

Foreshore Passive Treatment System Construction Report

Parkland Refinery, Burnaby, British Columbia

Parkland Refining (B.C.) Ltd.

Project number: 60542455

December 22, 2017

Quality information

Prepared by Checked by Verified by Approved by Approved by Robert Horwath, CA PG Ken Gauthier, B.Sc., Christine Patterson, P. Lesley Reid, M.Eng, Leslie Southern, P.Eng. Environmental Engineer(Contaminated Sites Approved Professional - CSAP) M.Sc., P.Ag. P.Ag. Senior Geologist **Environmental Scientist** Environmental Operations Manager Senior Project Manager Scientist

| # Hard Copies | PDF Required | Association / Company Name |
|---------------|--------------|----------------------------|
| | | |
| | | |
| | | |
| | | |

Prepared for:

Parkland Refining (B.C.) Ltd.

Prepared by:

AECOM Canada Ltd. 3292 Production Way Suite 330 Burnaby, BC V5A 4R4 Canada

T: 604.444.6400 F: 604.294.8597 aecom.com

© 2017 AECOM Canada Ltd.. All Rights Reserved.

This document has been prepared by AECOM Canada Ltd. ("AECOM") for sole use of our client (the "Client") in accordance with generally accepted consultancy principles, the budget for fees and the terms of reference agreed between AECOM and the Client. Any information provided by third parties and referred to herein has not been checked or verified by AECOM, unless otherwise expressly stated in the document. No third party may rely upon this document without the prior and express written agreement of AECOM.

Table of Contents

| 1. | Exec | cutive Summary | 6 |
|-----|--------|---|----|
| 2. | Introd | duction | 12 |
| 3. | Back | ground | 12 |
| | 3.1 | FPTS Design Basis | 13 |
| 4. | Objec | ctives | 14 |
| 5. | Scop | e of Work | 14 |
| | 5.1 | Original Scope of Work | 14 |
| | 5.2 | Additional Tasks Added in the Scope of Work | 15 |
| 6. | Site [| Description | 15 |
| | 6.1 | Geology | 15 |
| | 6.2 | Tidal Effects | 16 |
| 7. | Regu | ılatory Context | 16 |
| | 7.1 | Stage 11 Housekeeping Amendments | 16 |
| | 7.2 | Applicable Screening Standards For Sediment | 16 |
| 8. | Field | Program Methodologies | 17 |
| | 8.1 | Installation of Foreshore Passive Treatment System | 17 |
| | 8.1.1 | Site Preparation | 17 |
| | 8.1.2 | Sediment Sampling and Field Observations | 17 |
| | 8.1.3 | Subsurface Components | 18 |
| | 8.1.4 | Above Ground up Slope Components | 18 |
| | 8.1.5 | Above Ground Down Slope Components | 19 |
| | 8.1.5 | i.1Down Slope Rip-Rap Embankment | 19 |
| | 8.1.5 | 5.2Downslope Cobble Matting | 19 |
| | 8.2 | Drilling Activities and Monitoring Well Installations | 20 |
| | 8.3 | Environmental Monitoring | 20 |
| | 8.4 | Field Changes Made To the Work Plan | 21 |
| 9. | Field | Observations | 21 |
| 10. | Analy | ytical Results | 22 |
| | 10.1 | Sediment Analytical Results | 22 |
| | 10.1. | 1 Eastern IRA Barrier – Limit Samples | 22 |
| | 10.1. | .2 Eastern IRA Barrier – Disposal Samples | 22 |
| | 10.1. | .3 Western IRA Barrier – Limit Samples | 22 |
| | 10.1. | 4 Western IRA Barrier – Disposal Samples | 22 |
| | 10.1. | .5 Up Gradient Sediment Samples | 23 |
| | 10.1.0 | .6 Backfill Sediment Samples | 23 |
| 11. | Offsit | te Disposal of Materials | 23 |
| | 11.1 | Sediment | 23 |
| | 11.2 | Groundwater | 23 |
| 12. | Discu | ussion | 24 |
| | 12.1 | Distribution of Exceedances | 24 |
| | 12.2 | Variations from Issued-For-Construction Drawings | 24 |
| | 12.3 | Status of the Foreshore Passive Treatment System | 25 |
| 13. | Quali | ity Assurance/Quality Control | 25 |
| | 13.1 | Precision | |
| | 13.2 | Accuracy | 26 |
| | 13.3 | Completeness | 26 |

| | 13.4 QA/QC Mixing Assessment | 26 |
|-----|------------------------------|----|
| 14. | Post Construction Monitoring | |
| 15. | Summary | 27 |
| | Report Use and Limitations | |
| | Disclaimers | |
| 18. | Professional Statement | 29 |
| 19. | References | 30 |
| | | |

Figures (at the back of the Report)

| Figure 1 - | Foreshore | Work Area |
|------------|-----------|-----------|
|------------|-----------|-----------|

Figure 2 – Site Map – Pre-Construction

Figure 3 – Eastern IRA Barrier Excavation Limit Samples

Figure 4 – Western IRA Barrier Excavation Limit Samples

Figure 5 – Site Map – Post-Construction

Tables (in Report)

| Table A - Materials Disposed Offsite | .23 |
|--|-----|
| Table B – Water Disposed Offsite | .23 |
| Table C –Variations from IFC | .24 |
| Table D - Relative Percent Differences (%) of Duplicate Analyses | .26 |

Tables (at the back of the Report)

Table 1 – Well Installation Details

Table 2 - Concentrations of Petroleum Hydrocarbon Parameters in Sediment Samples

Table 3 – Concentrations of Polycyclic Aromatic Hydrocarbons in Sediment Samples

Table 4 – Concentrations of Metals in Sediment Sample

Appendices

| Appendix A - Additional Background | 34 |
|---|----|
| Appendix B - Regulatory Context | 37 |
| Appendix C - Vancouver Fraser Port Authority Permit: 16-180 | 40 |
| Appendix D - Photo Log | 41 |
| Appendix E - Borehole Logs and Monitoring Well Construction Details | |
| Appendix F – Field Reports to VFPA | 43 |
| Appendix G - Record Drawings | 44 |
| Appendix H - Sediment and Groundwater Laboratory COAs | |
| Appendix I - Tervita Manifests and Bill of Lading | 46 |
| Appendix J - Quality Assurance / Quality Control | 47 |
| Appendix K - FPTS Post Construction Monitoring and Maintenance Plan | |
| Appendix L – Project Data | |

1. Executive Summary

On behalf of the Parkland Refining (B.C.) Ltd. (Parkland) Burnaby Refinery AECOM Canada Ltd. (AECOM) has prepared this report to summarize the construction of the Foreshore Passive Treatment System (FPTS) executed by the prime contractor, Tervita Corporation (Tervita) and to meet various conditions in Permit 16-180 issued by the Vancouver Fraser Port Authority (VFPA). The FPTS was designed and constructed to be the final remedial action to address free-phase and dissolved phase hydrocarbon and sheens along the foreshore of Burrard Inlet, down slope from the Eastern Impounding Basin (EIB), Area 2 of the Parkland (formerly Chevron) Burnaby Refinery (Figure 1) (hereafter referred to as "the Site"). The FPTS was constructed to be a permanent feature on the Site. Construction of the FPTS was performed from July 10 through October 30, 2017.

The FPTS construction objectives were to excavate and dispose of the sand-organoclay and other materials from the existing 44 metre (m) Eastern and the 10 m Western Interim Remedial Action (IRA) Barriers and replace the Eastern IRA Barrier with the newly designed FPTS. The FPTS construction followed the British Columbia Ministry of Environment and Climate Change Strategies (ENV) supported Foreshore Remedial Action Plan (AECOM 2016b) and in accordance with the Construction Environmental Management Plan (AECOM 2017a). Based on field observations and sampling results, an FPTS was also installed at the former location of the Western IRA Barrier. The newly installed FPTS was designed to address the non-aqueous phase liquid (NAPL) seeps and associated potential contaminants of concern (PCOCs) in porewater and surface water, at the Site.

The Preliminary Site Investigation and Detailed Site Investigation were performed in June 2010 and April 2011, respectively (URS 2011a) to assess the nature and extent of petroleum hydrocarbon impacts across the Site. Findings of these Investigations along with various Human Health and Ecological Risk Assessments (SLR 2014 and 2016) identified the following contaminants of concern (COCs): benzene, toluene, ethylbenzene, and xylenes (BTEX), volatile petroleum hydrocarbons (VPH), light/heavy extractable petroleum hydrocarbons (LEPH/HEPH), polycyclic aromatic hydrocarbons (PAHs), and copper in sediment.

Applicable Standards

Sediment samples were screened against the ENV Consolidated Stage 11 Housekeeping Amendment to the Contaminated Sites Regulation (CSR), Schedule 3.4: Generic Numerical Sediment Standards for Sensitive and Typical sediments in marine and estuarine environments. Sensitive marine sediment applies to the upper 1 m of sediment collected below the high water mark in aquatic receiving environments that are not maintained watercourses. Typical marine sediment applies below the top 1 m of sediment collected below the high water mark in aquatic receiving environments. In the event that standards for a COC were not included in Schedule 3.4, sediment samples were compared to the most stringent of the following soil standards: Schedule 3.1 Part 1: Matrix Numerical Park Land (PL) Soil Standards, Schedule 3.1 Part 2: Generic Numerical PL Soil Standards to Protect Human Health; or Schedule 3.1 Part 3: Generic Numerical PL Soil Standards to Protect Ecological Health.

Field Program Methodologies

With a few exceptions, all above and below ground components of the FPTS were installed consistent with the issued for construction (IFC) drawings, completed in association with the Remedial Action Plan (AECOM 2016b). In summary, the components installed include:

- A subsurface treatment cell with Aquagate+Organoclay.
- An adjacent, down slope subsurface treatment cell with Aquagate+Powdered Activated Carbon,
- · Baffles in the treatment cells,
- A French drain system in the treatment cells,
- Monitoring wells,
- A polyethylene liner to direct groundwater into the treatment cells,
- An Oleophilic Bio-Barrier, and
- Cobbles and a boulder embankment to protect the wells and other components.

The IFC drawings were modified slightly to account for a change in design and construction of the FPTS based on field observations and sampling results from the Western IRA Barrier. Minor design variations that deviated from the original IFC drawings are discussed in Section 11.2 and shown in Appendix G.

During construction, all work was completed within the conditions included in Vancouver Fraser Port Authority (Port of Vancouver) Project Permit No: 16-180.

Field Observations

Notable observations are as follows:

- No hydrocarbon sheens were observed in Burrard Inlet during construction activities;
- During the removal of the Eastern and Western IRA Barriers, the majority of the excavated sand-organoclay contained staining and/or hydrocarbon odours, indicating the effectiveness of the IRA Barriers in trapping petroleum hydrocarbons;
- During the installation of monitoring well PW17-14, an oily film was observed in water seeping out of the upper surface of the sediment at approximately 0.3 m below ground surface;
- NAPL was not observed during the IRA demolition, limit sampling or FPTS construction; and,
- During construction, surface water inside and outside of the construction zone was monitored for pH, temperature, conductivity and turbidity as per Permit No: 16-180. Occasionally, elevated turbidity, temperature, and pH readings above the BC Approved Water Quality Guidelines (WQG) were recorded both inside and outside of the construction zone. Generally, elevated turbidity measurements were the result of anthropogenic sources outside the footprint of the FPTS construction zone (i.e. large waves from passing watercrafts). Temperature and pH measurements outside the desired ranges were likely attributed to natural variations associated with the tide.

Analytical Discussion

A total of 106 sediment samples (including sidewall and base limit samples, samples of sand-organoclay mixture from within the Eastern and Western IRA Barriers, backfill material and samples from up gradient of the Eastern Barrier and duplicates) were collected during the construction of the FPTS. Sediment samples were analyzed for BTEX/VPH, LEPH/HEPH, extractable petroleum hydrocarbons (EPH(C10-C19)/EPH(C19-C32)), PAHs, methyl tertiary-butyl ether (MTBE), and metals. Two sediment samples were also analyzed for EPH(C10-C19)/EPH(C19-C32) with silica gel cleanup.

Of the 106 samples collected:

- 36 were limit sediment samples associated with the Eastern IRA Barrier;
- 31 were sand-organoclay samples from within the Eastern IRA Barrier;
- 17 were limit sediment samples associated with the Western IRA Barrier;
- 3 were sand-organoclay samples from within the Western IRA Barrier;
- 14 were samples of backfill material; and
- 5 sediment samples were collected from up gradient of the Eastern Barrier.

Of the 36 limit sediment samples associated with the Eastern IRA Barrier, five samples (ESA-9, ESA-13, ESA-23, ESA-29 and ESA-30) marginally exceeded applicable standards for 2-methylnaphthalene and/or naphthalene. The five samples containing 2-methylnaphthalene, and the one of these containing naphthalene, had concentrations slightly above the applicable standards, and within the same order of magnitude as the standards. As a result of the introduction of the Stage 11 Amendment to the CSR, 2-methylnaphthalene is considered a PCOC in sediment at the Site. However, it should be noted that 2-methylnaphthalene is not considered a PCOC in porewater or surface water at the Site, as there is no applicable CSR standard for porewater nor a Working or Approved BC Water Quality Guideline for surface water for this constituent.

Of the 17 limit sediment samples associated with the Western IRA Barrier, two samples (WSA-2 and WSA-3) exceeded applicable standards for EPH(C10-C19) and LEPH.

Due to the close proximity of the southern sidewall samples to the Canadian Pacific Railway (CPR) Zone of Potential Training Loading (ZPTL), over excavation to achieve clean limits was not feasible due to safety and slope stability concerns. Any migration of these impacts is anticipated to be trapped by the FPTS. Generally, when signs of hydrocarbon impacts were observed on the base and/or other sidewalls (north, east or west) of either of the IRA Barriers, the excavator operator was instructed to scrape away additional materials to achieve a clean limit. Of the seven limit sediment samples with exceedances, three were collected from the southern up slope sidewall of the excavation for the Eastern IRA Barrier, two were collected from the southern up slope sidewall of the excavation for the Western IRA Barrier, and two were collected from the base of the Eastern IRA Barrier. Any migration of these impacts is anticipated to be intercepted by the FPTS since the impacts are up gradient or below the treatment cells.

Six of 31 sand-organoclay samples (EIRA-6, EIRA-15, EIRA-16, EIRA-25, DUP-5, and EIRA-26) collected from within the Eastern IRA Barrier contained concentrations of PHCs and/or PAHs above the applicable standards. The three sand-organoclay samples collected from within the Western IRA Barrier did not contain concentrations of PHCs and/or PAHs above the applicable standards. Elevated concentrations from samples collected within the Eastern IRA Barrier are not unexpected as the barrier was designed to trap NAPL within the sand-organoclay. All materials represented by these samples were removed from Site and disposed of in accordance with applicable regulatory requirements.

All samples of backfill materials were below applicable standards.

Offsite Disposal

All excavated soil, pumped water, and demolition refuse generated during construction was contained and disposed of offsite at Tervita's Richmond Bioremediation facility. Total quantities of materials disposed of offsite are as follows:

- Soil 103 tonnes (above commercial land use);
- Soil 367 tonnes (above residential land use);
- Demolition refuse 16 tonnes; and
- Groundwater 170,000 litres.

FPTS Post-Construction Monitoring & Maintenance Plan

A FPTS Post-Construction Monitoring & Maintenance Plan (MMP) contained in Appendix K presents protocols and procedures to maintain and assess the performance of the recently installed FPTS. The MMP includes the monitoring and sampling of 33 newly installed monitoring wells, the collection of surface water samples, and maintaining the integrity of the FPTS by checking and replacing the protective rip-rap, cobbles and monitoring wells, and managing vegetation as required.

Summary

In summary, the FPTS was successfully installed between July and October 2017. Limit sediment samples were generally below applicable standards indicating that the bulk of the petroleum impacted soil and other materials were removed from the previous Eastern and Western IRA Barriers prior to the installation of the FPTS. Post construction monitoring will be performed according to the MMP and will include an evaluation of the performance of the FPTS.

REPORT ACRONYMS

AG+OC Aquagate and Organoclay

AG+PAC Aquagate and Powdered Activated Carbon

ALS Laboratories

BC British Columbia

BCELM BC Environmental Laboratory Manual

bgs below ground surface

BTEX Benzene, Toluene, Ethylbenzene, and Xylenes

CEMP Construction Environmental Monitoring Plan

CEPA Canadian Environmental Protection Act

CCME Canadian Council of Ministers of the Environment

COC Contaminants of concern

CPR Canadian Pacific Railway

CSR Contaminated Sites Regulation

DFO Department of Fisheries and Oceans

DQO Data quality objective

DSI Detailed Site Investigation

EAZ Ecologically Active Zone

EC Environment Canada

EIB Eastern Impoundment Basin

ESA Eastern Seep Area

EMA Environmental Management Act

ENV Ministry of Environment and Climate Change Strategy

FPTS Foreshore Passive Treatment System

HASP Health and Safety Plan

HDPE High density polyethylene

HWR Hazardous Waste Regulation

IBA In-between area

IFC Issued for construction

IRA Interim Remedial Action

LCS Lab control sample

LEPH/HEPH Light/Heavy Extractable Petroleum Hydrocarbons

LEPHw Light Extractable Petroleum Hydrocarbons in water

m meter

mm millimeter

MTBE methyl tertiary-butyl ether

NAPL Non-aqueous phase liquid

OBB Oleophilic Biobarrier

OMM Operations, Monitoring, and Maintenance

OMOE Ontario Ministry of Environment

ORP Oxidation Reduction Potential

PAHs Polycyclic Aromatic Hydrocarbons

PHC Petroleum hydrocarbons

PCOC Potential Contaminants of Concern

PL Urban Park standards

PLv Urban Park vapor standards

PMV Port Metro Vancouver

PSI Preliminary Site Investigation

QA/QC Quality Assurance/Quality Control

RAP Remedial Action Plan

RBMT Risk based management target

RCM Reactive Core Mat

RDL Reported Detection Limit

RFP Request for proposal

ROW right-of-way

RPD Relative Percent Difference

SLR SLR Consulting Canada Ltd.

SedSSS Sediment Standards, Sensitive Sediments

SedSTS Sediment Standards, Typical Sediments

VFPA Vancouver Fraser Port Authority

VPH Volatile Petroleum Hydrocarbons

WQG Water Quality Guidelines

WSA Western Seep Area

ZPTL Zone of Potential Train Loading

2. Introduction

On behalf of the Parkland Refining (B.C.) Ltd. (Parkland) Burnaby Refinery, AECOM Canada Ltd. (AECOM) has prepared this remediation report to summarize the construction of the Foreshore Passive Treatment System (FPTS) executed by the prime contractor, Tervita Corporation (Tervita), and to meet various conditions in Permit 16-180 issued by the Vancouver Fraser Port Authority (VFPA). The FPTS was designed and constructed to be the final remedial action to address free-phase and dissolved phase hydrocarbon and sheens along the foreshore of Burrard Inlet, down slope from the Eastern Impounding Basin (EIB), Area 2 of the Parkland (formerly Chevron) Burnaby Refinery (Figure 1) (hereafter referred to as "the Site"). The FPTS was constructed to be a permanent feature on the Site. Construction of the FPTS was performed from July through October 2017.

The FPTS construction objectives were to excavate and dispose of the sand-organoclay and other materials from the existing 44 metre (m) Eastern and the 10 m Western Interim Remedial Action (IRA) Barriers and replace the Eastern IRA Barrier with the newly designed FPTS. The FPTS construction followed the British Columbia Ministry of Environment and Climate Change Strategies (ENV) supported Foreshore Remedial Action Plan (AECOM 2016b) and in accordance with the Construction Environmental Management Plan (AECOM 2017a). Based on field observations and sampling results, the FPTS was also installed at the former location of the Western IRA Barrier. The newly installed FPTS was designed to address the non-aqueous phase liquid (NAPL) seeps and associated potential contaminants of concern (PCOCs) in porewater and surface water, at the Site.

The scope of work was developed by Dr. Ram Kannappan, CA PE., Mr. Robert Horwath, CA PG, Ms. Leslie Southern, M.Sc., P.Ag., of AECOM and Mr. Michael Gill, P.Eng., CSAP, formerly of AECOM. Environmental monitoring was completed by Mr. Kenneth Gauthier, P.Ag., and Mr. Edward Preece, E.I.T., of AECOM. Additional field assistance was provided by Mr. Albert Wang, P.Eng., Mr. Brian McGill, B.Sc., Mr. Keith Bell, R.P.Bio., Mr. Justin Becker, E.I.T., Mr. Mark Hoculik, B.Sc., and Mr. Carny Wong, A.Ag. This report was prepared by Mr. Ken Gauthier and Ms. Leslie Southern and reviewed by Mr. Robert Horwath, Dr. Ram Kannappan, Mrs. Christine Patterson, P.Eng. and Ms. Lesley Reid, M.Eng., P.Eng., CSAP of AECOM.

3. Background

Chevron Canada Limited (CCL) first observed NAPL seeps on the north, downward slope of the Parkland (formerly Chevron) Burnaby Refinery (Refinery) towards Burrard Inlet during an inspection on April 21, 2010. The seeps were immediately reported by CCL to the Provincial Emergency Program (now Emergency Management BC [EMBC]) and addressed using soaker pads and booms. The source of the NAPL is unknown but believed to be associated with historical Refinery operations and the north process sewer (decommissioned in June 2011).

A Preliminary Site Investigation (PSI) and a Detailed Site Investigation (DSI) were performed at the Site in June 2010 and April 2011, respectively (URS 2011a). The PSI and DSI determined that the NAPL seeps emanated from the sediment near the contact between the overlaying beach sand and underlying colluvium, near the high tide line at the base of the Canadian Pacific Railway Right-of-Way (CPR ROW) slope. The DSI along with various Human Health and Ecological Risk Assessments (HHERA) (SLR 2014 and 2016) identified the following COCs: volatile petroleum hydrocarbons (VPH), light and heavy extractable petroleum hydrocarbons (LEPH/HEPH), polycyclic aromatic hydrocarbons (PAHs), and copper, in sediment.

Following the DSI, Interim Remedial Action (IRA) Barriers, comprised of a sand-organoclay mixture and a CETCO Reactive Core Mat (RCM) were constructed and installed in the Western Seep Area (WSA) and Eastern Seep Area (ESA) in February and March 2011 (URS 2011b). Confirmatory sediment "excavation limit" samples were collected from the base and sidewalls of the trench excavated at the Site during the DSI. Details of the IRA Barrier installation are included in URS' Foreshore Interim Remedial Action report (URS 2011b). In November 2011, an assessment of petroleum hydrocarbon (PHC) concentrations and NAPL saturation was completed in and down slope of the IRA Barriers. Based on the results of this assessment, the Eastern IRA Barrier was refurbished in March and April 2012

by removing the sand in the down slope anchor trench and replacing it with sand-organoclay. Confirmatory sediment excavation limit samples were collected from the base and some of the sidewalls of the refurbishment trench. The Western IRA Barrier did not require refurbishment. The extents of the IRA Barriers are shown in Figure 2.

In February and March 2013, an investigation assessed the extent of PHC in sediment in the area between the ESA and the WSA, labelled as the In-Between Area (IBA). None of the sediment samples collected contained concentrations of COCs above the applicable standards. Details of the IBA investigation are included in URS' Foreshore 2013 First Semi-Annual Monitoring Report (January-June 2013) (URS 2014).

In March 2014, a second assessment of PHC concentrations and NAPL saturation was completed within and down slope of the IRA Barriers. Concentrations of PHCs were reported above the applicable standards in the sand-organoclay samples collected from within the Eastern and/or the Western IRA Barriers. Details of the investigation are included in AECOM's Foreshore 2014 Annual Monitoring Report (AECOM 2016a).

AECOM completed air, porewater and surface water monitoring and sampling in the ESA and WSA from 2011 to 2017. Details of the monitoring and sampling from 2011 to 2016 are included in eight reports completed by AECOM (URS 2011a, URS 2013b, URS 2013c, URS 2014, URS 2015, AECOM 2016a, AECOM 2016e, and AECOM 2017b). The monitoring and sampling from 2017 has not yet been formally reported.

Additional information on the background of the Site, including summaries of investigations, remedial activities and a list of monitoring reports, is presented within Appendix A.

3.1 FPTS Design Basis

The Remedial Action Plan (RAP) gives the basis of design for the FPTS (AECOM 2016b). The FPTS is designed with built-in redundancy, or "belt-and-suspenders", and contingency. The following factors provide redundancy or over-design:

- The samples of contaminated water, upon which the design testing and calculations were based, were taken from wells at the Refinery because elevated LEPHw concentrations were not able to be found at the Foreshore or even up gradient at the railroad;
- Based on a conservative estimate of the quantity of NAPL entering the FPTS and the ability of organoclay to absorb NAPL, the mass of Aquagate+Organoclay (AG+OC) exceeds the minimum mass required to absorb a 30 year flow of NAPL by a factor of seven;
- Based on a conservative estimate of the concentration of dissolved LEPHw entering the FPTS and the
 ability of activated carbon to absorb LEPHw, the mass of Aquagate+Powdered Activated Carbon (AG+PAC)
 exceeds the minimum mass required to absorb a 30 year flow of dissolved LEPHw by a factor of 4 to 46
 times;
- NAPL has not been observed in the IRA Barriers since September 2011, and NAPL was not observed during the IRA demolition or FPTS construction;
- Surface water sheens observed within the boom have been rare and have not been observed since March 2015; and
- Up gradient remedial systems are precluding the movement of NAPL past the Refinery property.

As a contingency, a French drain system allows for nutrients or other components to be added to the FPTS. Given all these items, AECOM and Parkland believe the FPTS provides a reliable remedy to impacts at the Site resulting from the seeps. From an ecological benefit perspective, the additional boulders and cobbles provide habitat conditions consistent with the surrounding Foreshore.

4. Objectives

The purpose of the FPTS is to prevent migration of NAPL and associated COCs from reaching Burrard Inlet at the Site. The objectives of the construction were as follows:

- Excavation and removal of the existing Eastern and Western IRA Barriers as well as any additional impacted sediment identified during construction activities;
- Installation of a FPTS in the ESA;
- Evaluation of the WSA and, if found to be impacted, installation of a FPTS; and
- Completion of an effective and timely installation that can withstand extreme tidal fluctuations and winter storms.

As indicated in the Introduction, one of the objectives of this report is to meet several conditions in the VFPA Permit 16-180 (Appendix C). Portions of this comprehensive post-construction report meeting or contributing to various conditions are as follows:

- Condition 40, Record Drawings Appendix G
- Condition 41, Photos and Survey Plan Appendix D, Appendix G
- Condition 42, A comprehensive report that includes:
 - Information about Contamination onsite Sections 9.1.1, 9.1.3, and 11.1, Tables 2 and 3, and Figures 3 and 4.
 - Summary of Environmental Monitoring Section 7.3, Appendix F.
 - o Copies of all manifests Section 10, Appendix I.
 - A Post-Construction Monitoring Plan Section 13, Appendix K.

5. Scope of Work

5.1 Original Scope of Work

AECOM's scope of work for the FPTS included the following:

- Development of a Construction Environmental Management Plan (CEMP) for the construction of the FPTS;
- Providing environmental monitoring and technical support to Tervita during decommissioning and removal of the previously installed IRA Barriers and the installation of the FPTS;
- Completion of three Site inspections prior to construction to identify potential bird nests, rare or endangered plants, and/or wildlife;
- Ensuring the FPTS were installed to the designed requirements as detailed in the issued for construction (IFC) drawings and that all requirements within the CEMP were met;
- Ensuring Tervita, was aware of and adhered to all conditions included in Vancouver Fraser Port Authority (VFPA)
 Project Permit No: 16-180;
- Monitoring for hydrocarbon vapours during installation using a flame-ionization detector (FID), and observe visually for NAPL and other physical evidence of contamination;
- Completing daily surface water field parameter monitoring throughout the day using a YSI multimeter and Hach turbidimeter to monitor for any impacts to the receiving environment during construction activities;
- Collecting excavation limits soil samples (including blind duplicates) from the base and sidewalls of the excavations and within the barrier system trenches and extremities to be analyzed for the following chemical

analysis: benzene, toluene, ethylbenzene, and xylenes (BTEX), methyl tertiary-butyl ether (MTBE), volatile petroleum hydrocarbons (VPH), light/heavy extractable petroleum hydrocarbons (LEPH/HEPH), extractable petroleum hydrocarbons (EPH(C10-C19)/EPH(C19-C32)), polycyclic aromatic hydrocarbons (PAHs), and metals;

- Comparing excavation limit sample analytical results to the most stringent of the applicable Contaminated Site Regulation (CSR) matrix and generic numerical soil standards for Urban Park (PL), and numerical sediment standards (typical and sensitive) for marine environments;
- Conducting visual inspections of the FPTS at regular intervals during construction to monitor the performance;
- Preparing this report, summarizing work performed and discussing the results of the confirmatory analytical data collected during FPTS construction activities.

Key components of completed construction activities, field methods and observations, and laboratory analytical data are described in the following sections of this report.

5.2 Additional Tasks Added in the Scope of Work

Additional tasks added to AECOM's original scope of work included the following:

Update IFC Drawings to include a FPTS in the WSA.

6. Site Description

The Site is located on the southern shore of Burrard Inlet, north of Area 2 of the Refinery (Figure 1). The former NAPL seeps at the Site were located at the base of a north facing benched slope. NAPL has not been observed in monitoring wells at the Site since September, 2011. The upper portion of the slope (Upper Bench) is located within the Refinery fence and is the northern berm of the Eastern Impounding Basin (EIB). The topography north of the fence line drops sharply but flattens out at a Lower Bench which is located 10 metres (m) north of the Refinery fence line in the vicinity of the Refinery property line. The topography continues to drop past the Lower Bench to a pair of CPR railway tracks. There is a steep downward embankment north of the railway tracks onto the Site. The total drop in elevation from the Upper Bench to the high tide line of the Site is approximately 17 m. The intertidal zone at the Site then slopes more gently down into Burrard Inlet. The Site, established for the purposes of PSI, DSI, IRA installations and refurbishment, and subsequent Foreshore monitoring activities, is approximately 100 m wide from east to west.

6.1 Geology

According to the Geological Survey of Canada Map 1484A, Surficial Geology of New Westminster, BC, the Site is located in an area of raised marine, deltaic and fluvial deposits (Capilano Sediments) comprised of poorly sorted sand and gravel formed during the Pleistocene. The sand and gravel is underlain by glacial drift deposits (Vashon Drift and Capilano Sediments) comprised of lodgment and minor flow till, lenses and interbeds of sub-stratified drift (sedimentary materials deposited directly from the ice or melt water of a glacier) overlying the Tertiary bedrock.

The Site's southern boundary with the CPR ROW is located at the high tide line and is near the bottom of an approximately four metre high, steeply sloping embankment, covered with rip-rap. The rip-rap generally consists of boulders between 0.25 to 0.75 m in diameter, with scattered pieces up to 2 m in length. The surface of the Site is composed of fine to coarse sands with some silts and gravels. Visual estimates indicate about 15 to 20 percent of the surface of the Site is made up of 0.25 m or larger rock fragments; 5 percent of 0.25 to 0.1 m rock fragments; with the remaining being sands and silts. Beneath the rip-rap and beach sand, the underlying sediments are a mixture of weathered colluvium, underlain by colluvium, followed by till.

6.2 Tidal Effects

The local tide fluctuates from approximately 0.5 to 4.5 m above the local datum. During low tides of 0.5 m, approximately 25 m of foreshore at the Site is exposed between the NAPL seeps (toe of the rip-rap slope) and the tidal water line. During the FPTS construction, all work occurred during low to moderate tide levels.

7. Regulatory Context

7.1 Stage 11 Housekeeping Amendments

The British Columbia Ministry of Environment and Climate Change Strategy (ENV) approved the Stage 10 Amendment (Omnibus) to the Contaminated Sites Regulation (CSR) on October 27, 2016. The Omnibus amendment updated over 8,500 environmental quality standards and came into effect November 1, 2017. Since the introduction of the Omnibus, five Errata updates have been issued (Versions 1 - 5) with the most recent amendment being the Stage 11 (Housekeeping) Amendment, which came into force on November 1, 2017.

The Stage 11 Amendment included updates to all existing soil, water, vapour, and sediment standards to reflect contemporary science and have simplified the formatting and consolidation of the existing CSR schedules into four new schedules:

- Schedule 3.1 Part 1, Matrix Numerical Soil Standards;
- Schedule 3.1 Part 2, Generic Numerical Soil Standards to Protect Human Health;
- Schedule 3.1 Part 3, Generic Numerical Soil Standards to Protect Ecological Health;
- Schedule 3.2, Generic Numerical Water;
- Schedule 3.3, Generic Numerical Vapour Standards; and
- Schedule 3.4, Generic Numerical Sediment Standards.

7.2 Applicable Screening Standards For Sediment

All particulate matter samples collected at the Site were considered to be sediments, as opposed to soil, because they are collected in an inter-tidal, marine environment. According to the ENV's Technical Guidance 15, Concentration Limits for the Protection of Aquatic Receiving Environments, sediments in the upper one meter of an aquatic receiving environment are separated into those for sensitive (SedSSS) and typical (SedSTS) sediments based on the level of protection needed to support the designated uses of the ecosystem and ministry sediment management objectives (ENV 2017). Based on the ENV's January 24, 2011 letter, sediment samples collected in the upper 1 m below ground surface (bgs) were compared to (former) CSR Schedule 9 sensitive sediment criteria to assess potential risk to marine aquatic receptors.

Sediment samples collected within the upper 1 m of sediment during construction of the FPTS were compared against Schedule 3.4: Generic Numerical Sediment Standards for SedSSS in marine and estuarine environments. As per ENV's Technical Guidance 15, sediment samples collected from below 1 m bgs were compared to SedSTS standards.

In the event that standards for a COC were not included in Schedule 3.4, sediment samples were compared to the most stringent of the following soil standards: Schedule 3.1 Part 1: Matrix Numerical Park Land (PL) Soil Standards, Schedule 3.1 Part 2: Generic Numerical PL Soil Standards to Protect Human Health; or Schedule 3.1 Part 3: Generic Numerical PL Soil Standards to Protect Ecological Health.

One of the new standards introduced as part of the Stage 11 Amendment to the CSR, is for 2-methylnaphthalene, a polycyclic aromatic hydrocarbon, in Schedule 3.1 (soil) and Schedule 3.4 (sediment).

Although the construction of the FPTS altered the surface elevation through the addition of rip rap, the rip rap installed is between 0.25 and 0.75 m in diameter. This creates a very porous media which does not inhibit contact of sediments with the aquatic biota. Thus it is appropriate that the sediment samples taken prior to FPTS construction be compared to the SedSSS.

Further information on the regulatory context of the Site is presented in Appendix B.

8. Field Program Methodologies

8.1 Installation of Foreshore Passive Treatment System

The installation of the FPTS consisted of two key components:

- 1. Excavation and removal of the existing Eastern and Western IRA Barriers; and
- 2. Installation of the FPTS.

All work was completed at the toe of the CPR ROW rip-rap embankment located at the high tide line of the Site as shown in Figure 5 and in photos 1 and 13 in Appendix D. All construction activities at the Site occurred from July 10 to October 30, 2017. During construction, both Tervita and AECOM followed all conditions outlined in VFPA Permit No: 16-180. Due to unfavorable tidal windows, an amendment was made to VFPA Permit No: 16-180 to allow for night work, which occurred from October 2 through October 21, 2017. The VFPA permit, related email correspondence and night work amendment are provided as Appendix C.

Remedial construction activities were completed during low tides and consisted of the following sequence of events. A photo log showing the IRA Barrier's decommissioning and installation of the FPTS is provided as Appendix D. Equipment and materials used during construction are listed in Appendix L.

8.1.1 Site Preparation

- Prior to excavation activities, three baseline survey data points were collected on the up gradient CPR ROW.
 Surveying was completed by Peter Smith of PS Surveys to ensure excavation activities adjacent to the CPR ROW embankment did not compromise the integrity of the CPR railway. Surveying continued throughout the program any time excavation activities occurred. Yadav Pathak, P.Eng., of AECOM was onsite for slope stability monitoring and technical support;
- To allow safer access and egress, vegetation was trimmed throughout the footprint of the FPTS along the toe of
 the CPR ROW embankment. All efforts were made to keep a healthy strip of continuous vegetation above the
 work area and below the CPR tracks. Trimming was performed by hand and with the use of power tools, and all
 trimmings were taken offsite for disposal;
- A safe work area was established in the FPTS area by clearing rip-rap within the tidal zone to provide safe access for heavy duty equipment; and
- Following vegetation clearing all rip-rap was removed from the surface of the Eastern and Western IRA Barriers.

8.1.2 Sediment Sampling and Field Observations

During excavation activities, all sediment samples were collected with the use of a decontaminated Teflon spoon, placed on ice and submitted to ALS Laboratories (ALS) for analysis of:

BTEX/VPH, LEPH/HEPH, EPH(C10-C19)/EPH(C19-C32), PAHs, MTBE and metals.

Sediment samples were collected in the following manner:

Collection of confirmatory sediment limit samples (along the base and side walls) approximately every 5 m
horizontally and every 1 m vertically to ensure all contamination was removed; and

AECOM visually assessed the excavation limits for staining and collected samples based on staining, headspace vapours and/or odours. If contamination was suspected, the excavation was extended to achieve clean limits except along the southern sidewalls to preserve the integrity of the CPR ROW. Each day, all excavated material was placed in supersacs (1 m3 soil bags) by Tervita and brought onto the barge for later offsite disposal.

8.1.3 Subsurface Components

Refer to Record Drawings presented in Appendix G and photos in Appendix D.

- The Eastern and Western IRA Barriers were each excavated in 5 to 10 m segments at a time with the following general trench dimensions down slope treatment cell of 1.4 m in width by 1.2 m in depth and up slope treatment cell of 1.4m in width by 1.0 m in depth;
- Following sediment sampling, each 5 to 10 m length of trench installation was completed in the following manner:
 - Plywood forms were laid across the eastern and western edges of the excavation and across the length of the centre of the excavation to separate and contain the up slope and down slope subsurface treatment cells to be backfilled (refer to photo 3 in Appendix D);
 - Subsurface components were then installed into the trench, consisting of French drains (4" Schedule 80 PVC both with and without 0.25 millimetre (mm) slot size) and performance monitoring wells (2" Schedule 40 PVC);
 - Prior to backfilling, three rows of high density polyethylene (HDPE) baffles were placed one in the up slope, one in the down slope treatment cell, and one between the two cells. Plywood was used to reinforce the baffles during installation, but was removed from the baffles once the trenches were backfilled. The purpose of the baffles is to increase the length of the flow path for groundwater entering the FPTS, thereby using the absorbent materials more efficiently;
 - Both up slope and down slope treatment cells were backfilled with the appropriate materials. The up slope cells were composed of a mixture of 75% Lafarge washed sand and 25% AG+OC. The down slope cells were composed of 75% Lafarge washed sand and 25% AG+PAC. The treatment cells were compacted to a minimum of 90% modified proctor density, being careful not to damage the sub surface components during backfilling and compaction (refer to photo 4 in Appendix D);
 - If backfilling was unable to be completed on the same day, then supersacs of clean gravel were temporarily placed within the excavation. Polyethylene sheeting was placed on the surface of the excavation at the end of each day to minimize tidal erosion;
 - As a portion of the treatment cell was completed (backfilled and compacted), a plywood blind was placed
 at the end of the completed section within the trench to prevent sloughing of materials at the end of the
 work day. This blind was removed the following day at the start of the excavation to connect the treatment
 cell sections to one other;
 - Each end of the horizontally laid 4" drainage PVC piping was temporarily capped with filter fabric at the
 end of the work day. The filter fabric was removed prior to connecting the PVC piping to the next section
 as the excavation progressed;
 - Plywood forms were removed once an area was backfilled and compacted to the appropriate standards;
 and
 - At the ends of each trench, a 0.5m long layer of Aquablok was placed.

8.1.4 Above Ground up Slope Components

As sections of the treatment cells were backfilled and compacted, the GSE HD Textured High Density
Polyethylene Geomembrane (HDPE geomembrane) followed by the Nilex 4510 non-woven geotextile filter
fabric (filter fabric) were placed on the surface with small holes cut through the materials to allow the French
drains and Performance Wells to penetrate through;

- The overlapping geomembrane was sealed with an AECOM approved mouldable double-sided sealant tape (3M M50RC Black)¹. Prior to using the double sided tape, the overlapping areas were cleaned of debris, and a heat gun was used to dry the area of application. All other layers (i.e. filter fabric, etc.) were overlapped by 500 millimeters (mm) to ensure no gaps existed in the materials;
- A 150 mm layer of gravel was spread on the surface of the filter fabric to enhance support for the concrete protector casings and anchoring of rip-rap;
- Prior to placing the concrete protectors, square concrete forms were created (using plywood as the forms) to provide a strong and flat base for the concrete risers to sit on (refer to photo 8 in Appendix D);
- Using the excavator, concrete protectors were then set into place (providing protection for all the 4" French drain and/or 2" Performance Wells) and rip-rap was then placed on the surface to anchor all the components;
- Due to the height of the rip-rap, the concrete protectors were extended to allow the rip-rap to be built up around the 4" French drain and 2" Performance Wells;
- CPR embankment components were completed independently of the above:
 - A mixture of 75 % Lafarge washed sand and 25 % AG/OC was initially spread over the existing rip-rap;
 - Followed by the sequential placement of Tendrain II Oleophilic Biobarrier (OBB), Nilex Bx1100 Biaxial Geogrid (geogrid), HDPE geomembrane, and filter fabric.

Prior to the final placement of gravel and rip-rap, the multiple layers (OBB, geogrid, HDPE geomembrane and filter fabric)were temporarily anchored to the CPR embankment by tying rope to tree branches on the upper portions of the CPR slope:

- A 150 mm layer of gravel was then placed on the surface of the filter fabric (both on top of the treatment cells
 and CPR embankment), followed by the gradual placement of rip-rap. This gravel layer was continuous,
 extending from the initial placement of gravel above the treatment cells;
- In order to drill the Up Gradient Wells, rip-rap was not placed in the areas surrounding the wells locations. Small pads consisting of gravel and cobbles were created as a temporary working platform for the drill rig; and
- Following completion of all above ground components (up slope and down slope), a small layer of granular
 activated carbon was then placed along the entire length of the FPTS below the upper seam where the HDPE
 geomembrane approaches the CPR embankment.

8.1.5 Above Ground Down Slope Components

8.1.5.1 Down Slope Rip-Rap Embankment

- Upon completion of the up slope components discussed above, the down slope rip-rap embankment was
 excavated to an approximate depth of 0.6 m bgs to allow anchoring of the OBB, geogrid and filter fabric for final
 placement of rip-rap. Typically 10 m sections were excavated at a time to ensure the following sequence of
 events could be completed in a single tide window;
- After the down slope rip-rap embankment was excavated to the desired depth, surface layers were placed on the ground surface in the following order: OBB, geogrid, and filter fabric; and
- After inserting the surface layers, rip-rap was then placed at a general 2:1 slope throughout the entire FPTS
 (both east and west) from the most up gradient extent of the CPR embankment (where surface layers were laid)
 to the down slope portion of the rip-rap embankment.

8.1.5.2 Downslope Cobble Matting

- The Site was then excavated out in 10 to 20 m length sections approximately 0.4 m deep, followed by the
 placement of OBB, geogrid, and filter fabric with cobbles placed above to anchor the materials in (refer to photo
 9 in Appendix D); and
- Excavated beach sand from the down slope rip-rap and cobble surface preparation was spread over the cobble mat and rip-rap.

¹ The approved mouldable double sided sealant tape did not contain volatile organic compounds.

8.2 **Drilling Activities and Monitoring Well Installations**

A summary table of well installation details is provided in Table 1 and the borehole logs are provided as Appendix E. All 33 monitoring wells were installed using 50 millimeter (mm) diameter Schedule 40 PVC pipe casing with either PVC or stainless steel screens. The connections between the PVC and the stainless steel screens was completed with threaded joints and/or couplers connecting the PVC piping. Twenty (20) of 33 wells were installed using PVC 0.25 mm slot screen size and 20/40² filter sand. The remaining eight Performance Wells (within the treatment cells) and five of the nine down slope Compliance Wells were installed using stainless steel pre-packed screens pipe 0.25 mm screens prepacked with 20/40 filter sand. See borehole logs provided as Appendix E and Table 1.

The 16 - 4" French drains and eight Performance Wells in the treatment cells were installed during excavation activities, in which the eight Performance Wells were set into place prior to backfilling the cells with an excavator. All 25 remaining wells (8 Up Gradient, 8 Sentry, and 9 Compliance) were installed post trench construction using a Bobcat mounted with a 1 m length solid stem 8" diameter auger bit.

With the exception of the eight Performance Wells installed within the treatment cells (backfilled with sand and AG+OC or AG+PAC mixtures, refer to borehole logs provided as Appendix E), and the five Compliance Wells installed using stainless steel, the annulus of the remaining wells were backfilled in the following sequence:

- Silica sand filter pack placed approximately 0.5 0.15 m above and below the screened interval (the degree of sloughing reflected the amount of sand pack placed above and below the screen);
- A bentonite seal at least 0.3 m in thickness placed above the filter pack to hydraulically isolate the screened interval;
- When specified in IFCs, a 150 mm layer of gravel was placed on top of the bentonite seal to support the concrete protectors; and,
- Monitoring wells were completed with J-plugs and enclosed by a custom made concrete protector casing provided by Langley Concrete; eight concrete protectors and six original concrete protectors were extended (variance from the IFCs).

Generally, wells were screened between 0.45 and 1.2 m bgs with a 0.3 m length screened interval and in some instances a 0.36 m length screen (stainless steel prepacked screens). Details are as follows and presented in the MMP contained in Appendix K:

- The four Performance Wells (PW17-5, PW17-17, PW17-22, and PW17-27) located in the up slope treatment cell were installed at 1.0 m bgs and screened from 0.64 to 1.0 m bgs, whereas the four Performance Wells (PW17-6, PW17-18, PW17-23, and PW17-28) located in the down slope treatment cells were installed at 1.2 m bgs and screened from 0.84 to 1.2 m bgs; and
- Four Up Gradient Wells (PW17-4, PW17-16, PW17-21, and PW17-26) were installed following completion of the above ground up gradient components. These wells were installed to 0.8 m bgs and screened from 0.45 - 0.75 m bgs:

The remainder of the 21 Up Gradient, Sentry and Compliance Wells were installed after all the above ground components were completed. In order to properly anchor the concrete protectors in place (0.75 m height), a 0.4 m deep trench was excavated into the surface. Generally, these locations were drilled to 1.4 m bgs and screened from 0.85 - 1.15 m bgs.

All concrete protectors surrounding the monitoring wells were either filled in with concrete grout, gravel, and/or native beach sand.

8.3 **Environmental Monitoring**

Prior to vegetation trimming and construction, AECOM completed three Site inspections on May 3, June 30 and July 7, 2017 to identify potential bird nests, rare or endangered plants or wildlife, in proximity of the construction. Bird nests, rare endangered plants and wildlife were not identified during the three inspections.

² 20/40 Sand passes a #20 sieve but is captured on a #40 sieve. The sand has a nominal diameter between 0.42 and 0.84 mm.

During the course of the project, AECOM was responsible for enforcing all requirements of the CEMP and VFPA Project Permit No: 16-180. One of the key requirements of Project Permit No: 16-180, was the continuous monitoring of surface water field parameters (including temperature, pH, conductivity, and turbidity) both inside and outside the construction zone. At a minimum, AECOM measured these water quality parameters three times a day.

The weekly VFPA reports and environmental monitoring data are presented in Appendix F. Water quality parameters were generally stable throughout the course of the project with the occasional turbidity and temperature reading exceeding the applicable BC Approved Water Quality Guidelines (WQG). Any time a water quality parameter fell outside the desired range (i.e. turbidity), the crew was informed and mitigative measures were immediately implemented, when feasible. During construction, there were approximately 91 turbidity measurements, 33 temperature measurements, and five pH measurements, which were outside the desired ranges. Generally, elevated turbidity measurements were the result of anthropogenic sources outside the footprint of the FPTS construction zone (i.e. large waves from passing watercrafts). When this was the case, a follow up turbidity reading was collected to show that turbidity had decreased since the last measurement. Generally, mitigative measures consisted of minimizing unnecessary heavy duty equipment traffic, ensuring all equipment was operating as far away from the tide line as possible, and ensuring the barge was secured and not prone to shifting. Temperature and pH measurements outside the desired ranges were likely attributed to natural variations associated with the tide.

As the FPTS construction area is situated near a known archeological site (DhRr-0230) and per conditions 23 and 24 of VFPA Permit No: 16-180, a qualified archeologist and cultural monitor from Inlailawatash (a company of the Tsleil-Waututh Nation) were onsite during ground disturbance activities into native soils. During the course of the project, no cultural artifacts were identified.

AECOM submitted weekly update reports to the VFPA outlining all construction activities, volumes of soil and groundwater removed offsite, water quality data, environmental incidents, and any other notable activities. No environmental incidents occurred during the course of the project.

8.4 Field Changes Made To the Work Plan

Generally, the proposed work plan was carried out in the field as planned, with a few notable exceptions:

- Based on field observations and concentrations of LEPH detected in sediment samples (WSA-2 and WSA-3) collected from the south wall of the Western IRA Barrier excavation, a FPTS was constructed and installed in the WSA:
- Prior to receiving authorization to complete the FPTS in the WSA, the excavation was temporarily backfilled with native soil which was then disposed of once construction activities began;
- Due to the extended field program, an amendment was made to VFPA Permit No: 16-180 (provided as Appendix C) which authorized night work from Monday to Saturday, 12:00am - 7:00am. This working window was utilized to successfully complete the program; and
- Due to the sequence of excavation activities, there were circumstances when the excavation had to be temporarily infilled with supersacs of clean gravel.

9. **Field Observations**

Notable field observations recorded during construction are summarized below:

During the removal of the Eastern and Western IRA Barriers, as expected, the majority of the excavated sandorganoclay contained staining and/or hydrocarbon odours to varying degrees (based on the location within the Barriers) indicating the effectiveness of the IRA Barriers in trapping petroleum hydrocarbons. If staining was observed at the limits of either of the two excavations, the excavator operator was instructed to scrape away additional materials to achieve clean limits except along the southern sidewalls to preserve the integrity of the CPR ROW;

- Hydrocarbon sheens were not observed in Burrard Inlet during construction activities;
- During the installation of monitoring well PW17-14, an oily film was observed in water seeping out of the upper surface at approximately 0.3 m bgs; and
- NAPL was not observed during the IRA demolition, limit sampling or FPTS construction.

10. **Analytical Results**

From July 4 to October 2, 2017, 106 sediment samples (including five duplicates) were collected during the construction of the FPTS. Sediment samples were analyzed for BTEX/VPH, LEPH/HEPH, EPH(C10-C19)/EPH(C19-C32), PAHs, MTBE, and metals. Two samples were also collected for EPH(C10-C19)/EPH(C19-C32) with silica gel cleanup. All sediment analytical results are provided in Tables 2 through 4 and limit sample locations are presented in Figures 3 and 4. Copies of the 2017 analytical laboratory reports are provided in Appendix H.

Results of the sediment analytical data are discussed below.

10.1 **Sediment Analytical Results**

10.1.1 **Eastern IRA Barrier – Limit Samples**

Concentrations of petroleum hydrocarbons (PHCs), PAHs, and metals in sediment limit samples collected from the Eastern IRA Barrier were either below the reported detection limits (RDL) or the applicable standard in 31 of 36 samples. The remaining five samples (ESA-9, ESA-13, ESA-23, ESA-29 and ESA-30) collected from the base or southern wall contained concentrations of 2-methylnaphthalene and/or naphthalene above their applicable standards. The five samples containing 2 methylnaphthalene had concentrations slightly above the applicable standards, and within the same order of magnitude as the standards. The one elevated naphthalene sample (ESA-9) was collected from 1 m below ground surface, and contained a concentration (0.377 µg/L) slightly above the SedSSS standard applicable to the EAZ, but below the SedSTS standard.

10.1.2 Eastern IRA Barrier – Disposal Samples

Concentrations of PHCs, PAHs, and metals in sediment samples collected during the removal of the Eastern IRA Barrier were either below the RDL or the applicable standard in 25 of 31 samples. The remaining six samples (EIRA-6, EIRA-15, EIRA-16, EIRA-25, DUP-5, and EIRA-26) contained concentrations of EPH(C10-C19)/EPH(C19-C32), LEPH/HEPH, VPH, benzene, ethylbenzene, toluene, xylenes and/or PAH constituents (fluorene, 2methylnaphthalene, naphthalene, phenanthrene, and/or pyrene) above their applicable standards. All materials represented by these samples were removed from Site and disposed of in accordance with applicable regulatory requirements.

10.1.3 Western IRA Barrier – Limit Samples

Concentrations of PHCs, PAHs, and metals in sediment limit samples collected from the Western IRA Barrier were either below the RDL or the applicable standard in 15 of 17 samples. The remaining two samples (WSA-2 and WSA-3) collected from the southern wall contained concentrations of EPH(C10-C19) both with and without silica gel cleanup³ and LEPH, above but within an order of magnitude of their applicable standards.

10.1.4 Western IRA Barrier – Disposal Samples

Concentrations of PHCs, PAHs, and metals in sediment samples collected during the removal of the Western IRA Barrier were either below the RDL or the applicable standard in all three samples collected. All materials represented

Project number: 60542455

³ The with and without silica gel cleanup EPH_(C10-C19) concentrations were not significantly different in these two samples.

by these samples were removed from Site and disposed of in accordance in accordance with applicable regulatory requirements.

10.1.5 Up Gradient Sediment Samples

Concentrations of PHCs, PAHs, and metals in sediment samples collected during the installation of the four Up Gradient Wells (PW17-4, PW17-16, PW17-21 and PW17-26) were either below the RDL or the applicable standards in all five samples collected from the four locations.

10.1.6 Backfill Sediment Samples

Concentrations of PHCs, PAHs, and metals in samples of backfill material were either below the RDL or the applicable standards in all 14 samples collected.

11. Offsite Disposal of Materials

11.1 Sediment

During the FPTS construction, all sediment and demolition refuse were contained in Tervita provided supersacs and disposed of offsite at Tervita's Richmond Bioremediation facility. Sediment, once it is taken offsite for treatment and/or disposal is considered soil. Copies of the manifests are provided in Appendix I and Table A below summarizes quantities of materials disposed of offsite.

Table A - Materials Disposed Offsite

| Material Type | Waste Class1 | Weight (Tonnes) | |
|-------------------|----------------|-----------------|--|
| Soil | CL+ | 103 | |
| Soil | RL+ | 367 | |
| Demolition Refuse | Not Applicable | 16 | |

CL+ - Exceeds CSR commercial land use standard

11.2 Groundwater

During the FPTS construction, all water pumped from the excavation was contained in large holding tanks and later disposed of at Tervita's Richmond Bioremediation facility. Copies of the bill of lading are provided in Appendix I. Table B below summarizes quantities of water disposed of offsite.

Table B - Water Disposed Offsite

| Material Type | Waste Class | Quantity (L) | |
|---------------|-----------------------------|--------------|--|
| Groundwater | Groundwater with trace BTEX | 170,000 | |

RL+ - Exceeds CSR residential land use standard

¹ None of the soil disposed offsite was characterized as below residential land use standards.

12. Discussion

12.1 Distribution of Exceedances

An exceedance refers to concentrations of PHCs and/or PAHs that were greater than applicable standards. The following samples contained exceedances which are discussed below:

Two limit samples (WSA-2 and WSA-3) from the southern wall of the excavation of the Western IRA Barrier and five limit samples (ESA-9, ESA-13, ESA-23, ESA-29, and ESA-30) from the base and southern wall of the excavation of the Eastern IRA Barrier contained concentrations of PHCs or PAHs above the applicable standards. These samples were either located on the base or southern sidewalls of the excavations and due to their close proximity to the CPR Zone of Potential Training Loading (ZPTL), over excavation was not feasible due to safety and slope stability concerns. Any migration of these impacts is anticipated to be intercepted by the FPTS since the impacts are up gradient or below the treatment cells. The five samples containing 2 methylnaphthalene, and the one of these containing naphthalene, had concentrations slightly above the applicable standards, and within the same order of magnitude as the standards.

Six sediment disposal samples collected from within the Eastern IRA Barrier contained concentrations of PHCs and/or PAHs above the applicable standards. Elevated concentrations within the Eastern IRA Barrier are not unexpected as the barrier was designed to trap NAPL within the sand-organoclay.

All backfill samples were below applicable standards.

12.2 Variations from Issued-For-Construction Drawings

During the construction of the FPTS, there were construction variations to the project that had to deviate from the IFC drawings. The deviations were proposed by Tervita and approved by AECOM, prior to implementation in the field. These changes were generally the result of adapting to dynamic and challenging field conditions, and the use of alterative approved materials. The final record drawings including any red line markups (discussed below in Table C) were provided by Tervita which are included in Appendix G. The variations from the IFC drawings are summarized below in Table C.

Table C -Variations from IFC

| Design Component | Comments |
|---|--|
| Alternative material - Oleophilic Biobarrier (OBB) | While constructing the down slope cobble mat, Tervita experienced a shortage of the Tendrain II Oleophilic Biobarrier material (GSE Tendrain 7.6mm Geocomposite). Because of the extended lead time required to order more of this material, an alternative similar material was sourced (Skaps Transnet HDPE Geocomposite with TN 330 Geonet) and used on portions of the down slope cobble matting in both the east and west systems. See Drawing G-C-102. |
| Cobble matting design change | Due to shortages of the alternative OBB material, the cobble matting did not extend as far out from both FPTS's on the eastern and western edges. Rather than curve with the shape of the rip-rap (as shown on the IFC drawings), dimensions of the cobble matting was more rectangular in shape. See Drawing G-C-101. |
| Infilling of monitoring wells | IFC drawings indicated that all of the monitoring wells were to be infilled with non-shrink grout. Due to the excessive time involved with mixing and pouring the grout (during limited tidal windows), many of the monitoring wells (Compliance, Sentry, Performance and Up gradient) had their concrete protectors infilled with gravel, native beach sand, and/or cobbles to supplement the non-shrink grout. See Drawing G-C-401. |

| Design Component | Comments | | |
|---|--|--|--|
| Alternative screens - Compliance wells | Due to the tidal windows not dropping low enough during the installation of several of the Compliance Wells, five of the down slope Compliance Wells (PW17-8, PW17-11, PW17-15, PW17-20, and PW17-30) were installed using stainless steel wrapped screens prepacked with 20/40 filter sand, rather than the standard 2" Sch 40 PVC - 10 slot screens. During drilling, these boreholes had sloughing and infilling with water; the use of prepacked screens ensured the screen would have a sand pack surrounding it. | | |
| Alternative design for concrete protectors | Several concrete protectors were fabricated at the wrong total height when considering the final elevation of the rip-rap slope. Because of the extended lead time required to manufacture new custom protectors (18 days) Tervita completed two alternate designs consisting of: 1) Encapsulating the existing casings in a concrete basin from Langley concrete with a diameter of at least 762mm (Detail E, Drawing G-C-402) or 2) an extended casing with a concrete saddle for support (Detail F, Drawing G-C-402). The high density polyethylene (HDPE) well casings (2" monitoring wells and 4" French drains) were then extended to the top of the new basin | | |
| Concrete protector lids | Due to the design changes of the concrete protectors, the larger diameter sewer type lids were retrofitted with rope handles to allow safe lifting of these lids. See Drawing G-C-402. | | |
| Alternative moldable sealant for geomembrane | The Splash Zone (specified in the IFC) cured into a hard material, while the geomembrane remained flexible. The difference in elasticity created the concern that the Splash Zone would separate from the geomembrane. As a result, the Splash Zone epoxy was substituted with Tapecoat Moldable Sealant - M50RC Black double sized tape. See Drawing G-C-301. | | |
| Height of rip-rap | The height of the rip-rap around the down slope Performance Well concrete protectors was changed from 1.4 m to 1.2 m to reflect variation between the elevations shown in the construction drawings and true field conditions. See Drawing G-C-301. | | |
| Gravel placement on top of the filter fabric on the sloped CPR embankment | In order to achieve the 150 mm gravel layer, additional AG/OC was applied to build up the slope and lower the slope angle. A "stepped" approach was also applied to hold the gravel in place better. | | |
| Alternative baffle design | Plywood was used to brace the HDPE baffles during installation, but was removed prior to completion of the trenches. | | |
| Monitoring wells depth installation. | Many of the monitoring wells were installed and screened at a slightly deeper depth than the IFC drawings. The IFC showed a concrete protector with a height of approximately 0.3 m whereas the actual size was 0.75 m. As a result, a small trench was dug prior to drilling to allow the concrete protector to be properly secured (resulting in a deeper installation to true grade). See Detail 6 on Drawing C-401. | | |

12.3 Status of the Foreshore Passive Treatment System

Construction of the FPTS was completed on October 30, 2017 and the system has been in operation since this day. Since completion, NAPL has not been detected in any of the monitoring wells during well development and monitoring completed in November 2017. Post-construction monitoring will continue to assess the performance of the FPTS.

13. Quality Assurance/Quality Control

In order to assure the integrity and reliability of the data collected, rigorous quality assurance/quality control (QA/QC) protocols were observed. The results of the laboratory analyses were considered to be of good quality and

acceptable for the purposes of this investigation.QA/QC protocols used by AECOM in undertaking the staged investigation and remediation of the Site are presented in Appendix J.

13.1 Precision

Relative percent differences (RPD) are presented with duplicate samples for PHCs, PAHs, and metals in sediment samples in Tables 2, 3, and 4. For evaluating precision, RPDs were only calculated if the duplicate and parent samples had concentrations greater than five times the RDL for the conducted analyses. Throughout the FPTS construction, five samples were duplicated - resulting in 66 calculated RPDs.

The BC Environmental Lab Manual (BCELM) provides data quality objectives for recommended laboratory duplicate RPDs⁴. The ENV has provided guidance indicating that field RPDs within 1.5 times the laboratory RPDs as defined in the BCELM are acceptable⁵. Volatile organics (BTEX/VPH), EPH, and PAHs in sediment therefore have acceptable laboratory RPDs of 60%, 60% and 75%, respectively. Metals in sediment have acceptable RPDs of 60% for high variability metals and 45% for all other metals. Of the 66 RPDs, 65 were within the acceptable range for RPD values. The one RPD that fell outside the acceptable range came from ethylbenzene in sample EIRA-25 (and its corresponding duplicate, DUP-5) which was collected at 0.5 m bgs. This elevated RPD value was likely due to the "nugget" effect and aside from this one sample, sediment RPD ranges indicate good to moderate correlation.

The average, median, maximum and minimum RPDs of the field duplicates are presented in Table D:

Table D - Relative Percent Differences (%) of Duplicate Analyses

| Sample Type | Average RPD (%) | Median RPD (%) | Maximum RPD (%) | Minimum RPD (%) |
|-------------------------------|-----------------|----------------|-----------------|-----------------|
| | | | | |
| Sediment and Backfill Samples | 13.7 | 8.8 | 63.5 | 0.4 |

As 98% of the RPDs were within the acceptable RPD range and given the low average and median RPD values, the analytical results are considered acceptable and do not add uncertainty to the findings of the field program. It is AECOM's opinion that the analytical results are valid with respect to precision.

13.2 Accuracy

Analytical accuracy was confirmed in a review of percent recoveries reported in the laboratory reports. Percent recoveries are obtained when the project laboratory analyzes samples with known concentrations and compares their analytical results to the known concentrations. The laboratory provided percent recoveries for the majority of the organic parameter analyses. The reported laboratory control spike (LCS) sample recoveries and matrix control spike (MS) sample recoveries for parameters with CSR standards were within laboratory QC limits.

It is AECOM's opinion that the analytical results are valid with respect to accuracy.

13.3 Completeness

No samples were invalidated by ALS. Completeness for all samples collected for this project was 100%.

13.4 QA/QC Mixing Assessment

Prior to backfilling the FPTS trenches with the premixed materials, a QA/QC sieve analysis (ASTM E-11 Standard – Sieve No.8) was implemented to verify that Tervita was appropriately mixing the materials consistent with the RAP and IFC drawings. The backfill materials in the up slope treatment cells were designed to consist of a mixture of 75%

http://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/contaminated-sites/cs_q-a.pdf

⁴ British Columbia Environmental Laboratory Manual (2015)

https://www2.gov.bc.ca/assets/gov/environment/research-monitoring-and-reporting/monitoring/emre/lab-manual/section-a.pdf
⁵ Question #36 from the ENV Questions and Answers webpage accessed November 25, 2017.

Lafarge washed sand and 25% AG+OC. The backfill materials in the down slope treatment cells were designed to consist of a mixture of 75% Lafarge washed sand and 25% AG+PAC.

As the sand and AG/OC and AG/PAC mixtures were being placed in one cubic meter supersacs to store and transport the backfill materials to the Site, representative samples were collected from the top, middle, and bottom of the supersacs.

Prior to sieve analysis, materials were transferred to a bucket to determine the total weight. Once the sieve analysis was completed (fines and coarse materials separated), the percentage of fine materials were calculated. Overall, the average weight of fine materials (sand) was within the acceptable criteria for both types of premixed sand. The average fines weight (%) for the sand mixed with AG/OC was 68.% (acceptable criteria: 64 - 71 %), whereas the average fines weight (%) for the sand mixed with AG/PAC was 63.9% (acceptable criteria: 59 - 68.7 %). If the batches were outside the acceptable criteria, Tervita was then requested to mix in more or less sand to ensure the batches were within the acceptable criteria prior to using onsite. Results of the sieve analysis are summarized in further detail in Appendix J.

14. Post Construction Monitoring

As per condition #42 of VFPA Permit No: 16-180, a Post-Construction Monitoring and Maintenance Plan (MMP) has been prepared (Appendix K).

The objectives of the MMP are to:

- Collect samples from, and present the data for, the Compliance Wells;
- Assess the presence/absence of NAPL and the concentrations of dissolved phase contaminants of concern (COCs) in the water, at the Site;
- Assess the performance of the remedial treatment cells and OBB surface layer installed in 2017; and,
- Maintain the integrity of the FPTS by checking and, where needed, replacing the protective rip-rap, cobbles and monitoring wells, and by managing vegetation as required.

The complete MMP Plan is provided in Appendix K.

15. Summary

This 2017 FPTS Construction Report summarizes activities conducted July 10 through October 30, 2017 along the Foreshore. The objectives of the construction were as follows:

- Excavation and removal of the existing Eastern and Western IRA Barriers as well as any additional impacted sediment identified during construction activities;
- Installation of a FPTS in the ESA;
- Evaluation of the WSA and, if found to be impacted, installation of an FPTS; and
- Completion of an effective and timely installation that can withstand extreme tidal fluctuations and winter storms

As indicated in the Introduction, and Section 3, one of the objectives of this report is to meet several conditions in the VFPA Permit 16-180 (Appendix C). Portions of this comprehensive post-construction report meeting or contributing to various conditions are as follows:

- Condition 40, Record Drawings Appendix G
- Condition 41, Photos and Survey Plan Appendix D, Appendix G

- Condition 42, A comprehensive report that includes:
 - Information about Contamination onsite Sections 9.1.1, 9.1.3, and 11.1, Tables 2 and 3, and Figures 3 and 4.
 - Summary of Environmental Monitoring Section 7.3, Appendix F
 - Copies of all manifests Section 10, Appendix I
 - A Post-Construction Monitoring Plan Section 13, Appendix K.

•

The project was executed by prime contractor, Tervita, in which AECOM field personnel completed environmental monitoring and general field oversight. With a few exceptions, all components of the FPTS were installed consistent with the IFC drawings.

All requirements laid out in the CEMP were followed in addition to all field personnel being aware of and adhering to all conditions in VFPA Project Permit No: 16-180.

A total of 106 sediment samples (including limit, backfill and up gradient) were collected during the installation of the FPTS. Sediment samples were analyzed for BTEX/VPH, LEPH/HEPH, EPH(C10-C19)/EPH(C19-C32) and metals. Seven limit samples contained concentration of PHCs or PAHs greater than the applicable standards; however, due to their close proximity to the CPR ZPTL, over excavation to achieve clean limits was not feasible due to safety and slope stability concerns. Any migration of these impacts is anticipated to be intercepted by the FPTS.

As a result of the introduction of the Stage 11 Amendment to the CSR, 2-methylnaphthalene is considered a PCOC in sediment at the Site. However, it should be noted that 2-methylnaphthalene is not considered a PCOC in porewater or surface water at the Site, as there is no applicable CSR standard for porewater nor a Working or Approved BC Water Quality Guideline for surface water for this constituent.

All excavated soil, pumped water, and demolition refuse were contained and disposed of offsite at Tervita's Richmond Bioremediation facility. Total quantities of materials disposed of offsite are as follows:

- Soil 103 tonnes of CL+;
- Soil 367 tonnes of RL+;
- Demolition refuse 17 tonnes; and
- Groundwater; 170,000 litres.

As per condition #42 of VFPA Permit No: 16-180, an MMP has been prepared which sets out follow up monthly, quarterly, and annual sampling events in addition to maintenance activities. See Appendix K. Since completion of the FPTS, the MMP has been and will continue to be implemented in the field.

16. Report Use and Limitations

The findings and conclusions documented in this report have been prepared for specific application to this project and have been developed in a manner consistent with that level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area, and in accordance with AECOM's standard terms and conditions. No other warranty, expressed or implied, is made. This report is for the exclusive use of Parkland Refining (B.C.) Ltd., VFPA and ENV who may rely upon this report. This report has been prepared in accordance with ENV CSR (2017).

Testing conducted on the Site was in locations and for parameters consistent with the identified contamination for the subject property uses. Furthermore, the sampling was of sufficient quantity and location to provide adequate spatial coverage. However, as conditions between sampling locations may vary, a potential always remains for the presence of unknown, unidentified, or unforeseen surface and subsurface contamination. Further evidence against such

potential Site contamination would require additional surface and subsurface exploration and chemical analytical testing.

Conclusions and recommendations in this report are based on comparison of chemical analytical results to the ENV CSR (2017). In the event these standards are changed, new standards are introduced, or new information is developed in future Site work, AECOM should be contacted to re-evaluate the conclusions of this report, and to provide amendments as required.

AECOM's objective is to perform our work with care, exercising the customary thoroughness and competence of earth science, environmental, and engineering consulting professionals, in accordance with the standard for professional services at the time and location those services are rendered. It is important to recognize that even the most comprehensive scope of services may fail to detect environmental liability on a particular site. Therefore, AECOM cannot act as insurers and cannot "certify" or "underwrite" that a site is free of environmental contamination, and no expressed or implied representation or warranty is included or intended in our reports, except that our work was performed, within the limits prescribed by our client, with the customary thoroughness and competence of our profession.

17. Disclaimers

In the event that this report is provided in electronic format, AECOM is not responsible for uses of the data outside of or beyond the scope of our original agreement with our client. Our paper report represents our official work product. Also, because data stored on electronic media or transmitted by electronic means can deteriorate undetected or be modified without AECOM's knowledge, AECOM is not liable for the compatibility, completeness or correctness of the data.

18. Professional Statement

All information compiled for this document has been prepared in accordance with all requirements of the Environmental Management Act and its Regulations.

AECOM certifies that the persons signing this document have demonstrable experience in the assessment and remediation of industrial sites. The work has been performed by AECOM personnel under the guidance and supervision of the signatories below.

We trust this report meets your current requirements and clarifies the current status of the Site. If you have any questions or would like to discuss the project, please do not hesitate to call the undersigned at 604.444.6400 if you have any questions.

Statement of Qualifications and Limitations

The attached Report (the "Report") has been prepared by AECOM Canada Ltd. ("AECOM") for the benefit of the Client (Parkland Refining (B.C.) Ltd.) in accordance with the agreement between AECOM and Client, including the scope of work detailed therein (the "Agreement").

The information, data, recommendations and conclusions contained in the Report (collectively, the "Information"):

- is subject to the scope, schedule, and and the qualifications contained in the Report (the "Limitations");
- represents AECOM's professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
- may be based on information provided to AECOM which has not been ind ependently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;

- must be read as a whole and sections thereof should not be read out of such context;
- was prepared for the specific purposes described in the Report and the Agreement; and
- in the case of subsurface, environmental or geotechnical conditions, may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time.

AECOM shall be entitled to rely upon the accuracy and completeness of information that was provided to it and has no obligation to update such information. AECOM accepts no responsibility for any events or circumstances that may have occurred since the date on which the Report was prepared and, in the case of subsurface, environmental or geotechnical conditions, is not responsible for any variability in such conditions, geographically or over time.

AECOM agrees that the Report represents its professional judgement as described above and that the Information has been prepared for the specific purpose and use described in the Report and the Agreement, but AECOM makes no other representations, or any guarantees or warranties whatsoever, whether express or implied, with respect to the Report, the Information or any part thereof.

Except (1) as agreed to in writing by AECOM and Client; (2) as required bylaw; or (3) to the extent used by governmental reviewing agencies for the purpose of obtaining permits or approvals, the Report and the Information may be used and relied upon only by Client.

AECOM accepts no responsibility, and denies any liability whatsoever, to parties other than Client who may obtain access to the Report or the Information for any injury, loss or damage suffered by such parties arising from their use of, reliance upon, or decisions or actions based on the Report or any of the Information ("improper use of the Report"), except to the extent those parties have obtained the prior written consent of AECOM to use and rely upon the Report and the Information. Any injury, loss or damages arising from improper use of the Report shall be borne by the party making such use.

This Statement of Qualifications and Limitations is attached to and forms part of the Report and any use of the Report is subject to the terms hereof.

AECOM: 2015-04-13

© 2009-2015 AECOM Canada Ltd. All Rights Reserved.

19. References

AECOM, 2016a. Foreshore 2014 Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia. AECOM, July 13, 2016.

AECOM, 2016b. Foreshore Remedial Action Plan Below Area 2 Eastern Impounding Basin – Chevron Burnaby Refinery, Burnaby, BC. October 27, 2016.

AECOM, 2016c. Proposed Monthly Sampling Plan for select Foreshore Wells in the Vicinity of Monitoring Well P4.2-3D, Chevron Burnaby Refinery, Burnaby, BC. AECOM, December 9, 2016.

AECOM, 2016e. Foreshore 2015 Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia AECOM, December 21, 2016.

AECOM 2017a. Foreshore Final Remedy Construction Environmental Management Plan, Chevron Burnaby Refinery, British Columbia AECOM, June 28, 2017.

AECOM, 2017b. Foreshore 2016 Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia AECOM, September 26, 2017.

BC Environmental Laboratory Manual (BCELM), 2015. Section A, Table 2, Recommended Data Quality Objectives for Laboratory Duplicates. Webpage accessed November 25, 2017.

https://www2.gov.bc.ca/assets/gov/environment/research-monitoring-and-reporting/monitoring/emre/lab-manual/section-a.pdf

BC Ministry of Environment (ENV) 2015. Letter from Lavinia Zanini of the ENV to Christopher Boys of Chevron Re: Ministry Comments Regarding Request to Reduce Monitoring, February 5, 2015.

BC Ministry of Environment (ENV) 2016. Email from Lavinia Zanini of the ENV to Christopher Boys of Chevron Re: Chevron Refinery projects with ENV – response, December 22, 2016.

BC Ministry of Environment (ENV) 2017. Technical Guidance 15, Concentration Limits for the Protection of Aquatic Receiving Environments. Webpage accessed November 29, 2017.

https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/technical-guidance/tg15_2017.pdf

Parkland, 2017. Draft Foreshore Environmental Passive Barrier Installation Request for Proposal. Chevron, February 10, 2017.

SLR 2014. Risk-Based Management Targets, Seep Area Foreshore Down Slope of the East Impounding Basin, Chevron Burnaby Refinery, Burnaby BC. Vancouver, BC: SLR Consulting Canada, February 28, 2014.

SLR, 2016. Human Health and Ecological Risk Assessment of Seep Area Foreshore Down Slope of the East Impounding Basin, Chevron Burnaby Refinery, Burnaby BC. Vancouver, BC: SLR Consulting Canada, May 2016.

Tervita, 2017. Chevron Refinery Foreshore Remediation Project - 2017 Project Execution Plan, Chevron Burnaby Refinery, Tervita, July 5, 2017

URS 2011a. Foreshore Detailed Site Investigation Below Area 2 East Impounding Basin, Chevron Burnaby Refinery, Burnaby BC. URS Canada Inc., September 30, 2011.

URS 2011b. Foreshore Interim Remedial Action, Chevron Burnaby Refinery, Burnaby BC. URS Canada Inc., October 19, 2011.

URS, 2012a. Foreshore Monitoring Plan, Chevron Burnaby Refinery, Burnaby, British Columbia. URS Canada Inc., June 29, 2012.

URS, 2012b. Status Report – Area 2 Eastern Impounding Basin Groundwater Extraction System Chevron Burnaby Refinery, Chevron Canada Limited – Burnaby Refinery, Burnaby BC. URS Canada Inc., March 1, 2012.

URS, 2013a. Status Report Addendum Area 2 Eastern Impounding Basin Perimeter Extraction System Chevron Burnaby Refinery. URS Canada Inc., March 28, 2012

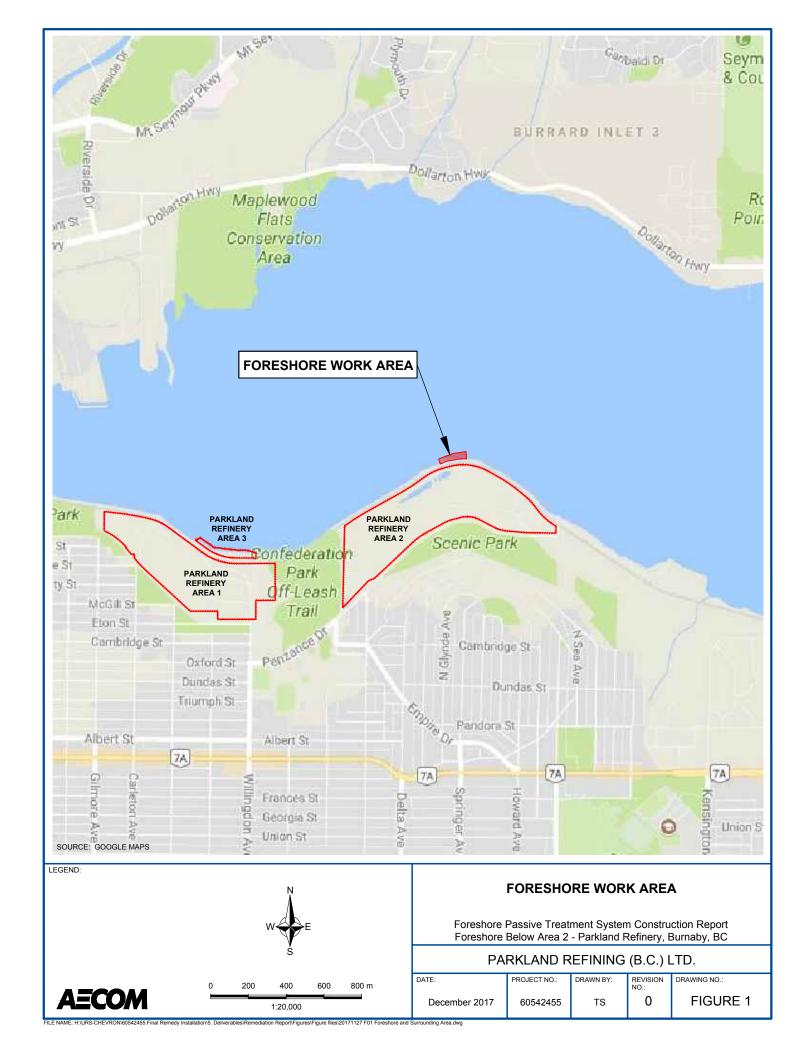
URS, 2013b. Foreshore 2012 First Semi-Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia. URS Canada Inc., December 19, 2012.

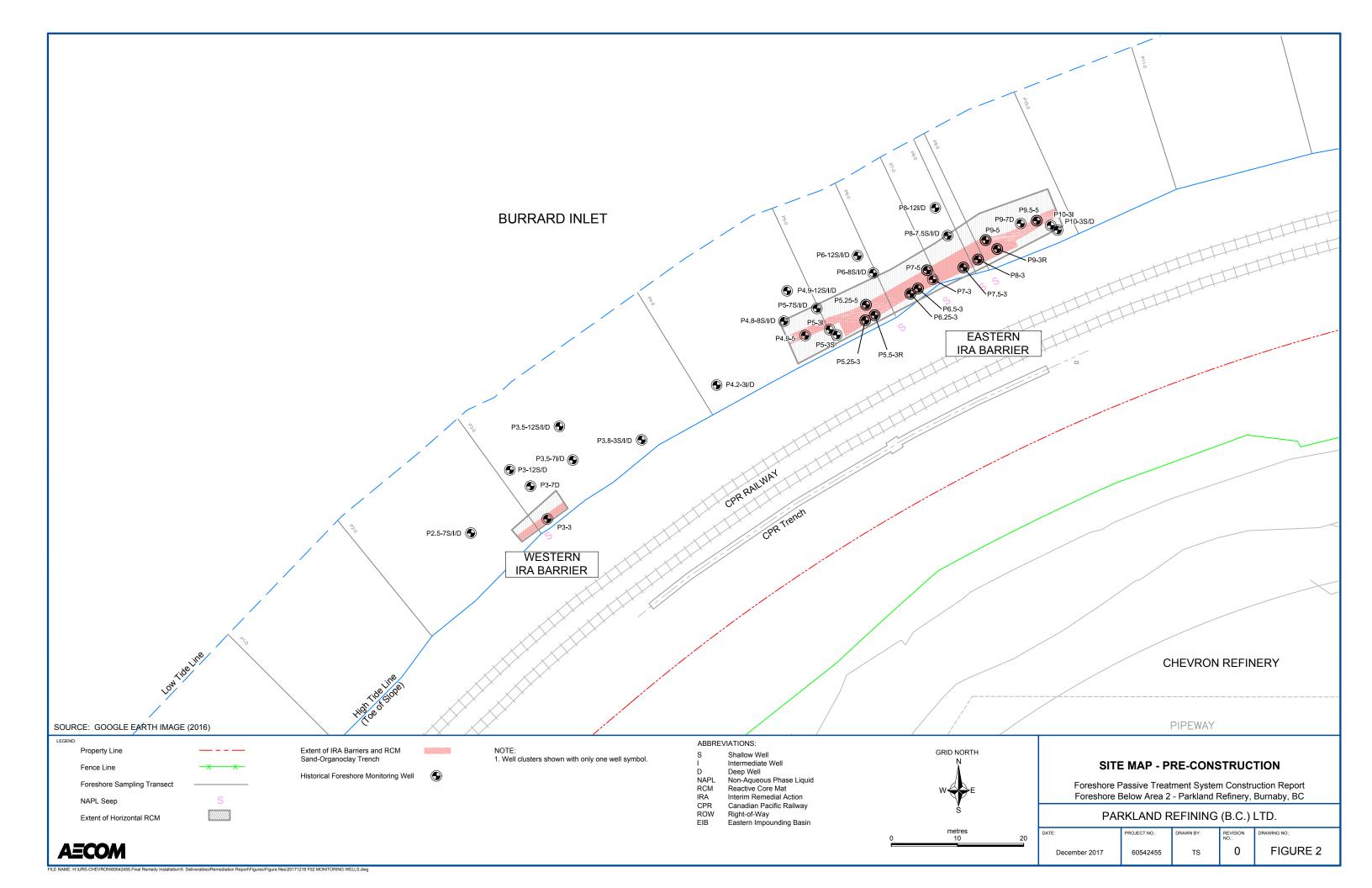
URS, 2013c. Foreshore 2012 Second Semi-Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia. URS Canada Inc., March 26, 2013.

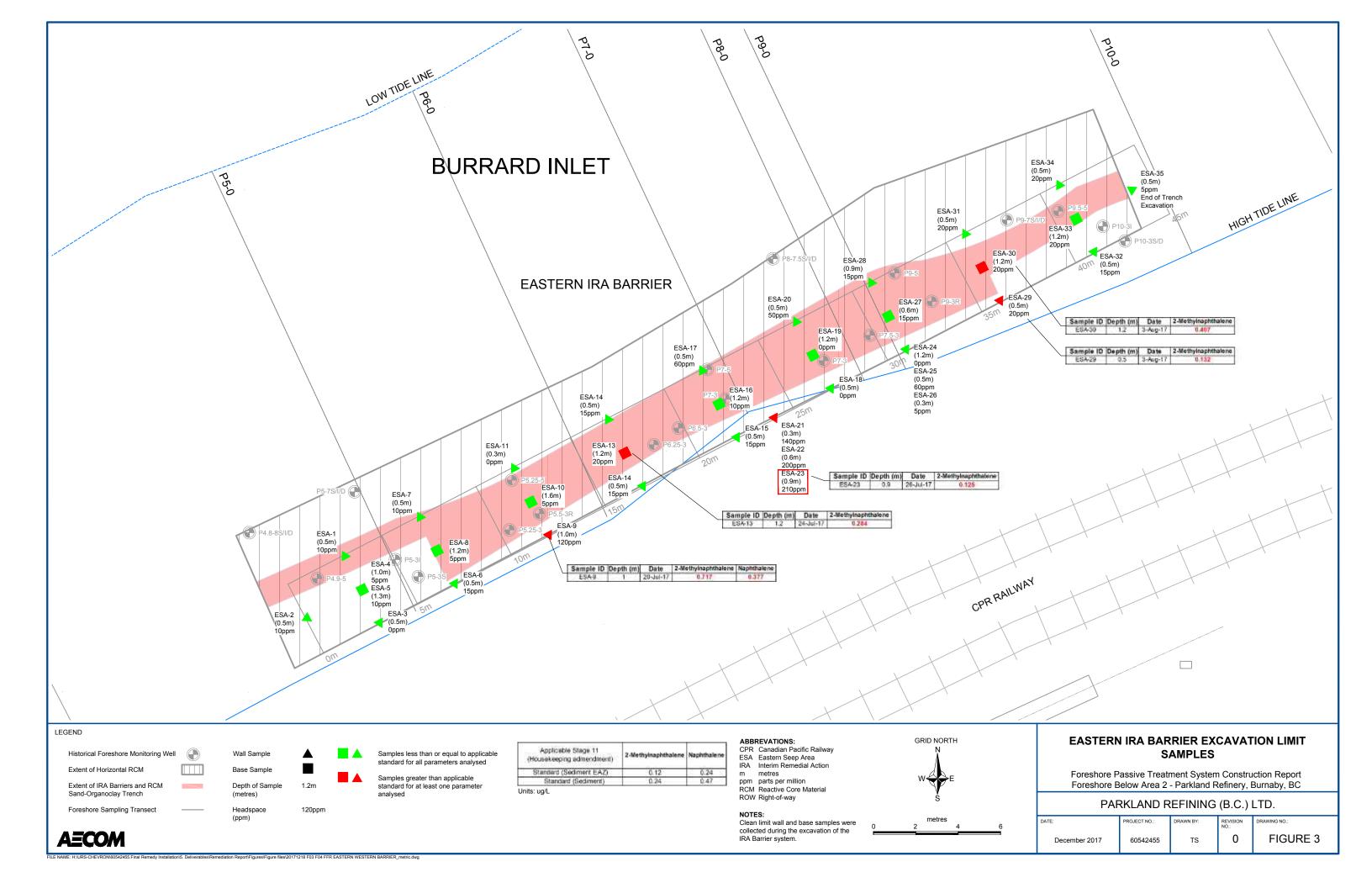
URS, 2014. Foreshore 2013 First Semi-Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia URS Canada Inc., October 30, 2014.

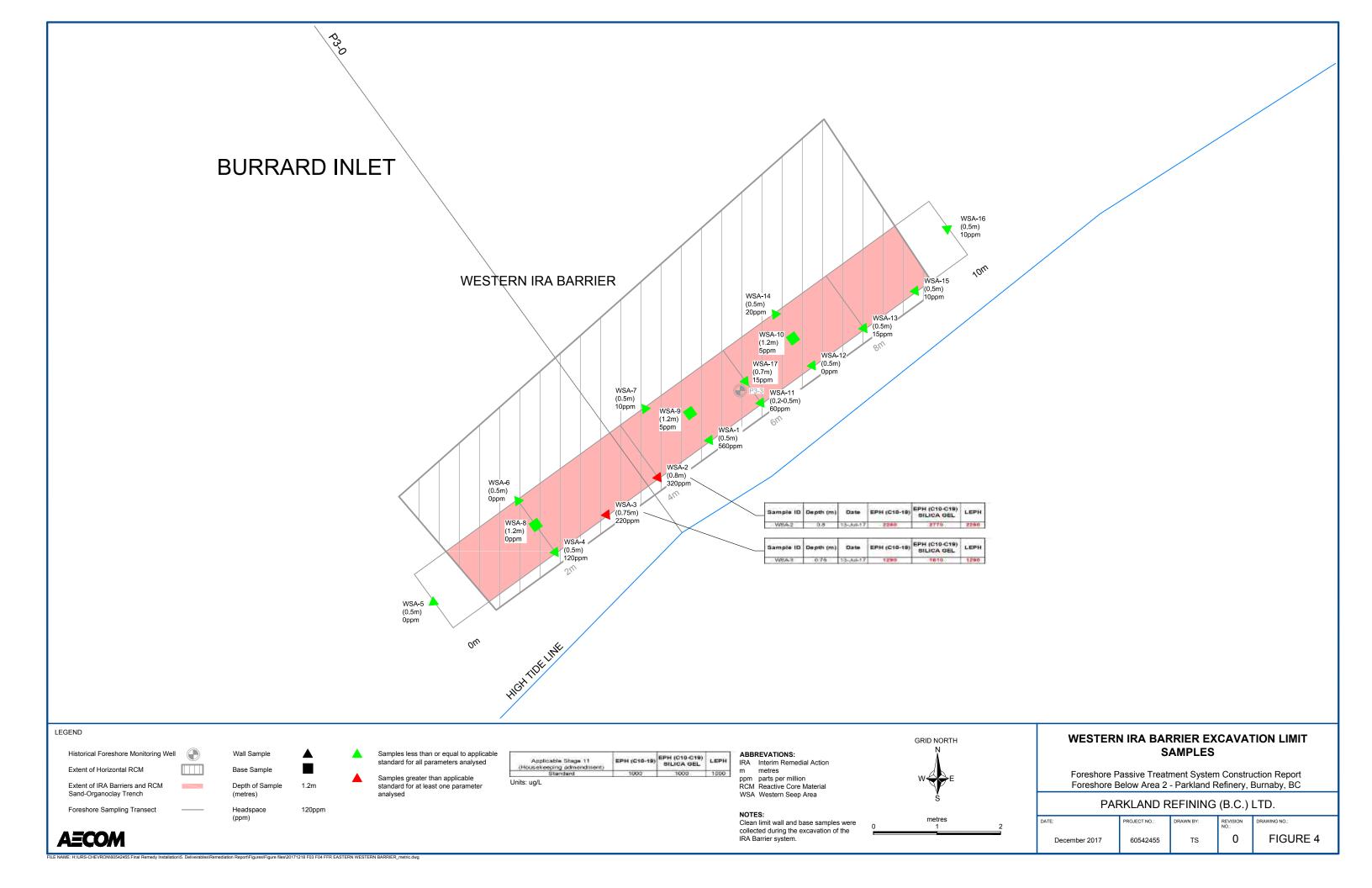
URS, 2015. Foreshore 2013 Second Semi-Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia URS Canada Inc., August 27, 2015.

