	2.10	2.00	mg/kg	0.2	26963	a
1,1,2,2-Tetrachloroethane	2.19	2.00	mg/kg	0.2	26963	a
Tetrachloroethylene	1.89	2.00	mg/kg	0.2	26963	a
1,1,1-Trichloroethane	1.86	2.00	mg/kg	0.2	26963	a
1,1,2-Trichloroethane	2.09	2.00	mg/kg	0.2	26963	a
Trichloroethylene	1.89	2.00	mg/kg	0.2	26963	a
Trichlorofluoromethane	1.78	2.00	mg/kg	0.2	26963	a
Vinyl Chloride	1.59	2.00	mg/kg	0.2	26963	a
Non-Halogenated Volatiles						
Benzene	1.93	2.00	mg/kg	0.04	26959	a
Benzene	1.92	2.00	mg/kg	0.04	26963	a
Ethylbenzene	2.10	2.00	mg/kg	0.04	26959	a
Ethylbenzene	2.05	2.00	mg/kg	0.05	26963	a
Styrene	2.31	2.00	mg/kg	0.05	26959	a
Styrene	2.11	2.00	mg/kg	0.05	26963	a

Methods:
a = Purge&Trap/GC-MS

File No. CC500323r

Appendix 1 - QUALITY CONTROL - Spikes

Sediment/Soil

	Result	Target	Units	DL	ALSQC#	Method
Non-Halogenated Volatiles						
Toluene	2.02	2.00	mg/kg	0.1	26959	a
Toluene	1.94	2.00	mg/kg	0.05	26963	a
meta- & para-Xylene	2.10	2.00	mg/kg	0.04	26959	a
meta- & para-Xylene	4.03	4.00	mg/kg	0.05	26963	a
ortho-Xylene	2.25	2.00	mg/kg	0.04	26959	a
ortho-Xylene	2.09	2.00	mg/kg	0.05	26963	a
Polycyclic Aromatic Hydrocarbons						
Naphthalene	20.9	25.0	mg/kg	0.1	26872	b
Phenanthrene	22.7	25.0	mg/kg	0.1	26872	b
Pyrene	25.0	25.0	mg/kg	0.1	26872	b
Extractable Hydrocarbons						
Decane (nC10)	19.7	25.0	mg/kg	0.1	26872	b
Dodecane (nC12)	20.9	25.0	mg/kg	0.1	26872	b
Dotriacontane (nC32)	27.8	25.0	mg/kg	0.1	26872	b
Eicosane (nC20)	23.8	25.0	mg/kg	0.1	26872	b
Hexadecane (nC16)	22.4	25.0	mg/kg	0.1	26872	b
Nonadecane (nC19)	23.8	25.0	mg/kg	0.1	26872	b
Triacontane (nC30)	25.2	25.0	mg/kg	0.1	26872	b

Methods:
a = Purge&Trap/GC-MS
b = Soxhlet/GC-FID

File No. CC500323r

Appendix 1 - QUALITY CONTROL - Spikes

Water

	Result	Target	Units	DL	ALSQC#	Method
Halogenated Volatiles						
Bromodichloromethane	0.0200	0.0200	mg/L	0.001	26918	a
Bromoform	0.0200	0.0200	mg/L	0.001	26918	a
Carbon Tetrachloride	0.0198	0.0200	mg/L	0.001	26918	a
Chlorobenzene	0.0204	0.0200	mg/L	0.001	26918	a
Chloroethane	0.0200	0.0200	mg/L	0.001	26918	a
Chloroform	0.0202	0.0200	mg/L	0.001	26918	a
Chloromethane	0.0195	0.0200	mg/L	0.001	26918	a
Dibromochloromethane	0.0201	0.0200	mg/L	0.001	26918	a
1,2-Dichlorobenzene	0.0200	0.0200	mg/L	0.001	26918	a
1,3-Dichlorobenzene	0.0199	0.0200	mg/L	0.001	26918	a
1,4-Dichlorobenzene	0.0202	0.0200	mg/L	0.001	26918	a
1,1-Dichloroethane	0.0205	0.0200	mg/L	0.001	26918	a
1,2-Dichloroethane	0.0205	0.0200	mg/L	0.001	26918	a
cis-1,2-Dichloroethylene	0.0202	0.0200	mg/L	0.001	26918	a
trans-1,2-Dichloroethylene	0.0202	0.0200	mg/L	0.001	26918	a
1,1-Dichloroethylene	0.0204	0.0200	mg/L	0.001	26918	a
Dichloromethane	0.0202	0.0200	mg/L	0.005	26918	a
1,2-Dichloropropane	0.0200	0.0200	mg/L	0.001	26918	a
cis-1,3-Dichloropropylene	0.0194	0.0200	mg/L	0.001	26918	a
trans-1,3-Dichloropropylene	0.0195	0.0200	mg/L	0.001	26918	a
1,1,1,2-Tetrachloroethane	0.0202	0.0200	mg/L	0.001	26918	a
1,1,2,2-Tetrachloroethane	0.0201	0.0200	mg/L	0.001	26918	a
Tetrachloroethylene	0.0200	0.0200	mg/L	0.001	26918	a
1,1,1-Trichloroethane	0.0201	0.0200	mg/L	0.001	26918	a
1,1,2-Trichloroethane	0.0202	0.0200	mg/L	0.001	26918	a
Trichloroethylene	0.0203	0.0200	mg/L	0.001	26918	a
Trichlorofluoromethane	0.0205	0.0200	mg/L	0.001	26918	a
Vinyl Chloride	0.0199	0.0200	mg/L	0.001	26918	a
Non-Halogenated Volatiles						
Benzene	0.0192	0.0200	mg/L	0.0005	26918	a
Ethylbenzene	0.0192	0.0200	mg/L	0.0005	26918	a
Styrene	0.0194	0.0200	mg/L	0.0005	26918	a
Toluene	0.0191	0.0200	mg/L	0.001	26918	a
meta- & para-Xylene	0.0391	0.0400	mg/L	0.0005	26918	a
ortho-Xylene	0.0193	0.0200	mg/L	0.005	26918	a