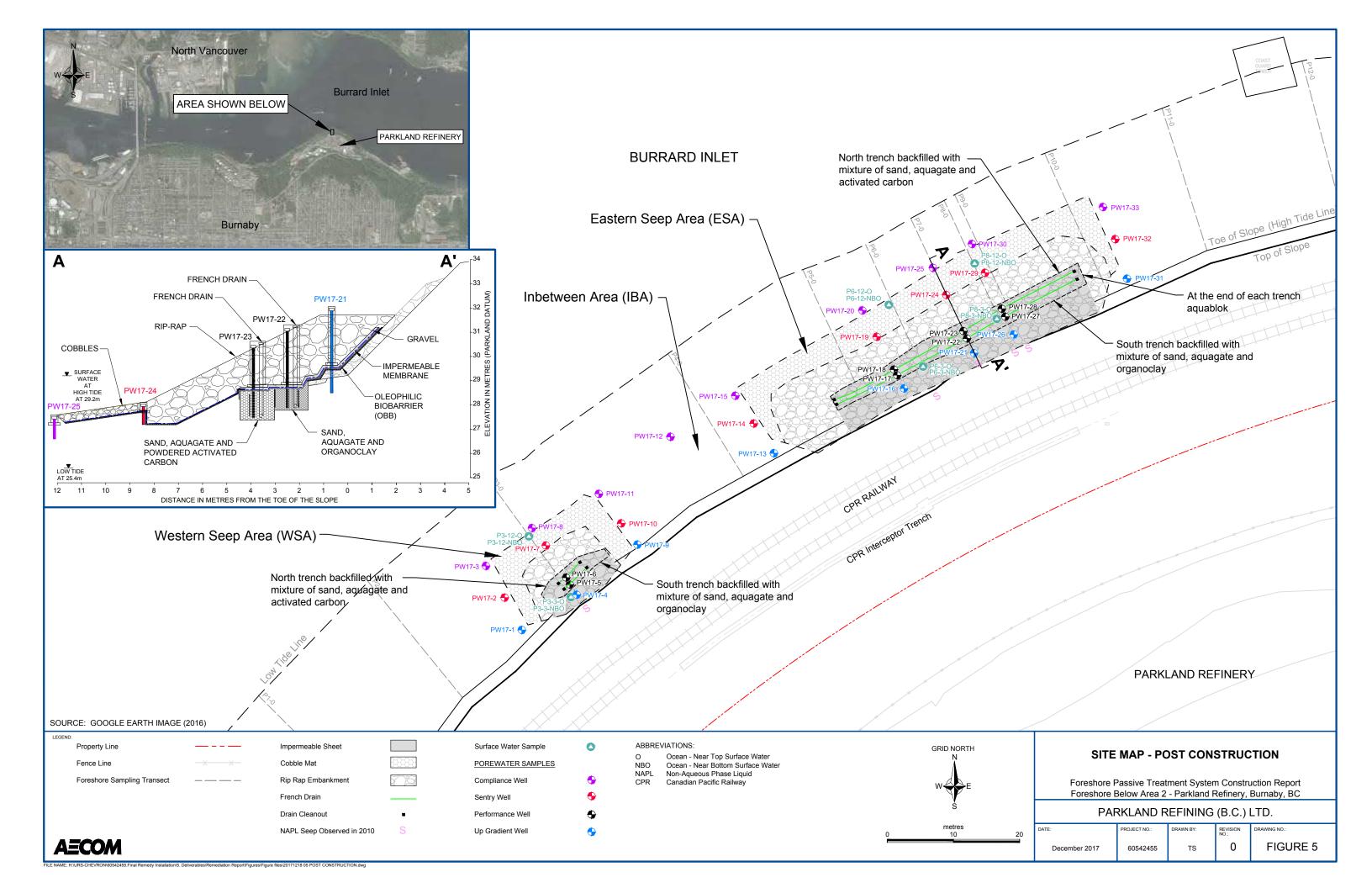
FIGURES











TABLES

TABLE 1 WELL INSTALLATION DETAILS FORESHORE PARKLAND BURNABY REFINERY

| Monitoring Well | Well Type | Total Depth (m bgs) | Top of Well Screen (m bgs) | Bottom of Well Screen (m bgs) | Screen type |
|--------------------|-------------|------------------------|-------------------------------|-------------------------------------|------------------|
| PW17-1 | Up gradient | 1.20 | 0.85 | 1.15 | PVC |
| PW17-2 | Sentry | 1.20 | 0.85 | 1.15 | PVC |
| PW17-3 | Compliance | 1.20 | 0.85 | 1.15 | PVC |
| PW17-4 | Up gradient | 0.80 | 0.45 | 0.75 | PVC |
| PW17-5 | Performance | 1.10 | 0.64 | 1.00 | SS |
| PW17-6 | Performance | 1.30 | 0.84 | 1.20 | SS |
| PW17-7 | Sentry | 1.05 | 0.7 | 1.00 | PVC |
| PW17-8 | Compliance | 1.30 | 0.84 | 1.20 | SS |
| PW17-9 | Up gradient | 1.20 | 0.85 | 1.15 | PVC |
| PW17-10 | Sentry | 1.25 | 0.85 | 1.15 | PVC |
| PW17-11 | Compliance | 1.20 | 0.74 | 1.10 | SS |
| PW17-12 | Compliance | 1.20 | 0.85 | 1.15 | PVC |
| PW17-13 | Up gradient | 1.20 | 0.85 | 1.15 | PVC |
| PW17-14 | Sentry | 1.20 | 0.85 | 1.15 | PVC |
| PW17-15 | Compliance | 1.30 | 0.84 | 1.20 | SS |
| PW17-16 | Up gradient | 0.80 | 0.45 | 0.75 | PVC |
| PW17-17 | Performance | 1.10 | 0.64 | 1.00 | SS |
| PW17-18 | Performance | 1.30 | 0.84 | 1.20 | SS |
| PW17-19 | Sentry | 1.20 | 0.87 | 1.15 | PVC |
| PW17-20 | Compliance | 1.10 | 0.64 | 1.00 | SS |
| PW17-21 | Up gradient | 0.80 | 0.45 | 0.75 | PVC |
| PW17-22 | Performance | 1.10 | 0.64 | 1.00 | SS |
| PW17-23 | Performance | 1.30 | 0.84 | 1.20 | SS |
| PW17-24 | Sentry | 1.20 | 0.85 | 1.15 | PVC |
| PW17-25 | Compliance | 1.25 | 0.85 | 1.15 | PVC ¹ |
| PW17-26 | Up gradient | 0.80 | 0.45 | 0.75 | PVC |
| PW17-27 | Performance | 1.10 | 0.64 | 1.00 | SS |
| PW17-28 | Performance | 1.30 | 0.84 | 1.20 | SS |
| PW17-29 | Sentry | 1.20 | 0.85 | 1.15 | PVC |
| PW17-30 | Compliance | 1.30 | 0.84 | 1.20 | SS |
| PW17-31 | Up gradient | 1.20 | 0.85 | 1.15 | PVC |
| PW17-32 | Sentry | 1.20 | 0.85 | 1.15 | PVC |
| PW17-33 | Compliance | 1.20 | 0.85 | 1.15 | PVC |

m bgs - metres below ground surface

SS - Stainless steel wrapped screen prepacked with 20/40 sand

PVC - Schedule 40 - 10 slot screen

^{1 -} Screen consisted of a 3" - 10 slot screen surrounding a 2" - 10 slot screen prepacked with 20/40 filter sand (manufactured by Bluemax Drilling)

TABLE 2 CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN SEDIMENT SAMPLES (µg/g [ppm]) FORESHORE PARKLAND BURNABY REFINERY

| | | | | | | | | PARKLAND | BURNABY RE | FINERY | | | | | | | | | | |
|--------------------------------------|----------------------------|----------------------|------------|----------|------------|------------------------|--|-----------------|--------------|----------------|-----------------|--------------|--------------|--------------|--------------------|------------------------|------------------|------------------|-----------------------|----------------|
| Applicable Stage 11 (Housekeepir | ng Amendment) Undated Si | randard ¹ | | | | | EPH _w (C ₁₀ - <c<sub>19)²</c<sub> | 00 (Silica gel) | 000°T | © (Silica gel) | 1.000 | 1,000 | Hd > 200 | HA NS | Benzene 6.5 | Ethylbenzene | Styrene | Toluene Toluene | Xylenes 20 | 8,000 |
| Source | ig randinament, opaatea et | | | | | | Gen. So. | Gen. So. | Gen. So. | Gen. So. | Gen. So. | Gen. So. | Gen. So. | | Mat. So. | Mat. So. | Gen. So. | Mat. So. | Mat. So. | Gen. So. |
| Sample | | Sample | Sediment | Area | Sample | | OCH. 00. | OC11. OO. | OCH. 00. | OCH. 00. | OCH. 00. | GC11. GG. | OCH. 00. | | Wat. Oo. | Wat. Oo. | OCH. 00. | Wat. Oo. | Mat. 00. | OCH. 00. |
| ID. | Matrix | Location | Location | Location | Depth (m) | SampleDate | | | | | | | | | | | | | | |
| Eastern IRA Barrier Removal | | | | | | | | | | | | | | | | | | | | |
| EIRA-1 | Sediment EAZ | P7-5 | ATB | EB | 0.4 | 14-Jul-17 | <200 | | 810 | | <200 | 810 | <100 | <100 | 0.1 | < 0.015 | < 0.050 | < 0.050 | <0.075 | <0.20 |
| EIRA-2 | Sediment EAZ | P7-5 | ATB | EB | 0.8 | 14-Jul-17 | <200 | | 730 | | <200 | 730 | <100 | <100 | 0.411 | <0.015 | <0.050 | < 0.050 | < 0.075 | <0.20 |
| EIRA-3 | Sediment EAZ | P7-3 | OB | EB | 0.8 | 14-Jul-17 | <200 | | 460 | | <200 | 460 | <100 | <100 | 0.327 | 0.049 | < 0.050 | 0.086 | 0.186 | <0.20 |
| EIRA-4 | Sediment EAZ | P7-3 | OB | EB | 0.4 | 14-Jul-17 | <200 | | 540 | | <200 | 540 | <100 | <100 | 0.297 | 0.051 | < 0.050 | < 0.050 | <0.075 | <0.20 |
| EIRA-5 | Sediment EAZ | P7-5 | ATB | EB | 0.4 | 14-Jul-17 | <200 | | 700 | | <200 | 700 | <100 | <100 | 0.0155 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| EIRA-6 | Sediment EAZ | P7-5 | ATB | EB | 0.8 | 14-Jul-17 | <200 | | 630 | | <200 | 630 | <100 | <100 | 0.0185 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| EIRA-7 | Sediment EAZ | P4.9-5 | ATB | EB | 0.2 | 17-Jul-17 | <200 | | 550 | | <200 | 550 | <100 | <100 | <0.0050 | <0.015 | < 0.050 | <0.050 | <0.075 | <0.20 |
| DUP-1 (EIRA-7) | Sediment EAZ | P4.9-5 | ATB | EB | 0.2 | 17-Jul-17 | <200 | | 750 | | <200 | 750 | <100 | <100 | <0.0050 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| QA/QC RPD | 0.1 | DE SI | 110.17 | F.5 | 0 - | Duplicates | | | | | | | | | | | | | | |
| EIRA-8 | Sediment EAZ | P5-3I | USAT | EB | 0.5 | 19-Jul-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | <0.0050 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| EIRA-9 | Sediment EAZ | P5.5-3R | OB | EB | 0 | 20-Jul-17 | <200 | | 660 | | <200 | 660 | <100 | <100 | 0.0124 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| EIRA-10 EIRA-11 | Sediment EAZ Sediment EAZ | P5.5-3R P5.5-3R | OB OB | EB EB | 0.4 | 20-Jul-17 20-Jul-17 | <200 <200 | | 790 680 | | <200 <200 | 790 680 | <100 <100 | <100 <100 | 0.0101 | <0.015 <0.015 | <0.050 <0.050 | <0.050 <0.050 | <0.075 <0.075 | <0.20 <0.20 |
| EIRA-11 | Sediment EAZ | P5.5-3R | OB | EB | 0.8 | 20-Jul-17 20-Jul-17 | <200 | | 680 | | <200 | 680 | <100 | <100 | 0.0083 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| EIRA-13 | Sediment EAZ | P5.5-3R | OB | EB | 0.4 | 20-Jul-17 | <200 | | 660 | | <200 | 660 | <100 | <100 | 0.0111 | <0.015 | <0.050 | <0.050 | 0.178 | <0.20 |
| EIRA-14 | Sediment EAZ | P5.5-3R | OB | EB | 0.8 | 20-Jul-17 | <200 | | 740 | | <200 | 740 | <100 | <100 | 0.0779 | 0.046 | <0.050 | <0.050 | 0.402 | <0.20 |
| EIRA-15 | Sediment EAZ | P5.25-5 | ATB | EB | 0.3 | 21-Jul-17 | <200 | | 670 | | <200 | 670 | <100 | <100 | 0.0303 | 0.101 | <0.050 | <0.070 | 0.534 | <0.20 |
| EIRA-16 | Sediment EAZ | P6.25-3 | OB | EB | 0.4 | 22-Jul-17 | 32,400 | | 22,900 | | 32,200 | 22,900 | 86,000 | 97,000 | 217 | 1,570 | <2.0 | 1,950 | 7,530 | <8.0 |
| EIRA-17 | Sediment EAZ | P7-5 | ATB | EB | 0.5 | 24-Jul-17 | 210 | | 790 | | 210 | 790 | <100 | <100 | 2.44 | 0.056 | < 0.050 | 0.082 | <0.075 | <0.20 |
| EIRA-18 | Sediment EAZ | P7.5-3 | ОВ | EB | 0.4 | 26-Jul-17 | <200 | | 670 | | <200 | 670 | <100 | <100 | 0.0116 | <0.015 | < 0.050 | < 0.050 | < 0.075 | <0.20 |
| DUP-2 (EIRA-18) | Sediment EAZ | P7.5-3 | OB | EB | 0.4 | 26-Jul-17 | <200 | | 710 | | <200 | 710 | <100 | <100 | 0.0132 | <0.015 | < 0.050 | < 0.050 | <0.075 | <0.20 |
| QA/QC RPD | | | | | | Duplicates | | | | | | | | | | | | | | |
| EIRA-19 | Sediment EAZ | P9-3R | ОВ | EB | 0 | 27-Jul-17 | <200 | | 670 | | <200 | 670 | <100 | <100 | 0.0099 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| EIRA-20 | Sediment EAZ | P9-3R | OB | EB | 0 | 27-Jul-17 | <200 | | 720 | | <200 | 720 | <100 | <100 | 0.014 | <0.015 | < 0.050 | < 0.050 | <0.075 | <0.20 |
| EIRA-21 | Sediment EAZ | P9-3R | OB | EB | 0.4 | 27-Jul-17 | <200 | | 660 | | <200 | 660 | <100 | <100 | 0.0134 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| EIRA-22 | Sediment EAZ | P9-3R | OB | EB | 0.4 | 27-Jul-17 | 210 | | 770 | | 210 | 770 | <100 | <100 | 0.039 | 0.034 | <0.050 | <0.050 | <0.075 | <0.20 |
| DUP-3 (EIRA-22) | Sediment EAZ | P9-3R | ОВ | EB | 0.4 | 27-Jul-17 | <200 | | 720 | | <200 | 720 | <100 | <100 | 0.0278 | 0.046 | <0.050 | <0.050 | <0.075 | <0.20 |
| QA/QC RPD EIRA-23 | Codiment EA7 | D0 2D | OP | - FB | 0.9 | Duplicates | 220 | | 740 | | 220 | 740 | | -100 | 34% | | | -0.050 | | |
| EIRA-23 | Sediment EAZ Sediment EAZ | P9-3R P9-3R | OB OB | EB EB | 0.8 | 27-Jul-17 27-Jul-17 | 230 <200 | | 740 420 | | 230 <200 | 740 420 | <100 <100 | <100 <100 | 0.006 0.0135 | <0.015 0.207 | <0.050 <0.050 | <0.050 <0.050 | <0.075 <0.075 | <0.20 <0.20 |
| EIRA-24 EIRA-25 | Sediment EAZ Sediment EAZ | P9-5K | ATB | EB | 0.6 | 1-Aug-17 | 2,260 | | 1,890 | | 2,250 | 1,890 | 1,150 | 1,230 | 0.528 | 11.5 | <0.050 | 0.588 | <0.075 61.6 | <0.20 |
| DUP-5 (EIRA 25) | Sediment EAZ | P9-5 | ATB | EB | 0.5 | 1-Aug-17 | 1,720 | | 1,660 | | 1,710 | 1,660 | 760 | 870 | 0.711 | 22.2 | <0.050 | 0.911 | 85.7 | <0.20 |
| QA/QC RPD | Codiment 27.2 | | 7.1.2 | | 0.0 | Duplicates | 27% | | 13% | | 27% | 13% | 41% | 34% | 30% | 64% | | 43% | 33% | |
| EIRA-26 | Sediment EAZ | P9-7 | DS | EB | 0.5 | 2-Aug-17 | 340 | | 690 | | 340 | 690 | <100 | <100 | <0.0070 | 0.382 | <0.050 | <0.050 | 2.57 | <0.20 |
| EIRA-27 | Sediment EAZ | P9.5-5 | ATB | EB | 0.5 | 3-Aug-17 | 200 | | 640 | | 200 | 640 | <100 | <100 | <0.0050 | <0.015 | < 0.050 | < 0.050 | < 0.075 | <0.20 |
| Western IRA Barrier Removal | | | | | | | | | | | | | | | | | | | | |
| WIRA-1 | Sediment | P3-3 | OB | WB | 0.5 | 13-Jul-17 | 220 | | 930 | | 220 | 930 | <100 | <100 | <0.0050 | <0.015 | < 0.050 | < 0.050 | <0.075 | <0.20 |
| WIRA-2 | Sediment | P3-3 | ОВ | WB | 0.5 | 13-Jul-17 | <200 | | 680 | | <200 | 680 | <100 | <100 | <0.0050 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| WIRA-3 | Sediment | P3-3 | ОВ | WB | 0.5 | 16-Aug-17 | 220 | | <200 | | 220 | <200 | <100 | <100 | <0.0050 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| Eastern Final Barrier Installation - | | | 1 .=- | | | 1 4 | | | | _ | | T | | 1 | | | | 1 | | |
| ESA-1 | Sediment EAZ | P4.9-5 | ATB | EB | 0.5 | 17-Jul-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | <0.0050 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| ESA-2 | Sediment EAZ | P4.9-5 | ATB | EB | 0.5 | 17-Jul-17 | <200 | | 210 | | <200 | 210 | <100 | <100 | <0.0050 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| ESA-3 ESA-4 | Sediment EAZ Sediment EAZ | P4.9-5 P4.9-5 | ATB ATB | EB EB | 0.5 1.0 | 17-Jul-17 17-Jul-17 | <200 <200 | | <200 <200 | | <200 | <200 | <100 <100 | <100 <100 | <0.0050 <0.0050 | <0.015 <0.015 | <0.050 | <0.050 <0.050 | <0.075 | <0.20 <0.20 |
| ESA-4 ESA-5 | Sediment EAZ Sediment | P4.9-5 P4.9-5 | ATB | EB | 1.0 | 17-Jul-17 18-Jul-17 | <200 <200 | | <200 <200 | | <200 <200 | <200 <200 | <100 | <100 | <0.0050 | <0.015 | <0.050 <0.050 | <0.050 | <0.075 <0.075 | <0.20 |
| ESA-6 | Sediment EAZ | P4.9-5 P5-3S | USAT | EB | 0.5 | 18-Jul-17 19-Jul-17 | <200 <200 | | <200 | | <200 | <200 | <100 | <100 | <0.0050 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| ESA-7 | Sediment EAZ | P5-3I | USAT | EB | 0.5 | 19-Jul-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | <0.0050 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| ESA-8 | Sediment | P5-3I | USAT | EB | 1.2 | 19-Jul-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | 0.0058 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| ESA-9 | Sediment EAZ | P5.5-3R | OB | EB | 1.0 | 20-Jul-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | 0.0071 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| ESA-10 | Sediment | P5.5-3R | OB | EB | 1.6 | 20-Jul-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | 0.0064 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| ESA-11 | Sediment EAZ | P5.25-5 | ATB | EB | 0.3 | 20-Jul-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | 0.0208 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| ESA-12 | Sediment EAZ | P6.5-3 | ОВ | EB | 0.5 | 24-Jul-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | 0.0189 | <0.015 | <0.050 | 0.099 | <0.075 | <0.20 |
| ESA-13 | Sediment | P6.5-3 | OB | EB | 1.2 | 24-Jul-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | 0.022 | 0.233 | <0.050 | 0.059 | 1.11 | <0.20 |
| ESA-14 | Sediment EAZ | P6.5-3 | ОВ | EB | 0.5 | 24-Jul-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | 0.0167 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| ESA-15 | Sediment EAZ | P7-3 | OB | EB | 0.5 | 25-Jul-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | <0.0050 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| ECA 16 | Codimont | D7 2 | | | | | -200 | • | -200 | | | | | | -0.020 | | | | | -0.20 |

ESA-16

<0.20

<200

<200

<200

<100

<100

<0.030

0.101

<0.050

<0.050

0.426

25-Jul-17

<200

TABLE 2 CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN SEDIMENT SAMPLES (µg/g [ppm]) FORESHORE PARKLAND BURNABY REFINERY

| 55-19 | | | | | | | | | TARREAGE | BURNABI RE | | | | | | | | | _ | | |
|--|--------------------|---------------------------|----------|------|----|----------|------------|---------------------------|---|------------|--|---------------------------------------|----------|----------|------|----------|--------------|----------|----------|----------|---------------------------------------|
| Part | | | 1 | | | | | EPH _w (C₁₀⁻≺C₁ | EPH _w (C ₁₀ - <c<sub>1 (Silica gel)</c<sub> | ЕРН М(| EPHw(C ¹⁹ -C ³²) ² (Silica gel) | | НЕРН | > | | Benzene | Ethylbenzene | Styrene | Toluene | Xylenes | MTBE |
| September Sept | | ing Amendment) Updated St | andard ' | | | | | <u> </u> | · · · · · · · · · · · · · · · · · · · | · · | † | · · · · · · · · · · · · · · · · · · · | , | | 1 | | | <u> </u> | | | · · · · · · · · · · · · · · · · · · · |
| 55:19 | Sample | Matrix | • | | | • | SampleDate | Gen. So. | Gen. So. | Gen. So. | Gen. So. | Gen. So. | Gen. So. | Gen. So. | | Mat. So. | Mat. So. | Gen. So. | Mat. So. | Mat. So. | Gen. So. |
| Section Fig. Fig. Section Fig. | ESA-17 | Sediment EAZ | P7-5 | ATB | EB | 0.5 | 25-Jul-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | 0.0112 | <0.015 | < 0.050 | < 0.050 | < 0.075 | <0.20 |
| Section Common | ESA-18 | Sediment EAZ | P7.5-3 | OB | EB | 0.5 | 27-Jul-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | 0.0221 | 0.04 | <0.050 | <0.050 | <0.075 | <0.20 |
| Section Sect | | | | | | | | 1 | | | | | | | | | | | | | |
| Second Column Second Colum | | | | | | | | 1 | ł | | <u> </u> | | | | | | | | | | |
| Section Property | | | | | | | | | ł | | <u> </u> | | + | | | | | | | | |
| Section Sect | ESA-23 | | | | | | | 1 | | | <u> </u> | | | | | | | | | | |
| Section Color Co | ESA-24 | Sediment EAZ | P9-3R | OB | EB | 0.3 | 27-Jul-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | <0.0050 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| Description Section P.2 P.5 B. C. P. C. C. C. C. C. C | ESA-25 | | | | | | | 1 | | | ļ | | | | | | | | | | |
| Mode Property Pr | | | | | | | | 1 | 1 | | 1 | | | | | | | | | + | |
| Section Part Part Part ATh 10 12 27-bir 200 | , | Sediment EAZ | ry-3K | UB | ED | 0.9 | | | | | | | | | | | | | | | |
| Section of FAZ Fig. ATR Fig. Q.S. Friedrick ADD | ESA-27 | Sediment | P9-5 | ATB | EB | 1.2 | | | | | | | | | | | | | | | |
| Section Pot | ESA-28 | Sediment EAZ | P9-5 | ATB | EB | 0.5 | 27-Jul-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | <0.0050 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| Section Part Part | ESA-29 | | | | | | | 1 | ł | | 1 | | | | | | | | | | |
| Section Price Price Price Barry Price Barry Price Pr | | | | | | | | | | | 1 | | | | | | | | | | |
| Section Ph | | | | | | | | 1 | † | | | | | | | | | | | | |
| Section Sect | ESA-33 | | | | | | | | <u> </u> | | 1 | | | | | | | | | | |
| Name Part | ESA-34 | Sediment EAZ | P9.5-5 | ATB | EB | 0.5 | | <200 | | <200 | | <200 | <200 | <100 | <100 | <0.0050 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| Section Sect | ESA-35 | | P10-3I | USAT | EB | 0.5 | 4-Aug-17 | <200 | | <200 | | <200 | <200 | <10 | <10 | <0.0050 | <0.015 | <0.050 | <0.050 | | |
| Section Post Post | | · · | D0 0 | 0.5 | | 0.5 | 40.1.4.7 | | _ | 200 | _ | 1 | | 100 | 100 | 0.0050 | | 0.050 | 0.050 | 0.075 | 0.00 |
| September Sept | | | | | | | | | | | | | | | | | | | | | |
| Sectioner FAZ P3-3 OB W8 O.5 13-Jul 7 220 490 220 490 -100 -100 -0.055 | | - | | | | | | | | | | | | | | | | | | | |
| Section Part Part | WSA-4 | - | | | | | | | 1 | | 1 | | | | + | | | | 1 | + | |
| Self-order EAZ P3-3 OB WB 0.5 13-Jul-17 -200 -200 -200 -200 -200 -200 -200 -200 -200 | WSA-5 | Sediment EAZ | | ОВ | WB | 0.5 | 13-Jul-17 | <200 | | 590 | | <200 | 590 | <100 | <100 | <0.0050 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| SAME Sediment P3-3 OB WB 1.2 13-M-17 4200 | WSA-6 | | | | | | | 1 | | | † | | | | | | | | | | |
| Skefument P3-3 OB WB 12 15-Jul-17 <200 <200 <200 <200 <100 <100 <0.0050 <0.015 <0.0050 <0.005 <0.0050 <0.0050 <0.0055 <0.020 <0.0050 <0.0055 <0.020 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0050 <0.0055 <0.0055 <0.0050 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 <0.0055 | | | | | | | | 1 | | | <u> </u> | | | | | | | | | | |
| Section Section F3-3 OB WB 1.2 15-Jul-17 <200 <200 <200 < <200 < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < | WSA-9 | | | | | | | | 1 | + | ł | | | | | | | | | | |
| SA-12 | WSA-10 | | | | | | | 1 | <u> </u> | | <u> </u> | | | | | | | | | | |
| SA-13 Sediment EAZ P3-3 OB WB O.5 15-Jul-17 -200 -220 | WSA-11 | Sediment EAZ | P3-3 | ОВ | WB | 0.2-0.5 | 15-Jul-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | <0.0050 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| VSA-14 Sediment EAZ P33 OB WB 0.5 15-Jul-17 <200 <200 <200 <-0.00 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0.005 <-0. | WSA-12 | | | | | | | 1 | | | | | | | | | | | | | |
| VSA-15 Sediment EAZ P3-3 OB WB O.5 15-Jul-17 <200 <200 <200 < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < < | | | | | | | | | | | | | | | | | | | | | |
| \(\sigma\$ \frac{\text{Sediment EAZ}}{\text{P3-3}} \text{OB} \text{WB} 0.5 \text{1.5}\text{J-1.7} \cdot <200 \cdot \cdot \cdot \cdot \cdot \qq \qq \qq \qq | | | | | | | | | | | | | | | | | | | | | |
| Section Backing | WSA-16 | | | | | | | | <u> </u> | | | | | | | | | | | | |
| FSG-01 Backfill 12-Jul-17 <200 <200 <200 <200 <100 <100 <100 <0.0050 <0.015 <0.050 <0.075 <0.20 <0.075 <0.20 <0.0050 <0.075 <0.20 <0.0050 <0.075 <0.20 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0. | WSA-17 | | P3-3 | ОВ | WB | 0.7 | 15-Jul-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | <0.0050 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| FSG-02 Backfill 12-Jul-17 <200 <200 <200 <100 <100 <0.0050 <0.015 <0.050 <0.050 <0.075 <0.20 <0.0050 <0.075 <0.20 <0.0050 <0.0050 <0.050 <0.055 <0.020 <0.0050 <0.0050 <0.055 <0.055 <0.020 <0.0050 <0.0050 <0.055 <0.055 <0.020 <0.0050 <0.0050 <0.055 <0.055 <0.020 <0.0050 <0.0050 <0.055 <0.055 <0.055 <0.020 <0.0050 <0.0050 <0.015 <0.050 <0.055 <0.020 <0.0050 <0.0050 <0.015 <0.050 <0.055 <0.020 <0.0050 <0.0050 <0.015 <0.050 <0.055 <0.020 <0.0050 <0.0050 <0.015 <0.050 <0.055 <0.020 | | <u> </u> | | | | ı | | | | T | | T | | T | | T | T | | T | | |
| SESC Backfill S-Aug-17 <200 <200 <200 <200 <100 <100 <0.0050 <0.015 <0.050 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.0050 <0.075 <0.20 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0050 <0.0 | | | | | | + | | | | | | | | | | | | | | | |
| Second Backfill 13_Jul-17 <200 <200 <200 <200 <100 <100 <0.0050 <0.015 <0.050 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.075 <0.20 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.0 | BF-SG-02 BF-SG2 | | | | | † | | 1 | | | | | | | | | | | | | |
| SST7-01 Grab | BF-SG2-1 | | | + | | | | | <u> </u> | | <u> </u> | | | | | | | | | | |
| SST-02 Grab 4-Jul-17 | BF-SG2-2 | Backfill | | | | | 13-Jul-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | <0.0050 | <0.015 | < 0.050 | <0.050 | <0.075 | <0.20 |
| SST7-03 Grab | GS17-01 | | | | | + | | | 1 | | 1 | 1 | | | | | | | | | |
| SST7-04 Grab 4-Jul-17 | | | | | | | | ł | | | | - | | | | | | | | | |
| SS17-05 Grab | | | | | | † | | | † | + | | + | | | | | | | | | |
| SS17-06 Grab | GS17-05 | | | + | | | | t | <u> </u> | 1 | <u> </u> | | | | | | | | | | |
| SS17-08 Grab 4-Jul-17 | GS17-06 | | | | | | | | | | | | | | | | | | 1 | + | |
| SS17-09 Grab 4-Jul-17 | GS17-07 | | | | | | | ł | | | | | | | + | | | | 1 | + | |
| Us | GS17-08 | | | + | | - | | ł | | + | 1 | + | + | | | | | | | | + |
| PW17-4@0.1-0.3 Sediment EAZ P3-3 US WB 0.1-0.3 2-Oct-17 <200 <200 <200 <100 <100 0.123 <0.015 <0.050 0.056 <0.075 <0.20 | | | | | | | 4-Jul-1 / | | | | | | | <100 | <100 | U.U151 | <0.015 | <0.050 | <0.050 | <0.075 | <0.20 |
| | PW17-4@0.1-0.3 | | P3-3 | US | WB | 0.1-0.3 | 2-Oct-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | 0.123 | <0.015 | <0.050 | 0.056 | <0.075 | <0.20 |
| | PW17-4@0.7-0.9 | | | | | | | | | | | | | | | | | | | | |

TABLE 2 CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN SEDIMENT SAMPLES (µg/g [ppm]) FORESHORE

PARKLAND BURNABY REFINERY

| | | | | | | | EPH _w (C ₁₀ - <c<sub>19) ²</c<sub> | EPH _w (C ₁₀ - <c<sub>19) (Silica gel)</c<sub> | ЕРН w (С¹ ¹⁹ -С³ ²) ² | EPHw(C¹º-C³²) ² (Silica gel) | ГЕРН | нерн | НΔ | Н, | Benzene | Ethylbenzene | Styrene | Toluene | Xylenes | MTBE |
|-----------------------------|-----------------------------|-----------|----------|----------|-----------|------------|---|---|--|---------------------------------|----------|----------|----------|------|----------|--------------|----------|----------|----------|----------|
| Applicable Stage 11 (Housek | eeping Amendment) Updated S | tandard 1 | | | | | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 200 | NS | 6.5 | 200 | 5 | 150 | 20 | 8,000 |
| Source | | | | | | | Gen. So. | Gen. So. | Gen. So. | Gen. So. | Gen. So. | Gen. So. | Gen. So. | | Mat. So. | Mat. So. | Gen. So. | Mat. So. | Mat. So. | Gen. So. |
| Sample | | Sample | Sediment | Area | Sample | | | - | | | | | | | | | | | | |
| ID | Matrix | Location | Location | Location | Depth (m) | SampleDate | | | | | | | | | | | | | | |
| PW17-16 @0.7-0.9 | Sediment EAZ | P6.25-3 | US | EB | 0.7-0.9 | 25-Aug-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | <0.0050 | < 0.015 | < 0.050 | <0.050 | < 0.075 | <0.20 |
| PW17-21 @0.5-0.7 | Sediment EAZ | P7-3 | US | EB | 0.5-0.7 | 31-Aug-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | 0.0074 | < 0.015 | < 0.050 | < 0.050 | < 0.075 | <0.20 |
| PW17-26 @0.5-0.7 | Sediment EAZ | P8-3 | US | EB | 0.5-0.7 | 31-Aug-17 | <200 | | <200 | | <200 | <200 | <100 | <100 | 0.0052 | < 0.015 | < 0.050 | < 0.050 | < 0.075 | <0.20 |

Page 4 of 9

Notes

- < Sample concentration less than the detection limit indicated.
- --- Sample not analyzed for indicated parameter.
- 1 The minimum of the CSR generic numerical soil (Park Land Use [PL]), CSR matrix numerical soil (Park Land Use [PL]), and CSR generic numerical sediment (marine/estuarine typical) was selected as the applicable standard. SedQCts are applicable to all depths at typical sediment sites and to any depth greater than 1 metre of stable sediment at sensitive sediment sites BC (CSR Stage 11 [Housekeeping] Amendment; approved on October 31, 2017 and effective November 1, 2017).
- 2 CSR standards are for EPH corrected for PAHs, sample concentrations listed are uncorrected and therefore conservative.

| BOLD | |
|-------|--|
| SHADE | |

Sample concentration is detected

Sample concentration greater than CSR sediment (marine/estuarine sensitive for depths less than 1 metre; marine/estuarine typical for depths greater than 1 metre), CSR generic or matrix soil standard for urban park land use Stage 11 Updates.

Abbreviations

μg/g [ppm] - micrograms per gram [parts per million] dry weight

ATB - located in anchor trench barrier

CSR - Contaminated Sites Regulation

DS - located down slope

EB - eastern barrier

EPHw - extractable petroleum hydrocarbons in water

Gen .So. - CSR generic numerical soil (Park Land Use [PL]) standard

HEPH - heavy extractable petroleum hydrocarbons

LEPH - light extractable petroleum hydrocarbons

Mat.So. - CSR matrix numerical soil (Park Land Use [PL]) standard

MTBE - methyl tert-butyl ether

NA - not applicable

NAPL - non-aqueous phase liquid

NS - no standard established for indicated parameter.

OB - located within the original barrier

USAT - located up slope anchor trench

US - Upslope

VPH - volatile petroleum hydrocarbons

WB - western barrier

TABLE 3 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN SEDIMENT SAMPLES (µg/g [ppm]) FORESHORE PARKLAND BURNABY REFINERY

| | | | | | | | | | | PARKLAND B | UKNADI KE | FINER I | | | | | | | | | | | | |
|--|---------------------------|--------------------|---------------|---------------|------------|-------------------------|-------------------|-------------------|------------------|------------------|------------------|------------------|------------------------|------------------|------------------|------------------|------------------|------------------------|------------------|------------------------|------------------------|-----------------------|------------------------|-----------|
| | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | 200 | | | | <u>o</u> | | | e u | | | | | |
| | | | | | | | | | | a. | | thene | ane | thene | | acen | | |)pyre | alene | | | | |
| | | | | | | | aue | /lene | | race | rene | oran | seryle | orani | | anthi | 9 | | 3-c,d | ohtha | Φ | eu . | | |
| | | | | | | | ohthe | ohthy | cene |)ant | (a)py | (b)flu | g(iybi) | (k)flu | au e | (a,h) | nther | Je U | (1,2, | ylna | nalen | nthre | | AHs |
| | | | | | | | Sena | cenal | nthra | e)zue |)ozue |)ozue |)ozue |)ozue | ıryse | penz | uora | nore | deno | Meth | aphtf | nenai | /rene | tal P |
| Applicable Stage 11 (Housekeeping A | Amendment) Updated | d Standard 1 (Se | ediments EAZ) |) | | | ₹ 0.055 | ₹ 0.079 | ₹ 0.15 | 0.43 | 0.47 | ă | MS NS | 1 | 0.52 | 0.084 | 0.93 | 0.089 | <u>=</u> 1 | الم 0.12 | 0.24 | 0.34 | 0.87 | 10 |
| Applicable Stage 11 (Housekeeping A | | | | | | | 0.11 | 0.15 | 0.29 | 0.83 | 0.92 | 1 | NS | 1 | 1 | 0.16 | 1.8 | 0.17 | 1 | 0.24 | 0.47 | 0.65 | 1.7 | 20 |
| Source Sample | 1 | Sample | Sediment | | Sample | | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. So. | | Gen. So. | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. So. | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. Sed. |
| ID Eastern IRA Barrier Removal | Matrix | Location | Location | Area Location | Depth (m) | SampleDate | | | | | | | | | | | | | | | | | | |
| EIRA-1 | Sediment EAZ | P7-5 | ATB | EB | 0.4 | 14-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| EIRA-2 EIRA-3 | Sediment EAZ Sediment EAZ | P7-5 P7-3 | ATB OB | EB EB | 0.8 | 14-Jul-17 14-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 0.066 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| EIRA-4 | Sediment EAZ | P7-3 | OB | EB | 0.4 | 14-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.061 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| EIRA-5 EIRA-6 | Sediment EAZ Sediment EAZ | P7-5 P7-5 | ATB ATB | EB EB | 0.4 | 14-Jul-17 14-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 0.121 | <0.050 0.068 | <0.050 <0.050 | <0.050 <0.050 | |
| EIRA-7 | Sediment EAZ | P4.9-5 | ATB | EB | 0.2 | 17-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| DUP-1 (EIRA-7) QA/QC RPD | Sediment EAZ | P4.9-5 | ATB | EB | 0.2 | 17-Jul-17 Duplicates | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| EIRA-8 | Sediment EAZ | P5-3I | NA OB | EB | 0.5 | 19-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| EIRA-9 EIRA-10 | Sediment EAZ Sediment EAZ | P5.5-3R P5.5-3R | OB OB | EB EB | 0 0.4 | 20-Jul-17 20-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| EIRA-11 EIRA-12 | Sediment EAZ Sediment EAZ | P5.5-3R P5.5-3R | OB OB | EB EB | 0.8 | 20-Jul-17 20-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| EIRA-13 | Sediment EAZ | P5.5-3R | OB | EB | 0.4 | 20-Jul-17 20-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| EIRA-14 EIRA-15 | Sediment EAZ Sediment EAZ | P5.5-3R P5.25-5 | OB ATB | EB EB | 0.8 | 20-Jul-17 21-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 0.272 | <0.050 <0.20 | <0.050 <0.050 | <0.050 <0.050 | |
| EIRA-16 | Sediment EAZ | P6.25-3 | OB | EB | 0.3 | 22-Jul-17 | <4.0 | <2.0 | <2.0 | <0.60 | <0.40 | <0.50 | 0.569 | <0.30 | <2.0 | <0.40 | <0.90 | 8.51 | <0.40 | 239 | 142 | 13.7 | 5.56 | |
| EIRA-17 EIRA-18 | Sediment EAZ Sediment EAZ | P7-5 P7.5-3 | ATB OB | EB EB | 0.5 | 24-Jul-17 26-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| DUP-2 (EIRA-18) | Sediment EAZ | P7.5-3 | OB | EB | 0.4 | 26-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| QA/QC RPD EIRA-19 | Sediment EAZ | P9-3R | OB | EB | 0 | Duplicates 27-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| EIRA-20 | Sediment EAZ | P9-3R | OB | EB | 0 | 27-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| EIRA-21 EIRA-22 | Sediment EAZ Sediment EAZ | P9-3R P9-3R | OB OB | EB EB | 0.4 | 27-Jul-17 27-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| DUP-3 (EIRA-22) QA/QC RPD | Sediment EAZ | P9-3R | ОВ | EB | 0.4 | 27-Jul-17 Duplicates | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| EIRA-23 | Sediment EAZ | P9-3R | ОВ | EB | 0.8 | 27-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| EIRA-24 EIRA-25 | Sediment EAZ Sediment EAZ | P9-3R P9-5 | OB ATB | EB EB | 0.8 | 27-Jul-17 1-Aug-17 | <0.050 <0.50 | <0.050 <0.20 | <0.050 <0.20 | <0.050 <0.060 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.090 | <0.050 <0.050 | <0.050 <0.070 | <0.050 0.857 | <0.050 <0.050 | <0.050 16.8 | <0.050 9.27 | <0.050 1.43 | <0.050 0.547 | |
| DUP-5 (EIRA 25) | Sediment EAZ | P9-5 | ATB | EB | 0.5 | 1-Aug-17 | <0.40 | <0.10 | <0.20 | <0.070 | <0.050 | <0.050 | <0.050 | <0.050 | <0.10 | <0.050 | <0.20 | 0.693 | <0.050 | 14 | 7.89 | 1.41 | 0.651 | |
| QA/QC RPD EIRA-26 | Sediment EAZ | P9-7 | DS | EB | 0.5 | Duplicates 2-Aug-17 | <0.070 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.20 | 21% 0.114 | <0.050 | 18% 1.47 | 16% 0.661 | 1% 0.223 | 17% 0.153 | |
| EIRA-27 Western IRA Barrier Removal | Sediment EAZ | P9.5-5 | ATB | EB | 0.5 | 3-Aug-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.40 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| WIRA-1 | Sediment | P3-3 | ОВ | WB | 0.5 | 13-Jul-17 | <0.050 | 0.067 | 0.055 | 0.313 | 0.346 | 0.418 | 0.215 | 0.172 | 0.328 | <0.050 | 0.348 | <0.050 | 0.212 | <0.050 | <0.050 | 0.085 | 0.333 | |
| WIRA-2 WIRA-3 | Sediment Sediment | P3-3 P3-3 | OB OB | WB WB | 0.5 0.5 | 13-Jul-17 16-Aug-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.060 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| Eastern Final Barrier Installation - Lim | | 100 | 05 | ,,,, | 0.0 | 10 / tag 17 | 40.000 | 40.000 | V0.000 | 40.000 | 40.000 | 40.000 | 40.000 | 10.000 | 40.000 | 40.000 | 40.000 | 40.000 | VO.000 | 40.000 | 40.000 | 40.000 | 10.000 | |
| ESA-1 ESA-2 | Sediment EAZ Sediment EAZ | P4.9-5 P4.9-5 | ATB ATB | EB EB | 0.5 0.5 | 17-Jul-17 17-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| ESA-3 | Sediment EAZ | P4.9-5 | ATB | EB | 0.5 | 17-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| ESA-4 ESA-5 | Sediment EAZ Sediment | P4.9-5 P4.9-5 | ATB ATB | EB EB | 1.3 | 17-Jul-17 18-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| ESA-6 | Sediment EAZ | P5-3S | USAT | EB | 0.5 | 19-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| ESA-7 ESA-8 | Sediment EAZ Sediment | P5-3I P5-3I | USAT | EB EB | 0.5 1.2 | 19-Jul-17 19-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| ESA-9 | Sediment EAZ | P5.5-3R | OB OB | EB | 1 | 20-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.717 | 0.377 | 0.081 | <0.050 | |
| ESA-10 ESA-11 | Sediment Sediment EAZ | P5.5-3R P5.25-5 | OB ATB | EB EB | 1.6 0.3 | 20-Jul-17 20-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| ESA-12 ESA-13 | Sediment EAZ | P6.5-3 | OB OB | EB EB | 0.5 1.2 | 24-Jul-17 | <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 <0.050 | <0.050 | <0.050 | <0.050 <0.050 | <0.050 | <0.050 0.284 | <0.050 | <0.050 | <0.050 <0.050 | |
| EOA-13 | Sediment | P6.5-3 | OB | FR | 1.2 | 24-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.284 | 0.145 | <0.050 | <0.050 | |

TABLE 3 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN SEDIMENT SAMPLES (µg/g [ppm]) FORESHORE PARKLAND BURNABY REFINERY

| | | | | | | | | | | PARKLAND B | OKNADI KE | · INCLIC | | | | | | | | | | | | |
|--|---------------------------|------------------|---------------|---------------|------------|-------------------------|------------------|------------------|---------------------|------------------|------------------------|------------------------|------------------------|------------------|------------------------|------------------|------------------------|------------------|------------------|------------------------|------------------------|------------------|------------------------|--------------|
| | | | | | | | | | | | | ane 2 | Φ. | ane | | ene | | | rene | ne | | | | |
| | | | | | | | aphthene | aphthylene | racene | (a)anthracene | o(a)pyrene | o(b)fluoranthe | o(ghi)perylene | o(k)fluoranthe | sene | ız(a,h)anthrac | anthene | eue | 1,2,3-c,d)py | thylnaphthale | thalene | anthrene | e. | PAHs |
| | | | | | | | Acen | Acen | Anth | Benz | Benz | Benz | Benz | Benz | Chry | Diber | Fluor | Fluor | nder | 2-Me | Naph | Phen | Pyrei | Fotal |
| Applicable Stage 11 (Housekeeping Ar | mendment) Updated | I Standard 1 (Se | ediments EAZ) |) | | | 0.055 | 0.079 | 0.15 | 0.43 | 0.47 | 1 | NS | 1 | 0.52 | 0.084 | 0.93 | 0.089 | 1 | 0.12 | 0.24 | 0.34 | 0.87 | 10 |
| Applicable Stage 11 (Housekeeping Ar | mendment) Updated | I Standard 1 (Se | ediments) | | | | 0.11 | 0.15 | 0.29 | 0.83 | 0.92 | 1 | NS | 1 | 1 | 0.16 | 1.8 | 0.17 | 1 | 0.24 | 0.47 | 0.65 | 1.7 | 20 |
| Source Sample | | Sample | Sediment | | Sample | | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. So. | | Gen. So. | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. So. | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. Sed. |
| ID SOA 44 | Matrix | Location | Location | Area Location | | SampleDate | | 0.050 | 0.050 | 1 0.050 | 0.050 | 0.050 | 0.050 | 0.050 | | | | | 1 0050 | 1 | | 0.050 | 0.050 | |
| ESA-14 ESA-15 | Sediment EAZ Sediment EAZ | P6.5-3 P7-3 | OB OB | EB EB | 0.5 0.5 | 24-Jul-17 25-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| ESA-16 | Sediment | P7-3 | OB | EB | 1.2 | 25-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.112 | 0.066 | <0.050 | <0.050 | |
| ESA-17 ESA-18 | Sediment EAZ Sediment EAZ | P7-5 P7.5-3 | ATB OB | EB EB | 0.5 0.5 | 25-Jul-17 27-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| ESA-19 | Sediment | P7.5-3 | OB | EB | 1.2 | 27-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.166 | 0.105 | <0.050 | <0.050 | |
| ESA-20 | Sediment EAZ | P7-5 | ATB | EB | 0.5 | 27-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| ESA-21 ESA-22 | Sediment EAZ Sediment EAZ | P7-3 P7-3 | OB OB | EB EB | 0.3 | 26-Jul-17 26-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| ESA-23 | Sediment EAZ | P7-3 | OB | EB | 0.9 | 26-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.125 | <0.050 | <0.050 | <0.050 | |
| ESA-24 | Sediment EAZ | P9-3R | OB | EB | 0.3 | 27-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| ESA-25 ESA-26 | Sediment EAZ Sediment EAZ | P9-3R P9-3R | OB OB | EB EB | 0.6 | 27-Jul-17 27-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| DUP-4 (ESA-26) | Sediment EAZ | P9-3R | ОВ | EB | 0.6 | 27-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| QA/QC RPD ESA-27 | Sediment | P9-5 | ATB | EB | 1.2 | Duplicates 27-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| ESA-28 | Sediment EAZ | P9-5 | ATB | EB | 0.5 | 27-Jul-17 27-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| ESA-29 | Sediment EAZ | P9-3R | ОВ | EB | 0.5 | 3-Aug-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.132 | <0.050 | <0.050 | <0.050 | |
| ESA-30 ESA-31 | Sediment Sediment EAZ | P9-7 P9-7 | DS DS | EB EB | 1.2 0.5 | 3-Aug-17 3-Aug-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.060 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | 0.407 <0.050 | 0.198 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| ESA-32 | Sediment EAZ | P10-3S | USAT | EB | 0.5 | 3-Aug-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| ESA-33 | Sediment | P9.5-5 | ATB | EB | 1.2 | 3-Aug-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| ESA-34 ESA-35 | Sediment EAZ Sediment EAZ | P9.5-5 P10-3I | ATB USAT | EB EB | 0.5 0.5 | 3-Aug-17 4-Aug-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.21 |
| Western Final Barrier Installation - Lim | | | | | | - 3 | | | | | | | | | | | | | | | | | | |
| WSA-1 | Sediment EAZ | P3-3 | OB | WB | 0.5 0.8 | 13-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | 0.061 | |
| WSA-2 WSA-3 | Sediment EAZ Sediment EAZ | P3-3 P3-3 | OB OB | WB WB | 0.8 | 13-Jul-17 13-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.060 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | 0.089 0.078 | |
| WSA-4 | Sediment EAZ | P3-3 | OB | WB | 0.5 | 13-Jul-17 | <0.050 | <0.050 | 0.087 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| WSA-5 WSA-6 | Sediment EAZ Sediment EAZ | P3-3 P3-3 | OB OB | WB WB | 0.5 0.5 | 13-Jul-17 13-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | 0.071 <0.050 | <0.050 <0.050 | <0.050 <0.050 | 0.051 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.080 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | 0.064 <0.050 | |
| WSA-7 | Sediment EAZ | P3-3 | OB | WB | 0.5 | 13-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| WSA-8 | Sediment | P3-3 | OB | WB | 1.2 | 13-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| WSA-9 WSA-10 | Sediment Sediment | P3-3 P3-3 | OB OB | WB WB | 1.2 | 13-Jul-17 15-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| WSA-11 | Sediment EAZ | P3-3 | OB | WB | 0.2-0.5 | 15-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| WSA-12 | Sediment EAZ | P3-3 | OB | WB | 0.5 | 15-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| WSA-13 WSA-14 | Sediment EAZ Sediment EAZ | P3-3 P3-3 | OB OB | WB WB | 0.5 0.5 | 15-Jul-17 15-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 0.053 | <0.050 0.111 | <0.050 0.097 | <0.050 <0.050 | <0.050 0.069 | <0.050 <0.050 | <0.050 0.129 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 0.123 | |
| WSA-15 | Sediment EAZ | P3-3 | OB | WB | 0.5 | 15-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| WSA-16 WSA-17 | Sediment EAZ Sediment EAZ | P3-3 P3-3 | OB OB | WB WB | 0.5 0.7 | 15-Jul-17 15-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| Backfill and Grab Samples from Final I | | F 3-3 | ОВ | VVD | 0.7 | 13-3ul-17 | <0.030 | VO.030 | VO.030 | VO.030 | ₹0.030 | VO.030 | ₹0.030 | V0.030 | ₹0.030 | <0.030 | ₹0.030 | ₹0.030 | ₹0.030 | <0.030 | <0.030 | ₹0.030 | <0.030 | |
| BF-SG-01 | Backfill | | | | | 12-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| BF-SG-02 BF-SG2 | Backfill Backfill | | | | | 12-Jul-17 8-Aug-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| BF-SG2-1 | Backfill | | | | | 13-Jul-17 | <0.050 | <0.050 | <0.050 | 0.062 | 0.056 | 0.073 | <0.050 | <0.050 | 0.074 | <0.050 | 0.099 | <0.050 | <0.050 | <0.050 | <0.050 | 0.051 | 0.111 | |
| BF-SG2-2 | Backfill | | | | | 13-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| GS17-01 GS17-02 | Grab Grab | | | | | 4-Jul-17 4-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| GS17-03 | Grab | | | | | 4-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| GS17-04 | Grab | | | | | 4-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| GS17-05 GS17-06 | Grab Grab | | | | | 4-Jul-17 4-Jul-17 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.20 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | <0.050 <0.050 | |
| GS17-00 GS17-07 | Grab | | | | | 4-Jul-17 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| | | | | | | | | | | | | | | | | | | | | | | | | |

TABLE 3 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN SEDIMENT SAMPLES (µg/g [ppm]) FORESHORE PARKLAND BURNABY REFINERY

| | | | | | | | | | | | | ene² | Ð | ene | | cene | | | yrene | aue | | | | |
|-------------------------------|--------------------------|--------------------|----------------------|---------------|---------------------|------------|--------------|----------------|------------|------------------|----------------|------------------|-------------------|-------------------|-----------|-------------------|--------------|-----------|--------------------|------------------|-------------|--------------|-----------|------------|
| | | | | | | | Acenaphthene | Acenaphthylene | Anthracene | Benz(a)anthracen | Benzo(a)pyrene | Benzo(b)fluorant | Benzo(ghi)peryler | Benzo(k)fluoranth | Chrysene | Dibenz(a,h)anthra | Fluoranthene | Fluorene | Indeno(1,2,3-c,d)p | 2-Methylnaphthal | Naphthalene | Phenanthrene | Pyrene | Total PAHs |
| Applicable Stage 11 (Housekee | eping Amendment) Updated | l Standard 1 (Se | ediments EAZ) | | | | 0.055 | 0.079 | 0.15 | 0.43 | 0.47 | 1 | NS | 1 | 0.52 | 0.084 | 0.93 | 0.089 | 1 | 0.12 | 0.24 | 0.34 | 0.87 | 10 |
| Applicable Stage 11 (Housekee | eping Amendment) Updated | l Standard 1 (Se | ediments) | | | | 0.11 | 0.15 | 0.29 | 0.83 | 0.92 | 1 | NS | 1 | 1 | 0.16 | 1.8 | 0.17 | 1 | 0.24 | 0.47 | 0.65 | 1.7 | 20 |
| Source | | | | | | | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. So. | | Gen. So. | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. So. | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. Sed. | Gen. Sed. |
| Sample ID | Matrix | Sample Location | Sediment Location | Area Location | Sample Depth (m) | SampleDate | | | | | | | | | | | | | | | | | | |
| GS17-08 | Grab | | | | | 4-Jul-17 | < 0.050 | <0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | <0.050 | < 0.050 | < 0.050 | < 0.050 | |
| GS17-09 | Grab | | | | | 4-Jul-17 | < 0.050 | <0.050 | < 0.050 | < 0.050 | <0.050 | <0.050 | < 0.050 | <0.050 | < 0.050 | < 0.050 | <0.050 | <0.050 | < 0.050 | < 0.050 | 0.065 | < 0.050 | <0.050 | |
| Upgradient Samples from Fina | al Barrier Installation | <u> </u> | <u> </u> | | <u> </u> | <u> </u> | | | <u> </u> | <u> </u> | | | <u> </u> | | <u> </u> | | | <u> </u> | <u> </u> | | | | | |
| PW17-4@0.1-0.3 | Sediment EAZ | P3-3 | US | WB | 0.1-0.3 | 2-Oct-17 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | <0.050 | <0.050 | <0.050 | <0.050 | < 0.050 | < 0.050 | <0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | <0.050 | |
| PW17-4@0.7-0.9 | Sediment EAZ | P3-3 | US | WB | 0.7-0.9 | 2-Oct-17 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | <0.050 | <0.050 | <0.050 | <0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | <0.050 | < 0.050 | < 0.050 | <0.050 | |
| PW17-16 @0.7-0.9 | Sediment EAZ | P6.25-3 | US | EB | 0.7-0.9 | 25-Aug-17 | < 0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | |
| PW17-21 @0.5-0.7 | Sediment EAZ | P7-3 | US | EB | 0.5-0.7 | 31-Aug-17 | < 0.050 | <0.050 | < 0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 | < 0.050 | <0.050 | < 0.050 | < 0.050 | < 0.050 | <0.050 | <0.050 | <0.050 | |
| PW17-26 @0.5-0.7 | Sediment EAZ | P8-3 | US | EB | 0.5-0.7 | 31-Aug-17 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | < 0.050 | |

. .

- < Sample concentration less than the detection limit indicated.
- --- Sample not analyzed for indicated parameter.
- 1 The minimum of the CSR generic numerical soil (Park Land Use [PL]), CSR matrix numerical soil (Park Land Use [PL]), and CSR generic numerical sediment (marine/estuarine typical) was selected as the applicable standard. SedQCts are applicable to all depths at typical sediment sites and to any depth greater than 1 metre of stable sediment at sensitive sediment sites BC (CSR Stage 11 [Housekeeping] Amendment; approved on October 31, 2017 and effective November 1, 2017).

2 - Standard is for benzo (b+j) fluoranthenes

BOLD Sample concentration is detected

SHADE Sample concentration greater than CSR sediment (marine/estuarine sensitive for depths less than 1 metre; marine/estuarine typical for depths greater than 1 metre), CSR generic or matrix soil standard for urban park land use Stage 11 Updates.

Abbreviations

µg/g [ppm] - micrograms per gram [parts per million] dry weight

m - meters

Acronyms

ATB- located in anchor trench barrier

B[a]P TPE - Benzo[a]pyrene total potency equivalents

CSR - Contaminated Sites Regulation

DS - located down slope

EAZ - ecologically active zone

EB - eastern barrier

Gen. Sed. - CSR generic numerical sediment (Marine/Estuarine) standard

Gen .So. - CSR generic numerical soil (Park Land Use [PL]) standard

n - metre

Mat.So. - CSR matrix numerical soil (Park Land Use [PL]) standard

MTBE - methyl tert-butyl ether

NA - not applicable

NAPL - non-aqueous phase liquid

NS - no standard established for indicated parameter.

OB - located within the original barrier

PAH - polycyclic aromatic hydrocarbons
USAT - located up slope anchor trench

US - Upslope

WB - western barrier

TABLE 4 CONCENTRATIONS OF METALS IN SEDIMENT SAMPLES (µg/g [ppm]) FORESHORE PARKLAND BURNABY REFINERY

| | | | | | | | | | | | PARKLAND BU | RNABY REFINERY | | | | | | | | | | | | | |
|--|------------------------------|----------------------------|-------------------|---------------|----------------|-------------------------------------|----------------------|----------------------|--------------|----------------------|--|-----------------|--------------|------------------|------------------|----------------------------|-------------------|--|-------------------------|-------------------------|------------------------|----------------------|-------------------------|----------------------|---|
| | | | | | | | | | | | | _ | | | | | Ę | | | | | | | | |
| | | | | | | | mony | ë | Ę | Ē | min | m im | # | je d | _ | ćin: | pden | 9 | E a | <u>.</u> | E . | | Ē | m je | |
| | | | | | | | Anti | Arse | Bari | Bery | Cadr | Chro | Cob | d S | Lead | Merc | Moly | Nic. | Sele | Silve | Thall | Ę | Uran | Vang | Zinc |
| Applicable Stage 11 (Housekeeping Amendment Applicable Stage 11 (Housekeeping Amendment | | | | | | | 20 20 | 10 10 | 700 700 | | 1.0-2.0, 2.6 ³ 1 - 3.5, 5.0 ³ | 60 ² | 25 25 | 67 75, 130 | 69 120, 130 | 0.43 0.84 | 80 80 | 70, 150 ³ 70, 150 ³ | 1 1 | 20 | 9 | 50 50 | 150 150 | | 150, 170 ³ 150-200 ³ |
| Source Sample | | Sample | | | Sample | Sample | Gen.So. | Gen.Sed. | Gen.So. | | Mat So./Gen Sed | | Mat.So. | | Gen.Sed./Gen So. | Gen.Sed | Mat So. | Gen.So./Mat So. | Mat So. | Gen.So. | Gen.So. | Gen.So. | Mat. So. | | Gen.Sed./Mat So |
| ID Eastern IRA Barrier Removal | Matrix | Location | Sediment Location | Location Area | Depth (m) | Sample Date | | | | | | | | | | | | | | | | | | | |
| EIRA-1 EIRA-2 | Sediment EAZ Sediment EAZ | P7-5 P7-5 | ATB ATB | EB | 0.4 0.8 | 14-Jul-17 14-Jul-17 | 0.17 0.23 | 3.39 3.72 | 56.1 41.5 | 0.27 0.25 | 0.119 0.115 | 24.3 | 5.19 5.48 | 17.4 17.5 | 6.4 6.09 | <0.050 <0.050 | 0.31 0.41 | 20.70 19.20 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 | 0.846 0.756 | 38.2 40.9 | 38.1 35.2 |
| EIRA-3 | Sediment EAZ | P7-3 P7-3 | OB | EB ED | 0.8 | 14-Jul-17 | 0.15 | 2.42 | 39.4 | 0.29 | 0.066 | 20.3 7.62 | 4.07 | 12.3 | 11.80 | < 0.050 | 0.28 | 6.05 | < 0.20 | <0.10 | < 0.050 | <2.0 <2.0 | 1.01 | 29.9 | 42 |
| EIRA-4 EIRA-5 | Sediment EAZ Sediment EAZ | P7-5 | OB ATB | EB EB | 0.4 | 14-Jul-17 14-Jul-17 | 0.14 0.19 | 2.57 3.34 | 28.5 88.5 | 0.23 0.28 | 0.068 0.104 | 8.24 20.6 | 4.59 6.29 | 13.9 17 | 10.60 6.21 | <0.050 <0.050 | 0.22 0.35 | 6.85 19.90 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 0.783 0.831 | 35 46.5 | 41.3 41.6 |
| EIRA-6 EIRA-7 | Sediment EAZ Sediment EAZ | P7-5 P4.9-5 | ATB ATB | EB EB | 0.8 | 14-Jul-17 17-Jul-17 | 0.22 <0.10 | 3.5 1.31 | 83.2 51.1 | 0.27 0.18 | 0.101 0.051 | 7.2 | 6.53 3.03 | 17.6 7.08 | 6.65 4.23 | <0.050 <0.050 | 0.46 | 19.20 5.40 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 0.802 0.875 | 45.6 28.1 | 44 19.6 |
| DUP-1 (EIRA-7) QA/QC RPD | Sediment EAZ | P4.9-5 | ATB | EB | 0.2 | 17-Jul-17 Duplicates | <0.10 | 1.14 | 40.6 23% | 0.18 | <0.050 | 6.68 7% | 2.8 | 6.61 7% | 3.85 | <0.050 | 0.23 | 4.77 12% | <0.20 | <0.10 | <0.050 | <2.0 | 0.669 27% | 29.5 5% | 18.4 6% |
| EIRA-8 EIRA-9 | Sediment EAZ Sediment EAZ | P5-3I P5.5-3R | NA OB | EB EB | 0.5 | 19-Jul-17 20-Jul-17 | 0.19 0.17 | 2.43 3.73 | 53 89.6 | 0.28 0.26 | <0.050 0.111 | 29 18.4 | 7.53 5.08 | 23.5 17.3 | 5.81 6.06 | <0.050 <0.050 | 0.56 <0.50 | 11.80 17.70 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 0.716 0.874 | 66.8 36.9 | 56.6 38 |
| EIRA-10 | Sediment EAZ | P5.5-3R | OB | EB | 0.4 | 20-Jul-17 | 0.17 | 2.95 | 70.2 | 0.25 | 0.097 | 18.5 | 5.32 | 15.8 | 5.50 | <0.050 | <0.50 | 18.10 | <0.20 | <0.10 | <0.050 | <2.0 | 0.812 | 34.9 | 33.4 |
| EIRA-11 EIRA-12 | Sediment EAZ Sediment EAZ | P5.5-3R P5.5-3R | OB OB | EB EB | 0.8 | 20-Jul-17 20-Jul-17 | 0.16 0.13 | 3.68 3.28 | 65.3 73.5 | 0.26 0.26 | 0.11 0.105 | 17.8 20.2 | 5.39 5.21 | 20.5 15.3 | 5.63 5.69 | <0.050 <0.050 | <0.50 <0.50 | 17.10 18.70 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 0.809 0.907 | 38 35.1 | 34.5 35.6 |
| EIRA-13 EIRA-14 | Sediment EAZ Sediment EAZ | P5.5-3R P5.5-3R | OB OB | EB EB | 0.4 | 20-Jul-17 20-Jul-17 | 0.15 0.17 | 3.11 2.82 | 76.3 56.4 | 0.25 0.24 | 0.098 | 17.3 19.7 | 5.62 6.46 | 17.4 16.2 | 5.78 6.11 | <0.050 <0.050 | <0.50 <0.50 | 19.40 17.00 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 0.877 0.716 | 39.7 39.3 | 37 37.6 |
| EIRA-15 EIRA-16 | Sediment EAZ Sediment EAZ | P5.25-5 P6.25-3 | ATB OB | EB EB | 0.3 | 21-Jul-17 22-Jul-17 | 0.14 0.12 | 3.19 3.53 | 76.8 46.4 | 0.24 | 0.102 0.089 | 21.8 6.47 | 4.99 3.66 | 14.8 12.1 | 6.21 14.60 | <0.050 <0.050 | 0.57 0.39 | 17.90 5.77 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 0.882 1.77 | 37.2 23.1 | 32.4 41.8 |
| EIRA-17 EIRA-18 | Sediment EAZ | P7-5 P7.5-3 | ATB OB | EB EB | 0.5 | 24-Jul-17 26-Jul-17 | 0.17 0.18 | 3.71 3.01 | 52.9 54.1 | 0.29 0.24 | 0.111 0.091 | 22.4 25.4 | 5.06 5.17 | 15.9 16.8 | 6.94 5.32 | <0.050 <0.050 | 0.29 0.29 | 19.10 18.50 | <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 0.964 0.708 | 38.9 36.6 | 35.7 38.7 |
| DUP-2 (EIRA-18) | Sediment EAZ Sediment EAZ | P7.5-3 | OB OB | EB EB | 0.4 | 26-Jul-17 | 0.14 | 3.37 | 51.4 | 0.24 | 0.108 | 20.1 | 5.75 | 16.9 | 5.78 | <0.050 | 0.29 | 18.10 | <0.20 <0.20 | <0.10 | <0.050 | <2.0 <2.0 | 0.74 | 41 | 39.5 |
| QA/QC RPD EIRA-19 | Sediment EAZ | P9-3R | OB | EB | 0 | Duplicates 27-Jul-17 | 0.19 | 11% 3.81 | 5% 71.5 | 0.26 | 0.105 | 23% 28.4 | 11% 4.91 | 1% 15.9 | 6.21 | <0.050 | 0.36 | 19.00 | <0.20 | <0.10 | <0.050 | <2.0 | 4% 0.862 | 11% 37 | 2% 35.3 |
| EIRA-20 EIRA-21 | Sediment EAZ Sediment EAZ | P9-3R P9-3R | OB OB | EB EB | 0 0.4 | 27-Jul-17 27-Jul-17 | 0.19 0.20 | 3.69 3.27 | 105 64.8 | 0.26 0.25 | 0.08 0.102 | 21.5 20 | 5.31 5.11 | 18.7 15.6 | 7.10 6.29 | <0.050 <0.050 | 0.33 0.36 | 20.50 17.10 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 1.05 | 41.2 40 | 37.7 34.4 |
| EIRA-22 DUP-3 (EIRA-22) | Sediment EAZ Sediment EAZ | P9-3R P9-3R | OB OB | EB EB | 0.4 | 27-Jul-17 27-Jul-17 | 0.17 0.15 | 2.92 2.75 | 37.1 32.4 | 0.28 0.23 | 0.096 0.088 | 23.4 17.9 | 5.08 4.56 | 16.8 15.6 | 6.13 6.17 | <0.050 <0.050 | 0.38 0.25 | 19.40 16.80 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 0.874 0.844 | 40 35.7 | 35.4 32.6 |
| QA/QC RPD EIRA-23 | Sediment EAZ | P9-3R | OB | EB | 0.8 | Duplicates 27-Jul-17 | 0.18 | 6% 2.36 | 14% 39 | 0.22 | 0.074 | 27% 11.2 | 11% 4.04 | 7% 11.7 | 1% 5.57 | <0.050 | 0.28 | 14% 9.46 | <0.20 | <0.10 | <0.050 | <2.0 | 3% 0.762 | 11% 35.5 | 8% 29.7 |
| EIRA-24 EIRA-25 | Sediment EAZ Sediment EAZ | P9-3R P9-5 | OB ATB | EB EB | 0.8 0.5 | 27-Jul-17 1-Aug-17 | 0.18 0.18 | 2.06 2.57 | 60.6 33.4 | 0.3 0.24 | 0.081 0.077 | 11.9 10.4 | 3.54 4.38 | 9.55 13.7 | 7.11 8.20 | <0.050 <0.050 <0.050 | 0.27 <0.50 | 8.54 10.90 | <0.20 <0.20 | <0.10 <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 <2.0 | 1.23 0.893 | 32.2 32.1 | 29.6 38.7 |
| DUP-5 (EIRA 25) | Sediment EAZ Sediment EAZ | P9-5 P9-5 | ATB | EB EB | 0.5 | 1-Aug-17 | 0.17 | 2.86 | 43.7 | 0.24 | 0.079 | 16.4 | 4.75 | 14.4 | 8.61 | <0.050 | <0.50 <0.50 | 15.30 | <0.20 | <0.10 | <0.050 | <2.0 <2.0 | 0.917 | 34.3 | 40.5 |
| QA/QC RPD EIRA-26 | Sediment EAZ | P9-7 | DS | EB | 0.5 | Duplicates 2-Aug-17 | 0.13 | 11% 2.23 | 27% 45.5 | 0.21 | 0.074 | 45% 14.9 | 8% 4.26 | 5% 14.3 | 5% 6.31 | <0.050 | <0.50 | 34% 11.30 | <0.20 | <0.10 | <0.050 | <2.0 | 3% 0.671 | 7% 33.6 | 5% 32.8 |
| EIRA-27 Western IRA Barrier Removal | Sediment EAZ | P9.5-5 | ATB | EB | 0.5 | 3-Aug-17 | 0.15 | 2.93 | 38.6 | 0.25 | 0.069 | 21.3 | 5.24 | 16.5 | 7.04 | <0.050 | 0.58 | 18.70 | <0.20 | <0.10 | <0.050 | 12.8 | 1.05 | 38.4 | 33.7 |
| WIRA-1 WIRA-2 | Sediment EAZ Sediment EAZ | P3-3 P3-3 | OB OB | WB WB | | 13-Jul-17 13-Jul-17 | 0.16 0.21 | 2.79 4.62 | 38.9 39.8 | 0.33 0.31 | 0.057 0.097 | 9.1 | 5.31 6.79 | 15.7 16.6 | 20.20 15.10 | <0.050 <0.050 | 0.59 | 6.99 8.58 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 1.38 | 36.1 46.8 | 52.9 59.3 |
| WIRA-3 Eastern Final Barrier Installation - Limit Sample | Sediment EAZ | P3-3 P3-3 | OB | WB | | 25-Aug-17 | 0.21 | 4.62 2.95 | 24 | <0.050 | 0.097 0.088 | 10.5 | 6.79 6.07 | 16.6 22.1 | 19.40 | <0.050 <0.050 | <0.50 | 8.58 8.46 | <0.20 <0.20 | <0.10 | <0.050 | 6.1 | 0.422 | 46.4 | 59.3 55.5 |
| ESA-1 ESA-2 | Sediment EAZ Sediment EAZ | P4.9-5 P4.9-5 | ATB ATB | EB EB | 0.5 0.5 | 17-Jul-17 17-Jul-17 | 0.22 0.14 | 3.88 1.62 | 55.1 52.2 | 0.27 0.23 | <0.050 <0.050 | 17.9 12.6 | 8.77 4.31 | 17.9 14.3 | 7.73 5.58 | <0.050 <0.050 | 0.75 0.44 | 7.64 6.29 | 0.29 <0.20 | <0.10 <0.10 | 0.056 <0.050 | <2.0 <2.0 | 0.917 0.855 | 83 54.5 | 47.1 33.9 |
| ESA-3 | Sediment EAZ | P4.9-5 | ATB | EB | 0.5 | 17-Jul-17 | 0.14 | 1.89 | 67.1 | 0.42 | <0.050 | 16.2 | 10.8 | 35.4 | 7.17 | < 0.050 | 0.37 | 11.90 | < 0.20 | <0.10 | 0.06 | <2.0 | 0.498 | 65.5 | 57.8 |
| ESA-4 ESA-5 | Sediment EAZ Sediment | P4.9-5 P4.9-5 | ATB ATB | EB EB | 1.3 | 17-Jul-17 18-Jul-17 | 0.18 0.46 | 1.55 2.61 | 27 73.2 | 0.21 0.31 | <0.050 <0.050 | 12.8 13.5 | 5.75 10.2 | 21 27 | 6.93 4.93 | <0.050 <0.050 | 0.43 0.36 | 6.90 7.95 | <0.20 0.21 | <0.10 <0.10 | 0.055 0.078 | <2.0 <2.0 | 0.588 0.499 | 59.5 68.3 | 46 58.1 |
| ESA-6 ESA-7 | Sediment EAZ Sediment EAZ | P5-3S P5-3I | USAT USAT | EB EB | 0.5 0.5 | 19-Jul-17 19-Jul-17 | 0.17 0.22 | 1.91 2.12 | 45 38.8 | 0.35 0.35 | <0.050 <0.050 | 16.5 20.7 | 17 6.76 | 38.7 29.6 | 8.44 5.34 | <0.050 <0.050 | 0.3 | 9.45 8.07 | <0.20 0.31 | <0.10 <0.10 | 0.071 0.061 | <2.0 <2.0 | 0.529 0.941 | 76.9 108 | 56.8 49.8 |
| ESA-8 ESA-9 | Sediment Sediment EAZ | P5-3I P5.5-3R | USAT OB | EB EB | 1.2 | 19-Jul-17 20-Jul-17 | 0.19 <0.10 | 2.45 0.74 | 83.7 3.1 | 0.43 <0.10 | 0.063 <0.050 | 14.8 0.93 | 12.2 0.59 | 35.8 0.99 | 6.77 0.82 | <0.050 <0.050 | 0.34 0.13 | 8.68 1.82 | <0.20 0.51 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 0.487 0.128 | 78.6 | 58.4 3.3 |
| ESA-10 ESA-11 | Sediment Sediment EAZ | P5.5-3R P5.25-5 | OB ATB | EB EB | 1.6 | 20-Jul-17 20-Jul-17 | 0.14 0.16 | 1.48 | 120 | 0.47 0.13 | <0.050 0.067 | 14.7 9.57 | 9.95 4.39 | 31.4 14.9 | 4.57 8.88 | <0.050 <0.050 | 0.13 0.41 | 8.44 6.22 | <0.20 <0.20 | <0.10 <0.10 | 0.081 <0.050 | <2.0 <2.0 | 0.505 0.459 | 82 35.3 | 71 40.6 |
| ESA-12 | Sediment EAZ | P6.5-3 | OB | EB | 0.5 | 24-Jul-17 | 0.13 | 1.22 | 65.3 | 0.45 | <0.050 | 15.7 | 11.9 8.71 | 38.1 | 7.03 4.45 | <0.050 | 0.28 | 8.83 | <0.20 | <0.10 | 0.062 | <2.0 | 0.498 | 64.5 | 67.1 |
| ESA-13 ESA-14 | Sediment Sediment EAZ | P6.5-3 P6.5-3 | OB OB | EB EB | 1.2 0.5 | 24-Jul-17 24-Jul-17 | 0.16 0.13 | 1.3 | 95.5 65.2 | 0.41 0.27 | 0.127 <0.050 | 22.8 9.78 | 10.6 | 32.7 36.5 | 4.54 | <0.050 <0.050 | 0.19 0.23 | 9.56 5.08 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 0.592 0.481 | 81.4 49.8 | 68.8 52.9 |
| ESA-15 ESA-16 | Sediment EAZ Sediment | P7-3 P7-3 | OB OB | EB EB | 0.5 1.2 | 25-Jul-17 25-Jul-17 | 0.18 0.13 | 1.69 1.27 | 65.8 74.8 | 0.4 0.33 | <0.050 0.062 | 12.1 13 | 8.14 7.88 | 33.4 25.5 | 6.70 4.09 | <0.050 <0.050 | 0.14 0.24 | 6.99 9.66 | <0.20 <0.20 | <0.10 <0.10 | 0.058 <0.050 | <2.0 <2.0 | 0.394 0.479 | 72.4 62.2 | 54 50.8 |
| ESA-17 ESA-18 | Sediment EAZ Sediment EAZ | P7-5 P7.5-3 | ATB OB | EB EB | 0.5 0.5 | 25-Jul-17 27-Jul-17 | 0.26 0.12 | 3.99 3.03 | 129 56.1 | 0.49 0.36 | 0.051 0.068 | 21.4 11.4 | 11.9 10.1 | 44.5 18 | 5.37 4.36 | <0.050 <0.050 | 0.24 | 10.60 7.75 | <0.20 <0.20 | <0.10 <0.10 | 0.07 0.11 | <2.0 <2.0 | 0.465 0.5 | 83.6 61.7 | 61.1 50.3 |
| ESA-19 ESA-20 | Sediment Sediment EAZ | P7.5-3 P7-5 | OB ATB | EB EB | 1.2 0.5 | 27-Jul-17 27-Jul-17 | 0.11 0.14 | 1.37 1.91 | 73.3 | 0.35 0.36 | 0.053 0.053 | 12.3 14.9 | 9.45 10.2 | 26.8 29.4 | 4.27 10.00 | <0.050 <0.050 | 0.16 0.15 | 8.99 8.23 | <0.20 <0.20 | <0.10 <0.10 | <0.050 0.066 | <2.0 <2.0 | 0.45 0.381 | 61.2 58.3 | 53.7 59.5 |
| ESA-21 ESA-22 | Sediment EAZ Sediment EAZ | P7-3 P7-3 | OB OB | EB EB | 0.3 | 26-Jul-17 26-Jul-17 | 0.19 0.19 | 1.32 1.25 | 45.6 55.4 | 0.31 0.38 | 0.064 0.053 | 13.7 17.5 | 7.85 10.5 | 22.4 29.4 | 5.81 5.30 | <0.050 <0.050 | 0.2 0.15 | 8.25 7.16 | <0.20 <0.20 | <0.10 <0.10 | 0.054 0.057 | <2.0 <2.0 | 0.517 0.6 | 65.2 73.3 | 52 59.9 |
| ESA-23 | Sediment EAZ | P7-3 | OB OB | EB EB | 0.9 | 26-Jul-17 27-Jul-17 | 0.21 0.19 | 1.49 | 49.2 110 | 0.33 0.43 | <0.050 | 12.8 | 8.49 10.8 | 26.9 34.2 | 5.13 6.55 | <0.050 | 0.13 0.11 | 6.16 | <0.20 | <0.10 <0.10 | 0.056 | <2.0 | 0.411 | 65 84.1 | 52.3 68.1 |
| ESA-24 ESA-25 ESA-26 | Sediment EAZ Sediment EAZ | P9-3R P9-3R | OB | EB | 0.6 | 27-Jul-17 | 0.20 | 1.29 2.26 | 63.8 | 0.44 | 0.069 0.115 | 21.8 26.9 | 10.5 | 34.9 | 5.81 | <0.050 <0.050 | 0.19 | 10.50 12.00 | <0.20 <0.20 | <0.10 | 0.082 0.103 | <2.0 <2.0 | 0.509 0.517 | 84.6 | 72 |
| DUP-4 (ERA-26) | Sediment EAZ Sediment EAZ | P9-3R P9-3R | OB OB | EB EB | 0.9 | 27-Jul-17 27-Jul-17 | 0.10 0.10 | 0.78 0.74 | 58.2 58.7 | 0.37 0.32 | <0.050 <0.050 | 12.7 12.4 | 7.16 | 24.3 | 3.69 3.61 | <0.050 <0.050 | <0.10 <0.10 | 7.83 7.58 | <0.20 <0.20 | <0.10 <0.10 | 0.091 0.096 | <2.0 <2.0 | 0.419 0.439 | 55.3 55.6 | 59.7 58.1 |
| QA/QC RPD ESA-27 | Sediment | P9-5 | ATB | EB | 1.2 | Duplicates 27-Jul-17 | <0.10 | 5% 0.77 | 1% 87.4 | 0.27 | <0.050 | 2% 9.76 | 0% 7.93 | 5% 24.5 | 2% 4.06 | <0.050 | <0.10 | 3% 6.30 | 0.24 | <0.10 | <0.050 | <2.0 | 5% 0.45 | 1% 54.8 | 3% 53.8 |
| ESA-28 ESA-29 | Sediment EAZ Sediment EAZ | P9-5 P9-3R | ATB OB | EB EB | 0.5 0.5 | 27-Jul-17 3-Aug-17 | 0.13 0.16 | 1.56 1.07 | 62.9 146 | 0.32 0.52 | <0.050 0.053 | 11.8 17.9 | 9.57 10.5 | 29 48.8 | 4.64 5.51 | <0.050 <0.050 | 0.27 0.19 | 6.09 10.30 | <0.20 <0.20 | <0.10 <0.10 | 0.069 0.065 | <2.0 <2.0 | 0.294 0.523 | 58 101 | 50.9 74.6 |
| ESA-30 ESA-31 | Sediment Sediment EAZ | P9-7 P9-7 | DS DS | EB EB | 1.2 0.5 | 3-Aug-17 3-Aug-17 | 0.12 0.18 | 0.8 1.91 | 345 46 | 0.39 0.24 | 0.083 0.071 | 15.8 13.4 | 7.27 6.77 | 26.5 19.6 | 4.49 7.56 | <0.050 <0.050 | 0.11 0.33 | 8.21 8.67 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 0.48 0.401 | 67.3 52 | 59.1 50.7 |
| ESA-32 ESA-33 | Sediment EAZ Sediment | P10-3S P9.5-5 | USAT ATB | EB EB | 0.5 1.2 | 3-Aug-17 3-Aug-17 | 0.14 0.14 | 2.01 | 86.2 73.7 | 0.42 | <0.050 0.061 | 13.8 16.4 | 9.73 8.76 | 30.2 31.5 | 4.97 4.11 | <0.050 <0.050 | 0.12 <0.10 | 7.40 8.47 | <0.20 <0.20 <0.20 | <0.10 <0.10 <0.10 | 0.084 | <2.0 <2.0 <2.0 | 0.348 | 65.5 76.2 | 56.7 63.9 |
| ESA-33 ESA-34 ESA-35 | Sediment EAZ Sediment EAZ | P9.5-5 P9.5-5 P10-3I | ATB USAT | EB EB | 0.5 0.5 | 3-Aug-17 3-Aug-17 4-Aug-17 | 0.14 0.15 0.14 | 0.87 0.87 1.26 | 80.1 44.2 | 0.48 0.36 | 0.061 0.197 <0.050 | 16.1 12.9 | 11.4 7.91 | 31.5 31 25 | 8.02 4.36 | <0.050 <0.050 <0.050 | 0.12 0.15 | 8.60 6.44 | <0.20 <0.20 <0.20 | 0.10 0.11 <0.10 | 0.084 0.079 0.06 | <2.0 <2.0 <2.0 | 0.444 0.508 0.465 | 88.1 62.4 | 57.7 48.2 |
| Western Final Barrier Installation - Limit Sample | es | | | | | | | | | | | | | | | | | | | | | | | | |
| WSA-1 WSA-2 | Sediment EAZ Sediment EAZ | P3-3 P3-3 | OB OB | WB WB | 0.5 0.8 | 13-Jul-17 13-Jul-17 | 0.25 0.28 | 2.81 2.53 | 26.2 28.7 | 0.26 0.21 | 0.096 0.062 | 14.9 13.6 | 5.64 6.4 | 20.7 15.7 | 5.96 12.70 | <0.050 <0.050 | 1.29 1.22 | 8.26 8.38 | <0.20 <0.20 | <0.10 <0.10 | <0.050 0.06 | <2.0 <2.0 | 4.12 3.73 | 59.5 54.1 | 43.4 44.3 |
| WSA-3 WSA-4 | Sediment EAZ Sediment EAZ | P3-3 P3-3 | OB OB | WB WB | 0.75 0.5 | 13-Jul-17 13-Jul-17 | 0.28 0.20 | 3.01 5.02 | 24.8 31.9 | 0.15 0.21 | 0.094 0.052 | 13.8 13.8 | 6.45 8.69 | 13.1 20.4 | 28.00 16.20 | <0.050 <0.050 | 1.79 1.56 | 8.13 8.58 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 3.8 3.47 | 56.3 60.2 | 41.6 43.5 |
| WSA-5 WSA-6 | Sediment EAZ Sediment EAZ | P3-3 P3-3 | OB OB | WB WB | 0.5 0.5 | 13-Jul-17 13-Jul-17 | 0.21 0.21 | 3.83 3.09 | 38.6 21.9 | 0.31 0.19 | 0.059 0.077 | 10.8 11.2 | 7.43 | 20.5 | 21.90 16.70 | <0.050 <0.050 | 1.38 | 7.67 9.11 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | 19.7 <2.0 | 2.92 0.363 | 41.9 50.8 | 50.6 63.5 |
| WSA-7 | Sediment EAZ | P3-3 | OB | WB | 0.5 | 13-Jul-17 | 0.36 | 4.74 | 38.2 | 0.24 | 0.188 | 15.9 | 9.29 | 23.5 | 10.90 | < 0.050 | 1.89 | 12.60 | < 0.20 | <0.10 | 0.091 | <2.0 | 1.11 | 58.8 | 55.9 |
| WSA-8 WSA-9 | Sediment Sediment | P3-3 P3-3 | OB OB | WB WB | 1.2 | 13-Jul-17 13-Jul-17 | 0.22 0.19 | 2.63 1.93 | 35.8 36.3 | 0.24 0.24 | <0.050 0.071 | 15.3 19.3 | 7.49 9.89 | 26.4 31.9 | 7.47 5.60 | <0.050 <0.050 | 0.39 0.25 | 7.80 8.95 | <0.20 <0.20 | <0.10 <0.10 | <0.050 0.061 | <2.0 <2.0 | 2.07 1.36 | 70.2 74.2 | 53 55.9 |
| WSA-10 WSA-11 | Sediment Sediment EAZ | P3-3 P3-3 | OB OB | WB WB | 1.2 0.2-0.5 | 15-Jul-17 15-Jul-17 | 0.17 0.27 | 1.94 3.41 | 122 27.8 | 0.26 0.25 | <0.050 0.057 | 12.6 14.9 | 8.72 7.35 | 27.2 23.2 | 5.84 11.70 | <0.050 <0.050 | 0.32 0.94 | 8.20 9.24 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 0.774 2.48 | 70.6 62.6 | 52.2 47.3 |
| WSA-12 WSA-13 | Sediment EAZ Sediment EAZ | P3-3 P3-3 | OB OB | WB WB | 0.5 0.5 | 15-Jul-17 15-Jul-17 | 0.25 0.20 | 4.04 3.3 | 24.4 26.6 | 0.21 0.18 | 0.069 0.083 | 15 19.3 | 6.77 7.78 | 18.9 16.2 | 12.70 4.78 | <0.050 <0.050 | 1.07 1.13 | 9.57 9.13 | 0.23 <0.20 | <0.10 <0.10 | <0.050 0.053 | <2.0 <2.0 | 2.6 2.62 | 54.1 58.1 | 39.6 35.9 |
| WSA-14 WSA-15 | Sediment EAZ Sediment EAZ | P3-3 P3-3 | OB OB | WB WB | 0.5 0.5 | 15-Jul-17 15-Jul-17 | 0.26 0.33 | 3.32 2.66 | 24.8 33.5 | 0.21 0.19 | 0.11 0.526 | 11.8 | 6.87 12.4 | 21.4 27.3 | 15.80 4.93 | 0.235 <0.050 | 0.64 0.64 | 9.02 | <0.20 | <0.10 <0.10 | <0.050 0.179 | <2.0 <2.0 | 0.706 4.04 | 47.8 73.5 | 62.9 47.5 |
| WSA-16 WSA-17 | Sediment EAZ Sediment EAZ | P3-3 P3-3 | OB OB | WB WB | 0.5 0.7 | 15-Jul-17 15-Jul-17 15-Jul-17 | 0.33 0.22 0.20 | 2.14 | 28 32.3 | 0.19 0.27 0.22 | <0.050 <0.050 | 14.2 18.3 | 9.44 8.35 | 31.9 30 | 6.92 4.76 | <0.050 <0.050 <0.050 | 0.31 | 7.84 9.13 | <0.20 <0.20 | <0.10 <0.10 <0.10 | 0.056 0.067 | <2.0 <2.0 <2.0 | 2.55 1.69 | 75.5 84.5 75.6 | 52.2 45.1 |
| Backfill and Grab Samples from Final Barrier Ins | stallation | F3-3 | UB | VVD | U./ | | | | | | | | | | | | | | | | | | | | |
| BF-SG-01 BF-SG-02 | Backfill Backfill | | | | | 12-Jul-17 12-Jul-17 | <0.10 <0.10 | 2.3 | 52.8 52.7 | 0.29 0.32 | <0.050 <0.050 | 5.05 3.31 | 4.14 3.75 | 41.2 4.46 | 5.57 1.13 | <0.050 <0.050 | 0.67 1.08 | 3.07 1.28 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 0.265 0.273 | 20.4 17.4 | 40.5 36.8 |
| BF-SG2 BF-SG2-1 | Backfill Backfill | | | | | 8-Aug-17 13-Jul-17 | <0.10 0.57 | 1.57 3.83 | 29.1 79.2 | 0.25 0.2 | <0.050 0.162 | 5.31 20.3 | 3.45 6.97 | 3.74 21.7 | 1.22 6.68 | <0.050 <0.050 | 2.45 1.19 | 2.73 21.20 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 0.263 0.326 | 18.7 43.1 | 32.4 62.6 |
| BF-SG2-2 GS17-01 | Backfill Grab | | | | | 13-Jul-17 4-Jul-17 | 0.34 0.19 | 3.23 3.8 | 44.9 42.6 | 0.19 0.18 | 0.075 0.111 | 23.2 22.8 | 5.87 6.61 | 13.2 | 1.91 | <0.050 <0.050 | 0.93 0.31 | 17.90 25.20 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 0.264 0.205 | 40.7 44.5 | 37.4 41.8 |
| GS17-02 | Grab | | | | *** | 4-Jul-17 | 0.16 | 2.89 | 46.6 | 0.16 | 0.089 | 22.6 | 6.04 | 16.5 | 1.60 | < 0.050 | 0.26 | 22.40 | <0.20 | <0.10 | < 0.050 | <2.0 | 0.175 | 39.1 | 34.9 |
| GS17-03 GS17-04 | Grab Grab | | | | *** | 4-Jul-17 4-Jul-17 | 0.20 <0.10 | 6.41 5.75 | 46.9 58.6 | 0.17 0.83 | 0.109 0.159 | 31.7 2.42 | 6.72 1.02 | 19 2.38 | 1.86 22.70 | <0.050 <0.050 | 0.26 2.13 | 27.50 3.22 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 0.182 6.95 | 47.5 2.16 | 38.4 47.2 |
| GS17-05 GS17-06 | Grab Grab | | | | | 4-Jul-17 4-Jul-17 | <0.10 <0.10 | 6.24 5.27 | 60.9 51.2 | 0.92 0.79 | 0.194 0.145 | 2.52 2.35 | 0.95 0.77 | 2.91 2.18 | 24.20 20.00 | <0.050 <0.050 | 2.25 1.95 | 3.49 2.93 | <0.20 <0.20 | <0.10 <0.10 | <0.050 <0.050 | <2.0 <2.0 | 7.83 6.54 | 1.77 | 52.2 45.5 29.7 |
| GS17-07 | Grab Grab | | | | ••• | 4-Jul-17 | 0.24 | 5.27 3.95 | 26.8 | 0.79 0.5 | 0.145 0.084 | 2.35 3.49 | 0.63 | 6.99 | 15.10 | <0.050 | 1.34 | 2.93 2.26 | <0.20 <0.20 | <0.10 | <0.050 <0.050 | <2.0 <2.0 | 4.61 | 1.42 2.13 | 29.7 |

TABLE 4 CONCENTRATIONS OF METALS IN SEDIMENT SAMPLES (µg/g [ppm]) FORESHORE PARKLAND BURNABY REFINERY

| | | | | | | | Antimony | Arsenic | Barium | Beryllium | Cadmium | Chromium | Cobalt | Copper | Fead | Mercury | Molybdenum | Nickel | Selenium | Silver | Thallium | Ē | Uranium | Vanadium | Zinc |
|---------------------------------------|-----------------------------------|--------------------|-------------------|---------------|---------------------|----------------|----------|----------|---------|--------------------------|---------------------------|-----------------|---------|----------------------|-----------------------|---------|------------|----------------------|----------|---------|----------|---------|----------|----------|-----------------------|
| Applicable Stage 11 (Housekeeping Ar | Amendment) Updated Standard 1 (Se | diments EAZ) | | | | | 20 | 10 | 700 | 85-100, 150 ³ | 1.0-2.0, 2.6 ³ | 60 2 | 25 | 67 | 69 | 0.43 | 80 | 70, 150 ³ | 1 | 20 | 9 | 50 | 150 | 150 | 150, 170 ³ |
| Applicable Stage 11 (Housekeeping Ar | Amendment) Updated Standard 1 (Se | diments) | | | | | 20 | 10 | 700 | 85-100, 150 ³ | 1 - 3.5, 5.0 ³ | 60 ² | 25 | 75, 130 ³ | 120, 130 ³ | 0.84 | 80 | 70, 150 ³ | 1 | 20 | 9 | 50 | 150 | 150 | 150-200 ³ |
| Source | | | | | | | Gen.So. | Gen.Sed. | Gen.So. | Mat.So. | Mat So./Gen Sed | Gen.Sed | Mat.So. | Gen.Sed./Gen So. | Gen.Sed./Gen So. | Gen.Sed | Mat So. | Gen.So./Mat So. | Mat So. | Gen.So. | Gen.So. | Gen.So. | Mat. So. | Mat. So. | Gen.Sed./Mat So |
| Sample ID | Matrix | Sample Location | Sediment Location | Location Area | Sample Depth (m) | Sample Date | | | | · | | • | | · | | | | | | | | | | | ļ |
| GS17-08 | Grab | | | | | 4-Jul-17 | 0.23 | 4.31 | 27.8 | 0.57 | 0.106 | 3.52 | 0.65 | 7.56 | 15.40 | < 0.050 | 1.46 | 2.35 | < 0.20 | <0.10 | < 0.050 | <2.0 | 4.74 | 2.2 | 40.5 |
| GS17-09 | Grab | | | | | 4-Jul-17 | 0.23 | 4.02 | 25.7 | 0.53 | 0.09 | 3.22 | 0.62 | 7.03 | 14.00 | < 0.050 | 1.37 | 2.19 | <0.20 | <0.10 | < 0.050 | <2.0 | 4.58 | 2.12 | 29.5 |
| Upgradient Samples from Final Barrier | er Installation | | | | | | | | | | | | | | | | | | | | | | | | |
| PW17-4@0.1-0.3 | Sediment EAZ | P3-3 | US | WB | 0.1-0.3 | 2-Oct-17 | 0.26 | 3.77 | 25.5 | 0.25 | 0.129 | 18.5 | 7.66 | 19.7 | 5.43 | < 0.050 | 1.01 | 11.60 | 0.29 | <0.10 | < 0.050 | <2.0 | 3.24 | 61.9 | 43.2 |
| PW17-4@0.7-0.9 | Sediment EAZ | P3-3 | US | WB | 0.7-0.9 | 2-Oct-17 | 0.26 | 4.92 | 24.1 | 0.22 | 0.166 | 16.9 | 10.7 | 21 | 5.21 | < 0.050 | 0.89 | 8.74 | 0.28 | <0.10 | 0.07 | <2.0 | 3.56 | 72.2 | 48.0 |
| PW17-16 @0.7-0.9 | Sediment EAZ | P6.25-3 | US | EB | 0.7-0.9 | 25-Aug-17 | 0.14 | 1.68 | 50.5 | 0.27 | < 0.050 | 14.9 | 7.52 | 23.5 | 5.01 | < 0.050 | 0.22 | 10.30 | < 0.20 | <0.10 | < 0.050 | <2.0 | 0.494 | 57.1 | 45.6 |
| PW17-21 @0.5-0.7 | Sediment EAZ | P7-3 | US | EB | 0.5-0.7 | 31-Aug-17 | 0.14 | 1.7 | 48.3 | 0.26 | 0.065 | 16.4 | 8.25 | 25.6 | 9.32 | < 0.050 | 0.2 | 12.20 | < 0.20 | < 0.10 | < 0.050 | <2.0 | 0.533 | 60.7 | 46.5 |
| PW17-26 @0.5-0.7 | Sediment EAZ | P8-3 | US | EB | 0.5-0.7 | 31-Aug-17 | 0.17 | 1.11 | 122 | 0.49 | 0.053 | 17.1 | 12.7 | 35.8 | 4.94 | < 0.050 | 0.15 | 10.30 | < 0.20 | <0.10 | 0.069 | <2.0 | 0.433 | 89.1 | 72.1 |

Page 9 of 9

Notes

- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit indicated.
- Sample concentration less than the detection limit in

SHADE

Sample concentration

Abbreviations

puging [pam] - micrograms per gram [parts per million] dry weight

m - melers

ACTONYMS

ATB. located in anchor trench barrier

CS - located cross slope

CSR - Conteminated Sites Regulation

DS - located drom slope

EA2 - ecologism schre zone

EB - eastern barrier

Gen. Sed - CSR gemeric numerical sediment (Marine/Estuarine) standard

Gen. Sed - CSR gemeric numerical sediment (Marine/Estuarine) standard

Gen. Sed - CSR gemeric numerical sediment (Marine/Estuarine) standard

Gen. Sed - CSR gemeric numerical sediment (Marine/Estuarine) standard

Gen. Sed - CSR gemeric numerical sediment (Marine/Estuarine) standard

Gen. Sed - CSR gemeric numerical sediment (Marine/Estuarine) standard

MR - no standard established for indicated parameter.