Methods:
a = WA_VOC_P&T_MS

Appendix 1 - QUALITY CONTROL - Spikes

Water

	Result	Target	Units	DL	ALSQC#	Method
Non-Halogenated Volatiles						
Volatile Hydrocarbons (VH6-10)	0.34	0.27	mg/L	0.1	26919	a
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.00371	0.00400	mg/L	0.00005	26893	b
Acenaphthylene	0.00373	0.00400	mg/L	0.00005	26893	b
Acridine	0.00376	0.00400	mg/L	0.00005	26893	b
Anthracene	0.00372	0.00400	mg/L	0.00005	26893	b
Benz(a)anthracene	0.00388	0.00400	mg/L	0.00005	26893	b
Benzo(a)pyrene	0.00386	0.00400	mg/L	0.00005	26893	b
Benzo(b)fluoranthene	0.00397	0.00400	mg/L	0.00005	26893	b
Benzo(g,h,i)perylene	0.00387	0.00400	mg/L	0.00005	26893	b
Benzo(k)fluoranthene	0.00385	0.00400	mg/L	0.00005	26893	b
Chrysene	0.00386	0.00400	mg/L	0.00005	26893	b
Dibenz(a,h)anthracene	0.00391	0.00400	mg/L	0.00005	26893	b
Fluoranthene	0.00388	0.00400	mg/L	0.00005	26893	b
Fluorene	0.00372	0.00400	mg/L	0.00005	26893	b
Indeno(1,2,3-c,d)pyrene	0.00391	0.00400	mg/L	0.00005	26893	b
Naphthalene	0.00354	0.00400	mg/L	0.00005	26893	b
Phenanthrene	0.00381	0.00400	mg/L	0.00005	26893	b
Pyrene	0.00390	0.00400	mg/L	0.00005	26893	b
Quinoline	0.00371	0.00400	mg/L	0.00005	26893	b