OB - located with the original barrier

USAT - located up slope anchor trench

WB - western barrier

Appendix A - Additional Background

Chevron Canada Limited (CCL) first observed non-aqueous phase liquid (NAPL) seeps on the north, downward slope of the Parkland (formerly Chevron) Burnaby Refinery towards Burrard Inlet during an inspection on April 21, 2010. The seeps were immediately reported to the Provincial Emergency Program and addressed using soaker pads and booms. Small volumes of NAPL were visually observed at the Site at the base of the approximately four metre high rip-rap embankment leading up to the railway. The seeps were initially observed along an approximately 20 metre long section of the Site.

The source of the NAPL is unknown but believed to be associated with historical Refinery operations and the north process sewer (decommissioned in June 2011).. Chemical analysis of the NAPL indicated that it consists of a mixture of semi-refined petroleum hydrocarbons in the diesel and straight-run gasoline ranges, along with the potential for small amounts of jet fuel and/or crude oil. None of the NAPL samples contained appreciable concentrations of metals (URS, 2011a). A ten well extraction well system was installed along the northern Refinery fence line in the summer of 2010 and has been operating since August 5, 2010 (URS, 2012b). In 2011, an additional 30 wells and pumps were added to the east and west of the initial extraction system and in June 2012, two new deeper extraction wells were installed in the centre of the original ten well system and replaced two of the original extraction wells (URS, 2013a). In addition, an interception trench system was installed along the Canadian Pacific Railway (CPR) Right of Way (ROW) in the spring of 2011.

1. PRELIMINARY AND DETAILED SITE INVESTIGATIONS

In June 2010, a Preliminary Site Investigation (PSI) was conducted that was followed by a Detailed Site Investigation (DSI) in January through April 2011 (URS, 2011a), by AECOM Canada Ltd. (formerly URS Canada Inc.) PCOCs identified during the PSI and DSI in porewater⁶, and surface water⁷ samples were compared to British Columbia (BC) Water Quality Guidelines (WQGs) for marine aquatic life. If no BC WQGs were available for certain PCOCs, then 1/10 the Contaminated Site Regulation (CSR) aquatic life (AW) standards were used for screening. If neither standard was available, a background approach based on Reference Area concentrations was used for the screening. A select number of PSI or DSI porewater samples analyzed exceeded the applicable regulatory screening levels for the following PCOCs in one or more samples:

- Volatile Petroleum Hydrocarbons in Water (VPHw);
- Benzene, Toluene, Ethylbenzene, Xylenes (BTEX);
- Light/Heavy Extractable Petroleum Hydrocarbons in Water (LEPHw / HEPHw);
- Polycyclic Aromatic Hydrocarbons (PAHs); and
- Metals (aluminum, boron, cadmium, cobalt, copper, iron, manganese, nickel, selenium, thallium, and zinc).

All eighteen of the surface water samples collected and analyzed during the DSI exceeded one or more of the applicable regulatory screening levels for xylenes and metals (aluminum, boron, iron, and cadmium).

DSI ambient air samples were compared to the CSR Schedule 11 Urban Park (PLv) Generic Numerical Vapour Standards. One air sample collected during the excavation component of the organoclay mats installation exceeded the applicable regulatory screening standard for benzene.

2. INTERIM REMEDIAL ACTION

In February and March 2011, IRA Barriers were constructed at the NAPL seep locations (URS, 2011b). The IRA Barriers consisted of: (a) excavating the beach sand to depths of approximately 0.6 metres immediately down slope of the seep locations; (b) back-filling with sand-organoclay mixture (2 to 3 parts of native beach sand to 1 part of organoclay) in order to intercept the seep and minimize NAPL mobilization below ground; (c) placing additional sand-organoclay mixture around large immovable boulders; (d) covering the surface and down slope portions of the sand-organoclay mixtures with a CETCO Reactive Core Material (RCM) mat; and finally (e) the placement of

⁶ In the DSI report water from wells screened from ground surface to 1 metre bgs was referred to as "porewater". The term "groundwater" was used to describe water collected from wells screened deeper than 1 metre bgs. However, since the update of ENV Technical Guidance 15, all subsurface water on the foreshore is now considered porewater. In this report, porewater in the top 1 metre is defined as "porewater ecologically active zone (EAZ)" and porewater deeper than 1 metre is defined as "porewater".

⁷ In the DSI report surface water was referred to as "seawater".

polyethylene sheeting, geogrid and large boulders to protect the RCM mat and the sand-organoclay barrier from the elements.

In November 2011, an assessment was completed by URS to assess the nature and extent of NAPL within and down slope of the sand-organoclay portions of both the Eastern and Western IRA Barriers. Based on field observations coupled with analytical results, NAPL impacts were encountered within the sand-organoclay mixture in both the Eastern and Western IRA Barriers and, to a lesser extent, down slope in the adjacent beach sand anchor trench in the Eastern IRA Barrier.

Based on the findings of the NAPL assessment, URS refurbished the Eastern IRA Barrier in March and April 2012. The refurbishment consisted of: (a) excavating the beach sand anchor trench to approximately 1 metre in depth to the base of the existing horizontal RCM mat, located immediately down slope of the original Eastern IRA Barrier; (b) installing a layer of RCM mat over the existing top surface of the Eastern IRA Barrier and down into the southern wall of the excavation; (c) installing a layer of RCM mat and polyethylene sheeting down into the northern wall of the new sand-organoclay excavation and folding the RCM back to the north over the native beach sand; (d) back-filling the trench with a sand-organoclay mixture (3 parts of imported sand to 1 part of organoclay), inserting baffles within the mixture, and folding the RCM mat and polyethylene sheeting over the newly installed, and original, RCM matting and polyethylene sheeting; and finally (e) installing a third layer of RCM mat over the existing Eastern IRA Barrier, the newly installed sand organoclay trench and 2 to 3 metres down slope towards Burrard Inlet.

During the course of the refurbishment of the Eastern IRA Barrier, approximately 368 cubic metres of sediment were excavated and disposed at an approved off-site facility. Twenty-seven confirmatory sediment samples collected from the base and sidewalls of the excavation contained concentrations less than the screening levels, and in most cases, less than the laboratory detection limit, indicating that all contamination was removed in the excavated area.

3. PREVIOUS MONITORING REPORTS

A monitoring plan and eight monitoring reports have been prepared and submitted to the ENV for the Site:

Foreshore Monitoring Plan, Chevron Burnaby Refinery, Burnaby, British Columbia. URS Canada Inc., June 29, 2012.

Foreshore Quarterly Monitoring Program Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia September to December 2011 URS Canada Inc., November 1, 2012.

Foreshore 2012 First Semi-Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia URS Canada Inc., December 19, 2012.

Foreshore 2012 Second Semi-Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia URS Canada Inc., March 26, 2013.

Foreshore 2013 First Semi-Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia URS Canada Inc., October 31, 2014.

Foreshore 2013 Second Semi-Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia URS Canada Inc., August 28, 2015.

Foreshore 2014 Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia AECOM, July 13, 2016.

Foreshore 2015 Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia AECOM, December 21, 2016.

Foreshore 2016 Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia AECOM, September 26, 2017.

The Foreshore 2015 Annual Monitoring Report (AECOM, 2016e) is available on the Parkland Community Advisory Panel website: http://chevroncap.com/files/current-issues.php. The most recent 2016 monitoring report (AECOM, 2017b) will be released online in 2018.

Appendix B - Regulatory Context

Several provincial and federal regulatory agencies share authority for assessing and managing contaminated sites in BC. The agencies that have regulatory power include the Fisheries and Oceans Canada (DFO), Environment and Climate Change Canada (ECCC), and the BC Ministry of Environment and Climate Change Strategy (ENV). The Site is under the jurisdiction of the VFPA. VFPA operates under the Canada Marine Act, and is a responsible agency under the Canadian Environmental Assessment Act. The ENV has taken the lead role in reviewing the remediation of the contamination at the Site.

Appropriate sections of the following laws and regulations applied during the design and construction of the FPTS:

- Canadian Environmental Protection Act, 1999 (S.C. 1999, c. 33) and associated regulations; Fisheries Act (R.S.C. 1985, c. F-14) and associated regulations
- Canada Marine Act (S.C. 1998, c. 10)
- Transportation of Dangerous Goods Act, 1992 (S.C. 1992, c. 34)
- Heritage Conservation Act (HCA) (R.S.B.C. 1996) c.187

Provincial statutes and regulations that apply to the management of sediment and porewater quality include:

- BC Environmental Management Act (EMA) (S.B.C. 2003, c. 53), effective July 8, 2004
- Contaminated Sites Regulation (CSR), BC Reg. 375/96, effective April 1, 1997 (including Stage 11 amendments, effective November 1, 2017)
- Hazardous Waste Regulation (HWR), BC Reg. 63/88, effective April 1, 1988 (including amendments up to B.C. Reg. 52/95)
- For surface water, the ENV Approved and Working WQG for marine aquatic life apply.

1. CANADIAN ENVIRONMENTAL PROTECTION ACT

Within the federal government jurisdiction, the Canadian Environmental Protection Act (CEPA) is the primary element of the legislative framework for preventing pollution and protecting the environment and human health. In general, CEPA:

- Makes pollution prevention the cornerstone of national efforts to reduce toxic substances in the environment;
- Sets out processes to assess the risks to the environment and human health posed by substances in commerce (in use) or used for manufacturing purposes in Canada;
- Imposes time frames for managing toxic substances;
- Provides a wide range of tools to manage toxic substances, other pollution and wastes; and,
- Ensures the most harmful substances are phased out or not released into the environment in any measurable quantity.

2. FISHERIES ACT

Under the authority of the Fisheries Act, DFO has decision-making authority for the conservation and protection of fish and fish habitat. The fish and fish habitat protection provisions of the Fisheries Act provide mechanisms to allow development of projects to occur while providing for the protection of fish and fish habitat.

The key sections within the act that directly apply to this project are:

- Section 35(1) of the Fisheries Act which prohibits the harmful alteration, disruption or destruction of fish habitat;
 and
- Section 36(3) of the Fisheries Act which prohibits the discharge of deleterious substances to water frequented by fish either directly or indirectly.

3. CONTAMINATED SITES REGULATION

The CSR under the EMA is the principal regulatory document defining requirements for contaminated sites management in BC. The CSR came into effect on April 1, 1997 and has been amended several times, with the most recent significant changes on November 1, 2017 via the Stage 11 Housekeeping Amendments. The EMA and CSR have provisions for both the numerical standards and risk-based standards approaches to managing site contamination. They outline the procedures for site assessment, remediation and application for environmental closure for a property. Numerical standards are key components of the requirements in the CSR as they define whether or not a site is contaminated. Land Remediation staff of the ENV currently oversee the ongoing investigation and remediation.

Under the CSR, there are three types of numerical remediation standards. 1) The Generic Numerical Standards refer to concentrations of given substances in soil or water for a particular land use. 2) Matrix Numerical Standards are applied for some substances in soil, taking into account various site-specific factors such as proximity to receiving waters, likelihood of human ingestion, and use of land for livestock rearing. 3) Site-Specific Numerical Standards involve the generation of a standard for a specific site, based on a protocol outlined by ENV.

3.1. STAGE 11 HOUSEKEEPING AMENDMENTS

ENV approved the Stage 10 Amendment (Omnibus) to the Contaminated Sites Regulation (CSR) on October 27, 2016. The Omnibus amendment updated over 8500 environmental quality standards and came into effect November 1, 2017. Since the introduction of the Omnibus, five Errata updates have been issued (Versions 1 - 5) with the most recent amendment being the Stage 11 (Housekeeping) Amendment, approved October 31, 2017, which corrected a number of errors in the Omnibus found during the year of transition prior to coming into legal force. Any submissions for Ministry services after November 1, 2017, have to be in compliance with the new standards. In conjunction with the Stage 11 Amendments, ENV has updated various protocols, guidance, procedures and policies.

The Stage 11 Amendments have included updates to all existing soil, water, vapour, and sediment standards to reflect contemporary science and have simplified the formatting and consolidation of the existing CSR schedules into four new schedules:

- Schedule 3.1 Part 1, Matrix Numerical Soil Standards;
- Schedule 3.1 Part 2, Generic Numerical Soil Standards to Protect Human Health;
- Schedule 3.1 Part 3, Generic Numerical Soil Standards to Protect Ecological Health;
- Schedule 3.2, Generic Numerical Water;
- Schedule 3.3, Generic Numerical Vapour Standards; and
- Schedule 3.4, Generic Numerical Sediment Standards.

4. HAZARDOUS WASTE REGULATION

The HWR, formerly the Special Waste Regulation, classifies substances as Hazardous Wastes if they contain leachable contaminants at concentrations in excess of a specified maximum, contain total concentrations in excess of a specified maximum, or are a listed waste type. The Toxicity Characteristic Leaching Procedure, United States Environmental Protection Agency Method 1311, is employed to assess contaminant leachability. Materials with contaminants detected in the leachate at concentrations exceeding the leachate quality standards specified in Table 1 of Schedule 4 of the HWR are considered a leachable toxic waste, and hence Hazardous Wastes. Hazardous Wastes defined by total concentrations include polychlorinated biphenyls waste, waste containing dioxin, waste oil, waste asbestos, waste containing tetrachloroethylene, and waste containing PAHs. Waste types listed in Schedule 7 of the HWR are considered hazardous wastes. Hazardous Wastes must be handled, stored and disposed of in accordance with the HWR.

Appendix C - Vancouver Fraser Port Authority Permit: 16-180



VANCOUVER FRASER PORT AUTHORITY PROJECT AND ENVIRONMENTAL REVIEW REPORT AND PERMIT

| PER No.: | 16-180 |
|-----------------------|--|
| Tenant: | Chevron Canada Limited |
| Project: | Chevron Refinery Foreshore Final Remedy |
| Project Location: | 5201 Penzance Drive, Burnaby |
| VFPA SID No.: | BBY089 |
| Land Use Designation: | Port Water |
| Applicant(s): | AECOM, on behalf of Chevron Canada Limited |
| Applicant Address: | 3292 Production Way, Burnaby, BC, V5A 4R4 |
| Category of Review: | В |
| Date of Approval: | May 24, 2017 |
| Date of Expiry: | May 31, 2022 |

1 INTRODUCTION

The Vancouver Fraser Port Authority (VFPA), a federal port authority, manages lands under the purview of the *Canada Marine Act*, which imparts responsibilities for environmental protection. VFPA accordingly conducts project and environmental reviews of works and activities undertaken on these lands to ensure that the works and activities will not likely cause significant adverse environmental effects. This project and environmental review report and project permit (the Permit) documents VFPA's project and environmental review of PER No. 16-180: Chevron Refinery Foreshore Final Remediation (the Project) proposed by AECOM working on behalf of Chevron Canada Limited (the Applicant).

This project and environmental review was carried out to address VFPA's responsibilities under the *Canada Marine Act*, and to meet the requirements of the *Canadian Environmental Assessment Act*, 2012 (CEAA 2012), as applicable. The proposed Project is not a CEAA 2012 "designated project" and an environmental assessment as described in CEAA 2012 is not required. However, VFPA authorization is required for the proposed Project to proceed and in such circumstances, where applicable, Section 67 of CEAA 2012 requires federal authorities to assure themselves that projects will not likely cause significant adverse environmental effects. This review provides that assurance. In addition, VFPA considers other interests, impacts and mitigations through the project and environmental review.

The project and environmental review considered the application along with supporting studies, assessments and consultations carried out or commissioned by the Applicant, as well as other information provided by the Applicant. In addition, this project and environmental review considered other information available to VFPA and other consultations carried out by VFPA. A full list of information sources germane to the review is provided in the following pages of this report.

This Permit is the authorizing document allowing the Applicant to proceed with the Project subject to the listed project and environmental conditions.

PER No. 16-180 Page 1 of 15

2 PROJECT DESCRIPTION

The Project is the final step in Chevron's Foreshore Remedial Action Plan (RAP) to remediate soil and groundwater near Chevron's Burnaby Refinery at 5201 Penzance Drive, Burnaby, BC. The Project is to mitigate environmental risk by managing the non-aqueous phase liquid (NAPL) and associated contaminants of concern in porewater and surface water in the vicinity of the NAPL seeps. The site of the NAPL seepage and of the Project is located in the northern portion of the refinery in and near the foreshore of Burrard Inlet. The proposed work will be conducted within 250m of archaeological site DhRr-0230.

After the initial observation of the seeps in April 2010, contaminants of concern were recorded in sediment, air, and ground and surface water, including petroleum hydrocarbons and select metals. The seeps were identified as two areas: Western Seep Area (WSA) and Eastern Seep Area (ESA), which are approximately 30m apart. Interim interceptor trenches were first installed in 2011, at both the WSA and ESA, as an interim measure to manage the seeps while more permanent solutions were studied. VFPA issued Permit 10-161 for the interim remediation project.

The works for the remediation activities are planned early July 2017 to late September 2017 at low tide during the day at normal operation hours. The footprint of the work site (including the ESA, WSA, rip-rap, and monitoring wells) is approximately 140m x 30m, or 4200m². The excavation footprint will range from 950m² to 1500m², depending on the extent of contaminated soils in the WSA. The site is not accessible by road; therefore, all equipment will be loaded on a barge and mobilized via Burrard Inlet to the site.

The Project consists of removing the interim remediation barriers installed in 2011 in the foreshore, and installing new permanent remediation measures. The ESA will have subsurface treatment cells installed; the WSA is not expected to require subsurface treatment cells and will be backfilled with appropriate matching subgrade material, provided no contaminated soils are found. If contaminated soils are discovered in the WSA, the size of the WSA excavation will be expanded and subsurface treatment cells will be installed in the same manner as the ESA. Rip-rap will be installed on the foreshore to protect the remediation structures and also to prevent scouring of the slope near the CP Rail right-of-way. Approximately 23 monitoring wells are proposed to be installed. A qualified remediation contractor will conduct these works.

The Applicant completed a *Fisheries Act* self-assessment and submitted a Request for Project Review to Fisheries and Oceans Canada (DFO). DFO responded that a *Fisheries Act* authorization is not required for the project given that serious harm to fish can be avoided by following standard measures. The Applicant will only work in the foreshore during low tide to keep works dry. No equipment or open excavations will be left in intertidal areas overnight or during high tides.

The Applicant has prepared a Construction Environmental Management Plan (CEMP) that includes measures to mitigate potential environmental impacts including: sediment transport and turbidity, contaminated soil and groundwater, riparian vegetation, and spills and leaks. An Environmental Monitor will ensure compliance with the CEMP, this Permit, and applicable environmental regulations. The Environmental Monitor will prepare weekly reports. A qualified archaeological monitor will be on site during ground disturbance to native soils. Aboriginal groups will be given the opportunity to participate in archaeological and environmental monitoring during the Project.

Confirmatory excavation sampling will follow the BC Ministry of Environment's *Technical Guidance 1* Site Characterization and Confirmation Testing (2009) with samples collected every metre vertically and every 5 metres horizontally from the base and side walls of excavations. Soils and groundwater that are confirmed to be contaminated will be removed and transported to an

PER No. 16-180 Page 2 of 15

approved disposal site. Confirmed contaminated soil will be removed to the extent allowed without affecting geotechnical stability of the CP Rail slope and right-of-way.

The Applicant plans to monitor contamination for a minimum of three (3) years post-construction. The Applicant will conduct ongoing vegetation maintenance and management near the Project site over the life of the remediation structures (~30 years). Rip-rap replacement may be required in the future, subject to a separate subsequent approval by VFPA.

The BC Ministry of Environment (BC MOE) has reviewed the Project and supports the planned works, as outlined in their letter to Chevron dated September 9, 2016.

In this project permit, the Project means the physical activities authorized by VFPA to be carried out pursuant to **PER No. 16-180**, as described below.

2.1 Proposed Works

- 1. Access to foreshore by loading equipment on a barge and mobilizing via Burrard Inlet to the site, and returning equipment to the barge prior to high-tide.
- 2. Removal of an estimated 150m² of riparian vegetation, including trees, shrubs, and ferns. Vegetation maintenance will be performed over the lifetime of the remedy to prevent damage to the remedy structures.
- 3. Removal of the boom near the ESA.
- 4. Excavation and removal of the existing interim remediation barriers (approximately 44m) from the WSA and ESA. The excavations will be staged in 5 to 10 metre segments along the length of the foreshore. Each segment will be excavated, backfilled and covered by the end of each work day before the tide covers the site; there will be minimal in-water works.
- 5. Contaminated soil and groundwater will be removed and transported on a barge in polypropylene super sack bags. All disposals will be at approved disposal sites.
- 6. Installation of the new permanent remediation barrier at the ESA within trench segments (5 to 10 metres) in the foreshore. This includes imported fill (e.g., gravel, sand, clay), geogrid filter fabric, and poly sheeting. The ESA subsurface treatment cells will be covered by an oleophilic biobarrier geocomposite to capture potential NAPL sheens. A layer of cobbles 20 centimetres (cm) thick will anchor the oleophilic biobarrier composite.
- 7. Installation of natural, non-leaching rip-rap of a median 0.7 metres in diameter and total rip rap thickness of 1.4 metres to protect the ESA remediation structures and for scour protection of the CP Rail right-of-way slope from wave forces generated by 100-year storm events and ship wakes.
- 8. The WSA trench segments will be backfilled with appropriate matching subgrade materials unless additional contamination is discovered, upon which the WSA excavation area will be extended and will receive similar remedy structures as the ESA.
- 9. Installation of 23 monitoring wells with concrete risers to protect them from shifting rip-rap. Porewater wells will be placed up slope, within and down slope of the ESA and WSA to monitor performance and establish compliance with applicable standards.

3 VANCOUVER FRASER PORT AUTHORITY INTERNAL REVIEWS

The following VFPA departments have reviewed the application and support approval of the Project subject to the listed project and environmental conditions.

 $oxed{oxed}$ Planning $oxed{oxed}$ Environmental Programs $oxed{oxed}$ Engineering

 $oxed{oxed}$ Marine Operations $oxed{oxed}$ Project Communications $oxed{oxed}$ Aboriginal Affairs

PER No. 16-180 Page 3 of 15

4 ABORIGINAL CONSULTATION

VFPA Aboriginal Affairs reviewed the proposed works and determined that the project may have the potential to adversely impact Aboriginal rights.

Scope of Consultation

- Tsleil-Waututh Nation
- Squamish Nation
- Musqueam Indian Band
- Sto: lo Nation
- Hul'qumi'num Treaty Group
 - Halalt First Nation
 - Lake Cowichan First Nation
 - Lyackson First Nation
 - o Penelakut Tribe
 - Cowichan Tribes
 - Stz'uminus First Nation

All Aboriginal groups listed above were consulted on the proposed project.

Overview of Consultation Activities

On December 14, 2016, a referral package was sent to each of the Aboriginal groups listed above. The referral package included:

- Referral Letter
- Permit Application
- Project Overview Map
- Project Remedial Action Plan

Comments were requested from Aboriginal groups within 40 business days, by February 10, 2017. VFPA elected to extend the review period from the usual 30 business days to account for office closures over the December holiday in some Aboriginal communities.

On January 12, 2017, VFPA sent an update email, reminding Aboriginal groups about the project review and requesting comments by the February 10, 2017 deadline.

VFPA received comments from Aboriginal groups via letters and email. VFPA responded to all comments from Aboriginal groups.

Summary of Issues

Below is a table summarizing comments received by VFPA and how they were considered as part of the project and environmental review.

PER No. 16-180 Page 4 of 15

| Issue | VFPA Considerations | Action Required |
|--|--|---|
| Current use of la | nds and resources for traditional purposes | |
| Contamination of Burrard Inlet | The project involves installing barriers to impede remaining contamination from entering the inlet, and installing long-term monitoring wells to monitor contamination and to assess whether or not further action needs to be taken. This project will reduce contamination and provide an overall environmental benefit to Burrard Inlet. In acknowledgement of the concerns of Aboriginal groups about the contamination, the Applicant committed to making communications relating to monitoring available. | VFPA included the following permit condition (no. 43): The Applicant shall make monitoring reports available to Aboriginal groups. |
| Presence of Aboriginal group environmental monitors on-site during installation | VFPA acknowledges that the environmental health of Burrard Inlet is of high importance to Aboriginal groups. VFPA is interested in working with Aboriginal groups to allow environmental monitors to be on-site during project works. | VFPA included the following permit condition (no. 25): The Applicant shall make opportunities available for Aboriginal groups to participate in environmental monitoring during project works. |
| Monitoring and Sampling of Project Area | The Applicant will undertake a monitoring and sampling program for three years, after which the program will be reviewed. Monitoring will likely occur for five years or more, but likely at a reduced frequency, subject to the analytical results from the first three years. The Applicant committed to copying Aboriginal groups on communications related to this issue. | VFPA included the following permit condition (no. 43): The Applicant shall make monitoring reports available to Aboriginal groups. |
| Preservation of sandy beach | The Applicant has completed the remedial design to limit the amount of sandy beach that will be altered while still installing a robust system that is protective of the environment. | None |

PER No. 16-180 Page 5 of 15

| Issue | VFPA Considerations | Action Required |
|---|---|--|
| Principle of net environmental gain, rather than no net environmental loss | VFPA continues to seek opportunities to work with Aboriginal groups and others to improve environmental management practices and to provide net environmental benefits through various initiatives. VFPA is also keen to continue identifying shared interests and to focus on collaborative projects with Aboriginal groups that will result in net environmental gains within Burrard Inlet. | None |
| | The Applicant provided a response recognizing that Aboriginal groups are leaders in environmental stewardship in Burrard Inlet. Chevron is working with Aboriginal groups and others on environmental initiatives that benefit Burrard Inlet. | |
| Monitoring of future cumulative effects of ground and surface water | The Applicant will undertake a monitoring and sampling program for three years, after which the program will be reviewed. Monitoring will likely occur for five years or more, but likely at a reduced frequency, subject to the analytical | VFPA included the following permit condition (no. 43): The Applicant shall make |
| contamination | results from the first three years. The Applicant committed to copying Aboriginal groups on communications related to this issue. | monitoring reports available to Aboriginal groups. |
| | The Applicant developed risk-based management targets (RBMTs) which were finalised in 2014 and approved by the BC MOE. The RBMTs are site-specific concentration limits for the parameters of concern in the site porewater, and are designed to be protective of aquatic life that may experience potentially long-term exposures. As long as the concentrations of the parameters are below the RBMTs (which the remedy is designed | |
| | to ensure), the ecological function and viability of aquatic life in the foreshore will be maintained. The RBMTs form an integral part of the performance monitoring program described in the RAP. | |
| Impacts to fish and fish habitat as a result of ground and surface water contamination | Impacts to fish and fish habitat are not expected as a result of the project. An analysis of the potential effect on the physical fish habitat was completed and submitted to Fisheries and Oceans Canada as part of the Request for Review process. That analysis showed that the physical changes to the Foreshore area would not result in significant harm to fish. | None |

PER No. 16-180 Page 6 of 15

| Issue | VFPA Considerations | Action Required | | |
|---|---|---|--|--|
| Loss of riparian vegetation resulting from lowering of groundwater levels | The drawdown from the Perimeter Extraction System is limited to 10 to 30 meters from the well. The wells are located far enough from Burrard Inlet to affect the water table near the inlet. Therefore, the project is not expected to have an effect on riparian vegetation as a result of lowering groundwater levels. | None | | |
| Loss of wildlife habitat resulting from lowering groundwater levels | The drawdown from the Perimeter Extraction System is limited to 10 to 30 meters from the well. The wells are located far enough from Burrard Inlet to affect the water table near the inlet. Therefore, the project is not expected to have an effect on wildlife habitat as a result of lowering groundwater levels. | None | | |
| Cultural Heritage | | | | |
| Project area holds high cultural value for TWN Impacts to archaeological resources | VFPA acknowledges the importance of the area to Aboriginal groups. The Applicant recognizes the cultural sensitivity of the site and has been working with an Aboriginal-owned business to ensure all activities are carried out in regards to this sensitivity. VFPA understands that the Applicant is working with Aboriginal groups to address potential impacts to archaeology. This includes the use of Aboriginal cultural monitors during project works. | VFPA included the following permit condition (no. 24): The Applicant shall make opportunities available for Aboriginal groups to provide archaeological monitors during project works. | | |
| Additional Issues | | | | |
| Outstanding project design considerations | VFPA will endeavor to share details around materials used with Aboriginal groups when they become available from the Applicant. This may occur through a post-construction report, which will be shared with Aboriginal groups. | None | | |

Based on the record of consultation, VFPA is of the view that the duty to consult has been met.

5 NOTIFICATIONS

5.1 Community Notification

The proposed Project was assessed by VFPA to have minimal or no potential impacts to community interests in the surrounding area either during construction or once the project is completed. Therefore no community consultation or construction notification was required.

PER No. 16-180 Page 7 of 15

6 INFORMATION SOURCES

VFPA has relied upon the following sources of information in its review of the Project.

- Application form and materials submitted by the Applicant on behalf of the tenant on November 23-December 16, 2016.
- Foreshore Remedial Action Plan Below Area 2 Eastern Impounding Basin Chevron Burnaby Refinery, Burnaby, BC" October 27, 2016, AECOM
- Letter titled "Final Remediation Action Plan Below Area 2 Eastern Impounding Basin Chevron Refinery", September 9, 2016, Lavinia Zanini of the BC Ministry of Environment
- Email dated 2016-10-04, from Michael Engelsjord of DFO to Chris Boys of Chevron, "Serious harm to fish can be avoided or mitigated."
- Draft Construction Environmental Management Plan (CEMP) for the Foreshore Final Remedy submitted by Aecom February 3, 2017.
- Email correspondence from Michael Gill May 15, 2017 re: Cost Proposal for tree planting at EIB in Area 2.
- All plans and drawings labelled PER No. 16-180-A to D.

7 PROJECT AND ENVIRONMENTAL CONDITIONS

VFPA has undertaken and completed a review of the Project in accordance with the *Canada Marine Act* and Section 5 of the Port Authorities Operations Regulations and, as applicable, Section 67 of the *Canadian Environmental Assessment Act*, 2012.

If at any time the Applicant fails to comply with any of the project and environmental conditions set out in the project permit (the Permit) below, or if VFPA determines that the Applicant has provided any incomplete, incorrect or misleading information in relation to the Project, VFPA may, in its sole and absolute discretion, cancel its authorization for the Project or change the project and environmental conditions to which such authorization is subject.

Pursuant to Section 29 of the Port Authorities Operations Regulations, VFPA may also cancel its authorization for the Project, or change the project and environmental conditions to which such authorization is subject, if new information is made available to VFPA at any time in relation to the potential adverse environmental and other effects of the Project.

The following are the minimum conditions that must be followed by the Applicant to mitigate potential or foreseeable adverse environmental and other effects.

| No. | GENERAL CONDITIONS |
|-----|--|
| 1. | This Permit is conditional on a valid tenure agreement with respect to the subject premises being in place. No construction or any other physical activities may commence in the absence of a valid tenure agreement. |
| 2. | This Permit is granted subject to the fulfillment of all other requirements of VFPA, relating to the Project. Furthermore, prior to commencing construction or any other physical activities the Applicant shall ensure that it has complied with all other necessary legal requirements and that all necessary regulatory approvals have been obtained. |
| 3. | This Permit in no way endorses or warrants the design, engineering, or construction of the Project and no person may rely upon this Permit for any purpose other than the fact that VFPA has permitted the construction of the Project, in accordance with the terms and conditions of this Permit. |

PER No. 16-180 Page 8 of 15

- 4. In consideration of the granting of this Permit by VFPA the Applicant agrees to indemnify and save harmless VFPA against any and all actions, claims, loss, damages or other expenses in any way arising or following from or caused by the granting of this Permit or the construction or operation of the Project as contemplated by this Permit.
- 5. The Applicant is responsible for locating all existing site services and utilities including any located underground and to employ best practices and meet applicable code requirements with respect to protection of existing site services and clearance between existing and proposed site services. The Applicant is responsible for repair or replacement of any damage to existing site services and utilities, to the satisfaction of VFPA, that result from construction and operation of the Project.
- 6. The Applicant shall undertake and deliver the Project to total completion in a professional, timely and diligent manner in accordance with the Application submitted by the Applicant and the applicable standards and specifications set out in the sections above entitled Project Description and Information Sources. The Applicant shall not carry out any other physical activities unless expressly authorized by VFPA.
- 7. The Applicant shall establish a spill prevention, containment and clean-up plan for hydrocarbon products (including fuel, oil and hydraulic fluid) and any other deleterious substances using standards, practices, methods and procedures to a good commercial standard, conforming to applicable law and using that degree of skill and care, diligence, prudence and foresight which would be reasonably and ordinarily expected from a qualified, skilled and experienced person engaged in a similar type of undertaking under the same or similar circumstances. The Applicant shall ensure that appropriate spill containment and clean-up supplies are available on site at all times and that all personnel working on the project are familiar with the spill prevention, containment and clean-up plan.
- 8. The Applicant shall have due regard to the potential application of the *Migratory Birds Convention Act* (Canada) and/or the *Wildlife Act* (British Columbia). To reduce the risk of Project-related harm to birds and/or their active nests and eggs, the Applicant may wish to avoid certain physical activities during the general bird breeding season, which falls between **April 1 and July 31**, or outside of this time span if occupied nests are present. The Applicant shall exercise all due diligence to avoid causing harm to birds and/or their active nests and eggs.

The Applicant shall also have due regard to nests of those species of birds protected by Applicable Law at all times of the year, regardless of the time of year or whether or not the nests are occupied. The Applicant should, where circumstances warrant, retain the services of qualified environmental professionals to assist in developing and undertaking appropriate bird nest surveys immediately before, during and after the general bird breeding season.

- The Applicant shall cooperate fully with VFPA in respect of any review by VFPA of the Applicant's compliance with these conditions including, without limitation, providing any information or documentation required by VFPA.
- 10. The Applicant shall make a copy of this Permit available to all employees, agents, contractors, licensees and invitees prior to commencing any physical activities. The Applicant shall be solely responsible for ensuring that all such employees, agents, contractors, licensees and invitees comply with these conditions.

PER No. 16-180 Page 9 of 15

| 11. | The Applicant shall make available upon request by any regulatory authority (such as a Fishery Officer) a copy of this Permit. | | |
|-----|--|---|--|
| 12. | Unless otherwise noted, the Applicant shall submit all documents required for VFPA approval to email: per@portvancouver.com ; fax: 1-866-284-4271 and referencing PER No.16-180. | | |
| | CONDITIONS – PRIOR TO COMMENCING CONSTRUCTION OR ANY PHYSICAL ACTIVITIES | SUBMISSION TIMING (business days) | |
| 13. | The Applicant shall notify the Fisheries and Oceans Canada (DFO), Conservation and Protection Field Supervisor for Fraser Valley West in Langley, British Columbia (tel: 604-607-4150; fax: 604-607-4199). The Applicant shall copy VFPA Environmental Programs and the Harbour Master on this notification EnvironmentalPrograms@portvancouver.com and Harbour_Master@portvancouver.com ; or fax 1-866-284-4271. | 2 days before commencing construction or any physical activities | |
| 14. | The Applicant shall submit signed and sealed drawings for proposed works approved for construction by a professional engineer licensed to practice in the Province of British Columbia. | 5 days before commencing construction or any physical activities | |
| 15. | The Applicant shall distribute a construction notice to the City of Burnaby describing the works and activities, hours of construction, and contact information. The Applicant shall copy VFPA when the construction notice is distributed. | 10 days before commencing construction or any physical activities | |
| 16. | Prior to the commencement of any vessel-related activities, the Applicant shall contact the appropriate Canadian Coast Guard ("CCG") Marine Communications and Traffic Services ("MCTS") centre regarding the issuance of a Notice to Shipping ("NOTSHIP") to advise the marine community of potential hazards associated with the Project. The Applicant must advise CCG that works are planned to occur | As per Coast Guard requirements | |
| | near a CCG-owned radar tower. | | |
| 17. | The Applicant shall submit a Vegetation Compensation Plan to the satisfaction of VFPA. The Vegetation Compensation Plan must include a description of the type and area of vegetation to be removed and describe how impacts will be compensated. | 10 days before commencing construction or any physical activities | |
| 18. | The Applicant shall submit a finalized Construction Environmental Management Plan (CEMP) to the satisfaction of VFPA. | 10 days before commencing construction or any physical activities | |
| | CONDITIONS – DURING CONSTRUCTION OR ANY PHYSICAL ACTIVITIES | | |
| 19. | The Applicant shall notify VFPA upon commencement of construction or any physical activities of the Project. | | |

PER No. 16-180 Page 10 of 15

20. The Project shall be monitored by an appropriately qualified Environmental Monitor. The Environmental Monitor shall be empowered in writing to direct works to ensure compliance with this Permit and the Construction Environmental Management Plan. Monitoring events shall occur when the Environmental Monitor deems it appropriate but in no case less than weekly, and shall be full time during works with potential to cause adverse effects on fish or fish habitat. The Environmental Monitor shall provide monitoring reports to VFPA on a weekly basis or 21. more frequently if circumstances warrant. The VFPA reserves the right to rule on the adequacy of the monitoring and the content of the reports. All general construction and physical activities related to the Project shall be conducted from Monday to Saturday between the hours of 7:00am and 8:00pm. No construction and physical activities shall occur during Sundays or holidays. These hours shall not be modified without prior approval from VFPA. 23. The Applicant shall ensure that an appropriately qualified archaeological monitor be on site at all times during ground disturbing activities that may intrude into native soils. 24. The Applicant shall make opportunities available for Aboriginal groups to provide archaeological monitors during project works. 25. The Applicant shall make opportunities available for Aboriginal groups to participate in environmental monitoring during project works. In the event that evidence of what is suspected to be an archaeological resource is 26. encountered, the Applicant shall: a) Immediately stop any activities that might disturb the archaeological resource or the site in which it is contained ("Site"). b) Not move or otherwise disturb the artifacts or other remains present at the c) Stake or flag off the Site to prevent additional disturbances. d) Immediately notify VFPA. 27. The Applicant shall not, directly or indirectly: (a) deposit or permit the deposit of a deleterious substance of any type in water frequented by fish in a manner contrary to Section 36(3) of the Fisheries Act; or (b) adversely affect fish or fish habitat in a manner contrary to Section 35(1) of the Fisheries Act. 28. The Applicant shall ensure that debris and waste material resulting from the Project are contained, collected, and disposed of at suitable upland locations using standards, practices, methods and procedures to a good commercial standard, conforming to applicable law and using that degree of skill and care, diligence, prudence and foresight which would be reasonably and ordinarily expected from a qualified, skilled and experienced person engaged in a similar type of undertaking under the same or similar circumstances. 29. The Applicant shall ensure that all equipment is in good mechanical condition and maintained free of fluid leaks, invasive species, and noxious weeds.

PER No. 16-180 Page 11 of 15

30. The Applicant shall not permit barges or other vessels used during the Project to ground on the foreshore or seabed or otherwise disturb the foreshore or seabed (including disturbance as a result of vessel propeller wash), excepting only such disturbance as is reasonably required to complete the Project. 31. Works in shoreline shall be limited to the project area as defined in the Construction Environmental Plan and PER No. 16-180-A to D. The Applicant shall be responsible for the repair of any damage, contamination, or erosion resulting from disturbance to the intertidal foreshore during the Project. Existing native riparian vegetation shall be retained where possible, and disturbance or 32. clearing of vegetation shall be staged and strictly limited to that required for Project implementation. 33. Works in the intertidal area shall be undertaken in the dry (i.e., above the water surface). 34. The Applicant shall use a clean excavator bucket. The bucket and any portion of the excavator arm that will be in contact with or near Burrard Inlet shall be clean prior to the start of works. 35. The direct or indirect release or deposit of sediment or sediment laden water into the aquatic environment shall be minimized during the works. In this regard, reference should be made to the water quality criteria described in the British Columbia Water Quality Guidelines (Criteria): May 2015 Edition produced by the BC Ministry of Environment. 36. Should contaminated materials be encountered, the Applicant shall ensure that all contaminated materials, including contaminated drill cuttings and equipment wash water, are removed, contained, and disposed of at appropriate off-site facilities using standards, practices, methods and procedures to a good commercial standard, conforming to Applicable Law and using that degree of skill and care, diligence, prudence and foresight which would be reasonably and ordinarily expected from a qualified, skilled and experienced person engaged in a similar type of undertaking under the same or similar circumstances. Suspect materials should be treated as contaminated or stockpiled until their environmental quality has been determined. Materials brought onto the property to be used for backfilling, site preparation, or other 37. uses shall be from sources demonstrated to be clean and free of environmental contamination.

PER No. 16-180 Page 12 of 15

38. During any vessel-related activities, the Applicant shall: a) Position vessels and equipment associated with the Project in such a manner so as not to obstruct line of sight to navigational aids or markers. b) As per the International Regulations for Preventing Collisions at Sea, exhibit the appropriate lights and day shapes at all times. c) Monitor the VHF channel used for MCTS communications in the respective area at all times and participate as necessary. d) Be familiar with vessel movements in areas affected by the Project. The Applicant shall plan and execute the Project in a manner that will not impede navigation or interfere with vessel operations. e) During night hours, unless working 24 hrs per day, the rig and associated equipment shall be moored outside the navigation channel and lit in accordance with all applicable regulations. SUBMISSION TIMING CONDITIONS – UPON COMPLETION (Business Days) 39. The Applicant shall notify VFPA upon completion of the Project. Within 10 days of completion 40. The Applicant shall provide record drawings, in both AutoCAD and Within 40 days of Adobe (PDF) format to VFPA. completion 41. The Applicant shall confirm the Project was constructed within the Within 40 days of tenured area by providing to VFPA: completion a) Digital photographs of the tenured area, both before and after construction of the Project, from the land and water side of the tenured area.

c) A letter from an engineer confirming the Project was

The Applicant shall submit a comprehensive post-construction

remains at the site, and any new contamination characteristics that can be attributed to the site; A summary of all environmental monitoring and

Copies of all manifest for contaminated soils and groundwater removed from the Project location; and Plans and schedules for post-construction monitoring as detailed in "Section 8: Performance Verification Plan" of the Applicant's Foreshore Remedial Action Plan dated October

A description of any known or suspected contamination that

constructed within the tenured area.

report, to VFPA's satisfaction, which shall include:

environmental incidents for the Project;

b) A survey plan.

27, 2016.

42.

PER No. 16-180 Page 13 of 15

Within 40 days of

completion

43. The Applicant shall provide VFPA all future environmental monitoring data and reports that are related to the Project until such time that environmental monitoring at the Project site is completed. Monitoring data and reports shall include, at minimum, monitoring as detailed in "Section 8: Performance Verification Plan" of the Applicant's Foreshore Remedial Action Plan dated October 27, 2016.

Within 30 days of each monitoring period

The Applicant shall also make monitoring reports available to Aboriginal groups and the BC MOE.

VFPA reserves the right to rescind or revise these conditions at any time that new information warranting this action is made available to VFPA.

LENGTH OF PERMIT VALIDITY

The Project must be completed no later than May 31, 2022 (the Expiry Date).

AMENDMENTS

- Details of any material proposed changes to the Project, including days and hours when construction and any physical activities will be conducted, must be submitted to VFPA for consideration of an amendment to this Permit.
- For an extension to the Expiry Date, the Applicant must apply in writing to VFPA no later than 30 days prior to that date.

Failure to apply for an extension as required may, at the sole discretion of VFPA, result in termination of this Permit.

8 ENVIRONMENTAL REVIEW DECISION

In completing the environmental review, VFPA has reviewed and taken into account relevant information available on the proposed project, has considered the information and proposed mitigations provided by the Applicant and other information as listed elsewhere in this document, and concludes that with the implementation of proposed mitigation measures and conditions described in the project and environmental conditions section above, the Project is not likely to cause significant adverse environmental effects.

ANDREA MACLEOD
MANAGER, ENVIRONMENTAL PROGRAMS

May 24, 2017

DATE OF DECISION

9 CONCLUSION

In completing the project and environmental review, VFPA concludes that with the implementation of proposed mitigation measures and conditions described in the project and environmental conditions section above, the Project has appropriately addressed all identified concerns.

PER No. 16-180 Page 14 of 15

PROJECT AND ENVIRONMENTAL REVIEW DECISION

Project Permit PER No. 16-180 is approved by:

ANDREA MACLEOD
MANAGER, ENVIRONMENTAL PROGRAMS

May 24, 2017

DATE OF APPROVAL

CONTACT INFORMATION

Vancouver Fraser Port Authority (VFPA) 100 The Pointe, 999 Canada Place Vancouver BC V6C 3T4 Canada Project & Environmental Review

Tel.: 604-665-9047 Fax: 1-866-284-4271

Email: PER@portvancouver.com
Website: www.portvancouver.com

Chevron Refinery Foreshore Final Remedy

PER #16-180



Proposed Project Area



--- VFPA Boundary



City of North Vancouver

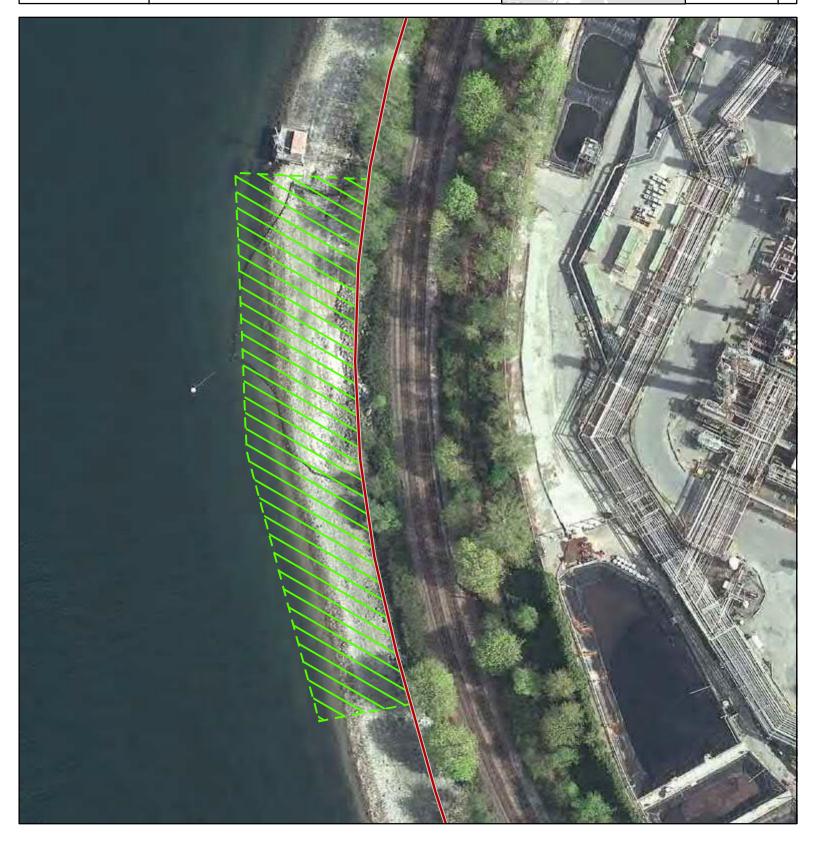
Map Location

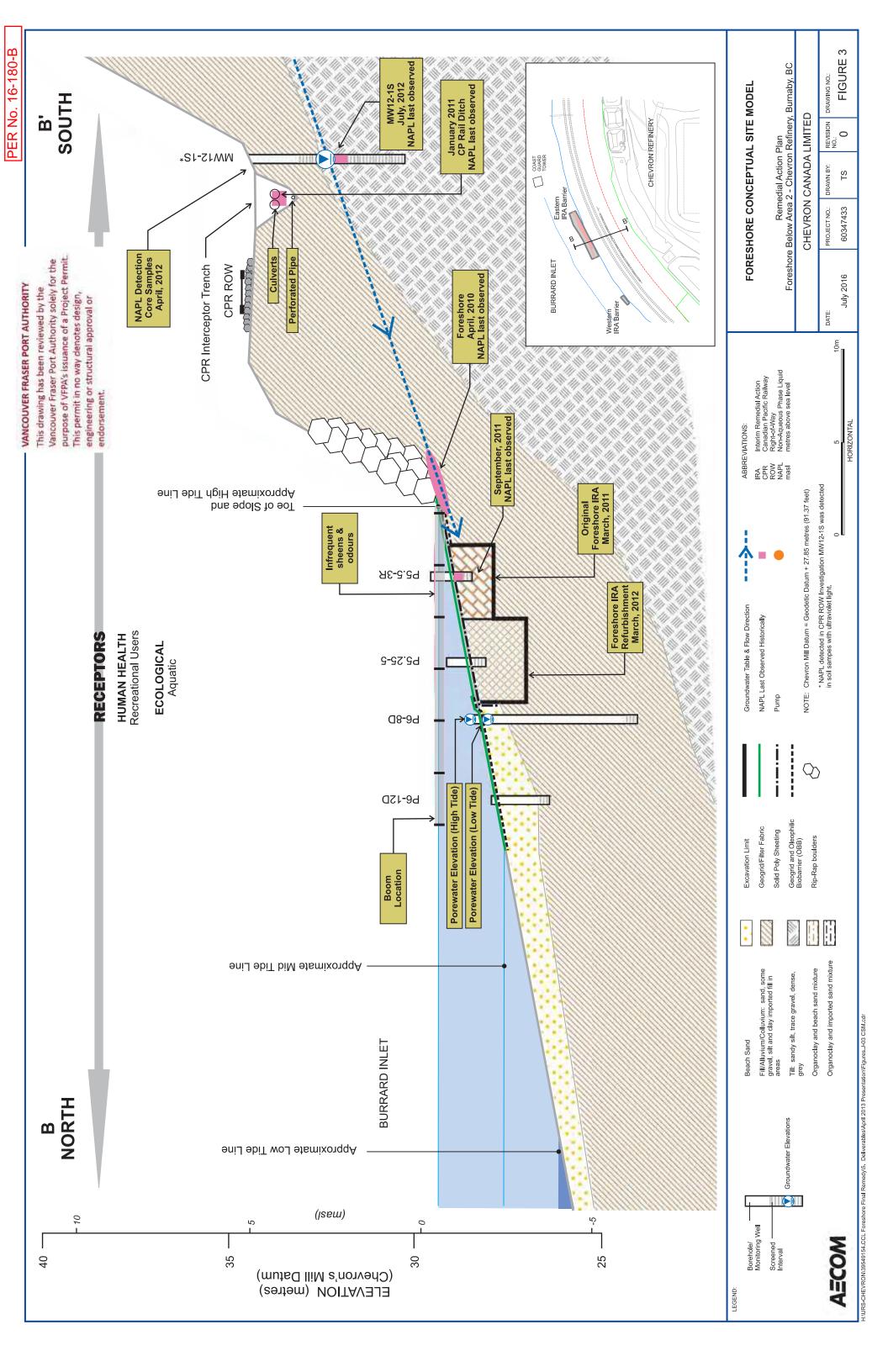
Vancouver

Burnaby

PORT of Vancouver

VFPA Spatial Data Group May 2017 PLAN # G2016-133





FORESHORE REMEDIAL
ACTION PLAN
BELOW AREA 2 EASTERN
IMPOUNDING BASIN
CHEVRON BURNABY REFINERY

mm148 x mm462 1A OSI

Designer:

CLIENT

Chevron Canada Limited Burnaby Refinery

355 North Willingdon Avenue Burnaby BC V5C 1X4

CONSULTANT

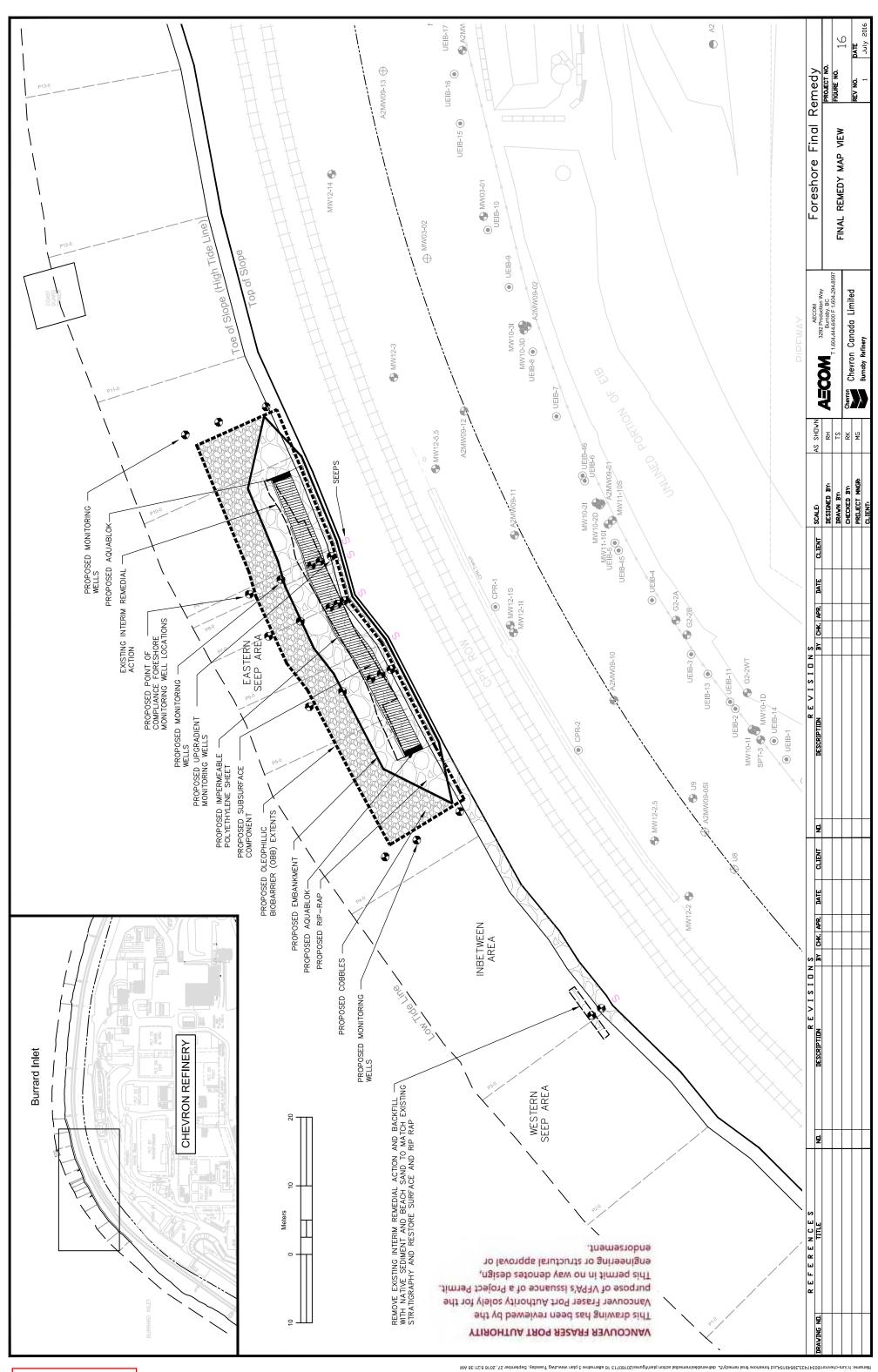
3292 Production Way Burnaby, BC 1.604.444.6400 tel 1. www.aecom.com

1.604294.8597 fax

FOR PORT OF VANCOUVER PERMIT REFERENCE PROJECT NUMBER 60347433 TITLE This drawing has been prepared for the use of PECOM's client and may not be used, reproduced or relied upon by third parties, except as agreed by AECOM accepts no responsibility, and denies any liability whatsoever, to any parties this denies any liability whatsoever, to any parties. AECOM's crient and the use of AECOM's client and may not be used, reproduced or relied upon by third parties, except as agreed by AECOM and the use of the used, reproduced or relied upon by third parties, except as agreed by AECOM and the used for use by any liability whatsoever, to any parties the used for use by any liability whatsoever, to any parties and used for use by any liability whatsoever, to any parties and used for use by any liability whatsoever, to any parties and used for use by any liability whatsoever, to any parties and used for use by any liability whatsoever, to any parties and used for use by any liability whatsoever, to any parties and used for use by any liability whatsoever, to any parties and used for use by any liability whatsoever, to any parties and used for use by any liability whatsoever, to any parties and used for use by any liability whatsoever.

This drawing has been reviewed by the Vancouver Fraser Port Authority solely for the purpose of VFPA's issuance of a Project Permit. This permit in no way denotes design, engineering or structural approval or VANCOUVER FRASER PORT AUTHORITY endorsement. Locations and calculated areas are approximate BOTTOM OF SLOPE TOP OF SLOPE AREA N N UTM: E= 500940.23m
N= 5460273.11m
CHEVRON MILL DATUM
REFERENCE SYSTEM:
X= 138.08m
Y = 268.41m ESA CONSTRUCTION A 922m² NOTE: LEGEI EXISTING COAST GUARD TOWER LIMIT OF CONSTRUCTION ROCIPHIO TAR PLAN EASTERN SEEP AREA CONTINGENCY AREA 524m² WSA CONSTRUCTION AREA 9.4m² CONSTRUCTION AREA 3111m² 国型 TOTAL

Last saved by: TIM.SMYTH(2016-12-14) Last Plotted: 2016-12-14) Last Plotted: 2016-12-14 Remedy: WORKING FILES/2016 CONTRACT DESIGN/900-CAD, GIS/910-CAD/05-MODELS/C/PORT OF VANCOUVER PERMIT APPLICATION/60347433-CONSTRUCTION AREAS.DWG







September 28, 2017

Mr. Michael Gill Senior Environmental Engineer AECOM 3293 Production Way Burnaby, BC V5A 4R4

Dear Mr. Gill:

Re: VFPA Project Permit No. 16-180
Chevron Refinery Foreshore Final Remedy

Request for Extended Hours of Work

The Vancouver Fraser Port Authority (VFPA) has received AECOM's September 19, 2017 request to undertake Project Permit No. 16-180 shoreline remediation activities within VFPA jurisdiction during extended hours of work at night Monday to Saturday 12am to 7am in Burnaby, BC. This constitutes an exemption to Condition 22 of the Permit.

Extended hours of work are understood to be limited to the following dates: from September 28 to November 15, 2017. The shoreline remediation activities proposed during these hours include:

- Minor rip rap placement;
- Excavation and backfill to 0.4 m depth from 8 m to 12 m from the original toe of the slope;
- Placement of a geotextile;
- Placement of 200 mm cobbles on top of geotextile to grade; and
- Installation of monitoring wells using an excavator mounted auger.

Due to AECOM's need to work within the low tide window to mitigate the in-water dispersal of suspended contaminated sediments in conjunction with their Project Permit, VFPA will allow extended hours of work during the above noted windows provided the following conditions are met:

 AECOM shall ensure the scope of works undertaken during extended hours is limited to the activities outlined in their September 20 and 21, 2017 emails detailing the request.





Mr. Gill PER No. 16-180 September 28, 2017 Page 2 of 2

- 2. AECOM must implement all proposed mitigation measures and activities outlined in their September 20 and 21, 2017 emails including a construction notification email to the City of Burnaby and the Tsleil Waututh First Nation prior to extended work hours. VFPA must approve the content of the email prior to distribution. It is understood that the proposed works were communicated to the Chevron Burnaby Community Advisory Panel during their September 20, 2017 meeting and that no concerns were raised.
- 3. All Project Permit No. 16-180 conditions shall be strictly adhered to during extended work windows.

VFPA reserves the right to cancel or revoke authorization for remediation work within the port authority's jurisdiction during extended periods should noise levels or disturbances to surrounding residents exceed reasonable levels.

Should you have any questions please contact Spencer Chaisson, Environmental Coordinator at 604-665-9389 or spencer.chaisson@portvancouver.com.

Yours truly,

VANCOUVER FRASER PORT AUTHORITY

Greg Yeomans

Director Planning & Development

cc Tegan Smith, Manager, Planning, VFPA
Andrea Macleod, Manager, Environmental Programs
Spencer Chaisson, Environmental Programs, VFPA
Barbara Yandel, Real Estate, VFPA
Jessica Davies, Aboriginal Affairs, VFPA
Cherryl Lam, Project Communications, VFPA

Gauthier, Ken

From: Chaisson, Spencer < Spencer.Chaisson@portvancouver.com>

Sent: Tuesday, November 07, 2017 3:43 PM

To: Southern, Leslie

Cc: Gauthier, Ken; Kannappan, Ram; Horwath, Robert; Gill, Michael (Vancouver);

christopher.boys@parkland.ca

Subject: RE: VFPA Permit 16-180 - future sampling events

Hi Leslie,

VFPA has decided that additional approval for ongoing monitoring, during night or day, is not required so long as there are no new intrusive works. This does not limit any of the conditions or requirements of VFPA Permit 16-180.

Several restrictions will apply:

- 1. Crossing other lease boundaries for access will continue to require prior approval specifically if you plan night time access across the Penzance rail tracks, which is not a public crossing. You have stated that access will be by boat but we must be alerted if that changes.
- 2. Share the well sampling/monitoring schedule with the Chevron/Parkland Community Advisory Panel so that they are aware of planned night time works.
- 3. For all night time works that require access by boat myself and Marine Operations (<u>Harbour Master@portvancouver.com</u>) must be notified 2 days in advance via email.

These requirements will be reiterated after VFPA receives the plans and schedules for post-construction monitoring as detailed in condition 42 of VFPA Permit 16-180.

Thank you,

Spencer Chaisson

Environmental Coordinator
Environmental Programs
P 604.665.9389
E species chairson@portyapsquyor.co

E spencer.chaisson@portvancouver.com



Vancouver Fraser Port Authority 100 The Pointe, 999 Canada Place Vancouver, B.C. Canada V6C 3T4 portvancouver.com

From: Chaisson, Spencer

Sent: Friday, November 03, 2017 12:10 PM

To: 'Southern, Leslie' < leslie.southern@aecom.com>

Cc: Gauthier, Ken <ken.gauthier@aecom.com>; Kannappan, Ram <ram.kannappan@aecom.com>; Horwath, Robert <robert.horwath@aecom.com>; Gill, Michael (Vancouver) <michael.gill@aecom.com>; christopher.boys@parkland.ca **Subject:** RE: VFPA Permit 16-180 - November sampling event

Hello Leslie.

Thank you for providing this information. By way of this email, provided the ongoing activities consist of monitoring and sampling the wells at the site (i.e., no new intrusive works), the period of validity for VFPA Permit 16-180 extended work hours as stated in the attached 2017-09-28 letter is hereby extended to November 16, 2017.

As project construction nears completion and you move on to monitoring, please be sure to fulfill conditions 39 to 43 of VFPA Permit 16-180.

Thank you,

Spencer Chaisson

Environmental Coordinator Environmental Programs P 604.665.9389

E spencer.chaisson@portvancouver.com



Vancouver Fraser Port Authority 100 The Pointe, 999 Canada Place Vancouver, B.C. Canada V6C 3T4 portvancouver.com

From: Southern, Leslie [mailto:leslie.southern@aecom.com]

Sent: Friday, November 03, 2017 11:43 AM

To: Chaisson, Spencer < Spencer.Chaisson@portvancouver.com>

Cc: Gauthier, Ken <<u>ken.gauthier@aecom.com</u>>; Kannappan, Ram <<u>ram.kannappan@aecom.com</u>>; Horwath, Robert <<u>robert.horwath@aecom.com</u>>; Gill, Michael (Vancouver) <<u>michael.gill@aecom.com</u>>; <u>christopher.boys@parkland.ca</u>

Subject: VFPA Permit 16-180 - November sampling event

Spencer,

As discussed, we plan on collecting porewater samples from the wells on the Foreshore in November 14-16, approximately 6:30pm to 11:00pm). The sampling must be completed at night, when the tide allows access. A subcontractor will provide access to the site via boat. They will bring a generator and light stands to illuminate the work area - which is comprised of the two barriers. A barge and heavy equipment will not be at the site.

The exemption to condition 22 of the permit provided on September 28, to allow for extended work hours expires on November 15, 2017. Can this be extended to November 16?

Thank you,

Leslie

Leslie Southern M.Sc., P.Ag. Environmental Scientist leslie.southern@aecom.com

AECOM 3292 Production Way, Suite 330 Burnaby, BC V5A 4R4 T 604-444-6608 F 604-294-8597 www.aecom.com This communication is intended for the sole use of the person(s) to whom it is addressed and may contain information that is privileged, confidential or subject to copyright. Any unauthorized use, disclosure or copying of this communication is strictly prohibited. If you have received this communication in error, please contact the sender immediately. Any communication received in error should be deleted and all copies destroyed.



Mease consider the environment before printing this page.

Project number: 60542455

Appendix D - Photo Log

IRA Barrier.

| | | | PHOTO LOG |
|---|---|--|--------------------------------|
| Client Na Parkland (B.C.) Ltd | Refining | Site Location: Foreshore – Downgradient Area 2, Parkland Refinery, Burnaby, BC | Project Number: 60542455 |
| Photo No. | Date: March 29, 2016 | | |
| | Photo ownwards op of page) | | |
| conditions and West Barriers. IRA Barrie surrounde boom. Th | ruction site s – Eastern ern IRA The Eastern er is ed by the e Western er is right of | | |
| Photo No. 2 Direction | Date: August 20, 2015 | | |
| Taken: Looking s | | + | |
| | ruction site s – Eastern | | |

PHOTO LOG

Client Name: Parkland Refining (B.C.) Ltd.

 Photo No.
 Date:

 3
 2017

Direction Photo Taken:

Looking northeast

Description:

Below ground components – Plywood reinforced baffles can be seen placed within both cells of the Eastern FPTS. The plywood was removed once backfilling was complete.

Site Location:

Foreshore – Downgradient Area 2, Parkland Refinery, Burnaby, BC

Project Number: 60542455



Client Name:

Parkland Refining (B.C.) Ltd.

Site Location:

Foreshore – Downgradient Area 2, Parkland Refinery, Burnaby, BC

Project Number: 60542455

| Photo No. | Date: July 28, 2017 |
|--------------|----------------------------|
| | |

Direction Photo Taken:

Looking east

Description:

Below ground components – Eastern FPTS, after backfilling a small portion of trench and compaction to surface.



PHOTO LOG

Client Name: Parkland Refining (B.C.) Ltd.

Photo

No.

Date:August
10, 2017

Site Location: Foreshore – Downgradient Area 2, Parkland Refinery, Burnaby, BC Project Number: 60542455

Direction Photo Taken:

Looking south

Description:

Above ground components – Eastern FPTS materials laid out.

| Photo | Date: |
|-------|----------|
| No. | August |
| 6 | 18, 2017 |

Direction Photo Taken:

Looking west

Description:

Above ground components (OBB, filter fabric and geogrid) – Up gradient CPR embankment material placement.



Site Location:

Burnaby, BC

Appendix D: Photo Log (2017)

PHOTO LOG

Project

Number:

60542455

Client Name: Parkland Refining (B.C.) Ltd.

Photo Date: No. September 7 15, 2017

Direction Photo Taken:

Looking northeast

Description:

Above ground component – Western FPTS, placement of concrete protectors, materials and gravel.

Foreshore - Downgradient Area 2, Parkland Refinery,

Photo No. September 6, 2016

Direction Photo Taken:

Looking southeast

Description:

Above ground component – Concrete supports for extended concrete protectors.



PHOTO LOG

Project

Number:

60542455

Client Name: Parkland Refining (B.C.) Ltd.

Direction Photo Taken:

Looking northeast

Description:

Above ground components – Installation of downgradient cobbling matting in Eastern FPTS.

 Photo
 Date:

 No.
 September

 10
 5, 2017

Direction Photo Taken: Looking east

Description:

Above ground component – Placement of rip rap at 2:1 slope of the Eastern FPTS.







Site Location:

PHOTO LOG

Project

Number:

Client Name: Parkland Refining (B.C.) Ltd.

 Photo
 Date:

 No.
 October

 11
 13, 2017

Direction Photo Taken:

Looking south

Description:

Monitoring well installation in east passive treatment system – Bobcat drill rig used to install monitoring wells

Direction Photo Taken:
Looking east

Description:

Final layout of rip rap with a 2:1 slope of the Eastern FPTS.

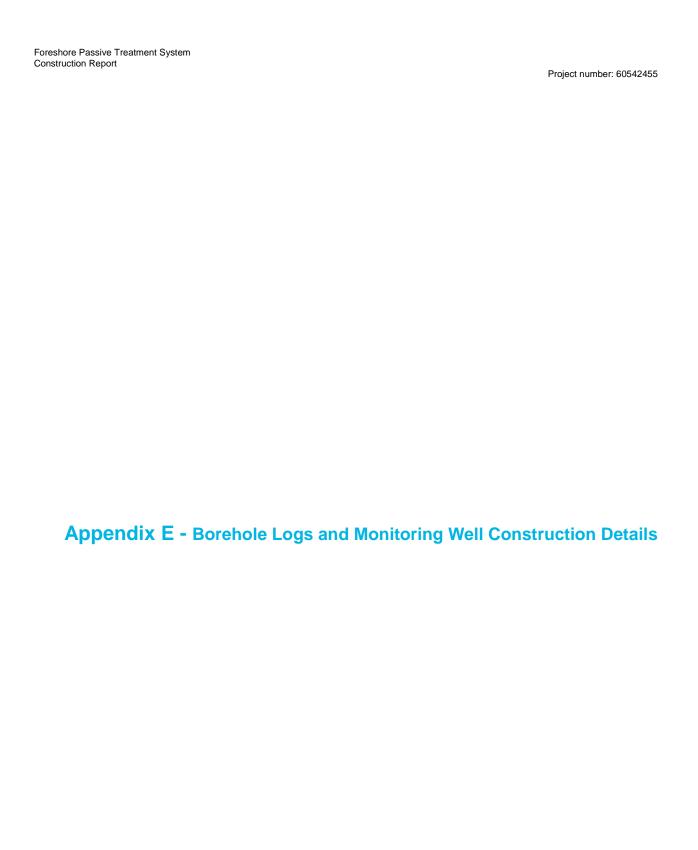


Foreshore - Downgradient Area 2, Parkland Refinery,



Appendix D: Photo Log (2017)

| | | | PHOTO LOG |
|---|------------------------------|--|--------------------------------|
| Client Na Parkland (B.C.) Ltd | Refining | Site Location: Foreshore – Downgradient Area 2, Parkland Refinery, Burnaby, BC | Project Number: 60542455 |
| Photo No. | Date: October, 30 2017 | | 1 |
| Direction Taken: Looking | n Photo southeast | | III ANTO |
| Post-construction conditions. Eastern and Western Foreshore Passive Treatment Systems (FPTS). | | | |



| PF | ROJEC | T: Fo | eshore Final Remedy | | CLIENT: Parklan | d Refining Ltd. | | | | 1 | TESTH(| OLE NO: PW17-01 | |
|---|-------|-------------|--|--|-------------------------|-----------------|-------------|---------|-------------|-----|--------|------------------------|-----------|
| | | | ogradient - West Passive | Barrier N 0.0 E 0.0 | | | | | | | | CT NO.: 60542455 | |
| | | | R: Tervita | | METHOD: Bobca | | | uger | | | | ΓΙΟΝ (m): | |
| | | TYPE | GRAB | SHELBY TUBE | SPLIT SPO | | | | | | RECOVE | | |
| BA | CKFIL | L TYP | BENTONITE | GRAVEL | SLOUGH | ∴ GF | ROUT | Г | | CUT | TINGS | SAND | |
| OEDTH (m) | | SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | | pm) | | COMMENTS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 127/17 | | | Cobbles, modifier gravel, rigrey moist low density non-cohesive Sand, some gravel, trace of brown-grey fine-medium grained sand moist low density non-cohesive becoming brown, trace silt Well Construction Details: 2" PVC well - Sch 40, 10 s Concrete: 0 - 0.40 m BGS Bentonite: 0.40 - 0.70 m B Sand: 0.70 - 1.30 m BGS Screen: 0.85 - 1.40 m BGS Screen: 0.85 - 1.40 m BGS End of Bore: 1.40 m BGS | below 0.4 m BGS lot screen, 20/40 sand filter p | pack; completed as stic | к-ир | | | | 00 | 1000 | | 1 |
| NMEN 2 | | | | | | LOGGED BY: | | | | _ | | ETION DEPTH: 1.40 r | |
| MRO | | | A=CO/ | M | | REVIEWED BY | | | | - 1 | COMPL | ETION DATE: 10/13/1 | |
| A L | | | | | | PROJECT ENG | JINE | ER: k | K. Gauthier | | | Pag | je 1 of 1 |

| | | | | shore Final Remedy | | CLIE | ENT: Parkland R | efining Ltd. | | | | | _ | | | NO: PW17-02 | |
|--|---------------------------------|------|-------------|--|---------------------|---------|-----------------------|-------------------|-------------|---------|--------|-----------------|-----|-----------------|------|-------------------------------------|-----------|
| | | | | ssgradient - West Passive E | Barrier N 0.0 E 0.0 | | | | | | | | _ | | | IO.: 60542455 | |
| | | | | Tervita GRAB | SHELBY TUBE | | THOD: Bobcat - | Solid Stem ⊟B∪ | | Auger | | | _ | ELEVA RECOVE | | (m): | |
| | SAMF | | | BENTONITE | GRAVEL | | SLOUGH | BBU | | т | | | | TINGS | -KY | SAND | |
| ŀ | BAUN | FILL | TIPE | DENTONITE | [] GRAVEL | | Шогооди | <u>. •</u> 1 Gr | | , | | | CUT | IIIVGS | | [:·]SAND | |
| | DEPTH (m) | 7 | SOIL SYMBOL | S | OIL DESCRI | PTI | ON | | SAMPLE TYPE | SAMPLE# | ⊗ | Vapour I (pp | m) | g⊗ 1000 | | COMMENTS | DEРТН (m) |
| | 0 | | | Cobbles, modifier gravel/ sand grey | | | | | | | | : | | : | | | |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 1277/17 | - - - - - - - | | | grey moist low density non-cohesive Sand, some gravel/ cobbles, trace brown-grey fine-medium grained sand moist low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot sch Concrete: 0 - 0.40 m BGS Bentonite: 0.40 - 0.70 m BGS Sand: 0.70 - 1.30 m BGS Screen: 0.85 - 1.15 m BGS Native: 1.30 - 1.40 m BGS End of Bore: 1.40 m BGS | | pack; c | completed as stick-up | | | | | | | | | | 1 |
| MENT | 2 | | | | | | 110 | GGED BY: | KC | | : | : | | COMP | ETIO | N DEPTH: 1.40 m | |
| RON | | | | A=COM | | | | VIEWED BY | | S | | | _ | | | N DEPTH: 1.40 m N DATE: 10/11/17 | |
| EN | | | | 7-50/4 | | | | ROJECT ENG | | | (. Gau | thier | | | ., | | e 1 of 1 |

| | PRO. | JECT | : Fore | shore Final Remedy | | CLIENT: Parklan | d Refining Ltd. | | | | | TESTH | IOLE NO: PV | /17-03 | |
|---|-----------|------|-------------|--|-----------------------------|-------------------------|-----------------|------------------|---------|------------|--------------------|--------|--------------|--------|-----------|
| | | | | ssgradient - West Passi | ve Barrier N 0.0 E 0.0 | | | | | | | | CT NO.: 605 | 42455 | |
| | | | | Tervita | | METHOD: Bobca | | | Auger | | _ | | TION (m): | | |
| - | | | YPE | GRAB | SHELBY TUBE | SPLIT SPO | | | | | | RECOVE | | | |
| E | BACK | FILL | TYPE | BENTONITE | GRAVEL | SLOUGH | ∭GF | rou ⁻ | T I | | | TINGS | SA | AND | I |
| | DEPTH (m) | | SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | ⊗ Vapo | our Readi (ppm) | | СОММЕ | ENTS | DЕРТН (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS SRA.GPJ UMA.GDT 127/17 | 0 | | | Cobbles, modifier gravel/ sar grey moist low density non-cohesive Sand, some gravel/ cobbles brown-grey fine-medium grained sand moist low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slc Concrete: 0 - 0.40 m BGS Bentonite: 0.40 - 0.70 m BGS Sand: 0.70 - 1.30 m BGS Screen: 0.85 - 1.15 m BGS Native: 1.30 - 1.40 m BGS End of Bore: 1.40 m BGS | trace silt, shell fragments | pack; completed as stic | к-ир | | | | 100 | 1000 | | | 1- |
| NME | 2 | | ı | A ===== | | | LOGGED BY: | | | | | | ETION DEPTH | | |
| MIRC | | | | A=CO/ | И | | REVIEWED BY | | | / O | | COMPI | LETION DATE: | | 1 -5 4 |
| шL | | | | | | | PROJECT ENG | JINE | :⊏K: I | v. Gauthie | ſ | | | ⊬age | 1 of 1 |

| PRO | JECT: F | ores | hore Final Remedy | | CLIENT: Parkland R | efining Ltd. | | | | | _ | | OLE NO: PW17-04 | |
|---|-------------------|---|--|---|--|-------------------------|-------------|---------|-------|------------------|---------------|---------------|--|---|
| | | | adient - West Passive | Barrier N 0.0 E 0.0 | | | | | | | _ | | CT NO.: 60542455 | |
| | TRACTO | | Tervita GRAB | SHELBY TUBE | METHOD: Bobcat - S | Solid Stem 8 | | uger | | | | LEVA ECOVE | TION (m): RY TORE | |
| | (FILL TYI | | BENTONITE | GRAVEL | SLOUGH | BBU | | Г | | | CUTTI | | SAND | |
| DEPTH (m) | WELL INSTALLATION | OT IMBOL | _ | SOIL DESCRI | | | SAMPLE TYPE | SAMPLE# | ⊗ | Vapour F (ppi | Reading m) | | COMMENTS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS. SRA.GPJ. UMA.GDT 12/7/17 O | | 000000000000000000000000000000000000000 | Sand, some gravel/ cobbles brown-grey sand fine-medium grained sand wet low density non-cohesive Hydrocarbon odour at 0-0.3r Well Construction Details: 2" PVC well - Sch 40, 10 slc Following well installation, o surface. The well stickup wa Concrete well protector and Bentonite: 2.54 - 2.84 m (0.30 - Sand: 2.84 - 3.44 m (0.30 - Screen: 2.99 - 3.29 m (0.45 Native: 3.44 - 3.54 m (1.00 m Rip rap thickness has been at the surface of the surf | m/ no staining of screen, 20/40 sand filter poncrete well protector and riss subsequently extended a rip rap: 0 - 2.54 m (0 - 2.54 - 0.30 m BGS) - 0.75 m BGS) - 1.00 m BGS) approximated based on sur | ip rap were constructed above the ground surface. m AGS) vey data and field measurer | | ⟨G | | | 8 | > | | Sample collected at 0.1 - 0.3 m BGS Sample collected at 0.6 - 0.8 m BGS | 1 — 3 — 3 — 3 — 3 — 3 — 3 — 3 — 3 — 3 — |
| NVIRO | | | A=COM | И | | VIEWED BY: OJECT ENG | | | (Gau | thier | | | ETION DATE: 10/2/17 | 1 of 1 |
| ш | | | | | 1110 | 10 | | 1 | | | | | . ago | . 01 1 |

| PR | OJECT: | Fores | shore Final Remedy | | CLIENT: Parklar | d Refining Ltd. | | | | | TESTH | OLE NO: PW17-0 |)5 |
|--|---------|-------------|--|---|---|------------------------------------|-------------|---------|-------------|--------------------------|-------------|--|--------------------------|
| | | | nin West Passive Barrier | N 0.0 E 0.0 | | | | | | | | CT NO.: 6054245 | 5 |
| | NTRACT | | | | METHOD: Excav | | | | | _ | | ΓΙΟΝ (m): | |
| | IPLE TY | | GRAB | SHELBY TUBE | SPLIT SPC | | | - | | | RECOVER | | |
| BAC | KFILL T | YPE | BENTONITE | GRAVEL | SLOUGH | GF | KOU I | | | ZCU1 | TINGS | SAND | |
| DEPTH (m) | WELL | SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | , | ır Readii ppm) 100 | ng⊗ 1000 | COMMENTS | DEPTH (m) |
| -0 -1 -1 -2 -3 -4 4 | | | Sand and aquagate/organocl brown-grey fine-medium grained sand moist low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot Following well installation, co surface. The well stickup was Concrete well protection and 75% washed sand and 25% Screen: 2.74 - 3.10 m (0.64 - End of Bore: 3.10 m (1.00 m) Borehole log details have bee Rip rap thickness has been a | screen (prepacked screer increte well protector and ris subsequently extended a rip rap: 0 - 2.10 m (0 - 2.10 aquagate/organoclay: 2.10 1.00 m BGS) | ip rap were constructed bove the ground surfact 0 m AGS) 0 - 3.10 m (0 - 1.00 m Endowed by the constructions. | d above ground e. GGS) | | | | | | | 1 - 2 - 3 - 4 - 5 - |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 12/7/17 C | | | | | | | | | | | | | 6 - 7 - 8 - 9 - |
| ENVIRON | | | A=COM | 1 | | LOGGED BY: REVIEWED BY PROJECT ENG | : LS | | K. Gauthier | | | ETION DEPTH: 1.0 ETION DATE: 8/17/ F | |

| PRO | JECT: For | eshore Final Remedy | | CLIENT: Parklan | d Refining Ltd. | | | | 7 | TESTHO | DLE NO: PW17-0 6 | 6 |
|--|-------------------------------|--|--|--|-------------------------------------|-------------|---------|-------------|------|---------|-------------------------|----------------------------|
| | | thin West Passive Barrier | N 0.0 E 0.0 | | | | | | | | CT NO.: 60542455 | 5 |
| | TRACTOR | | | METHOD: Excav | | | | | _ | | TION (m): | |
| | PLE TYPE | GRAB | SHELBY TUBE | SPLIT SPO | | | | | | RECOVER | | |
| BACK | (FILL TYPE | BENTONITE | GRAVEL | SLOUGH | GF | ROUT | 1 | | JCUI | TINGS | SAND | |
| DEPTH (m) | WELL INSTALLATION SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | | opm) | | COMMENTS | DEРТН (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 127/17 THE | | Sand and aquagate/powder brown-grey fine-medium grained sand moist low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slo Following well installation, o surface. The well stickup wards washed sand and 25% BGS) Screen: 2.74 - 3.10 m (0.84 End of Bore: 3.10 m (1.20 m) Borehole log details have be Rip rap thickness has been and some surface. | activated carbon It screen (prepacked screer oncrete well protector and r is subsequently extended a drip rap: 0 - 1.90 m (0 - 1.9 aquagate/powder activated - 1.20 m BGS) The property of the protector of the property of | ip rap were constructed bove the ground surfact 0 m AGS) d carbon: 1.90 - 3.10 m | d above ground e. (0 - 1.20 m | | | 10 | | 1000 | | 2- 3- 3- 5- 6- |
| ENTAL (VAPOUR ONI | | | | | | | | | | | | 9 - |
| MM IO | 1 | | | | LOGGED BY: | EP | | | | COMPLE | ETION DEPTH: 1.20 | m |
| MRO | | A=COM | И | | REVIEWED BY | : LS | | | | COMPLE | ETION DATE: 8/17/1 | |
| Z | | | New York Control of the Control of t | | PROJECT ENG | SINEE | R: K | C. Gauthier | | | Pa | age 1 of 1 |

| | PRO | IECT | : Fore | shore Final Remedy | | CLIENT: Parklan | d Refining Ltd. | | | | | TESTH | IOLE NO: PW | /17-07 | |
|---|-----------|------|-------------|---|-------------------------------|-------------------------|-----------------|-------------|---------|------------|--------------------|--------------|--------------|--------|-----------|
| | LOCA | TIOI | N: Dov | vngradient - West Passi | ve Barrier N 0.0 E 0.0 | | | | | | | PROJE | CT NO.: 605 | 42455 | |
| - | | | | Tervita | | METHOD: Bobca | | | Auger | | _ | | TION (m): | | |
| - ⊢ | SAMP | | | GRAB | SHELBY TUBE | SPLIT SPO | | | | | | RECOVE | | | |
| | BACK | FILL | TYPE | BENTONITE | GRAVEL | SLOUGH | ∏ GF | ROU' | T | | ∕ CUT | TINGS | | ND | |
| | DEPTH (m) | | SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | ⊗ Vapo | our Readi (ppm) | ing⊗ 1000 | COMME | NTS | DEРТН (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 127/17 | -1 | | | Cobbles, modifier gravel/ sabrown-grey moist low density non-cohesive Sand, some gravel/ cobbles brown-grey fine-medium grained sand wet low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slc Concrete: 0 - 0.30 m BGS Bentonite: 0.0 - 1.05 m BGS Sard: 0.60 - 1.05 m BGS Sard: 0.70 - 1.40 m BGS End of Bore: 1.40 m BGS End of Bore: 1.40 m BGS | t screen, 20/40 sand filter p | pack; completed as stic | к-ир | | | | | | | | 1- |
| ONME | 2 | | | A = CO. | 4 | | LOGGED BY: | | | | | | ETION DEPTH | | |
| VIR | | | | A=COM | И | | REVIEWED BY | | | (Courthin | r | COMPL | LETION DATE: | | 1 of 1 |
| 甸 | | | | | | | PROJECT ENG | ⊐וווכ | .⊏K. I | v. Gauthie | I | | | rage | 1 of 1 |

| | PRO | JECT | : Fore | shore Final Remedy | | CLIENT: Parklan | d Refining Ltd. | | | | | TESTH | OLE NO: PW17-0 | 8 |
|---|-----------|------|-------------|--|-----------------------|--------------------------|---------------------------|-------------|---------|------------|--------------------|--------|--------------------------------------|-------------|
| | LOCA | OITA | V: Dov | vngradient - West Passiv | e Barrier N 0.0 E 0.0 | | | | | | | | CT NO.: 6054245 | 5 |
| | | | | Tervita | | METHOD: Bobca | | | Auger | | | | TION (m): | |
| ŀ | SAMF | | | GRAB | SHELBY TUBE | SPLIT SPO | | | | | | RECOVE | | |
| ŀ | BACK | FILL | TYPE | BENTONITE | GRAVEL | SLOUGH | ∭GF | ROU | T I | | ∠JCUT | TINGS | SAND | |
| | DEPTH (m) | | SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | | ur Readii (ppm) | | COMMENTS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ. UMA.GDT. 127/17 | 0 | | | Cobbles, modifier gravel/ sa brown-grey fine-medium grained sand wet low density non-cohesive Sand, some gravel/ cobbles brown-grey fine-medium grained sand wet low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slo Concrete: 0 - 0.40 m BGS Bentonite: 0.40 - 0.70 m BG Sacre on: 0.84 - 1.20 m BGS Shative: 1.30 - 1.40 m BGS End of Bore: 1.40 m BGS | trace silt | n); completed as stick-u | | | | | 100 | 1000 | | 1- |
| RON | | | | A=COA | A | | LOGGED BY: REVIEWED BY | | 3 | | | | ETION DEPTH: 1.4 ETION DATE: 10/2 | |
| EN | | | | | 61 €6 | | PROJECT ENG | | | K. Gauthie | r | | | Page 1 of 1 |

| | | | | shore Final Remedy | | CLIE | ENT: Parkland R | efining Ltd. | | | | | | OLE NO: PW1 | | |
|---|-----------|------|-------------|---|------------------|---------|-----------------------|----------------|-------------|---------|-------------|----------|-------------|----------------------|------|-----------|
| - | | | • | gradient - West Passive Barı | rier N 0.0 E 0.0 | 1 | | 0 11 0 | 011 4 | | | - | | CT NO.: 6054 | 2455 | |
| ŀ | SAME | | | Tervita GRAB | SHELBY TUBE | | THOD: Bobcat - | Solid Stem | | Auger | | _ | RECOVE | ΓΙΟΝ (m): RY ∭COF | DE | |
| - 1 | | | TYPE | | GRAVEL | | SLOUGH | Gl | | т | | | TINGS | SAN | | |
| ŀ | DACR | TILL | 1115 | BLINTONITE | L_JOINVLL | | Шэгооон | <u>. ♣</u> j∪i | T | | | 1001 | TINOS | <u>. · </u>]OAI | טו | |
| | DEPTH (m) | | SOIL SYMBOL | S | OIL DESCRI | PTI | ON | | SAMPLE TYPE | SAMPLE# | | pm) | ng⊗ 1000 | COMMEN | ITS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 127/17 | 0 | | | Cobbles, modifier gravel, rip rap grey moist low density non-cohesive Sand, some gravel, trace cobble brown-grey fine-medium grained sand moist low density non-cohesive mottling throughout becoming grey, trace silt below 0 density non-cohesive mottling throughout becoming grey, trace silt below 0 density non-cohesive mottling throughout becoming grey, trace silt below 0 density non-cohesive nottling throughout becoming grey, trace silt below 0 density non-cohesive nottling throughout becoming grey, trace silt below 0 density non-cohesive nottling throughout becoming grey, trace silt below 0 density non-cohesive nottling throughout becoming grey, trace silt below 0 density non-cohesive nottling throughout becoming grey, trace silt below 0 density non-cohesive nottling throughout becoming grey, trace silt below 0 density non-cohesive nottling throughout becoming grey, trace silt below 0 density non-cohesive nottling throughout becoming grey, trace silt below 0 density non-cohesive nottling throughout becoming grey, trace silt below 0 density non-cohesive nottling throughout becoming grey, trace silt below 0 density non-cohesive nottling throughout becoming grey, trace silt below 0 density non-cohesive nottling throughout becoming grey, trace silt below 0 density non-cohesive nottling throughout becoming grey, trace silt below 0 density non-cohesive | 0.4 m BGS | pack; c | completed as stick-up | | | | | | | | | 1 |
| ENTAL (VAPOUF | - 2 | | | | | | | | | | | | | | | _ |
| ONME | | | • | A = CO 14 | | | | GGED BY: | | | | _ | | ETION DEPTH: | | |
| MIRC | | | | A=COM | | | | EVIEWED BY | | | (Couthing | \dashv | COMPL | ETION DATE: 1 | | 1 of 1 |
| 甸 | | | ALCOM | | | | PF | ROJECT ENG | בוווכ | ck. I | v. Gauthier | | | | rage | 1 of 1 |

| | | | | shore Final Remedy | | | ENT: Parkland I | Refining Ltd. | | | | | _ | | DLE NO: PW1 | | |
|---|-----------|-------|-------------|--|--------------------|---------|-----------------|-------------------------|-------------|----------|----------|-----------------|-------|------|-------------------------------|------|---------------|
| - | | | | ssgradient - West Passive B | arrier N 0.0 E 0.0 | | 5110D D I 1 | 0 " 1 0 1 | 011 4 | | | | _ | | CT NO.: 60542 | 2455 | |
| ŀ | SAMF | | | Tervita GRAB | SHELBY TUBE | | THOD: Bobcat - | | | Auger | | | | COVE | TION (m): RY ■ COR | | |
| - 1 | | | TYPE | <u></u> | GRAVEL | | SLOUGH | <u>'</u> ⊟□C | | т | | | | | SAN | | |
| | | I ILL | | BENTONITE | OWVEE | | Шосоосн | <u>••</u> | | | | | 20111 | NOO | <u>. </u> OAN | | (u |
| | DEPTH (m) | | SOIL SYMBOL | | OIL DESCRI | PTI | ON | | SAMPLE TYPE | SAMPLE# | ⊗\ | apour R (ppm | 1) | ⊗ | COMMEN | TS | (ш) DEPTH (ш) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 127/17 | 0 | | | Cobbles, modifier gravel/ sand brown-grey fine-medium grained moist low density non-cohesive Sand, some gravel/ cobbles, trace brown-grey fine-medium grained sand dry low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot screen concrete: 0 - 0.40 m BGS Sentonite: 0.40 - 0.70 m BGS Sand: 0.70 - 1.30 m BGS Screen: 0.85 - 1.15 m BGS Native: 1.30 - 1.40 m BGS End of Bore: 1.40 m BGS | | pack; c | | | | | | | | | | | 1 |
| IRON | | | AECOM | | | | | OGGED BY: EVIEWED BY | | <u> </u> | | | _ | | ETION DEPTH: ETION DATE: 1 | | |
| EN | | | AECOM | | | | P | ROJECT ENG | SINE | ER: k | (. Gautl | nier | | | | | 1 of 1 |