Methods:
a = WA_VPH_P&T_FID
b = WA_PAH_Ext_MS

Appendix 1 - QUALITY CONTROL - Blanks

Sediment/Soil

		Result	Target	Units	DL	ALSQC#	Method
Total Metals							
Antimony	T-Sb	<10	<10	mg/kg	10	27325	a
Antimony	T-Sb	<10	<10	mg/kg	10	27326	a
Antimony	T-Sb	<10	<10	mg/kg	10	27620	a
Antimony	T-Sb	<10	<10	mg/kg	10	27621	a
Arsenic	T-As	<5.0	<5.0	mg/kg	5	27325	a
Arsenic	T-As	<5.0	<5.0	mg/kg	5	27326	a
Arsenic	T-As	<5.0	<5.0	mg/kg	5	27620	a
Arsenic	T-As	<5.0	<5.0	mg/kg	5	27621	a
Barium	T-Ba	<1.0	<1.0	mg/kg	1	27325	a
Barium	T-Ba	<1.0	<1.0	mg/kg	1	27326	a
Barium	T-Ba	<1.0	<1.0	mg/kg	1	27620	a
Barium	T-Ba	<1.0	<1.0	mg/kg	1	27621	a
Beryllium	T-Be	<0.50	<0.50	mg/kg	0.5	27325	a
Beryllium	T-Be	<0.50	<0.50	mg/kg	0.5	27326	a
Beryllium	T-Be	<0.50	<0.50	mg/kg	0.5	27620	a
Beryllium	T-Be	<0.50	<0.50	mg/kg	0.5	27621	a
Cadmium	T-Cd	<0.50	<0.50	mg/kg	0.5	27325	a
Cadmium	T-Cd	<0.50	<0.50	mg/kg	0.5	27326	a
Cadmium	T-Cd	<0.50	<0.50	mg/kg	0.5	27620	a
Cadmium	T-Cd	<0.50	<0.50	mg/kg	0.5	27621	a
Chromium	T-Cr	<2.0	<2.0	mg/kg	2	27325	a
Chromium	T-Cr	<2.0	<2.0	mg/kg	2	27326	a
Chromium	T-Cr	<2.0	<2.0	mg/kg	2	27620	a
Chromium	T-Cr	<2.0	<2.0	mg/kg	2	27621	a
Cobalt	T-Co	<2.0	<2.0	mg/kg	2	27325	a
Cobalt	T-Co	<2.0	<2.0	mg/kg	2	27326	a
Cobalt	T-Co	<2.0	<2.0	mg/kg	2	27620	a
Cobalt	T-Co	<2.0	<2.0	mg/kg	2	27621	a
Copper	T-Cu	<1.0	<1.0	mg/kg	1	27325	a
Copper	T-Cu	<1.0	<1.0	mg/kg	1	27326	a
Copper	T-Cu	<1.0	<1.0	mg/kg	1	27620	a
Copper	T-Cu	<1.0	<1.0	mg/kg	1	27621	a
Lead	T-Pb	<50	<50	mg/kg	50	27325	a
Lead	T-Pb	<50	<50	mg/kg	50	27326	a
Lead	T-Pb	<50	<50	mg/kg	50	27620	a

Methods:
a = CSR/HCl-HNO3/ICPOES

Appendix 1 - QUALITY CONTROL - Blanks

Sediment/Soil

		Result	Target	Units	DL	ALSQC#	Method
Total Metals							
Lead	T-Pb	<50	<50	mg/kg	50	27621	a
Mercury	T-Hg	<0.050	<0.050	mg/kg	0.05	27330	b
Mercury	T-Hg	<0.050	<0.050	mg/kg	0.05	27331	b
Mercury	T-Hg	<0.050	<0.050	mg/kg	0.05	27625	b
Mercury	T-Hg	<0.050	<0.050	mg/kg	0.05	27626	b
Molybdenum	T-Mo	<4.0	<4.0	mg/kg	4	27325	a
Molybdenum	T-Mo	<4.0	<4.0	mg/kg	4	27326	a
Molybdenum	T-Mo	<4.0	<4.0	mg/kg	4	27620	a
Molybdenum	T-Mo	<4.0	<4.0	mg/kg	4	27621	a
Nickel	T-Ni	<5.0	<5.0	mg/kg	5	27325	a
Nickel	T-Ni	<5.0	<5.0	mg/kg	5	27326	a
Nickel	T-Ni	<5.0	<5.0	mg/kg	5	27620	a
Nickel	T-Ni	<5.0	<5.0	mg/kg	5	27621	a
Selenium	T-Se	<2.0	<2.0	mg/kg	2	27325	a
Selenium	T-Se	<2.0	<2.0	mg/kg	2	27326	a
Selenium	T-Se	<2.0	<2.0	mg/kg	2	27620	a
Selenium	T-Se	<2.0	<2.0	mg/kg	2	27621	a
Silver	T-Ag	<2.0	<2.0	mg/kg	2	27325	a
Silver	T-Ag	<2.0	<2.0	mg/kg	2	27326	a
Silver	T-Ag	<2.0	<2.0	mg/kg	2	27620	a
Silver	T-Ag	<2.0	<2.0	mg/kg	2	27621	a
Tin	T-Sn	<5.0	<5.0	mg/kg	5	27325	a
Tin	T-Sn	<5.0	<5.0	mg/kg	5	27326	a
Tin	T-Sn	<5.0	<5.0	mg/kg	5	27620	a
Tin	T-Sn	<5.0	<5.0	mg/kg	5	27621	a
Vanadium	T-V	<2.0	<2.0	mg/kg	2	27325	a
Vanadium	T-V	<2.0	<2.0	mg/kg	2	27326	a
Vanadium	T-V	<2.0	<2.0	mg/kg	2	27620	a
Vanadium	T-V	<2.0	<2.0	mg/kg	2	27621	a
Zinc	T-Zn	<1.0	<1.0	mg/kg	1	27325	a
Zinc	T-Zn	<1.0	<1.0	mg/kg	1	27326	a
Zinc	T-Zn	<1.0	<1.0	mg/kg	1	27620	a
Zinc	T-Zn	<1.0	<1.0	mg/kg	1	27621	a