| | | | | shore Final Remedy | | CLIE | ENT: Parkland | Refining Ltd | d. | | | | _ | | OLE NO: | | |
|--|-------|-------|-------------------|--|---------------------|---------|--------------------|--------------|----------------|---------|--------|--------------------------|------|------------|-----------|--------------|-----------|
| | | | | ssgradient - West Passive Ba | rrier N 0.0 E 0.0 | | | 0 11 10 | 011 | | | | _ | | CT NO.: | | |
| | MPLE | | | Tervita GRAB | SHELBY TUBE | | THOD: Bobcat | | 1 8" / BULK | | | | | ECOVE | TION (m): | CORE | |
| | CKFIL | | | BENTONITE | GRAVEL | | SLOUGH | | | | | | | INGS | | SAND | |
| DAG | JAFIL | | | DENTONIE | | | Шэгооон | ·•· | | ,, | | | 0011 | 11100 | <u> </u> | JOHND | |
| DEPTH (m) | | 7 | SOIL SYMBOL | SO | IL DESCRI | PTI | ON | | SAMPLE TYPE | SAMPLE# | ⊗ | Vapour I (pp) 1() | m) | g⊗ 1000 | COM | IMENTS | DEPTH (m) |
| 0 | | | 100 100 100 | Cobbles, some gravel/ sand brown/ grey wet low density | | | | | | | : | : | | | | | _ |
| - | | | | non-cohesive | | | | | | | | | | | | | - |
| - | | Ġ | | Sand, some gravel/ cobbles brown/ grey fine to medium grained sand | | | | | | | | | | | | | _ |
| - | | | . • | wet low plasticity non-cohesive | | | | | | | | | | | | | _ |
| - | | | | | | | | | | | | | | | | | _ |
| - | | | | | | | | | | | : | | | | | | _ |
| - | | • | | | | | | | | | | | | | | | - |
| _ _1 | | | | | | | | | | | | | | | | | 1- |
| - | | | | | | | | | | | | | | | | | - |
| 3DT 12/7/1 | | • | • • | | | | | | | | | | | | | | - |
| GPJ UMA. | | • | | | | | | | | | | | | | | | - |
| LOGS.SRA | | | | Well Construction Details: 2" PVC well - Sch 40, 10 slot scree | n (prepacked screer | ı); com | pleted as stick-up | | | | | | | | | | _ |
| ESHORE BF | | | | Concrete: 0 - 0.34 m BGS Bentonite: 0.34 - 0.64 m BGS Sand: 0.64 - 1.20 m BGS Screen: 0.74 - 1.10 m BGS | | | | | | | | | | | | | _ |
| 2017 FORE | | | | Native: 1.20 - 1.40 m BGS End of Bore: 1.40 m BGS | | | | | | | | | | | | | _ |
| OUR ONLY) | | | | | | | | | | | : | | | | | | _ |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 12/7/17 | | | | | | | | | | | | | | | | | - |
| JNME - | | | | A = 00 L | | | | LOGGED BY: | | | | | | | | PTH: 1.40 m | • |
| MIRC | | | | A=COM | | | _ | REVIEWED E | | | / O | thia: | (| COMPL | ETION DA | TE: 10/21/17 | 1 -5 4 |
| 甸 | | ALCOM | | | | | | PROJECT EN | IGINE | EEK: I | ۸. Gau | ınıer | | | | Page | 1 of 1 |

| L | PROJE | CT: F | res | hore Final Remedy | | CLIENT: Parklan | d Refining Ltd. | | | | | _ | | | PW17-12 | |
|---|-----------|------------|-----|---|-----------------------------|------------------------|---------------------------|-------------|----------|---------|------------------|-------------|-----------|------------|-----------------------------|-----------|
| | | | | ngradient - In between E | | | | | | | | _ | | | 60542455 | |
| ŀ | CONTR | | | | | METHOD: Bobca | | | \uger | | | _ | | TION (m): | | |
| - 1 | SAMPLE | | | GRAB | SHELBY TUBE | SPLIT SPO | | | <u> </u> | | | | COVE | | CORE | |
| ŀ | BACKFI | ILL I YH | 'E | BENTONITE | GRAVEL | SLOUGH | GF | KOU T | | | \square | CUTTI | INGS | <u>[:-</u> | SAND | |
| | DEPTH (m) | IONNO IIOS | - 0 | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | ⊗' | Vapour R (ppr | n) | | COM | IMENTS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 127/17 | 2 | | | Cobbles, modifier gravel/ sar grey moist low density non-cohesive Sand, some gravel/ cobbles, brown-grey fine-medium grained sand moist low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot Concrete: 0 - 0.40 m BGS Bentonite: 0.40 - 0.70 m BGS Sand: 0.70 - 1.30 m BGS Sand: 0.70 - 1.30 m BGS Sand: 0.70 - 1.40 m BGS End of Bore: 1.40 m BGS | trace silt, shell fragments | ack; completed as stic | k-up | | | | | <u>u 11</u> | 000 | | | 1- |
| SONM | | A=COM | | | | | LOGGED BY: REVIEWED BY | | 3 | | | | | | PTH: 1.40 m TE: 10/11/17 | |
| NE NE | | A=COM | | | | | PROJECT ENG | | | K. Gaut | hier | + | , CIVII L | LIIONDA | | 1 of 1 |

| | PRO | JECT: | Fore | shore Final Remedy | | CLIENT: Parklan | d Refining Ltd. | | | | T | TESTH(| OLE NO: PW17-13 | |
|---|-------------|-------|-------------|--|-----------------------------|-------------------------|---------------------------|------------------|---------|-------------|------|-----------|---|-----------|
| | | | | radient - East Passive B | arrier N 0.0 E 0.0 | | | | | | | | CT NO.: 60542455 | |
| | | | | Tervita | | METHOD: Bobca | | | Auger | | _ | | TION (m): | |
| - 1 | SAMP | | | GRAB | SHELBY TUBE | SPLIT SPO | | | | | | ECOVER | | |
| ╽ | BACK | FILL | TYPE | BENTONITE | GRAVEL | SLOUGH | ∴ GF | rou [.] | T I | | CUTI | TINGS | SAND | |
| | DEPTH (m) | 7 | SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | | pm) | | COMMENTS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 127/17 | 0 -1 -1 - 2 | | | Sand, some cobbles/ gravel, brown-grey sand fine- medium grained sand moist, wet in upper 0.3-0.7m low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot Concrete: 0 - 0.37 m BGS Sand: 0.37 - 0.40 m BGS Bento 0.37 - 0.40 - 0.70 m BGS Sand: 0.70 - 1.30 m BGS Screen: 0.85 - 1.15 m BGS Native: 1.30 - 1.40 m BGS End of Bore: 1.40 m BGS | screen, 20/40 sand filter p | pack; completed as stic | | | | | | 1000 | | 1- |
| SON. | | | A=COM | | | | LOGGED BY: REVIEWED BY | | 3 | | | | ETION DEPTH: 1.40 m ETION DATE: 10/12/17 | |
| ENVE ENVE | | AECOM | | | | | PROJECT ENG | | | K. Gauthier | + | COIVII LI | | e 1 of 1 |

| | . ^^. | | | | | CLIENT: Parklan | a ritorii iirig Eta. | | | | | 120111 | OLE NO: PW17-14 | |
|-------|-----------|------|-------------|---|-------------------------|-----------------|-----------------------------|------------------|---------|------------|--------------------|---------|---|-----------|
| | | | | ssgradient - East Passive | Barrier N 0.0 E 0.0 | | | | | | | | CT NO.: 60542455 | |
| | | | | Tervita | | METHOD: Bobca | | | Auger | | _ | | TION (m): | |
| - | | LE T | | GRAB | SHELBY TUBE | SPLIT SPO | | | | | | RECOVE | | |
| ŀ | BACK | FILL | TYPE | BENTONITE | GRAVEL | SLOUGH | GF | rou [.] | T I | | ∠JCUT | TINGS | SAND | 1 |
| | DEPTH (m) | | SOIL SYMBOL | \$ | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | | our Readi (ppm) | | COMMENTS | DEPTH (m) |
| - | 0 | | | Sand, some gravel, trace cobb brown-grey fine-medium grained sand wet water seepage in upper 0.2 - 0 low plasticity non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot s Concrete: 0 - 0.40 m BGS Bentonite: 0.40 - 0.70 m BGS Sand: 0.70 - 1.30 m BGS Screen: 0.85 - 1.15 m BGS Native: 1.30 - 1.40 m BGS End of Bore: 1.40 m BGS | .4 m observed with shee | | | | | | | 1000 | | 1- |
| SONM | | | A=COM | | | | LOGGED BY: I REVIEWED BY | | 2 | | | | ETION DEPTH: 1.40 m ETION DATE: 10/12/17 | |
| ENVIE | | | AECOM | | | | PROJECT ENG | | | K. Gauthie | r | JOIVIPL | | 1 of 1 |

| | | | eshore Final Remedy | | CLIE | ENT: Parkland F | Refining Ltd. | | | | | | | | NO: PW17-15 | |
|---|-------|-------------|---|--------------------|---------|-----------------------------|---------------|-------------|---------|----------|----------|---------------|-----------------|-------|--------------------|-----------|
| | | | rossgradient - East Passive Ba | arrier N 0.0 E 0.0 | | FUOD D 1 4 | 0 11 101 | OII A | | | | _ | | | O.: 60542455 | |
| | MPLE. | | R: Tervita GRAB | SHELBY TUBE | | THOD: Bobcat - SPLIT SPOON | | | luger | | | _ | ELEVA RECOVE | | (m): CORE | |
| - | | _ TYPE | | GRAVEL | | SLOUGH | <u> </u> | | т | | | ' | TINGS | -K1 | SAND | |
| DEPTH (m) | | SOIL SYMBOL | SC | DIL DESCRI | | | [·š] (/ | SAMPLE TYPE | SAMPLE# | ⊗¹ 10 | Vapour I | Readin om) | | (| COMMENTS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GPJ 12/7/17 C C C C C C C C C C C C C | | | Sand, some gravel/ cobbles brown/ grey fine to medium grained sand moist low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot scre Concrete: 0 - 0.40 m BGS Bentonite: 0.40 - 0.70 m BGS Sand: 0.70 - 1.30 m BGS Sarter: 0.84 - 1.20 m BGS Native: 1.30 - 1.40 m BGS End of Bore: 1.40 m BGS | | n); com | | OGGED BY: | KG | | | | | COMPI | ETION | NDEPTH: 1.40 m | 1 |
| MRO | | A=COM | | | | R | EVIEWED BY | : LS | | , - | | | | | N DATE: 10/21/17 | |
| Ä | | AECOM | | | | P | ROJECT ENG | SINE | ER: k | C. Gaut | thier | | | | Page | 1 of 1 |

| PRO | JECT: Fore | shore Final Remedy | | CLIENT: Parklan | d Refining Ltd. | | | | TESTH | OLE NO: PW17-16 | |
|---|-------------------------------|---|---|--|--------------------|-------------|-------------|----------------------------------|-------------------|--|---|
| | | gradient - East Passive B | arrier N 0.0 E 0.0 | T | | | | | | CT NO.: 60542455 | |
| | TRACTOR: | | | METHOD: Bobca | | | uger | | | TION (m): | |
| | PLE TYPE | GRAB | SHELBY TUBE | SPLIT SPO | | | | | RECOVEI TTINGS | | |
| BACK | (FILL TYPE | BENTONITE | GRAVEL | SLOUGH | GF | ROUI | | | TIINGS | SAND | 1 |
| DEPTH (m) | WELL INSTALLATION SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | ⊗ Vapour Reac (ppm) 10 100 | ling⊗ | COMMENTS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 127/17 | | Sand, some cobbles/ gravel light grey medium grained sand moist low density non-cohesive becoming brown, fine-coarse Well Construction Details: 2" PVC well - Sch 40, 10 slor Following well installation, or surface. The well stickup ward Concrete protector and rip rabentonite: 2.83 - 3.13 m (0 - Sand: 3.13 - 3.63 m (0.30 - Screen: 3.28 - 3.58 m (0.45 - Native: 3.63 - 3.83 m (1.00 m). Rip rap thickness has been a | e subrounded gravel, trace t screen, 20/40 sand filter protector and resubsequently extended a pp: 0 - 2.83 m (0 - 2.83 m A 0.30 m BGS) 1.00 m BGS) 1.00 m BGS) approximated based on sur | pack; completed as sticl rip rap were constructed bove the ground surfac (GS) | above ground e. | KG | | | | Vapour reading at 0.3 m BGS is non-detectable Sample collected at 0.7 - 0.9 m BGS Vapour reading at 0.8 m BGS is non-detectable | 1 — 3 — 3 — 3 — 3 — 3 — 3 — 3 — 3 — 3 — |
| VIRO | | A=COM | 1 | | REVIEWED BY | : LS | | | | ETION DATE: 8/25/17 | |
| EN L | | | | PROJECT ENG | SINE | ER: I | K. Gauthier | | Page | 1 of 1 | |

| | | shore Final Remedy | | CLIE | ENT: Parkland R | efining Ltd. | | | | | DLE NO: PW17-17 | |
|---|-------------|--|---|-------------------------------|---|-------------------------|-------------|---------|--------------------------------|---------------|--|---|
| | | nin East Passive Barrier N 0 | .0 E 0.0 | | | | | | | | CT NO.: 60542455 | |
| CONTRAC | | | Mousi py zupe | | THOD: Excavato | | | | | | TON (m): | |
| SAMPLE TY | | GRAB | SHELBY TUBE | | SPLIT SPOON | ■BU | | - | | RECOVER | | |
| BACKFILL | IYPE | BENTONITE | GRAVEL | | SLOUGH | Ğ | KOU I | l | | JTTINGS | SAND | 1 |
| DEPTH (m) WELL INSTALLATION | SOIL SYMBOL | SO | OIL DESCRI | PTI | ON | | SAMPLE TYPE | SAMPLE# | ⊗Vapour Rea (ppm) 10 100 | ding⊗ 1000 | COMMENTS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 12/7/17 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | | Sand and aquagate/organoclay brown-grey sand fine-medium grained sand moist low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot scre Following well installation, concresurface. The well stickup was subtoched to the substant of the substan | een (prepacked screer te well protector and r sequently extended a ap: 0 - 2.20 m (0 - 2.2 agate/organoclay: 2.20 0 m BGS) | bove to 0 m A() - 3.20 | he ground surface. GS)) m (0 - 1.00 m BGS) | | | | | | | 2 — 3 — 3 — 5 — 6 — 7 — 9 — 9 — 9 — 9 — 9 — 9 — 9 — 9 — 9 |
| VIRONMENTAL (| | A=COM | | | RE | OGGED BY: EVIEWED BY | ': LS | | | | ETION DEPTH: 1.00 m ETION DATE: 7/21/17 | - |
| | ALCOM | | | | | ROJECT ENG | SINE | ER: I | K. Gauthier | | Page | e 1 of 1 |

| | eshore Final Remedy | | CLIENT: Parkland | Refining Ltd. | | | | | | OLE NO: PW17-18 | |
|---|--|--|---|----------------------------|-------------|------------|--------------|-------------------------|--------------------|------------------------|-----------|
| | thin East Passive Barrier | N 0.0 E 0.0 | T | | | | | | | CT NO.: 60542455 | |
| CONTRACTOR: | | | METHOD: Excava | | | | | 71110 | | ΓΙΟΝ (m): | |
| SAMPLE TYPE | GRAB | SHELBY TUBE | | N ⊟ BU | | | | _ | RECOVER | RY CORE | |
| BACKFILL TYPE | BENTONITE | GRAVEL | SLOUGH | <u></u> ⊌GR | 1001 | | | <u>/</u>]co | TINGS | [:·]SAND | |
| DEPTH (m) WELL WELL INSTALLATION SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE # | ⊗ Vapı 10 | our Rea (ppm) 100 | ding⊗ 1000 | COMMENTS | DEPTH (m) |
| ENVIRONIMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ. UMA.GDT. 12/1/17 | Sand and aquagate/powder brown-grey fine-medium grained sand moist low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slc Following well installation, c surface. The well stickup we Concrete well protection and 75% washed sand and 25% BGS) Screen: 3.04 - 3.40 m (0.84 End of Bore: 3.40 m (1.20 n Borehole log details have be Rip rap thickness has been | ot screen (prepacked screen concrete well protector and as subsequently extended a drip rap: 0 - 2.20 m (0 - 2.2 o aquagate/powder activate - 1.20 m BGS) n BGS) een extrapolated from field | rip rap were constructed above the ground surface to m AGS) d carbon: 2.20 - 3.40 m (| above ground 0 - 1.20 m | | | | | | | 1 |
| M - 10 | | | | | | | <u> </u> | : | | | |
| ONM | A = CO. | 4 | _ | LOGGED BY: E | | | | | | ETION DEPTH: 1.20 | |
| NA R | A=CO/ | - | REVIEWED BY: PROJECT ENG | | | (Gauthia | ar . | COMPL | ETION DATE: 7/21/1 | 7 ige 1 of 1 | |
| ш | | | I NOULUI ENG | HVEE | _i \. f | . Oautille | / 1 | 1 | Po | ıyıcı ∪II | |

| | PRO. | JECT | : Fore | shore Final Remedy | | CLIENT: Parklan | d Refining Ltd. | | | | | TESTH | OLE NO: PW17- | 19 | |
|--|-----------|------|-------------|---|---------------------------|-----------------|------------------|------------------|---------|------------|-------|--------|-------------------|-------------------|-----|
| | | | | vngradient East Passive | Barrier N 0.0 E 0.0 | T | | | | | | | CT NO.: 6054245 | 55 | |
| | | | | Tervita | | METHOD: Bobca | | | luger | | _ | | TION (m): | | _ |
| - | | | YPE | GRAB | SHELBY TUBE | SPLIT SPO | | | | | | RECOVE | | | _ |
| B | BACK | FILL | TYPE | BENTONITE | GRAVEL | SLOUGH | GF | ROU [®] | Ī | | ∕]CUT | TINGS | SAND | | |
| | DEPTH (m) | | SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | | (ppm) | | COMMENTS | DEPTH (m) | |
| FAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 1277/17 | 0 | | | Sand, some gravel/ cobbles, s brown/ grey fine - medium grained sand moist low plasticity non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot Concrete: 0 - 0.40 m BGS Bentonite: 0.40 - 0.70 m BGS Sand: 0.70 - 1.30 m BGS Screen: 0.87 - 1.15 m BGS Native: 1.30 - 1.40 m BGS End of Bore: 1.40 m BGS | ng throughout below 0.4 n | | k-up | | | | | 1000 | | 1 | 11- |
| ONM | | | A=COM | | | | LOGGED BY: | | | | | | ETION DEPTH: 1.4 | | _ |
| NVIR | | | | ALCON | | | PROJECT ENG | | | (Gauthier | | COMPL | ETION DATE: 10/1. | 2/17 Page 1 of | 1 |
| ш | | | | | | | I . I COLOT LING | /II V | I | Juuli IICI | | | | ago i Ul | _' |

| | | | shore Final Remedy | | CLIE | ENT: Parkland | Refining Ltd. | | | | | | | | D: PW17-20 | |
|---|-------------------|-------------|---|----------------|---------|---------------|---------------|-------------|-------|--------------|-----------------|----|-------------------|---------|-------------------|-----------|
| | | | vngradient East Passive Barri | er N 0.0 E 0.0 | | | 0 11 1 01 | 011 4 | | | | _ | | | : 60542455 | |
| | NTRAC (IPLE T) | | Tervita GRAB | SHELBY TUBE | | THOD: Bobcat | | | Auger | | | | ECOVE | TION (r | n): CORE | |
| | KFILL | | | GRAVEL | | SLOUGH | G | | T | | | | INGS | .111 | SAND | |
| O DEPTH (m) | | SOIL SYMBOL | | IL DESCRI | PTI | ON | _ | SAMPLE TYPE | | ⊗ 10 · | Vapour I (pp | m) | g⊗ 1000 · | Co | DMMENTS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 127/17 | | | brown/ grey fine-medium grained sand wet low plasticity non-cohesive becoming grey, trace silt below 0.4 becoming grey, trace silt below 0.4 Well Construction Details: 2" PVC well - Sch 40, 10 slot scree Concrete: 0 - 0.30 m BGS Bentonite: 0.30 - 0.54 m BGS Sand: 0.54 - 1.10 m BGS Screen: 0.64 - 1.00 m BGS Native: 1.10 - 1.40 m BGS End of Bore: 1.40 m BGS | m BGS | i); com | | OGGED BY: | KG | | | | | COMPI | FTION | DEPTH: 1.40 m | 1- |
| VIRO | | AECOM | | | | F | REVIEWED BY | /: LS | | | | | | | DATE: 10/14/17 | |
| | | AECOM | | | | F | PROJECT ENG | SINE | ER: k | C. Gaut | thier | | | | Page | 1 of 1 |

| PROJECT: Foreshore Final Remedy | | | | CLIENT: Parkland Refining Ltd. | | | | TESTHOLE NO: PW17-21 | | | |
|--|-------------------------------|---|--|--|-----------------------|---------|--|-----------------------|--------------------------|---|-----|
| | | gradient - East Passive B | | | | | | PROJECT NO.: 60542455 | | | |
| | NTRACTOR: | | METHOD: Bobcat - Solid Stem 8" Auger | | | | ELEVATION (m): | | | | |
| | SAMPLE TYPE GRAB SHELBY TUBE | | | SPLIT SPOON BULK SLOUGH GROUT | | | NO RECOVERY CORE | | | | |
| BAC | ACKFILL TYPE BENTONITE GRAVEL | | | SLOUGH | <u></u> G⊦ | KOU I | | CUTTINGS | | SAND | |
| DEPTH (m) | WELL INSTALLATION SOIL SYMBOL | | SOIL DESCRI | PTION SAMPLE TYPE | | SAMPLE# | ⊗ Vapour Reading ⊗ (ppm) 10 100 1000 | | COMMENTS | DEPTH (m) | |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ. UMA.GDT 12/7/17 C | | Sand/ organoclay, some gravifine-medium grained sand moist low density non-cohesive Sand, some gravel (angular/ grey fine-medium grained sand moist low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot Following well installation, co surface. The well stickup was Concrete protector and rip ra Bentonite: 2.83 - 3.13 m (0 - Sand: 3.13 - 3.63 m (0.30 - 0 Screen: 3.28 - 3.58 m (0.45 - Native: 3.63 - 3.83 m (0.80 - End of Bore: 3.83 m (1.00 m) Rip rap thickness has been a | screen, 20/40 sand filter porcete well protector and resubsequently extended as concentration of the subsequently extended and concentration of the subsequently exten | rip rap were constructed bove the ground surfact (AGS) | d above ground De. | KG | | | | Sample collected at 0.5 - 0.7 m BGS Vapour reading at 0.6 m BGS is non-detectable | 1 — |
| AECOM | | | | REVIEWED BY: LS | | | | | COMPLETION DATE: 8/31/17 | | |
| EN EN | | | PROJECT ENGINEER: K. Gauthier | | | | | Page 1 of 1 | | | |

| PRO | JECT: Fore | shore Final Remedy | | CLIENT: Parklan | d Refining Ltd. | | | | | OLE NO: PW17-22 | |
|---|-------------------------------|--|--|---|-----------------------------|-------------|-------------|-------------------|------------|------------------------|---|
| | | hin East Passive Barrier | N 0.0 E 0.0 | | | | | | _ | CT NO.: 60542455 | |
| | NTRACTOR: | | Mousi by Tube | METHOD: Exca | | 11.17 | | | | TION (m): | |
| | PLE TYPE | GRAB | SHELBY TUBE GRAVEL | SPLIT SPO | ON ■BU | | | | NO RECOVER | RY CORE SAND | |
| BAC | KFILL TYPE | BENTONITE | [:_]GRAVEL | [[[]]SLOUGH | . . . GR | KOU I | | | CUTTINGS | [∴]SAND | |
| DEPTH (m) | WELL INSTALLATION SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | ⊗ Vapour F (pp | m) | COMMENTS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 12/7/17 ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 12/7/17 O | | Sand and aquagate/organoc brown-grey fine-medium grained sand moist low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot Following well installation, or surface. The well stickup was Concrete well protection and 75% washed sand and 25% Screen: 3.14 - 3.50 m (0.64 - End of Bore: 3.50 m (1.00 m) Borehole log details have be Rip rap thickness has been a | t screen (prepacked screer oncrete well protector and ris subsequently extended a rip rap: 0 - 2.50 m (0 - 2.5 aquagate/organoclay: 2.50 + 1.00 m BGS) in BGS) | ip rap were constructed bove the ground surfact 0 m AGS) 0 - 3.50 m (0 - 1.00 m Exposervations. | d above ground e. GS) | | | 10 10 | 0 1000 | | 3 - 3 - 3 - 3 - 3 - 3 - 3 - 3 - 3 - 3 - |
| - 10 | 1 1 | | | | LOGGED BY: 1 | EP | | • 1 • 1 | COMPL | ETION DEPTH: 1.00 m | |
| VIRO | | A=CON | 1 | | REVIEWED BY | | | | COMPL | ETION DATE: 7/22/17 | |
| N N | | | | PROJECT ENG | INE | ER: I | K. Gauthier | | Page | 1 of 1 | |

| PR | OJECT: F | ores | hore Final Remedy | | CLIENT: Parklar | d Refining Ltd. | | | | | TE | ESTHO | DLE NO: PW1 | 7-23 | |
|---|----------------------|--------------|--|---|--|--|--------------|---------|------------|---------------------------|-------|-------|----------------|-------|----------------------------|
| | | | in East Passive Barrier N | 1 0.0 E 0.0 | | | | | | | _ | | CT NO.: 60542 | 455 | |
| | NTRACTO | | | Meur ex = :== | METHOD: Exca | | 11.17 | | Г | <u></u> | | | TON (m): | | |
| - | IPLE TYPE | | GRAB | SHELBY TUBE | SPLIT SPO | | | т | | | | COVER | | | |
| BAC | KFILL TYF | <u>'</u> | BENTONITE | GRAVEL | SLOUGH | GF | ₹ ∪∪` | I | <u></u> | $\mathbb{Z}_{\mathbb{C}}$ | UTTII | NGS | SANI |) | |
| DEPTH (m) | WELL INSTALLATION | SOIL STIMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | ⊗Vap | (ppm) |) | | COMMEN | TS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 12/1/17 ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 12/1/17 O | | | Sand and aquagate/powder a brown-grey fine-medium grained sand moist low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot Following well installation, cor surface. The well stickup was Concrete well protection and r.75% washed sand and 25% a BGS) Screen: 3.04 - 3.40 m (0.84 - End of Bore: 3.40 m (1.20 m B) Borehole log details have bee Rip rap thickness has been approximately and the second se | screen (prepacked screen crete well protector and r subsequently extended a rip rap: 0 - 2.20 m (0 - 2.21 equagate/powder activated 1.20 m BGS) BGS) n extrapolated from field of | ip rap were constructed bove the ground surfact 0 m AGS) d carbon: 2.20 - 3.40 m bbservations. | d above ground xe. I (0 - 1.20 m | | | | 100 | | | | | 1— 2— 3— 5— 6— |
| OT THE THE THE THE | | | | | | | | | | | | | | | |
| NME O | 1 1 | | A = C = 1 | • | | LOGGED BY: | | | | | _ | | ETION DEPTH: | | |
| MRC | | | A=CON | | | REVIEWED BY | | | | | C | OMPLE | ETION DATE: 7/ | | 4 - : |
| A L | | | | | | PROJECT ENG | SINE | ER: I | K. Gauthie | er | | | | Page | 1 of 1 |

| | PRO | JECT | : Fore | shore Final Remedy | | CLIENT: Parklan | d Refining Ltd. | | | | | TESTH | OLE NO: PW17-24 | |
|---|-----------|------|-------------|---|-----------------------------|-------------------------|------------------|------------------|---------|--------------------|--------------------------|-------------|------------------------|---------------|
| | LOCA | ATIO | N: Dov | vngradient East Passive | Barrier N 0.0 E 0.0 | | | | | | | | CT NO.: 60542455 | |
| | | | | Tervita | | METHOD: Bobca | | | Auger | | _ | | TION (m): | |
| ŀ | SAMF | | | GRAB | SHELBY TUBE | SPLIT SPO | | | | | | RECOVE | | |
| ŀ | BACK | FILL | TYPE | BENTONITE | GRAVEL | SLOUGH | ∏ GF | rou [.] | T I | | ∆CUT | TINGS | SAND | |
| | DEPTH (m) | | SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | ⊗ Vapoi (10 | ur Readii ppm) 100 | ng⊗ 1000 | COMMENTS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 127/17 | 0 | | | Sand, some gravel, trace cot brown-grey fine-medium grained sand moist low plasticity non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot Concrete: 0 - 0.40 m BGS Bentonite: 0.40 - 0.70 m BGS Sand: 0.70 - 1.20 m BGS Screen: 0.85 - 1.15 m BGS Native: 1.20 - 1.40 m BGS End of Bore: 1.40 m BGS | screen, 20/40 sand filter p | pack; completed as stic | к-ир | | | | | | | 1- |
| ONME | | | | A = CO. | 4 | | LOGGED BY: | | | | | | ETION DEPTH: 1.40 n | |
| NVIR | | | | A=CON | 1 | | PROJECT ENG | | | (Gauthion | | COMPL | ETION DATE: 10/12/1 | 7 e 1 of 1 |
| ш | | | | | | | I I KOOLO I LING | /II VL | ı.\. I | . Oddiniel | | | ray | 0 1 01 1 |

| | | | | shore Final Remedy | | CLIE | ENT: Parkland F | Refining Ltd. | | | | | | | | O: PW17-25 | |
|---|-----------------|--|---------------|---|----------------|---------|-----------------------------|----------------|-------------|--------|---------|-----------------|-----|-------------------|--------|-------------------|-----------|
| | | | | ngradient East Passive Barri | er N 0.0 E 0.0 | | F110D D 1 1 | 0 11 101 | 011 4 | | | | _ | | | 0.: 60542455 | |
| | ON I RA MPLE | | | Tervita GRAB | SHELBY TUBE | | THOD: Bobcat - SPLIT SPOON | | | Auger | | | _ | ECOVE | TION (| m): CORE | |
| | CKFIL | | | BENTONITE | GRAVEL | | SLOUGH | GI | | Т | | | ' | INGS | | SAND | |
| O DEPTH (m) | | | SOIL OF WIDOL | Sand, some grave/cobbles, shell fra | IL DESCRI | | | _ | SAMPLE TYPE | | ⊗ 11 | Vapour l (pp | om) | g⊗ 1000 · | С | OMMENTS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 127/17 | | | | brown-grey fine-medium grained sand wet low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot screet Concrete: 0 - 0.40 m BGS Bentonite: 0.40 - 0.70 m BGS Sand: 0.70 - 1.30 m BGS Sard: 1.15 m BGS Sand: 0.70 - 1.40 m BGS End of Bore: 1.40 m BGS | m BGS | eack; c | | p OGGED BY: | KG | | | | | COMPL | ETION | DEPTH: 1.40 m | 1 |
| MIROI | | | | A=COM | | | R | EVIEWED BY | ′: LS | | / O- | Un!a· | | | | DATE: 10/21/17 | 4 . 5 4 |
| 핆 | | | | | | | P | ROJECT ENG | NEاز | :ER: I | C. Gau | thier | | | | Page | 1 of 1 |

| PRO | JECT: Fore | shore Final Remedy | | CLIENT: Parklan | d Refining Ltd. | | | | | 1 | ESTH | OLE NO: PW17-26 | |
|---|-------------------------------|---|--|---|----------------------|-------------|---------|--------|------------|--|-------|---|---|
| | | gradient - East Passive E | Barrier N 0.0 E 0.0 | T | | | | | | _ | | CT NO.: 60542455 | |
| | ITRACTOR: | | | METHOD: Bobca | | | uger | | | | | TION (m): | |
| - | PLE TYPE | GRAB | SHELBY TUBE | | | | - | | | | ECOVE | | |
| BACK | KFILL TYPE | BENTONITE | GRAVEL | SLOUGH | GF | KOU I | | | | CUII | INGS | SAND | |
| DEPTH (m) | WELL INSTALLATION SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | ⊗ | | om) | | COMMENTS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 12//17 | | Sand/ organoclay, some graight grey fine-medium grained sand moist low density non-cohesive Sand, some gravel, trace sill brown/grey fine-medium grained sand moist low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slo Following well installation, or surface. The well stickup was concrete well protector and Bentonite: 2.99 - 3.29 m (0.80 - Sand: 3.29 - 3.79 (0.30 - 0.85 Creen: 3.44 - 3.74 m (0.45 Native: 3.79 - 3.99 m (1.00 m). Rip rap thickness has been as service of the same service of the | t screen, 20/40 sand filter procrete well protector and a subsequently extended a rip rap: 0 - 2.99 m (0 - 2.99 0.30 m BGS) 0 m BGS) - 0.75 m BGS) 1.00 m BGS) 1.00 m BGS) | rip rap were constructed above the ground surface of m AGS) | d above ground e. | | | 11 | <u>J</u> 1 | 00 | 1000 | Sample collected at 0.5 - 0.7 m BGS Vapour reading at 0.6 m BGS is non-detectable | 2 — 3 — 3 — 3 — 3 — 3 — 3 — 3 — 3 — 3 — |
| 10 EN | | | | | LOGGED BY: | K.C. | | : | | <u> </u> | COMBI | ETION DEPTH: 1.00 m | |
| RON | | A=COA | 1 | | REVIEWED BY | | ; | | | | | ETION DEPTH: 1.00 m | |
| EN | | 7-60/ | A=8 | | PROJECT ENG | | | K. Gau | thier | | | | 1 of 1 |

| PRO | JECT: Fore | shore Final Remedy | | CLIENT: Parklan | d Refining Ltd. | | | | | DLE NO: PW17-27 | |
|---|-------------------------------|--|--|---|------------------------------|-------------|---------|------------------------|-------------------|------------------------|-----------|
| | | nin East Passive Barrier I | N 0.0 E 0.0 | | | | | | | CT NO.: 60542455 | |
| | TRACTOR: | | Mousi by Tube | METHOD: Excav | | | | | | TON (m): | |
| - | LE TYPE | GRAB | SHELBY TUBE | SPLIT SPO | | | | | RECOVER TTINGS | CORE SAND | |
| BACK | FILL TYPE | BENTONITE | · GRAVEL | [[[]]SLOUGH | GF | KOU I | | <u>[∑]</u> CU | TTINGS | [:·]SAND | |
| DEPTH (m) | WELL INSTALLATION SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | ⊗ Vapour Reac (ppm) | · I | COMMENTS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 12/7/17 ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 12/7/17 O | | Sand and aquagate/organocl brown-grey financemedium grained sand moist low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot Following well installation, co surface. The well stickup was Concrete well protection and 75% washed sand and 25% Screen: 3.44 - 3.80 m (0.64 - End of Bore: 3.80 m (1.00 m) Borehole log details have bee Rip rap thickness has been a | screen (prepacked screer ncrete well protector and r subsequently extended a rip rap: 0 - 2.80 m (0 - 2.8 aquagate/organoclay: 2.80 1.00 m BGS) BGS) | ip rap were constructed bove the ground surfact 0 m AGS) 0 - 3.80 m (0 - 1.00 m E servations. | d above ground e. (GS) | | | 10 100 | 1000 | | 2 |
| | | | - | | LOGGED BY: I | EP | • | | COMPLE | ETION DEPTH: 1.00 m | |
| VIRO | | A=CON | 1 | | REVIEWED BY | | | | | ETION DATE: 7/26/17 | |
| Z Z | | The state of the s | *************************************** | | PROJECT ENG | INE | ER: I | K. Gauthier | | Page | 1 of 1 |

| PR | OJECT: Fore | eshore Final Remedy | | CLIENT: Parkland | Refining Ltd. | | | | Т | ESTHO | DLE NO: PW17-28 | |
|---|-------------------------------------|---|---|--|-------------------------------|-------------|---------|-------------|------|--------|---|----------------------------------|
| | | hin East Passive Barrier | N 0.0 E 0.0 | | | | | | | | CT NO.: 60542455 | |
| | NTRACTOR: | | | METHOD: Excava | | | | | | | TON (m): | |
| | IPLE TYPE | GRAB | SHELBY TUBE | SPLIT SPOO | | | | | | ECOVER | | |
| BAC | KFILL TYPE | BENTONITE | GRAVEL | SLOUGH | GR | ROUT | | | СИТТ | INGS | SAND | |
| DEPTH (m) | WELL INSTALLATION SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | | pm) | | COMMENTS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 12/1/17 ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 12/1/17 O | | Sand and aquagate/powder brown-grey fine-medium grained sand moist low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slo Following well installation, or surface. The well stickup wa Concrete well protection and 75% washed sand and 25% Screen: 2.84 - 3.20 m (0.84 End of Bore: 3.20 m (1.20 m) Borehole log details have be Rip rap thickness has been a | activated carbon t screen (prepacked screer oncrete well protector and r s subsequently extended a l rip rap: 0 - 2.00 m (0 - 2.0 aquagate/powder activated - 1.20 m BGS) BGS) en extrapolated from field of | ip rap were constructed bove the ground surface 00 m AGS) d carbon: 2.00 - 3.20 (0 - 0.00 - 0 | above ground . 1.20 m BGS) | | | 10 1 | 00 1 | 000 | | 2- 3- 3- 5- 6- 8- |
| IRONMENTAL (V | | A=COA | 1 | | LOGGED BY: I | | | | | | ETION DEPTH: 1.20 ETION DATE: 7/26/1 | |
| ≧ E | | | 5 6 | | PROJECT ENG | | R: k | (. Gauthier | | | | ge 1 of 1 |

| | PRO | JECT | : Fore | shore Final Remedy | | CLIENT: Parklan | d Refining Ltd. | | | | - | TESTH | OLE NO: PW17-29 | |
|---|-----------|------|-------------|--|--|-------------------------|-----------------------------|-------------|---------|-------------|-------|---------|--|----------------|
| L | LOCA | OITA | N: Dov | vngradient East Passive | Barrier N 0.0 E 0.0 | | | | | | | | CT NO.: 60542455 | |
| - | | | | Tervita | | METHOD: Bobca | | | luger | | _ | | TION (m): | |
| - 1 | SAMF | | | GRAB | SHELBY TUBE | SPLIT SPO | | | | | | RECOVE | | |
| - | BACK | FILL | TYPE | BENTONITE | GRAVEL | SLOUGH | GF | ROU | Г | | ∕JCUT | TINGS | SAND | |
| | DEPTH (m) | | SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | | ppm) | | COMMENTS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 127/17 | 2 | | | Sand, some gravel, trace cobbrown/ grey fine-medium grained sand wet low density non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot Concrete: 0 - 0.40 m BGS Bentonite: 0.40 - 0.70 m BGS Sand: 0.70 - 1.20 m BGS Screen: 0.85 - 1.15 m BGS Native: 1.20 - 1.40 m BGS End of Bore: 1.40 m BGS | ow 0.4 m BGS screen, 20/40 sand filter p | pack; completed as stic | к-ир | | | | | 1000 | | 1- |
| MNO | | | | A=CO4 | A | | LOGGED BY: I REVIEWED BY | | - | | | | ETION DEPTH: 1.40 n ETION DATE: 10/12/1 | |
| NVIF | | | | A=CON | 1 | | PROJECT ENG | | | K. Gauthier | | COIVIPL | | / je 1 of 1 |

| | PRO | JECT | : Fore | shore Final Remedy | | CLIENT: Parklan | d Refining Ltd. | | | | | TESTH | OLE NO: PW17-30 | |
|---|------------|------|-------------|---|---------------------|--------------------------|-----------------|-------------|-----------------|-------------|--------------------|-------------|------------------------|----------------|
| | LOCA | ATIO | N: Dov | vngradient East Passive | Barrier N 0.0 E 0.0 | | | | | | | | CT NO.: 60542455 | |
| ŀ | | | | Tervita | | METHOD: Bobca | | | luger | | _ | | TION (m): | |
| - 1 | SAMF | | | GRAB | SHELBY TUBE | SPLIT SPO | | | | | | RECOVE | | |
| - | BACK | FILL | TYPE | BENTONITE | GRAVEL | SLOUGH | ∴ GF | ROU | Г | | ∕]CUT | TINGS | SAND | |
| | DEPTH (m) | | SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | ⊗ Vapo | ur Readii (ppm) | ng⊗ 1000 | COMMENTS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 127/17 | 0 -1 -1 -2 | | | Sand, some gravel/ cobbles, brown/ grey fine-medium grained sand wet low plasticity non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot Concrete: 0 - 0.40 m BGS Bentonite: 0.40 - 0.70 m BGS Sand: 0.70 - 1.30 m BGS Screen: 0.49 - 1.40 m BGS End of Bore: 1.40 m BGS End of Bore: 1.40 m BGS | ow 0.4 m BGS | n); completed as stick-u | p | | | | | | | 1- |
| ONME | | | | A = CO. | 4 | | LOGGED BY: | | | | | | ETION DEPTH: 1.40 r | |
| MIR | | | | A=CON | 1 | | PROJECT ENG | | | (Gauthia | . | COMPL | ETION DATE: 10/21/1 | 7 ge 1 of 1 |
| 甸 | | | | | | | LLKONEO I ENG | ⊒וווכ | .⊏ r : I | v. Gautniei | | | Pag | ye ı ∪ĭ İ |

| | PRO | JECT: | Fore | shore Final Remedy | | CLIENT: Parklan | d Refining Ltd. | | | | 1 | ΓESTΗ | OLE NO: PW17-31 | |
|--|-----------|-------|-------------|---|-----------------------------|-------------------------|-----------------------------|-------------|-------------|-------------|------|------------|--|-----------|
| | LOCA | OITA | l: Upg | radient - East Passive B | arrier N 0.0 E 0.0 | | | | | | _ | | CT NO.: 60542455 | |
| | | | | Tervita | | METHOD: Bobca | | | uger | | _ | | TION (m): | |
| | SAMF | | | GRAB | SHELBY TUBE | SPLIT SPO | | | | | | RECOVE | | |
| ŀ | BACK | FILL | TYPE | BENTONITE | GRAVEL | SLOUGH | ∴ GF | ROU | Г | |]CUT | TINGS | SAND | |
| | DEPTH (m) | 7 | SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | | pm) | g⊗ 1000 | COMMENTS | DEPTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 12/7/17 | 0 | | | Sand, some gravel, trace cobbrown/ grey fine-medium grained sand moist low plasticity non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot Concrete: 0 - 0.40 m BGS Bentonite: 0.40 - 0.70 m BGS Sand: 0.70 - 1.30 m BGS Sarden: 0.85 - 1.15 m BGS Native: 1.30 - 1.40 m BGS End of Bore: 1.40 m BGS | screen, 20/40 sand filter p | pack; completed as stic | к-ир | | | | | | | 1— |
| RONN | | | | A=CON | 1 | | LOGGED BY: I REVIEWED BY | | | | | | ETION DEPTH: 1.40 r ETION DATE: 10/12/1 | |
| Ν | | | | 7_60// | . ■2. | | PROJECT ENG | | | K. Gauthier | | | | ge 1 of 1 |

| | | | | shore Final Remedy | | CLIE | ENT: Parkland F | Refining Ltd. | | | | | _ | | | : PW17-32 | |
|--|-----------|-------|------------|--|------------------|------|-----------------------------|---------------|-------------|----------|--------|-------|----------------|---------|---------|---------------|-----------|
| | | | | ssgradient - East Passive Bar | rier N 0.0 E 0.0 | | TUOD D. I. (| 0 11 101 | OII A | | | | _ | | | 60542455 | |
| | | LE T | | Tervita GRAB | SHELBY TUBE | | THOD: Bobcat - SPLIT SPOON | | | Auger | | | _ | ECOVE | TION (m | CORE | |
| - | | | TYPE | | GRAVEL | | SLOUGH | | | т | | | | INGS | | SAND | |
| | | I ILL | SYMBOL | | IL DESCRI | | _ | . | | | | | 10011 | 11100 | | MMENTS | PTH (m) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 12/7/17 | DEPTH (m) | | SOIL SYMBO | Sand, some gravel, trace cobbles, s brown/ grey fine-medium grained sand moist low plasticity non-cohesive Trace silt below 0.5 m BGS Well Construction Details: 2" PVC well - Sch 40, 10 slot screet Concrete: 0 - 0.40 m BGS Bentonite: 0.40 - 0.70 m BGS Sand: 0.70 - 1.30 m BGS Sand: 0.70 - 1.30 m BGS | shell fragments | | | p | SAMPLE TYPE | SAMPLE # | | | om) | g⊗ 1000 | CC | MMENTS | DEPTH (m) |
| JTAL (VAPOUR ONLY) 2017 FORESI | | | | Screen: 0.85 - 1.15 m BGS Native: 1.30 - 1.40 m BGS End of Bore: 1.40 m BGS | | | | | | | | | | | | | - |
| WEN_ | <u> </u> | | 1 | | | | L | OGGED BY: | KG | <u> </u> | • | | | COMPL | ETION D | EPTH: 1.40 m | I |
| ROA | | | | A=COM | | | | EVIEWED BY | | 3 | | | | | | ATE: 10/12/17 | |
| ENV | | | | , 120/// | | | | ROJECT ENG | | | K. Gau | thier | | | | | 1 of 1 |

| | PRO | JECT | : Fore | shore Final Remedy | | CLIENT: Parklan | d Refining Ltd. | | | | - | TESTH | OLE NO: PW17- | 33 | |
|---|-----------|------|-------------|---|-----------------------------|-------------------------|-----------------------------|-------------|---------|---------------------------------------|--------------------|-------------|--------------------------------------|-----------|-------|
| | LOCA | OITA | N: Cro | ssgradient - East Passive | Barrier N 0.0 E 0.0 | | | | | | | | CT NO.: 6054245 | 55 | |
| | | | | Tervita | | METHOD: Bobca | | | luger | | | | TION (m): | | |
| | SAMF | | | GRAB | SHELBY TUBE | SPLIT SPO | | | | · · · · · · · · · · · · · · · · · · · | | RECOVE | | | |
| ļ | BACK | FILL | TYPE | BENTONITE | GRAVEL | SLOUGH | GF | ROU' | Γ | | CUT | TINGS | SAND | | |
| | DEPTH (m) | | SOIL SYMBOL | | SOIL DESCRI | PTION | | SAMPLE TYPE | SAMPLE# | ⊗ Vapoi | ur Readir (ppm) | ng⊗ 1000 | COMMENTS | DEPTH (m) | נייי) |
| ENVIRONMENTAL (VAPOUR ONLY) 2017 FORESHORE BH LOGS.SRA.GPJ UMA.GDT 127/17 | 0 | | | Sand, some gravel, trace cobbrown-grey fine-medium grained sand moist low plasticity non-cohesive Well Construction Details: 2" PVC well - Sch 40, 10 slot Concrete: 0 - 0.40 m BGS Bentonite: 0.40 - 0.70 m BGS Sand: 0.70 - 1.30 m BGS Sarceon: 0.85 - 1.15 m BGS Native: 1.30 - 1.40 m BGS End of Bore: 1.40 m BGS | screen, 20/40 sand filter p | pack; completed as stic | | | | | | | | | 1— |
| RON | | | | A=CON | 1 | | LOGGED BY: I REVIEWED BY | | 3 | | | | ETION DEPTH: 1.4 ETION DATE: 10/1 | | |
| EN | | | | ~=~~// | (1) | | PROJECT ENG | | | K. Gauthier | | | | Page 1 of | f 1 |

TABLE E-1 FORESHORE MONITORING WELLS CONSTRUCTION DETAILS

| Monitoring Well | Well Type | Total Depth (m bgs) | Top of Well Screen (m bgs) | Bottom of Well Screen (m bgs) | Screen type | |
|-----------------|-------------|------------------------|-------------------------------|-------------------------------------|------------------|--|
| PW17-1 | Upslope | 1.20 | 0.85 | 1.15 | PVC | |
| PW17-2 | Sentry | 1.20 | 0.85 | 1.15 | PVC | |
| PW17-3 | Compliance | 1.20 | 0.85 | 1.15 | PVC | |
| PW17-4 | Upslope | 0.80 | 0.45 | 0.75 | PVC | |
| PW17-5 | Performance | 1.10 | 0.64 | 1.00 | SS | |
| PW17-6 | Performance | 1.30 | 0.84 | 1.20 | SS | |
| PW17-7 | Sentry | 1.05 | 0.7 | 1.00 | PVC | |
| PW17-8 | Compliance | 1.30 | 0.84 | 1.20 | SS | |
| PW17-9 | Upslope | 1.20 | 0.85 | 1.15 | PVC | |
| PW17-10 | Sentry | 1.25 | 0.85 | 1.15 | PVC | |
| PW17-11 | Compliance | 1.20 | 0.74 | 1.10 | SS | |
| PW17-12 | Compliance | 1.20 | 0.85 | 1.15 | PVC | |
| PW17-13 | Upslope | 1.20 | 0.85 | 1.15 | PVC | |
| PW17-14 | Sentry | 1.20 | 0.85 | 1.15 | PVC | |
| PW17-15 | Compliance | 1.30 | 0.84 | 1.20 | SS | |
| PW17-16 | Upslope | 0.80 | 0.45 | 0.75 | PVC | |
| PW17-17 | Performance | 1.10 | 0.64 | 1.00 | SS | |
| PW17-18 | Performance | 1.30 | 0.84 | 1.20 | SS | |
| PW17-19 | Sentry | 1.20 | 0.87 | 1.15 | PVC | |
| PW17-20 | Compliance | 1.10 | 0.64 | 1.00 | SS | |
| PW17-21 | Upslope | 0.80 | 0.45 | 0.75 | PVC | |
| PW17-22 | Performance | 1.10 | 0.64 | 1.00 | SS | |
| PW17-23 | Performance | 1.30 | 0.84 | 1.20 | SS | |
| PW17-24 | Sentry | 1.20 | 0.85 | 1.15 | PVC | |
| PW17-25 | Compliance | 1.25 | 0.85 | 1.15 | PVC ¹ | |
| PW17-26 | Upslope | 0.80 | 0.45 | 0.75 | PVC | |
| PW17-27 | Performance | 1.10 | 0.64 | 1.00 | SS | |
| PW17-28 | Performance | 1.30 | 0.84 | 1.20 | SS | |
| PW17-29 | Sentry | 1.20 | 0.85 | 1.15 | PVC | |
| PW17-30 | Compliance | 1.30 | 0.84 | 1.20 | SS | |
| PW17-31 | Upslope | 1.20 | 0.85 | 1.15 | PVC | |
| PW17-32 | Sentry | 1.20 | 0.85 | 1.15 | PVC | |
| PW17-33 | Compliance | 1.20 | 0.85 | 1.15 | PVC | |

m bgs - metres below ground surface
SS - Stainless steel wrapped screen prepacked with 20/40 sand
PVC - Schedule 40 - 10 slot screen
1 - Screen consisted of a 3" - 10 slot screen surrounding a 2" - 10 slot screen prepacked with
20/40 filter sand (manufactured by Bluemax Drilling)

Project number: 60542455

Appendix F – Field Reports to VFPA

From: Gill, Michael (Vancouver)
To: Chaisson, Spencer

Cc: Southern, Leslie; Chris Boys; O"Neill, Eoghan

Subject: PER No.16-180 Environmental Monitoring Report October 16 - 21, 2017

Date: October 23, 2017 4:16:38 PM

Attachments: 20171023.Table 1. Foreshore Field Measurements.xlsx

image001.png

Dear Mr. Chaisson.

Construction for the project has been completed with two exceptions: surveying and the installation of the lids for several concrete protectors. This work is scheduled to be completed over the next few weeks, but won't require the use of the barge or heavy equipment. We will let you know when this work is carried out and notify you of completion of the project.

Construction work was completed on the Foreshore of Berry Point located down gradient of Area 2 of the Chevron Burnaby Refinery (hereafter referred to as the 'Site') between Monday, October 16 and Saturday, October 21, 2017 under the Port of Vancouver permit PER No.16-180.

No work was completed at the site on the following days: Monday through Thursday, October 16-19, and Saturday, October 21, 2017.

Report

Temperature and turbidity readings exceeded guidelines on October 20, 2017.

During this period, work consisted of: placement of concrete protectors and cobble mat around the barriers, movement of rip rap, and installation of monitoring wells.

Field measurements collected from seawater at the Site are provided in Table 1 attached.

Approximately 300 litres of groundwater was removed from the Site between October 16-21, 2017. No soil was removed during this week.

No incidents occurred at the Site.

No cultural artifacts were identified at the Site.

Michael Gill, P.Eng., CSAP
Senior Environmental Engineer
NEW DIRECT PHONE NUMBER: 604.444.6547

Michael.gill@aecom.com

AECOM 3292 Production Way Burnaby, BC V5A 4R4 T 1-604-444-6400 F 1-604-294-8597

www.aecom.com

Please consider the environment before printing this email.

This e-mail and any attachments contain AECOM confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

From: Gill, Michael (Vancouver)

Sent: Monday, October 16, 2017 3:55 PM

To: 'Chaisson, Spencer'

Cc: Southern, Leslie; 'Chris Boys'; 'O'Neill, Eoghan'

Subject: PER No.16-180 Environmental Monitoring Report October 9-14, 2017

Dear Mr. Chaisson,

Construction work was completed on the Foreshore of Berry Point located down gradient of Area 2 of the Chevron Burnaby Refinery (hereafter referred to as the 'Site') between Monday, October 9 and Saturday, October 14, 2017 under the Port of Vancouver permit PER No.16-180.

No work was completed at the site on the following day: Monday, October 9, 2017.

Report

Turbidity readings exceeded guidelines on October 12 and 13, 2017.

During this period, work consisted of: placement of concrete protectors and cobble mat around the barriers, movement of rip rap, and installation of monitoring wells.

Field measurements collected from seawater at the Site are provided in Table 1 attached.

No soil or groundwater was removed from the Site between October 9 and 14, 2017.

No incidents occurred at the Site.

Cultural artifacts were not identified at the Site.

Cheers,

Michael Gill, P.Eng., CSAP
Senior Environmental Engineer
NEW DIRECT PHONE NUMBER: 604.444.6547
Michael.gill@aecom.com

AECOM 3292 Production Way Burnaby, BC V5A 4R4

T 1-604-444-6400 F 1-604-294-8597

www.aecom.com

Please consider the environment before printing this email.

This e-mail and any attachments contain AECOM confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

From: Gill, Michael (Vancouver)

Sent: Friday, October 06, 2017 2:57 PM

To: 'Chaisson, Spencer'

Cc: Southern, Leslie; 'Chris Boys'; 'O'Neill, Eoghan'

Subject: PER No.16-180 Environmental Monitoring Report October 2-7, 2017

Dear Mr. Chaisson,

Construction work was completed on the Foreshore of Berry Point located down gradient of Area 2 of the Chevron Burnaby Refinery (hereafter referred to as the 'Site') between Monday, October 2 and Saturday, October 7, 2017 under the Port of Vancouver permit PER No.16-180.

No work was completed at the site on the following days: No work was completed at the Site on Tuesday, October 3, Friday, October 6, and Saturday, October 7, 2017.

Report

Turbidity readings exceeded the guideline on October 5, 2017.

During this period, work consisted of: well installation, and placement of concrete protectors and rip rap around the western barrier in addition to the partial excavation of the cobble mat in the eastern barrier and subsequent placement of cobble stones.

Field measurements collected from seawater at the Site are provided in Table 1 attached.

No soil or groundwater was removed from the Site between October 2-7, 2017.

No incidents occurred at the Site.

Cultural artifacts were not identified at the Site.

Michael Gill, P.Eng., CSAP Senior Environmental Engineer **NEW DIRECT PHONE NUMBER: 604.444.6547**

Michael.gill@aecom.com

3292 Production Way Burnaby, BC V5A 4R4 T 1-604-444-6400 F 1-604-294-8597

www.aecom.com

Please consider the environment before printing this email.

This e-mail and any attachments contain AECOM confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

From: Gill, Michael (Vancouver)

Sent: Tuesday, October 03, 2017 9:33 AM

To: 'Chaisson, Spencer'

Cc: Southern, Leslie; 'Chris Boys'; 'O'Neill, Eoghan'

Subject: RE: PER No.16-180 Environmental Monitoring Report September 18-23, 2017

Dear Mr. Chaisson,

Due to short tidal windows, construction work was not completed on the Foreshore of Berry Point located down gradient of Area 2 of the Chevron Burnaby Refinery (hereafter referred to as the 'Site') between Monday, September 25 and Saturday, September 30, 2017 under the Port of Vancouver permit PER No.16-180.

Best regards,

Michael Gill, P.Eng., CSAP Senior Environmental Engineer

NEW DIRECT PHONE NUMBER: 604.444.6547

Michael.gill@aecom.com

AECOM 3292 Production Way Burnaby, BC V5A 4R4 T 1-604-444-6400 F 1-604-294-8597

www.aecom.com

Please consider the environment before printing this email.

This e-mail and any attachments contain AECOM confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

From: Gill, Michael (Vancouver)

Sent: Monday, September 25, 2017 1:22 PM

To: 'Chaisson, Spencer'

Cc: Southern, Leslie; 'Chris Boys'; 'O'Neill, Eoghan'

Subject: PER No.16-180 Environmental Monitoring Report September 18-23, 2017

Dear Mr. Chaisson,

Have you made any progress in getting allowance for Tervita to work nights?

Construction work was completed on the Foreshore of Berry Point located down gradient of Area 2 of the Chevron Burnaby Refinery (hereafter referred to as the 'Site') between Monday, September 18 and Saturday, September 23, 2017 under the Port of Vancouver permit PER No.16-180.

No work was completed at the site on the following days: No work was completed at the Site on Wednesday, September 20 and Saturday, September 23, 2017.

Report

Turbidity readings exceeded guidelines on September 18, 19, 21 and 22.

During this period, work consisted of: placement of concrete protectors, constructing concrete collars and placing rip rap around the eastern barrier.

Field measurements collected from seawater at the Site are provided in Table 1 attached.

No soil or groundwater was removed from the Site between September 18 through 23, 2017.

No incidents occurred at the Site.

Cultural artifacts were not identified at the Site.

Best regards,

Michael Gill, P.Eng., CSAP
Senior Environmental Engineer
NEW DIRECT PHONE NUMBER: 604.444.6547
Michael.gill@aecom.com

AECOM 3292 Production Way Burnaby, BC V5A 4R4 T 1-604-444-6400 F 1-604-294-8597

www.aecom.com

Please consider the environment before printing this email.

This e-mail and any attachments contain AECOM confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

T 1-604-444-6400 F 1-604-294-8597

www.aecom.com

Please consider the environment before printing this email.

This e-mail and any attachments contain AECOM confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

From: Gill, Michael (Vancouver)

Sent: Monday, September 18, 2017 2:52 PM

To: Chaisson, Spencer (Spencer.Chaisson@portvancouver.com)

Cc: Southern, Leslie; Chris Boys; 'per.environment@portvancouver.com'

Subject: RE: PER No.16-180 Environmental Monitoring Report September 4-9, 2017

Dear Mr. Chaisson,

Construction work was completed on the Foreshore of Berry Point located down gradient of Area 2 of the Chevron Burnaby Refinery (hereafter referred to as the 'Site') between Monday, September 11 and Saturday, September 16, 2017 under the Port of Vancouver permit PER No.16-180.

No work was completed at the site on the following days: Monday, September 11, Tuesday, September 12, and Wednesday, September 13, 2017.

Report

On September 14, 15 and 16, samples collected from inside and outside of the construction zone exceeded background values for turbidity.

During this period, work consisted of: placement of concrete protectors and rip rap around the eastern barrier and development of monitoring wells within the eastern barrier trench.

Field measurements collected from seawater at the Site are provided in Table 1 attached.

Approximately 208 litres of porewater from the installed monitoring wells was removed from the Site between September 11 through 16, 2017. No soil was removed from the Site between September 11 through 16, 2017.

Cultural artifacts were not identified at the Site.

Cheers,

Michael Gill, P.Eng., CSAP Senior Environmental Engineer

NEW DIRECT PHONE NUMBER: 604.444.6547

Michael.gill@aecom.com

AECOM 3292 Production Way Burnaby, BC V5A 4R4 T 1-604-444-6400 F 1-604-294-8597

www.aecom.com

Please consider the environment before printing this email.

This e-mail and any attachments contain AECOM confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

From: Gill, Michael (Vancouver)

Sent: Monday, September 11, 2017 12:22 PM

To: Chaisson, Spencer (Spencer.Chaisson@portvancouver.com)

Cc: Southern, Leslie; Chris Boys; 'per.environment@portvancouver.com'

Subject: PER No.16-180 Environmental Monitoring Report September 4-9, 2017

Dear Mr. Chaisson,

Construction work was completed on the Foreshore of Berry Point located down gradient of Area 2 of the Chevron Burnaby Refinery (hereafter referred to as the 'Site') between Monday, September 4 and Saturday, September 9, 2017 under the Port of Vancouver permit PER No.16-180.

No work was completed at the site on the following days: Monday, September 4, and Friday, September 8 2017.

Report

Turbidity readings exceeded guidelines on September 5, 7 and 9. Temperature readings exceeded guidelines on September, 5, 6, 7 and 9.

During this period, work consisted of: placement of concrete protectors and pouring of foundations.

Field measurements collected from seawater at the Site are provided in Table 1 attached.

No incidents occurred September 4 through 9, 2017.

No soil or groundwater was removed from the Site between September 4 through 9, 2017.

Cultural artifacts were not identified at the Site.

Cheers,

Michael Gill, P.Eng., CSAP Senior Environmental Engineer

NEW DIRECT PHONE NUMBER: 604.444.6547

Michael.gill@aecom.com

AECOM 3292 Production Way Burnaby, BC V5A 4R4 T 1-604-444-6400 F 1-604-294-8597 www.aecom.com

Please consider the environment before printing this email.

This e-mail and any attachments contain AECOM confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

From: Gill, Michael (Vancouver)

Sent: Tuesday, September 05, 2017 12:05 PM

To: Chaisson, Spencer (Spencer.Chaisson@portvancouver.com)

Cc: Southern, Leslie; Chris Boys; 'per.environment@portvancouver.com'

Subject: PER No.16-180 Environmental Monitoring Report August 28 - September 2, 2017

Dear Mr. Chaisson,

Construction work was completed on the Foreshore of Berry Point located down gradient of Area 2 of the Chevron Burnaby Refinery (hereafter referred to as the 'Site') between Monday, August 28 and Saturday, September 2, 2017, under the Port of Vancouver permit PER No.16-180. No work was completed at the site on the following days: Monday, August 28, Tuesday, August 29, and Saturday, September 2, 2017.

Report

On Friday, September 1, two samples collected from within the construction zone were adversely affected by waves from passing boats. The turbidity readings at these times were not considered to be caused by construction activities.

During this period, work consisted of: installation of remedial barrier in Eastern Seep Area, including rip rap placement and well installation.

Field measurements collected from seawater at the Site are provided in Table 1 attached.

No incidents occurred during August 28 through September 2, 2017.

No soil or groundwater was removed from Site August 28 through September 2, 2017.

Cultural artifacts were not identified at the Site.

Cheers,

Michael Gill, P.Eng., CSAP Senior Environmental Engineer

NEW DIRECT PHONE NUMBER: 604.444.6547

Michael.gill@aecom.com

AECOM 3292 Production Way Burnaby, BC V5A 4R4 T 1-604-444-6400 F 1-604-294-8597 www.aecom.com

Please consider the environment before printing this email.

This e-mail and any attachments contain AECOM confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

From: Gill, Michael (Vancouver)

Sent: Monday, August 28, 2017 2:55 PM

To: Chaisson, Spencer (Spencer.Chaisson@portvancouver.com)

Cc: Southern, Leslie; Chris Boys; 'per.environment@portvancouver.com'

Subject: PER No.16-180 Environmental Monitoring Report August 21-26, 2017

Dear Mr. Chaisson,

Construction work was completed on the Foreshore of Berry Point located down gradient of Area 2 of the Chevron Burnaby Refinery (hereafter referred to as the 'Site') between Monday, August 21 and Saturday, August 26, 2017, under the Port of Vancouver permit PER No.16-180. No work was completed at the site on the following days: Wednesday, August 23, 2017 and Saturday, August 26, 2017.

Please note, due to the Labour Day holiday, the next report will be submitted on Tuesday, September 5, 2017.

Report

During this period, work consisted of: installation of remedial barrier in Eastern Seep Area.

Field measurements collected from seawater at the Site are provided in Table 1 attached.

No incidents occurred during August 21 through 26, 2017.

No soil or groundwater was removed from Site August 21 through 26, 2017.

Cultural artifacts were not identified at the Site.

Cheers,

Michael Gill, P.Eng., CSAP Senior Environmental Engineer

NEW DIRECT PHONE NUMBER: 604.444.6547

Michael.gill@aecom.com

AECOM 3292 Production Way Burnaby, BC V5A 4R4 T 1-604-444-6400 F 1-604-294-8597 www.aecom.com

Please consider the environment before printing this email.

This e-mail and any attachments contain AECOM confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

From: Gill, Michael (Vancouver)

Sent: Monday, August 21, 2017 1:36 PM

To: Chaisson, Spencer (Spencer.Chaisson@portvancouver.com)

Cc: Southern, Leslie; Chris Boys; 'per.environment@portvancouver.com' **Subject:** PER No.16-180 Environmental Monitoring Report August 14-19, 2017

Dear Mr. Chaisson,

Construction work was completed on the Foreshore of Berry Point located down gradient of Area 2 of the Chevron Burnaby Refinery (hereafter referred to as the 'Site') between Monday, August 14 and Saturday, August 19, 2017, under the Port of Vancouver permit PER No.16-180. No work was completed at the site on the following days: Monday, August 14 and Tuesday, August 15.

Report

On August 18, a sample collected from within the construction zone was adversely affected by waves. The turbidity reading at this time was not considered to be caused by construction activities.

During this period, work consisted of: excavation and backfill of a portion of the western seep area.

Field measurements collected from seawater at the Site are provided in Table 1 attached.

No incidents occurred during August 14 through 19, 2017.

Quantity of soil and/or groundwater removed from Site: Approximately 3,000 gallons of groundwater was removed from Site. Approximately 49.4 tons of sediment was removed.

Cultural artifacts were not identified at the Site.

Cheers,

Michael Gill, P.Eng., CSAP Senior Environmental Engineer

NEW DIRECT PHONE NUMBER: 604.444.6547

Michael.gill@aecom.com

AECOM 3292 Production Way Burnaby, BC V5A 4R4 T 1-604-444-6400 F 1-604-294-8597 www.aecom.com

Please consider the environment before printing this email.

This e-mail and any attachments contain AECOM confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

From: Gill, Michael (Vancouver)

Sent: Monday, August 14, 2017 1:42 PM

To: Chaisson, Spencer (<u>Spencer.Chaisson@portvancouver.com</u>)

Cc: Southern, Leslie; Chris Boys; 'per.environment@portvancouver.com'

Subject: RE: PER No.16-180 Environmental Monitoring Report July 24 -29, 2017

Dear Mr. Chaisson,

Construction work was completed on the Foreshore of Berry Point located down gradient of Area 2 of the Chevron Burnaby Refinery (hereafter referred to as the 'Site') between Tuesday August 8 and Saturday, August 12, 2017, under the Port of Vancouver permit PER No.16-180. No work was completed at the site on Sunday, August 13.

Report

During this period, work consisted of: excavation and backfill of a portion of the eastern seep area.

Field measurements collected from seawater at the Site are provided in Table 1 attached.

No incidents occurred during August 8 through 12, 2017.

Quantity of soil and/or groundwater removed from Site: Approximately 5,000 gallons of groundwater was removed from Site. Approximately 10 tons of sediment was removed.

Cultural artifacts were not identified at the Site.

Cheers,

Michael Gill, P.Eng., CSAP Senior Environmental Engineer

NEW DIRECT PHONE NUMBER: 604.444.6547

Michael.gill@aecom.com

AECOM 3292 Production Way Burnaby, BC V5A 4R4 T 1-604-444-6400 F 1-604-294-8597 www.aecom.com

Please consider the environment before printing this email.

This e-mail and any attachments contain AECOM confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

From: Gill, Michael (Vancouver)

Sent: Tuesday, August 08, 2017 2:21 PM

To: Chaisson, Spencer (Spencer.Chaisson@portvancouver.com)

Cc: Southern, Leslie; Chris Boys; 'per.environment@portvancouver.com'

Subject: RE: PER No.16-180 Environmental Monitoring Report July 24 -29, 2017

Dear Mr. Chaisson.

Construction work was completed on the Foreshore of Berry Point located down gradient of Area 2 of the Chevron Burnaby Refinery (hereafter referred to as the 'Site') between Tuesday July 31 and Friday, August 4, 2017, under the Port of Vancouver permit PER No.16-180. No work was completed at the site on the following days: Monday July 31, and Saturday August 5 through Monday August 7.

Report

On August 3, a sample collected from within the construction zone was adversely affected by wave action from passing boats. The turbidity reading at this time was not considered to be caused by construction activities.

During this period, work consisted of: excavation and backfill of a portion of the eastern seep area.

Field measurements collected from seawater at the Site are provided in Table 1 attached.

No incidents occurred during August 1 through 4, 2017.

Quantity of soil and/or groundwater removed from Site: Approximately 20,500 gallons of groundwater was removed from Site. Approximately 126.1 tons of sediment was removed.

Cultural artifacts were not identified at the Site.

Cheers,

Michael Gill, P.Eng., CSAP Senior Environmental Engineer

NEW DIRECT PHONE NUMBER: 604.444.6547

Michael.gill@aecom.com

AECOM 3292 Production Way Burnaby, BC V5A 4R4 T 1-604-444-6400 F 1-604-294-8597 www.aecom.com

Please consider the environment before printing this email.

This e-mail and any attachments contain AECOM confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

From: Gill, Michael (Vancouver)
Sent: Monday, July 31, 2017 1:44 PM

To: Chaisson, Spencer (<u>Spencer.Chaisson@portvancouver.com</u>)

Cc: Southern, Leslie; Chris Boys; 'per.environment@portvancouver.com' **Subject:** PER No.16-180 Environmental Monitoring Report July 24 -29, 2017

Dear Mr. Chaisson,

Construction work was completed on the Foreshore of Berry Point located down gradient of Area 2 of the Chevron Burnaby Refinery (hereafter referred to as the 'Site') between Monday July 24 and Saturday, July 29, 2017, under the Port of Vancouver permit PER No.16-180. Please note, no work will be completed on Monday, August 5, due to the BC day holiday.

Report

On July 24 and 27 samples collected from within the construction zone were adversely affected by wave action from passing boats. Turbidity readings at these times were not considered to be caused by construction activities.

During this period, work consisted of: excavation and backfill of a portion of the eastern seep area.

Field measurements collected from seawater at the Site are provided in Table 1 attached.

No incidents occurred during July 14 through July 29, 2017.

Quantity of soil and/or groundwater removed from Site: Approximately 31,300 gallons of groundwater was removed from Site. Approximately 132.6 tonnes of sediment was removed.

Cultural artifacts were not identified at the Site.

Cheers.

Michael Gill, P.Eng., CSAP Senior Environmental Engineer

NEW DIRECT PHONE NUMBER: 604.444.6547

Michael.gill@aecom.com

AECOM 3292 Production Way Burnaby, BC V5A 4R4 T 1-604-444-6400 F 1-604-294-8597 www.aecom.com

Please consider the environment before printing this email.

This e-mail and any attachments contain AECOM confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

From: Gill, Michael (Vancouver)
Sent: Monday, July 24, 2017 4:43 PM

To: 'per.environment@portvancouver.com'; Chaisson, Spencer (Spencer.Chaisson@portvancouver.com)

Cc: Southern, Leslie; Chris Boys

Subject: RE: PER No.16-180 Environmental Monitoring Report July 17-22, 2017

Dear Mr. Chaisson,

Construction work was completed on the Foreshore of Berry Point located down gradient of Area 2 of the Chevron Burnaby Refinery (hereafter referred to as the 'Site') between Monday July 17 and Saturday, July 22, 2017, under the Port of Vancouver permit PER No.16-180.

Please note that the report submitted on July 17, 2017 was incorrectly labelled as a report for Monday July 17 and Saturday, July 22, 2017. The correct date for that report is Monday, July 10 through Saturday, July 15, 2017.

Report

On July 18, 20 and 22 samples collected from within the construction zone were adversely affected by wave action from passing boats. Turbidity readings at these times were not considered to be caused by construction activities.

During this period, work consisted of: excavation and backfill of a portion of the eastern seep area.

Field measurements collected from seawater at the Site are provided in Table 1 attached.

No incidents occurred during July 17 through July 22, 2017.

Quantity of soil and/or groundwater removed from Site: Approximately 5,000 gallons of groundwater has been removed from Site. Approximately 87 tonnes of sediment has been removed.

Cultural artifacts were not identified at the Site.

Michael Gill, P.Eng., CSAP
Senior Environmental Engineer
NEW DIRECT PHONE NUMBER: 604.444.6547
Michael.qill@aecom.com

AECOM 3292 Production Way Burnaby, BC V5A 4R4 T 1-604-444-6400 F 1-604-294-8597 www.aecom.com

Please consider the environment before printing this email.

This e-mail and any attachments contain AECOM confidential information that may be proprietary or privileged. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any attachments or copies.

From: Gill, Michael (Vancouver)
Sent: Monday, July 17, 2017 5:06 PM
To: 'per.environment@portvancouver.com'

Cc: Southern, Leslie; Chaisson, Spencer (Spencer.Chaisson@portvancouver.com); Chris Boys

Subject: PER No.16-180 Environmental Monitoring Report July 17-22, 2017

Dear Mr. Chaisson.

Construction work was completed on the Foreshore of Berry Point located down gradient of Area 2 of the Chevron Burnaby Refinery (hereafter referred to as the 'Site') between Monday July 17 and Saturday, July 22, 2017, under the Port of Vancouver permit PER No.16-180.

Background

The Port of Vancouver (PoV) published guidelines for the preparation of Construction Environmental Management Plans (CEMP) in which they describe the roles and responsibilities of the Environmental Monitor (EM). The primary responsibility of the EM is to ensure that the environmental protection objectives of the applicant, and applicable approvals/permits are met by ensuring that the requirements of the CEMP are adhered to. The guidelines specify that monitoring events should be conducted with greater frequency during periods of inclement weather and during critical components of the project.

In order to meet these requirements, seawater samples have been collected from both inside

and outside of the construction zone and tested for temperature, pH, conductivity, and turbidity. The construction zone is defined as areas that may have direct or indirect release or deposit of sediment or sediment laden water into the aquatic environment and, for this project, is an area within 20 metres of any ground disturbance activities. Samples collected from outside of the construction zone have been used to determine background levels of turbidity and temperature. Seawater samples have been compared to BC Ministry of Environment Approved Water Quality Guidelines (BC MoE 2015).

Report

On July 13, 14 and 15 samples collected from within the construction zone were adversely affected by wave action from passing boats. Turbidity readings at these times were not considered to be caused by construction activities.

During this period, work consisted of: excavation and backfill of a portion of the eastern seep area and the entire western seep area.

Field measurements collected from seawater at the Site are provided in Table 1 attached.

No incidents occurred during July 17 through July 22, 2017.

Quantity of soil and/or groundwater removed from Site: no groundwater has been removed from Site. Approximately 1.3 tonnes of sediment has been removed.

Cultural artifacts were not identified at the Site.

Michael Gill, P.Eng., CSAP
Senior Environmental Engineer
PLEASE NOTE MY NEW DIRECT PHONE NUMBER: 604.444.6547
Michael.gill@aecom.com

AECOM 3292 Production Way, Burnaby, BC, V5A 4R4T 1-604-444-6400 F 1-604-294-8597
www.aecom.com

Table F-1 Environmental Monitoring Reports Submitted to the Vancouver Fraser Port Authority

| Table F-1 Envi | ronmenta | Monitoring Reports Submitted to the | e Vancouve | r Fraser Port Auth | | T | |
|------------------------|----------------|---|--------------|---|-------------------------|---|---|
| Date | Time⁴ | Sample Location | pH | Temperature (°C) | Conductivity (µS/cm) | Turbidity (NTU) | |
| | | Inside / outside of Construction zone/ inside construction zone but not caused by construction activities | 7.0 - 8.7 | ±1 change from ambient background ⁻² . Hourly rate of change up to 0.5.3 | NG | Change from background ² of 5 NTU at any time when background is 8 - 50 NTU during high flows or in turbid waters or Change from background of 10% when background is > 50 NTU at any time during high flows or in turbid waters | Comments |
| 10-Jul-17 | 8:30 | inside | NC | NC | NC | 4.2 | Boat (small craft) pulled up to barge to transport personnel (Chris Boys/Tervita/Mercury) to assess evacuation routes in Area 3 of the Refinery. Sample collected from waves along ban |
| 10-Jul-17 10-Jul-17 | 8:35 9:10 | inside | NC NC | NC NC | NC NC | 9.55 3.84 | Lifted ramp to adjust barge for falling tide. Sample collected along the shore. Barge anchors deployed (lock blocks) |
| | | | | | | | Moving/lifting barge ramp (large sediment plume approximately 3m x 3m lasting one minute in duration. |
| 10-Jul-17 | 9:12 | inside | NC | NC | NC | <u>302</u> | Note, when the barge adjusts ramp the lock block anchors stir up sediment. A discussion with Mercury occurred to try and reduce sediment generation |
| 10-Jul-17 10-Jul-17 | 10:10 | inside | 8.34 8.63 | 17.96 18.41 | 28377 28682 | NC NC | Sample collected along the shore. Sample collected along the shore. |
| 10-Jul-17 | 11:51 | inside | NC NC | NC NC | NC NC | 63.7 | Moving/lifting barge ramp. Sample collected along the shore. |
| 10-Jul-17 | 12:00 | inside | 8.58 | 18.38 | 28983 | NC | Sample collected along the shore. |
| 10-Jul-17 11-Jul-17 | 14:40 | inside | 8.83 NC | 18.78 NC | 28767 NC | NC 28.2 | Sample collected along the shore. Moving/lifting barge ramp. Sample collected along the shore. |
| 11-Jul-17 | 11:19 | inside | 8.84 | 18.32 | 27725 | NC | Sample collected along the shore. |
| 11-Jul-17 11-Jul-17 | 12:17 12:46 | inside | 8.53 NC | 18.35 NC | 28713 NC | NC 41 | Sample collected along the shore. Moving/lifting barge ramp. Sample collected along the shore. |
| 11-Jul-17 | 14:22 | inside | 8.76 | 19.2 | 28709 | NC NC | Sample collected along the shore. |
| 11-Jul-17 12-Jul-17 | 15:01 13:19 | inside | NC 8.45 | NC 18.1 | NC 30121 | 18.8 19.9 | Unloading/loading - no barge movement. Sample collected along the shore. Ambient conditions - outside construction zone. Sample collected along the shore. |
| 12-Jul-17 | 14:00 | inside | 8.51 | 18.06 | 29887 | 12.1 | Ambient conditions - outside construction zone. Sample collected along the shore. |
| 13-Jul-17 | 12:01 | inside | 8.27 | 16.18 | 31805 | 17.8 | Ambient conditions - inside construction zone. Sample collected along the shore. |
| 13-Jul-17 | 12:28 | inside | 8.37 | 16.45 | 31904 | 47.7 | Moving/lifting barge ramp. Sample collected along the shore. |
| 13-Jul-17 13-Jul-17 | 15:40 15:42 | outside | 8.58 8.55 | 16.58 16.58 | 32513 32516 | 8.68 | Ambient conditions (calm, no waves) - outside construction zone. Sample collected along the shore. Ambient conditions (farra waves). Sample collected along the shore. |
| 13-Jul-17 14-Jul-17 | 11:13 | outside | 8.55 | 16.58 | 30227 | 29.6 11.6 | Ambient conditions (large waves). Sample collected along the shore. Ambient conditions (calm, no waves) - outside construction zone. Sample collected along the shore. |
| 14-Jul-17 | 13:07 | inside | 8.55 | 18.57 | 29657 | 36.4 | Moving/lifting barge ramp. Sample collected along the shore. |
| 14-Jul-17 | 15:16 | inside - not caused by construction | 8.6 | 17.94 | 31666 | 44.4 | Big wave silt plumes inside and outside construction zones. |
| 15-Jul-17 15-Jul-17 | 12:17 13:15 | inside inside - not caused by construction | 8.37 8.41 | 17.78 17.82 | 31985 32410 | 37.2 59.8 | Moving/lifting barge ramp. Sample collected along the shore. Large waves and silt plumes created from passing boats. |
| 15-Jul-17 | 15:22 | inside - not caused by construction | 8.45 | 17.85 | 33096 | 88.2 | Large waves and sit plumes created from passing todas. |
| 17-Jul-17 | 7:01 | Inside | 8.19 | 15.48 | 34075 | 37.8 | Barge ramp landing on shore |
| 17-Jul-17 17-Jul-17 | 8:00 9:41 | Outside Inside | 8.41 | 15.8 | 33832 33871 | 13.7 808 | 50 m east of boom/construction zone Skid steer loading/unloading super sacs. Asked Tervita to instead use barge crane to load and unload |
| 17-Jul-17 | 10:05 | Inside | 8.35 | 15.81 | 34100 | 17.8 | super sacs to reduce sediment disturbance Loading barge for departure |
| 18-Jul-17 | 7:16 | outside | 8.12 | 16.46 | 32391 | 22.9 | 50 m east of boom/construction zone |
| 18-Jul-17 18-Jul-17 | 8:13 8:40 | Inside - not caused by construction | 8.3 8.35 | 16.36 16.53 | 33013 32818 | 4.76 64 | Barge ramp along shore Silt plume from passing boat |
| 18-Jul-17 | 10:15 | Outside - not caused by construction | 8.48 | 17.17 | 32448 | 64 | Silt plume from passing boat |
| 18-Jul-17 | 11:00 | Outside | 8.52 | 17.67 | 32449 | 19.8 | Silt plume from passing boat |
| 18-Jul-17 18-Jul-17 | 11:00 11:28 | Inside - not caused by construction Outside | 8.52 8.4 | 17.67 16.46 | 32449 33769 | 11.3 9.62 | Silt plume from passing boat Silt plume from passing boat |
| 18-Jul-17 | 11:28 | Inside - not caused by construction | 8.4 | 16.46 | 33769 | 284 | Silt plume from passing boat |
| 19-Jul-17 19-Jul-17 | 7:28 8:44 | Inside | 8.04 8.39 | 17.1 17.24 | 32498 31975 | 13.4 85.6 | Unloading excavator Excavating trench |
| 19-Jul-17 | 10:33 | Inside - not caused by construction | 8.59 | 17.51 | 32055 | 68.9 | Ambient conditions beside barge ramp, no movement |
| 19-Jul-17 | 10:39 | Outside | 8.79 | <u>17.79</u> | 32153 | 8.59 | Waves outside boom |
| 19-Jul-17 | 12:01 | Inside - not caused by construction | 8.62 | 17.61 | 32281 | <u>56</u> | Rising tide |
| 20-Jul-17 20-Jul-17 | 7:20 7:26 | Outside Inside | 7.71 8.99 | 16.5 16.39 | 33027 33163 | 12.1 93.1 | Ambient conditions beside barge ramp, no movement Barge ramp along shore |
| 20-Jul-17 | 9:26 | Inside | 7.85 | 16.5 | 33150 | 3.02 | Sample taken from barge end, furthest from shore |
| 20-Jul-17 20-Jul-17 | 9:30 10:55 | Outside Inside | 7.95 7.92 | 16.89 16.92 | 32966 32694 | 17 4.31 | Boat passed approx. 200 m out, sample collected 30 m west of boom. Barge ramp along shore |
| 20-Jul-17 | 10:58 | Outside | 8.03 | 17.13 | 32750 | 31.3 | Waves from passing boats |
| 20-Jul-17 20-Jul-17 | 11:20 | Outside | 8.07 8.64 | 17.38 | 32713 32468 | <u>59.7</u> 17.4 | Port authority boat passing causing waves 2 m west of barge inside construction zone |
| 20-Jul-17 | 11:53 | Outside | 8.12 | 17.87 | 32812 | 11.8 | Waves from passing boats |
| 20-Jul-17 20-Jul-17 | 12:00 12:30 | Inside - not caused by construction Outside | 7.98 8.14 | 17.06 | 32518 23209 | 6.26 11.6 | Waves from passing boats Waves from passing boats |
| 20-Jul-17 20-Jul-17 | 12:41 | Inside - not caused by construction | 8.04 | 17.83 17.63 | 31764 | 4.86 | Waves from passing boats Waves from passing boats |
| 21-Jul-17 | 7:20 | Inside | 7.76 | 16.04 | 32011 | 117 | Barge ramp along shore |
| 21-Jul-17 22-Jul-17 | 12:12 8:12 | Inside - not caused by construction Inside | 7.95 7.69 | 16.68 15.25 | 32307 34344 | 46.8 115 | Ambient conditions beside barge ramp, no movement Dropped barge ramp |
| 22-Jul-17 | 8:28 | Outside | 7.77 | 15.84 | 33499 | 15.1 | 50 m west of boom along shore |
| 22-Jul-17 22-Jul-17 | 10:25 10:28 | Inside - not caused by construction Outside | 7.71 7.81 | 15.25 15.25 | 34528 34338 | 16.3 44.6 | Waves from passing boats 50 m west of boom along shore |
| 22-Jul-17 | 12:16 | Inside - not caused by construction | 7.78 | 14.95 | 34997 | 158 | Waves from passing boats |
| 22-Jul-17 24-Jul-17 | 12:21 9:55 | Outside Inside | 7.7 | 14.96 14.9 | 35022 35590 | <u>126</u> <u>450</u> | Waves from passing boats Excavator Unloading |
| 24-Jul-17 24-Jul-17 | 10:00 | Outside | 7.71 | 15.51 | 35104 | 450 61.4 | Ambient conditions |
| 24-Jul-17 | 11:00 | Inside - not caused by construction | 7.80 | 15.82 | 35160 | <u>57.0</u> | Passing boat |
| 24-Jul-17 24-Jul-17 | 11:15 12:35 | Outside Inside | 7.99 7.82 | 15.89 15.35 | 35305 35383 | 104 62.0 | Passing boat Beginning to backfill |
| 24-Jul-17 | 12:35 | Outside | NR | NR | NR | 39.0 | Beginning to backfill |
| 24-Jul-17 25-Jul-17 | 14:08 10:45 | Inside | 7.80 7.31 | 15.11 15.94 | 35926 35179 | 29.7 16.3 | Ambient conditions (no movement) Excavator unloading |
| 25-Jul-17 | 10:45 | Outside | NR | NR | NR | 38.3 | Excavator unloading |
| 25-Jul-17 | 12:55 | Inside | 7.74 NP | 15.83 NP | 35990 NP | 37.0 | Excavation of trench |
| 25-Jul-17 25-Jul-17 | 12:55 15:10 | Outside Outside | 7.71 | NR 14.64 | NR 36720 | 30.4 21.9 | Excavation of trench Backfilling |
| 25-Jul-17 | 15:10 | Outside | NR 7.00 | NR | NR | 115 | Waves came during sampling |
| 26-Jul-17 26-Jul-17 | 11:41 | Inside Outside | 7.66 7.65 | 16.39 16.85 | 35288 35572 | 71.6 52.9 | Barge ramp lowered/unloading Ambient conditions |
| 26-Jul-17 | 13:00 | Outside | 7.63 | 16.31 | 35879 | 43.1 | Ambient beside ramp |
| 26-Jul-17 26-Jul-17 | 13:00 15:55 | Inside Outside | NR 7.84 | NR 15.1 | NR 366889 | 26.0 22.6 | Excavation of trench |
| 26-Jul-17 | 15:55 | Inside | NR | NR | NR | 9.84 | Backfilling |
| 27-Jul-17 | 12:00 | Inside | 7.71 NP | 15.65 NP | 36356 | <u>51.6</u> | Unloading, beginning to scrape surface material back |
| 27-Jul-17 27-Jul-17 | 12:00 16:00 | Outside Inside | NR 7.6 | NR 15.19 | NR 36302 | 7.81 40.7 | Small waves coming in |
| 27-Jul-17 | 17:21 | Inside - not caused by construction | 7.63 | 14.5 | 37600 | 59.2 | Large waves |
| 28-Jul-17 | 12:40 | Inside | 7.71 NP | 15.59 | 36332 NP | 14.6 | Landing barge / unloading |
| 28-Jul-17 28-Jul-17 | 12:40 16:00 | Outside Outside | 7.81 | NR 15.9 | NR 36576 | 6.13 40.1 | Backfilling/ heavy boat traffic |
| 20-Jul-17 | 10.00 | 04000 | 7.01 | 13.8 | 30370 | 40.1 | Duotaming moury boat traine |

Table F-1 Environmental Monitoring Reports Submitted to the Vancouver Fraser Port Authority

| Date | Time ⁴ | Sample Location | pН | Temperature (°C) | Conductivity (µS/cm) | Turbidity (NTU) | |
|------------------------|-------------------|---|--------------|--|----------------------|--|--|
| | | Inside / outside of Construction zone/ inside construction zone but not caused by construction activities | 7.0 - 8.7 | ± 1 change from ambient background ^{1,2} . Hourly rate of change up to 0.5 ³ . | NG | Change from background ² of 5 NTU at any time when background is 8 - 50 NTU during whigh flows or in turbid waters or Change from background of 10% when background is > 50 NTU at any time during high flows or in turbid waters | Comments |
| 28-Jul-17 | 17:00 | Inside | 7.84 | 16.58 | 35862 | 40 | Passing boat |
| 28-Jul-17 29-Jul-17 | 17:00 14:00 | Outside Inside | 7.74 | NR 16.81 | NR 36204 | 40 15.9 | Collected off side of barge ~ 15 m from shore |
| 29-Jul-17 | 16:15 | Inside | 7.54 | 16.52 | 36050 | 40.3 | Beside barge ramp - ambient |
| 29-Jul-17 | 16:30 7:00 | Inside | 7.44 7.62 | 16.32 16.59 | 36193 35177 | 33.6 | Loading excavator |
| 1-Aug-17 1-Aug-17 | 9:45 | Inside | 7.82 | 16.15 | 35838 | 23.5 | Loading equipment Ambient - calm water |
| 1-Aug-17 | 10:40 | Inside | 7.75 | 16.04 | 36006 | 7.1 | Ambient - beside ramp |
| 2-Aug-17 2-Aug-17 | 7:25 7:25 | Inside Outside | 7.56 NR | 16.99 NR | 34748 NR | 4.82 4.95 | Unloading excavator |
| 2-Aug-17 2-Aug-17 | 9:50 | Inside | 7.81 | 16.59 | 35850 | 12.4 | Boat passing by |
| 2-Aug-17 | 11:45 | Inside | 7.78 | 15.87 | 36378 | 5.5 | Beside ramp - ambient |
| 3-Aug-17 | 7:20 | Inside - not caused by construction | 7.41 7.87 | 16.26 16.52 | 35683 35643 | 120 102 | Unloading excavator Boats passing |
| 3-Aug-17 3-Aug-17 | 12:00 | Inside - not caused by construction | 7.82 | 16.98 | 35631 | 129 | Loading excavator |
| 4-Aug-17 | 7:15 | Inside | 7.5 | 16.70 | 34967 | 26.0 | Unloading excavator |
| 4-Aug-17 4-Aug-17 | 12:14 | Inside Inside | 7.81 7.75 | 15.52 15.55 | 36440 36413 | 120 144 | Moving ramp Loading / unloading |
| 8-Aug-17 | 9:00 | inside construction zone | 7.8 | 14.87 | 36930 | 13.2 | beside ramp - ambient |
| 8-Aug-17 | 12:30 | inside construction zone | 7.91 | 15.25 | 37188 | 7.56 | ambient |
| 8-Aug-17 | 8:09 4F:02 | outside construction zone inside construction zone but not caused | 7.9 | 15.21 | 36999 | 8.49 | ambient - along shore |
| 8-Aug-17 | 15:02 | by construction activities | 7.87 | 14.38 | 37836 | 43.9 46.1 | boats passing - waves |
| 8-Aug-17 | 15:09 | outside construction zone inside construction zone but not caused | 7.84 7.84 | 14.32 | 37875 36904 | 46.1 67.3 | boats passing - waves heside ramn - hoats passing - waves |
| 9-Aug-17 9-Aug-17 | 10:01 | by construction activities outside construction zone | 7.84 | 15.13 | 36904 | 67.3 | beside ramp - boats passing - waves along shore - waves from passing boats |
| 9-Aug-17 9-Aug-17 | 12:46 | outside construction zone | 8.06 | 18.93 | 36195 | 79.8 | along shore - waves from passing boats |
| 9-Aug-17 | 12:52 | inside construction zone but not caused by construction activities | 7.99 | 17.78 | 36277 | 47.4 | beside ramp - boats passing - waves |
| 9-Aug-17 | 14:15 | outside construction zone | 8.11 | 18.78 | 36071 | 41.3 | ambient - along shore |
| 9-Aug-17 | 14:18 | inside construction zone | 8.13 | 18.25 | 36591 | 16.4 | beside ramp - ambient |
| 10-Aug-17 | 10:30 | inside construction zone inside construction zone but not caused | 7.67 | 17.19 | 36735 37025 | 43.4 16.7 | beside ramp - ambient ambient - along shore |
| 10-Aug-17 | | by construction activities inside construction zone but not caused | | | | | |
| 10-Aug-17 | 13:27 | by construction activities | 7.92 | 17.72 | 37384 | 75.3 | beside ramp - boats passing - waves |
| 10-Aug-17 10-Aug-17 | 13:31 16:20 | outside construction zone inside construction zone | 8.1 7.98 | 16.92 17.45 | 37966 37849 | 17.8 17.9 | along shore - waves from passing boats beside ramp - ambient |
| 10-Aug-17 | 16:25 | outside construction zone | 7.91 | 17.86 | 37025 | 14.1 | ambient - along shore |
| 11-Aug-17 | 11:25 | inside construction zone | 7.78 | 16.49 | 38483 | 104 | beside ramp - unloading equipment |
| 11-Aug-17 | 11:30 | outside construction zone | 7.86 | 15.88 | 38117 | 12.2 | ambient - along shore |
| 11-Aug-17 | 13:37 | outside construction zone | 7.97 | 18.24 | 37141 | 26.4 | ambient - along shore |
| 11-Aug-17 | 13:41 | inside construction zone | 7.96 | 17.5 | 37228 | 22.3 | ambient - along shore |
| 11-Aug-17 11-Aug-17 | 16:13 16:19 | outside construction zone inside construction zone | 8.1 | 18.36 17.27 | 38361 37934 | 12.8 13.8 | ambient - along shore beside ramp - ambient |
| 12-Aug-17 | 12:21 | outside construction zone | 7.8 | 16.42 | 38193 | 14.2 | ambient - along shore |
| 12-Aug-17 | 12:26 | inside construction zone | 7.81 | 16.36 | 38084 | 76.8 | beside ramp - unloading equipment |
| 12-Aug-17 12-Aug-17 | 15:15 15:20 | outside construction zone inside construction zone | 8.03 7.97 | 17.25 17.26 | 38413 38329 | 33.9 24.1 | ambient - along shore beside ramp - ambient |
| 12-Aug-17 | 16:41 | outside construction zone | 7.96 | 17.04 | 38572 | 75.7 | ambient - along shore - loading equipment |
| 12-Aug-17 | 16:46 | inside construction zone | 7.93 | 17.7 | 38991 | 33.8 | beside ramp - loading equipment |
| 16-Aug-17 16-Aug-17 | 7:50 7:55 | outside construction zone inside construction zone | 7.66 7.72 | 15.28 15.13 | 37396 37555 | 16.0 27.8 | Along shore Beside ramp |
| 16-Aug-17 | 10:40 | outside construction zone | 7.86 | 14.98 | 37819 | 11.4 | Along shore |
| 16-Aug-17 | 10:44 7:30 | inside construction zone inside construction zone | 7.9 7.81 | 14.74 15.09 | 38041 37470 | 14.0 10.1 | Beside ramp Beside ramp |
| 17-Aug-17 17-Aug-17 | 7:36 | outside construction zone | 7.69 | 15.31 | 37228 | 22.3 | Along shore |
| 17-Aug-17 | 10:53 | outside construction zone | 7.93 | 16.50 | 37796 | 73.8 | along shore - waves from passing boats |
| 17-Aug-17 17-Aug-17 | 10:57 | inside construction zone inside construction zone | 8.02 7.82 | 16.28 16.38 | 37814 38506 | 45.2 56.4 | Beside ramp Beside ramp |
| 17-Aug-17 | 12:06 | outside construction zone | 7.97 | 16.8 | 38664 | 14.9 | Along shore |
| 18-Aug-17 | 7:28 | outside construction zone | 7.9 | 15.27 | 37771 | 24.9 | Along shore |
| 18-Aug-17 18-Aug-17 | 7:33 12:26 | inside construction zone outside construction zone | 7.89 8.05 | 15.69 17.00 | 37750 37922 | 36.0 <u>127</u> | Beside ramp Waves from boat passing |
| 18-Aug-17 | 12:31 | inside construction zone not caused by | 8.04 | 16.59 | 38151 | 140 | Beside ramp - waves |
| 18-Aug-17 | 13:18 | construction activities inside construction zone | 7.97 | 14.91 | 38597 | 179 | Loading excavator |
| 19-Aug-17 | 7:40 | outside construction zone | 7.66 | 15.09 | 37729 | 17.6 | Along shore |
| 19-Aug-17 19-Aug-17 | 7:46 11:01 | inside construction zone outside construction zone | 7.69 7.89 | 14.66 16.41 | 38161 38021 | 48.4 161 | Beside ramp Along shore |
| 19-Aug-17 | 11:05 | inside construction zone | 7.92 | 15.86 | 38071 | 76.9 | Beside ramp |
| 19-Aug-17 | 13:50 | outside construction zone | 8.02 | 16.42 | 39339 | 20.8 | Boat waves |
| 19-Aug-17 21-Aug-17 | 13:54 9:40 | inside construction zone inside construction zone | 7.91 7.67 | 15.63 14.59 | 39032 32893 | 24.7 7.08 | Beside ramp Excavator moving material |
| 21-Aug-17 | 9:45 | outside construction zone | 7.89 | 14.72 | 33005 | 11.8 | Adding organoclay later top of rip rap |
| 21-Aug-17 | 12:05 | inside construction zone | 8.19 | 14.67 | 33296 | 14.2 | Adding organoclay later to rip rap |
| 21-Aug-17 21-Aug-17 | 12:10 15:15 | outside construction zone inside construction zone | 8.19 8.01 | 15.48 14.26 | 33217 33776 | 28.7 40.1 | Leisure boats passing by Leisure boats in area. Excavator moving rip rap |
| 21-Aug-17 | 15:20 | outside construction zone | 8.21 | 15.12 | 33533 | 28.7 | Leisure boats in area. Excavator moving rip rap |
| 22-Aug-17 | 9:35 | inside construction zone | 7.92 | 14.12 | 32592 | 23.1 | Excavator activity |
| 22-Aug-17 22-Aug-17 | 9:40 | outside construction zone inside construction zone | 8.06 | 14.31 15.06 | 32581 32255 | 28.9 38.2 | Minor leisure boats Apply geomembrane to CPR slope |
| 22-Aug-17 | 12:30 | outside construction zone | 8.09 | 15.95 | 31887 | <u>87.0</u> | Large waves |
| 22-Aug-17 | 15:12 | inside construction zone | 8.2 | 14.35 | 32708 | 14.3 | Moving rip rap / installing geogrid |
| 22-Aug-17 24-Aug-17 | 15:19 11:30 | outside construction zone inside construction zone | 8.29 7.58 | 15.41 14.08 | 32499 33026 | <u>62.2</u> 15.6 | Moving rip rap / installing geogrid Excavator unloading rip rap |
| 24-Aug-17 | 11:35 | outside construction zone | 7.78 | 14.06 | 33142 | 24.8 | Excavator unloading rip rap |
| 24-Aug-17 | 13:53 | inside construction zone | 8.01 | 14.72 | 33046 | 25.3 | Excavator unloading rip rap |
| 24-Aug-17 | 13:58 16:20 | outside construction zone inside construction zone | 8.13 8.05 | 15.03 13.96 | 32994 33145 | 35.1 27.6 | Excavator unloading rip rap Moving rip rap |
| 24-Aug-17 | | | 8.11 | 14.78 | NR. | 39.6 | Moving rip rap |
| 24-Aug-17 24-Aug-17 | 16:25 | outside construction zone | | | | | |
| 24-Aug-17 25-Aug-17 | 13:05 | inside construction zone | 8.14 | 14.99 | NR | 19.9 | Loading materials/ YSI Malfunction/Leisure boats |
| 24-Aug-17 | | | | | | 19.9 38.0 39.9 | |

Table F-1 Environmental Monitoring Reports Submitted to the Vancouver Fraser Port Authority

| | | Monitoring Reports Submitted to the | | | Conductivity | Turk Mr. AITH | |
|------------------------|----------------|---|--------------|--|----------------|--|---|
| Date | Time* | Sample Location | pH | Temperature (°C) | (µS/cm) | Turbidity (NTU) | |
| 05 Aug 47 | 40.45 | Inside / outside of Construction zone/ inside construction zone but not caused by construction activities | 7.0 - 8.7 | ±1 change from ambient background ¹² . Hourly rate of change up to 0.5 ³ . | NG | Change from background 3 of 5 NTU during time when background is 8 - 50 NTU during high flows or in turbid waters or Change from background of 10% when background is > 50 NTU at any time during high flows or in turbid waters | Comments |
| 25-Aug-17 25-Aug-17 | 16:45 16:50 | inside construction zone outside construction zone | 8.1 8.3 | 14.85 15.79 | NR NR | 42.5 40.2 | Unloading rip rap off barge / Leisure boats Unloading rip rap off barge / Leisure boats |
| 30-Aug-17 | 7:40 | inside construction zone | 8.10 | 15.94 | 31717 | 5.15 | Excavator emptying gravel bags. Calm water - slack tide |
| 30-Aug-17 | 7:55 | outside construction zone | 7.96 | 16.07 | 31312 | 20.7 | |
| 30-Aug-17 30-Aug-17 | 10:00 | inside construction zone outside construction zone | 8.17 8.14 | 15.87 16.15 | 31842 32041 | 4.93 9.30 | Excavator placing rip rap |
| 30-Aug-17 | 11:00 | inside construction zone | 8.13 | 15.5 | 31684 | 7.88 | End of day / tidying up. |
| 30-Aug-17 | 11:04 | outside construction zone | 8.15 | 16.02 | 31921 | 8.07 | |
| 31-Aug-17 31-Aug-17 | 7:35 7:40 | inside construction zone outside construction zone | 8.12 7.99 | 15.45 15.39 | 31855 31810 | 5.83 19.6 | Excavator dumping gravel. |
| 31-Aug-17 | 11:00 | inside construction zone | 8.06 | 15.17 | 31716 | 12.9 | Moving rip rap / installing wells |
| 31-Aug-17 | 11:05 | outside construction zone | 8.04 | 15.39 | 32235 | 14.7 | Moving rip rap / installing wells |
| 31-Aug-17 31-Aug-17 | 11:50 11:55 | inside construction zone outside construction zone | 8.02 8.10 | 15.05 15.87 | 31900 31835 | 11.0 | Moving rip rap / installing wells Moving rip rap / installing wells |
| 1-Sep-17 | 7:26 | inside construction zone | 8.00 | 14.91 | 31553 | 17.3 | Moving rip rap / installing wells |
| 1-Sep-17 | 7:31 | outside construction zone | 7.87 | 14.94 | 30507 | 18.8 | Moving rip rap / installing wells |
| 1-Sep-17 | 9:21 | inside construction zone but not caused by construction activities | 8.17 | 15.67 | 31596 | 38.2 | Moving rip rap / installing wells. Large tanker, boats passing by |
| 1-Sep-17 | 9:26 | outside construction zone | 8.14 | 15.4 | 31839 | 98 | Moving rip rap / installing wells. Large tanker, boats passing by |
| 1-Sep-17 | 11:11 | inside construction zone but not caused by construction activities | 8.10 | 15.08 | 31687 | <u>56.1</u> | End of day. Leisure boat crafts. |
| 1-Sep-17 | 11:16 | outside construction zone | 8.09 | 15.12 | 31698 | 60.7 | Delatively coles water Tenito building |
| 5-Sep-17 5-Sep-17 | 9:30 | inside construction zone outside construction zone | 7.98 7.95 | 16.18 | 32159 32153 | 2.94 | Relatively calm water. Tervita building concrete forms |
| 5-Sep-17 | 11:51 | inside construction zone | 8.00 | 16.11 | 32260 | 5.9 | Building concrete forms, minor leisure boat traffic |
| 5-Sep-17 | 11:56 | outside construction zone | 7.97 | 15.9 | 32017 | 28.70 | End of the Albertan |
| 5-Sep-17 5-Sep-17 | 13:45 13:50 | inside construction zone outside construction zone | 7.92 7.92 | 18.07 15.4 | 31948 32290 | 7.82 23.5 | End of day / tidying up. |
| 6-Sep-17 | 9:00 | inside construction zone | 7.79 | 15.27 | 30357 | 14.8 | Building forms |
| 6-Sep-17 | 9:05 | outside construction zone | 7.96 | 15.9 | 30451 | 12.8 | Building forms |
| 6-Sep-17 6-Sep-17 | 11:39 11:44 | inside construction zone outside construction zone | 7.98 8.08 | 15.41 16.1 | 30374 | 8.61 14.9 | |
| 6-Sep-17 | 14:08 | inside construction zone | 7.93 | 14.94 | 30348 | 9.4 | Pouring concrete into forms |
| 6-Sep-17 | 14:16 | outside construction zone | 8.05 | 16.2 | 30988 | 16.1 | Pouring concrete into forms |
| 7-Sep-17 7-Sep-17 | 10:10 | inside construction zone outside construction zone | 7.92 8.01 | 15.09 16.2 | 30321 30419 | 4.91 6.42 | Calm ambient Calm ambient |
| 7-Sep-17 | 13:40 | inside construction zone | 7.90 | 14.06 | 30281 | 27.6 | Skid steer moving concrete collars off barge |
| 7-Sep-17 | 13:46 | outside construction zone | 7.87 | 14.0 | 30377 | 13.2 | Skid steer moving concrete collars off barge |
| 7-Sep-17 7-Sep-17 | 15:05 15:09 | inside construction zone outside construction zone | 7.92 7.96 | 14.42 14.5 | 30288 30301 | 17.4 15.2 | |
| 9-Sep-17 | 10:50 | inside construction zone | 7.89 | 13.86 | 29945 | 48.9 | Unloading / ramp dropped. |
| 9-Sep-17 | 10:54 | outside construction zone | 7.91 | 14.0 | 30011 | 17.0 | |
| 9-Sep-17 9-Sep-17 | 13:20 | inside construction zone outside construction zone | 7.88 7.86 | 13.81 13.8 | 30023 | 6.84 5.13 | |
| 9-Sep-17 | 16:31 | inside construction zone | 7.97 | 14.30 | 29994 | 48.6 | |
| 9-Sep-17 | 16:37 | outside construction zone | 8.01 | 14.3 | 29918 | <u>27.9</u> | |
| 14-Sep-17 | 7:10 | inside construction zone | 7.94 | 13.21 | 29841 | 29.5 | Unloading, no waves |
| 14-Sep-17 14-Sep-17 | 7:13 9:46 | outside construction zone inside construction zone | 7.98 7.96 | 13.4 14.01 | 29613 29687 | 11.0 14.6 | Unloading, no waves |
| 14-Sep-17 | 9:51 | outside construction zone | 7.93 | 14.1 | 29691 | 16.8 | |
| 14-Sep-17 | 10:19 | inside construction zone outside construction zone | 7.98 7.97 | 13.73 | 29684 32290 | 73.1 24.3 | Loading Excavator with waves |
| 14-Sep-17 15-Sep-17 | 7:04 | inside construction zone | 7.92 | 13.51 | 29326 | 112 | Loading Excavator with waves Unloading Excavator |
| | 7:09 | outside construction zone | 7.94 | 13.65 | 29243 | 24.7 | Unidating Excavator |
| 15-Sep-17 15-Sep-17 | 9:36 | inside construction zone | 7.94 | 13.66 | 29243 | 13.8 | Applicant colors |
| 15-Sep-17 | 9:40 | outside construction zone | 7.98 | 13.71 | 29654 | 94.6 | Ambient calm Waves from passing boat |
| 15-Sep-17 | 11:45 | inside construction zone | 8.02 | 14.21 | 29790 | 117 | Very turbid all along shore |
| 15-Sep-17 | 11:50 7:11 | outside construction zone inside construction zone | 8.00 7.84 | 14.46 13.18 | 29801 29460 | 99.8 | Very turbid all along shore |
| 16-Sep-17 16-Sep-17 | 7:15 | outside construction zone | 7.86 | 13.16 | 29503 | <u>59.1</u> 21.0 | |
| 16-Sep-17 | 9:37 | inside construction zone | 7.92 | 13.44 | 29636 | 32.2 | |
| 16-Sep-17 | 9:41 | outside construction zone | 7.93 | 13.43 | 29643 | 24.9 | West from a series best |
| 16-Sep-17 16-Sep-17 | 12:07 12:12 | inside construction zone outside construction zone | 7.99 7.99 | 13.82 13.72 | 29951 29900 | 101 47.8 | Waves from passing boat |
| 18-Sep-17 | 8:15 | inside construction zone | 7.88 | 12.89 | 29540 | 17.6 | Unloading excavator |
| 18-Sep-17 | 8:19 | outside construction zone | 7.89 | 12.93 | 29533 | 16.8 | Unloading excavator |
| 18-Sep-17 18-Sep-17 | 10:51 | inside construction zone outside construction zone | 7.86 7.85 | 13.00 12.99 | 29869 29871 | 11.4 | ambient waves ambient waves |
| 18-Sep-17 | 12:38 | inside construction zone | 7.88 | 12.93 | 29899 | 46.4 | Loading excavator |
| 18-Sep-17 19-Sep-17 | 12:42 8:50 | outside construction zone inside construction zone | 7.87 7.87 | 12.99 12.73 | 29904 29046 | 22.8 39.9 | Loading excavator Unloading excavator |
| 19-Sep-17 19-Sep-17 | 8:54 | outside construction zone | 7.85 | 12.73 | 29046 | 13.8 | Unloading excavator Unloading excavator |
| 19-Sep-17 | 12:13 | inside construction zone | 7.9 | 12.66 | 29426 | 28.1 | ambient waves |
| 19-Sep-17 19-Sep-17 | 12:17 | outside construction zone inside construction zone | 7.89 7.94 | 12.61 12.99 | 29419 29090 | 20.4 15 | ambient waves Loading excavator |
| 19-Sep-17 | 13:41 | outside construction zone | 7.94 | 13.04 | 28947 | 11.3 | Loading excavator |
| 21-Sep-17 | 10:40 | inside construction zone | 7.86 | 12.86 | 29720 | 31.1 | Unloading excavator |
| 21-Sep-17 21-Sep-17 | 10:45 12:50 | outside construction zone inside construction zone | 7.85 7.90 | 12.84 | 29707 29874 | 18.7 14.6 | Unloading excavator ambient waves |
| 21-Sep-17 | 12:54 | outside construction zone | 7.91 | 13.31 | 29891 | 17.7 | ambient waves |
| 21-Sep-17 | 15:05 | inside construction zone | 7.87 | 12.88 | 29612 | 78.9 | Loading excavator |
| 21-Sep-17 22-Sep-17 | 15:09 12:04 | outside construction zone inside construction zone | 7.88 7.89 | 12.86 12.92 | 29633 29536 | 32.3 88.6 | Loading excavator Unloading excavator |
| 22-Sep-17 22-Sep-17 | 12:04 | outside construction zone | 7.89 | 12.92 | 29553 | 43.1 | Unloading excavator |
| 22-Sep-17 | 14:31 | inside construction zone | 8.01 | 13.20 | 29458 | 38.9 | ambient waves |
| 22-Sep-17 | 14:36 | outside construction zone | 8.00 | 13.19 | 29468 | <u>46.8</u> | ambient waves |
| 22-Sep-17 22-Sep-17 | 15:26 15:30 | inside construction zone outside construction zone | 7.95 7.96 | 13.06 | 29524 29526 | 11.7 | Loading excavator Loading excavator |
| 2-Oct-17 | 7:55 | inside construction zone | 7.71 | 12.43 | 37676 | 6.43 | Excavator on beach moving super sacs / barge set up at western barrier |
| 2-Oct-17 | 8:00 | outside construction zone | 7.79 | 12.04 | 37136 | 4.16 | 50 west of eastern barrier |
| 2-Oct-17 2-Oct-17 | 10:20 | inside construction zone outside construction zone | 7.99 7.98 | 12.47 | 37847 37270 | 7.12 14.40 | calm water, excavator working ambient waves |
| 2-Oct-17 | 12:24 | inside construction zone | 8.08 | 12.87 | 37995 | 12.10 | Gentle waves |
| 2-Oct-17 | 12:30 | outside construction zone | 8.19 | 13.08 | 37954 | 8.90 | |
| 4-Oct-17 4-Oct-17 | 9:00 | inside construction zone outside construction zone | 7.96 7.92 | 12.15 11.82 | 37590 37475 | 3.99 7.42 | Calm water / barge set up at western barrier |
| 4-Uct-1/ | 9:05 | puiside construction ZONE | 7.92 | 11.82 | 3/4/5 | 1.42 | |

Table F-1 Environmental Monitoring Reports Submitted to the Vancouver Fraser Port Authority

| Date | Time ⁴ | Monitoring Reports Submitted to the Sample Location | pН | Temperature (°C) | Conductivity (µS/cm) | Turbidity (NTU) | |
|------------------------|--------------------|---|-----------|---|----------------------|---|--|
| | | Inside / outside of Construction zone/ inside construction zone but not caused by construction activities | 7.0 - 8.7 | ± 1 change from ambient background ^{1,2} . Hourly rate of change up to 0.5.3 | NG | Change from background ² of 5 NTU at any time when background is 8 - 50 NTU during high flows or in turbid waters or Change from background of 10% when background is - 50 NTU at any time during high flows or in turbid waters | Comments |
| 4-Oct-17 | 11:15 | inside construction zone | 8.08 | 12.35 | 37731 | 8.52 | Excavator moving rip rap |
| 4-Oct-17 | 11:20 | outside construction zone | 8.07 | 12.39 | 37692 | 9.01 | |
| 4-Oct-17 | 13:08 | inside construction zone | 8.07 | 12.9 | 38101 | 7.00 | Excavator moving rip rap |
| 4-Oct-17 | 13:13 | outside construction zone | 8.09 | 12.79 | 38007 | 14.5 | |
| 5-Oct-17 | 10:23 | inside construction zone | 7.99 | 12.25 | 37852 | 20.7 | Excavator unloading materials from barge / slightly elevated turbidity from barge ramp / barge set up at eastern barrier |
| 5-Oct-17 | 10:28 | outside construction zone | 7.95 | 12.03 | 37800 | 56.8 | Moderate boat activity in Burrard Inlet |
| 5-Oct-17 | 12:37 | inside construction zone | 8.09 | 12.79 | 38156 | 25.4 | Moderate boat activity in Burrard Inlet |
| 5-Oct-17 | 12:42 | outside construction zone | 8.02 | 12.22 | 37954 | <u>36.5</u> | |
| 5-Oct-17 | 13:36 | inside construction zone | 8.04 | 12.63 | 38246 | 15.0 | |
| 5-Oct-17 | 13:41 | outside construction zone | 8.06 | 12.71 | 38240 | 16.1 | |
| 10-Oct-17 | 12:53 AM | inside construction zone | 7.59 | 11.84 | 38266 | 7.10 | Calm water/ excavator moving rip rap in west trench |
| 10-Oct-17 | 12:58 AM | outside construction zone | 7.75 | 11.61 | 38017 | 4.71 | Calm water/ excavator moving rip rap in west trench |
| 10-Oct-17 | 3:05 AM | inside construction zone | 7.87 | 11.59 | 37868 | 4.27 | Calm water/ excavator moving rip rap in west trench |
| 10-Oct-17 | 3:08 AM | outside construction zone | 7.79 | 11.50 | 37553 | 3.25 | Calm water/ excavator moving rip rap in west trench |
| 10-Oct-17 | 5:13 AM | inside construction zone | 7.86 | 11.86 | 38431 | 2.39 | |
| 10-Oct-17 | 5:18 AM | outside construction zone | 7.84 | 11.89 | 38411 | 5.12 | |
| 11-Oct-17 | 1:30 AM | inside construction zone | 7.87 | 11.70 | 38293 | 2.99 | Calm water |
| 11-Oct-17 | 1:35 AM | outside construction zone | 7.82 | 11.36 | 37984 | 12.6 | |
| 11-Oct-17 | 3:55 AM | inside construction zone | 7.87 | 11.67 | 38122 | 17.6 | |
| 11-Oct-17 | 4:00 AM | outside construction zone | 7.71 | 11.52 | 37661 | 11.4 | |
| 11-Oct-17 | 6:45 AM | inside construction zone | 7.92 | 11.83 | 38373 | 15.3 | |
| 11-Oct-17 | 3:22 AM | outside construction zone | 7.90 | 11.82 | 38340 | 17.1 | Management of the second of th |
| 12-Oct-17 | 3:26 AM | inside construction zone | 7.89 | 11.72 | 38086 | 4.54 | Moderate wind and waves, excavating, drilling wells in east section |
| 12-Oct-17 | 3:26 AM | outside construction zone inside construction zone, but not caused | 7.82 | 11.32 | 37706 | 60.1 | Wind, waves and falling tide likely impact turbidity |
| 12-Oct-17 | 6:04 AM | by construction activities | 7.87 | 11.61 | 37869 | 33.1 | Wind, waves and falling tide likely impact turbidity |
| 12-Oct-17 | 6:08 AM | outside construction zone | 7.72 | 11.16 | 37178 | <u>50.7</u> | Wind, waves and falling tide likely impact turbidity |
| 12-Oct-17 | 7:40 AM | inside construction zone | 7.84 | 11.83 | 38306 | 9.01 | |
| 12-Oct-17 | 7:45 AM | outside construction zone | 7.84 | 11.82 | 38290 | 15.2 | |
| 13-Oct-17 | 3:36 AM | inside construction zone | 7.88 | 11.44 | 37652 | 8.15 | Set up barge, ramp in place, unloading cobbles to east trench areas. |
| 13-Oct-17 13-Oct-17 | 3:31 AM 7:10 AM | outside construction zone inside construction zone | 7.84 | 11.10 11.44 | 37309 37741 | <u>43.3</u> 16.4 | Excavating in west trench. Large tanker boat passed by, leisure boat traffic. |
| 13-Oct-17 | 7:15 AM | | 7.77 | 10.84 | 37310 | 17 | Excavating in west trench. Large tanker boat passed by, leisure boat tranic. |
| 13-Oct-17 | 9:11 AM | outside construction zone inside construction zone | 7.77 | 11.48 | 37675 | 10.1 | |
| 13-Oct-17 | 9:11 AM 9:16 AM | outside construction zone | 7.95 | 11.51 | 37675 | 15.1 | |
| 14-Oct-17 | 4:27 AM | inside construction zone | 7.13 | 11.43 | 38293 | 7.89 | Lowered barge ramp, working in east barrier |
| 14-Oct-17 | 4:32 AM | outside construction zone | 7.55 | 11.43 | 38157 | 13 | Learning burge rump, working in east barrier |
| 14-Oct-17 | 7:00 AM | inside construction zone | 7.32 | 11.15 | 37142 | 11.5 | |
| 14-Oct-17 | 7:05 AM | outside construction zone | 7.8 | 11.44 | 37757 | 5.64 | |
| 14-Oct-17 | 8:55 AM | inside construction zone | 7.82 | 11.5 | 38349 | 7.96 | Unloading cobbles from barge |
| 14-Oct-17 | 9:00 AM | outside construction zone | 7.77 | 11.27 | 37873 | 19.7 | V V |
| 20-Oct-17 | 11:29 PM | inside construction zone | 7.76 | 10.22 | 27145 | 6.96 | Barge landed near east barrier, calm water |
| 20-Oct-17 | 11:34 PM | outside construction zone | 7.64 | 10.17 | 26682 | 13.5 | |
| 20-Oct-17 | 1:45 AM | inside construction zone | 8.12 | 10.02 | 28991 | 11.1 | Drilling monitoring wells |
| 20-Oct-17 | 1:50 AM | outside construction zone | 8.04 | 10.01 | 28901 | 14.50 | Excavating cobble matt in west section |
| 20-Oct-17 | 5:50 AM | inside construction zone | 7.98 | 10.23 | 27198 | 10.0 | |
| 20-Oct-17 | 5:56 AM | outside construction zone | 7.96 | 10.20 | 27202 | 15.1 | |

- BC Ministry of Environment (MoE) 2015. Approved Water Quality Guidelines http://www2.gov.bc.ca/gov/content/environment/air-land-water/water-quality-quidelines/approved-water-quality-guidelines/approved-water-qu
- ² Samples were collected from seawater outside of the construction zone to determine background turbidity and temperature.
 ³ The natural temperature cycle characteristic of the site should not be altered in amplitude or frequency by human activities.
- 4 Seawater samples were collected at the start, mid-way and at the end of each work period or when there was evidence of a direct or indirect release or deposit of sediment or sediment laden water into the aquatic environment.

 5 The construction zone is defined as areas that may potential direct or indirect release or deposit of sediment laden water into the aquatic environment. For the project, it is set at 50 feet from any ground disturbance activities.
- NC = not collected
- NG = no guideline
- NR = not recorded
- NTU = nephelometric turbidity units
- uS/cm microsiemens per centimetre Concentration exceeds guideline

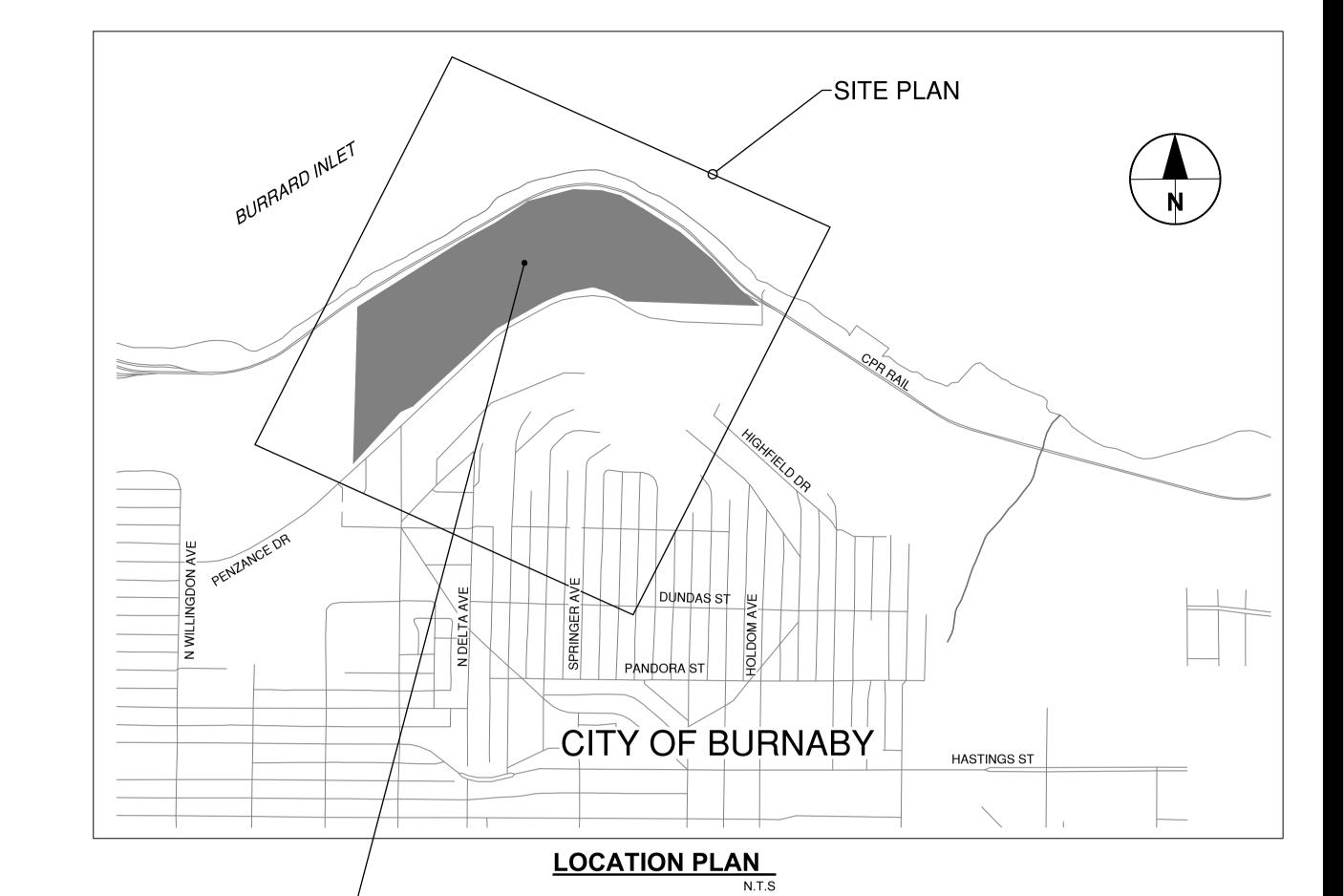
Work was not completed at the site on the following days: July 31, August 5, 6, 7, 14, 15, 23, 26, 28, 29, September 2, 4, 8, 11, 12, 13, 20, 23, October 3, 6, 7, 9, 16, 17, 18, 19, and 21, 2017.

- Data screened against average ambient temperature readings and average background turbidity readings collected outside the construction zone on a weekly basis as follows: July 10-15 ambient temperature = 18.49; background turbidity =17.45

- July 17-22 ambient temperature = 16.73; background turbidity = 31.19 July 24-28 ambient temperature = 15.72; background turbidity = 44.47 July 24-28 ambient temperature = 16.9; August 8-12 background turbidity = 30 August 16-19 ambient temperature = 15.91; background turbidity = 49
- August 21-25 ambient temperature = 15.10; background turbidity = 39
- August 30 September 1 ambient temperature = 15.59; background turbidity = 29.2
 October 2-5 ambient temperature = 11.237; background turbidity = 18.64
 October 10-14 ambient temperature = 11.43; background turbidity = 19.59
- October 20 ambient temperature = 14.37; background turbidity = 10.13
- September 4-9 ambient temperature = 15.2; background turbidity = 16.2 September 14-16 ambient temperature = 13.7; background turbidity = 40.5
- September 18-23 ambient temperature = 12.97; background turbidity = 22.9

Project number: 60542455

Appendix G - Record Drawings



| | DRAWING LIST |
|--------------|--|
| | DIVAVVIIVO LIOT |
| SHEET NUMBER | SHEET TITLE |
| C-000 | COVER SHEET |
| C-101 | SITE PLAN - SUBSURFACE & ABOVE GROUND COMPONENTS |
| C-102 | SITE PLAN - BURIED GEOTEXTILE LAYOUT |
| C-103 | SITE GRADING SECTIONS |
| C-301 | TYPICAL SECTION |
| C-401 | TYPICAL DETAILS |
| C-402 | TYPICAL DETAILS |

PARKLAND REFINERY



PARKLAND BURNABY REFINERY SITE PLAN

125 250 m

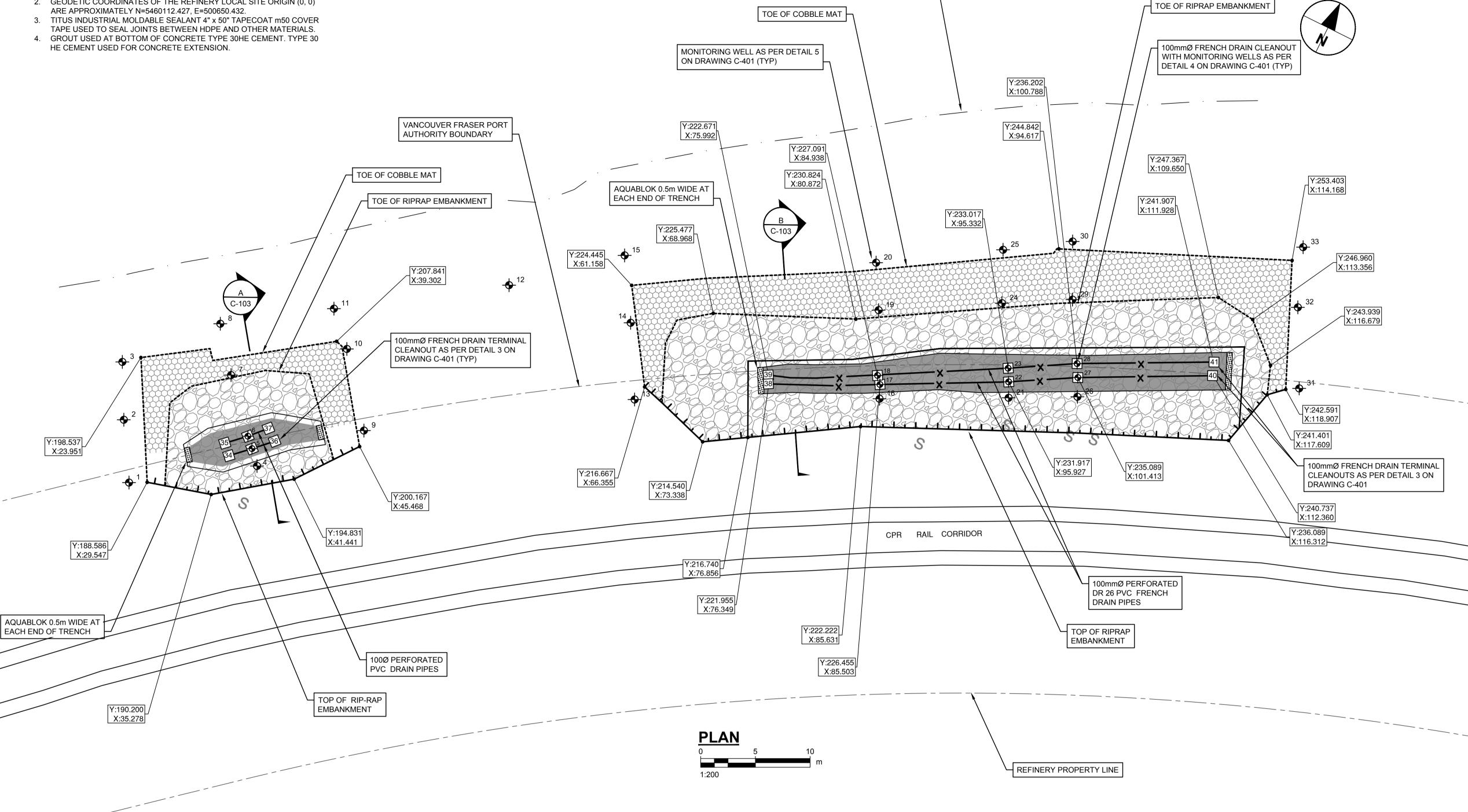
KLAND BURNABY REFINERY

ED FOR RECORD - DEC 19, 201

Printed on ___% Post-Consumer Recycled Content Paper Parkland REFINING (B.C.) LTD.

NOTES:

- COORDINATES ARE TO REFINERY LOCAL SITE COORDINATES.
- 2. GEODETIC COORDINATES OF THE REFINERY LOCAL SITE ORIGIN (0, 0)

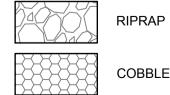


LOW TIDE LINE

| PROTECTORS, WELLS & CLEANOUTS | | | | | |
|-------------------------------|---|--|--|--|--|
| ID NUMBER | CONTENTS (REFER TO DETAILS ON SHEET C-401 & C-402) | PROTECTOR (REFER TO DETAIL ON SHEET C-402) | | | |
| 1 | 6 | Α | | | |
| 2 | 6 | Α | | | |
| 3 | 6 | Α | | | |
| 4 | 5 | D | | | |
| 5 | 4 | С | | | |
| 6 | 4 | В | | | |
| 7 | 7 | Α | | | |
| 8 | 6 | Α | | | |
| 9 | 6 | А | | | |
| 10 | 6 | А | | | |
| 11 | 6 | Α | | | |
| 12 | 6 | Α | | | |
| 13 | 6 | Α | | | |
| 14 | 6 | А | | | |
| 15 | 6 | А | | | |
| 16 | 5 | E | | | |
| 17 | 4 | Е | | | |
| 18 | 4 | F | | | |
| 19 | 7 | А | | | |
| | | | | | |

| PROTECTORS, WELLS & CLEANOUTS | | | | | |
|-------------------------------|---|--|--|--|--|
| ID NUMBER | CONTENTS (REFER TO DETAILS ON SHEET C-401 & C-402) | PROTECTOR (REFER TO DETAIL ON SHEET C-402) | | | |
| 22 | 4 | Е | | | |
| 23 | 4 | F | | | |
| 24 | 7 | Α | | | |
| 25 | 5 | Α | | | |
| 26 | 5 | Е | | | |
| 27 | 4 | Е | | | |
| 28 | 4 | F | | | |
| 29 | 7 | Α | | | |
| 30 | 6 | Α | | | |
| 31 | 6 | Α | | | |
| 32 | 6 | Α | | | |
| 33 | 6 | Α | | | |
| 34 | 3 | С | | | |
| 35 | 3 | F | | | |
| 36 | 3 | F | | | |
| 37 | 3 | F | | | |
| 38 | 3 | Е | | | |
| 39 | 3 | F | | | |
| 40 | 3 | Е | | | |
| 41 | 3 | F | | | |

LEGEND



COBBLE MAT



TRENCH

- 100mmØ FRENCH DRAIN TERMINAL CLEANOUT AS PER DETAIL 3 ON SHEET C-401
- 28 MONITORING WELL WITH 100mmØ FRENCH DRAIN CLEANOUT AS PER DETAIL 4 ON SHEET C-401
- MONITORING WELL AS PER DETAIL 5 ON SHEET C-401
- LOCATION OF SEEPS OBSERVED IN 2010

PROJECT

FORESHORE PASSIVE TREATMENT SYSTEM **CONSTRUCTION REPORT BELOW AREA 2 EASTERN IMPOUNDING BASIN** PARKLAND BURNABY REFINERY

CLIENT



CONSULTANT



3292 Production Way Burnaby, BC 1.604.444.6400 tel 1.604294.8597 fax www.aecom.com

AS-CONSTRUCTED DIMENSIONS, MEASUREMENTS AND OTHER DETAILS CONTAINED IN THIS RECORD DRAWING HAVE BEEN OBTAINED BY AECOM CANADA LTD. ("AECOM") FROM VARIOUS SOURCES. SUCH INFORMATION REPRESENTS THE BEST INFORMATION AVAILABLE TO AECOM AT THE TIME OF PREPARATION OF THIS **RECORD DRAWING. AECOM DOES NOT IN** ANY WAY REPRESENT OR WARRANT THAT SUCH INFORMATION IS ACCURATE AND ASSUMES NO RESPONSIBILITY FOR ANY **ERRORS OR OMISSIONS CONTAINED** THEREIN.

REGISTRATION

ISSUE/REVISION

| 40 | | | |
|--------------|-----|-------------|------------------------------|
| as | | | |
| nt, | | | |
| its client, | | | |
| S | _ | | |
| ind ii | | | |
| by AECOM and | 3 | DEC.20.2017 | ISSUED FOR RECORD |
| AEC | 2 | JUL.26.2017 | REVISED ISSUED FOR CONSTRUCT |
| ed by | 1 | MAY.16.17 | ISSUED FOR CONSTRUCTION |
| agreed | I/R | DATE | DESCRIPTION |

KEY PLAN

PROJECT NUMBER

60542455

SHEET TITLE

SITE PLAN - SUBSURFACE & ABOVE GROUND COMPONENTS

SHEET NUMBER

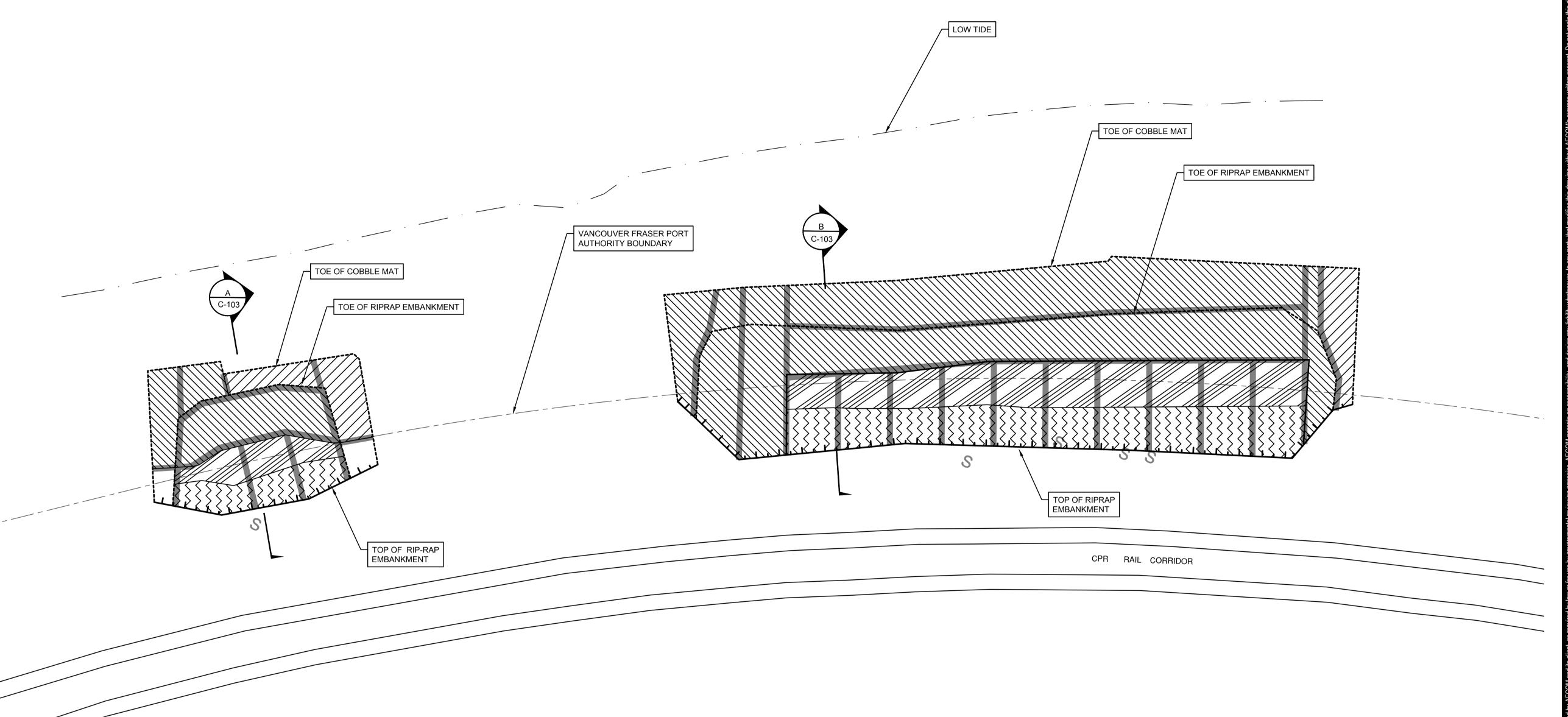
C-101

Printed on ____% Post-Consumer
Recycled Content Paper

NOTES:

- 1. REFER TO C-301 FOR DETAILED GEOTEXTILE LAYER VERTICAL LAYOUT.
- 2. COORDINATES ARE TO REFINERY LOCAL SITE COORDINATES. 2. GEODETIC COORDINATES OF THE REFINERY LOCAL SITE ORIGIN (0, 0) ARE
- APPROXIMATELY N=5460112.427, E=500650.432.
- 3. TITUS INDUSTRIAL MOLDABLE SEALANT 4" x 50" TAPECOAT m50 COVER TAPE
- USED TO SEAL JOINTS BETWEEN HDPE AND OTHER MATERIALS. 4. GROUT USED AT BOTTOM OF CONCRETE TYPE 30HE CEMENT. TYPE 30 HE
- CEMENT USED FOR CONCRETE EXTENSION.





LEGEND

REFINERY PROPERTY LINE

NILEX 4510 GEOTEXTILE, GSE HDPE GEOMEMBRANE, NILEX Bx1100 GEOGRID, TENDRAIN II (OBB)

NILEX 4510 GEOTEXTILE, GSE HDPE GEOMEMBRANE NILEX 4510 GEOTEXTILE, NILEX Bx1100 GEOGRID, TENDRAIN II (OBB)



NILEX 4510 GEOTEXTILE, NILEX Bx1100 GEOGRID, SKAP TRANSNET (OBB)



500mm OVERLAP OF GEOTEXTILE MATERIALS RIPRAP/ COBBLE BOUNDARY

PROJECT

FORESHORE PASSIVE TREATMENT SYSTEM **CONSTRUCTION REPORT** BELOW AREA 2 EASTERN **IMPOUNDING BASIN** PARKLAND BURNABY REFINERY

CLIENT



CONSULTANT



3292 Production Way Burnaby, BC 1.604.444.6400 tel 1.604294.8597 fax www.aecom.com

NOTICE:
AS-CONSTRUCTED DIMENSIONS, MEASUREMENTS AND OTHER DETAILS CONTAINED IN THIS RECORD DRAWING HAVE BEEN OBTAINED BY AECOM CANADA LTD. ("AECOM") FROM VARIOUS SOURCES. SUCH INFORMATION REPRESENTS THE BEST INFORMATION AVAILABLE TO AECOM AT THE TIME OF PREPARATION OF THIS RECORD DRAWING. AECOM DOES NOT IN ANY WAY REPRESENT OR WARRANT THAT SUCH INFORMATION IS ACCURATE AND ASSUMES NO RESPONSIBILITY FOR ANY ERRORS OR OMISSIONS CONTAINED THEREIN.

REGISTRATION

ISSUE/REVISION

| nt, as | | | |
|--------------------------------|-----|-------------|---------------------------------|
| greed by AECOM and its client, | | | |
| and its | | | |
| WO. | 3 | DEC.20.2017 | ISSUED FOR RECORD |
| AEC | 2 | JUL.26.2017 | REVISED ISSUED FOR CONSTRUCTION |
| ed by | 1 | MAY.16.17 | ISSUED FOR CONSTRUCTION |
| gree | I/R | DATE | DESCRIPTION |

KEY PLAN

PROJECT NUMBER

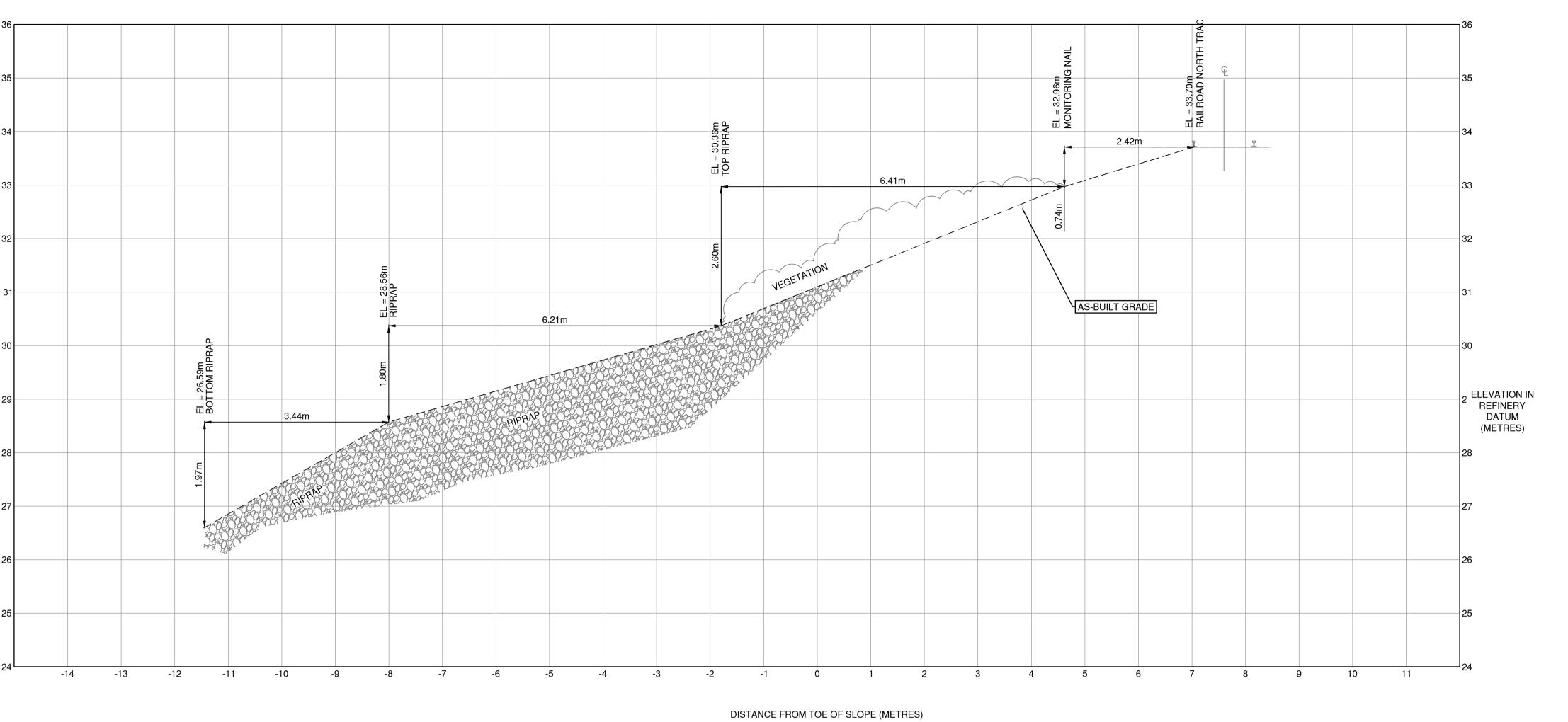
60542455

SHEET TITLE

SITE PLAN -**BURIED GEOTEXTILE LAYOUT**

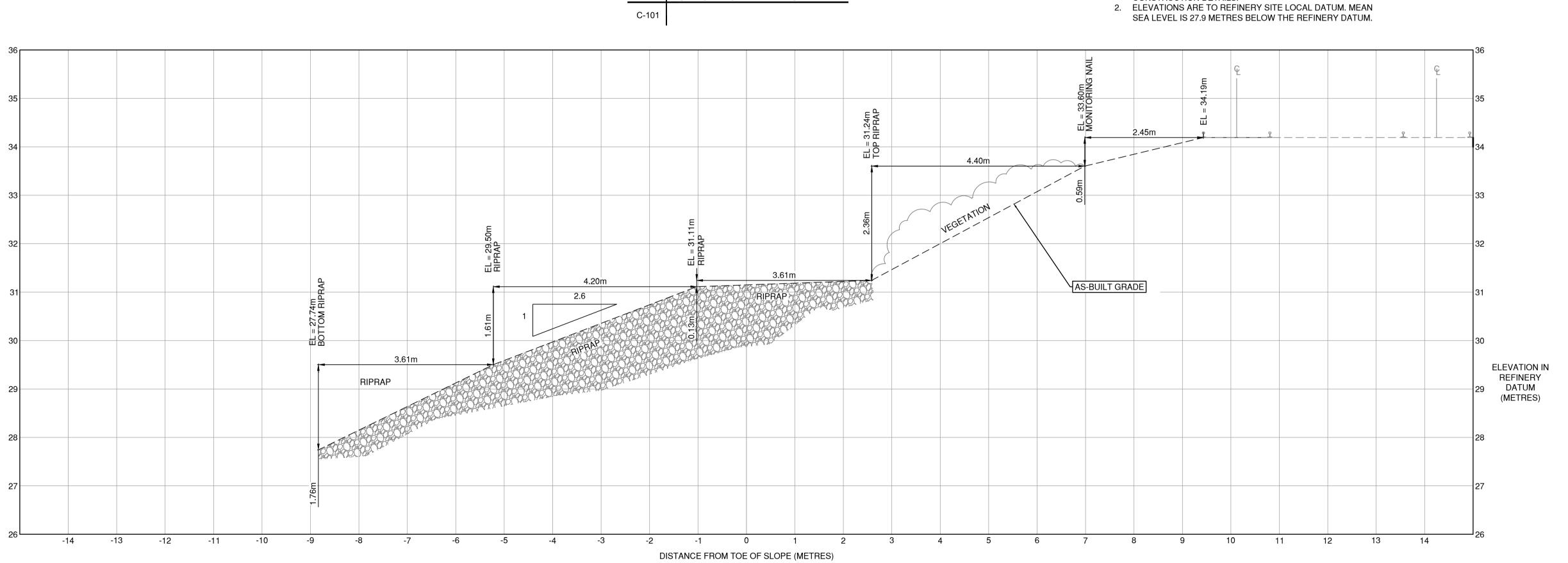
SHEET NUMBER

C-102



SECTION: WEST IRA

- 1. SEE C-101 FOR CROSS-SECTION LOCATIONS, AND C-301 FOR
- CONSTRUCTION DETAILS.



B | SECTION: EAST IRA

PROJECT

FORESHORE PASSIVE TREATMENT SYSTEM **CONSTRUCTION REPORT** BELOW AREA 2 EASTERN IMPOUNDING BASIN PARKLAND BURNABY REFINERY

CLIENT



CONSULTANT



3292 Production Way Burnaby, BC 1.604.444.6400 tel 1.604294.8597 fax www.aecom.com

AS-CONSTRUCTED DIMENSIONS, MEASUREMENTS AND OTHER DETAILS CONTAINED IN THIS RECORD DRAWING HAVE BEEN OBTAINED BY AECOM CANADA LTD. ("AECOM") FROM VARIOUS SOURCES. SUCH INFORMATION REPRESENTS THE BEST INFORMATION AVAILABLE TO AECOM AT THE TIME OF PREPARATION OF THIS **RECORD DRAWING. AECOM DOES NOT IN** ANY WAY REPRESENT OR WARRANT THAT SUCH INFORMATION IS ACCURATE AND ASSUMES NO RESPONSIBILITY FOR ANY ERRORS OR OMISSIONS CONTAINED THEREIN.

REGISTRATION

ISSUE/REVISION

| = | | | |
|------------|-----|-------------|-------------------------|
| its client | | | |
| and its | | | |
| AECOM and | | | |
| | 2 | DEC.19.2017 | ISSUED FOR RECORD |
| ed by | 1 | MAY.16.17 | ISSUED FOR CONSTRUCTION |
| agreed | I/R | DATE | DESCRIPTION |

KEY PLAN

PROJECT NUMBER

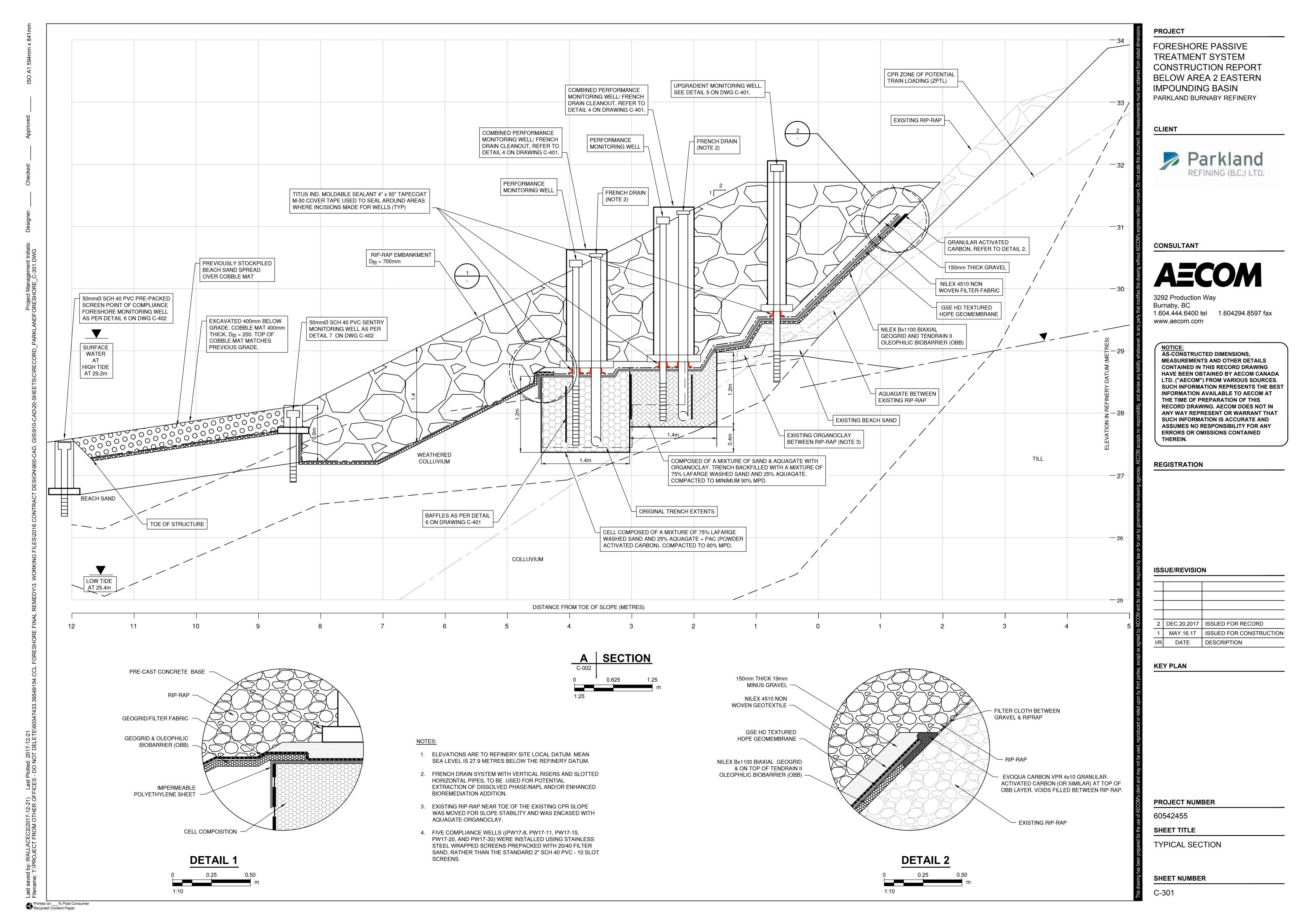
60542455

SHEET TITLE

SITE GRADING SECTIONS

SHEET NUMBER

Printed on ___% Post-Consumer
Recycled Content Paper



PROJECT

FORESHORE PASSIVE
TREATMENT SYSTEM
CONSTRUCTION REPORT
BELOW AREA 2 EASTERN
IMPOUNDING BASIN
PARKLAND BURNABY REFINERY

CLIENT



CONSULTANT



3292 Production Way Burnaby, BC 1.604.444.6400 tel 1.604294.8597 fax www.aecom.com

NOTICE: AS-CON

AS-CONSTRUCTED DIMENSIONS,
MEASUREMENTS AND OTHER DETAILS
CONTAINED IN THIS RECORD DRAWING
HAVE BEEN OBTAINED BY AECOM CANADA
LTD. ("AECOM") FROM VARIOUS SOURCES.
SUCH INFORMATION REPRESENTS THE BEST
INFORMATION AVAILABLE TO AECOM AT
THE TIME OF PREPARATION OF THIS
RECORD DRAWING. AECOM DOES NOT IN
ANY WAY REPRESENT OR WARRANT THAT
SUCH INFORMATION IS ACCURATE AND
ASSUMES NO RESPONSIBILITY FOR ANY
ERRORS OR OMISSIONS CONTAINED
THEREIN.

REGISTRATION

ISSUE/REVISION

| nt, | | | |
|-----------------------|-----|-------------|-------------------------|
| s clie | | | |
| AECOM and its client, | | | |
| MO: | | | |
| | 2 | DEC.20.2017 | ISSUED FOR RECORD |
| ed by | 1 | MAY.16.17 | ISSUED FOR CONSTRUCTION |
| agreed | I/R | DATE | DESCRIPTION |

KEY PLAN

PROJECT NUMBER

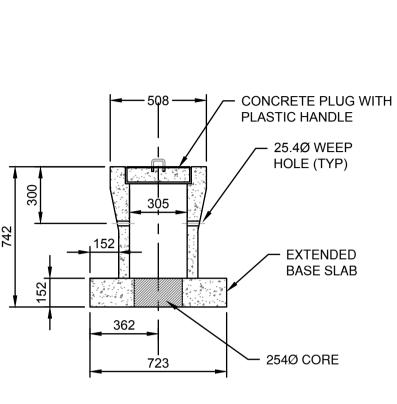
60542455

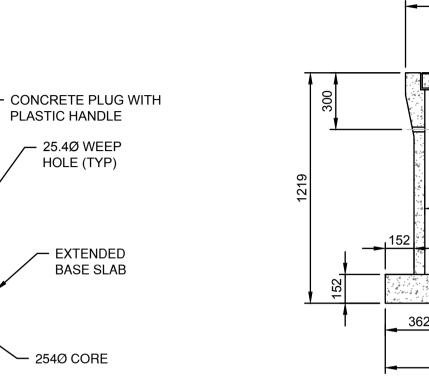
SHEET TITLE

TYPICAL DETAILS

SHEET NUMBER

C-401





CONCRETE PLUG WITH

- 8-12Ømm ANCHOR BOLT

A307 THREADED ROD

GU 20mm AGGREGATE

0.55 MAXIMUM WATER/

CEMENT RATIO EXPOSURE

- 25MPa CONCRETE

75 TO 125 SLUMP

CLASS C2

- 25.4Ø WEEP HOLE (TYP)

CONCRETE

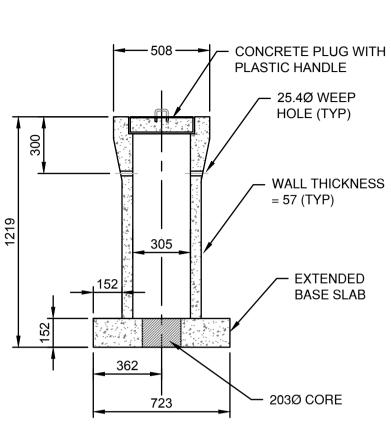
WALL THICKNESS

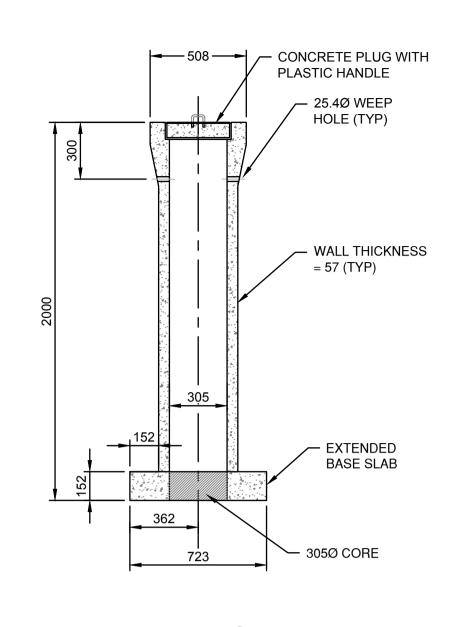
- EXTENDED BASE SLAB

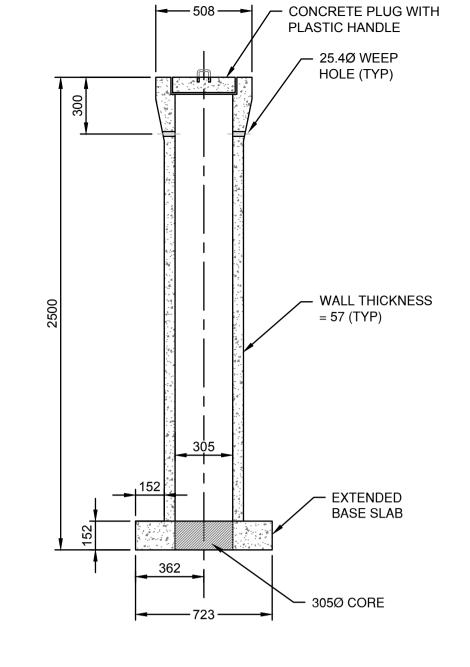
SADDLE

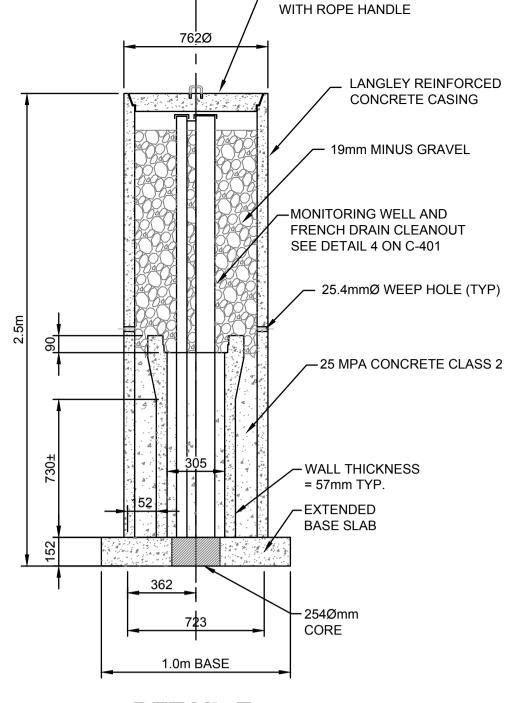
- 203Ø CORE

PLASTIC HANDLE

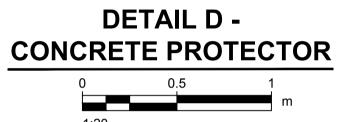




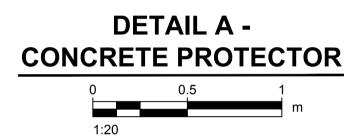


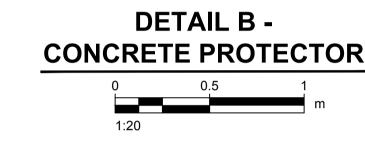


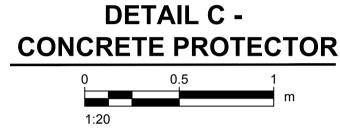
- CONCRETE PLUG

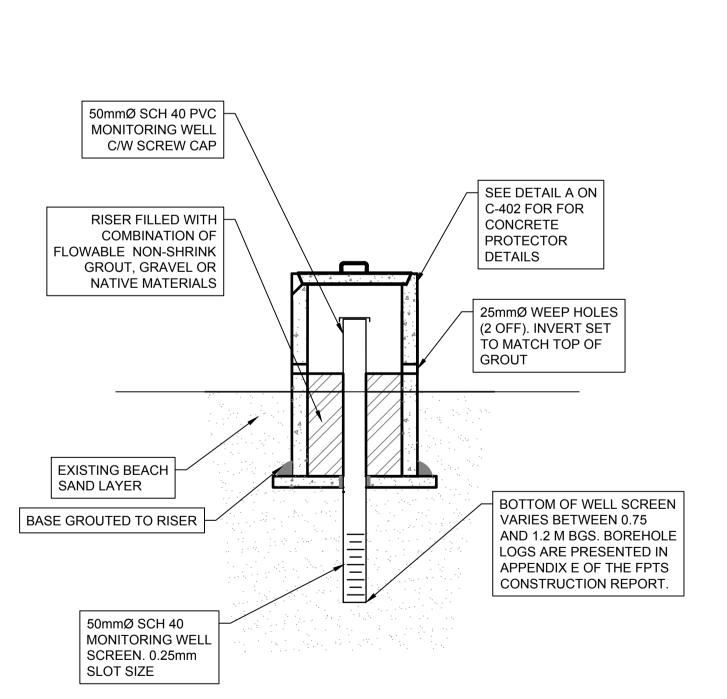


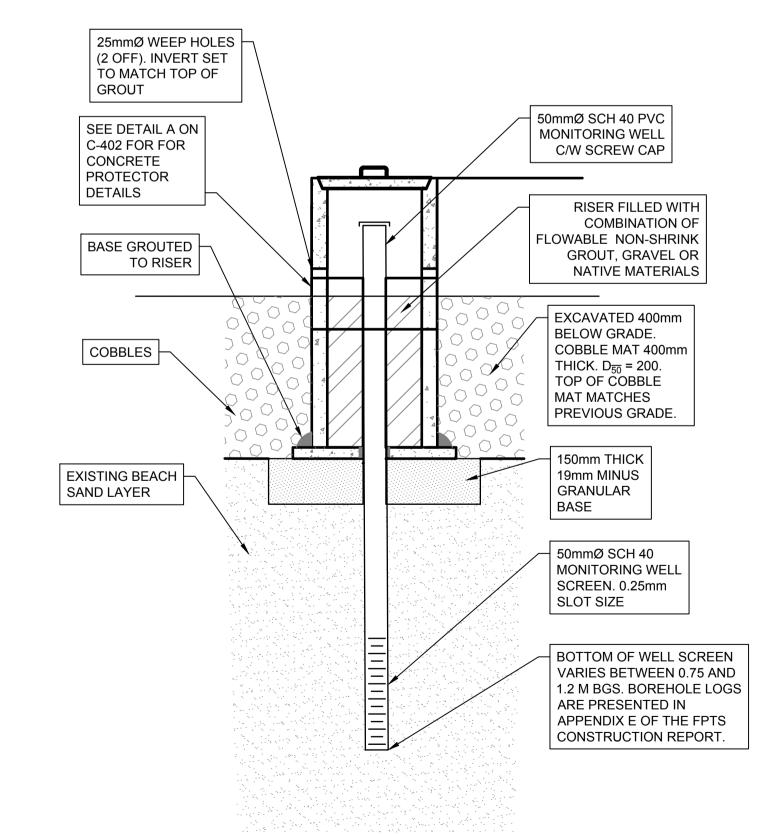
DETAIL E -MODIFIED CONCRETE PROTECTOR











DETAIL F - MODIFIED CONCRETE PROTECTOR WITH SADDLE

362

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

DETAIL 6 - COMPLIANCE MONITORING WELL

DETAIL 7 - SENTRY MONITORING WELL

PROJECT NUMBER

60542455 SHEET TITLE

PROJECT

CLIENT

CONSULTANT

3292 Production Way

1.604.444.6400 tel 1.604294.8597 fax

AS-CONSTRUCTED DIMENSIONS,

MEASUREMENTS AND OTHER DETAILS CONTAINED IN THIS RECORD DRAWING HAVE BEEN OBTAINED BY AECOM CANADA LTD. ("AECOM") FROM VARIOUS SOURCES. SUCH INFORMATION REPRESENTS THE BEST INFORMATION AVAILABLE TO AECOM AT THE TIME OF PREPARATION OF THIS RECORD DRAWING. AECOM DOES NOT IN ANY WAY REPRESENT OR WARRANT THAT SUCH INFORMATION IS ACCURATE AND ASSUMES NO RESPONSIBILITY FOR ANY ERRORS OR OMISSIONS CONTAINED

Burnaby, BC

www.aecom.com

THEREIN.

REGISTRATION

ISSUE/REVISION

KEY PLAN

1 DEC.20.2017 ISSUED FOR RECORD

DATE DESCRIPTION

FORESHORE PASSIVE

TREATMENT SYSTEM

IMPOUNDING BASIN

CONSTRUCTION REPORT

BELOW AREA 2 EASTERN

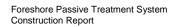
PARKLAND BURNABY REFINERY

TYPICAL DETAILS

SHEET NUMBER

Printed on ____% Post-Consume
Recycled Content Paper

C-402



Project number: 60542455

Appendix H - Sediment and Groundwater Laboratory COAs



AECOM CANADA LTD.

ATTN: Leslie Southern

330 - 3292 Production Way

Burnaby BC V5A 4R4

Date Received: 04-JUL-17

Report Date: 10-AUG-17 18:03 (MT)

Version: FINAL

Client Phone: 604-444-6400

Certificate of Analysis

Lab Work Order #: L1952865
Project P.O. #: NOT SUBMITTED

Job Reference:

C of C Numbers: 15-607729

Legal Site Desc:

Comments: Samples 4 to 9 were crushed to <2mm before metals analyses. All other analysis were

performed on unaltered sample.

Dean Watt, B.Sc. Account Manager

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

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



PAGE 2 of 7 10-AUG-17 18:03 (MT)

Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1952865-1 GRAB 04-JUL-17 08:30 GS17-01 | L1952865-2 GRAB 04-JUL-17 08:30 GS17-02 | L1952865-3 GRAB 04-JUL-17 08:30 GS17-03 | L1952865-4 GRAB 04-JUL-17 08:30 GS17-04 | L1952865-5 GRAB 04-JUL-17 08:30 GS17-06 |
|-------------------------------|---|---|---|---|---|---|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Physical Tests | Moisture (%) | 4.33 | 4.36 | 5.38 | 5.30 | 7.33 |
| | pH (1:2 soil:water) (pH) | 7.42 | 7.52 | 7.51 | 7.99 | 8.05 |
| Metals | Antimony (Sb) (mg/kg) | 0.19 | 0.16 | 0.20 | <0.10 | <0.10 |
| | Arsenic (As) (mg/kg) | 3.80 | 2.89 | 6.41 | 5.75 | 5.27 |
| | Barium (Ba) (mg/kg) | 42.6 | 46.6 | 46.9 | 58.6 | 51.2 |
| | Beryllium (Be) (mg/kg) | 0.18 | 0.16 | 0.17 | 0.83 | 0.79 |
| | Cadmium (Cd) (mg/kg) | 0.111 | 0.089 | 0.109 | 0.159 | 0.145 |
| | Chromium (Cr) (mg/kg) | 22.8 | 22.6 | 31.7 | 2.42 | 2.35 |
| | Cobalt (Co) (mg/kg) | 6.61 | 6.04 | 6.72 | 1.02 | 0.77 |
| | Copper (Cu) (mg/kg) | 19.7 | 16.5 | 19.0 | 2.38 | 2.18 |
| | Lead (Pb) (mg/kg) | 1.88 | 1.60 | 1.86 | 22.7 | 20.0 |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Molybdenum (Mo) (mg/kg) | 0.31 | 0.26 | 0.26 | 2.13 | 1.95 |
| | Nickel (Ni) (mg/kg) | 25.2 | 22.4 | 27.5 | 3.22 | 2.93 |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| | Thallium (TI) (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| | Uranium (U) (mg/kg) | 0.205 | 0.175 | 0.182 | 6.95 | 6.54 |
| | Vanadium (V) (mg/kg) | 44.5 | 39.1 | 47.5 | 2.16 | 1.42 |
| | Zinc (Zn) (mg/kg) | 41.8 | 34.9 | 38.4 | 47.2 | 45.5 |
| Volatile Organic Compounds | VOC Sample Container | Soil Jar |
| | Benzene (mg/kg) | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| | Ethylbenzene (mg/kg) | <0.015 | <0.015 | <0.015 | <0.015 | <0.015 |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Xylenes (mg/kg) | <0.075 | <0.075 | <0.075 | <0.075 | <0.075 |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 76.6 | SURR- ND 69.0 | 79.8 | 70.3 | 83.1 |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 94.1 | 87.2 | 100.2 | 90.2 | 103.0 |
| Hydrocarbons | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | <100 | <100 | <100 |
| | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | <100 | <100 |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 79.6 | 74.1 | 73.8 | 85.9 | SURR- ND 55.3 |

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

PAGE 3 of 7 10-AUG-17 18:03 (MT)

Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1952865-6 GRAB 04-JUL-17 08:30 GS17-07 | L1952865-7 GRAB 04-JUL-17 08:30 GS17-08 | L1952865-8 GRAB 04-JUL-17 08:30 GS17-09 | L1952865-9 GRAB 04-JUL-17 08:30 GS17-05 | |
|-------------------------------|---|---|---|---|---|--|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Physical Tests | Moisture (%) | 2.09 | 1.65 | 2.62 | 7.86 | |
| | pH (1:2 soil:water) (pH) | 9.53 | 9.46 | 9.51 | 8.04 | |
| Metals | Antimony (Sb) (mg/kg) | 0.24 | 0.23 | 0.23 | <0.10 | |
| | Arsenic (As) (mg/kg) | 3.95 | 4.31 | 4.02 | 6.24 | |
| | Barium (Ba) (mg/kg) | 26.8 | 27.8 | 25.7 | 60.9 | |
| | Beryllium (Be) (mg/kg) | 0.50 | 0.57 | 0.53 | 0.92 | |
| | Cadmium (Cd) (mg/kg) | 0.084 | 0.106 | 0.090 | 0.194 | |
| | Chromium (Cr) (mg/kg) | 3.49 | 3.52 | 3.22 | 2.52 | |
| | Cobalt (Co) (mg/kg) | 0.63 | 0.65 | 0.62 | 0.95 | |
| | Copper (Cu) (mg/kg) | 6.99 | 7.56 | 7.03 | 2.91 | |
| | Lead (Pb) (mg/kg) | 15.1 | 15.4 | 14.0 | 24.2 | |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Molybdenum (Mo) (mg/kg) | 1.34 | 1.46 | 1.37 | 2.25 | |
| | Nickel (Ni) (mg/kg) | 2.26 | 2.35 | 2.19 | 3.49 | |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 | <0.10 | |
| | Thallium (TI) (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | <2.0 | |
| | Uranium (U) (mg/kg) | 4.61 | 4.74 | 4.58 | 7.83 | |
| | Vanadium (V) (mg/kg) | 2.13 | 2.20 | 2.12 | 1.77 | |
| | Zinc (Zn) (mg/kg) | 29.7 | 40.5 | 29.5 | 52.2 | |
| Volatile Organic Compounds | VOC Sample Container | Soil Jar | Soil Jar | Soil Jar | Soil Jar | |
| | Benzene (mg/kg) | 0.0076 | 0.0117 | 0.0151 | <0.0050 | |
| | Ethylbenzene (mg/kg) | <0.015 | <0.015 | <0.015 | <0.015 | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 ABL | <0.20 ABL | <0.20 | <0.20 | |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Xylenes (mg/kg) | <0.075 | <0.075 | <0.075 | <0.075 | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 1.4 | 1.3 | 1.0 | 70.7 | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 2.7 | 3.2 LSRA | 3.1 | 92.9 | |
| Hydrocarbons | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 ABL | <100 ABL | <100 ABL | <100 | |
| | VPH (C6-C10) (mg/kg) Surrogate: 3,4-Dichlorotoluene (SS) (%) | <100 LSRA 2.4 | <100 LSRA 3.2 | <100 LSRA 1.8 | <100 SURR- ND | |
| | | | | - | 63.1 | |

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

L1952865 CONTD....

PAGE 4 of 7 10-AUG-17 18:03 (MT)

Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1952865-1 GRAB 04-JUL-17 08:30 GS17-01 | L1952865-2 GRAB 04-JUL-17 08:30 GS17-02 | L1952865-3 GRAB 04-JUL-17 08:30 GS17-03 | L1952865-4 GRAB 04-JUL-17 08:30 GS17-04 | L1952865-5 GRAB 04-JUL-17 08:30 GS17-06 |
|--|---|---|---|---|---|---|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.20 |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Surrogate: Acenaphthene d10 (%) | 90.6 | 87.9 | 96.9 | 96.3 | 102.6 |
| | Surrogate: Chrysene d12 (%) | 94.0 | 94.1 | 101.6 | Not Reportable | 126.2 |
| | Surrogate: Naphthalene d8 (%) | 89.8 | 87.1 | 96.4 | 92.1 | 96.9 |
| | Surrogate: Phenanthrene d10 (%) | 88.2 | 89.8 | 95.8 | 93.2 | 98.1 |
| | | | | | | |

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

L1952865 CONTD....

PAGE 5 of 7 10-AUG-17 18:03 (MT)

Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1952865-6 GRAB 04-JUL-17 08:30 GS17-07 | L1952865-7 GRAB 04-JUL-17 08:30 GS17-08 | L1952865-8 GRAB 04-JUL-17 08:30 GS17-09 | L1952865-9 GRAB 04-JUL-17 08:30 GS17-05 | |
|--|---|---|---|---|---|--|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Benzo(b)fluoranthene (mg/kg) | ABL <0.050 | <0.050 | <0.050 | <0.050 | |
| | Benzo(g,h,i)perylene (mg/kg) | ABL <0.050 | <0.050 | <0.050 | <0.050 | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Dibenz(a,h)anthracene (mg/kg) | ABL <0.050 | <0.050 | ABL <0.050 | <0.050 | |
| | Fluoranthene (mg/kg) | ABL <0.050 | <0.050 | <0.050 | <0.050 | |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | 0.065 | <0.050 | |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Surrogate: Acenaphthene d10 (%) | 6.1 | 8.0 | 8.1 | 96.8 | |
| | Surrogate: Chrysene d12 (%) | 0.20 LSRA | 0.10 LSRA | 0.20 | 115.7 | |
| | Surrogate: Naphthalene d8 (%) | 15.5 | 21.5 LSRA | 23.2 LSRA | 92.9 | |
| | Surrogate: Phenanthrene d10 (%) | 0.30 LSRA | 0.20 LSRA | 0.30 LSRA | 89.8 | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

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

L1952865 CONTD.... PAGE 6 of 7 10-AUG-17 18:03 (MT)

Reference Information

10-AUG-17 18:03 (MT)

Version: FINAL

QC Samples with Qualifiers & Comments:

| QC Type Des | C Type Description Parameter | | Qualifier | Applies to Sample Number(s) | | |
|--|--|-------------------------|-----------|-----------------------------|--|--|
| Qualifiers for Individual Parameters Listed: | | | | | | |
| Qualifier | Description | | | | | |
| ABL | Approximate Res | sult: May Be Biased Low | | | | |
| DLCI | Detection Limit Raised: Chromatographic Interference due to co-elution. | | | | | |
| LSRA | Low surrogate recovery observed due to adsorptive material in sample (e.g. charcoal). Associated results represent solvent extractable concentrations. | | | | | |
| SMI | Surrogate recovery could not be measured due to sample matrix interference. | | | | | |
| SURR-ND | Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected. | | | | | |

Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** |
|------------------|--------|--------------------------|-----------------------|
| HG-200.2-CVAF-VA | Soil | Mercury in Soil by CVAFS | EPA 200.2/1631E (mod) |
| | | | , |

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCI and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including AI, Ba, Be, Cr, Sr, Ti, TI, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

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).

XYLENES-CALC-VA Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

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.

Reference Information

L1952865 CONTD....

PAGE 7 of 7

10-AUG-17 18:03 (MT)

Version: FINAL

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

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

 Laboratory Definition Code
 Laboratory Location

 VA
 ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-607729

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

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

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

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



Chain of Custody (COC) / Analytical **Request Form**



L1952865-COFC

Page of

Canada Toll Free: 1 800 668 9878

| Report To | Contact and company name below wit | company name below will appear on the final report Report Format / Distribution | | | | | Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply | | | | | | | | | | |
|----------------|--|---|---------------------|---|--------------------------|---|---|--|------------------|---------------|-------------|------------|---------------|------------------|--------------|----------------|----------------------|
| Company: | AECOM | | Select Report Fo | | EXCEL. | EDD (DIGITAL) | † | | egular [R] | _ | | | | _ | | ays - no surch | arges apply |
| Contact: | LESLIE SOUTHE | RN | Quality Control (| QC) Report with Re | epont YES | S NO | (ŝ | 1 | day [P4] | | , | 5 | | usiness | | | |
| Phone: | 1004-444-10608 | | Compare Res | ults to Criteria on Repoi | t - provide details belo | w if box checked | PRIORITY tusiness Days) | 3 | day [P3] | 一百 | | 3GEN(| Same 1 | Dav We | ekend | or Statuto | ~ _ |
| | Company address below will appear on the t | inal report | Select Distribution | on: 🗖 EM. | AIL MAIL | FAX | PRI (Busin | 2 | day [P2] | | | EME | ounic i | | day [E | | , [|
| Street: | 50.16 | | Email 1 or Fax | 1251.2.50 | outhern Q | reem.com | | Date and Time Required for all E&P TATs: | | | | | | | | | |
| City/Province: | SAME | | Email 2 | | | | | s that ca | n not be perforr | ned accordin | ig to the s | service le | vel select | ed, you will | be contac | ted. | |
| Postal Code: | J. | | Email 3 | | | | | | | | | Analy | sis Req | uest | | | |
| Invoice To | Same as Report To | S NO | | Invoice | Distribution | | | | Indicate Filter | ed (F), Prese | erved (P) | or Filter | red and Pr | reserved (I | F/P) belo | N | |
|] | Copy of Invoice with Report Y | S NO | Select Invoice D | istribution: | EMAIL MAI | L FAX | | | | | | | | | T | | 7 |
| Company: | AECOM | | Email 1 or Fax | · - | | | | | | | | | | | | | ٦ ' |
| Contact: | | | Email 2 | | | |] | 1 | | | | | | | | | φ |
| | Project Information | | | Oil and Gas Requi | red Fields (client | use) | | | | | | | | | | | Number of Containers |
| ALS Account # | | | AFE/Cost Center: | | PO# | |] | | | | | | | | | | onts |
| | 542455 | | Major/Minor Code: | | Routing Code: | |] | | | | l . | | | | | | ofc |
| PO / AFE: | | | Requisitioner: | | | | \rfloor | | | | | | | | | | per |
| LSD: | · · · · · · · · · · · · · · · · · · · | | Location: | | | |] | 1 | | | | li | | | | | Eng. |
| ALS Lab Wo | ork Order# (lab use only) | | ALS Contact: | | Sampler: N | 10RKH. | 401 | | | | | | | | | | |
| ALS Sample # | Sample Identific | ation and/or Coordinates | - | Date | Time | Sample Type | 1 1 | ł | | | | | | | | | |
| (lab use only) | (This description | will appear on the report) | | (dd-mmm-yy) | (hh:mm) | Sample Type | | | | | | | | | | | |
| | 16517-01 | | | 04-07-1 | 7 8:30 | 6 RAB | 4 | | | | | | | | | | 1 |
| | -02 | | | 1 | 1 | ; | \prod | | | | | | | | | | t |
| | -03 | | | | | | П | | | | | | | | 1 | | i |
| | 04 | | | | | | \sqcap | | | | | | | - | + | | 1 7 |
| | -06 | | | | | | ++ | | | + | | | | | + | | |
| | -07 | | | | 1 | | ++ | | | + | | | | + | +- | | +; |
| | | | | | | | ╁╂╴ | - | | | | | | | + | | + |
| | -08 | | | | | | + | | | | | | | | | | |
| | - 09 | - · · · · · · · · · · · · · · · · · · · | | , | | <u>'</u> | ١, | L | | | | | | | <u> </u> | |] |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| Baladala | - INI-to-(DIAD Co | Special Instructions / | Specify Criteria to | add on report by c | icking on the drop | -down list below | | | s | AMPLE (| CONDI | TION A | AS REC | EIVED (| lab us | e only) | - |
| | ng Water (DW) Samples¹ (client use) | | (ele | ctronic COC only) | | | Froze | n | | | | SIF O | bservati | ions | Yes | No | , 🗓 |
| | n from a Regulated DW System? | WAIT FOR | 2 16557 | 0 LVD NN | DOM | | Ice Pa | | _ | Cubes | | Custo | dy seal | intact | Yes | ☐ No | · 🗖 |
| _ | S NO | | | | | | Coolir | ng Initia | | | | | | | | | |
| · | numan drinking water use? | LESHE | 2001HF | LKIU | | | | INI | ITIAL COOLEI | R TEMPERA | TURES | °C | \rightarrow | FI | VAL COC | LER TEMPER | :ATURES °C |
| | S NO | <u></u> | | nueral access | | | <u> </u> | | | | <u> </u> | | | <u> 25</u> | | L | |
| Released by: | SHIPMENT RELEASE (client u | Time: | Received by: | INITIAL SHIPM | ENT RECEPTION Date: | (lab use only) | Time: | | Received | | -INAL S | SHIPM | | ECEPTIO Date: | ON (lab | use only) | Time: |
| Mark | HOCULY 04-0 | 1-2017 | | | | | | | |) , N | W | | ا ا | 1 | les | 4 | 177:551 |
| REFER TO BACK | PAGE FOR ALS LOCATIONS AND SAMPLIN | | • | W | HITE - LABORATOR | RY COPY YELLO | N - CLIE | NT CC | PY | | ~ | | | - ; - | | | OCTOBER 2015 FRONT |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 12-JUL-17

Report Date: 24-JUL-17 19:12 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1957480
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 15-608377
Legal Site Desc: FORESHORE

Dean Watt, B.Sc. Account Manager

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

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group An ALS Limited Company



L1957480 CONTD.... PAGE 2 of 5

ALS ENVIRONMENTAL ANALYTICAL REPORT

24-JUL-17 19:12 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1957480-1 SOIL 12-JUL-17 12:15 BF-SG-01 | L1957480-2 SOIL 12-JUL-17 12:00 BF-SG-02 | |
|-------------------------------|---|--|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Physical Tests | Moisture (%) | 1.83 | 2.32 | |
| • | pH (1:2 soil:water) (pH) | 8.82 | 8.78 | |
| Metals | Antimony (Sb) (mg/kg) | <0.10 | <0.10 | |
| | Arsenic (As) (mg/kg) | 2.30 | 2.03 | |
| | Barium (Ba) (mg/kg) | 52.8 | 52.7 | |
| | Beryllium (Be) (mg/kg) | 0.29 | 0.32 | |
| | Cadmium (Cd) (mg/kg) | <0.050 | <0.050 | |
| | Chromium (Cr) (mg/kg) | 5.05 | 3.31 | |
| | Cobalt (Co) (mg/kg) | 4.14 | 3.75 | |
| | Copper (Cu) (mg/kg) | 41.2 | 4.46 | |
| | Lead (Pb) (mg/kg) | 5.57 | 1.13 | |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | |
| | Molybdenum (Mo) (mg/kg) | 0.67 | 1.08 | |
| | Nickel (Ni) (mg/kg) | 3.07 | 1.28 | |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | |
| | Thallium (TI) (mg/kg) | <0.050 | <0.050 | |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | |
| | Uranium (U) (mg/kg) | 0.265 | 0.273 | |
| | Vanadium (V) (mg/kg) | 20.4 | 17.4 | |
| | Zinc (Zn) (mg/kg) | 40.5 | 36.8 | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | Field MeOH | |
| | Benzene (mg/kg) | <0.0050 | <0.0050 | |
| | Ethylbenzene (mg/kg) | <0.015 | <0.015 | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | |
| | Styrene (mg/kg) | <0.050 | <0.050 | |
| | Toluene (mg/kg) | <0.050 | <0.050 | |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | |
| | Xylenes (mg/kg) | <0.075 | <0.075 | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 92.1 | 102.0 | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 91.1 | 99.4 | |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | |
| | EPH19-32 (mg/kg) | <200 | <200 | |
| | LEPH (mg/kg) | <200 | <200 | |
| | HEPH (mg/kg) | <200 | <200 | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | |

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

L1957480 CONTD.... PAGE 3 of 5

24-JUL-17 19:12 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1957480-1 SOIL 12-JUL-17 12:15 BF-SG-01 | L1957480-2 SOIL 12-JUL-17 12:00 BF-SG-02 | | |
|--|---|--|--|--|--|
| Grouping | Analyte | | | | |
| SOIL | | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | <100 | | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 84.1 | 87.7 | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 97.8 | 114.7 | | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | | |
| , | Acenaphthylene (mg/kg) | <0.050 | <0.050 | | |
| | Anthracene (mg/kg) | <0.050 | <0.050 | | |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | | |
| | Chrysene (mg/kg) | <0.050 | <0.050 | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | | |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | | |
| | Fluorene (mg/kg) | <0.050 | <0.050 | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | | |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | | |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | | |
| | Pyrene (mg/kg) | <0.050 | <0.050 | | |
| | Surrogate: Acenaphthene d10 (%) | 80.4 | 86.5 | | |
| | Surrogate: Chrysene d12 (%) | 74.3 | 94.5 | | |
| | Surrogate: Naphthalene d8 (%) | 75.0 | 82.1 | | |
| | Surrogate: Phenanthrene d10 (%) | 87.5 | 88.1 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

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

Reference Information

L1957480 CONTD....

PAGE 4 of 5

24-JUL-17 19:12 (MT)

Version: FINAL

QC Samples with Qualifiers & Comments:

| QC Type Description | Parameter | Qualifier | Applies to Sample Number(s) | |
|---------------------|-----------------|-----------|-----------------------------|--|
| Duplicate | Copper (Cu) | DUP-H | L1957480-2 | |
| Duplicate | Molybdenum (Mo) | DUP-H | L1957480-2 | |

Test Method References:

DUP-H

| ALS Test Code | Matrix | Test Description | Method Reference** | |
|-----------------|--------|------------------------------------|--------------------|--|
| EPH-TUMB-FID-VA | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID | |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

Duplicate results outside ALS DQO, due to sample heterogeneity.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

Reference Information

L1957480 CONTD....