Methods:
a = CSR/HCl-HNO3/ICPOES
b = CSR/HCl-HNO3/CVAFS

File No. CC500323r

Appendix 1 - QUALITY CONTROL - Blanks

Sediment/Soil

	Result	Target	Units	DL	ALSQC#	Method
Halogenated Volatiles						
Bromodichloromethane	<0.05	<0.05	mg/kg	0.05	26962	a
Bromoform	<0.05	<0.05	mg/kg	0.05	26962	a
Carbon Tetrachloride	<0.05	<0.05	mg/kg	0.05	26962	a
Chlorobenzene	<0.05	<0.05	mg/kg	0.05	26962	a
Chloroethane	<0.10	<0.10	mg/kg	0.1	26962	a
Chloroform	<0.10	<0.10	mg/kg	0.1	26962	a
Chloromethane	<0.10	<0.10	mg/kg	0.1	26962	a
Dibromochloromethane	<0.05	<0.05	mg/kg	0.05	26962	a
1,2-Dichlorobenzene	<0.05	<0.05	mg/kg	0.05	26962	a
1,3-Dichlorobenzene	<0.05	<0.05	mg/kg	0.05	26962	a
1,4-Dichlorobenzene	<0.05	<0.05	mg/kg	0.05	26962	a
1,1-Dichloroethane	<0.05	<0.05	mg/kg	0.05	26962	a
1,2-Dichloroethane	<0.05	<0.05	mg/kg	0.05	26962	a
cis-1,2-Dichloroethylene	<0.05	<0.05	mg/kg	0.05	26962	a
trans-1,2-Dichloroethylene	<0.05	<0.05	mg/kg	0.05	26962	a
1,1-Dichloroethylene	<0.05	<0.05	mg/kg	0.05	26962	a
Dichloromethane	<0.50	<0.50	mg/kg	0.5	26962	a
1,2-Dichloropropane	<0.05	<0.05	mg/kg	0.05	26962	a
cis-1,3-Dichloropropylene	<0.05	<0.05	mg/kg	0.05	26962	a
trans-1,3-Dichloropropylene	<0.05	<0.05	mg/kg	0.05	26962	a
1,1,1,2-Tetrachloroethane	<0.05	<0.05	mg/kg	0.05	26962	a
1,1,2,2-Tetrachloroethane	<0.05	<0.05	mg/kg	0.05	26962	a
Tetrachloroethylene	<0.05	<0.05	mg/kg	0.05	26962	a
1,1,1-Trichloroethane	<0.05	<0.05	mg/kg	0.05	26962	a
1,1,2-Trichloroethane	<0.05	<0.05	mg/kg	0.05	26962	a
Trichloroethylene	<0.05	<0.05	mg/kg	0.05	26962	a
Trichlorofluoromethane	<0.10	<0.10	mg/kg	0.1	26962	a
Vinyl Chloride	<0.10	<0.10	mg/kg	0.1	26962	a
Non-Halogenated Volatiles						
Benzene	<0.040	<0.040	mg/kg	0.04	26960	a
Benzene	<0.04	<0.04	mg/kg	0.04	26962	a
Ethylbenzene	<0.050	<0.050	mg/kg	0.05	26960	a
Ethylbenzene	<0.05	<0.05	mg/kg	0.05	26962	a
Styrene	<0.050	<0.050	mg/kg	0.05	26960	a
Styrene	<0.05	<0.05	mg/kg	0.05	26962	a

Methods:
a = Purge&Trap/GC-MS

File No. CC500323r

Appendix 1 - QUALITY CONTROL - Blanks

Sediment/Soil

	Result	Target	Units	DL	ALSQC#	Method
Non-Halogenated Volatiles						
Toluene	<0.100	<0.100	mg/kg	0.1	26960	a
Toluene	<0.10	<0.10	mg/kg	0.1	26962	a
meta- & para-Xylene	<0.050	<0.050	mg/kg	0.05	26960	a
meta- & para-Xylene	<0.05	<0.05	mg/kg	0.05	26962	a
ortho-Xylene	<0.050	<0.050	mg/kg	0.05	26960	a
ortho-Xylene	<0.05	<0.05	mg/kg	0.05	26962	a
Volatile Hydrocarbons (VH6-10)	<100	<100	mg/kg	100	26960	b
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	<0.050	<0.050	mg/kg	0.05	26890	c
Acenaphthylene	<0.050	<0.050	mg/kg	0.05	26890	c
Anthracene	<0.050	<0.050	mg/kg	0.05	26890	c
Benz(a)anthracene	<0.050	<0.050	mg/kg	0.05	26890	c
Benzo(a)pyrene	<0.050	<0.050	mg/kg	0.05	26890	c
Benzo(b)fluoranthene	<0.050	<0.050	mg/kg	0.05	26890	c
Benzo(g,h,i)perylene	<0.050	<0.050	mg/kg	0.05	26890	c
Benzo(k)fluoranthene	<0.050	<0.050	mg/kg	0.05	26890	c
Chrysene	<0.050	<0.050	mg/kg	0.05	26890	c
Dibenz(a,h)anthracene	<0.050	<0.050	mg/kg	0.05	26890	c
Fluoranthene	<0.050	<0.050	mg/kg	0.05	26890	c
Fluorene	<0.050	<0.050	mg/kg	0.05	26890	c
Indeno(1,2,3-c,d)pyrene	<0.050	<0.050	mg/kg	0.05	26890	c
Naphthalene	<0.050	<0.050	mg/kg	0.05	26890	c
Phenanthrene	<0.050	<0.050	mg/kg	0.05	26890	c
Pyrene	<0.050	<0.050	mg/kg	0.05	26890	c
Extractable Hydrocarbons						
EPH10-19	<200	<200	mg/kg	200	26873	d
EPH19-32	<200	<200	mg/kg	200	26873	d

Methods:
a = Purge&Trap/GC-MS
b = Purge&Trap/GC-FID
c = Soxhlet/GC-MS
d = Soxhlet/GC-FID

File No. CC500323r

Appendix 1 - QUALITY CONTROL - Blanks

Water

		Result	Target	Units	DL	ALSQC#	Method
Total Metals							
Antimony	T-Sb	<0.00020	<0.00020	mg/L	0.0002	27329	a
Antimony	T-Sb	<0.00020	<0.00020	mg/L	0.0002	27624	a
Arsenic	T-As	<0.00020	<0.00020	mg/L	0.0002	27329	a
Arsenic	T-As	<0.00020	<0.00020	mg/L	0.0002	27624	a
Barium	T-Ba	<0.0010	<0.0010	mg/L	0.001	27329	a
Barium	T-Ba	<0.0010	<0.0010	mg/L	0.001	27624	a
Beryllium	T-Be	<0.0010	<0.0010	mg/L	0.001	27329	a
Beryllium	T-Be	<0.0010	<0.0010	mg/L	0.001	27624	a
Cadmium	T-Cd	<0.00020	<0.00020	mg/L	0.0002	27329	a
Cadmium	T-Cd	<0.00020	<0.00020	mg/L	0.0002	27624	a
Chromium	T-Cr	<0.0010	<0.0010	mg/L	0.001	27329	a
Chromium	T-Cr	<0.0010	<0.0010	mg/L	0.001	27624	a
Cobalt	T-Co	<0.0010	<0.0010	mg/L	0.001	27329	a
Cobalt	T-Co	<0.0010	<0.0010	mg/L	0.001	27624	a
Copper	T-Cu	<0.0010	<0.0010	mg/L	0.001	27329	a
Copper	T-Cu	<0.0010	<0.0010	mg/L	0.001	27624	a
Lead	T-Pb	<0.0010	<0.0010	mg/L	0.001	27329	a
Lead	T-Pb	<0.0010	<0.0010	mg/L	0.001	27624	a
Mercury	T-Hg	<0.000010	<0.000010	mg/L	0.00001	27334	b
Mercury	T-Hg	<0.000010	<0.000010	mg/L	0.00001	27629	b
Molybdenum	T-Mo	<0.0010	<0.0010	mg/L	0.001	27329	a
Molybdenum	T-Mo	<0.0010	<0.0010	mg/L	0.001	27624	a
Nickel	T-Ni	<0.0010	<0.0010	mg/L	0.001	27329	a
Nickel	T-Ni	<0.0010	<0.0010	mg/L	0.001	27624	a
Selenium	T-Se	<0.0010	<0.0010	mg/L	0.001	27329	a
Selenium	T-Se	<0.0010	<0.0010	mg/L	0.001	27624	a
Silver	T-Ag	<0.00010	<0.00010	mg/L	0.0001	27329	a
Silver	T-Ag	<0.00010	<0.00010	mg/L	0.0001	27624	a
Tin	T-Sn	<0.0010	<0.0010	mg/L	0.001	27329	a
Tin	T-Sn	<0.0010	<0.0010	mg/L	0.001	27624	a
Vanadium	T-V	<0.0050	<0.0050	mg/L	0.005	27329	a
Vanadium	T-V	<0.0050	<0.0050	mg/L	0.005	27624	a
Zinc	T-Zn	<0.0050	<0.0050	mg/L	0.005	27329	a
Zinc	T-Zn	<0.0050	<0.0050	mg/L	0.005	27624	a