PAGE 5 of 5

24-JUL-17 19:12 (MT)

Version: FINAL

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).

XYLENES-CALC-VA

Soil

Sum of Xylene Isomer Concentrations

EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

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

Laboratory Definition Code

Laboratory Location

VA

ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-608377

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

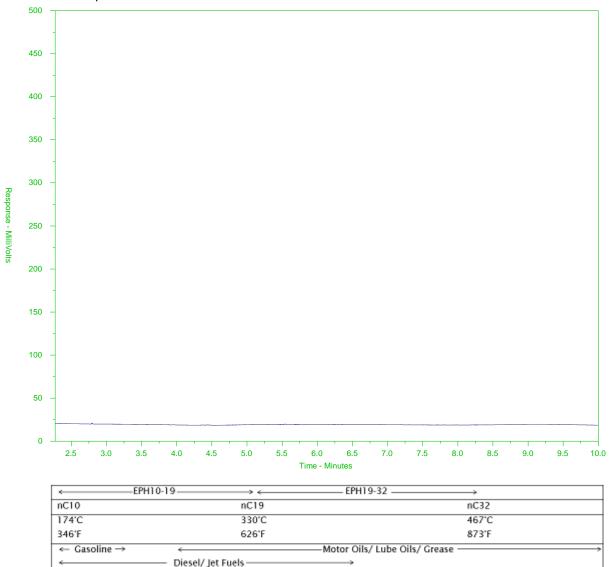
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1957480-1 Client Sample ID: BF-SG-01



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

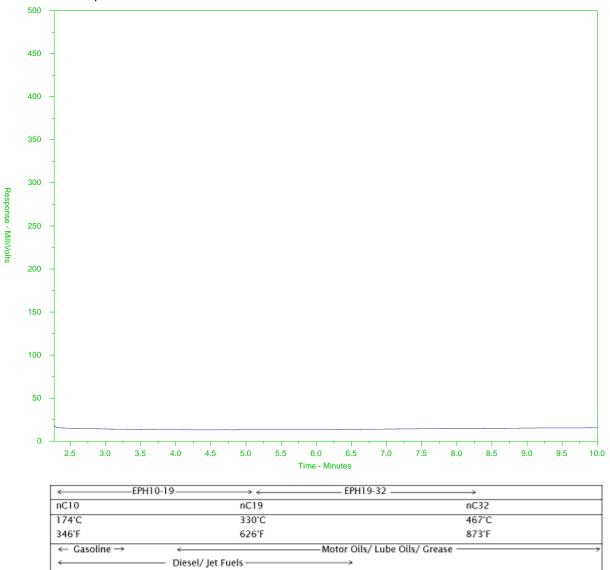
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1957480-2 Client Sample ID: BF-SG-02



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form



L1957480-COFC

coc Number: 15 - 608377

Canada Toll Free: 1 800 668 9878

| | | | | | | and the second second | | | | | | | | | | |
|------------------------------|--|---------------------------------------|---|---|--------------------|-----------------------|--|--------------|-----------------------|------------------|-------------|-------------|------------|---------------|-----------------|--|
| Report To | Contact and company name below will appea | r on the final report | | Report Format / | Distribution | | Select Se | rvice Lev | el Below - Pleas | e confirm all E8 | P TATs wit | h your AM | - surcharg | es will apply | , | |
| Company: | AECOM | | Select Report Fo | rmat: PDF | EXCEL | EDD (DIGITAL) | | Reg | jular [R] | Stand | ard TAT if | | | | ays - no surcha | |
| Contact: | Michael, Gillam | | Quality Control (0 | QC) Report with Repo | | NO | ays) | 4 0 | lay [P4] | | ò | 1 1 | Busine | s day [E | 11 24 W | X |
| Phone: | 604 444 6460 | | Compare Resi | ults to Criteria on Report - p | | | PRIORITY usiness Days) | 3 0 | lay [P3] | П | RGEN | | | | or Statutor | |
| | Company address below will appear on the final rep | ort | Select Distributio | ults to Criteria on Report - p | MAIL | FAX | PR (Busin | 2 0 | lay [P2] | | EME | | ho | liday [E |)] | |
| Street: | 3292 Production | \A/AIA | Email 1 or Fax 🗸 | nichael.gill | DRU COM | 1. Cam | | Date a | nd Time Requ | ired for all E& | P TATs: | | | | | |
| City/Province: | Burnaby B.C. | | Email 2 es \ | and those | 1 DOOLDA | 1. (OW) | For tests | that can | not be performe | d according to | he service | level selec | ted, you w | ill be contac | ted. | |
| Postal Code: | | | Email 3 | | , | | | | | | Anal | ysis Re | quest | | | · |
| Invoice To | Same as Report To | NO | | Invoice Dis | tribution | | | l: | idicate Filtered | (F), Preserved | (P) or Filt | ered and f | Preserved | (F/P) belov | v | |
| | Copy of Invoice with Report | PA | Select Invoice Di | stribution: | EMAIL MAIL | FAX | P | | | | | | | | | 1 |
| Company: | Cherron Canada | Lated | Email 🚧 🙀 x | Same as | abole | | | | | | | | | | | 1 |
| Contact: | Chris Bous | | Email 2 | | | |] | | | | | 1 | | | | φ |
| | Project Information | · · · · · · · · · · · · · · · · · · · | C | il and Gas Required | Fields (client us | e) | اسد ا | 4 | | | | | | | | iner |
| ALS Account # / | Quote #: | | AFE/Cost Center: | | PO# | | 江 | \star | | | | | | | | nta |
| Job #: (a/) | 542455 | - | Major/Minor Code: | | Routing Code: | | 9 | EPH | | | | | | | | ပို |
| Job#: 60 5 PO/AFE: | 3-12 (3-9 | | Requisitioner: | _ | | | [</td <td>五</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>l o</td> | 五 | | | | | | | | l o |
| | smre | | Location: | | | | | \leq | J | | | | | | | Number of Containers |
| | 2011 | | | | | .0 | | 1 | 75 | | | | | | | Ž |
| ALS Lab Wo | rk Order# (lab use only) | | ALS Contact: | ean Watt | Sampler: EA | £Ρ | 円 | 0 | 5 | | | | | | | |
| ALS Sample # | Sample Identification | and/or Coordinates | • | Date | Time | Sample Type | 8 | , w | \leq | | | | | | | |
| (lab use only) | (This description will a | ppear on the report) | | (dd-mmm-yy) | (hh:mm) | Gumple Type | <u> </u> | | | | | | | | | |
| | BF-SG-01 BF-SG-02 | | | 12-Jul-17 | 12:15 | 5011 | X | \mathbf{x} | $\boldsymbol{\times}$ | | | | | | | 14 |
| | QE- CC- 07 | | | 12-Jul-17 | 12:00 | Soil | V | V | \mathbf{V} | | | | | | | 11 |
| | DF 30 02 | | | 1/2 300 | | 2011 | | \sim | | | | | | | | |
| | | | | | • | | \vdash | | | + + | - | | - | - | | |
| | | | | | | | | | | | | - | | | | ļ |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | · · · · · · · · · · · · · · · · · | <u>-</u> | - | | | | + | | | | - | | |
| | | | | | | | | | -+- | - | | + | | | | |
| | | | | | | | | | | | | - | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | L | | | \perp | <u> </u> | <u> </u> |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | + | | 1 | | | <u> </u> | |
| | | 0 | 0 | | | P. 4 b. L. | | | 94 | MPLE CON | DITION | ASPE | CEIVED | (lab use | only) | |
| Drinkin | g Water (DW) Samples¹ (client use) | Special Instructions / | Specify Criteria to ele) | аса оп героп ру сиск ctronic COC only) | ing on the arop-ao | wn list below | Frozer | , | | LL 001 | | Observa | | Yes | No | |
| Are samples taker | r from a Regulated DW System? | | | | | | ice Pa | | | Cubes |] Cust | | | Yes | = | / |
| YES | No | BC | $P \subset Q$ | | | | | g Initia | _ | | | .vuj oca | . maot | 103 | | , P |
| Are samples for h | uman drinking water use? | めし | | | | | F | - | | TEMPERATUR | ES°C | | | FINAL COC | LER TEMPER | ATURES °C |
| | | | - | | | | | | | 2.3.101 | | | 5 | | | T |
| ' | SHIPMENT RELEASE (client use) | | r · · · · - · · · · · · · · · · · · · · | INITIAL SHIPMEN | T DECERTION (In | h una aniu) | L | | | Eikli | i cuin | MENT | | <u> </u> | use only) | |
| Released by: | Date: | Time: | Received by: | | Date: | io use only) | Time: | | Received b | | | | Date: | / (lab | / | Time: |
| | 1 | 1 | | | | | | | | • | JC | | 1 | /12 / | 17 | 14-27 |
| REFER TO BACK I | PAGE FOR ALS LOCATIONS AND SAMPLING INFO | ORMATION | <u> </u> | | F - LABORATORY | COPY YELLOV | V - CLIE | NT CO | PΥ | | | | | | -'-/ | OCTOBER 2015 FRONT |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 13-JUL-17

Report Date: 01-AUG-17 17:11 (MT)

Version: FINAL REV. 2

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1958382
Project P.O. #: 0015243589
Job Reference: 60542455

C of C Numbers: 15-608375, 15-608376

Legal Site Desc: Foreshore

Comments: 1-AUG-2017 EPH SG results have been added to samples 6 & 7.

Dean Watt, B.Sc. Account Manager

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

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group An ALS Limited Company



PAGE 2 of 9

ALS ENVIRONMENTAL ANALYTICAL REPORT 01-AUG-17 17:11 (MT) Version: FINAL REV. 2

| | Sample ID Description Sampled Date Sampled Time Client ID | L1958382-1 Sediment 13-JUL-17 12:50 BF-SG2-1 | L1958382-2 Sediment 13-JUL-17 13:09 BF-SG2-2 | L1958382-3 Sediment 13-JUL-17 12:00 WIRA-1 | L1958382-4 Sediment 13-JUL-17 13:49 WIRA-2 | L1958382-5 Sediment 13-JUL-17 13:35 WSA-1 |
|-------------------------------|---|--|--|--|--|---|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Physical Tests | Moisture (%) | 3.79 | 3.33 | 25.3 | 20.6 | 26.1 |
| | pH (1:2 soil:water) (pH) | 8.50 | 8.75 | 8.43 | 8.65 | 7.46 |
| Metals | Antimony (Sb) (mg/kg) | 0.57 | 0.34 | 0.16 | 0.21 | 0.25 |
| | Arsenic (As) (mg/kg) | 3.83 | 3.23 | 2.79 | 4.62 | 2.81 |
| | Barium (Ba) (mg/kg) | 79.2 | 44.9 | 38.9 | 39.8 | 26.2 |
| | Beryllium (Be) (mg/kg) | 0.20 | 0.19 | 0.33 | 0.31 | 0.26 |
| | Cadmium (Cd) (mg/kg) | 0.162 | 0.075 | 0.057 | 0.097 | 0.096 |
| | Chromium (Cr) (mg/kg) | 20.3 | 23.2 | 9.10 | 10.7 | 14.9 |
| | Cobalt (Co) (mg/kg) | 6.97 | 5.87 | 5.31 | 6.79 | 5.64 |
| | Copper (Cu) (mg/kg) | 21.7 | 13.2 | 15.7 | 16.6 | 20.7 |
| | Lead (Pb) (mg/kg) | 6.68 | 1.91 | 20.2 | 15.1 | 5.96 |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Molybdenum (Mo) (mg/kg) | 1.19 | 0.93 | 0.59 | 0.40 | 1.29 |
| | Nickel (Ni) (mg/kg) | 21.2 | 17.9 | 6.99 | 8.58 | 8.26 |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| | Thallium (TI) (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| | Uranium (U) (mg/kg) | 0.326 | 0.264 | 1.38 | 1.04 | 4.12 |
| | Vanadium (V) (mg/kg) | 43.1 | 40.7 | 36.1 | 46.8 | 59.5 |
| | Zinc (Zn) (mg/kg) | 62.6 | 37.4 | 52.9 | 59.3 | 43.4 |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | Field MeOH | Field MeOH | Field MeOH | Field MeOH |
| | Benzene (mg/kg) | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| | Ethylbenzene (mg/kg) | <0.015 | <0.015 | <0.015 | <0.015 | <0.015 |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Xylenes (mg/kg) | <0.075 | <0.075 | <0.075 | <0.075 | <0.075 |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 86.6 | 85.5 | 74.2 | 80.7 | 97.7 |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 101.0 | 99.4 | 89.6 | 89.8 | 87.2 |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | 220 | <200 | 390 |
| | EPH10-19 (sg) (mg/kg) | | | | | |
| | EPH19-32 (mg/kg) EPH19-32 (sg) (mg/kg) | <200 | <200 | 930 | 680 | <200 |
| | LEPH (mg/kg) | <200 | <200 | 220 | <200 | 390 |

 $^{^{\}star}$ Please refer to the Reference Information section for an explanation of any qualifiers detected.

PAGE 3 of 9

ALS ENVIRONMENTAL ANALYTICAL REPORT 01-AUG-17 17:11 (MT) Version: FINAL REV. 2

| | Sample ID Description Sampled Date Sampled Time Client ID | L1958382-6 Sediment 13-JUL-17 13:46 WSA-2 | L1958382-7 Sediment 13-JUL-17 13:58 WSA-3 | L1958382-8 Sediment 13-JUL-17 14:05 WSA-4 | L1958382-9 Sediment 13-JUL-17 14:10 WSA-5 | L1958382-10 Sediment 13-JUL-17 14:18 WSA-6 |
|-------------------------------|---|---|---|---|---|--|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Physical Tests | Moisture (%) | 25.9 | 21.0 | 23.0 | 24.2 | 19.7 |
| | pH (1:2 soil:water) (pH) | 7.23 | 6.96 | 7.14 | 7.49 | 8.48 |
| Metals | Antimony (Sb) (mg/kg) | 0.28 | 0.28 | 0.20 | 0.21 | 0.21 |
| | Arsenic (As) (mg/kg) | 2.53 | 3.01 | 5.02 | 3.83 | 3.09 |
| | Barium (Ba) (mg/kg) | 28.7 | 24.8 | 31.9 | 38.6 | 21.9 |
| | Beryllium (Be) (mg/kg) | 0.21 | 0.15 | 0.21 | 0.31 | 0.19 |
| | Cadmium (Cd) (mg/kg) | 0.062 | 0.094 | 0.052 | 0.059 | 0.077 |
| | Chromium (Cr) (mg/kg) | 13.6 | 13.8 | 13.8 | 10.8 | 11.2 |
| | Cobalt (Co) (mg/kg) | 6.40 | 6.45 | 8.69 | 7.43 | 8.40 |
| | Copper (Cu) (mg/kg) | 15.7 | 13.1 | 20.4 | 20.5 | 20.8 |
| | Lead (Pb) (mg/kg) | 12.7 | 28.0 | 16.2 | 21.9 | 16.7 |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Molybdenum (Mo) (mg/kg) | 1.22 | 1.79 | 1.56 | 1.38 | 0.90 |
| | Nickel (Ni) (mg/kg) | 8.38 | 8.13 | 8.58 | 7.67 | 9.11 |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| | Thallium (TI) (mg/kg) | 0.060 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | 19.7 | <2.0 |
| | Uranium (U) (mg/kg) | 3.73 | 3.80 | 3.47 | 2.92 | 0.363 |
| | Vanadium (V) (mg/kg) | 54.1 | 56.3 | 60.2 | 41.9 | 50.8 |
| | Zinc (Zn) (mg/kg) | 44.3 | 41.6 | 43.5 | 50.6 | 63.5 |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH |
| | Benzene (mg/kg) | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| | Ethylbenzene (mg/kg) | <0.015 | <0.015 | <0.015 | <0.015 | <0.015 |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Xylenes (mg/kg) | <0.075 | <0.075 | <0.075 | <0.075 | <0.075 |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 106.4 | 105.7 | 83.9 | 84.8 | 80.9 |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 91.6 | 88.4 | 85.4 | 93.2 | 88.6 |
| Hydrocarbons | EPH10-19 (mg/kg) | 2250 | 1290 | <200 | <200 | <200 |
| | EPH10-19 (sg) (mg/kg) | 2770 | 1610 | | | |
| | EPH19-32 (mg/kg) | 420 | 200 | 490 | 590 | <200 |
| | EPH19-32 (sg) (mg/kg) | 490 | 260 | | | |
| | LEPH (mg/kg) | 2250 | 1290 | <200 | <200 | <200 |

 $^{^{\}star}$ Please refer to the Reference Information section for an explanation of any qualifiers detected.

PAGE 4 of 9 01-AUG-17 17:11 (MT)

ALS ENVIRONMENTAL ANALYTICAL REPORT

Version: FINAL REV. 2

| | Sample ID Description Sampled Date Sampled Time Client ID | L1958382-11 Sediment 13-JUL-17 14:29 WSA-7 | L1958382-12 Sediment 13-JUL-17 14:40 WSA-8 | L1958382-13 Sediment 13-JUL-17 14:47 WSA-9 | |
|-------------------------------|---|--|--|--|--|
| Grouping | Analyte | | | | |
| SOIL | · | | | | |
| Physical Tests | Moisture (%) | 24.1 | 18.4 | 19.1 | |
| | pH (1:2 soil:water) (pH) | 8.47 | 8.34 | 7.95 | |
| Metals | Antimony (Sb) (mg/kg) | 0.36 | 0.22 | 0.19 | |
| | Arsenic (As) (mg/kg) | 4.74 | 2.63 | 1.93 | |
| | Barium (Ba) (mg/kg) | 38.2 | 35.8 | 36.3 | |
| | Beryllium (Be) (mg/kg) | 0.24 | 0.24 | 0.24 | |
| | Cadmium (Cd) (mg/kg) | 0.188 | <0.050 | 0.071 | |
| | Chromium (Cr) (mg/kg) | 15.9 | 15.3 | 19.3 | |
| | Cobalt (Co) (mg/kg) | 9.29 | 7.49 | 9.89 | |
| | Copper (Cu) (mg/kg) | 23.5 | 26.4 | 31.9 | |
| | Lead (Pb) (mg/kg) | 10.9 | 7.47 | 5.60 | |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Molybdenum (Mo) (mg/kg) | 1.89 | 0.39 | 0.25 | |
| | Nickel (Ni) (mg/kg) | 12.6 | 7.80 | 8.95 | |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | <0.20 | |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 | |
| | Thallium (TI) (mg/kg) | 0.091 | <0.050 | 0.061 | |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | |
| | Uranium (U) (mg/kg) | 1.11 | 2.07 | 1.36 | |
| | Vanadium (V) (mg/kg) | 58.8 | 70.2 | 74.2 | |
| | Zinc (Zn) (mg/kg) | 55.9 | 53.0 | 55.9 | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | Field MeOH | Field MeOH | |
| | Benzene (mg/kg) | <0.0050 | <0.0050 | <0.0050 | |
| | Ethylbenzene (mg/kg) | <0.015 | <0.015 | <0.015 | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Xylenes (mg/kg) | <0.075 | <0.075 | <0.075 | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 98.6 | 89.4 | 88.2 | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 90.1 | 88.5 | 95.6 | |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | <200 | |
| | EPH10-19 (sg) (mg/kg) | | | | |
| | EPH19-32 (mg/kg) | <200 | <200 | <200 | |
| | EPH19-32 (sg) (mg/kg) | | | | |
| | LEPH (mg/kg) | <200 | <200 | <200 | |

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

PAGE 5 of 9 01-AUG-17 17:11 (MT)

Version: FINAL REV. 2

| | Sample ID Description Sampled Date Sampled Time Client ID | L1958382-1 Sediment 13-JUL-17 12:50 BF-SG2-1 | L1958382-2 Sediment 13-JUL-17 13:09 BF-SG2-2 | L1958382-3 Sediment 13-JUL-17 12:00 WIRA-1 | L1958382-4 Sediment 13-JUL-17 13:49 WIRA-2 | L1958382-5 Sediment 13-JUL-17 13:35 WSA-1 |
|--|---|--|--|--|--|---|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Hydrocarbons | HEPH (mg/kg) | <200 | <200 | 930 | 680 | <200 |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | <100 | <100 | 130 |
| | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | <100 | 130 |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 99.0 | 101.3 | 107.3 | 98.8 | 107.0 |
| | Surrogate: 2-Bromobenzotrifluoride, EPH-sg (%) | | | | QUID | 0.11 |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 98.1 | 111.8 | 87.7 | SURR- ND 68.6 | 196.6 |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | 0.067 | <0.050 | <0.050 |
| | Anthracene (mg/kg) | <0.050 | <0.050 | 0.055 | <0.050 | <0.050 |
| | Benz(a)anthracene (mg/kg) | 0.062 | <0.050 | 0.313 | <0.050 | < 0.050 |
| | Benzo(a)pyrene (mg/kg) | 0.056 | <0.050 | 0.346 | <0.060 | < 0.050 |
| | Benzo(b)fluoranthene (mg/kg) | 0.073 | <0.050 | 0.418 | <0.050 | < 0.050 |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | 0.215 | <0.050 | < 0.050 |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | 0.172 | <0.050 | < 0.050 |
| | Chrysene (mg/kg) | 0.074 | <0.050 | 0.328 | <0.050 | < 0.050 |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | < 0.050 |
| | Fluoranthene (mg/kg) | 0.099 | <0.050 | 0.348 | <0.050 | < 0.050 |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | < 0.050 |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | 0.212 | <0.050 | < 0.050 |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | < 0.050 |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | < 0.050 |
| | Phenanthrene (mg/kg) | 0.051 | <0.050 | 0.085 | <0.050 | <0.050 |
| | Pyrene (mg/kg) | 0.111 | <0.050 | 0.333 | <0.050 | 0.061 |
| | Surrogate: Acenaphthene d10 (%) | 97.4 | 100.2 | 127.9 | 120.6 | 96.2 |
| | Surrogate: Chrysene d12 (%) | 92.8 | 101.9 | 111.7 | 112.6 | 109.5 |
| | Surrogate: Naphthalene d8 (%) | 96.6 | 99.1 | 106.2 | 114.3 | 99.0 |
| | Surrogate: Phenanthrene d10 (%) | 98.0 | 102.9 | 111.6 | 118.2 | 101.3 |
| | | | | | | |

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

PAGE 6 of 9 01-AUG-17 17:11 (MT)

ALS ENVIRONMENTAL ANALYTICAL REPORT 01-AUG-17 17:11 (MT) Version: FINAL REV. 2

| | Sample ID Description Sampled Date Sampled Time Client ID | L1958382-6 Sediment 13-JUL-17 13:46 WSA-2 | L1958382-7 Sediment 13-JUL-17 13:58 WSA-3 | L1958382-8 Sediment 13-JUL-17 14:05 WSA-4 | L1958382-9 Sediment 13-JUL-17 14:10 WSA-5 | L1958382-10 Sediment 13-JUL-17 14:18 WSA-6 |
|--|---|---|---|---|---|--|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Hydrocarbons | HEPH (mg/kg) | 420 | 200 | 490 | 590 | <200 |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | <100 | <100 | <100 |
| | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | <100 | <100 |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 101.4 | 110.2 | 90.0 | 103.0 | 98.3 |
| | Surrogate: 2-Bromobenzotrifluoride, EPH-sg (%) | 110.0 | 113.3 | | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 123.1 | Not Reportable | 91.2 | 105.8 | 113.5 |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Anthracene (mg/kg) | <0.060 | <0.050 | 0.087 | 0.071 | < 0.050 |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | 0.051 | <0.050 |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.080 | <0.050 |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | < 0.050 |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Phenanthrene (mg/kg) | < 0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Pyrene (mg/kg) | 0.089 | 0.078 | <0.050 | 0.064 | <0.050 |
| | Surrogate: Acenaphthene d10 (%) | 89.5 | 95.5 | 98.9 | 109.5 | 104.0 |
| | Surrogate: Chrysene d12 (%) | 84.2 | 94.6 | 95.3 | 106.2 | 105.2 |
| | Surrogate: Naphthalene d8 (%) | 97.9 | 100.9 | 92.7 | 102.9 | 101.1 |
| | Surrogate: Phenanthrene d10 (%) | 94.2 | 100.7 | 94.7 | 108.4 | 104.7 |

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

PAGE 7 of 9 01-AUG-17 17:11 (MT) Version: FINAL REV. 2

ALS ENVIRONMENTAL ANALYTICAL REPORT

L1958382-11 L1958382-12 L1958382-13 Sample ID Description Sediment Sediment Sediment 13-JUL-17 13-JUL-17 13-JUL-17 Sampled Date 14:40 14:29 14:47 Sampled Time WSA-7 WSA-8 WSA-9 Client ID Grouping **Analyte** SOIL **Hydrocarbons** HEPH (mg/kg) <200 <200 <200 Volatile Hydrocarbons (VH6-10) (mg/kg) <100 <100 <100 VPH (C6-C10) (mg/kg) <100 <100 <100 Surrogate: 2-Bromobenzotrifluoride (%) 102.3 103.2 100.2 Surrogate: 2-Bromobenzotrifluoride, EPH-sg Surrogate: 3,4-Dichlorotoluene (SS) (%) 110.7 118.2 113.7 **Polycyclic** Acenaphthene (mg/kg) < 0.050 < 0.050 < 0.050 **Aromatic Hydrocarbons** Acenaphthylene (mg/kg) < 0.050 < 0.050 < 0.050 Anthracene (mg/kg) < 0.050 < 0.050 < 0.050 Benz(a)anthracene (mg/kg) < 0.050 < 0.050 < 0.050 Benzo(a)pyrene (mg/kg) < 0.050 < 0.050 < 0.050 Benzo(b)fluoranthene (mg/kg) < 0.050 < 0.050 < 0.050 Benzo(g,h,i)perylene (mg/kg) < 0.050 < 0.050 < 0.050 Benzo(k)fluoranthene (mg/kg) < 0.050 < 0.050 < 0.050 Chrysene (mg/kg) < 0.050 < 0.050 < 0.050 Dibenz(a,h)anthracene (mg/kg) < 0.050 < 0.050 < 0.050 Fluoranthene (mg/kg) < 0.050 < 0.050 < 0.050 Fluorene (mg/kg) < 0.050 < 0.050 < 0.050 Indeno(1,2,3-c,d)pyrene (mg/kg) < 0.050 < 0.050 < 0.050 2-Methylnaphthalene (mg/kg) < 0.050 < 0.050 < 0.050 Naphthalene (mg/kg) < 0.050 < 0.050 < 0.050 Phenanthrene (mg/kg) < 0.050 < 0.050 < 0.050 Pyrene (mg/kg) < 0.050 < 0.050 < 0.050 Surrogate: Acenaphthene d10 (%) 109.0 112.6 103.6 Surrogate: Chrysene d12 (%) 109.6 112.4 104.2 Surrogate: Naphthalene d8 (%) 104.3 106.0 98.5 Surrogate: Phenanthrene d10 (%) 109.2 114.4 105.9

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

Reference Information

L1958382 CONTD.... PAGE 8 of 9 01-AUG-17 17:11 (MT)

Prence Information

Version: FINAL REV. 2

Qualifiers for Individual Parameters Listed:

| Qualifier | Description |
|-----------|--|
| DLCI | Detection Limit Raised: Chromatographic Interference due to co-elution. |
| SMI | Surrogate recovery could not be measured due to sample matrix interference. |
| SURR-ND | Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected. |

Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** | |
|-----------------|--------|------------------------------------|--------------------|--|
| EPH-TUMB-FID-VA | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID | |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to gas chromatography with flame ionization detection (GC-FID). EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH).

EPH-TUMB-SG-FID-VA Soil EPH with Silica Gel by Tumbler and GCFID BCMOE EPH GCFID

EPH in Sediment/Soil with Silica Gel Cleanup - EPH(sg)

This analysis is carried out using British Columbia Ministry of Water, Land and Air Protection (BC WLAP) methods. Sediment/Soil samples are extracted and analyzed in accordance with the BC WLAP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID, Version 2.1 July 1999". The procedure, based on EPA 3570, uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone.

Prior to analysis by capillary gas chromatography with flame ionization detection (GC/FID), a silica gel cleanup procedure is applied. The cleanup, which is intended to selectively remove most naturally occurring organics, follows the BC WLAP method "Silica Gel Cleanup of Extractable Petroleum Hydrocarbons" (Draft, October 23, 2003).

Note that EPH results include Polycyclic Aromatic Hydrocarbons (PAH) and are therefore not equivalent to Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH). This analysis is sometimes also referred to as Total Petroleum Hydrocarbons.

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

HG-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

LEPH/HEPH-CALC-VA Soil LEPHs and HEPHs

BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCI and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including AI, Ba, Be, Cr, Sr, Ti, TI, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

Reference Information

L1958382 CONTD....
PAGE 9 of 9
01-AUG-17 17:11 (MT)

Version: FINAL REV. 2

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

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).

XYLENES-CALC-VA Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

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

Laboratory Definition Code Laboratory Location

VA ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-608375 15-608376

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

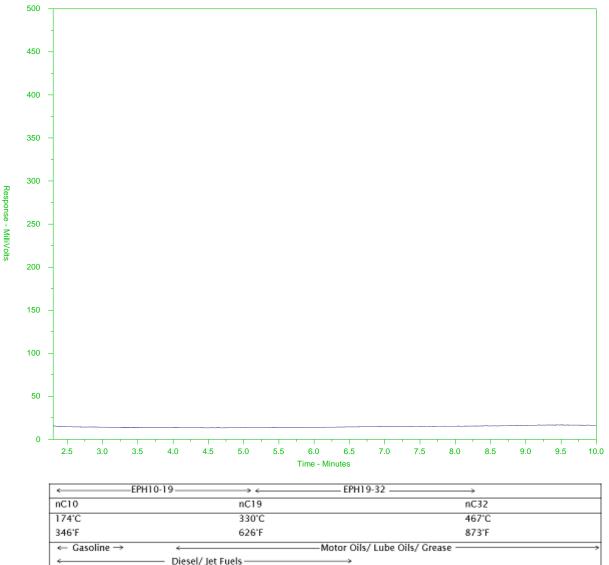
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1958382-1 Client Sample ID: BF-SG2-1



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

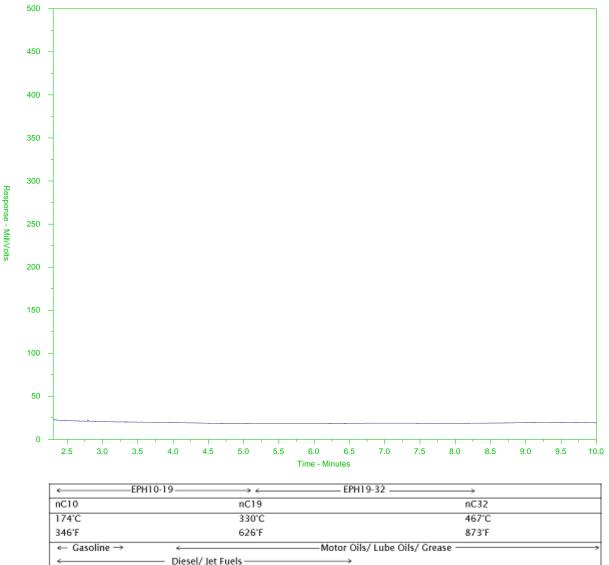
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1958382-2 Client Sample ID: BF-SG2-2



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

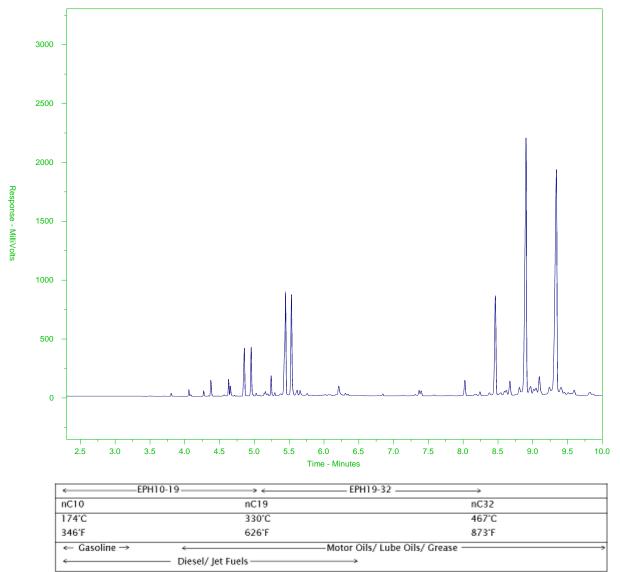
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1958382-3 Client Sample ID: WIRA-1



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

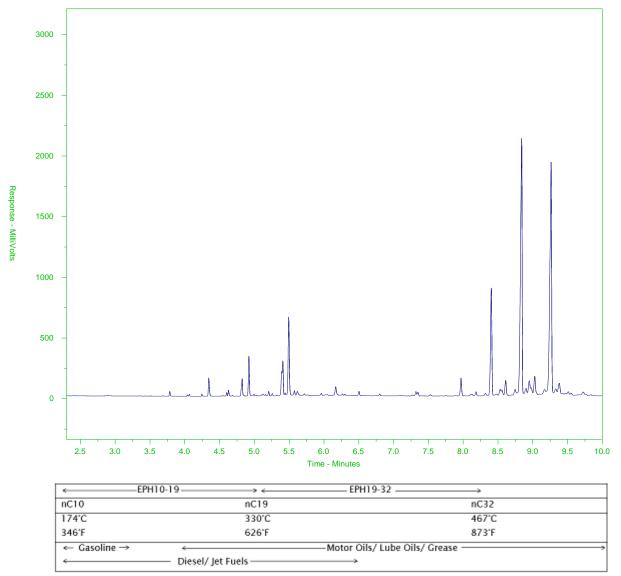
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1958382-4 Client Sample ID: WIRA-2



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

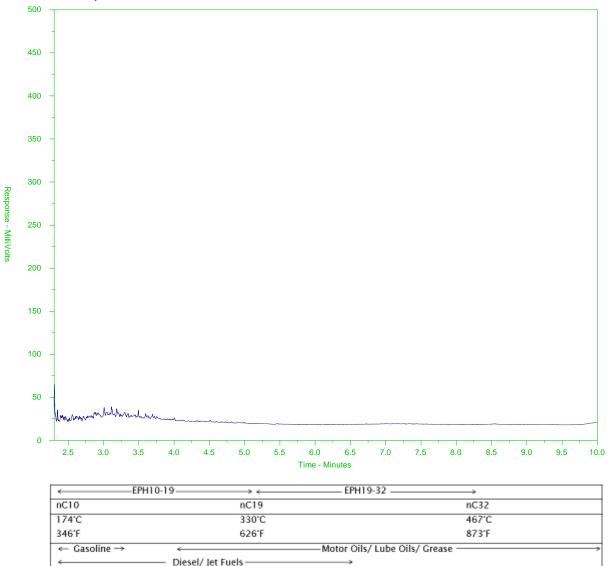
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1958382-5 Client Sample ID: WSA-1



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

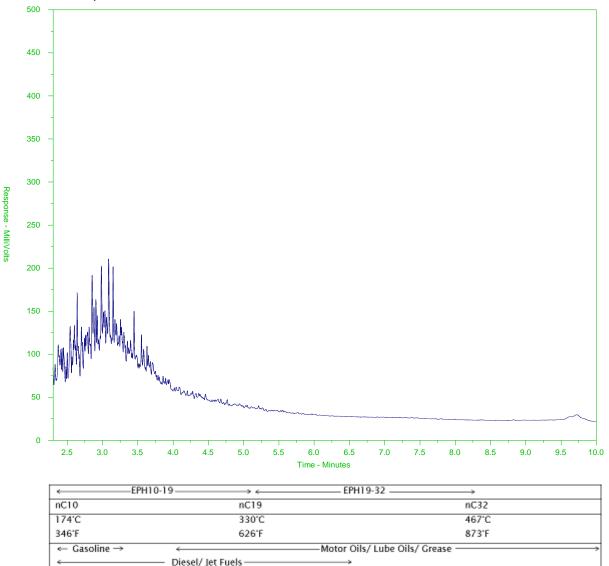
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1958382-6 Client Sample ID: WSA-2



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

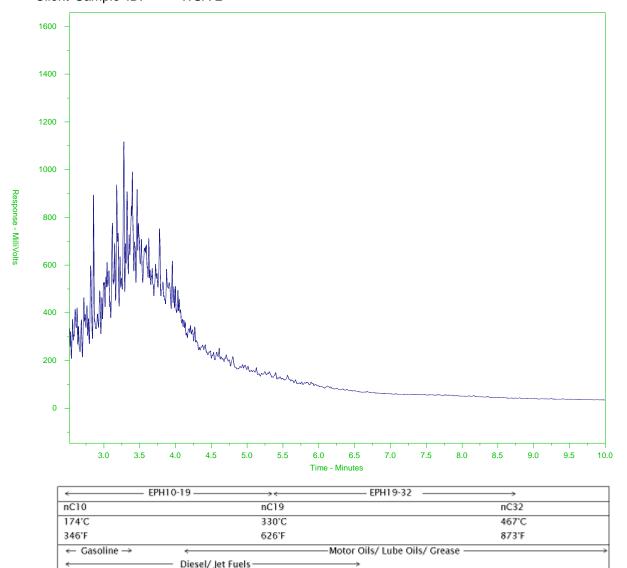
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1958382-S-6 Client Sample ID: WSA-2



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

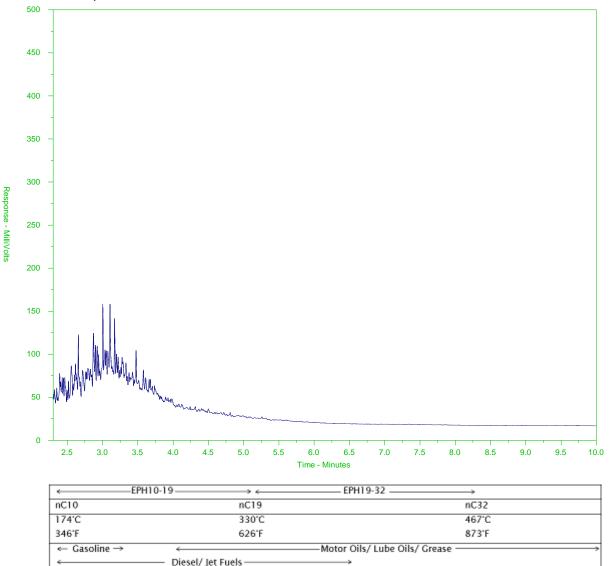
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1958382-7 Client Sample ID: WSA-3



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

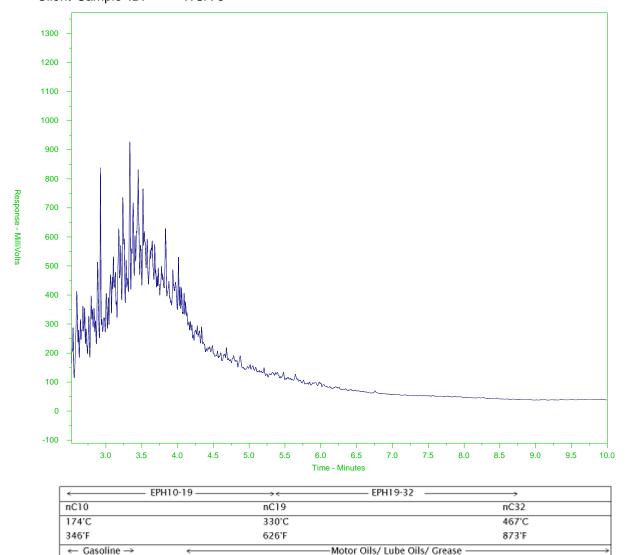
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1958382-S-7 Client Sample ID: WSA-3



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

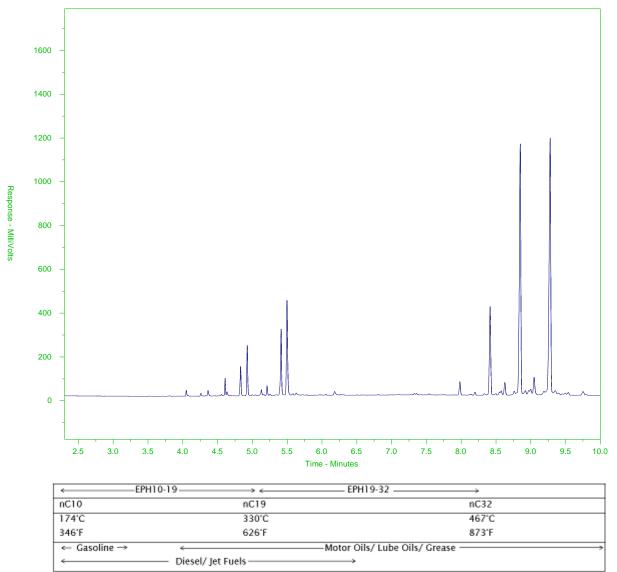
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Diesel/ Jet Fuels



ALS Sample ID: L1958382-8 Client Sample ID: WSA-4



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

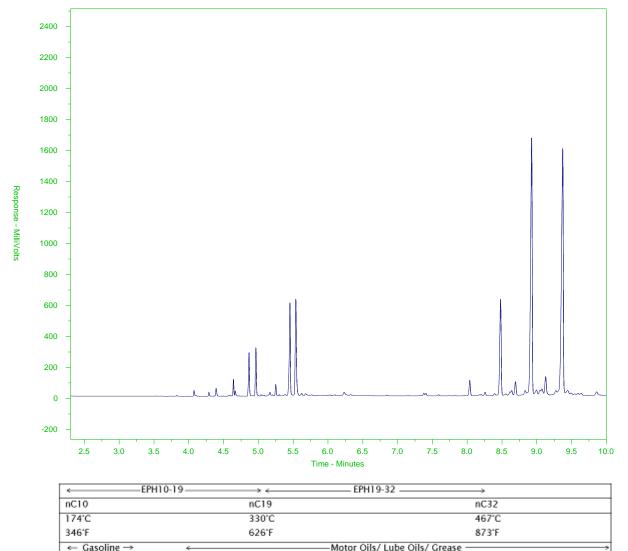
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1958382-9 Client Sample ID: WSA-5



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

Diesel/ Jet Fuels

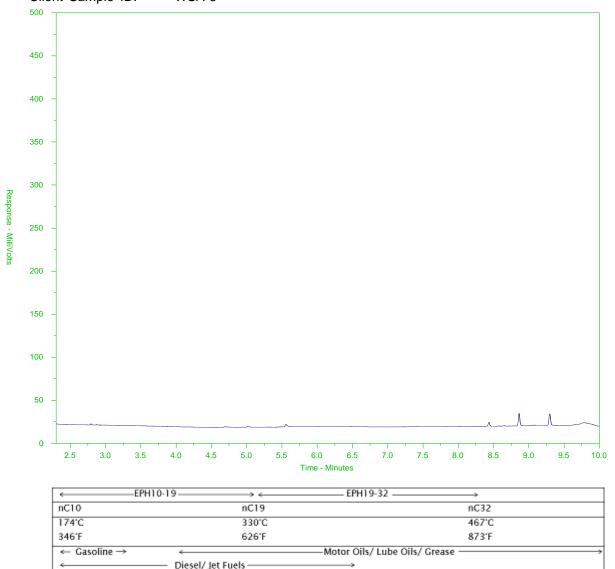
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1958382-10 Client Sample ID: WSA-6



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

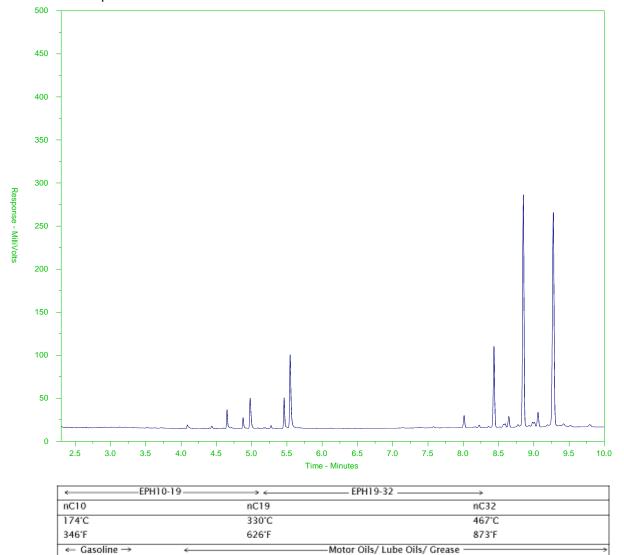
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1958382-11 Client Sample ID: WSA-7



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

Diesel/ Jet Fuels

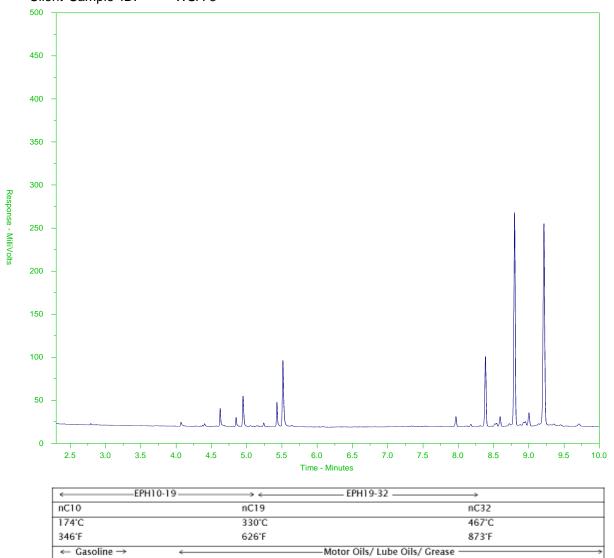
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1958382-12 Client Sample ID: WSA-8



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

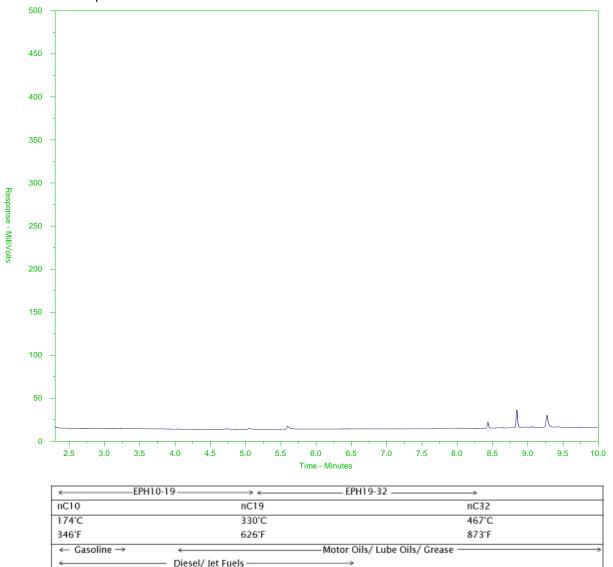
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Diesel/ Jet Fuels



ALS Sample ID: L1958382-13 Client Sample ID: WSA-9



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

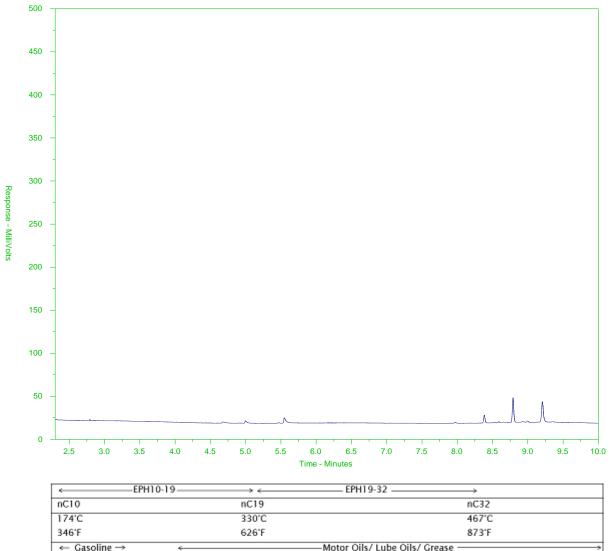
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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



ALS Sample ID: WG2569795-4#L1958382-13

Client Sample ID: WSA-9



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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

Diesel/ Jet Fuels



Chain of Custody (COC) / Analytical Request Form

L1958382-COFC

COC Number: 15 - 608376

Page $\sqrt{2}$

www.alsglobal.com Canada Toll Free: 1 800 668 9878

| Report To | Contact and company name below will appear on the final report | | Report Format | / Distribution | | Select Se | ervice Lev | vel Below - Pleas | se confirm all E&F | TATs with | your AM - s | urcharges wi | li apply | | |
|-------------------|--|---------------------------------------|------------------------------|--------------------------|--|--|--------------|-------------------------|--|-------------|---------------|-----------------------|-------------|-------------|--------------------|
| Company: | AECOM | Select Report Fo | rmat: PDF | EXCEL | EDD (DIGITAL) | | Re | gular [R] | Standa | rd TAT if i | eceived by | 3 pm - busii | ness days - | no surcharg | es apply |
| Contact: | Michael (Zill | Quality Control (| QC) Report with Repo | | NO | Jys) | 4 (| day [P4] | | }; | 1 Bu | ısiness d | ay [E1] | • | |
| Phone: | 604.444.6400 | Compare Res | ults to Criteria on Report - | provide details below if | box checked | ORIT) | 3 (| day [P3] | Ħ | EMERGENC' | Same D | av Waak | and or 9 | statutory | |
| | Company address below will appear on the final report | Select Distribution | n: EMAIL | MAIL | FAX | PRI | 2 (| day [P2] | Ħ | EME | Guine B | holida | y [E0] | riutuioi y | |
| Street: | 16920 3292 Production Way | Email 1 10 Ather | ræligin@c | W Lane Con | | | | | ired for all E&P | TATs: | ASAP | | | | |
| City/Province: | Burnalon B.C. | Email 2 | va Caralana | COM CO | // | For tests | that can | not be performe | ed according to th | e service l | evel selected | | | | - |
| Postal Code: | DIA VILVEY DI CI | Email 3 | | | | | | | | Analy | sis Requ | est | | | |
| Invoice To S | Same as Report To YES NO | | Invoice Dis | tribution | | l | I | ndicate Filtered | (F), Preserved (| | | |) below | | |
| | Same as Report To YES NO Copy of Invoice with Report YES NO | Select Invoice D | elect Invoice Distribution: | | | 191 | | | | | | | | | |
| Company: | Chevior Canada Ha | Email 1 or Fax 4 | Jame as | above/ | | | | | | | | | | | |
| Contact: | Claris Bauc | Email 2 | | | |] | | • | | | | | | | ø |
| | Project Information | | Oil and Gas Required | Fields (client us | e) | 1 | | | | | | | | | iner |
| ALS Account # / C | | AFE/Cost Center: | | PO# | | 1 | 4 | | | | | | | | Containe |
| Job #: 605 | 42455 | Major/Minor Code: | | Routing Code: | | 1 | α | | 1 1 | | | | | 1 | of CC |
| PO/AFE: | | Requisitioner: | | | | 8 | SPH | | | | | 1 | | | e. o |
| LSD: Fores | hore | Location: | | | | <u>اع</u> ا | H | 3 | | | | | | | g |
| | | | 11/1/ | | 0/=0 | \sim | 1 | 25 | | | | 1 1 | | i l | ž |
| ALS Lab Work | (Order # (lab use only) | ALS Contact: | sean Watt | Sampler: EA | JOR | [₹ | B; | 1 | | | | | | | |
| ALS Sample # | Sample Identification and/or Coordinates | | Date | Time | Samuela Tura | BE | 2 | 3 | | | | | ł | | |
| (lab use only) | (This description will appear on the report) | | (dd-mmm-yy) | (hh:mm) | Sample Type | 100 | \Box | ~ | | | | | | | |
| | RF-SG2-1 | | 12-JUI-17 | 12:50 | Sediment | | \sum | $\overline{\mathbf{x}}$ | | | | | | | 4 |
| | BF-SG2- 2. WIRA - 1 | | 1 | 13:09 | SECULIVIES : | 7 | - | | | | | | | | } |
| | WAA - 1 | · | 12:0 | | | | 1- | + | 1 | | | + + | | - | _ |
| | W.T.IXI | | 10. | MARKE | | | | + | | | | + + | | | |
| | WIRA-2 | | | 13:41 | | | \bot | + | | | | | | | |
| | WSA-I | | | 13135 | | | | | | | | | | | |
| | WSA-2 | | | 13:46 | 1 1 | 1 | | 1 | | | | | | | |
| | W8A-3 | | | V3:58 | | | | | | | | | | | |
| | WSA-4 | | | 14,05 | | | 1 | ++ | | | | T | | | |
| | W6A-5 | | | 14:10 | | | | ++- | + + - | | | + + | | | |
| | | | - | | | | \dashv | + | + | | | | | | |
| | WSA-6 | · · · · · · · · · · · · · · · · · · · | ļ \ | 14:18 | 1 | | -1 | + | | | | + | | | |
| | WSA-7 | | 1 | 14.29 | | | \mathbf{H} | | | | | | | | 1_ |
| | WSA-8 | | V | 14:40 | l V | A | Λ | V | | | | | | | V |
| Drinkina ' | Water (DW) Samples ¹ (client use) Special Instructions | | add on report by click | ing on the drop-do | wn list below | | | SA | MPLE CON | OITION . | AS RECE | IVED (la | o use or | ly) | |
| | | (ele | etronic COC only) | | | Frozer | | | | SIF C | bservatio | ns | es _ | No | |
| | from a Regulated DW System? | | | | | Ice Pa | cks | lce l | Cubes 🔲 | Custo | dy seal ir | ntact | Yes [| No | |
| | | ⁷ SO | | | | Coolin | g Initia | | | | | | | | |
| | nan drinking water use? | ~YK | | | | <u> </u> | INII | TIAL COOLER | TEMPERATURE | S°C | | FINA | COOLER | TEMPERAT | URES °C |
| YES | No | , | | | | | | | | | | 0/ | | | |
| Released by: | SHIPMENT RELEASE (client use) | Becoius de la | INITIAL SHIPMEN | | b use only) | I | | Description 11 | | SHIPN | IENT RE | | (lab use | only) | |
| Justa R | Date: July 13, 20,7 G:48 | Received by: | | Date: | | Time: |] | Received b | y: | | Da | ite: 1 / /· | 11 | /2 | 18545 |
| EFER TO BACK PA | IGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | 3 | WHIT | E - LABORATORY | COPY YELLOV | V - CLIE | NT CO | - / <u>C</u> | | | | | <u> </u> | 7 | OCTORER 2015 FRONT |



Chain of Custody (COC) / Analytical Request Form



coc Number: 15 - 608375

Page 2 of 2

www.aisglobal.com

Canada Toll Free: 1 800 668 9878

| Report To | Contact and company name below will appear on the final report | 1 | Report Format | / Distribution | · · · · · · · · · · · · · · · · · · · | Select S | ervice Leve | l Below - Fre | ase outilim | all E&P T/ | ATs with you | ır AM - surc | harges wi | li apply | | |
|-----------------|---|---------------------|--------------------------------|---------------------|---------------------------------------|--|--------------|-----------------------|--------------|------------|--------------|--------------|---------------|----------|--------------|----------------------|
| Company: | AFCOM | Select Report For | mat: PDF | | EDD (DIGITAL) | | Reg | ular [R] | | Standard | TAT if rece | ived by 3 p | om - busir | ness day | s - no surch | arges apply |
| Contact: | Moland Gill | Quality Control (C | C) Report with Repo | | NO | ays) | 4 da | ay [P4] | | | ζ | 1 Bus | iness d | ay [E1 |] | |
| Phone: | 604,444, 6400 | J. / | ilts to Criteria on Report - ! | - | | ORIT ess D | 3 da | ay [P3] | | | RGENCY | ame Day | , Week | end o | r Statutoi | у 🖂 - |
| 110110. | Company address below will appear on the final report | Select Distribution | V/ | | | PRIORITY (Business Days) | 2 da | ay [P2] | | | EME | | holida | | | y 🛂 |
| Street: | 3292 Production Way | Email 100FEC | raeligill@ | Becom C | om. | Date and Time Required for all E&P TATs: | | | | | | | | | | |
| City/Province: | Burnaby | Email 2 | 00 | | | For tests | s that can n | ot be perfor | ned accordin | g to the s | ervice level | selected, y | ou will be | contacte | d. | |
| Postal Code: | 200 | Email 3 | | | | | | | | | Analysis | Reque | st | | | |
| Invoice To | Same as Report To YES NO | | Invoice Dis | stribution | | | Inc | dicate Filter | ed (F), Pres | erved (P) | or Filtered | and Prese | rved (F/P |) below | | _ |
| | Copy of Invoice with Report YES NO | Select Invoice Dis | stribution: | EMAIL MAIL | FAX | | | | | | | | | | | |
| Company: | Chewron Canada Ltd. | Email 1 or Fax | Same | as abou | 9) | | | | | | | | | | | |
| Contact: | CINTS BOUS | Email 2 | | | | | | | | | | | | İ | | 8 |
| | Project Information | C | il and Gas Required | d Fields (client us | e) | | | | 1 | | | | | | | aine |
| ALS Account # | / Quote #: | AFE/Cost Center: | | PO# | |] | 7 | | | | | | 1 | | | l time |
| Job #: 60 | 542455 | Major/Minor Code: | | Routing Code: | | JZ | HEPH | | | | | | | | | of C |
| PO / AFE: | 7.40 100 100 100 100 100 100 100 100 100 1 | Requisitioner: | | | | NPH V | 14 | | ı | | | | | | | per |
| | Show | Location: | | | | 」く | 🛨 | N | | | | | | 1 | | Number of Containers |
| 10,2 | | | 1/1/ | C | 1-0 |] × | ₹ _1 | 4 | | | | | | | | |
| . ALS Lab Wo | ork Order # (lab use only) | ALS Contactive | m watt | Sampler: EAR | JB | STEX | -EPH | Meta | | | | | | | | |
| ALS Sample # | Sample Identification and/or Coordinates | | Date | Time | Sample Type | 7点 | m | 2 | | | | | | | i | |
| (lab use only) | (This description will appear on the report) | | (dd-mmm-yy) | (hh:mm) | Sample Type | G ₂ | 7 | _ | | | | | | | | |
| | WSA-9 | | 12-Jul-17 | 14:47 | Sediment | X | | $\boldsymbol{\times}$ | | | | | 1 | | | 4 |
| | W JA | | 15 VM 17 | 12127 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | - | - | | | - | | | | + | | | |
| | | | | | | - | | | | | \vdash | | | | | |
| | | | | | | | | | _ | | _ | | - | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | İ | | | | 1 |
| | | | | | | 1 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | - | - | | \vdash | | | + | | | + | - | | |
| | | | | | | | | | | - | | - | - | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | <u> </u> | | | | | | |
| | Special Instructions | Specify Criteria to | add on report by clic | king on the drop-de | own list below | | | | SAMPLE | COND | | | | | | |
| | ng Water (DW) Samples¹ (client use) | (ele | ctronic COC only) | | | Froze | | | | _ | | servation | | Yes | □ N | |
| • | en from a Regulated DW System? | _ | | | | | acks | _ | e Cubes | | Custod | y seal int | act | Yes | □ N | · 🗆 |
| YE | ES NO human drinking water use? | SR S | | | | Cooli | ng Initiat | <u>_</u> |] | | | | | | | |
| Are samples for | human drinking water use? | 217 | | | | | INIIT | TAL COOLE | R TEMPER | ATURES | °C | | FINA | 4F C00 | LER TEMPE | RATURES °C |
| Y | ES XNO | | | | | <u>L.</u> | | | | | | | して | | | |
| | SHIPMENT RELEASE (client use) | | INITIAL SHIPME | NT RECEPTION (I | ab use only) | 1=- | | | | FINAL | SHIPME | | | ۷ (lab | use only) | Time: |
| Released by: | Becher July 13, 20,7 18:48 | Received by: | | Date: | | Time | • | Received | | | | Dat | e:// 7 | 1/ | 7 | I V C |
| Justin | Becker July 13, 2017 18.48 R PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | | | TE - LABORATORY | GODY VELLO | MAC CLI | ENT COP | . /` | | | | <u>{</u> | ' \$ | // | | OCTOBER 2015 EBG |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 14-JUL-17

Report Date: 17-JUL-17 16:47 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1959111

Project P.O. #: NOT SUBMITTED

Job Reference: 60542455 C of C Numbers: 608560 Legal Site Desc: FORESHORE

Dean Watt, B.Sc. Account Manager

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

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group An ALS Limited Company



L1959111 CONTD....

PAGE 2 of 7 17-JUL-17 16:47 (MT)

Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1959111-1 SEDIMENT 14-JUL-17 12:30 EIRA-1 | L1959111-2 SEDIMENT 14-JUL-17 12:45 EIRA-2 | L1959111-3 SEDIMENT 14-JUL-17 14:20 EIRA-3 | L1959111-4 SEDIMENT 14-JUL-17 14:10 EIRA-4 | L1959111-5 SEDIMENT 14-JUL-17 14:30 EIRA-5 |
|-------------------------------|---|--|--|--|--|--|
| Grouping | Analyte | - | | | | |
| SOIL | | | | | | |
| Physical Tests | Moisture (%) | 21.4 | 22.6 | 16.8 | 16.6 | 23.3 |
| | pH (1:2 soil:water) (pH) | 8.83 | 8.92 | 9.13 | 8.54 | 8.71 |
| Metals | Antimony (Sb) (mg/kg) | 0.17 | 0.23 | 0.15 | 0.14 | 0.19 |
| | Arsenic (As) (mg/kg) | 3.39 | 3.72 | 2.42 | 2.57 | 3.34 |
| | Barium (Ba) (mg/kg) | 56.1 | 41.5 | 39.4 | 28.5 | 88.5 |
| | Beryllium (Be) (mg/kg) | 0.27 | 0.25 | 0.29 | 0.23 | 0.28 |
| | Cadmium (Cd) (mg/kg) | 0.119 | 0.115 | 0.066 | 0.068 | 0.104 |
| | Chromium (Cr) (mg/kg) | 24.3 | 20.3 | 7.62 | 8.24 | 20.6 |
| | Cobalt (Co) (mg/kg) | 5.19 | 5.48 | 4.07 | 4.59 | 6.29 |
| | Copper (Cu) (mg/kg) | 17.4 | 17.5 | 12.3 | 13.9 | 17.0 |
| | Lead (Pb) (mg/kg) | 6.42 | 6.09 | 11.8 | 10.6 | 6.21 |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Molybdenum (Mo) (mg/kg) | 0.31 | 0.41 | 0.28 | 0.22 | 0.35 |
| | Nickel (Ni) (mg/kg) | 20.7 | 19.2 | 6.05 | 6.85 | 19.9 |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| | Thallium (TI) (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| | Uranium (U) (mg/kg) | 0.846 | 0.756 | 1.01 | 0.783 | 0.831 |
| | Vanadium (V) (mg/kg) | 38.2 | 40.9 | 29.9 | 35.0 | 46.5 |
| | Zinc (Zn) (mg/kg) | 38.1 | 35.2 | 42.0 | 41.3 | 41.6 |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH |
| | Benzene (mg/kg) | 0.100 | 0.411 | 0.327 | 0.297 | 0.0155 |
| | Ethylbenzene (mg/kg) | <0.015 | <0.015 | 0.049 | 0.051 | <0.015 |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Toluene (mg/kg) | <0.050 | <0.050 | 0.086 | <0.050 | <0.050 |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | 0.054 | <0.050 | <0.050 |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | 0.132 | <0.050 | <0.050 |
| | Xylenes (mg/kg) | <0.075 | <0.075 | 0.186 | <0.075 | <0.075 |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 70.4 | 74.3 | 92.5 | 88.2 | 79.2 |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 79.6 | 78.6 | 91.5 | 90.0 | 84.3 |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | <200 | <200 | <200 |
| | EPH19-32 (mg/kg) | 810 | 730 | 460 | 540 | 700 |
| | LEPH (mg/kg) | <200 | <200 | <200 | <200 | <200 |
| | HEPH (mg/kg) | 810 | 730 | 460 | 540 | 700 |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | <100 | <100 | <100 |

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

L1959111 CONTD.... PAGE 3 of 7 17-JUL-17 16:47 (MT)

ALS ENVIRONMENTAL ANALYTICAL REPORT

Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1959111-6 SEDIMENT 14-JUL-17 14:45 EIRA-6 | | |
|-------------------------------|---|--|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Physical Tests | Moisture (%) | 21.1 | | |
| | pH (1:2 soil:water) (pH) | 8.68 | | |
| Metals | Antimony (Sb) (mg/kg) | 0.22 | | |
| | Arsenic (As) (mg/kg) | 3.50 | | |
| | Barium (Ba) (mg/kg) | 83.2 | | |
| | Beryllium (Be) (mg/kg) | 0.27 | | |
| | Cadmium (Cd) (mg/kg) | 0.101 | | |
| | Chromium (Cr) (mg/kg) | 20.2 | | |
| | Cobalt (Co) (mg/kg) | 6.53 | | |
| | Copper (Cu) (mg/kg) | 17.6 | | |
| | Lead (Pb) (mg/kg) | 6.65 | | |
| | Mercury (Hg) (mg/kg) | <0.050 | | |
| | Molybdenum (Mo) (mg/kg) | 0.46 | | |
| | Nickel (Ni) (mg/kg) | 19.2 | | |
| | Selenium (Se) (mg/kg) | <0.20 | | |
| | Silver (Ag) (mg/kg) | <0.10 | | |
| | Thallium (TI) (mg/kg) | <0.050 | | |
| | Tin (Sn) (mg/kg) | <2.0 | | |
| | Uranium (U) (mg/kg) | 0.802 | | |
| | Vanadium (V) (mg/kg) | 45.6 | | |
| | Zinc (Zn) (mg/kg) | 44.0 | | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | | |
| | Benzene (mg/kg) | 0.0185 | | |
| | Ethylbenzene (mg/kg) | <0.015 | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | | |
| | Styrene (mg/kg) | <0.050 | | |
| | Toluene (mg/kg) | <0.050 | | |
| | ortho-Xylene (mg/kg) | <0.050 | | |
| | meta- & para-Xylene (mg/kg) | <0.050 | | |
| | Xylenes (mg/kg) | <0.075 | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 82.2 | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 87.0 | | |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | | |
| | EPH19-32 (mg/kg) | 630 | | |
| | LEPH (mg/kg) | <200 | | |
| | HEPH (mg/kg) | 630 | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | | |

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

L1959111 CONTD....

PAGE 4 of 7 17-JUL-17 16:47 (MT)

ALS ENVIRONMENTAL ANALYTICAL REPORT

Version: FINAL

| Praumina. | Description Sampled Date Sampled Time Client ID | L1959111-1 SEDIMENT 14-JUL-17 12:30 EIRA-1 | L1959111-2 SEDIMENT 14-JUL-17 12:45 EIRA-2 | L1959111-3 SEDIMENT 14-JUL-17 14:20 EIRA-3 | L1959111-4 SEDIMENT 14-JUL-17 14:10 EIRA-4 | L1959111-5 SEDIMENT 14-JUL-17 14:30 EIRA-5 |
|--|--|--|--|--|--|--|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | <100 | <100 |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 95.9 | 94.7 | 87.2 | 87.4 | 92.2 |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 74.8 | 85.7 | 103.0 | 97.9 | SURI ND 63.6 |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | 0.066 | 0.061 | <0.050 |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Surrogate: Acenaphthene d10 (%) | 102.2 | 101.6 | 91.8 | 94.5 | 97.0 |
| | Surrogate: Chrysene d12 (%) | 108.1 | 112.1 | 96.6 | 96.1 | 108.6 |
| | Surrogate: Naphthalene d8 (%) | 97.2 | 89.8 | 85.1 | 85.4 | 87.0 |
| | Surrogate: Phenanthrene d10 (%) | 100.8 | 104.5 | 91.7 | 96.8 | 98.3 |

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

L1959111 CONTD.... PAGE 5 of 7 17-JUL-17 16:47 (MT)

ALS ENVIRONMENTAL ANALYTICAL REPORT

Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1959111-6 SEDIMENT 14-JUL-17 14:45 EIRA-6 | | |
|--|---|--|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 90.4 | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 86.0 | | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | | |
| | Acenaphthylene (mg/kg) | < 0.050 | | |
| | Anthracene (mg/kg) | <0.050 | | |
| | Benz(a)anthracene (mg/kg) | <0.050 | | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | | |
| | Benzo(g,h,i)perylene (mg/kg) | < 0.050 | | |
| | Benzo(k)fluoranthene (mg/kg) | < 0.050 | | |
| | Chrysene (mg/kg) | < 0.050 | | |
| | Dibenz(a,h)anthracene (mg/kg) | < 0.050 | | |
| | Fluoranthene (mg/kg) | < 0.050 | | |
| | Fluorene (mg/kg) | < 0.050 | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | < 0.050 | | |
| | 2-Methylnaphthalene (mg/kg) | 0.121 | | |
| | Naphthalene (mg/kg) | 0.068 | | |
| | Phenanthrene (mg/kg) | <0.050 | | |
| | Pyrene (mg/kg) | <0.050 | | |
| | Surrogate: Acenaphthene d10 (%) | 98.7 | | |
| | Surrogate: Chrysene d12 (%) | 99.6 | | |
| | Surrogate: Naphthalene d8 (%) | 92.3 | | |
| | Surrogate: Phenanthrene d10 (%) | 98.3 | | |
| | | | | |

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

Reference Information

L1959111 CONTD....

PAGE 6 of 7

17-JUL-17 16:47 (MT)

Version: FINAL

QC Samples with Qualifiers & Comments:

| QC Type Desc | cription | Parameter | Qualifier | Applies to Sample Number(s) |
|----------------|--|---------------------------------|--------------------|---|
| Laboratory Co | ntrol Sample | Selenium (Se) | LCS-H | L1959111-1, -2, -3, -4, -5, -6 |
| Qualifiers for | Individual Parameters Li | sted: | | |
| Qualifier | Description | | | |
| LCS-H | Lab Control Sample rechave been qualified. | overy was above ALS DQO. Non-d | letected sample re | esults are considered reliable. Other results, if reported, |
| SURR-ND | Surrogate recovery margunaffected. | ginally exceeded ALS DQO. Repor | ted non-detect res | sults for associated samples were deemed to be |

Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** |
|-----------------|--------|------------------------------------|--------------------|
| EPH-TUMB-FID-VA | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

Reference Information

L1959111 CONTD....

PAGE 7 of 7

17-JUL-17 16:47 (MT)

Version: FINAL

VPH-CALC-VA

Soil

VPH is VH minus select aromatics

BC MOE LABORATORY MANUAL (2005)

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).

XYLENES-CALC-VA

Soil

Sum of Xylene Isomer Concentrations

EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

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

Laboratory Definition Code

Laboratory Location

V۸

ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

608560

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

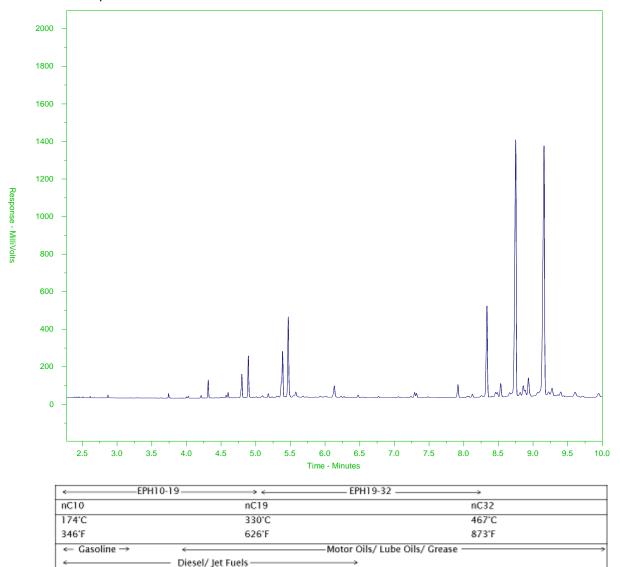
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1959111-1 Client Sample ID: EIRA-1



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

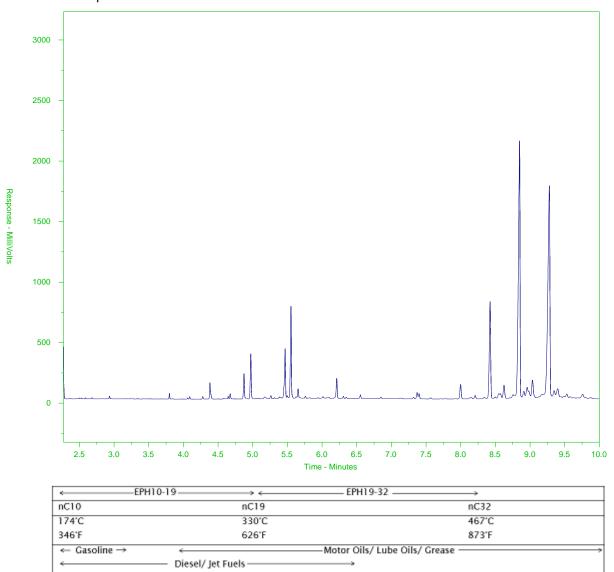
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1959111-2 Client Sample ID: EIRA-2



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

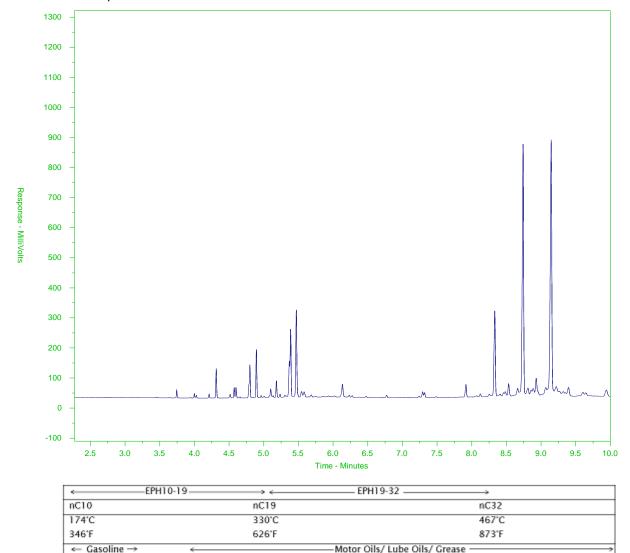
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1959111-3 Client Sample ID: EIRA-3



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

Diesel/ Jet Fuels

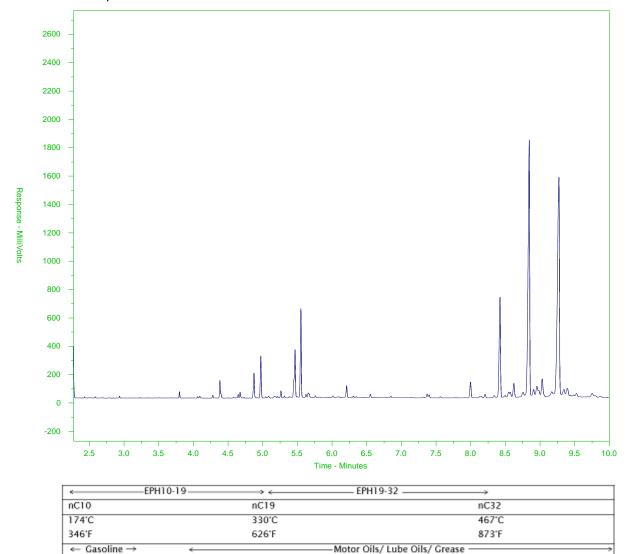
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1959111-4 Client Sample ID: EIRA-4



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

Diesel/ Jet Fuels

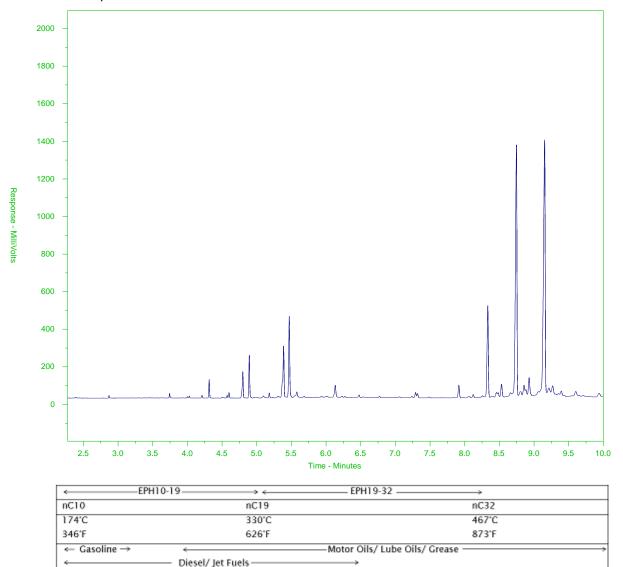
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1959111-5 Client Sample ID: EIRA-5



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

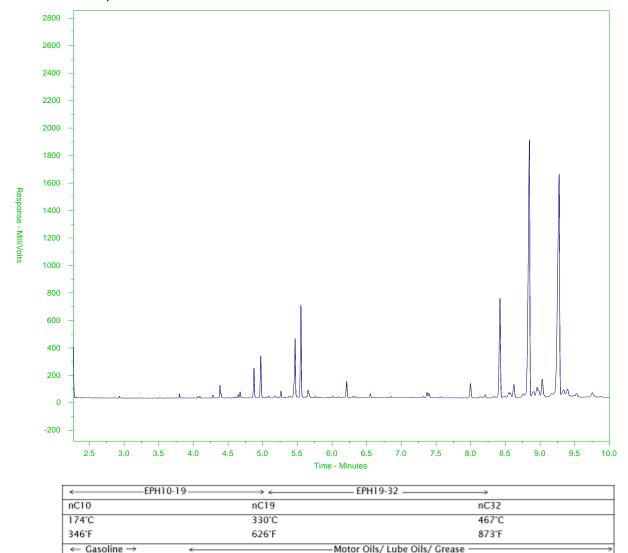
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1959111-6 Client Sample ID: EIRA-6



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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

Diesel/ Jet Fuels



Chain of Custody (COC) / Analytical Request Form



L1959111-COFC

coc Number: 15 - 60856

Canada Toll Free: 1 800 668 9878 www.alsglobal.com Report Format / Distribution Report To Contact and company name below will appear on the final report Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply Select Report Format: PDF EXCEL EDD (DIGITAL) Company: Regular [R] Standard TAT if received by 3 pm - business days - no surcharges ap Quality Control (QC) Report with Report Contact: 4 day [P4] 1 Business day [E1] Compare Results to Criteria on Report - provide details below if box checked Phone: 3 day [P3] Same Day, Weekend or Statutory EMAIL MAIL FAX holiday [E0] 2 day [P2] Street: . ail @ secom. com Date and Time Required for all E&P TATs: City/Province For tests that can not be performed according to the service level selected, you will be contacted. Postal Code: **Analysis Request** Invoice Distribution Invoice To Same as Report To Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below 0 Copy of Invoice with Report Select Invoice Distribution: EMAIL MAIL FAX Email 1 of Ame , as Company: anachs Contact: Email 2 F Project information Oil and Gas Required Fields (client use) ALS Account # / Quote #: PO# AFE/Cost Center: 五 Major/Minor Code: Routing Code: Requisitioner: LSD: Foreshore Location: ALS Lab Work Order # (lab use only) ALS Sample # Sample Identification and/or Coordinates Date Time Sample Type (lab use only) (dd-mmm-yy) (This description will appear on the report) (hh:mm) Sediment SAMPLE CONDITION AS RECEIVED (lab use only) Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below Drinking Water (DW) Samples1 (client use) (electronic COC only) SIF Observations Frozen Are samples taken from a Regulated DW System? П lce Packs Yes YES NO Cooling Initiated Are samples for human drinking water use? INITIAL COOLER TEMPERATURES °C FINAL COOLER TEMPERATURE YES SHIPMENT RELEASE (client use) INITIAL SHIPMENT RECEPTION (lab use only) FINAL SHIPMENT RECEPTION (lab use only) Released by: Received by: Date: Time: Received by: ™7:10



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 17-JUL-17

Report Date: 19-JUL-17 00:46 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1959524 Project P.O. #: 0015243589

Job Reference: 60542455 SOIL ANALYSIS

C of C Numbers: 15-609400 Legal Site Desc: Foreshore

Dean Watt, B.Sc. Account Manager

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

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group An ALS Limited Company



PAGE 2 of 7 19-JUL-17 00:46 (MT)

Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1959524-1 Sediment 15-JUL-17 14:20 WSA-10 | L1959524-2 Sediment 15-JUL-17 14:40 WSA-11 | L1959524-3 Sediment 15-JUL-17 14:48 WSA-12 | L1959524-4 Sediment 15-JUL-17 14:50 WSA-13 | L1959524-5 Sediment 15-JUL-17 14:55 WSA-14 |
|-------------------------------|---|--|--|--|--|--|
| Grouping | Analyte | - | | | | |
| SOIL | | | | | | |
| Physical Tests | Moisture (%) | 14.7 | 24.9 | 22.5 | 19.8 | 17.8 |
| | pH (1:2 soil:water) (pH) | 7.58 | 7.57 | 7.11 | 6.90 | 8.41 |
| Metals | Antimony (Sb) (mg/kg) | 0.17 | 0.27 | 0.25 | 0.20 | 0.26 |
| | Arsenic (As) (mg/kg) | 1.94 | 3.41 | 4.04 | 3.30 | 3.32 |
| | Barium (Ba) (mg/kg) | 122 | 27.8 | 24.4 | 26.6 | 24.8 |
| | Beryllium (Be) (mg/kg) | 0.26 | 0.25 | 0.21 | 0.18 | 0.21 |
| | Cadmium (Cd) (mg/kg) | <0.050 | 0.057 | 0.069 | 0.083 | 0.110 |
| | Chromium (Cr) (mg/kg) | 12.6 | 14.9 | 15.0 | 19.3 | 11.8 |
| | Cobalt (Co) (mg/kg) | 8.72 | 7.35 | 6.77 | 7.78 | 6.87 |
| | Copper (Cu) (mg/kg) | 27.2 | 23.2 | 18.9 | 16.2 | 21.4 |
| | Lead (Pb) (mg/kg) | 5.84 | 11.7 | 12.7 | 4.78 | 15.8 |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | 0.235 |
| | Molybdenum (Mo) (mg/kg) | 0.32 | 0.94 | 1.07 | 1.13 | 0.64 |
| | Nickel (Ni) (mg/kg) | 8.20 | 9.24 | 9.57 | 9.13 | 9.02 |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | 0.23 | <0.20 | <0.20 |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| | Thallium (TI) (mg/kg) | <0.050 | <0.050 | <0.050 | 0.053 | <0.050 |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| | Uranium (U) (mg/kg) | 0.774 | 2.48 | 2.60 | 2.62 | 0.706 |
| | Vanadium (V) (mg/kg) | 70.6 | 62.6 | 54.1 | 58.1 | 47.8 |
| | Zinc (Zn) (mg/kg) | 52.2 | 47.3 | 39.6 | 35.9 | 62.9 |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH |
| | Benzene (mg/kg) | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| | Ethylbenzene (mg/kg) | <0.015 | <0.015 | <0.015 | <0.015 | <0.015 |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Xylenes (mg/kg) | <0.075 | <0.075 | <0.075 | <0.075 | <0.075 |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 90.5 | 84.4 | 89.7 | 89.7 | 92.2 |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 88.1 | 85.0 | 92.9 | 92.9 | 89.9 |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | <200 | <200 | <200 |
| | EPH19-32 (mg/kg) | <200 | <200 | <200 | <200 | <200 |
| | LEPH (mg/kg) | <200 | <200 | <200 | <200 | <200 |
| | HEPH (mg/kg) | <200 | <200 | <200 | <200 | <200 |
| | V 1 (2) 11 1 1 (1) (1) (1) (1) (1) (1) (1) | 1 | 1 | I | 1 | 1 |

<100

Volatile Hydrocarbons (VH6-10) (mg/kg)

L1959524 CONTD....

PAGE 3 of 7 19-JUL-17 00:46 (MT)

Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1959524-6 Sediment 15-JUL-17 15:05 WSA-15 | L1959524-7 Sediment 15-JUL-17 15:10 WSA-16 | L1959524-8 Sediment 15-JUL-17 15:30 WSA-17 | |
|-------------------------------|---|--|--|--|--|
| Grouping | Analyte | | | | |
| SOIL | | | | | |
| Physical Tests | Moisture (%) | 23.1 | 20.0 | 17.8 | |
| | pH (1:2 soil:water) (pH) | 7.49 | 7.61 | 7.31 | |
| Metals | Antimony (Sb) (mg/kg) | 0.33 | 0.22 | 0.20 | |
| | Arsenic (As) (mg/kg) | 2.66 | 2.14 | 3.70 | |
| | Barium (Ba) (mg/kg) | 33.5 | 28.0 | 32.3 | |
| | Beryllium (Be) (mg/kg) | 0.19 | 0.27 | 0.22 | |
| | Cadmium (Cd) (mg/kg) | 0.526 | <0.050 | <0.050 | |
| | Chromium (Cr) (mg/kg) | 20.0 | 14.2 | 18.3 | |
| | Cobalt (Co) (mg/kg) | 12.4 | 9.44 | 8.35 | |
| | Copper (Cu) (mg/kg) | 27.3 | 31.9 | 30.0 | |
| | Lead (Pb) (mg/kg) | 4.93 | 6.92 | 4.76 | |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Molybdenum (Mo) (mg/kg) | 0.64 | 0.31 | 0.67 | |
| | Nickel (Ni) (mg/kg) | 10.7 | 7.84 | 9.13 | |
| | Selenium (Se) (mg/kg) | 0.40 | <0.20 | <0.20 | |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 | |
| | Thallium (TI) (mg/kg) | 0.179 | 0.056 | 0.067 | |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | |
| | Uranium (U) (mg/kg) | 4.04 | 2.55 | 1.69 | |
| | Vanadium (V) (mg/kg) | 73.5 | 84.5 | 75.6 | |
| | Zinc (Zn) (mg/kg) | 47.5 | 52.2 | 45.1 | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | Field MeOH | Field MeOH | |
| | Benzene (mg/kg) | <0.0050 | <0.0050 | <0.0050 | |
| | Ethylbenzene (mg/kg) | <0.015 | <0.015 | <0.015 | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Xylenes (mg/kg) | <0.075 | <0.075 | <0.075 | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 94.6 | 83.7 | 98.5 | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 97.4 | 91.5 | 100.6 | |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | <200 | |
| | EPH19-32 (mg/kg) | <200 | <200 | <200 | |
| | LEPH (mg/kg) | <200 | <200 | <200 | |
| | HEPH (mg/kg) | <200 | <200 | <200 | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | <100 | |

PAGE 4 of 7 19-JUL-17 00:46 (MT)

Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1959524-1 Sediment 15-JUL-17 14:20 WSA-10 | L1959524-2 Sediment 15-JUL-17 14:40 WSA-11 | L1959524-3 Sediment 15-JUL-17 14:48 WSA-12 | L1959524-4 Sediment 15-JUL-17 14:50 WSA-13 | L1959524-5 Sediment 15-JUL-17 14:55 WSA-14 |
|--|---|--|--|--|--|--|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | <100 | <100 |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 81.3 | 81.3 | 81.1 | 85.8 | 88.6 |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 94.9 | 124.5 | 124.3 | 108.8 | 123.0 |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | 0.053 |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | 0.111 |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | 0.097 |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | 0.069 |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | 0.129 |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | 0.123 |
| | Surrogate: Acenaphthene d10 (%) | 88.4 | 88.2 | 88.2 | 81.4 | 96.0 |
| | Surrogate: Chrysene d12 (%) | 85.9 | 91.3 | 91.2 | 92.8 | 99.5 |
| | Surrogate: Naphthalene d8 (%) | 61.1 | 73.6 | 64.9 | 68.2 | 86.3 |
| | Surrogate: Phenanthrene d10 (%) | 89.7 | 90.6 | 92.1 | 89.4 | 101.6 |
| | | | | | | |
| | | | | | | |

L1959524 CONTD.... PAGE 5 of 7

ALS ENVIRONMENTAL ANALYTICAL REPORT

19-JUL-17 00:46 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1959524-6 Sediment 15-JUL-17 15:05 WSA-15 | L1959524-7 Sediment 15-JUL-17 15:10 WSA-16 | L1959524-8 Sediment 15-JUL-17 15:30 WSA-17 | |
|--|---|--|--|--|--|
| Grouping | Analyte | • | | | |
| SOIL | | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 88.5 | 88.5 | 85.2 | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 109.4 | 100.6 | 106.4 | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| , | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Surrogate: Acenaphthene d10 (%) | 83.3 | 86.6 | 81.0 | |
| | Surrogate: Chrysene d12 (%) | 97.4 | 95.3 | 93.3 | |
| | Surrogate: Naphthalene d8 (%) | 76.8 | 76.3 | 66.9 | |
| | Surrogate: Phenanthrene d10 (%) | 91.1 | 88.9 | 84.8 | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Reference Information

L1959524 CONTD....

PAGE 6 of 7

19-JUL-17 00:46 (MT)

Version: FINAL

Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** | |
|-----------------|--------|------------------------------------|--------------------|--|
| EPH-TUMB-FID-VA | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID | |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

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).

XYLENES-CALC-VA Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

Reference Information

L1959524 CONTD....

PAGE 7 of 7

19-JUL-17 00:46 (MT)

Version: FINAL

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

 Laboratory Definition Code
 Laboratory Location

 VA
 ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-609400

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

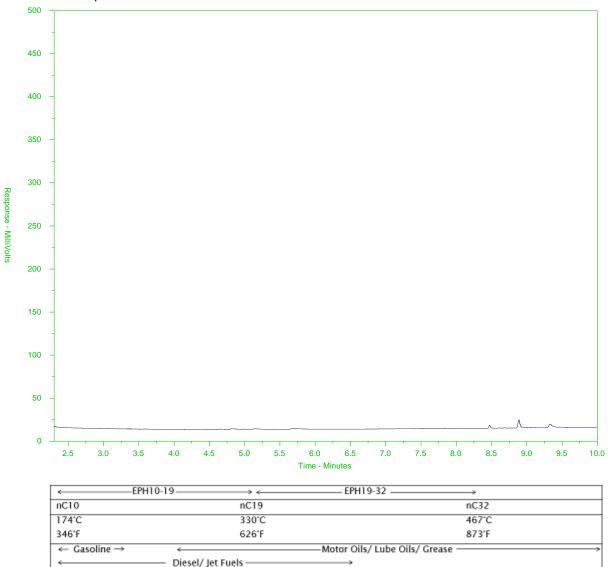
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1959524-1 Client Sample ID: WSA-10



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

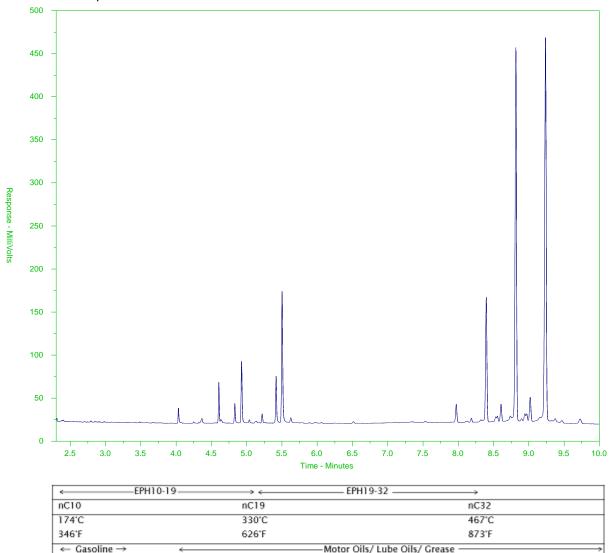
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1959524-2 Client Sample ID: WSA-11



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

Diesel/ Jet Fuels

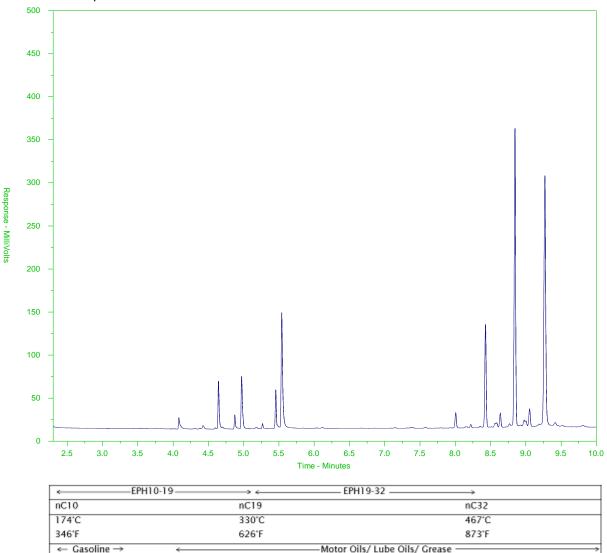
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1959524-3 Client Sample ID: WSA-12



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

Diesel/ Jet Fuels

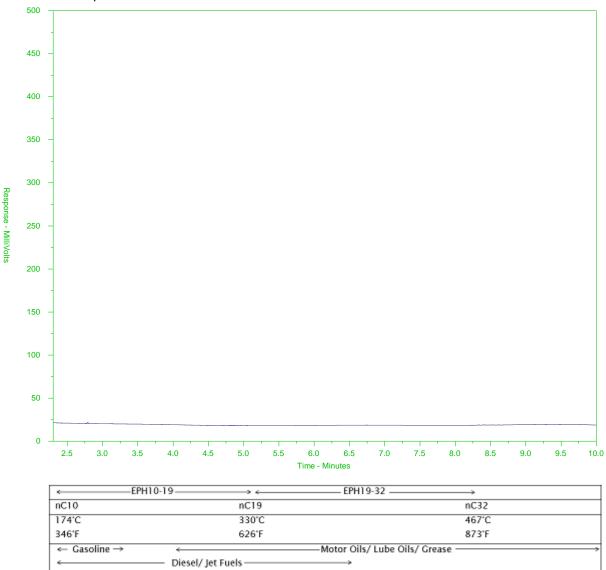
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1959524-4 Client Sample ID: WSA-13



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

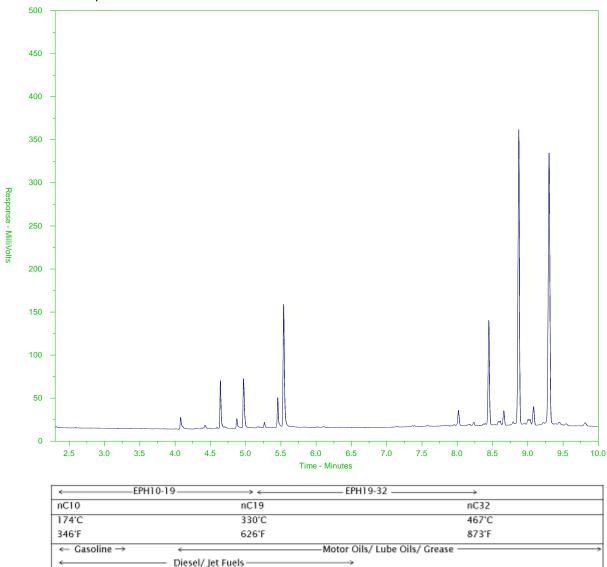
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1959524-5 Client Sample ID: WSA-14



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

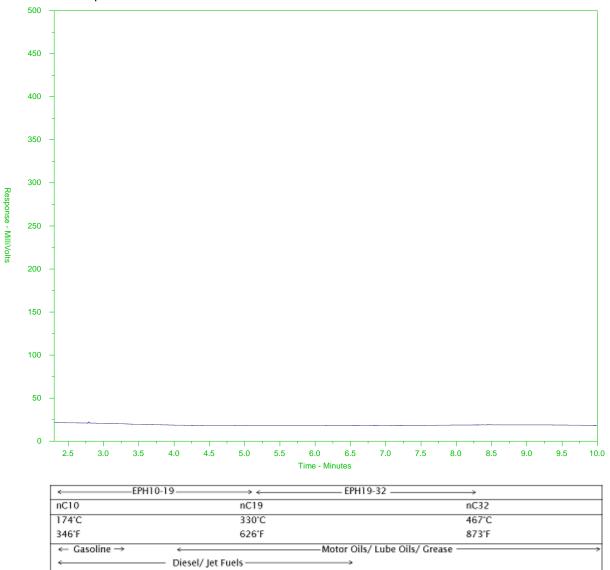
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1959524-6 Client Sample ID: WSA-15



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

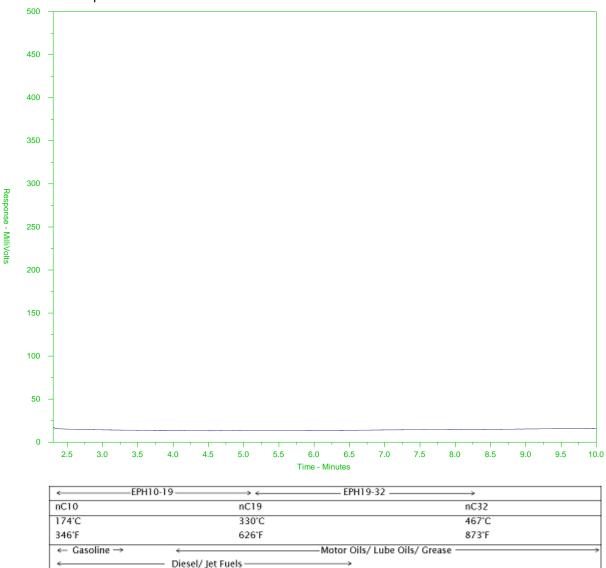
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1959524-7 Client Sample ID: WSA-16



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

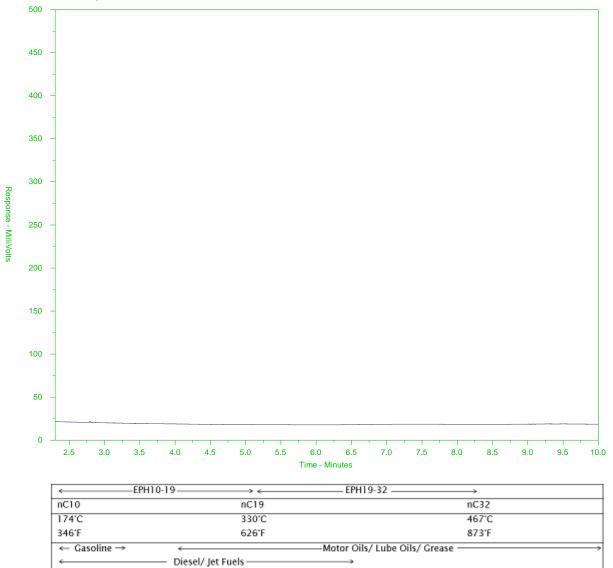
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1959524-8 Client Sample ID: WSA-17



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form



L1959524-COFC

Canada Toll Free: 1 800 668 9878 www.alsglobal.com

| Report To | Contact and company name below will ap | pear on the final report | | Report Format | | | Select S | ervice Le | vel Below - | riease cor | ofirm all E&P 1 | ATs with yo | ır AM - suro | charges will | apply | | |
|--------------------------------|--|--------------------------|--------------------|--|--------------------------|-----------------|--------------------|-------------------|---------------|------------|-----------------|----------------|------------------|--------------|----------|-------------|--|
| Company: | AECOM | | Select Report Fo | rmat: PDF | EXCEL | EDD (DIGITAL) | | Re | gular [R | 1 [| Standard | TAT if rece | eived by 3 | pm - busine | ss days | - no surcha | rges apply |
| Contact: | Michael Gill 604 444 6400 | | | QC) Report with Repo | | | TY Days) | 4 | day [P4] | [| i | ģ | 1 Bus | iness da | y [E1] | J | |
| Phone: | 604 444 6400 | | | ults to Criteria on Report - p | provide details below if | box checked | RIOR | 3 | day [P3] | [| | EMERGENCY S | ame Day | y, Weeke | nd or | Statutory | |
| 1 | Company address below will appear on the final | | Select Distributio | | MAIL | FAX | d (Bus | | day [P2] | | | | | holiday | | | |
| Street: | 3292 Production W | au | EMAil Contour | gill accom | 1. com | | | Date : | and Time I | Required | for all E&P T | ATs: | Ш_ | <u> AS</u> | A |) | |
| City/Province: | Burnaby B.C. | <u> </u> | Fressie. | 5 Intherno | Daecom | Comp | For tests | that can | not be perf | ormed acc | ording to the | service leve | selected, y | ou will be c | ontacted | 1. | |
| Postal Code: | | | Email 3 | | | | <u> </u> | | | | | Analysis | | | | | |
| | | No | | Invoice Dis | | | ļ | | ndicate Fill | tered (F), | Preserved (P |) or Filtered | and Prese | rved (F/P) | oelow | | _ |
| | Copy of Invoice with Report | NO | Select Invoice Di | | EMAIL MAIL | FAX | P | | | | | | | | | | 」 Ⅰ |
| Company: | Chewron Canada L | to | Email 1 or F | me as a | bove | | | | | | | | | | | | |
| Contact: | Chris Boys | | Email 2 | | | | | | | | | | | 1 | | | S S |
| | Project Information | | - | Oil and Gas Required | | e) | ہے۔ ا | 1 | | | | | | | | | taine |
| ALS Account # / | <u> </u> | | AFE/Cost Center: | | PO# | | lä | Q. | . | | | | | | | | .io Coil |
| Job#: 605 | 42455 | | Major/Minor Code: | | Routing Code: | | VPH | HEPH | | | | | | | | | T of |
| PO / AFE: | | | Requisitioner: | | | | | ~ | | | | 1 | | | | | Number of Containers |
| LSD: Fare | shore. | | Location: | | | | ΙX | Y | <u>(Ľ</u> | | | | | | | | , Ž |
| ALS Lab Wor | k Order # (lab use only) | | ALS Contact: | A | Sampler | TO | ΙŴ | EPH | Medal | | | | | | | , | |
| | | | Lean ! | | Sampler: AP 4 | 78 | BIE | T) | 9 | | | | | | | | . I |
| ALS Sample # (lab use only) | • | on and/or Coordinates | | Date | Time (hh:mm) | Sample Type | 100 | | \geq | | | | J | | | | |
| (iai doc siny) | | I appear on the report) | | (dd-mmm-yy) | | A 12 1 | | $\overline{}$ | $\overline{}$ | | | | - - | | | | |
| | WSA-10 | | | 15-Jul-17 | 14:20 | Sediment | X | X | | - | _ | 1 - 41 | ` | - | 7 | | 17 |
| | W8A-11 | | | | 14:40 | | 1 | \perp | $\bot \bot$ | | | | | , | | | + |
| | WSA-12 | | | <u> </u> | 14:48 | | Ш | | 44 | | | | | | | | \perp |
| | WSA-13 | | | | 14:50 | } | | | | | l | | | 131 | | | |
| | WSA-14 | | | | 14:55 | | I | | | | | | | | Ì | | 1 1 |
| | WSA-15 | | | | 15:05 | | | | | | | | | | | 1 | |
| | 110 A - 11 | | | | 15:10 | - | . | \top | + | | | | | | | | 1 1 1 |
| | WSA-16 WSA-17 | . | | 1/ | 15:30 | 1 | V | V | | | | - | | | | | |
| | WSA-1-+ | | _ | V | 10120 | - | V | У. | <u> </u> | <u> </u> | | + + | | 1 | | | |
| | | | | | | | - | | | | | | | - | | | |
| | | | | | | | | | | | | | | <u> </u> | | | 1 |
| | | | | | _ | | | _ | | | | | | | | | 1 |
| | | | | | | | | | | | | | | | | | |
| Drinkins | g Water (DW) Samples ¹ (client use) | Special Instructions / | | add on report by click | ing on the drop-do | own list below | | | | SAMP | LE COND | | | <u>`</u> | | | |
| | | | (ele | ctronic COC only) | | | Froze | | _ | ╙ | | | servation | | | No | |
| - | from a Regulated DW System? | _ | • • • | | | | Ice Pa | icks ng Initia | _ | Ice Cub | es 📙 | Custody | / seal int | act \ | 'es | ☐ No | |
| | uman drinking water use? | BC | CSR | | | | COOM | • | | ER TEM | PERATURES | °C | | FINIAL | COOL | ER TEMPER | ATURES °C |
| | NO Water use: | | - 0, , | | | | | DAU | TIAL COO | LEIN 1 EWI | FERMIONES | · · · | | LIIVAL | T | 4 | T |
| ☐ YES | SHIPMENT RELEASE (client use | | | INITIAL SHIPMEN | T DECEDTION (I | ab uso only) | L . | | | | EINA | SHIPME | NT PEC | EDTION | (lah | | |
| Released by: | Date: | Time: | Received by: | INITIAL SHIPMEN | Date: | an age offis) | Time: | | Receive | ed by: | 1 HVAL | OT III INIE | Dat | | (ian u | I Surviy | Time: |
| , | | | 1 | - | | | | | | | J | _ | | 71 | 17 | 117 | 113814 |
| REFER TO BACK P | PAGE FOR ALS LOCATIONS AND SAMPLING I | NFORMATION | | WHIT | E - LABORATORY | COPY YELLO | Ñ - CLIE | NT CO | PY | | | | | i | | , , | OCTOBER 2015 FRONT |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 17-JUL-17

Report Date: 19-JUL-17 00:55 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1959529 Project P.O. #: 0015243589

Job Reference: 60542455 SOIL ANALYSIS

C of C Numbers: 15-609401 Legal Site Desc: foreshore

Dean Watt, B.Sc. Account Manager

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

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



PAGE 2 of 7 19-JUL-17 00:55 (MT)

Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1959529-1 Sediment 17-JUL-17 07:35 EIRA-7 | L1959529-2 Sediment 17-JUL-17 DUP-1 | L1959529-3 Sediment 17-JUL-17 09:10 ESA-1 | L1959529-4 Sediment 17-JUL-17 09:14 ESA-2 | L1959529-5 Sediment 17-JUL-17 05:00 ESA-3 |
|-------------------------------|---|--|--|---|---|---|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Physical Tests | Moisture (%) | 22.0 | 23.4 | 17.8 | 19.6 | 21.2 |
| | pH (1:2 soil:water) (pH) | 8.78 | 8.45 | 6.86 | 8.65 | 6.11 |
| Metals | Antimony (Sb) (mg/kg) | <0.10 | <0.10 | 0.22 | 0.14 | 0.14 |
| | Arsenic (As) (mg/kg) | 1.31 | 1.14 | 3.88 | 1.62 | 1.89 |
| | Barium (Ba) (mg/kg) | 51.1 | 40.6 | 55.1 | 52.2 | 67.1 |
| | Beryllium (Be) (mg/kg) | 0.18 | 0.18 | 0.27 | 0.23 | 0.42 |
| | Cadmium (Cd) (mg/kg) | 0.051 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Chromium (Cr) (mg/kg) | 7.20 | 6.68 | 17.9 | 12.6 | 16.2 |
| | Cobalt (Co) (mg/kg) | 3.03 | 2.80 | 8.77 | 4.31 | 10.8 |
| | Copper (Cu) (mg/kg) | 7.08 | 6.61 | 17.9 | 14.3 | 35.4 |
| | Lead (Pb) (mg/kg) | 4.23 | 3.85 | 7.73 | 5.58 | 7.17 |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Molybdenum (Mo) (mg/kg) | 0.37 | 0.23 | 0.75 | 0.44 | 0.37 |
| | Nickel (Ni) (mg/kg) | 5.40 | 4.77 | 7.64 | 6.29 | 11.9 |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | 0.29 | <0.20 | <0.20 |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| | Thallium (Tl) (mg/kg) | <0.050 | <0.050 | 0.056 | <0.050 | 0.060 |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| | Uranium (U) (mg/kg) | 0.875 | 0.669 | 0.917 | 0.855 | 0.498 |
| | Vanadium (V) (mg/kg) | 28.1 | 29.5 | 83.0 | 54.5 | 65.5 |
| | Zinc (Zn) (mg/kg) | 19.6 | 18.4 | 47.1 | 33.9 | 57.8 |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | Field MeOH | Field MeOH | Field MeOH | Field MeOH |
| | Benzene (mg/kg) | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 |
| | Ethylbenzene (mg/kg) | <0.015 | <0.015 | <0.015 | <0.015 | <0.015 |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Xylenes (mg/kg) | <0.075 | <0.075 | <0.075 | <0.075 | <0.075 |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 74.0 | SURR- ND 61.8 | 80.2 | 72.2 | 81.3 |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 87.8 | 71.2 | 93.7 | 86.5 | 92.5 |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | <200 | <200 | <200 |
| | EPH19-32 (mg/kg) | 550 | 750 | <200 | 210 | <200 |
| | LEPH (mg/kg) | <200 | <200 | <200 | <200 | <200 |
| | HEPH (mg/kg) | 550 | 750 | <200 | 210 | <200 |

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

L1959529 CONTD.... PAGE 3 of 7

19-JUL-17 00:55 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1959529-6 Sediment 17-JUL-17 09:20 ESA-4 | | |
|-----------------------------|---|---|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Physical Tests | Moisture (%) | 18.6 | | |
| | pH (1:2 soil:water) (pH) | 7.79 | | |
| Vietals | Antimony (Sb) (mg/kg) | 0.18 | | |
| | Arsenic (As) (mg/kg) | 1.55 | | |
| | Barium (Ba) (mg/kg) | 27.0 | | |
| | Beryllium (Be) (mg/kg) | 0.21 | | |
| | Cadmium (Cd) (mg/kg) | <0.050 | | |
| | Chromium (Cr) (mg/kg) | 12.8 | | |
| | Cobalt (Co) (mg/kg) | 5.75 | | |
| | Copper (Cu) (mg/kg) | 21.0 | | |
| | Lead (Pb) (mg/kg) | 6.93 | | |
| | Mercury (Hg) (mg/kg) | <0.050 | | |
| | Molybdenum (Mo) (mg/kg) | 0.43 | | |
| | Nickel (Ni) (mg/kg) | 6.90 | | |
| | Selenium (Se) (mg/kg) | <0.20 | | |
| | Silver (Ag) (mg/kg) | <0.10 | | |
| | Thallium (TI) (mg/kg) | 0.055 | | |
| | Tin (Sn) (mg/kg) | <2.0 | | |
| | Uranium (U) (mg/kg) | 0.588 | | |
| | Vanadium (V) (mg/kg) | 59.5 | | |
| | Zinc (Zn) (mg/kg) | 46.0 | | |
| olatile Organic ompounds | VOC Sample Container | Field MeOH | | |
| | Benzene (mg/kg) | <0.0050 | | |
| | Ethylbenzene (mg/kg) | <0.015 | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | | |
| | Styrene (mg/kg) | <0.050 | | |
| | Toluene (mg/kg) | <0.050 | | |
| | ortho-Xylene (mg/kg) | <0.050 | | |
| | meta- & para-Xylene (mg/kg) | <0.050 | | |
| | Xylenes (mg/kg) | <0.075 | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 78.3 | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 92.5 | | |
| lydrocarbons | EPH10-19 (mg/kg) | <200 | | |
| | EPH19-32 (mg/kg) | <200 | | |
| | LEPH (mg/kg) | <200 | | |
| | HEPH (mg/kg) | <200 | | |

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

PAGE 4 of 7 19-JUL-17 00:55 (MT)

Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1959529-1 Sediment 17-JUL-17 07:35 EIRA-7 | L1959529-2 Sediment 17-JUL-17 DUP-1 | L1959529-3 Sediment 17-JUL-17 09:10 ESA-1 | L1959529-4 Sediment 17-JUL-17 09:14 ESA-2 | L1959529-5 Sediment 17-JUL-17 05:00 ESA-3 |
|--|---|--|--|---|---|---|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Hydrocarbons | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | <100 | <100 | <100 |
| | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | <100 | <100 |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 86.1 | 84.1 | 83.4 | 85.8 | 85.4 |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 74.2 | 72.2 | 88.3 | SURR- ND 69.1 | 81.7 |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Surrogate: Acenaphthene d10 (%) | 97.1 | 114.7 | 82.9 | 92.1 | 96.2 |
| | Surrogate: Chrysene d12 (%) | 93.4 | 108.9 | 92.7 | 94.9 | 90.6 |
| | Surrogate: Naphthalene d8 (%) | 93.4 | 108.6 | 79.9 | 88.0 | 94.9 |
| | Surrogate: Phenanthrene d10 (%) | 96.2 | 114.7 | 88.2 | 95.1 | 96.6 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

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

L1959529 CONTD.... PAGE 5 of 7

Version: FINAL

19-JUL-17 00:55 (MT)

| | Sample ID Description Sampled Date Sampled Time Client ID | L1959529-6 Sediment 17-JUL-17 09:20 ESA-4 | | |
|--|---|---|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Hydrocarbons | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | | |
| | VPH (C6-C10) (mg/kg) | <100 | | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 93.0 | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 82.8 | | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | | |
| | Acenaphthylene (mg/kg) | <0.050 | | |
| | Anthracene (mg/kg) | <0.050 | | |
| | Benz(a)anthracene (mg/kg) | <0.050 | | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | | |
| | Chrysene (mg/kg) | <0.050 | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | | |
| | Fluoranthene (mg/kg) | <0.050 | | |
| | Fluorene (mg/kg) | <0.050 | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | | |
| | Naphthalene (mg/kg) | <0.050 | | |
| | Phenanthrene (mg/kg) | <0.050 | | |
| | Pyrene (mg/kg) | <0.050 | | |
| | Surrogate: Acenaphthene d10 (%) | 92.7 | | |
| | Surrogate: Chrysene d12 (%) | 99.6 | | |
| | Surrogate: Naphthalene d8 (%) | 88.5 | | |
| | Surrogate: Phenanthrene d10 (%) | 98.4 | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

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

Reference Information

L1959529 CONTD....

PAGE 6 of 7

19-JUL-17 00:55 (MT)

Version: FINAL

Qualifiers for Individual Parameters Listed:

Qualifier Description

SURR-ND Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected.

Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** |
|-----------------|--------|------------------------------------|--------------------|
| EPH-TUMB-FID-VA | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

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).

XYLENES-CALC-VA Soil Sum of Xvlene Isomer Concentrations EPA 8260B & 524.2

Reference Information

L1959529 CONTD....

PAGE 7 of 7

19-JUL-17 00:55 (MT)

Version: FINAL

Calculation of Total Xylenes

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

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

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

| Laboratory Definition Code | Laboratory Location |
|----------------------------|---|
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |

Chain of Custody Numbers:

15-609401

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

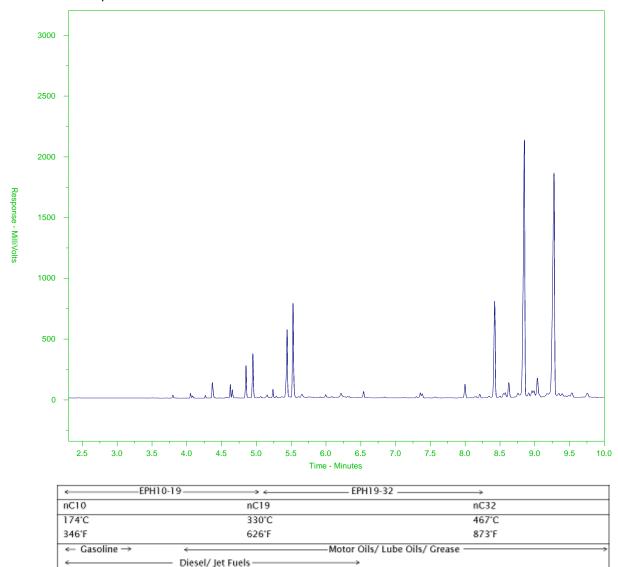
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1959529-1 Client Sample ID: EIRA-7



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

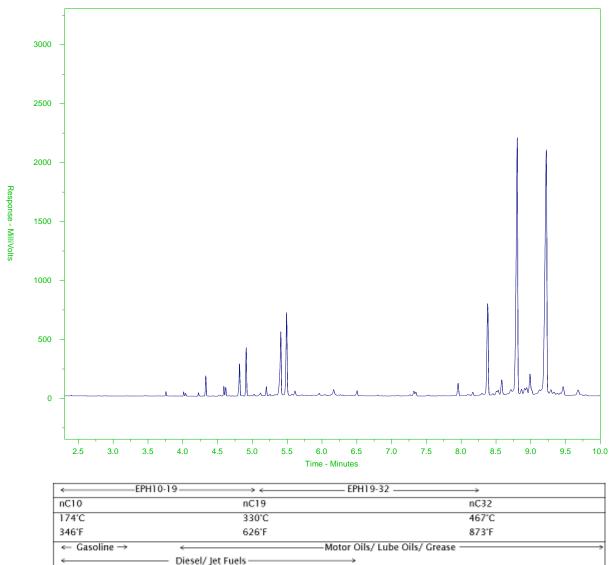
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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



ALS Sample ID: WG2571988-6#L1959529-1

Client Sample ID: EIRA-7



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

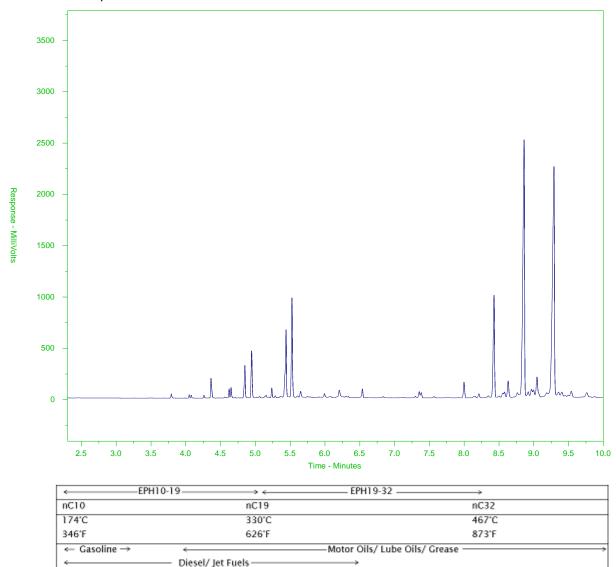
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1959529-2 Client Sample ID: DUP-1



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

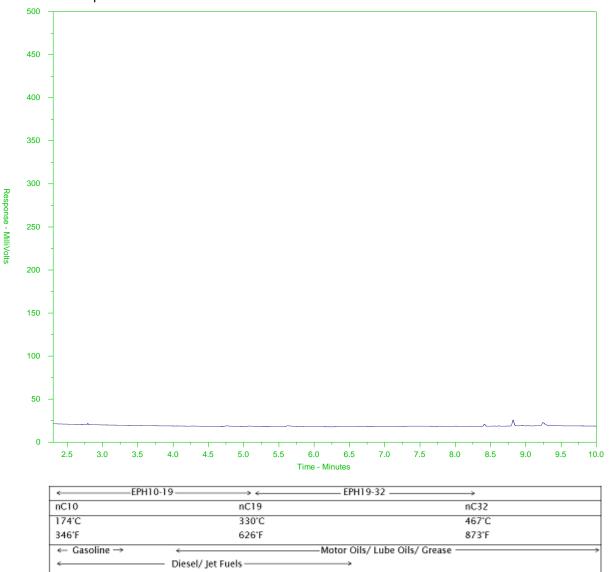
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1959529-3 Client Sample ID: ESA-1



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

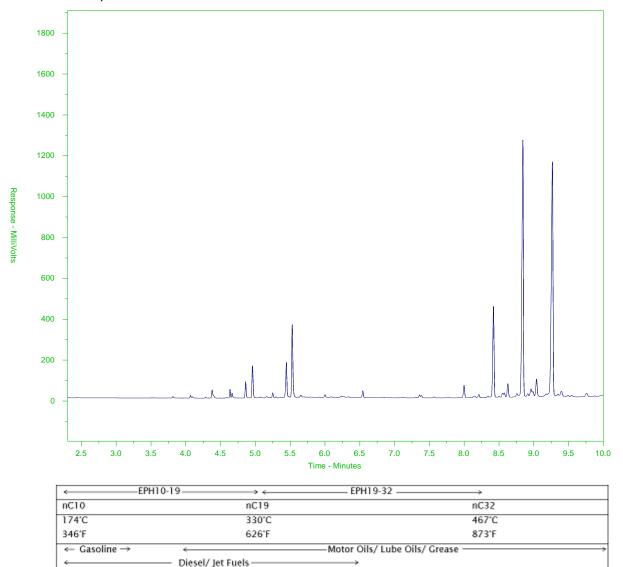
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1959529-4 Client Sample ID: ESA-2



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

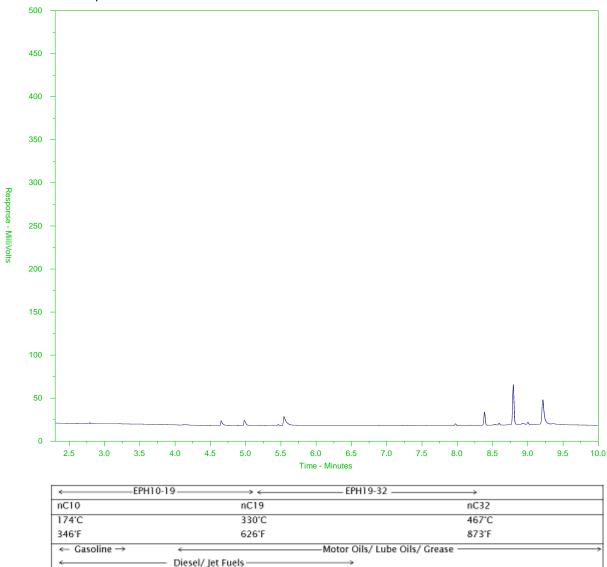
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1959529-5 Client Sample ID: ESA-3



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

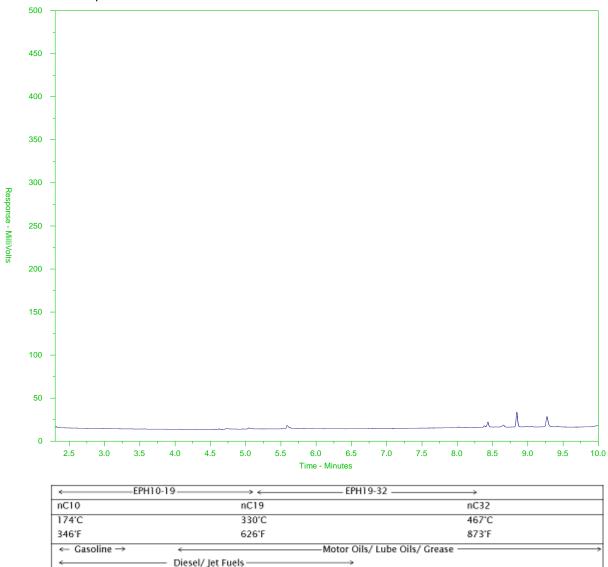
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1959529-6 Client Sample ID: ESA-4



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form

L1959529-COFC

COC Number: 15 - 609401

age of

Environmental www.alsglobal.com

Canada Toll Free: 1 800 668 9878

| Danari Ta | Contact and company name below will appear on the final report | 1 | Report Format / | Distribution | | Select Se | rvice Leve | I Below - Pleas | e confirm all E& | P TATs with | your AM - si | ırcharges | will apply | | | |
|--------------------------------|--|-------------------------|----------------------------|--------------------------|----------------|---------------------------|-------------------|-----------------|------------------|---------------|--|---------------|--|-----------|------------------|----------------------|
| Report To Company: | AFCOW! | Select Report Form | | | DD (DIGITAL) | | Reg | ular [R] | Stand | ard TAT if re | | | | | narges ap | ply |
| Contact: | Maria and Arthur | Quality Control (QC |) Report with Repor | YES [| NO | ΓΥ Days) | 4 d | ay [P4] | | NC. | 1 Bu | ısiness | day [E1 |] | L | _ |
| Phone: | Lots Obly Toling | Compare Results | to Criteria on Report - pi | ovide details below if I | oox checked | PRIORITY usiness Days) | 3 d | ay [P3] | | EMERGENCY | Same D | ay, Wed | ekend o | r Statuto | ry 🌫 | ∤ |
| Filone. | Company address below will appear on the final report | Select Distribution: | EMAIL | MAIL | FAX | P P (Bush | | ay [P2] | | | | | day [E0] | _ | $\overline{}$ | 3 |
| Street: | | MAN CLARA | a allia. I | erow . | ° om | | | | ired for all E& | | | | ASE. | | | |
| | | | out herro | | | For tests | that can n | ot be performe | d according to | he service le | vel selected | l, you will | be contacte | d. | | |
| City/Province: Postal Code: | | Email 3 | ON A PEN AND | TANK TANK | | | | | | | sis Requ | | | | | |
| Invoice To | Same as Report To YES NO | | Invoice Dist | ribution | | | In | dicate Filtered | (F), Preserved | (P) or Filte | red and Pre | served (F | /P) below | | _ | ļ |
| IIIVOICE IO | Copy of Invoice with Report YES NO | Select Invoice Distr | ribution: | MAIL MAIL | FAX | 10 | | | | | | | | | | |
| | A | Email 1 or Fax | ame as | about | | | | | | | | | 1 1 | | ŀ | |
| Company: | Charan Ganada Ltol | Email 2 | ANG W | THE SERVICE | |] | | | | | | | 1 | | | S S |
| Contact: | Project Normation | | and Gas Required | Fields (client us | e) | 1 | 玉 | | | | | 1 | 1 1 | 1 | | aine |
| 4.04 | | AFE/Cost Center: | | PO# | | 1 | 的 | | | | | | 1 1 | 1 | - 1 | Sont |
| ALS Account # | TUDICE #. | Major/Minor Code: | | Routing Code: | | T | \mathcal{H} | |] | - 1 | | İ | 1 [| 1 | | ofC |
| Job #: 600 PO / AFE: | 5 4 2 4 5 5 | Requisitioner: | | | | d | T | | | | l i | | 1 1 | 1 | | ber |
| | 05/10/0 | Location: | | | | 1> | | | | 1 | | | 1 | | | Number of Containers |
| LSD: YON | eshare | | | | 1 | 13 | 18 | , X | 1 | | | | 1 | | | _ |
| ALS Lab Wo | ork Order# (lab use only) | ALS SCORES | World | Sampler: | JB | 61E) | , 6 | Metal | | | | | | l | ١ | · |
| ALS Sample # | Sample Identification and/or Coordinates | | Date | Time | Sample Type | 120 | \vec{m} | 8 | | | | | | | | |
| (lab use only) | (This description will appear on the report) | | (dd-mmm-yy) | (hh:mm) | | 4 4 | \Box | | | | | _ | | | $-\!\!+\!\!\!-$ | |
| | FIRA-7 | | 17-JU1-17 | 7:35 | Sedimen | 1-X | \boldsymbol{X} | \times | | | <u> </u> | | 1_1 | | | 4 |
| | Dup-1 | | 1 | AM | 4 | 1 | \ \ \ | <i>[</i> | | | | | | | | |
| | DNP | | | aub | | | | | | | | | | | | |
| | LESA-1 | | | 0 11 | | + - | 77 | | | | | | | | | 1 1 |
| | LSA-2 | | | 71.19 | | + | -1 | | + | | | | 1 | | | |
| | ESA-3 | | | 9117 | | | - 1/- | \leftarrow | + | | ++ | + | + | | - - | |
| | ESA-4 | | - $$ | 9:20 | V | _\V_ | V | A | | | | \rightarrow | + | | | A |
| | 10013 | | | | | | | | _ | | <u> </u> | | | | - | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | . L | | |
| ļ | | | | | - | | | | | | | | | | _ | |
| | | | | | | + - | - | | | | | | | | \neg | |
| | | | | | | | | | | _ | + | - | | | -+- | |
| | | | | | | | | | AMPLE CO | AIDITION | AC DEC | FIVED | (lab use | - Only) | | |
| | Special Instructions | / Specify Criteria to a | add on report by clic | king on the drop-d | own list below | | | 3. | | | Observa | | Yes | | No | |
| | ng Water (DW) Samples¹ (client use) | (elec | tronic COC only) | | | Froze | | | • | ☐ Cus | | | Yes | = | No | |
| | en from a Regulated DW System? | | | | | i i | acks ng Initia | | | — Сиз | .54, 564 | | | _ | | _ |
| | ES \(\overline{\chi_N} \) | COO | | | | - | - | | R TEMPERATU | RES °C | | 1 | FINAL COC | LER TEM | PERATUF | ≀ES°C |
| Are samples for | human drinking water use? | r CSR | , | | | | | | | | | 25 | 5.2 | | | |
| | es No | | INITIAL OLUBACI | IT DECEDION / | lab usa anly) | | | | FI | IAL SHIP | MENT R | | 1011/11 | use only | y) | |
| | SHIPMENT RELEASE (client use) | Received by: | INITIAL SHIPMEI | Date: | iau use urily) | Time | : | Received | by: | | T | Date: | | | Ti | me |
| Released by: | Becker Duly 17th, 2017 12:0 | 5 | | | | | | | PAI | <u>/</u> | | <u> </u> | <u> </u> | <u> </u> | | 17:02 |
| JASILA | Joseph J. J. J. J. J. J. J. J. J. J. J. J. J. | | W/HI | TE - LABORATORY | COPY YELLO | OW - CLI | ENT CC | PY | | | | | | | | OCTOBER 2015 FRONT |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 18-JUL-17

Report Date: 01-AUG-17 17:06 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1960419
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 15-609402
Legal Site Desc: FORESHORE

Dean Watt, B.Sc. Account Manager

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

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



L1960419 CONTD.... PAGE 2 of 5

01-AUG-17 17:06 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1960419-1 SEDIMENT 18-JUL-17 09:25 ESA-5 | | |
|-------------------------------|---|---|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Physical Tests | Moisture (%) | 19.6 | | |
| | pH (1:2 soil:water) (pH) | 6.87 | | |
| Metals | Antimony (Sb) (mg/kg) | 0.46 | | |
| | Arsenic (As) (mg/kg) | 2.61 | | |
| | Barium (Ba) (mg/kg) | 73.2 | | |
| | Beryllium (Be) (mg/kg) | 0.31 | | |
| | Cadmium (Cd) (mg/kg) | <0.050 | | |
| | Chromium (Cr) (mg/kg) | 13.5 | | |
| | Cobalt (Co) (mg/kg) | 10.2 | | |
| | Copper (Cu) (mg/kg) | 27.0 | | |
| | Lead (Pb) (mg/kg) | 4.93 | | |
| | Mercury (Hg) (mg/kg) | <0.050 | | |
| | Molybdenum (Mo) (mg/kg) | 0.36 | | |
| | Nickel (Ni) (mg/kg) | 7.95 | | |
| | Selenium (Se) (mg/kg) | 0.21 | | |
| | Silver (Ag) (mg/kg) | <0.10 | | |
| | Thallium (TI) (mg/kg) | 0.078 | | |
| | Tin (Sn) (mg/kg) | <2.0 | | |
| | Uranium (U) (mg/kg) | 0.499 | | |
| | Vanadium (V) (mg/kg) | 68.3 | | |
| | Zinc (Zn) (mg/kg) | 58.1 | | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | | |
| | Benzene (mg/kg) | <0.0050 | | |
| | Ethylbenzene (mg/kg) | <0.015 | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | | |
| | Styrene (mg/kg) | <0.050 | | |
| | Toluene (mg/kg) | <0.050 | | |
| | ortho-Xylene (mg/kg) | <0.050 | | |
| | meta- & para-Xylene (mg/kg) | <0.050 | | |
| | Xylenes (mg/kg) | <0.075 | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 97.7 | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 92.5 | | |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | | |
| | EPH19-32 (mg/kg) | <200 | | |
| | LEPH (mg/kg) | <200 | | |
| | HEPH (mg/kg) | <200 | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | | |

L1960419 CONTD.... PAGE 3 of 5

ALS ENVIRONMENTAL ANALYTICAL REPORT

01-AUG-17 17:06 (MT) Version: FINAL

| Sample I Descriptio Sampled Da Sampled Tin Client I | SEDIMENT 18-JUL-17 09:25 | | |
|---|----------------------------|--|--|
| Grouping Analyte | | | |
| SOIL | | | |
| Hydrocarbons VPH (C6-C10) (mg/kg) | <100 | | |
| Surrogate: 2-Bromobenzotrifluoride (%) | 83.4 | | |
| Surrogate: 3,4-Dichlorotoluene (SS) (%) | 93.9 | | |
| Polycyclic Acenaphthene (mg/kg) Aromatic Hydrocarbons | <0.050 | | |
| Acenaphthylene (mg/kg) | <0.050 | | |
| Anthracene (mg/kg) | <0.050 | | |
| Benz(a)anthracene (mg/kg) | <0.050 | | |
| Benzo(a)pyrene (mg/kg) | <0.050 | | |
| Benzo(b)fluoranthene (mg/kg) | <0.050 | | |
| Benzo(g,h,i)perylene (mg/kg) | <0.050 | | |
| Benzo(k)fluoranthene (mg/kg) | <0.050 | | |
| Chrysene (mg/kg) | <0.050 | | |
| Dibenz(a,h)anthracene (mg/kg) | <0.050 | | |
| Fluoranthene (mg/kg) | <0.050 | | |
| Fluorene (mg/kg) | <0.050 | | |
| Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | | |
| 2-Methylnaphthalene (mg/kg) | <0.050 | | |
| Naphthalene (mg/kg) | <0.050 | | |
| Phenanthrene (mg/kg) | <0.050 | | |
| Pyrene (mg/kg) | <0.050 | | |
| Surrogate: Acenaphthene d10 (%) | 80.3 | | |
| Surrogate: Chrysene d12 (%) | 80.4 | | |
| Surrogate: Naphthalene d8 (%) | 76.5 | | |
| Surrogate: Phenanthrene d10 (%) | 77.8 | | |
| | | | |

Reference Information

L1960419 CONTD....

PAGE 4 of 5
01-AUG-17 17:06 (MT)

Version: FINAL

QC Samples with Qualifiers & Comments:

QC Type Description Parameter Qualifier Applies to Sample Number(s)

Test Method References:

ALS Test Code Matrix Test Description Method Reference**

EPH-TUMB-FID-VA Soil EPH in Solids by Tumbler and GCFID BC MOE EPH GCFID

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

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).

XYLENES-CALC-VA Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

Calculation of Total Xylenes

Reference Information

L1960419 CONTD....

PAGE 5 of 5

01-AUG-17 17:06 (MT)

Version: FINAL

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

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

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

Laboratory Definition Code Laboratory Location

VA ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-609402

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

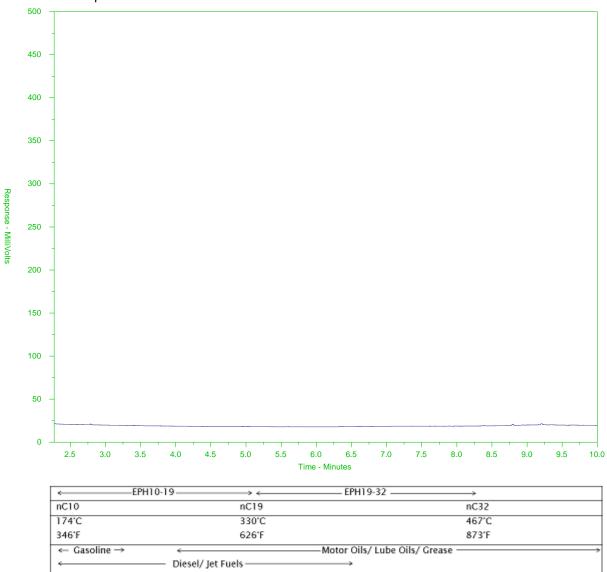
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1960419-1 Client Sample ID: ESA-5



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form

L1960419-COFC

DC Number: 15 - 609402

age 1 of 1

www.alsglobal.com Canada Toll Free: 1 800 668 9878

| Report To | Contact and company na | ame below will appear on the final | report | | Report Format | / Distribution | | galact o | C1 ¥100 20 | with your AM - surcharges will apply | | | | | | | | | | | |
|--------------------------------|---|--|--------------------|---------------------------------------|-----------------------------------|-----------------------|---|-----------------------------|------------------|--------------------------------------|--------------------|---------------|-----------|-----------|-----------|---|-----------|---------|------------|--|--|
| Company: | AECOM | | | Select Report Fo | | | EDD (DIGITAL) | | Re | gular | [R] | Sta | ndard T | AT if re | eceived b | ved by 3 pm - business days - no surcharges apply | | | | | |
| Contact: | Michael Gill 604-444-64 | | | Quality Control (| QC) Report with Rep | ort YES | NO | Y ays) | 4 | day [P | 4] | | Ī | ò | 1 1 | Busin | ess da | y [E1 |] | | |
| Phone: | 604-444-64 | DO | | Compare Res | oults to Criteria on Report - | provide details below | if box checked | JORIT Tess D | 3 | day [P | 3] | | | RGEN | Same | Dav. | Weeke | nd o | Statuto | rv 🗔 | |
| | Company address below will a | | | Select Distribution | on: 🔀 EMAIL | MAIL | FAX | PRIORITY (Business Days) | 2 | day [P | 2] | | | EME | | | noliday | | | ^{ry} | |
| Street: | | | | Email 1 or Fax | Michael. Gill ie. Southern | Daecom | .Com | | Date | and Tim | e Requir | red for all l | E&P TA | Ts: | | | | | | | |
| City/Province: | | | | Email 2 Lest | ie, Southern | Dacom. | Com | For tests | that car | not be p | erformed | according | to the se | rvice le | vel selec | ted, you | will be c | ontacte | d. | | |
| Postal Code: | | | | Email 3 | | | | | | | | | Δ | naly | sis Re | quest | | | | | |
| Invoice To | Same as Report To | YES NO | | | Invoice Di | stribution | _ | | | Indicate I | Filtered (| F), Preserv | red (P) | or Filter | ed and F | reserv | ed (F/P) | below | | | |
| | Copy of Invoice with Report | YES NO | | Select Invoice D | | EMAIL MAIL | FAX | P | | | | | | | | | | | | | |
| Company: | Chevron Car Chris Boys | nada Ltd | | Email 1 or Fax | Same as | above | | | | | | | | | | | | | | 7 I | |
| Contact: | Chris Bovs | | | Email 2 | | | |] | | 1 | | | | | | ļ | | ł | | φ | |
| | Project Infor | rmation | | (| Oil and Gas Require | d Fields (client u | se) |] | | | | | | | | | ĺ | | | ii. | |
| ALS Account # / | | | | AFE/Cost Center: | | PO# | | | \equiv | | | | | | | | | | 1 | onta | |
| Job #: 6 | 0542455 | | | Major/Minor Code: | | Routing Code: | | F.J. | EPA | | | | | | | | | | | of C | |
| PO / AFE: | | | | Requisitioner: | | | | > | 五 | | | | | | | | | 1 | | per Der D | |
| LSD: Fo | creshere | | | Location: | | | | $ \mathcal{A} $ | \leq | ا ا | | | | | | | | | | Number of Containers | |
| ALS Lab Wor | rk Order # (lab use only) | | | ALS Contact: (| Dean Watt | Sampler: [] | 2/ 0 | | エ | Melals | | | | | | | ĺ | | | | |
| | | <u>. </u> | | \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ | Jan Watt | Sampler: EA | 1/2013 | 1E) | 5 | -8 | | | | | - 1 | | | | | | |
| ALS Sample # (lab use only) | · · | le Identification and/or Co description will appear on tl | | | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | 8 | LEPH | 3 | | | | | | | | | | | |
| | ESA-S | | | | 18-54-17 | 9:25 | Sediment | X | メ | メ | | | | | | | | \top | | 1 4 | |
| | | | | | 10 300, 11 | | 3 4017-011 | | | | | | | | | _ | | \neg | | | |
| - | | · · · · · · · · · · · · · · · · · · · | | | - | | | | | | | | | | - | | | + | + | | |
| | | | | | - | | - | | | | | | | | | | | - | | | |
| | <u> </u> | | | | | | | | | | | | | | | | | _ | | | |
| | | · · · · · · · · · · · · · · · · · · · | | | | | | | | | | | | | | | | | | | |
| | | | | _ | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | _ | | | | | | |
| | | · | | | | | | 1 | | | | | | - | \dashv | - | \dashv | _ | | | |
| | | | | | | - | | \vdash | | | | | | | | | | _ | | | |
| | | · ··- | | | | - | | - | | | | | | | | | | _ | | | |
| <u> </u> | | | | | <u> </u> | | | | | | | | | | | | | | | | |
| Drinking | g Water (DW) Samples ¹ (clie | nt use) Specia | I Instructions I | | add on report by click | king on the drop-d | own list below | <u> </u> | | | | IPLE CO | | | | | | | | | |
| Are samples taken | from a Regulated DW System | ? | | | Caronic GGG Giny) | | | Frozei | | | | | | | bserva | | | | No. | - ; | |
| | No | | | _ | | | | Ice Pa | icks g Initia | ted. | | ubes | Ц | Justo | dy sea | Intac | it i | 'es | ☐ No | · 🗆 | |
| Are samples for hu | uman drinking water use? | 1 120 | C CS | R | | | | | - | | | EMPERAT | IDES 9 | ~. | | | EINIAI | COOL | D TEMOS | RATURES °C | |
| l _ | 2 40 | 0 | | 11 | | | | <u> </u> | 21411 | | JEEN 10 | | OINEO 1 | | | 1). | 10 | 7 | I LIVIT CI | 0.701.00 | |
| | SHIPMENT RELEA | SE (client use) | | | INITIAL SHIPMEN | IT RECEPTION (| ah use only) | <u> </u> | | 1 | | F17 | NAI C | HIDM | ENT P | ECE | TION | (lah () | se only) | | |
| Released by: | O / Date | | Time: | Received by: | INTIAL OF ILEMEN | Date: | us use only) | Time: | | Recei | ved by: | | 7 | 1117 IV! | | Date: | 1 1 | | | Time: | |
| Justin | Becker 5 | | - 13:40 | <u> </u> | VAIL OS | E LABORATORY | CODY VEGE | 1 01 15 | NTOO | | | | dy | | | | hli | 4 1 2 | <u> </u> | 1.40Pm | |
| | | | By the use of this | form the user acknowle | WHII edges and agrees with the | TE - LABORATORY | COPY YELLOW - CLIENT COPY as specified on the back page of the white - report copy. | | | | OCTOBER 2015 FRONT | | | | | | | | | | |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 19-JUL-17

Report Date: 26-JUL-17 17:42 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1961328
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 15-609404
Legal Site Desc: FORESHORE

Dean Watt, B.Sc. Account Manager

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

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



L1961328 CONTD....

PAGE 2 of 5 26-JUL-17 17:42 (MT)

Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1961328-1 SEDIMENT 19-JUL-17 09:15 ESA-6 | L1961328-2 SEDIMENT 19-JUL-17 09:30 ESA-7 | L1961328-3 SEDIMENT 19-JUL-17 10:00 ESA-8 |
|-------------------------------|---|---|---|---|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Physical Tests | Moisture (%) | 16.5 | 17.5 | 19.8 |
| | pH (1:2 soil:water) (pH) | 5.90 | 7.53 | 7.75 |
| Metals | Antimony (Sb) (mg/kg) | 0.17 | 0.22 | 0.19 |
| | Arsenic (As) (mg/kg) | 1.91 | 2.12 | 2.45 |
| | Barium (Ba) (mg/kg) | 45.0 | 38.8 | 83.7 |
| | Beryllium (Be) (mg/kg) | 0.35 | 0.35 | 0.43 |
| | Cadmium (Cd) (mg/kg) | <0.050 | <0.050 | 0.063 |
| | Chromium (Cr) (mg/kg) | 16.5 | 20.7 | 14.8 |
| | Cobalt (Co) (mg/kg) | 17.0 | 6.76 | 12.2 |
| | Copper (Cu) (mg/kg) | 38.7 | 29.6 | 35.8 |
| | Lead (Pb) (mg/kg) | 8.44 | 5.34 | 6.77 |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 |
| | Molybdenum (Mo) (mg/kg) | 0.30 | 0.35 | 0.34 |
| | Nickel (Ni) (mg/kg) | 9.45 | 8.07 | 8.68 |
| | Selenium (Se) (mg/kg) | <0.20 | 0.31 | <0.20 |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 |
| | Thallium (TI) (mg/kg) | 0.071 | 0.061 | <0.050 |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 |
| | Uranium (U) (mg/kg) | 0.529 | 0.941 | 0.487 |
| | Vanadium (V) (mg/kg) | 76.9 | 108 | 78.6 |
| | Zinc (Zn) (mg/kg) | 56.8 | 49.8 | 58.4 |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | Field MeOH | Field MeOH |
| | Benzene (mg/kg) | <0.0050 | <0.0050 | 0.0058 |
| | Ethylbenzene (mg/kg) | <0.015 | <0.015 | <0.015 |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 |
| | Xylenes (mg/kg) | <0.075 | <0.075 | <0.075 |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 93.2 | 83.9 | 83.5 |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 96.3 | 84.2 | 85.5 |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | <200 |
| | EPH19-32 (mg/kg) | <200 | <200 | <200 |
| | LEPH (mg/kg) | <200 | <200 | <200 |
| | HEPH (mg/kg) | <200 | <200 | <200 |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | <100 |

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

L1961328 CONTD....

PAGE 3 of 5 26-JUL-17 17:42 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1961328-1 SEDIMENT 19-JUL-17 09:15 ESA-6 | L1961328-2 SEDIMENT 19-JUL-17 09:30 ESA-7 | L1961328-3 SEDIMENT 19-JUL-17 10:00 ESA-8 | |
|--|---|---|---|---|--|
| Grouping | Analyte | | | | |
| SOIL | | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 89.3 | 86.5 | 88.6 | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 79.1 | SURR- ND 68.8 | 71.8 | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Surrogate: Acenaphthene d10 (%) | 92.6 | 85.9 | 96.0 | |
| | Surrogate: Chrysene d12 (%) | 89.4 | 89.5 | 95.5 | |
| | Surrogate: Naphthalene d8 (%) | 90.4 | 84.5 | 89.0 | |
| | Surrogate: Phenanthrene d10 (%) | 92.3 | 83.9 | 95.9 | |
| | | | | | |

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

Reference Information

L1961328 CONTD....

PAGE 4 of 5
26-JUL-17 17:42 (MT)

Version: FINAL

Qualifiers for Individual Parameters Listed:

Qualifier Description

SURR-ND Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected.

Test Method References:

ALS Test Code Matrix Test Description Method Reference**

EPH-TUMB-FID-VA Soil EPH in Solids by Tumbler and GCFID BC MOE EPH GCFID

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

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).

XYLENES-CALC-VA Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

Reference Information

L1961328 CONTD....

PAGE 5 of 5

26-JUL-17 17:42 (MT)

Version: FINAL

Calculation of Total Xylenes

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

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

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

| Laboratory Definition Code | Laboratory Location |
|----------------------------|---|
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |

Chain of Custody Numbers:

15-609404

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

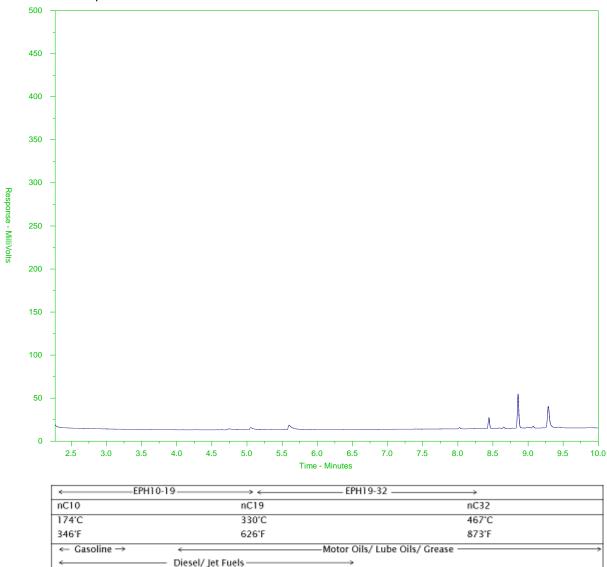
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1961328-1 Client Sample ID: ESA-6



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

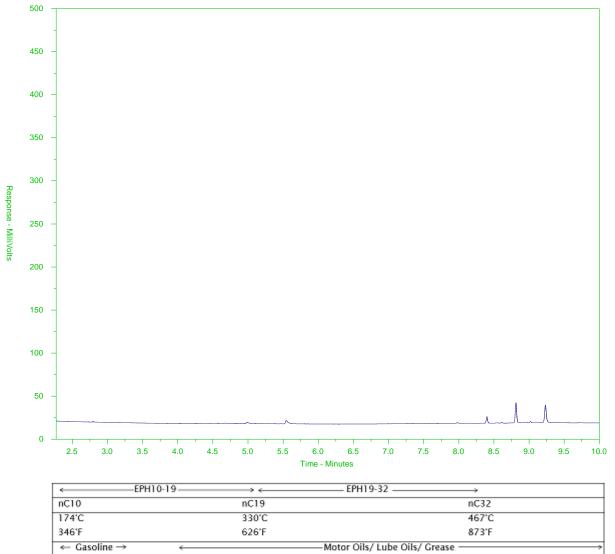
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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



ALS Sample ID: WG2574976-4#L1961328-1

Client Sample ID: ESA-6



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

Diesel/ Jet Fuels

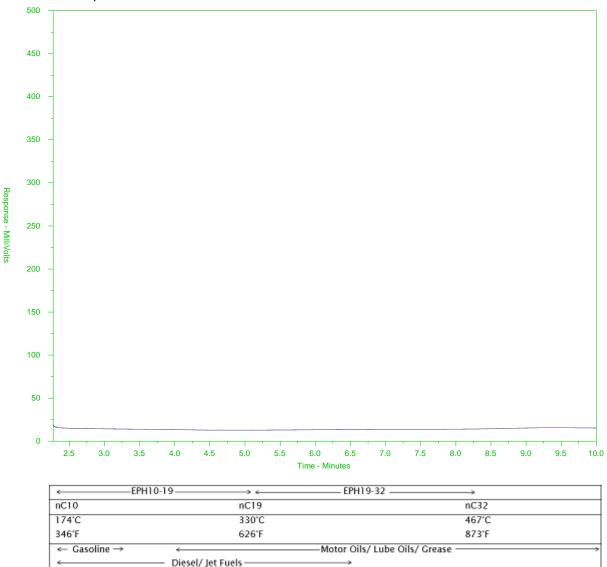
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1961328-2 Client Sample ID: ESA-7



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

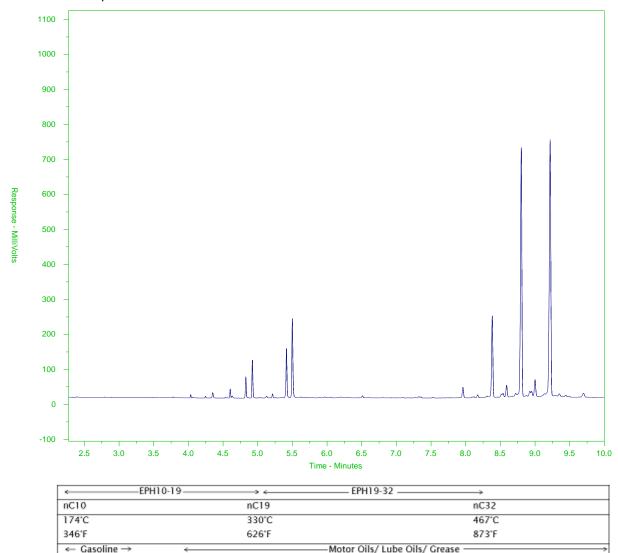
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1961328-3 Client Sample ID: ESA-8



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

Diesel/ Jet Fuels

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form

COC Number: 15 - 609404

Canada Toll Free: 1 800 668 9878

| | | | | | No. of Contrast of | | | | | | · | | | | | | |
|---------------------------------------|---|------------------------|---------------------------|---------------------------------------|--|---------------|-------------|-----------------|--------------|-------------|---------------|-------------|-------------|--------------|------------|----------------|--------------------|
| Report To | Contact and company name below will appear | on the final report | | Report Format | | | Select S | ervice 50 | | | .firm all E&P | TATs with | your AM - | surcharge: | will apply | | |
| Company: | Hecom | | Select Report For | mat: PDF | | EDD (DIGITAL) | | Re | gular [F | <u> </u> | Standa | rd TAT if | received b | y 3 pm - b | usiness da | ys - no surcha | ges apply |
| Contact: | Michael Gill | | | IC) Report with Repo | | | 7 Jays} | 4 | day [P4 |] | | չ | 1 E | usines | day [E | 1] | |
| Phone: | 664 444 64 | 00 | Compare Resu | lts to Criteria on Report - | provide details below i | box checked | HORIT | 3 | day [P3 |] | | RGEN | Same | Day, We | ekend o | r Statutory | |
| | Company address below will appear on the final report | п | Select Distribution | a | | | PR (Bush | 2 | day [P2 |] | | EME | | | day [E0 | | |
| Street: | | | Email 1 or Fax | michael | · gilled | ecom, com. | | Date : | and Time | Required | for all E&P | TATs: | | | | | - |
| City/Province: | | | Email 2 | slie. sout | hern @de | com, com | For tests | s that can | not be per | formed acc | ording to the | e service I | evel select | ed, you will | be contact | ed. | |
| Postal Code: | | _ | Email 3 | | | | | | | | | Analy | sis Rec | uest | | | |
| Invoice To | Same as Report To YES X | Ino | | Invoice Dis | | | L., | | Indicate Fi | ltered (F), | Preserved (| P) or Filte | red and P | reserved (| F/P) below | | |
| | Copy of Invoice with Report YES | NO | Select Invoice Dis | | EMAIL MAIL | | P | | | | | | | | | | |
| Company: | Chevron Canada | L+6. | Email 1 or Fax | Same | à5 d6 | OVE | | / | | | | | | | | | 1 |
| Contact: | Chris Bous. | • | Email 2 | | | | 12 | $ \mathcal{L} $ | 1 | | | 1 | | | | | ø |
| | Project Information | | 0 | il and Gas Require | l Fields (client us | se) | 9 | | | | | | | | | | iner |
| ALS Account # | Quote #: CONTONION | | AFE/Cost Center: | | PO# | | 1~ | \mathbb{U} | | | | - | | | | - | ntai |
| Job #: | 60542455 | | Major/Minor Code: | | Routing Code: | • | | \mathcal{I} | | | | | | | | | of Containers |
| PO / AFE: | | | Requisitioner: | | 1 | | 1 \ | | \sigma_* | | | | | - 1 | | | o ie |
| LSD: [- | Foreshore | | Location: | · · · · · · · · · · · · · · · · · · · | | | 1 . | 7 | 2 | | | | | | 1 | | quin |
| | ork Order # (lab use only) | | ALS Contact: $\mathcal L$ | How nos | Sampler: [(| 4P/JB. | 407 | 7 | to | | £ | | | | | | Z |
| ALS Sample # | Sample Identification a | nd/or Coordinates | . | Date | Time | Sample Type | $b \wedge$ | 1 | \mathbf{z} | | | | | | | | |
| (lab use only) | (This description will ap | pear on the report) | | (dd-mmm-yy) | (hh:mm) | Sample Type | 1 | | | | | | | | | | <u>,</u> |
| | ESA-6 | | , | 19-54-17 | 9:15 | Sediment | X | ∇ | X | | | | | | | | 4 |
| | ESA-6 ESA-7 ESA-8 | | | 1 | 9:30 | 1 | 1 | 1 | | | | | | | 1 | | |
| | FSA - 8 | | | Ų, | 10:00 | V | V | J | | | | \top | | | | | |
| | | | | | 7 5 5 5 | | <u> </u> | - | | | | | | | + | | <u>`</u> |
| | | | | | | - | | | - + | | - | + | | - | +-+ | | |
| · · · · · · · · · · · · · · · · · · · | | | | | | | | | | | | _ | | | + | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | j | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | 1 | | |
| | | | | | | | | | -+ | _ | | + | | | ++ | | |
| | | | | | | | | | | | | - | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| Deintri | ng Water (DW) Samples¹ (client use) | Special Instructions / | | | ing on the drop-do | wn list below | | | | SAMP | LE CONE | DITION | AS REC | EIVED | lab use | only) | |
| | • , , . , , , | | (elec | tronic COC only) | | | Froze | n | | | | SIF |)bservat | ions | Yes | ☐ No | |
| | en from a Regulated DW System? | | | | | | Ice Pa | icks | | Ice Cub | es 🔲 | Custo | ody seal | intact | Yes | ☐ No | |
| | ES X NO | 010 | | /0 | | | Coolin | g Initia | ted | | | | | | | | |
| | human drinking water use? | | _ | $\supset \vdash$ | | | | INII | TIAL COO | LER TEM | PERATURE | s∙c | | FI | NAL COO | ER TEMPERA | TURES °C |
| YE | ES 🔯 NO | | | - 1 | | | | | | |) | -6 | | | ĺ | | |
| | SHIPMENT RELEASE (client use) | | | INITIAL SHIPMEN | | ab use only) | | | | | FINAL | SHIP | | | ON (lab | use only) | |
| Released by: | Date: July 19 | Time: | Received by: | | Date: Jul | . 15 | Time: | J. 7 | Receive | ed by: | | | | ate: | | | Time: |
| DESERTO BACK | PAGE FOR ALS LOCATIONS AND SAMPLING INFO | 15:00 BMATION | L 1/2 | tick | J VI | COPY YELLOW | 15 | VV | DV. | | | | | | | | OCTOBER 2015 ERONT |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 19-JUL-17

Report Date: 20-JUL-17 15:07 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1961329
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 15-609403
Legal Site Desc: FORESHORE

Dean Watt, B.Sc. Account Manager

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

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



L1961329 CONTD.... PAGE 2 of 5

ALS ENVIRONMENTAL ANALYTICAL REPORT 20-JUL-17 15:07 (MT)

Version: **FINAL** L1961329-1 Sample ID Description SEDIMENT 19-JUL-17 Sampled Date 08:30 **Sampled Time** EIRA-8 Client ID Grouping Analyte SOIL Moisture (%) **Physical Tests** 16.8 pH (1:2 soil:water) (pH) 8.18 Antimony (Sb) (mg/kg) Metals 0.19 Arsenic (As) (mg/kg) 2.43 Barium (Ba) (mg/kg) 53.0 Beryllium (Be) (mg/kg) 0.28 Cadmium (Cd) (mg/kg) < 0.050 Chromium (Cr) (mg/kg) 29.0 Cobalt (Co) (mg/kg) 7.53 Copper (Cu) (mg/kg) 23.5 Lead (Pb) (mg/kg) 5.81 Mercury (Hg) (mg/kg) < 0.050 Molybdenum (Mo) (mg/kg) 0.56 Nickel (Ni) (mg/kg) 11.8 Selenium (Se) (mg/kg) < 0.20 Silver (Ag) (mg/kg) < 0.10 Thallium (TI) (mg/kg) < 0.050 Tin (Sn) (mg/kg) <2.0 Uranium (U) (mg/kg) 0.716 Vanadium (V) (mg/kg) 66.8 Zinc (Zn) (mg/kg) 56.6 **Volatile Organic VOC Sample Container** Field MeOH Compounds Benzene (mg/kg) < 0.0050 Ethylbenzene (mg/kg) < 0.015 Methyl t-butyl ether (MTBE) (mg/kg) <0.20 Styrene (mg/kg) < 0.050 Toluene (mg/kg) < 0.050 ortho-Xylene (mg/kg) < 0.050 meta- & para-Xylene (mg/kg) < 0.050 Xylenes (mg/kg) < 0.075 Surrogate: 4-Bromofluorobenzene (SS) (%) 72.9 Surrogate: 1,4-Difluorobenzene (SS) (%) 87.7 Hydrocarbons EPH10-19 (mg/kg) <200 EPH19-32 (mg/kg) <200 LEPH (mg/kg) <200

<200

<100

Volatile Hydrocarbons (VH6-10) (mg/kg)

HEPH (mg/kg)

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

L1961329 CONTD....

PAGE 3 of 5
20-JUL-17 15:07 (MT)

ALS ENVIRONMENTAL ANALYTICAL REPORT

Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1961329-1 SEDIMENT 19-JUL-17 08:30 EIRA-8 | | |
|--|---|--|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 93.5 | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 102.8 | | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | | |
| • | Acenaphthylene (mg/kg) | <0.050 | | |
| | Anthracene (mg/kg) | <0.050 | | |
| | Benz(a)anthracene (mg/kg) | <0.050 | | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | | |
| | Chrysene (mg/kg) | <0.050 | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | | |
| | Fluoranthene (mg/kg) | <0.050 | | |
| | Fluorene (mg/kg) | <0.050 | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | | |
| | Naphthalene (mg/kg) | <0.050 | | |
| | Phenanthrene (mg/kg) | <0.050 | | |
| | Pyrene (mg/kg) | <0.050 | | |
| | Surrogate: Acenaphthene d10 (%) | 109.4 | | |
| | Surrogate: Chrysene d12 (%) | 103.5 | | |
| | Surrogate: Naphthalene d8 (%) | 104.9 | | |
| | Surrogate: Phenanthrene d10 (%) | 109.2 | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

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

L1961329 CONTD.... PAGE 4 of 5

20-JUL-17 15:07 (MT) Version: FINAL

Reference Information

QC Samples with Qualifiers & Comments:

| QC Type Description | Parameter | Qualifier | Applies to Sample Number(s) | |
|---------------------------------|----------------|-----------|-----------------------------|--|
| Method Blank | Copper (Cu) | В | L1961329-1 | |
| Duplicate | Chromium (Cr) | DUP-H | L1961329-1 | |
| Qualifiers for Individual Paran | neters Listed: | | | |

| Qualifiers to | r Individual Parameters Listed: |
|---------------|--|
| Qualifier | Description |
| В | Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable. |
| DUP-H | Duplicate results outside ALS DQO, due to sample heterogeneity. |

Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** |
|-----------------|--------|------------------------------------|--------------------|
| EPH-TUMB-FID-VA | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

Hg-WW-200.2-CVAF-VA Soil Hg in Soil by CVAFS EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, sieved (wet sample) through a 2 mm (10 mesh) sieve, and a representative subsample of the material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

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

LEPH/HEPH-CALC-VA Soil LEPHs and HEPHs

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(b)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene, and Pyrene are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

MET-WW-200.2-CCMS-VA Soil

Metals in Soil by CRC ICPMS

EPA 200.2/6020A (mod)

BC MOE LABORATORY MANUAL (2005)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-SIEVE-VA Soil Moisture for CSR Metals Calculations ASTM D2974-00 Method A

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

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-WW-1:2-DI-MAN-VA Soil pH in Soil (1:2 Soil:Water Ext.) (WET) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the wet sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water, where the samples moisture is accounted for. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and

Reference Information

L1961329 CONTD....

PAGE 5 of 5

20-JUL-17 15:07 (MT)

Version: FINAL

reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

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).

XYLENES-CALC-VA Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

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

Laboratory Definition Code Laboratory Location

VA ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-609403

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

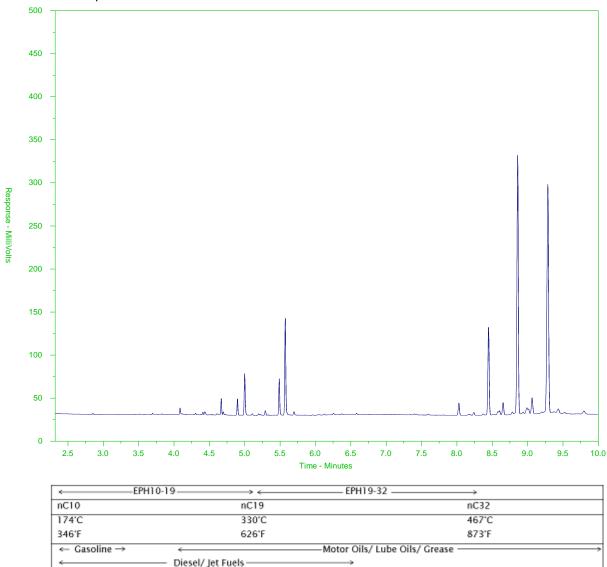
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1961329-1 Client Sample ID: EIRA-8



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form

L1961329-COFC

COC Number: 15 - 609403

ge of

www.alsglobal.com Canada Toll Free: 1 800 668 9878

| Report To | Contact and company name below will appear or | n the final report | | Report Format | | | Select Se | ervice Lev | el Below - | Please confir | m all E&P | TATs with | your AM - | surcharg | es will apply | | | |
|-----------------|---|--------------------------|--------------------|---|--------------------------|---------------|-------------------|-------------------|---------------------------|---------------|-------------|------------|-------------|-----------|---------------------------------------|-------------|-----------|---------------------------|
| Company: | Aecom | | Select Report Fo | rmat: PDF | | EDD (DIGITAL) | | Reç | gular [F | | Standar | TAT if | eceived b | y 3 pm - | business d | ıys - no sı | urcharges | apply |
| Contact: | Michael Gill | | Quality Control (C | QC) Report with Repo | | NO | TY Days) | 4 0 | lay [P4 | |] | λ | 1 E | usine | ss day [E | 1] | | |
| Phone: | 604 4446400 |) | Compare Resu | ılts to Criteria on Report - p | provide details below if | box checked | RIORIT Iness (| 3 0 | day [P3 | |] | ERGE | Same | | eekend | | itory | $ \mathbf{x}$ |
| | Company address below will appear on the final report | t | Select Distributio | n: EMAIL | | FAX | (Bus | 2 0 | lay [P2 | |] | E | | | liday [E | | | X |
| Street: | | | Email 1 or Fax | michael. | 9:11(0) 20 | COMICOM | | | | Required fo | | | | | 5 BY | | | |
| City/Province: | | | جم ا Email 2 | slie. sou | the ine do | ecomicon | For tests | that can | not be per | formed accor | ding to the | service le | evel select | ed, you w | ill be contac | ted. | | |
| Postal Code: | | | Email 3 | | | | | | | | | Analy | sis Red | uest | | | | |
| nvoice To | Same as Report To | No | | Invoice Dis | tribution | | | lı | ndicate Fi | tered (F), Pr | eserved (F |) or Filte | red and P | reserved | (F/P) below | <i>i</i> | | Ì |
| | Copy of Invoice with Report | NO | Select Invoice Di | stribution: | EMAIL MAIL | FAX | P | | | | | | | | | | | |
| Company: | Cho vion Canada | Ltd | Email 1 or Fax | S'dMe | 15 d bov | e, | | | | | | | | | | | | |
| Contact: | Chris Boys | · · · · · · · | Email 2 | | | | | 7 | , | | | | | | 1 | | ı | ည |
| | Project Information | | C | il and Gas Required | Fields (client us | e) | ا _ ا | 0 | ı | | | | | | | | | aine |
| ALS Account # / | | | AFE/Cost Center: | | PO# | | | 117 | | - 1 | | | | | | | | Conti |
| Job #: | 60542455 | | Major/Minor Code: | | Routing Code: | | 0 | * | | | | | | | | . | . [| of C |
| PO / AFE: | | | Requisitioner: | | | , | 1.2 | <u> </u> | $\sqrt{}$ | | | | | | | | | per |
| LSD: | Foreshore | | Location: | | | | \mathbb{N} | (_) | <u>~</u>) | | | | | | | | | * Number of Containers |
| ALC: - L' | ork Order # (lab use only) | | ALS Contact: T | Dean Wolf | Sampler: T | 10/-0 | $ \cdot\rangle$ | X | 10 | | | | | | | | | - |
| ALS Lab WO | ork Order # (lab use only) | | ALS COITACE. | Dear mall | Sampler: E | AR/JB |] [] | 7 | ' ~ | | | | | | | | l | |
| ALS Sample # | Sample Identification ar | nd/or Coordinates | | Date | Time | Sample Type | \mathbb{H} | . Ų[| \mathcal{Z}_{\parallel} | | | | | | | | ı | |
| (lab use only) | (This description will app | pear on the report) | | (dd-mmm-yy) | (hh:mm) | | € C | <u>\</u> | | | | | | | | | | |
| | ETRA-8 | | | 119-Jul-17 | 8:30 | Sediment | X | X | \vee | | | | | | | | | 4 |
| | | | | | | | | | 7 | | | | | | | | | 1 |
| | | | | | | | | | | | | | | • | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | \vdash | | | | - | | | | - | | | |
| | | | | | ļ | | - | | | | | - | | + | | | | |
| L | | | | | | | | | | | | ļ | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | _ | _ | 1 | | | | | | |
| ļ | | | | | | | | | | | + | + | | | - | | | |
| | | | | | | | | | - | | - | + | | | - | - | -+ | |
| | | | | | 1 | | ļ | | | | | 1 | | \ | \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ | | | |
| Drinki | ng Water (DW) Samples¹ (client use) | Special Instructions / S | | add on report by click ctronic COC only) | king on the drop-do | wn list below | Erca | | | SAMPL | CONE | | AS REC | | Yes | | No | |
| | en from a Regulated DW System? | | (ele | - Caronic GGG Only) | | | Froze | | | Lac Cubo | | | | | | | No No | |
| | ES NO | \mathcal{O} | _ | \sim | | | Ice Pa | icks ig Initia | ☐ ted | Ice Cube | , Ц | Cusio | ody sea | mact | Yes | Ц | INO | Ц |
| | human drinking water use? | D (| | SR | | | | - | | LER TEMPE | RATURE | S °C | - г | | FINAL COC | LER TEN | IPERATI | JRES °C |
| 1 | · · · · · · · · · · · · · · · · · · · | | | ~ I~ | | | | | T | | 7 | Ž | | | | | | |
| YE | S NO | | | INITIAL CHIDINEN | IT RECEPTION (Is | h use only) | Ц | - 1 | | | FINAL | SHIP | /ENT P | ECEP | ΓΙΟΝ (lab | tise on | lv) | |
| Released by: | SHIPMENT RELEASE (client use) Date: | i Time: | Received by: | | IDate: | an ase only) | Time: | | Receiv | ed by: | INAL | , OI HEN | | Date: | TON (IdD | use of | | Time: |
| 17/ | July 19/ | 2017 15:00 | | never | JVY | 17 | 15 | OO | | • | | | • | | | | | |
| REFER TO MACK | PAGE FOR ALS LOCATIONS AND SAMPLING INFOR | | | WHI | E - LABORATORY | COPY YELLO | | | PY | | | | | | | | | OCTOBER 2015 FRONT |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 20-JUL-17

Report Date: 27-JUL-17 17:13 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1962060
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 15-609407
Legal Site Desc: FORESHORE

Dean Watt, B.Sc. Account Manager

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

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



L1962060 CONTD....

PAGE 2 of 5 27-JUL-17 17:13 (MT)

Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1962060-1 SEDIMENT 20-JUL-17 11:20 ESA-9 | L1962060-2 SEDIMENT 20-JUL-17 11:25 ESA-10 | L1962060-3 SEDIMENT 20-JUL-17 11:30 ESA-11 | |
|-------------------------------|---|---|--|--|--|
| Grouping | Analyte | | | | |
| SOIL | | | | | |
| Physical Tests | Moisture (%) | 4.67 | 12.6 | 13.8 | |
| | pH (1:2 soil:water) (pH) | 7.42 | 7.46 | 8.41 | |
| Metals | Antimony (Sb) (mg/kg) | <0.10 | 0.14 | 0.16 | |
| | Arsenic (As) (mg/kg) | 0.74 | 1.48 | 2.09 | |
| | Barium (Ba) (mg/kg) | 3.10 | 120 | 30.4 | |
| | Beryllium (Be) (mg/kg) | <0.10 | 0.47 | 0.13 | |
| | Cadmium (Cd) (mg/kg) | <0.050 | <0.050 | 0.067 | |
| | Chromium (Cr) (mg/kg) | 0.93 | 14.7 | 9.57 | |
| | Cobalt (Co) (mg/kg) | 0.59 | 9.95 | 4.39 | |
| | Copper (Cu) (mg/kg) | 0.99 | 31.4 | 14.9 | |
| | Lead (Pb) (mg/kg) | 0.82 | 4.57 | 8.88 | |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Molybdenum (Mo) (mg/kg) | 0.13 | 0.13 | 0.41 | |
| | Nickel (Ni) (mg/kg) | 1.82 | 8.44 | 6.22 | |
| | Selenium (Se) (mg/kg) | 0.51 | <0.20 | <0.20 | |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 | |
| | Thallium (TI) (mg/kg) | <0.050 | 0.081 | <0.050 | |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | |
| | Uranium (U) (mg/kg) | 0.128 | 0.505 | 0.459 | |
| | Vanadium (V) (mg/kg) | 2.00 | 82.0 | 35.3 | |
| | Zinc (Zn) (mg/kg) | 3.3 | 71.0 | 40.6 | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | Field MeOH | Field MeOH | |
| | Benzene (mg/kg) | 0.0071 | 0.0064 | 0.0208 | |
| | Ethylbenzene (mg/kg) | <0.015 | <0.015 | <0.015 | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Xylenes (mg/kg) | <0.075 | <0.075 | <0.075 | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 94.8 | 94.6 | 89.9 | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 91.8 | 98.6 | 89.9 | |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | <200 | |
| | EPH19-32 (mg/kg) | <200 | <200 | <200 | |
| | LEPH (mg/kg) | <200 | <200 | <200 | |
| | HEPH (mg/kg) | <200 | <200 | <200 | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | <100 | |

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

L1962060 CONTD.... PAGE 3 of 5

27-JUL-17 17:13 (MT)

Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1962060-1 SEDIMENT 20-JUL-17 11:20 ESA-9 | L1962060-2 SEDIMENT 20-JUL-17 11:25 ESA-10 | L1962060-3 SEDIMENT 20-JUL-17 11:30 ESA-11 | |
|--|---|---|--|--|--|
| Grouping | Analyte | | | | |
| SOIL | | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 86.7 | 93.6 | 93.7 | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | SURR- ND | 114.2 | 104.9 | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | 208.1 <0.050 | <0.050 | <0.050 | |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | 2-Methylnaphthalene (mg/kg) | 0.717 | <0.050 | <0.050 | |
| | Naphthalene (mg/kg) | 0.377 | <0.050 | <0.050 | |
| | Phenanthrene (mg/kg) | 0.081 | <0.050 | <0.050 | |
| | Pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Surrogate: Acenaphthene d10 (%) | 109.0 | 101.3 | 105.5 | |
| | Surrogate: Chrysene d12 (%) | 104.5 | 94.5 | 104.8 | |
| | Surrogate: Naphthalene d8 (%) | 111.9 | 98.5 | 98.6 | |
| | Surrogate: Phenanthrene d10 (%) | 104.4 | 99.9 | 101.6 | |
| | | | | | |

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

Reference Information

PAGE 4 of 5 27-JUL-17 17:13 (MT)

L1962060 CONTD....

Version: FINAL

Qualifiers for Individual Parameters Listed:

Qualifier Description

SURR-ND Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected.

Test Method References:

ALS Test Code Matrix Test Description Method Reference**

EPH-TUMB-FID-VA Soil EPH in Solids by Tumbler and GCFID BC MOE EPH GCFID

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

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).

XYLENES-CALC-VA Soil Sum of Xvlene Isomer Concentrations EPA 8260B & 524.2

Reference Information

L1962060 CONTD....

PAGE 5 of 5

27-JUL-17 17:13 (MT)

Version: FINAL

Calculation of Total Xylenes

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

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

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

| Laboratory Definition Code | Laboratory Location |
|----------------------------|---|
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |

Chain of Custody Numbers:

15-609407

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

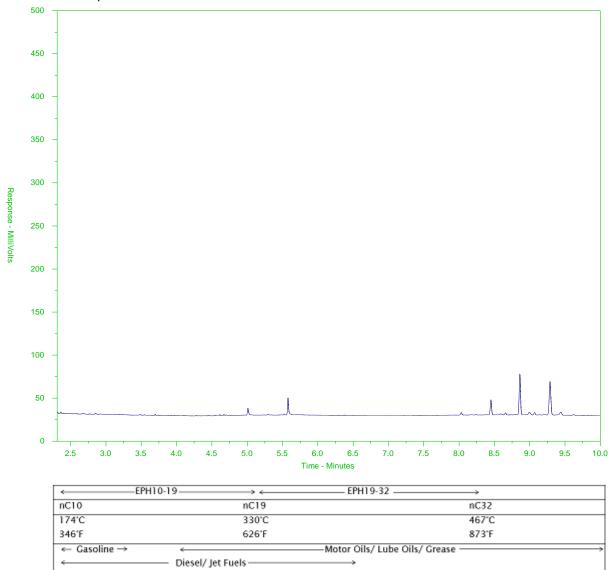
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1962060-1 Client Sample ID: ESA-9



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

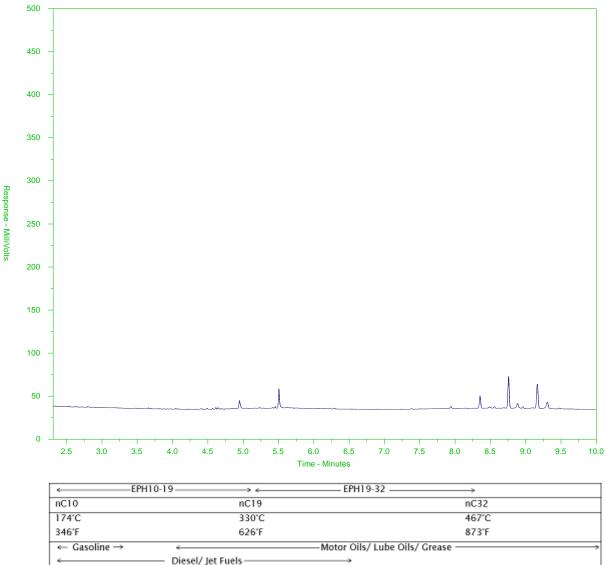
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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



ALS Sample ID: WG2575771-4#L1962060-1

Client Sample ID: ESA-9



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

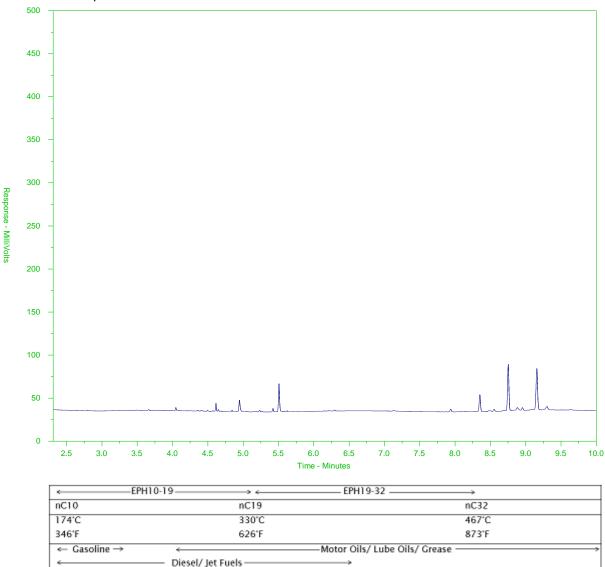
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1962060-2 Client Sample ID: ESA-10



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

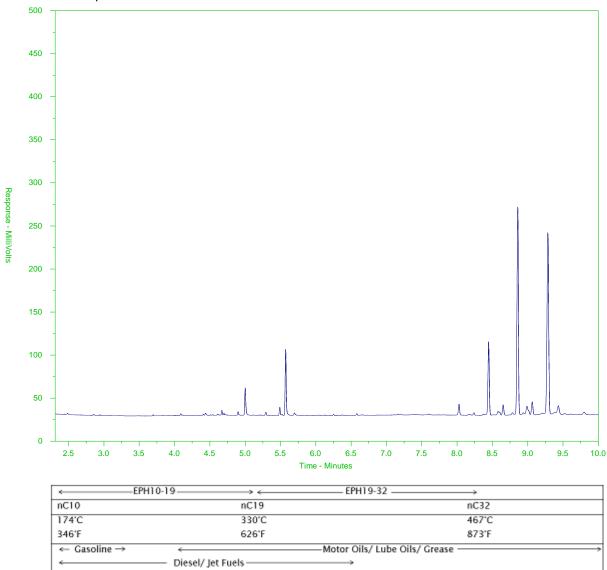
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1962060-3 Client Sample ID: ESA-11



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form

L1962060-COFC

DOC Number: 15 - 609407

age of

www.alsglobal.com Canada Toll Free: 1 800 668 9878

| Report To | Contact and company name below will appear | ar on the final report | | Report Format | | | Select a | 21VIUE 140 | · v · | | • | ./s with | your AM - | surcharge | s will apply | | |
|--------------------------------|--|------------------------|---------------------|------------------------------|--------------------------|----------------|------------------------|------------|---------------|--------------|---------------|---|------------|--------------|--------------|----------------|--|
| Company: | AECOM | | Select Report Fo | rmat: PDF | EXCEL . | EDD (DIGITAL) | | Re | gular [| R] 🔽 | Standar | d TAT if re | eceived b | y 3 pm - t | usiness da | ys - no surcha | rges apply |
| Contact: | Michael Gill | · | Quality Control (| QC) Report with Repo | | NO | Y hays} | 4 | day [P | 1] [| | ò | 1 E | Busines | s day [E | 1] | |
| Phone: | 604 444 6400 | | Compare Res | ults to Criteria on Report - | provide details below it | box checked | PRIORITY usiness Da | 3 | day [P: | 3] [| | EMERGENCY | Same | Day, We | ekend o | or Statutory | , _— |
| | Company address below will appear on the final rep | oort | Select Distribution | n: EMAIL | MAIL [| FAX | PR (Busil | 2 | day [P: | 2] [| | EWE | | hol | iday [E0 |] | Ш |
| Street: | | | michael | gill@ae | COM. COV | N | | Date : | and Time | Required | for all E&P | TATs: | | | | | |
| City/Province: | | | Appelie, 6 | outhern @ | OP CAM. | 20W1 | For tests | that can | not be pe | rformed acc | ording to the | service le | vel select | ed, you wil | be contac | ed. | • • |
| Postal Code: | | | Email 3 | | | | | | | | | Analys | sis Rec | uest | | | |
| Invoice To | Same as Report To YES | NO | | Invoice Dis | stribution | | _ | | ndicate F | iltered (F), | reserved (| P) or Filter | ed and P | reserved (| F/P) below | | |
| | Copy of Invoice with Report |] NO | Select Invoice D | stribution: | EMAIL MAIL | FAX | P | | | | | | | | | |] |
| Company: | Chevron Canada L | tol. | Email 1 or Fax | same as | about | | | | | | | | | | | | 1 |
| Contact: | Chris BOUS | | Email 2 | | | |] | | | | | + | | | | | ę |
| | Project Information | | | Oil and Gas Required | l Fields (client us | ie) | | | | | | | | | | | Containers |
| ALS Account # / | | | AFE/Cost Center: | | PO# | |] | 7 | | | | | | | | | onts |
| Job #: 6 | 0542455 | | Major/Minor Code: | | Routing Code: | | 13 | HEPH | | | | | | | | | ofC |
| PO/AFE: | | | Requisitioner: | | | | ンア | 46 | | | | | | | | | per |
| LSD: Fo | reshore | | Location: | | | |] [] | ~ | .v | | | | | | | | Number of |
| ALS Lab Wo | rk Order# (lab use only) | | ALS Contact: | Dean Watt | Sampler: EA | /cxw | EX. | Id | Metals | | | | | | | | |
| ALS Sample # (lab use only) | Sample Identification (This description will a | | | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | BTEX | <u>1E</u> | Me | | | | | | | | · |
| | | ppour on the reporty | | 20-Jul -17 | 11:20 | Sediment | X | X | X | | | + + | - | + | | | n |
| | ESA - 9 ESA - 10 | | | 20-341 | | Segiment | 7 | - | $\frac{1}{1}$ | | | | | | + | | '7 |
| | | | | | 11:25 | — | - | | + | | | | | | | | |
| | ESA - 11 | | | <u> </u> | 11:30 | V | V | 4 | V | | | 1 | | | | | V |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | ĺ | 1 |
| | | | | ï | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | - | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | + | | |
| | | | | | | | | | | | | | | | | | |
| ļ | | | | | | | | | | | | | | | - | | ļ |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| Drinkin | g Water (DW) Samples¹ (client use) | Special Instructions / | | | ing on the drop-do | own list below | | | | | E CONE | | | | | | |
| | n from a Regulated DW System? | | (ele | ctronic COC only) | | | Frozei | | _ | Ш | _ | | bserva | | Yes | ☐ No | |
| YES | . • | 00 000 | 2 | | | | ice Pa | | | Ice Cub | es | Custo | dy seal | intact | Yes | ☐ No | |
| | uman drinking water use? | BC CSK | _ | | | | Coolin | g Initia | | LI TEM | CDATUCE | 0.00 | | | MAL COO | ED TELEDED | ATUDES OF |
| Are samples for I | * | - | - | | | | | IMI | HAL CO | JEK IEM | PERATURE | 3-0 | | | INAL GOO | LERTEMPER | 24 C |
| L YES | 1,41 | | | INSTINI COMPANY | T DECEDION " | - b | | | | | CIAIAI | CLUD' | ENT S | - C- C- T- 1 | ONT/1=1: | | 1 24 4 |
| Released by: | SHIPMENT RELEASE (client use) Date: | Time: | Received by: | INITIAL SHIPMEN | Date: | use only) | Time: | | Recei | red by: | FINAL | MAIN | | loto: | 1 - 6 | use only) | Time: |
| MARK + | July 20, | 2017 2:30 | | | | | | | | ,- | lad | M | | (| M | 120 | Time: 30Pn |
| DECEDIO DAOK | DAGE FOR HOLOGATIONS AND OF INCINCINCINCINCINCINCINCINCINCINCINCINCI | ODMATION GA | | 340 112 | E LABORATORY | CORV VELLOV | | NE OO | - | | 100 | // | | | | | |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 20-JUL-17

Report Date: 21-JUL-17 13:08 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1962063

Project P.O. #: 0015243589

Job Reference: 60542455

C of C Numbers: 15-609405

Legal Site Desc: FORESHORE

Dean Watt, B.Sc. Account Manager

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

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



L1962063 CONTD....