Methods:
a = ICPMS
b = CVAFS

File No. CC500323r

Appendix 1 - QUALITY CONTROL - Blanks

Water

	Result	Target	Units	DL	ALSQC#	Method
Halogenated Volatiles						
Bromodichloromethane	<0.0010	<0.0010	mg/L	0.001	26917	a
Bromoform	<0.0010	<0.0010	mg/L	0.001	26917	a
Carbon Tetrachloride	<0.0010	<0.0010	mg/L	0.001	26917	a
Chlorobenzene	<0.0010	<0.0010	mg/L	0.001	26917	a
Chloroethane	<0.0010	<0.0010	mg/L	0.001	26917	a
Chloroform	<0.0010	<0.0010	mg/L	0.001	26917	a
Chloromethane	<0.0010	<0.0010	mg/L	0.001	26917	a
Dibromochloromethane	<0.0010	<0.0010	mg/L	0.001	26917	a
1,2-Dichlorobenzene	<0.0010	<0.0010	mg/L	0.001	26917	a
1,3-Dichlorobenzene	<0.0010	<0.0010	mg/L	0.001	26917	a
1,4-Dichlorobenzene	<0.0010	<0.0010	mg/L	0.001	26917	a
1,1-Dichloroethane	<0.0010	<0.0010	mg/L	0.001	26917	a
1,2-Dichloroethane	<0.0010	<0.0010	mg/L	0.001	26917	a
cis-1,2-Dichloroethylene	<0.0010	<0.0010	mg/L	0.001	26917	a
trans-1,2-Dichloroethylene	<0.0010	<0.0010	mg/L	0.001	26917	a
1,1-Dichloroethylene	<0.0010	<0.0010	mg/L	0.001	26917	a
Dichloromethane	<0.0050	<0.0050	mg/L	0.005	26917	a
1,2-Dichloropropane	<0.0010	<0.0010	mg/L	0.001	26917	a
cis-1,3-Dichloropropylene	<0.0010	<0.0010	mg/L	0.001	26917	a
trans-1,3-Dichloropropylene	<0.0010	<0.0010	mg/L	0.001	26917	a
1,1,1,2-Tetrachloroethane	<0.0010	<0.0010	mg/L	0.001	26917	a
1,1,2,2-Tetrachloroethane	<0.0010	<0.0010	mg/L	0.001	26917	a
Tetrachloroethylene	<0.0010	<0.0010	mg/L	0.001	26917	a
1,1,1-Trichloroethane	<0.0010	<0.0010	mg/L	0.001	26917	a
1,1,2-Trichloroethane	<0.0010	<0.0010	mg/L	0.001	26917	a
Trichloroethylene	<0.0010	<0.0010	mg/L	0.001	26917	a
Trichlorofluoromethane	<0.0010	<0.0010	mg/L	0.001	26917	a
Vinyl Chloride	<0.0010	<0.0010	mg/L	0.001	26917	a
Non-Halogenated Volatiles						
Benzene	<0.00050	<0.00050	mg/L	0.0005	26917	a
Ethylbenzene	<0.00050	<0.00050	mg/L	0.0005	26917	a
Styrene	<0.00050	<0.00050	mg/L	0.0005	26917	a
Toluene	<0.00100	<0.00100	mg/L	0.001	26917	a
meta- & para-Xylene	<0.00050	<0.00050	mg/L	0.0005	26917	a
ortho-Xylene	<0.00050	<0.00050	mg/L	0.0005	26917	a

Methods:
a = WA_VOC_P&T_MS

Appendix 1 - QUALITY CONTROL - Blanks

Water

	Result	Target	Units	DL	ALSQC#	Method
Non-Halogenated Volatiles						
Volatile Hydrocarbons (VH6-10)	<0.10	<0.10	mg/L	0.1	26917	a
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	<0.000050	<0.000050	mg/L	0.00005	26892	b
Acenaphthylene	<0.000050	<0.000050	mg/L	0.00005	26892	b
Acridine	<0.000050	<0.000050	mg/L	0.00005	26892	b
Anthracene	<0.000050	<0.000050	mg/L	0.00005	26892	b
Benz(a)anthracene	<0.000050	<0.000050	mg/L	0.00005	26892	b
Benzo(a)pyrene	<0.000050	<0.000050	mg/L	0.00005	26892	b
Benzo(b)fluoranthene	<0.000050	<0.000050	mg/L	0.00005	26892	b
Benzo(g,h,i)perylene	<0.000050	<0.000050	mg/L	0.00005	26892	b
Benzo(k)fluoranthene	<0.000050	<0.000050	mg/L	0.00005	26892	b
Chrysene	<0.000050	<0.000050	mg/L	0.00005	26892	b
Dibenz(a,h)anthracene	<0.000050	<0.000050	mg/L	0.00005	26892	b
Fluoranthene	<0.000050	<0.000050	mg/L	0.00005	26892	b
Fluorene	<0.000050	<0.000050	mg/L	0.00005	26892	b
Indeno(1,2,3-c,d)pyrene	<0.000050	<0.000050	mg/L	0.00005	26892	b
Naphthalene	<0.000050	<0.000050	mg/L	0.00005	26892	b
Phenanthrene	<0.000050	<0.000050	mg/L	0.00005	26892	b
Pyrene	<0.000050	<0.000050	mg/L	0.00005	26892	b
Quinoline	<0.000050	<0.000050	mg/L	0.00005	26892	b

Methods:
a = WA_VPH_P&T_FID
b = WA_PAH_Ext_MS
Bold Targets indicate uncertified targets

Appendix 2 - METHODOLOGY

Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Moisture in Sediment/Soil

This analysis is carried out gravimetrically by drying the sample at 103 C for a minimum of six hours.

Recommended Holding Time:
Sample: 14 days
Reference: Puget

Laboratory Location: ALS Environmental, Calgary

Volatile Organic Compounds in Sediment/Soil

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then analyzed for specific Volatile Organic Compounds (VOC) by capillary column gas chromatography with mass spectrometric detection (GC/MS). The VOC analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260, published by the United States Environmental Protection Agency (EPA).

Recommended Holding Time:
Sample: 7 days Extract: 40 days
Reference: EPA

Laboratory Location: ALS Environmental, Calgary

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.

Laboratory Location: ALS Environmental, Vancouver

Volatile Hydrocarbons in Sediment/Soil

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then analyzed for Volatile Hydrocarbons (VH6-10) by capillary column gas chromatography with flame-ionization detection (GC/FID). The VH analysis is carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Water by GC/FID" (Version 2.1, July

1999).

Recommended Holding Time:
Sample: 7 days Extract: NA
Reference: BCMELP

Laboratory Location: ALS Environmental, Calgary

Volatile Petroleum Hydrocarbons (VPH) in Solids

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water" (Version 2.1, July 20, 1999). According to this method, the concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, Xylenes and Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10). Analysis of Volatile Hydrocarbons adheres to all prescribed elements of BCMELP method "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

Recommended Holding Time: Not Applicable

Laboratory Location: ALS Environmental, Vancouver

Extractable Hydrocarbons in Sediment/Soil

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846. Methods 3540 & 8015B, published by the United States Enviornmental Protection Agency (EPA). The procedure uses a Soxhlet system to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene and analysed by capillary column gas chromatography with flame ionization detection (GC/FID).

Recommended Holding Time:
Sample: 14 days Extract: 40 days
Reference: BCMELP

Laboratory Location: ALS Environmental, Calgary

pH in Soil

This analysis is carried out in accordance with procedures described in "Soil Sampling and Methods of Analysis" (CSSS). The procedure involves mixing the air-dried sample with deionized/distilled water. The pH of the solution is then measured using a standard pH probe. A one to two ratio of sediment to water is used for mineral soils and a one to ten ratio is used for highly organic soils.

Appendix 2 - METHODOLOGY - Continued

Laboratory Location: ALS Environmental, Vancouver

Metals in Sediment/Soil

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B or Method 3051, United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic absorption/fluorescence spectrophotometry (EPA Method 7000 series), inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B), and/or inductively coupled plasma - mass spectrometry (EPA Method 6020).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Recommended Holding Time:
Sample: 6 months (Hg = 28 days)
Extract: 6 months (Hg = 28 days, Sb & Sn = 7 days)
Reference: BCMELP

Laboratory Location: ALS Environmental, Vancouver

Polycyclic Aromatic Hydrocarbons in Sediment/Soil

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3540, 3630 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a Soxhlet system to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene and undergoes a silica gel clean-up to remove sample components that could potentially interfere with the analysis. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS).

Recommended Holding Time:
Sample: 14 days Extract: 40 days
Reference: EPA

Laboratory Location: ALS Environmental, Calgary

Light and Heavy Extractable Petroleum Hydrocarbons in Solids

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in

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

Recommended Holding Time: Not Applicable

Laboratory Location: ALS Environmental, Vancouver

Sediment/Soil Particle Size Distribution

This analysis is carried out in accordance with Canadian Society of Soil Sciene and Iowa Department of Transportation I.M. 306. The procedure involves oven-drying a representative subsample which is then passed through all requested sieves. Particle size is determined as the percentage of a sample that is greater than and less than the requested sieve sizes.

Recommended Holding Time:
Sample: not applicable
Reference: Canadian Society of Soil Science and IDT IM

Laboratory Location: ALS Environmental, Calgary

Metals in Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" 20th Edition 1998 published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotplate or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by atomic absorption/emission spectrophotometry (EPA Method 7000 series), inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B), and/or inductively coupled plasma - mass spectrometry (EPA Method 6020).

Recommended Holding Time:
Sample: 6 months
Reference: EPA

Laboratory Location: ALS Environmental, Vancouver

Mercury in Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" 20th Edition 1998 published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

Recommended Holding Time:
Sample: 28 days
Reference: EPA

Laboratory Location: ALS Environmental, Vancouver

Volatile Organic Compounds in Water

This procedure involves the purge and trap extraction of the sample prior to analysis for specific Volatile Organic Compounds (VOC) by capillary column gas chromatography with mass spectrometric detection (GC/MS). The VOC analysis are carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260, published by the United States Environmental Protection Agency (EPA).

Recommended Holding Time:
Sample: 7 days Extract: NA
Reference: BCMELP

Laboratory Location: ALS Environmental, Calgary

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 sum of the DLs of the individual Xylenes.

Laboratory Location: ALS Environmental, Vancouver

Volatile Hydrocarbons in Water

This procedure involves the purge and trap extraction of the sample prior to analysis for Volatile Hydrocarbons (VH6-10) by capillary column gas chromatography with flame-ionization detection (GC/FID). The VH analysis is carried out in accordance with the British Columbia Ministry of Environment, Lands

and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Water by GC/FID" (Version 2.1, July 1999).

Recommended Holding Time:
Sample: 7 days Extract: NA
Reference: BCMELP

Laboratory Location: ALS Environmental, Calgary

Volatile Petroleum Hydrocarbons (VPH) in Water

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water" (Version 2.1, July 20, 1999). According to this method, the concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, and Xylenes) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10). Analysis of Volatile Hydrocarbons adheres to all prescribed elements of BCMELP method "Volatile Hydrocarbons in Water by GC/FID" (Version 2.1, July 20, 1999).

Recommended Holding Time: Not Applicable

Laboratory Location: ALS Environmental, Vancouver

Polycyclic Aromatic Hydrocarbons in Water

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3510, 3630 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure involves extraction of the entire water sample with dichloromethane. The extract is then solvent exchanged to toluene prior to analysis by capillary column gas chromatography with mass spectrometric detection (GC/MS).

Recommended Holding Time:
Sample: 7 days Extract: 40 days
Reference: EPA

Laboratory Location: ALS Environmental, Calgary

Extractable Hydrocarbons in Water

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).

Appendix 2 - METHODOLOGY - Continued

Recommended Holding Time:
Sample: 7 days Extract: 40 days
Reference: BCMELP

Laboratory Location: ALS Environmental, Calgary

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 Polynuclear 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).

Recommended Holding Time: Not Applicable

Laboratory Location: ALS Environmental, Vancouver

Results contained within this certificate relate only to the samples as submitted.

End of Report

APPENDIX C
Data Quality Review

Terasen Pipelines (Trans Mountain) Inc.
Trans Mountain Pump Station Expansion Project
Proposed Finn Pump Station, British Columbia
SEACOR Project #: 212.06117.02

QUALITY ASSURANCE / QUALITY CONTROL – DATA QUALITY REVIEW

Project No.: 212.06117.02 Project Name: Pump Station Site Assessment

Project Location: Proposed Finn Pump Station, DL 3262, KDYD, Highway 5, BC

Chain of Custody Form No(s):

- ☒ Soil: CC500323r
- ☒ Water: CC500323r
- ☐ Air:

Name and location of laboratory: ALS Environmental, Calgary, AB

QA/QC – LABORATORY

QC Parameter	Soil	Water	Air
Blanks	Acceptable	Acceptable	n/a
Spikes	Acceptable	Acceptable	n/a
Surrogate Recovery	Acceptable	Acceptable	n/a

Comments:

QA/QC – FIELD

QC Parameter	Soil	Water	Air
Temperature at Lab	Acceptable	Acceptable	n/a
Duplicate	n/a[1]	n/a	n/a

Comments:

1. Relative percent differences could not be calculated as the sample results were below the laboratory method detection limits.

OTHER DATA REPORTABLES

		Yes/No
1.	Has the CoA (certificate of analysis) been signed off?	Yes
2.	Has lab warranted all tests were in statistical control in CoA?	Yes
3.	Has lab warranted all tests were analyzed following SOP's in CoA?	Yes
4.	Were all samples analyzed within hold times?	Yes
5.	Is Chain of Custody completed and signed?	Yes

DATA RELIABILITY

Is the data considered to be reliable (Yes/No)?: Yes

If answer is "No", describe and provide rationale:

Reviewed by (Print): Emma Kirsh Date: November 14, 2005