PAGE 2 of 7 21-JUL-17 13:08 (MT)

Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1962063-1 SEDIMENT 20-JUL-17 10:00 EIRA-9 | L1962063-2 SEDIMENT 20-JUL-17 10:05 EIRA-10 | L1962063-3 SEDIMENT 20-JUL-17 10:10 EIRA-11 | L1962063-4 SEDIMENT 20-JUL-17 10:15 EIRA-12 | L1962063-5 SEDIMENT 20-JUL-17 10:20 EIRA-13 |
|-------------------------------|---|--|---|---|---|---|
| Grouping | Analyte | - | | | | |
| SOIL | | | | | | |
| Physical Tests | Moisture (%) | 12.6 | 16.9 | 17.6 | 12.6 | 15.0 |
| | pH (1:2 soil:water) (pH) | 7.50 | 8.66 | 8.60 | 8.06 | 7.63 |
| Metals | Antimony (Sb) (mg/kg) | 0.17 | 0.17 | 0.16 | 0.13 | 0.15 |
| | Arsenic (As) (mg/kg) | 3.73 | 2.95 | 3.68 | 3.28 | 3.11 |
| | Barium (Ba) (mg/kg) | 89.6 | 70.2 | 65.3 | 73.5 | 76.3 |
| | Beryllium (Be) (mg/kg) | 0.26 | 0.25 | 0.26 | 0.26 | 0.25 |
| | Cadmium (Cd) (mg/kg) | 0.111 | 0.097 | 0.110 | 0.105 | 0.098 |
| | Chromium (Cr) (mg/kg) | 18.4 | 18.5 | 17.8 | 20.2 | 17.3 |
| | Cobalt (Co) (mg/kg) | 5.08 | 5.32 | 5.39 | 5.21 | 5.62 |
| | Copper (Cu) (mg/kg) | 17.3 | 15.8 | 20.5 | 15.3 | 17.4 |
| | Lead (Pb) (mg/kg) | 6.06 | 5.50 | 5.63 | 5.69 | 5.78 |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Molybdenum (Mo) (mg/kg) | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 |
| | Nickel (Ni) (mg/kg) | 17.7 | 18.1 | 17.1 | 18.7 | 19.4 |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| | Thallium (Tl) (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| | Uranium (U) (mg/kg) | 0.874 | 0.812 | 0.809 | 0.907 | 0.877 |
| | Vanadium (V) (mg/kg) | 36.9 | 34.9 | 38.0 | 35.1 | 39.7 |
| | Zinc (Zn) (mg/kg) | 38.0 | 33.4 | 34.5 | 35.6 | 37.0 |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | Field MeOH | Field MeOH | Field MeOH | Field MeOH |
| | Benzene (mg/kg) | 0.0124 | 0.0101 | 0.0899 | 0.0083 | 0.0111 |
| | Ethylbenzene (mg/kg) | <0.015 | <0.015 | <0.015 | <0.015 | <0.015 |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | 0.178 |
| | Xylenes (mg/kg) | <0.075 | <0.075 | <0.075 | <0.075 | 0.178 |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 76.8 | 86.8 | 79.5 | 83.5 | 85.2 |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 89.4 | 97.9 | 90.7 | 96.8 | 96.7 |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | <200 | <200 | <200 |
| | EPH19-32 (mg/kg) | 660 | 790 | 680 | 680 | 660 |
| | LEPH (mg/kg) | <200 | <200 | <200 | <200 | <200 |
| | HEPH (mg/kg) | 660 | 790 | 680 | 680 | 660 |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | <100 | <100 | <100 |

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

L1962063 CONTD.... PAGE 3 of 7

ALS ENVIRONMENTAL ANALYTICAL REPORT

21-JUL-17 13:08 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1962063-6 SEDIMENT 20-JUL-17 10:25 EIRA-14 | | |
|-------------------------------|---|---|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Physical Tests | Moisture (%) | 18.9 | | |
| | pH (1:2 soil:water) (pH) | 8.34 | | |
| Metals | Antimony (Sb) (mg/kg) | 0.17 | | |
| | Arsenic (As) (mg/kg) | 2.82 | | |
| | Barium (Ba) (mg/kg) | 56.4 | | |
| | Beryllium (Be) (mg/kg) | 0.24 | | |
| | Cadmium (Cd) (mg/kg) | 0.098 | | |
| | Chromium (Cr) (mg/kg) | 19.7 | | |
| | Cobalt (Co) (mg/kg) | 6.46 | | |
| | Copper (Cu) (mg/kg) | 16.2 | | |
| | Lead (Pb) (mg/kg) | 6.11 | | |
| | Mercury (Hg) (mg/kg) | <0.050 | | |
| | Molybdenum (Mo) (mg/kg) | <0.50 | | |
| | Nickel (Ni) (mg/kg) | 17.0 | | |
| | Selenium (Se) (mg/kg) | <0.20 | | |
| | Silver (Ag) (mg/kg) | <0.10 | | |
| | Thallium (TI) (mg/kg) | <0.050 | | |
| | Tin (Sn) (mg/kg) | <2.0 | | |
| | Uranium (U) (mg/kg) | 0.716 | | |
| | Vanadium (V) (mg/kg) | 39.3 | | |
| | Zinc (Zn) (mg/kg) | 37.6 | | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | | |
| | Benzene (mg/kg) | 0.0779 | | |
| | Ethylbenzene (mg/kg) | 0.046 | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | | |
| | Styrene (mg/kg) | <0.050 | | |
| | Toluene (mg/kg) | <0.050 | | |
| | ortho-Xylene (mg/kg) | 0.062 | | |
| | meta- & para-Xylene (mg/kg) | 0.340 | | |
| | Xylenes (mg/kg) | 0.402 | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 79.1 | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 89.4 | | |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | | |
| | EPH19-32 (mg/kg) | 740 | | |
| | LEPH (mg/kg) | <200 | | |
| | HEPH (mg/kg) | 740 | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | | |

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

L1962063 CONTD....

PAGE 4 of 7 21-JUL-17 13:08 (MT)

Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1962063-1 SEDIMENT 20-JUL-17 10:00 EIRA-9 | L1962063-2 SEDIMENT 20-JUL-17 10:05 EIRA-10 | L1962063-3 SEDIMENT 20-JUL-17 10:10 EIRA-11 | L1962063-4 SEDIMENT 20-JUL-17 10:15 EIRA-12 | L1962063-5 SEDIMENT 20-JUL-17 10:20 EIRA-13 |
|--|---|--|---|---|---|---|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | <100 | <100 |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 95.8 | 110.4 | 100.5 | 108.3 | 98.8 |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 73.3 | 79.9 | 76.8 | 75.3 | 76.5 |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| • | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Surrogate: Acenaphthene d10 (%) | 66.1 | 125.3 | 97.0 | 105.1 | 117.1 |
| | Surrogate: Chrysene d12 (%) | 60.5 | 112.2 | 89.1 | 109.7 | 121.4 |
| | Surrogate: Naphthalene d8 (%) | 60.1 | 116.5 | 99.3 | 99.4 | 112.3 |
| | Surrogate: Phenanthrene d10 (%) | 60.6 | 119.3 | 91.5 | 107.0 | 114.9 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

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

L1962063 CONTD.... PAGE 5 of 7

21-JUL-17 13:08 (MT) Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1962063-6 SEDIMENT 20-JUL-17 10:25 EIRA-14 | | | |
|--|---|---|--|--|--|
| Grouping | Analyte | | | | |
| SOIL | | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | | | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | | | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 80.1 | | | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | Description Sampled Date Sampled Time Client ID | | | |
| | Acenaphthylene (mg/kg) | <0.050 | | | |
| | Anthracene (mg/kg) | | | | |
| | Benz(a)anthracene (mg/kg) | | | | |
| | Benzo(a)pyrene (mg/kg) | | | | |
| | Benzo(b)fluoranthene (mg/kg) | | | | |
| | Benzo(g,h,i)perylene (mg/kg) | | | | |
| | Benzo(k)fluoranthene (mg/kg) | | | | |
| | Chrysene (mg/kg) | | | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | | | |
| | Fluoranthene (mg/kg) | <0.050 | | | |
| | Fluorene (mg/kg) | <0.050 | | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | | | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | | | |
| | Naphthalene (mg/kg) | <0.050 | | | |
| | Phenanthrene (mg/kg) | <0.050 | | | |
| | Pyrene (mg/kg) | <0.050 | | | |
| | Surrogate: Acenaphthene d10 (%) | 122.4 | | | |
| | Surrogate: Chrysene d12 (%) | 120.2 | | | |
| | Surrogate: Naphthalene d8 (%) | 116.9 | | | |
| | Surrogate: Phenanthrene d10 (%) | 119.2 | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

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

Reference Information

L1962063 CONTD....

PAGE 6 of 7

21-JUL-17 13:08 (MT)

Version: FINAL

QC Samples with Qualifiers & Comments:

| QC Type Description | | Parameter | Qualifier | Applies to Sample Number(s) | | | | |
|--|------------------------|--|-----------|--------------------------------|--|--|--|--|
| Certified Reference Material | | Silver (Ag) | MES | L1962063-1, -2, -3, -4, -5, -6 | | | | |
| Qualifiers fo | or Individual Paramete | rs Listed: | | | | | | |
| Qualifier | Description | | | | | | | |
| MES Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Pascan (considered acceptable as per OMOE & CCME). | | 0% of analytes in a Multi-Element Scan / Multi-Parameter | | | | | | |

Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** | |
|-----------------|--------|------------------------------------|--------------------|--|
| EPH-TUMB-FID-VA | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID | |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

Hg-WW-200.2-CVAF-VA Soil Hg in Soil by CVAFS EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, sieved (wet sample) through a 2 mm (10 mesh) sieve, and a representative subsample of the material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

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

LEPH/HEPH-CALC-VA Soil LEPHs and HEPHs

BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-WW-200.2-CCMS-VA Soil

Metals in Soil by CRC ICPMS

EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-SIEVE-VA Soil Moisture for CSR Metals Calculations ASTM D2974-00 Method A

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

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-WW-1:2-DI-MAN-VA Soil pH in Soil (1:2 Soil:Water Ext.) (WET) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the wet sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water, where the samples moisture is accounted for. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID"

Reference Information

L1962063 CONTD....

PAGE 7 of 7

21-JUL-17 13:08 (MT)

Version: FINAL

(Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a

gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

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).

XYLENES-CALC-VA Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

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

Laboratory Definition Code Laboratory Location

VA ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-609405

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

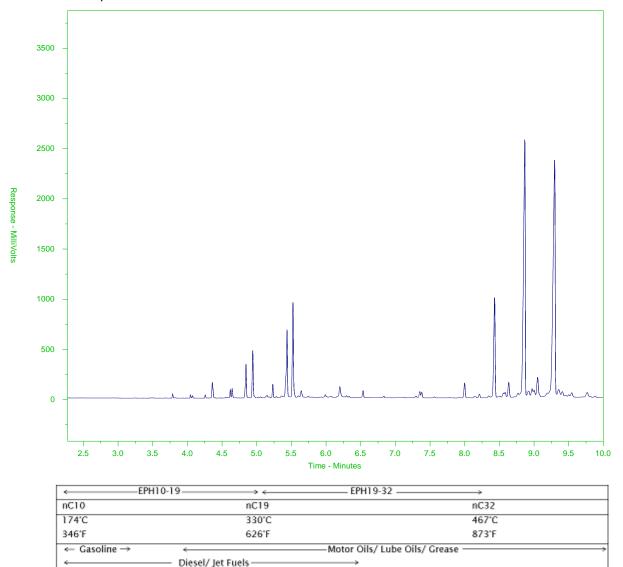
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1962063-1 Client Sample ID: EIRA-9



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

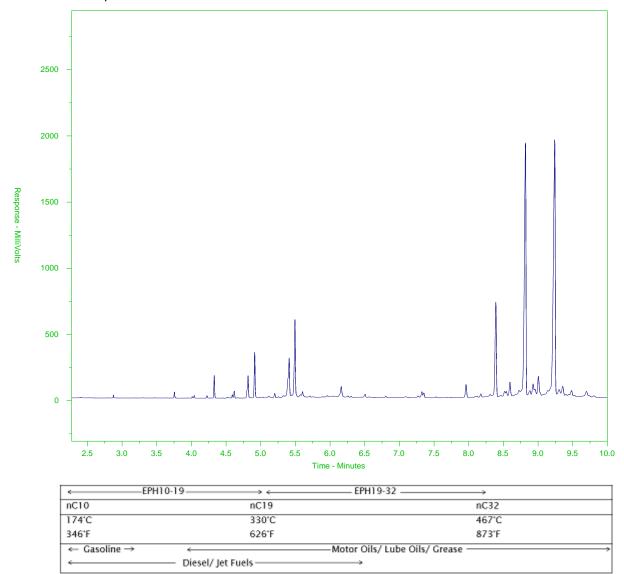
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1962063-2 Client Sample ID: EIRA-10



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

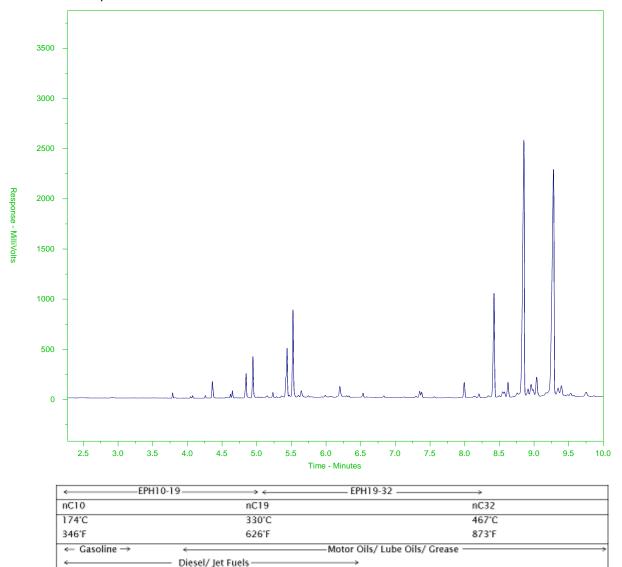
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1962063-3 Client Sample ID: EIRA-11



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

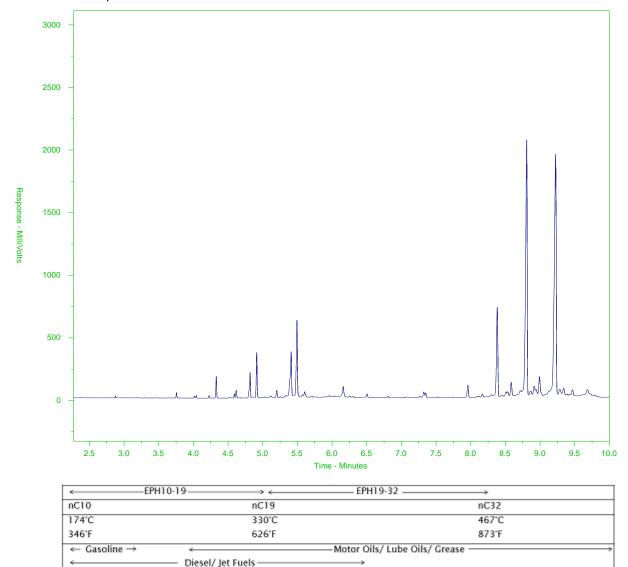
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1962063-4 Client Sample ID: EIRA-12



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

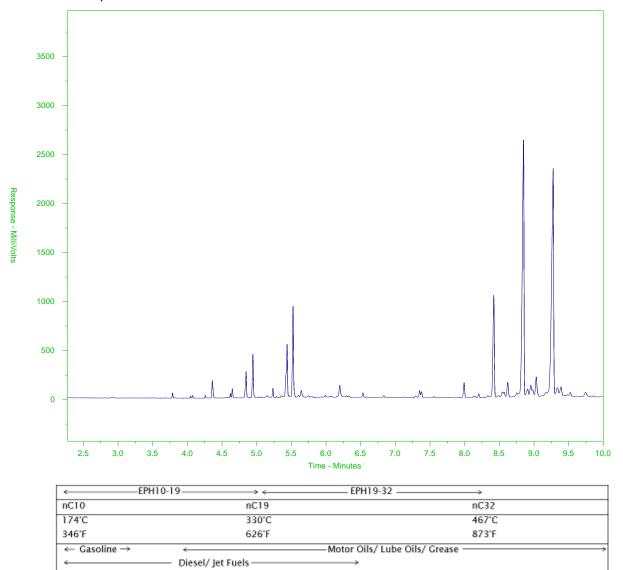
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1962063-5 Client Sample ID: EIRA-13



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

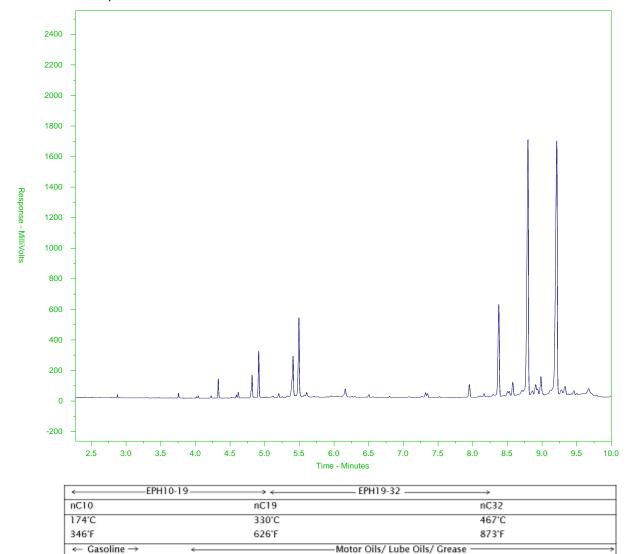
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1962063-6 Client Sample ID: EIRA-14



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

Diesel/ Jet Fuels

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form

COC Number: 15 - 609405

| | www.alsglobal.com Cana | da Toll Free: 1 800 668 9 | 3878 | | L196. | 2003 | -001 | • | | | | | | | | | |
|-----------|--|--------------------------------|-------------------------|---|--|-----------------------------|------------|--------------|----------------|---------------|-------------------|-----------------|-------------------|------------------|-----------------|-------------|--|
| t To | Contact and company name below will appear on the final report | | Report Forma | | | 1 | L T | ver Below | - Please con | firm all E&P | TATs with | your AM | l - surcharges | s will apply | | | |
| ıy: | AFCOM | Select Report Form | at: PDF | EXCEL | EDD (DIGITAL) | | Re | gular [l | R] 📗 | Standa | rd TAT if | received | by 3 pm - b | ousiness da | ys - no sur | charges ap | oply |
| | Michael Gill | Quality Control (QC |) Report with Rep | oort YES | □ NO | ays) | 4 | day [P4 |] | | λ | 1 | Business | s day [E | 1] | | 7 |
| | 604 444 6400 | Compare Results | to Criteria on Report - | provide details below | if box checked | ORIT. | 3 | day [P3 | 31 F | Ħ | GENC | | Day, We | | _ | | |
| | Company address below will appear on the final report | Select Distribution: | EMAI | L MAIL | FAX | PRIORITY (Business Days) | | day [P2 | ` | 7 | EMER | Same | holi | iday [E0] | i Statut | Oly 🔀 | $ \leftarrow$ |
| | | Mei Chael. | | | | += | | | Required f | or all E&D | ΤΛΤα | └── | | $\sim \lambda C$ | > | | |
| ince: | | Postie Sov | Till ever | 204040 C | | En. too | | | | | | | cted, you will | Σ | | | |
| de: | | Email 3 | ELINELA D | vecon. | D/// | FOI LESI | s mat can | not be pe | normed acco | ording to the | | | | . be contacte | 3G. | | |
| | Same as Report To YES NO | Liliali 3 | I | 7-1-21 | | + | | | | | | sis Re | | | | | |
| ō | | | | istribution | | | · · | ndicate F | iltered (F), F | reserved (| P) or Filte | red and I | Preserved (F | F/P) below | | | |
| | Copy of Invoice with Report YES NO | Select Invoice Distri | bution: | EMAIL MAIL | FAX | 16 | | | | | | | | | | | |
| : | Cheuron Canada Ltd | Email 1 or Fa | me as | Blo ove | |]՝ | . | | | | | | | | | | |
| | (MNS_13045 | Email 2 | | | | _ | | | | | | | | | | | go |
| | Project Information | Oil a | and Gas Require | ed Fields (client u | se) | | | | | ŀ | | 1 | | | ŀ | | iner |
| ount#/ | Quote #: | AFE/Cost Center: | | PO# | | | 1 | | | | | 1 | i | | | | nta |
| | 60542455 | Major/Minor Code: | | Routing Code: | | VPIT | 0- | . | | | | 1 | | | | | ပ္ခံ |
| : | | Requisitioner: | | | | 79 | 五 | | | | | | | | | | 9 |
| Fare | share | Location: | | | | | | | | | | i l | | | | 1 | Number of Containers |
| | rk Order # (lab use only) | ALS Contact: | Vott | Sampler: EA | P/CXW | T W | OH/ | tals, | | | | | | | | | ź |
| npie# | Sample Identification and/or Coordinate | | Date | Time | 10/10/ | 1 1- | | 9 | | | | | | | | | |
| only) | (This description will appear on the report | i i | (dd-mmm-yy) | (hh:mm) | Sample Type | 72 | | Z | | | | | | | | | |
| | EIRA-9 | | | | | <u> </u> | | \ | | | | | - | + | | | |
| | | μ | o-Jul-17 | | Sediment | X | Z, | \mathbf{X} | | | | | | + | | | 1_ |
| | EIRA-10 | | | 10:05 | | $\perp \downarrow$ | | | | | | | | | | | 1_ |
| | EIRA- 11 | | İ | 10:10 | | { | | 1 | | | | | | 1 1 | ľ | | 1 |
| | ETRA-12 | | | 10:15 | | | | | | | | | | | | | 1 |
| | ETRA-13 | | | | | ++- | | -/- | | | + | _ | | + | | | + |
| | 5104-13 | - | // | 10:20 | | 1. | - | -1,- | | | | | | + | | | ↓ |
| | EIRA-14 | | | 10:25 | | V | V | V | | | | | | | | ' | <u> </u> |
| | ' | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | 1 | | | 1 | | | |
| | | | | | | | | | | | | \rightarrow | -+- | +-+ | | | |
| | | | | | | + | | | | _ | 1 | \rightarrow | | + | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | 1 | | | | | | | | | | | | | |
| | | | | | | | | | | | 1 1 | $\neg \uparrow$ | | 1 1 | \top | | |
| | Special Instruct | ions / Specify Criteria to add | d on report by clic | king on the drop-d | own list below | 1 | l | | SAMPI | E COND | ITION A | AS RE | CEIVED (| (lab use | only) | | |
| Drinkin | g Water (DW) Samples ¹ (client use) | (electro | onic COC only) | g on the drop-u | O HIST DELOW | Froze | n | | | | | bserva | | Yes | □ N | lo. | |
| les taker | n from a Regulated DW System? | | | | | Ice Pa | | | Ice Cube | s \square | Custo | | | | | | |
| YES | uman drinking water use? | C5Q | | | | | ig Initial | | | - ⊔ | - 3010 | _, Joa | | 100 | – " | | ш |
| les for h | uman drinking water use? | COD | | | | | | | LER TEMPI | ERATURES | s °C | | - FII | NAL COOL | ER TEMPI | RATURE: | s °C |
| YES | s Xno | | | | | | | | | | | - | | | i Will C | v.lone. | 24 |
| | SHIPMENT RELEASE (client use) | | INITIAL QUIDMEI | NT RECEPTION (I | ob vao only) | .L | | | | FINIAL | CL UP: | ENT F | FOEDTY | 201 (1) | | | <u>~ </u> |
| y: / | | ne: Received by: | MIDAL SHIFME! | Date: | au use only) | Time: | | Receive | ed by: | riNAL | . onlyM | | RECEPTION Date: / | | | Time | <u> </u> |
| 1 | | 36 | | | | """ | | . 1000101 | ou by. | 10 | \mathcal{L}_{x} | | Jaio. // | 1. | 20 | 1 1 11 11 | e: • 7 |

K PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION PIM WHITE - LABORATORY COPY YELLOW - CLIENT COPY all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy. 'K PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION 's are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 21-JUL-17

Report Date: 22-JUL-17 17:45 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1962860
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 15-609408
Legal Site Desc: Foreshore

Dean Watt, B.Sc. Account Manager

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

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group An ALS Limited Company



L1962860 CONTD....

PAGE 2 of 5 22-JUL-17 17:45 (MT) Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1962860-1 Sediment 21-JUL-17 09:00 EIRA-15 | | |
|-------------------------------|---|---|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Physical Tests | Moisture (%) | 17.5 | | |
| | pH (1:2 soil:water) (pH) | 9.06 | | |
| Metals | Antimony (Sb) (mg/kg) | 0.14 | | |
| | Arsenic (As) (mg/kg) | 3.19 | | |
| | Barium (Ba) (mg/kg) | 76.8 | | |
| | Beryllium (Be) (mg/kg) | 0.24 | | |
| | Cadmium (Cd) (mg/kg) | 0.102 | | |
| | Chromium (Cr) (mg/kg) | 21.8 | | |
| | Cobalt (Co) (mg/kg) | 4.99 | | |
| | Copper (Cu) (mg/kg) | 14.8 | | |
| | Lead (Pb) (mg/kg) | 6.21 | | |
| | Mercury (Hg) (mg/kg) | <0.050 | | |
| | Molybdenum (Mo) (mg/kg) | 0.57 | | |
| | Nickel (Ni) (mg/kg) | 17.9 | | |
| | Selenium (Se) (mg/kg) | <0.20 | | |
| | Silver (Ag) (mg/kg) | <0.10 | | |
| | Thallium (TI) (mg/kg) | <0.050 | | |
| | Tin (Sn) (mg/kg) | <2.0 | | |
| | Uranium (U) (mg/kg) | 0.882 | | |
| | Vanadium (V) (mg/kg) | 37.2 | | |
| | Zinc (Zn) (mg/kg) | 32.4 | | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | | |
| | Benzene (mg/kg) | 0.0303 | | |
| | Ethylbenzene (mg/kg) | 0.101 | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | | |
| | Styrene (mg/kg) | <0.050 | | |
| | Toluene (mg/kg) | <0.070 | | |
| | ortho-Xylene (mg/kg) | 0.148 | | |
| | meta- & para-Xylene (mg/kg) | 0.386 | | |
| | Xylenes (mg/kg) | 0.534 | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 90.7 | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 92.9 | | |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | | |
| | EPH19-32 (mg/kg) | 670 | | |
| | LEPH (mg/kg) | <200 | | |
| | HEPH (mg/kg) | 670 | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | | |

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

L1962860 CONTD.... PAGE 3 of 5

22-JUL-17 17:45 (MT) Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1962860-1 Sediment 21-JUL-17 09:00 EIRA-15 | | |
|--|---|---|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 89.3 | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 97.5 | | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | | |
| · · · · · · · · · · · · · · · · · · · | Acenaphthylene (mg/kg) | <0.050 | | |
| | Anthracene (mg/kg) | <0.050 | | |
| | Benz(a)anthracene (mg/kg) | <0.050 | | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | | |
| | Chrysene (mg/kg) | <0.050 | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | | |
| | Fluoranthene (mg/kg) | <0.050 | | |
| | Fluorene (mg/kg) | <0.050 | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | | |
| | 2-Methylnaphthalene (mg/kg) | 0.272 | | |
| | Naphthalene (mg/kg) | DLQ <0.20 | | |
| | Phenanthrene (mg/kg) | <0.050 | | |
| | Pyrene (mg/kg) | <0.050 | | |
| | Surrogate: Acenaphthene d10 (%) | 92.2 | | |
| | Surrogate: Chrysene d12 (%) | 85.3 | | |
| | Surrogate: Naphthalene d8 (%) | 86.7 | | |
| | Surrogate: Phenanthrene d10 (%) | 91.8 | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

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

L1962860 CONTD....

PAGE 4 of 5

22-JUL-17 17:45 (MT)

Version: FINAL

Qualifiers for Individual Parameters Listed:

| Qualifier | Description |
|-----------|---|
| DLB | Detection Limit Raised. Analyte detected at comparable level in Method Blank. |
| DLQ | Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria. |

Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** | |
|-----------------|--------|------------------------------------|--------------------|--|
| EPH-TUMB-FID-VA | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID | |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

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).

L1962860 CONTD.... PAGE 5 of 5 22-JUL-17 17:45 (MT) Version: FINΔI

XYLENES-CALC-VA

Sum of Xylene Isomer Concentrations

EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

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

Laboratory Definition Code Laboratory Location VA

ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-609408

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

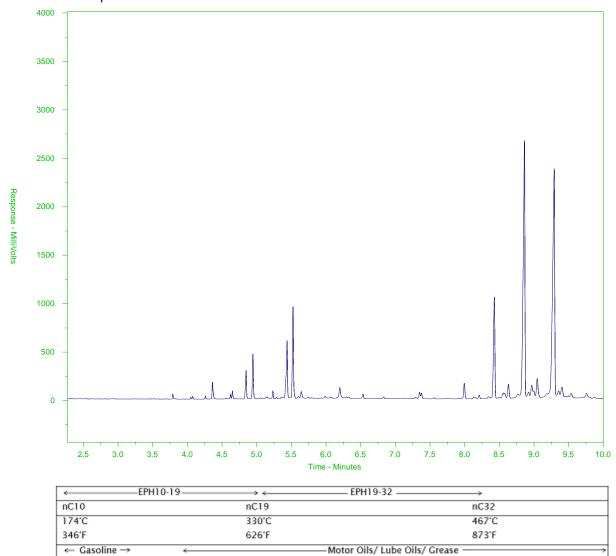
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

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

Test results reported relate only to the samples as received by the laboratory. UNLESS OTHERWISE STATÉD, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION. Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



ALS Sample ID: L1962860-1 Client Sample ID: EIRA-15



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

Diesel/ Jet Fuels

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form



L1962860-COFC

COC Number: 15 - 609408

age of

www.alsglobal.com Canada Toll Free: 1 800 668 9878

| Report To Contact and company name below will appear on the final report Report Format / Distribution Select Service Level Below - Please confirm all E&P TATS with your AM - surcharges will apply Company: Company: Company: Contact: Minacl Gill Quality Control (QC) Report with Report Report Format / Distribution Report Format / Distribution Select Service Level Below - Please confirm all E&P TATS with your AM - surcharges will apply Regular [R] Standard TAT if received by 3 pm - business days - no surcharges will apply Quality Control (QC) Report with Report YES NO Regular [R] Standard TAT if received by 3 pm - business days - no surcharges will apply A day [P4] Standard TAT if received by 3 pm - business days - no surcharges will apply Contact: No No Pigg 4 day [P4] Standard TAT if received by 3 pm - business days - no surcharges will apply | ges apply |
|--|---------------------------------------|
| A / | дез арріў |
| | |
| Phone: 604 444 6400 | |
| Company address below will appear on the final report Select Distribution: EMAIL MAIL FAX # g 2 day [P2] | |
| Street: Email 1 or Fax michael.gill@aecom.com Date and Time Required for all E&P TATS: ASAP City/Province: Email 2 [eS/ie, Southern Paecom.com For tests that can not be performed according to the service level selected, you will be contacted. | |
| City/Province: Email 2 [es/ig. Southern @ accom can For tests that can not be performed according to the service level selected, you will be contacted. | |
| Analysis Request | |
| Invoice To Same as Report To YES X NO Invoice Distribution Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below | 1 |
| Copy of Invoice with Report X YES NO Select Invoice Distribution: X EMAIL MAIL FAX | 1 |
| Company: Chevron Canada Ltd. Email 1 or Fax Same as above | 1 |
| Contact: Chris Roys Email 2 | ω |
| Project Information Oil and Gas Required Fields (client use) | Number of Containers |
| ALS Account # / Quote #: Job #: 605 42455 Major/Minor Code: Routing Code: | onta |
| Job #: 6C5 42455 Major/Minor Code: Routing Code: | o Jo |
| PO/AFE: Requisitioner: LSD: Fore shore Location: |) ser |
| | lmn (um |
| ALS Lab Work Order # (lab use only) ALS Contact: ALS Sample # Sample Identification and/or Coordinates Date Time Sample Type | 2 |
| ALS Sample # Sample Identification and/or Coordinates Date Time | Ì |
| (lab use only) (This description will appear on the report) (dd-mmm-yy) (hh:mm) Sample Type | |
| EIRA-15 21-jul-17 9:00 Sediment XXX | 4 |
| | · · · · · · · · · · · · · · · · · · · |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| CANDLE CONDITION AS PECENTED (1) | <u></u> |
| Drinking Water (DW) Samples¹ (client use) Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only) Frozen SIF Observations Yes No | |
| Are samples taken from a Regulated DW System? | - H |
| I VEC WAS | - |
| Are samples for human drinking water use? BC CSR Cooling Initiated INITIAL COOLER TEMPERATURES °C FINAL COOLER TEMPERATURES °C FI | TURES °C |
| TYES XNQ | |
| SHIPMENT RELEASE (client use) INITIAL SHIPMENT RECEPTION (lab use only) FINAL SHIPMENT RECEPTION (lab use only) | |
| Released by: Date: 7 21 217 Time: Received by: Date: Time: Received by: Date: 1721/17 | Time: 35 |
| REFER TO BACK PAGE RALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY | OCTOBER 2016 EDCAT |

Failure to complete all partous of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 22-JUL-17

Report Date: 25-JUL-17 14:56 (MT)

Version: FINAL REV. 2

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1962974
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 15-609406
Legal Site Desc: Foreshore

Comments:

25-JUL-2017 LEPH, HEPH, EPH and PAH results have been added.

Dean Watt, B.Sc. Account Manager

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

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



L1962974 CONTD....

PAGE 2 of 5 25-JUL-17 14:56 (MT) Version: FINAL REV. 2

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1962974-1 SEDIMENT 22-JUL-17 09:25 EIRA-16 | | |
|-------------------------------|---|---|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Physical Tests | Moisture (%) | 22.9 | | |
| | pH (1:2 soil:water) (pH) | 8.65 | | |
| Metals | Antimony (Sb) (mg/kg) | 0.12 | | |
| | Arsenic (As) (mg/kg) | 3.53 | | |
| | Barium (Ba) (mg/kg) | 46.4 | | |
| | Beryllium (Be) (mg/kg) | 0.40 | | |
| | Cadmium (Cd) (mg/kg) | 0.089 | | |
| | Chromium (Cr) (mg/kg) | 6.47 | | |
| | Cobalt (Co) (mg/kg) | 3.66 | | |
| | Copper (Cu) (mg/kg) | 12.1 | | |
| | Lead (Pb) (mg/kg) | 14.6 | | |
| | Mercury (Hg) (mg/kg) | <0.050 | | |
| | Molybdenum (Mo) (mg/kg) | 0.39 | | |
| | Nickel (Ni) (mg/kg) | 5.77 | | |
| | Selenium (Se) (mg/kg) | <0.20 | | |
| | Silver (Ag) (mg/kg) | <0.10 | | |
| | Thallium (TI) (mg/kg) | <0.050 | | |
| | Tin (Sn) (mg/kg) | <2.0 | | |
| | Uranium (U) (mg/kg) | 1.77 | | |
| | Vanadium (V) (mg/kg) | 23.1 | | |
| | Zinc (Zn) (mg/kg) | 41.8 | | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | | |
| | Benzene (mg/kg) | 217 | | |
| | Ethylbenzene (mg/kg) | 1570 | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <8.0 | | |
| | Styrene (mg/kg) | <2.0 DLA | | |
| | Toluene (mg/kg) | 1950 | | |
| | ortho-Xylene (mg/kg) | 2210 | | |
| | meta- & para-Xylene (mg/kg) | 5330 | | |
| | Xylenes (mg/kg) | 7530 | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 100.0 | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 100.0 | | |
| Hydrocarbons | EPH10-19 (mg/kg) | 32400 | | |
| | EPH19-32 (mg/kg) | 22900 | | |
| | LEPH (mg/kg) | 32200 | | |
| | HEPH (mg/kg) | 22900 | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | 97000 | | |

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

L1962974 CONTD....

PAGE 3 of 5 25-JUL-17 14:56 (MT) Version: FINAL REV. 2

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1962974-1 SEDIMENT 22-JUL-17 09:25 EIRA-16 | | |
|--|---|---|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | 86000 | | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | Not Reportable | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | SDO:R NA | | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | Not Reportable OLCI <4.0 | | |
| | Acenaphthylene (mg/kg) | <2.0 | | |
| | Anthracene (mg/kg) | <2.0 | | |
| | Benz(a)anthracene (mg/kg) | <0.60 | | |
| | Benzo(a)pyrene (mg/kg) | <0.40 | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.50 | | |
| | Benzo(g,h,i)perylene (mg/kg) | 0.569 | | |
| | Benzo(k)fluoranthene (mg/kg) | <0.30 | | |
| | Chrysene (mg/kg) | <2.0 | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.40 | | |
| | Fluoranthene (mg/kg) | <0.90 | | |
| | Fluorene (mg/kg) | 8.51 | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.40 | | |
| | 2-Methylnaphthalene (mg/kg) | 239 | | |
| | Naphthalene (mg/kg) | 142 | | |
| | Phenanthrene (mg/kg) | 13.7 | | |
| | Pyrene (mg/kg) | 5.56 | | |
| | Surrogate: Acenaphthene d10 (%) | 113.1 | | |
| | Surrogate: Chrysene d12 (%) | 94.5 | | |
| | Surrogate: Naphthalene d8 (%) | 101.1 | | |
| | Surrogate: Phenanthrene d10 (%) | 76.7 | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

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

L1962974 CONTD.... PAGE 4 of 5 25-JUL-17 14:56 (MT)

Version: FINAL REV. 2

Qualifiers for Individual Parameters Listed:

| Qualifier | Description |
|-----------|---|
| DLA | Detection Limit adjusted for required dilution |
| DLCI | Detection Limit Raised: Chromatographic Interference due to co-elution. |
| DLQ | Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria. |
| SDO:RNA | Surrogate diluted out:% recovery not available |
| SMI | Surrogate recovery could not be measured due to sample matrix interference. |

Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** |
|-----------------|--------|------------------------------------|--------------------|
| EPH-TUMB-FID-VA | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)
VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

L1962974 CONTD.... PAGE 5 of 5 25-JUL-17 14:56 (MT)

Version: FINAL REV. 2

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).

XYLENES-CALC-VA

Soil

Sum of Xylene Isomer Concentrations

EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

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

Laboratory Definition Code

Laboratory Location

VA

ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-609406

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

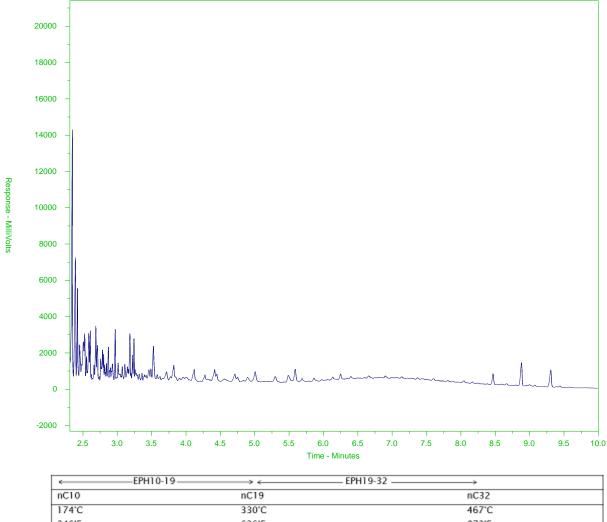
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1962974-1 Client Sample ID: EIRA-16



| | -EPH10-19 | — EPH19-32 — → |
|--------------|-------------------|---------------------------------|
| nC10 | nC19 | nC32 |
| 174°C | 330°C | 467°C |
| 346'F | 626°F | 873°F |
| ← Gasoline → | ← | Motor Oils/ Lube Oils/ Grease — |
| < | Diesel/ Jet Fuels | <u></u> |

The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

coc Number: 15 - 609406

Page of

www.aisglobal.com

| | | · · · · · · · · · · · · · · · · · · · | | | \ | | | | | | | | | | | | |
|----------------|----------------------------------|---------------------------------------|---------------------|---------------------------------|-------------------|--|-----------------|-----------|--------------|----------------|-----------------|--|--------------|---------------|--|----------------|----------------------|
| Report To | Contact and company name | below will appear on the final report | | Report Format | Distribution | | Select S | ervice Le | et below - | F16436 CO | E&P T | ATs with | your AM - s | urcharges | will apply | | - |
| Company: | AECOM | | Select Report Fo | ormat: PDF | | EDD (DIGITAL) | | Re | gular [F |] | Standard | TAT if re | eceived by | 3 pm - bu | siness da | ys - no surcha | rges apply |
| Contact: | Michael Gill | | Quality Control (| QC) Report with Repo | rt YES | NO NO | Y ays) | 4 (| day [P4] | | | Շ | 1 Bt | ısiness | day [E | [1] | |
| Phone: | 604 444 646 | 00 | Compare Res | sults to Criteria on Report - p | | | JORIT Tess C | 3 (| day [P3] | | | RGEN | Same D | av. Wee | ekend (| or Statutor | |
| | Company address below will appea | r on the final report | Select Distribution | on: EMAIL | MAIL | FAX | PR (Busia | 2 (| iay [P2 | | | EWE | | holid | lay [E0 | I | |
| Street: | 3292 Produc | ASON | EMAIN OLT PLA | 1 gill @ ac | OW . TO IN | ^ | | Date a | ınd Time | Required for | all E&P T | ATs: | 4 | 15/1 | Ø | | |
| City/Province: | Burnabu | | Epolio c | southern | Dingerm | CONO | For tests | that can | not be per | formed accord | ing to the | service le | vel selected | l, you will I | oe contac | ted. | |
| Postal Code: | 10 | | Email 3 | 30 20 1 4 1221 01 | e te com | | | | _ | | | Analys | sis Requ | est | _ | • | |
| nvoice To | Same as Report To | YES X NO | | Invoice Dis | tribution | | | - I | ndicate Fil | tered (F), Pre | served (P | or Filter | ed and Pre | served (F | /P) below | , | |
| | Copy of Invoice with Report | XYES NO | Select Invoice D | | EMAIL MAIL | FAX | P | | | | | | | _ | | | |
| Company: | Chevron Canad | la Lital. | Email 1 45 | ne as al | DOVE/ | | | | | | | | | | | | |
| Contact: | Chris Bous | | Email 2 | | | | . | | | | | | | | | | ဖွ |
| | Project Informa | tion | | Oil and Gas Required | Fields (client us | se) | 1 | 土 | | | | | | | | | aine |
| LS Account # / | | | AFE/Cost Center: | | PO# | | | ō | | | | | | | | | onte |
| | 0542455 | | Major/Minor Code: | | Routing Code: | | d | لآ | } | | | | | | | | J _C |
| O/AFE: | | | Requisitioner: | | | • | | 工 | | | | | | | | ŀ | Jer (|
| SD: FO | reshore | • | Location: | | | | | | S | | | | | | | | Number of Containers |
| ALC Lab Was | rk Order# (lab use only) | | ALS Contacts | | Common gram | _ | 1×1 | ~= | | | | | | | | | Z |
| ALS Lab Wo | ik Order # (lab use orny) | | ALS Contact: | Wash | Sampler: E | ₹P | النا | `Q_ | - | | | | | | | | |
| ALS Sample # | Sample Id | entification and/or Coordinates | | Date | Time | Sample Type | 1 5 | m | 2 | | Ĭ | 1 | | | | | |
| (lab use only) | (This des | cription will appear on the report) | | (dd-mmm-yy) | (hh:mm) | Sample Type | CA | | 2 | | | | | | | | |
| | EIRA-16 | | | 22-Jul-17 | 9:25 | Sediment | Ż | X | \mathbf{X} | | | | | | | | 1/1 |
| | | | | 341. 1 | | | | - | | | | | | | | | |
| | | | | | | | | | | | 1 | | | + | | | |
| | | | | | | | | | | _ | | ├ | - | + | | | |
| | | | | | | | | | | | ļ | | | | | | _ |
| | | | | | | | | | | | | | | | <u> </u> | | |
| | | | | | | | | | | | | | | | | | |
| | • | | | | | | | | | | | | | | 1] | | |
| | | | | | | | | | i | | | | | | 1 | | |
| | | | | ÷ | | | | | | | + | | | _ | | | |
| | | | | | | | | | | | | - | | | | | + |
| | | | | | | - | | | | | | | | - | - | | - |
| | | | | | | | | | | | | | | _ | | | |
| | | | | | | | | , | | | | | | | | | |
| Drinkin | g Water (DW) Samples¹ (client u | Special Instructions | | add on report by click | ng on the drop-do | own list below | | | | SAMPLE | | | | <u> </u> | | | |
| | | 30, | (ele | ectronic COC only) | | | Frozer | ו | _ | | | | oservatio | | Yes | ☐ No | _ |
| | from a Regulated DW System? | | ۸.۵ | | | | Ice Pa | | _ | ice Cubes | | Custo | dy seal i | ntact | Yes | ☐ No | |
| | NO | BC (| JSIA | | | | Coolin | g Initiat | | | | | | | | | |
| · | uman drinking water use? | | , | | | | <u> </u> | THIAT | IAL COO | ER TEMPER | ATURES | ° C | | | | LER TEMPER | ATURES °C |
| YES | | | | | | | | | | | | | | | 10.0 | | |
| Released by: | SHIPMENT RELEASE (| (client use) | Received by: | INITIAL SHIPMEN | T RECEPTION (I | ab use only) | Time: | | Docah | | FINAL | SHIPM | | | N (lab | use only) | Time |
| | | 22, 2017 | neceived by: | | Dale. | | me: | | Receive | u by. | 1/1 | Un | | ite: | nh | 22 | I In Day |
| REFER TO BACK | PAGE FOR ALS LOCATIONS AND SA | | · | WHIT | E - LABORATORY | COPY YELLOV | V - CLIE | NT COF | PΥ | | - : <u>// L</u> | ~ 1/ | | | () | | OCTOBER 2015 FRONT |
| | | | | | | | | | | | | | | | | | |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 24-JUL-17

Report Date: 26-JUL-17 10:40 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1963473
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 15-609409
Legal Site Desc: FORESHORE

Dean Watt, B.Sc. Account Manager

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

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



L1963473 CONTD.... PAGE 2 of 5

ALS ENVIRONMENTAL ANALYTICAL REPORT

26-JUL-17 10:40 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1963473-1 SEDIMENT 24-JUL-17 10:50 EIRA-17 | | |
|-------------------------------|---|---|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Physical Tests | Moisture (%) | 20.1 | | |
| | pH (1:2 soil:water) (pH) | 8.85 | | |
| Metals | Antimony (Sb) (mg/kg) | 0.17 | | |
| | Arsenic (As) (mg/kg) | 3.71 | | |
| | Barium (Ba) (mg/kg) | 52.9 | | |
| | Beryllium (Be) (mg/kg) | 0.29 | | |
| | Cadmium (Cd) (mg/kg) | 0.111 | | |
| | Chromium (Cr) (mg/kg) | 22.4 | | |
| | Cobalt (Co) (mg/kg) | 5.06 | | |
| | Copper (Cu) (mg/kg) | 15.9 | | |
| | Lead (Pb) (mg/kg) | 6.94 | | |
| | Mercury (Hg) (mg/kg) | <0.050 | | |
| | Molybdenum (Mo) (mg/kg) | 0.29 | | |
| | Nickel (Ni) (mg/kg) | 19.1 | | |
| | Selenium (Se) (mg/kg) | <0.20 | | |
| | Silver (Ag) (mg/kg) | <0.10 | | |
| | Thallium (TI) (mg/kg) | <0.050 | | |
| | Tin (Sn) (mg/kg) | <2.0 | | |
| | Uranium (U) (mg/kg) | 0.964 | | |
| | Vanadium (V) (mg/kg) | 38.9 | | |
| | Zinc (Zn) (mg/kg) | 35.7 | | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | | |
| | Benzene (mg/kg) | 2.44 | | |
| | Ethylbenzene (mg/kg) | 0.056 | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | | |
| | Styrene (mg/kg) | <0.050 | | |
| | Toluene (mg/kg) | 0.082 | | |
| | ortho-Xylene (mg/kg) | <0.050 | | |
| | meta- & para-Xylene (mg/kg) | <0.050 | | |
| | Xylenes (mg/kg) | <0.075 | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 88.6 | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 88.5 | | |
| Hydrocarbons | EPH10-19 (mg/kg) | 210 | | |
| | EPH19-32 (mg/kg) | 790 | | |
| | LEPH (mg/kg) | 210 | | |
| | HEPH (mg/kg) | 790 | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | | |

L1963473 CONTD.... PAGE 3 of 5 26-JUL-17 10:40 (MT)

ALS ENVIRONMENTAL ANALYTICAL REPORT

Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1963473-1 SEDIMENT 24-JUL-17 10:50 EIRA-17 | | |
|--|---|---|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 91.1 | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 115.3 | | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | | |
| | Acenaphthylene (mg/kg) | <0.050 | | |
| | Anthracene (mg/kg) | <0.050 | | |
| | Benz(a)anthracene (mg/kg) | <0.050 | | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | | |
| | Chrysene (mg/kg) | <0.050 | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | | |
| | Fluoranthene (mg/kg) | <0.050 | | |
| | Fluorene (mg/kg) | <0.050 | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | | |
| | Naphthalene (mg/kg) | <0.050 | | |
| | Phenanthrene (mg/kg) | <0.050 | | |
| | Pyrene (mg/kg) | <0.050 | | |
| | Surrogate: Acenaphthene d10 (%) | 121.7 | | |
| | Surrogate: Chrysene d12 (%) | 129.8 | | |
| | Surrogate: Naphthalene d8 (%) | 67.8 | | |
| | Surrogate: Phenanthrene d10 (%) | 104.7 | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

L1963473 CONTD....

PAGE 4 of 5
26-JUL-17 10:40 (MT)

Version: FINAL

Test Method References:

ALS Test Code Matrix Test Description Method Reference**

EPH-TUMB-FID-VA Soil EPH in Solids by Tumbler and GCFID BC MOE EPH GCFID

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil

samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-D/A-MS-VA Soil PAH - Rotary Extraction (DCM/Acetone) EPA 3570/8270

Polycyclic Aromatic Hydrocarbons in Sediment/Soil

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

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

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).

XYLENES-CALC-VA Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

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.

L1963473 CONTD....

PAGE 5 of 5

26-JUL-17 10:40 (MT)

Version: FINAL

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

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

 Laboratory Definition Code
 Laboratory Location

 VA
 ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-609409

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

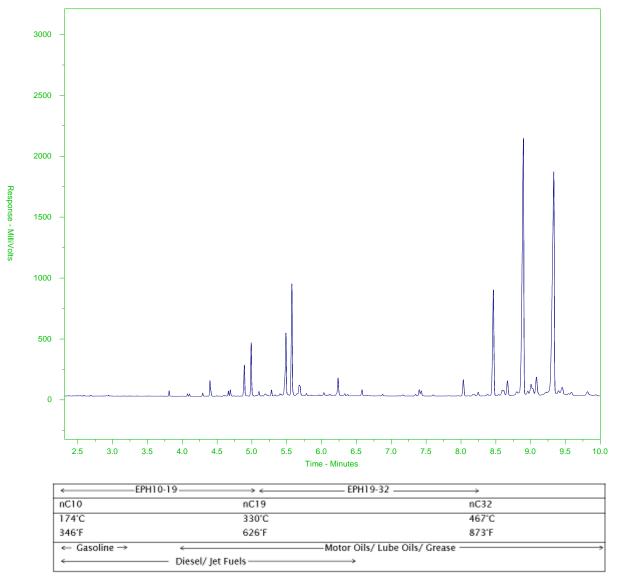
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1963473-1 Client Sample ID: EIRA-17



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

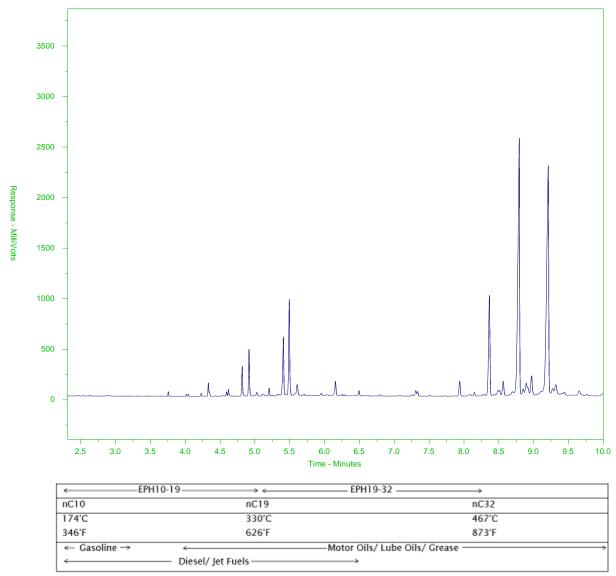
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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



ALS Sample ID: WG2577422-3#L1963473-1

Client Sample ID: EIRA-17



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form

L1963473-COFC

COC Number: 15 - 609409

age of

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

| Report To | Contact and company name below will appear on the final report | Report Format / Distribution s | | | | | Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply | | | | | | | | | | |
|--------------------------------|---|--|---|--------------------|---------------|--|---|-------------|----------|----------------|-------------|--|------------|--------------|-----------|-------------|-------------------------------------|
| Company: | ABCOM | Select Report Format: PDF EXCEL EDD (DIGITAL) | | | | Regular [R] Standard TAT if received by 3 pm - business days - no surcharges apply | | | | | | | | | nes apply | | |
| Contact: | Michael Gill | Quality Control (QC) Report with Report | | | | - ŝ | 4 (| day [P4] | | | > | | | iness da | | | ,,-,-,-,-,-,-,-,-,-,-,-,-,-,-,-,-,- |
| Phone: | 604 444 6400 | Compare Results to Criteria on Report - provide details below if box checked | | | | TORITY Gess D | 3 (| day [P3] | | П | SGENC | | | | | Statutory | <u> </u> |
| | Company address below will appear on the final report | Select Distributio | | MAIL | | E holiday [E0] | | | | | | X | | | | | |
| Street: | | AMAINTALETA. | Anichoted Gill Balcon Com | | | | Date and Time Required for all E&P TATs: | | | | | | | | | | |
| City/Province: | Burnabu | Frankey, course of weam, com | | | | For tests | that can | not be perf | ormed a | scording to th | e service | level se | lected, ye | ou will be o | ontacted | l. | |
| Postal Code: | 7 | Email 3 | Email 3 | | | | | | | | Anal | ysis F | Reques | st | | | |
| Invoice To | Same as Report To YES NO | | Invoice Dis | tribution | | | f | ndicate Fil | tered (F |), Preserved | (P) or Filt | ered an | d Preser | ved (F/P) | below | | |
| | Copy of Invoice with Report ES No | Select Invoice Di | stribution: | EMAIL MAIL | FAX | 0 | | | | | | | | | | | |
| Company: | Chevron Canada | Email 100 Tax | e as abo | 100/ | | • | | | | | | | | | | | |
| Contact: | ANNA XIA Chris BONG | Email 2 | | | |] [| | | | | | | | 1 | İ | | Ø |
| | Project Information 🔾 | | il and Gas Required Fields (client use) | | | | + | | | | | | | 1 | | | of Containers |
| ALS Account # / | | AFE/Cost Center: PO# | | | | PH | | | | | 1 | | 1 | | | onta | |
| Job#: 6 | 9542455 | Major/Minor Code: | | Routing Code: | | 1 #4 | ME | | | | | | | | | | of C |
| PO/AFE: | | Requisitioner: | | | | Hd/ | V | | | | | | | | | | ber (|
| LSD: Fore | shore | Location: | | | | | | ·N | | | İ | | | | | | [tum] |
| ALS Lab Wo | rk Order # (lab use only) | ALS Contact: | Wass | Sampler: BA | P/JB | 位 | ,भु | Medal | | | | | | | | | 2 |
| ALS Sample # (lab use only) | Sample Identification and/or Coordinates (This description will appear on the report) | , , | Date (dd-mmm-yy) | Time (hh:mm) | Sample Type | | 113 | * | İ | | | | | | | | |
| | EIRA-1:7 | | | ` . | h 1: 4 | | $\overline{\Box}$ | | \dashv | | + | | - | \vdash | | | -1: |
| | ETDU-1.+ | | 24-211-17 | 10:50 | Sediment | X | X | <u> </u> | - | | - | - | ļ | \vdash | | | 4 |
| | | | | | | | | - | | | 1 | <u> </u> | ! | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | İ | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | - | | † | | | | |
| | | | | | | | | - | | | + | | h | | | _ | |
| | | | | | | | | | - | <u> </u> | + | - | | -+ | - | | |
| | | | | | | | | | | | | | - | | | | |
| | | | | | | | | | _ | | | ļ | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| Drinkin | g Water (DW) Samples ¹ (client use) Special Instructions / | Specify Criteria to | add on report by click | ing on the drop-do | wn list below | | | | | PLE CON | | | | | | | |
| | n from a Regulated DW System? | (elec | ctronic COC only) | | | Frozer | | ' | □ | _ | | | vations | | - | No | |
| | | 300 | | | | Ice Pa | | . — . | ce Cu | bes | Cust | ody se | eal inta | ct Y | 'es [| ☐ No | |
| | S NO luman drinking water use? | SK | | | | Cooling | | | FD TE | MPERATURE | 0.00 | | | | 20015 | | |
| YES | | • | | | | | HANT | IAL COOL | EN IEF | WIT ERATURE | J -U | | 2 | | COOLE | R TEMPERAT | URES "C |
| | SHIPMENT RELEASE (client use) | г | INITIAL SHIPMEN | T RECEPTION (I | th use only) | L | | | | CINIA | C LII DA | AENT. | | | (lak ::: | o onki) | |
| Released by: | | Received by: | | Date: | is use only) | Time: | | Receive | d by:_ | | . SHIPT | VIENI | Date | PTION | (Iad us | e only) | Time: |
| Justin | Beeler July 24th, 2017 17,38 | | | | | | | | V. | | | | 11 | 24 | /[| 7 | 17:40 |
| EFFR TO BACK | DAGE FOR ALCI OCATIONS AND SAMPLING INFORMATION | | VALUE | E . I AROPATORY | OODY VELLOY | CLIE | - 00° | | _ | | | | _ | | | | |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 24-JUL-17

Report Date: 01-AUG-17 17:09 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1963798

Project P.O. #: NOT SUBMITTED

Job Reference: 60542455 C of C Numbers: 15-609416 Legal Site Desc: Foreshore

Dean Watt, B.Sc. Account Manager

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

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



L1963798 CONTD.... PAGE 2 of 5

01-AUG-17 17:09 (MT)

ALS ENVIRONMENTAL ANALYTICAL REPORT

Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1963798-1 Sediment 24-JUL-17 12:10 ESA-12 | L1963798-2 Sediment 24-JUL-17 12:15 ESA-13 | L1963798-3 Sediment 24-JUL-17 12:20 ESA-14 | |
|-------------------------------|---|--|--|--|--|
| Grouping | Analyte | | | | |
| SOIL | | | | | |
| Physical Tests | Moisture (%) | 16.9 | 19.1 | 15.1 | |
| | pH (1:2 soil:water) (pH) | 7.88 | 7.91 | 8.10 | |
| Metals | Antimony (Sb) (mg/kg) | 0.13 | 0.16 | 0.13 | |
| | Arsenic (As) (mg/kg) | 1.22 | 1.30 | 1.40 | |
| | Barium (Ba) (mg/kg) | 65.3 | 95.5 | 65.2 | |
| | Beryllium (Be) (mg/kg) | 0.45 | 0.41 | 0.27 | |
| | Cadmium (Cd) (mg/kg) | <0.050 | 0.127 | <0.050 | |
| | Chromium (Cr) (mg/kg) | 15.7 | 22.8 | 9.78 | |
| | Cobalt (Co) (mg/kg) | 11.9 | 8.71 | 10.6 | |
| | Copper (Cu) (mg/kg) | 38.1 | 32.7 | 36.5 | |
| | Lead (Pb) (mg/kg) | 7.03 | 4.45 | 4.54 | |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Molybdenum (Mo) (mg/kg) | 0.28 | 0.19 | 0.23 | |
| | Nickel (Ni) (mg/kg) | 8.83 | 9.56 | 5.08 | |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | <0.20 | |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 | |
| | Thallium (TI) (mg/kg) | 0.062 | <0.050 | <0.050 | |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | |
| | Uranium (U) (mg/kg) | 0.498 | 0.592 | 0.481 | |
| | Vanadium (V) (mg/kg) | 64.5 | 81.4 | 49.8 | |
| | Zinc (Zn) (mg/kg) | 67.1 | 68.8 | 52.9 | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | Field MeOH | Field MeOH | |
| | Benzene (mg/kg) | 0.0189 | 0.0220 | 0.0167 | |
| | Ethylbenzene (mg/kg) | <0.015 | 0.233 | <0.015 | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Toluene (mg/kg) | 0.099 | 0.059 | <0.050 | |
| | ortho-Xylene (mg/kg) | <0.050 | 0.354 | <0.050 | |
| | meta- & para-Xylene (mg/kg) | <0.050 | 0.761 | <0.050 | |
| | Xylenes (mg/kg) | <0.075 | 1.11 | <0.075 | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 87.7 | 93.7 | 94.6 | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 89.9 | 90.3 | 93.4 | |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | <200 | |
| | EPH19-32 (mg/kg) | <200 | <200 | <200 | |
| | LEPH (mg/kg) | <200 | <200 | <200 | |
| | HEPH (mg/kg) | <200 | <200 | <200 | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | <100 | |

L1963798 CONTD.... PAGE 3 of 5

ALS ENVIRONMENTAL ANALYTICAL REPORT

01-AUG-17 17:09 (MT) Version: FINAL

| b) (mg/kg) Bromobenzotrifluoride (%) 4-Dichlorotoluene (SS) (%) e (mg/kg) ene (mg/kg) mg/kg) acene (mg/kg) ne (mg/kg) anthene (mg/kg) erylene (mg/kg) anthene (mg/kg) anthene (mg/kg) anthene (mg/kg) anthene (mg/kg) | <100 95.0 104.2 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 | <100 98.1 112.1 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 | <100 90.6 105.8 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 | | |
|---|---|--|---|-------------------|--------|
| Bromobenzotrifluoride (%) 4-Dichlorotoluene (SS) (%) e (mg/kg) ene (mg/kg) mg/kg) acene (mg/kg) ne (mg/kg) anthene (mg/kg) erylene (mg/kg) anthene (mg/kg) | 95.0 104.2 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 | 98.1 112.1 <0.050 <0.050 <0.050 <0.050 <0.050 | 90.6 105.8 <0.050 <0.050 <0.050 <0.050 | | |
| Bromobenzotrifluoride (%) 4-Dichlorotoluene (SS) (%) e (mg/kg) ene (mg/kg) mg/kg) acene (mg/kg) ne (mg/kg) anthene (mg/kg) erylene (mg/kg) anthene (mg/kg) | 95.0 104.2 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 | 98.1 112.1 <0.050 <0.050 <0.050 <0.050 <0.050 | 90.6 105.8 <0.050 <0.050 <0.050 <0.050 | | |
| 4-Dichlorotoluene (SS) (%) e (mg/kg) ene (mg/kg) mg/kg) acene (mg/kg) ne (mg/kg) anthene (mg/kg) erylene (mg/kg) anthene (mg/kg) anthene (mg/kg) | 95.0 104.2 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 | 98.1 112.1 <0.050 <0.050 <0.050 <0.050 <0.050 | 90.6 105.8 <0.050 <0.050 <0.050 <0.050 | | |
| e (mg/kg) ene (mg/kg) mg/kg) acene (mg/kg) ne (mg/kg) anthene (mg/kg) erylene (mg/kg) anthene (mg/kg) | <pre></pre> | <pre>112.1 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050</pre> | 105.8 <0.050 <0.050 <0.050 <0.050 | | |
| ene (mg/kg) mg/kg) acene (mg/kg) ne (mg/kg) ranthene (mg/kg) erylene (mg/kg) anthene (mg/kg) | <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 <0.050 | <0.050 <0.050 <0.050 <0.050 <0.050 | <0.050 <0.050 <0.050 <0.050 <0.050 | | |
| mg/kg) acene (mg/kg) ne (mg/kg) anthene (mg/kg) erylene (mg/kg) anthene (mg/kg) | <0.050 <0.050 <0.050 <0.050 <0.050 | <0.050 <0.050 <0.050 <0.050 | <0.050 <0.050 <0.050 | | |
| acene (mg/kg) ne (mg/kg) anthene (mg/kg) erylene (mg/kg) anthene (mg/kg) | <0.050 <0.050 <0.050 <0.050 | <0.050 <0.050 <0.050 | <0.050 <0.050 | | |
| ne (mg/kg) anthene (mg/kg) erylene (mg/kg) anthene (mg/kg) g/kg) | <0.050 <0.050 <0.050 | <0.050 <0.050 | <0.050 | | |
| ranthene (mg/kg) erylene (mg/kg) anthene (mg/kg) g/kg) | <0.050 <0.050 | <0.050 | | | |
| erylene (mg/kg) anthene (mg/kg) g/kg) | <0.050 | | <0.050 | | |
| anthene (mg/kg) g/kg) | | <0.050 | | | |
| g/kg) | <0.050 | | <0.050 | | |
| | I | <0.050 | <0.050 | | |
| nthracene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| | <0.050 | <0.050 | <0.050 | | |
| (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| /kg) | <0.050 | <0.050 | <0.050 | | |
| c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| thalene (mg/kg) | <0.050 | 0.284 | <0.050 | | |
| (mg/kg) | <0.050 | 0.145 | <0.050 | | |
| e (mg/kg) | <0.050 | <0.050 | <0.050 | | |
| g) | <0.050 | <0.050 | <0.050 | | |
| cenaphthene d10 (%) | 89.3 | 107.4 | 100.7 | | |
| nrysene d12 (%) | 94.6 | 79.4 | 85.8 | | |
| aphthalene d8 (%) | 89.2 | 108.0 | 99.5 | | |
| nenanthrene d10 (%) | 85.9 | 97.7 | 98.8 | | |
| () = () | mg/kg) (mg/kg) a)) enaphthene d10 (%) rysene d12 (%) phthalene d8 (%) | mg/kg) <0.050 (mg/kg) <0.050 s) <0.050 enaphthene d10 (%) 89.3 rysene d12 (%) 94.6 phthalene d8 (%) 89.2 | mg/kg) | mg/kg) <0.050 | mg/kg) |

L1963798 CONTD.... PAGE 4 of 5 01-AUG-17 17:09 (MT) Version: FINΔI

Test Method References:

HG-200.2-CVAF-VA

ALS Test Code Matrix Method Reference** **Test Description EPH-TUMB-FID-VA** Soil EPH in Solids by Tumbler and GCFID BC MOE EPH GCFID

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

Mercury in Soil by CVAFS EPA 200.2/1631E (mod) Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including AI, Ba, Be, Cr, Sr, Ti, TI, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH. ELECTROMETRIC. SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH in soil by Headspace GCFID VH-HSFID-VA Soil BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA VH Surrogates for Soils BC Env. Lab Manual (VH in Solids) Soil

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7 and/or VOC Surrogates for Soils VOC7/VOC-SURR-MS-VA Soil EPA 5035A/5021A/8260C

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

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).

Soil Sum of Xvlene Isomer Concentrations EPA 8260B & 524.2 XYLENES-CALC-VA

Calculation of Total Xylenes

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

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

L1963798 CONTD....

PAGE 5 of 5

01-AUG-17 17:09 (MT)

Version: FINAL

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

 Laboratory Definition Code
 Laboratory Location

 VA
 ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-609416

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

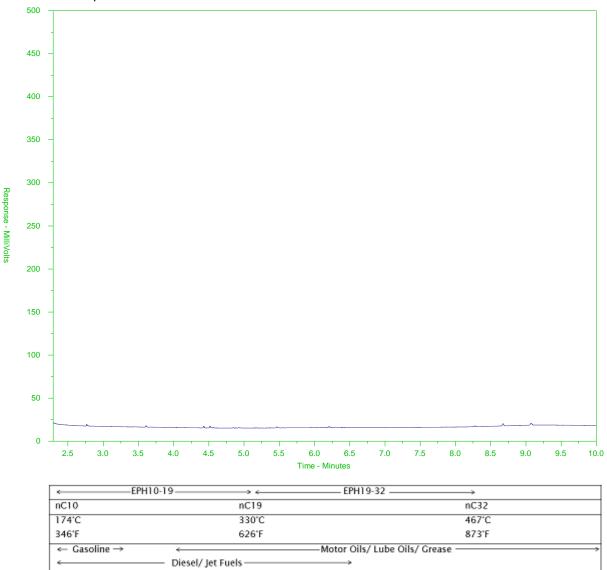
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1963798-1 Client Sample ID: ESA-12



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

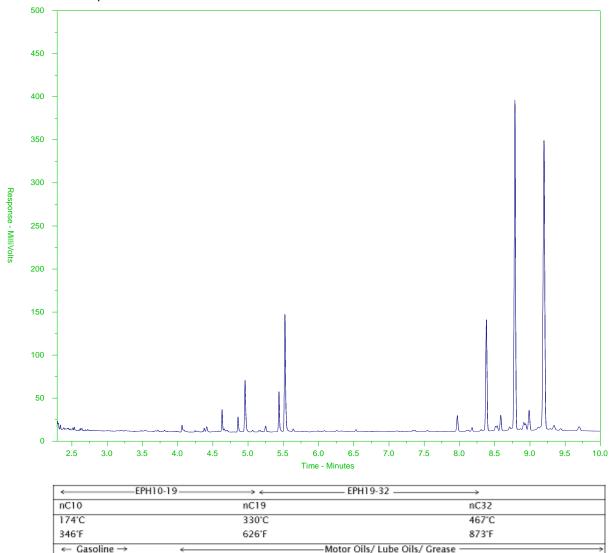
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1963798-2 Client Sample ID: ESA-13



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

Diesel/ Jet Fuels

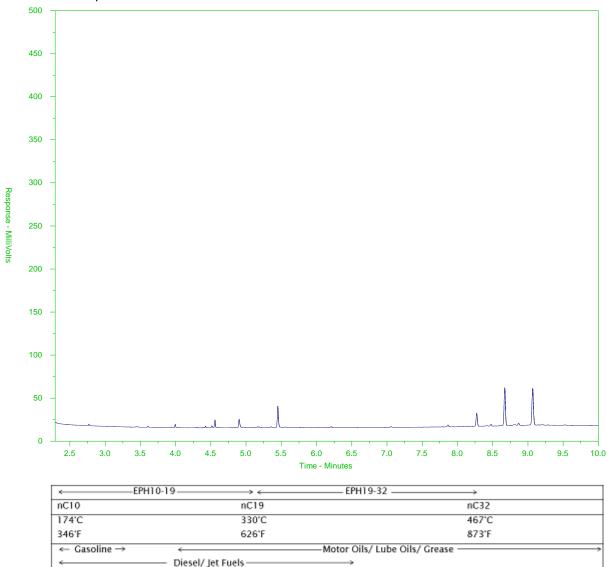
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1963798-3 Client Sample ID: ESA-14



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form

COC Number: 15 - 609416

Environmenta!

www.aisglobal.com

Canada Toll Free: 1 800 668 9878

| 5 | | | | | | | | | | | - F | 1 | | | | | |
|-------------------------------|--|---------------------------------------|---------------------|-------------------------------|-----------------------|-------------------|---------------------------|---------------------|---------------|------------------------------|-------------|---------------------------|-------------|--|--------------------|----------|----------------|
| Report To | Contact and company name below will appea | r on the final report | | Report Forma | | | | | | | <u></u> | ATs with v | our AM - si | urcharges w | Il apply | | |
| Company: | AECOM | | Select Report F | 4 | EXCEL | EDD (DIGITAL) | † – | Re | – egular f | R] 🔭 | | | | 3 pm - busi | | | |
| Contact: | Michael Gill | | Quality Control | (QC) Report with Rep | ort YES | NO | iys) | | day [P | | 7 | , | | isiness c | | | rges apply |
| Phone: | 604 444 6400 | | Compare Re | sults to Criteria on Report - | provide details below | if box checked | PRIORITY usiness Days) | 1 | day [P: | т " | 7 | GENC | | | | | |
| ļ | Company address below will appear on the final rep | ort | Select Distribut | | . MAIL | FAX | R R | | day [P2 | _ | † | EMER | Same D | ay, Week holida | end or v (FN) | Statutor | ′ □ |
| Street: | | | PAN CANER | alle ocen | n Coins | | ╁ | | | Required fo | rali F&PT | ATo: | | Honde | y [LU] | | |
| City/Province: | Burnaby | | Final Par | southern & | B. BOLDINA | PARA | For test | | | rformed accor | | | | | | | · |
| Postal Code: | <u> </u> | | Email 3 | Carried to the | y (3023P-11 | COPPS | | | ре | | | | is Regu | | contacted. | | |
| invoice To | Same as Report To YES | NO | | Invoice Di | stribution | | + | _ | Indicate F | iltered (F), Pr | | | | | | | |
| | | NO | Select Invoice [| Distribution: | EMAIL MAIL | FAX | 0 | ı — | Indicate I | Thereo (F), FI | eserved (P) | or Filtere | and Pres | served (F/P | below | | 4 |
| Company: | Chevron Canada | 130. | Email & Fax | | | L FAX | 1 | | | | - | | | | | | |
| Contact: | Lewis Rous | | Email 2 | y ws arou | <u> </u> | - | - | | | - | | | | | | Ī | 1 |
| | Project information | | | Oil and Gas Require | d Fields (client u | co) | - | | | İ | | | | | | 1 | یو |
| ALS Account # / | / Quote #: | | AFE/Cost Center: | | PO# | 56) | - | Ť | |] | | | | | | | Containers |
| Job#: 60 | 542455 | | | | | | ┨╧ | , 9 | | ĺ | | | | | | - | onta |
| PO/AFE: | 10-1-03 | | Requisitioner: | | Routing Code: | | PH | Ä | _ | | | - | | 1 1 | | | ď |
| LSD: For | eshore, | | Location: | | | | ۱Š | | - | | | | | | | | j jej |
| | Control of the Contro | | Location. | | | | | 47 | 'Ń | | 1 1 | İ | | 1 1 | | | l q |
| ir∶ALS LabiWo | is order # nam use only) | | ALS Contact: | Au 34. | Sampler: | 170 | 1×1 | | X | | 1 1 | | | | | - | Ž |
| Alce | Comple Identificati | | ALS Contact: | WART | Sampler: EA | 5/1B |]]4 | EP, | 1 | | | | | 1 1 | | | |
| ALS Sample# (lab use only) | Sample Identification a | | | Date | Time | Sample Type | SEE. | - 3 | ~ | | | | 1 | 1 | | | |
| | (Time decomption will ap | pear on the report) | | (dd-mmm-yy) | (hh:mm) | <u> </u> | | 7 | _ | | 1 1 | 1 | | | | | ! |
| | ESA-12 | | | 24-Jul-17 | 12:10 | Sediment | X | ∇ | X | | | | | + | | | |
| | ESA-13 ESA-14 | | | 1 | | | 1 | ~ | \uparrow | | ++ | | +- | ++ | | - | - 7 |
| <u></u> | ESA-1U | | | V | 12:15 | N N | | | 1 | | | | | | | | |
| | | · | | - Y | 12:00 | - A | ₩. | V | V | | 11 | | | | | L_ | |
| | | | | | | | | | | | 1 | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | 1 | $\neg +$ | _ | +-+ | | | <u> </u> |
| | | | | | | | | | | | + | | | ╂ | | | |
| ł | | | | | | | | | | | ╀┼ | | | + | | | |
| | | | | | | | | | | | | | | | | | |
| | | | · | | | | | | | | | | ļ | | | | |
| | | | | | | | İ | | | | | | | | | | |
| | | | | | | | | 1 | | | 1 | -+ | _ | | + | +- | |
| | | | | - | | | \vdash | | | | +-+ | | | ┼─┼- | | | |
| Drinking | Mater (DM) Semilar 1 | Special Instructions / | Specify Criteria to | add on report by click | ing on the draw -1- | ation limb by the | D. 2500 | 3-36-3V | 4 D. V. | CASINI | 000 | 200 | | (Aug. 16 - 14 - 14 - 14 - 14 - 14 - 14 - 14 - | | | |
| | g Water (DW) Samples¹ (client use) | | (ele | ctronic COC only) | ing on the drop-ac | WII IIST DEIOW | Frozen | | | SAMHER | CONDI | ON AS | RECER | | | | rie IV. |
| | from a Regulated DW System? | | | | | | ice Pac | | | | | | ervation | | | | □ |
| | Мо | 20 | 000 | | | | | as Jinitiat | | ce Cubes | | ustody | seal inta | act Y | es 🗌 | No | |
| | man drinking water use? | RC | CSA | | | Į | | | | | NO IDEC. | grad of Judge 275 | 888 SEC. 95 | | Marie Style Street | No. | |
| YES | No | | • | | | | | THE PERSON NAMED IN | AUTE COST | -CAGMINER | PHONES S | 生 (多) | 24 23 | Z I D | OCUER 1 | EMPERAT | URES 16. |
| | SHIPMENT RELEASE (client use) | · · · · · · · · · · · · · · · · · · · | 578, 788 (13 S E) | INITIAL SHIPMEN | T RECEPTION 4- | 6 decisions | ge protestine | - | হাপ্যসূত্র ল | ६८ स्ट.स्ट.स्ट.स्ट.स्ट.स्ट.स | ********** | Opposite and other states | | 7 | | | |
| Released by: | Seeler July 2 | Time: | Received by: | - San San San San San Charles | Date: | o nacionity) | Time: | | Receive | d by: | HINAL SI | HPMEN | IT RECE | PTION (| ab use | only)- | |
| | celler July O | 1 ¹⁷ , 2017 17-38 | | | | | | | | | | | Date | 1720 | 1/1. | 2 | ime: |
| ailure to complete all p | AGE FOR ALS LOCATIONS AND SAMPLING INFOR- portions of this form may delay analysis. Please fill in this form | | | WHITI | - LABORATORY (| COPY YELLOW | - CLIEN | IT COP | Y | | | | 11 | · · | (* (. | | 11,40 |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 25-JUL-17

Report Date: 03-AUG-17 19:08 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1964330

Project P.O. #: NOT SUBMITTED

Job Reference: 60542455 C of C Numbers: 15-609417 Legal Site Desc: Foreshore

Dean Watt, B.Sc. Account Manager

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

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group An ALS Limited Company



L1964330 CONTD.... PAGE 2 of 5

03-AUG-17 19:08 (MT) Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1964330-1 Sediment 25-JUL-17 00:50 ESA-15 | L1964330-2 Sediment 25-JUL-17 01:15 ESA-16 | L1964330-3 Sediment 25-JUL-17 12:55 ESA-17 | |
|-------------------------------|---|--|--|--|--|
| Grouping | Analyte | | | | |
| SOIL | | | | | |
| Physical Tests | Moisture (%) | 12.7 | 13.9 | 14.5 | |
| | pH (1:2 soil:water) (pH) | 7.69 | 8.05 | 8.12 | |
| Metals | Antimony (Sb) (mg/kg) | 0.18 | 0.13 | 0.26 | |
| | Arsenic (As) (mg/kg) | 1.69 | 1.27 | 3.99 | |
| | Barium (Ba) (mg/kg) | 65.8 | 74.8 | 129 | |
| | Beryllium (Be) (mg/kg) | 0.40 | 0.33 | 0.49 | |
| | Cadmium (Cd) (mg/kg) | <0.050 | 0.062 | 0.051 | |
| | Chromium (Cr) (mg/kg) | 12.1 | 13.0 | 21.4 | |
| | Cobalt (Co) (mg/kg) | 8.14 | 7.88 | 11.9 | |
| | Copper (Cu) (mg/kg) | 33.4 | 25.5 | 44.5 | |
| | Lead (Pb) (mg/kg) | 6.70 | 4.09 | 5.37 | |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Molybdenum (Mo) (mg/kg) | 0.14 | 0.24 | 0.24 | |
| | Nickel (Ni) (mg/kg) | 6.99 | 9.66 | 10.6 | |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | <0.20 | |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 | |
| | Thallium (TI) (mg/kg) | 0.058 | <0.050 | 0.070 | |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | |
| | Uranium (U) (mg/kg) | 0.394 | 0.479 | 0.465 | |
| | Vanadium (V) (mg/kg) | 72.4 | 62.2 | 83.6 | |
| | Zinc (Zn) (mg/kg) | 54.0 | 50.8 | 61.1 | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | Field MeOH | Field MeOH | |
| | Benzene (mg/kg) | <0.0050 | <0.030 | 0.0112 | |
| | Ethylbenzene (mg/kg) | <0.015 | 0.101 | <0.015 | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | ortho-Xylene (mg/kg) | <0.050 | 0.117 | <0.050 | |
| | meta- & para-Xylene (mg/kg) | <0.050 | 0.309 | <0.050 | |
| | Xylenes (mg/kg) | <0.075 | 0.426 | <0.075 | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 83.3 | 90.3 | 87.9 | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 94.0 | 90.7 | 90.6 | |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | <200 | |
| | EPH19-32 (mg/kg) | <200 | <200 | <200 | |
| | LEPH (mg/kg) | <200 | <200 | <200 | |
| | HEPH (mg/kg) | <200 | <200 | <200 | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | <100 | |

 $^{^{\}star}$ Please refer to the Reference Information section for an explanation of any qualifiers detected.

L1964330 CONTD.... PAGE 3 of 5

03-AUG-17 19:08 (MT) Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1964330-1 Sediment 25-JUL-17 00:50 ESA-15 | L1964330-2 Sediment 25-JUL-17 01:15 ESA-16 | L1964330-3 Sediment 25-JUL-17 12:55 ESA-17 | |
|--|---|--|--|--|--|
| Grouping | Analyte | | | | |
| SOIL | | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 91.0 | 95.3 | 89.3 | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 100.3 | 90.4 | SURR- ND | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | 329.9 <0.050 | |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | 0.112 | <0.050 | |
| | Naphthalene (mg/kg) | <0.050 | 0.066 | <0.050 | |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Surrogate: Acenaphthene d10 (%) | 85.0 | 108.1 | 92.7 | |
| | Surrogate: Chrysene d12 (%) | 82.6 | 70.9 | 89.1 | |
| | Surrogate: Naphthalene d8 (%) | 84.0 | 98.9 | 89.1 | |
| | Surrogate: Phenanthrene d10 (%) | 84.3 | 94.8 | 93.6 | |
| | | | | | |

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

L1964330 CONTD....

PAGE 4 of 5
03-AUG-17 19:08 (MT)

Version: FINAL

QC Samples with Qualifiers & Comments:

| ~ · · · · · · · · · · · · · · | | | | |
|-------------------------------|--|-----------------------------------|--------------|--|
| QC Type Des | cription Param | arameter Qualifier Applies t | | Applies to Sample Number(s) |
| Duplicate | Lead (l | d (Pb) DUP-H L1964330-1, - | | L1964330-1, -2, -3 |
| Qualifiers fo | r Individual Parameters Listed: | | | |
| Qualifier | Description | | | |
| DLCI | Detection Limit Raised: Chromato | ographic Interference due to co-e | elution. | |
| DUP-H | Duplicate results outside ALS DQ | O, due to sample heterogeneity. | | |
| SURR-ND | Surrogate recovery marginally excunaffected. | ceeded ALS DQO. Reported no | n-detect res | sults for associated samples were deemed to be |

Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** |
|-----------------|--------|------------------------------------|--------------------|
| EPH-TUMB-FID-VA | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

L1964330 CONTD....

PAGE 5 of 5

03-AUG-17 19:08 (MT)

Version: FINAL

VPH-CALC-VA

Soil

VPH is VH minus select aromatics

BC MOE LABORATORY MANUAL (2005)

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).

XYLENES-CALC-VA

Soil

Sum of Xylene Isomer Concentrations

EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

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

Laboratory Definition Code

Laboratory Location

VA

ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-609417

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

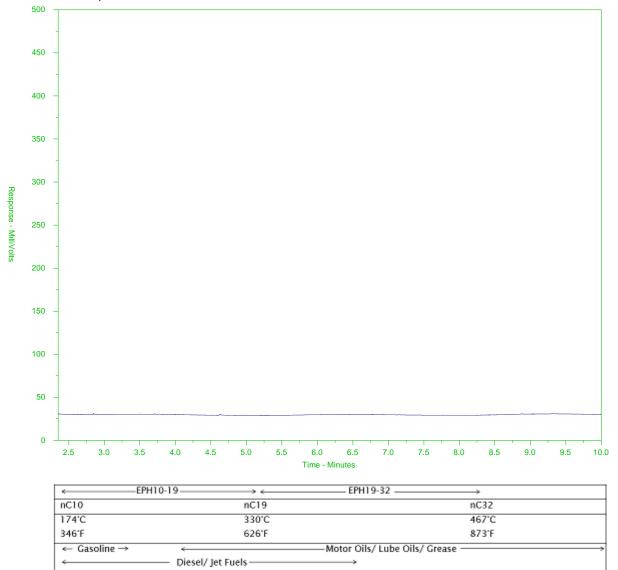
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1964330-1 Client Sample ID: ESA-15



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

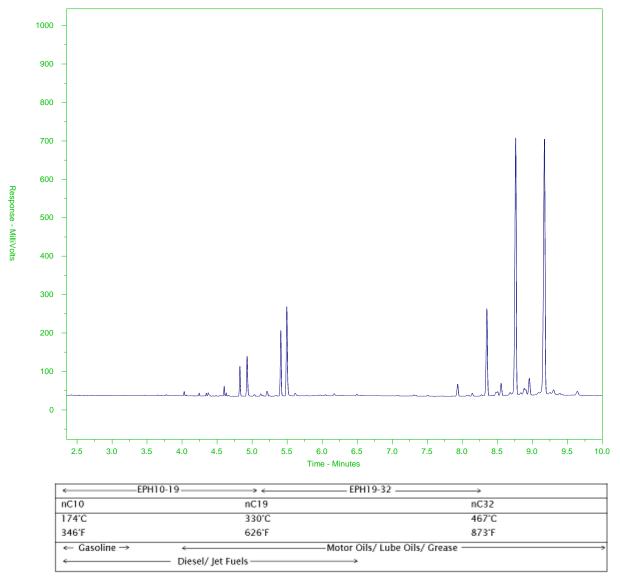
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1964330-2 Client Sample ID: ESA-16



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

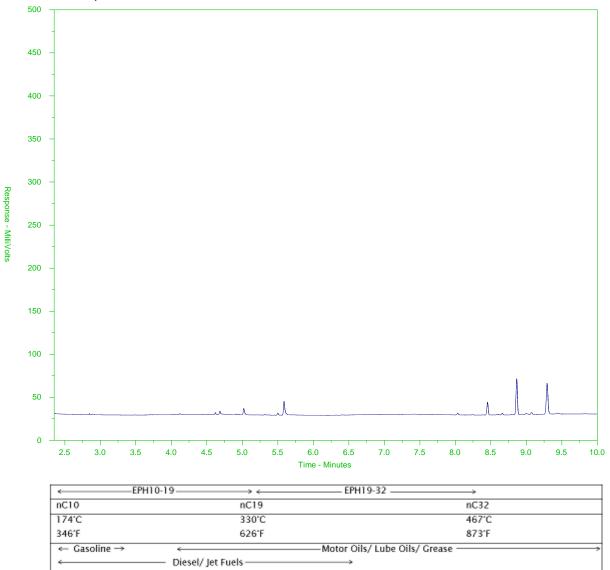
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1964330-3 Client Sample ID: ESA-17



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form

L1964330-COFC

COC Number: 15 - 609417

age of

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

| | | | | _ | | | | | | | | | | | | |
|--|--|-----------------------|--------------------------------|--------------------------|---------------------------------------|-----------------------------|------------------|---------------------|----------------|--------------|-------------|-------------|-------------|------------|----------------|----------------------|
| | company name below will appear on the final report | | Report Format | / L | | Select S | ervice Le | vel Below | - Please conf | irm all E&P | TATs with | your AM - s | surcharges | will apply | | |
| Company: | DW) | Select Report F | | | EDD (DIGITAL) | L., | Re | gular [| RI 🔀 | Standar | d TAT if re | eceived by | r 3 pm - bu | siness day | s - no surchar | ges apply |
| Contact: Michael Phone: 604 UU | (1) | ¬ĸ—, ∠ | (QC) Report with Rep | • | NO | PRIORITY (Business Days) | | day [P | | | NC. | 1 B | usiness | day [E |] | |
| | 4 6400 | _ | esults to Criteria on Report - | | | RIOR | | day [P: | | ╛ | ERGE | Same D | | | r Statutory | ′ 🖂 |
| | below will appear on the final report | Select Distributi | | MAIL | | , g | 2 | day [P: | 2] | | ä | | holic | lay [E0] | | |
| Street: 3/9/2 | Production Way | EMMATER | | erom. (| | ļ | | | Required for | | | | | | | |
| City/Province: Dwyale Postal Code: | y | Email 3 | . South Nem | r or seco | m. Com | For tests | that can | not be pe | rformed acco | rding to the | | | | e contacte | d. | |
| Invoice To Same as Report To | YES | Етіан 3 | lucation Est | | | - | | | | | | is Requ | | | | |
| Copy of Invoice with | | Calast Issueis - 5 | Invoice Dis | | | | | Indicate F | iltered (F), P | reserved (F | or Filter | ed and Pre | eserved (F | /P) below | _ | _ |
| Company: | | Select Invoice [| Distribution: | | FAX | P | | | | | | | \bot | | | _[|
| Contact: | | Email 1 Sr Fan | me as | about | | ↓ ' ∤ | | i | | | | | | | | İ |
| | ject Information | | Oil and Can Barrier | I Finds (allow) | \ | 1 | | | 1 | | | | | | | SIS |
| ALS Account # / Quote #: | yeot impiliation | AFE/Cost Center: | Oil and Gas Require | PO# | ie) | ┨ | P | | | | | | | | | aine |
| Job#: 60547) | المعامر ا | Major/Minor Code: | | Routing Code: | · · · · · · · · · · · · · · · · · · · | E | 27 | | | | | | | 1 - 1 | | Sont |
| PO/AFE: | 150 | Requisitioner: | | Rodding Code. | - | 12 | # | | | | | | | | |) jo . |
| LSD: FORESLAM | 1 | Location: | | | | | | ٦, | | | | | | | | Number of Containers |
| 1 8 1 7 1 7 | | Location. | | | | \ | 4 | \~ | | | | | | | | N n |
| ALS Lab Work Order # (lab use | only) | A S Contact: | Watt | Sampler: | +JB | (A) | 古山 | ¥. | | | | | | | | |
| ALS Sample # | Sample Identification and/or Coordinates | | Date | Time | Sample Type |] <u> </u> | m | S | | | 1 1 | | İ | | | |
| (lab use only) | (This description will appear on the report) | | (dd-mmm-yy) | (hh:mm) | | 80 | | 2 | | | | | | | | |
| ESA - | 15 | | 25-Jul-17 | 12:50 | Sedimen | X | \boldsymbol{X} | $\boldsymbol{\chi}$ | | | | | | | | 4 |
| ESA ~ | 16 | • | | 13:15 | | | 1 | 1 | | | | | | | | 1 |
| ESA - | 17 | | | 12:53 | V | V | V | V | | | | | | | _ | 1 , |
| | | - | | 10:00 | | | | | | | + | | +- | - | +- | - |
| | | | - | | | $\vdash \dashv$ | | | | | | | + | | - | |
| | | | | | | | | | | | - | | | L | | |
| | | | | | | | | | | | | _ | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | + | | + | | | |
| | | | | | | | | _ - | _ | | | - | | | | |
| | Special Instructions | / Specify Critoria to | add on report by click | ing on the during d | U. 4 la 1 | - | | | SAMPLI | CONDI | TION A | e proc | ERVED # | | 1 | <u> </u> |
| Drinking Water (DW) Sampl | es¹ (client use) | (ele | ectronic COC only) | ing on the drop-do | will list below | Frozen | | | | COND | | servatio | | Yes | No | |
| Are samples taken from a Regulated DV | V System? | | | | | Ice Pa | | | Ice Cubes | . П | | ly seal ir | | | ☐ No | = |
| YES NO | | 100 | | | | Cooling | | | | _ | | , | | | | |
| Are samples for human drinking water u | ise? | CSR | | | | | INIT | FIAL COC | LER TEMPE | RATURES | °C | | FIN. | AL COOLE | RTEMPERA | TURES °C |
| YES NO | | | | | | | | 1 | | 7 | 5.0 |) T | | | | |
| SHIPMENT | RELEASE (client use) | | INITIAL SHIPMEN | T RECEPTION (la | | · | | | | FINAL | SHIPME | NT RE | CEPTIO | N (lab u | e only) | L |
| Released by: Justin Bedler | Date: 54/25, 2017 16:25 | Received by: | 0 | Date: |) < | Time: | 20 | Receiv | ed by: | | | Da | ate: | | | Time: |
| <u>Vistin Secher</u> REFER TO BACK PAGE FOR ALS LOCAT | IONS AND SAMPLING INFORMATION | |)A/HIT | My S E - LABORATORY (| COPY YELLOW | (10 · 2 | (7) | iv. | | | | | | | | |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 26-JUL-17

Report Date: 27-JUL-17 18:02 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1965280
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 15-609410
Legal Site Desc: Foreshore

Dean Watt, B.Sc. Account Manager

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

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



L1965280 CONTD.... PAGE 2 of 5

ALS ENVIRONMENTAL ANALYTICAL REPORT

27-JUL-17 18:02 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1965280-1 Sediment 26-JUL-17 12:30 EIRA-18 | L1965280-2 Sediment 26-JUL-17 12:30 DUP-2 |
|-------------------------------|---|---|---|
| Grouping | Analyte | | |
| SOIL | | | |
| Physical Tests | Moisture (%) | 21.7 | 23.4 |
| | pH (1:2 soil:water) (pH) | 8.93 | 8.94 |
| Metals | Antimony (Sb) (mg/kg) | 0.18 | 0.14 |
| | Arsenic (As) (mg/kg) | 3.01 | 3.37 |
| | Barium (Ba) (mg/kg) | 54.1 | 51.4 |
| | Beryllium (Be) (mg/kg) | 0.24 | 0.24 |
| | Cadmium (Cd) (mg/kg) | 0.091 | 0.108 |
| | Chromium (Cr) (mg/kg) | 25.4 | 20.1 |
| | Cobalt (Co) (mg/kg) | 5.17 | 5.75 |
| | Copper (Cu) (mg/kg) | 16.8 | 16.9 |
| | Lead (Pb) (mg/kg) | 5.32 | 5.78 |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 |
| | Molybdenum (Mo) (mg/kg) | 0.29 | 0.30 |
| | Nickel (Ni) (mg/kg) | 18.5 | 18.1 |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 |
| | Thallium (TI) (mg/kg) | <0.050 | <0.050 |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 |
| | Uranium (U) (mg/kg) | 0.708 | 0.740 |
| | Vanadium (V) (mg/kg) | 36.6 | 41.0 |
| | Zinc (Zn) (mg/kg) | 38.7 | 39.5 |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | Field MeOH |
| | Benzene (mg/kg) | 0.0116 | 0.0132 |
| | Ethylbenzene (mg/kg) | <0.015 | <0.015 |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 |
| | Styrene (mg/kg) | <0.050 | <0.050 |
| | Toluene (mg/kg) | <0.050 | <0.050 |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 |
| | Xylenes (mg/kg) | <0.075 | <0.075 |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 89.0 | 76.3 |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 92.9 | 81.0 |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 |
| | EPH19-32 (mg/kg) | 670 | 710 |
| | LEPH (mg/kg) | <200 | <200 |
| | HEPH (mg/kg) | 670 | 710 |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 |

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

L1965280 CONTD.... PAGE 3 of 5

ALS ENVIRONMENTAL ANALYTICAL REPORT

27-JUL-17 18:02 (MT) Version: FINAL

| Polycyclic Aromatic Hydrocarbons | Analyte VPH (C6-C10) (mg/kg) Surrogate: 2-Bromobenzotrifluoride (%) Surrogate: 3,4-Dichlorotoluene (SS) (%) Acenaphthene (mg/kg) | <100 73.9 SURR- ND 65.4 | <100 75.7 72.5 | |
|--|--|-------------------------------------|----------------------|--|
| Hydrocarbons Polycyclic Aromatic Hydrocarbons | Surrogate: 2-Bromobenzotrifluoride (%) Surrogate: 3,4-Dichlorotoluene (SS) (%) | 73.9 SURR- ND | 75.7 | |
| Polycyclic Aromatic Hydrocarbons | Surrogate: 2-Bromobenzotrifluoride (%) Surrogate: 3,4-Dichlorotoluene (SS) (%) | 73.9 SURR- ND | 75.7 | |
| Polycyclic Aromatic Hydrocarbons | Surrogate: 3,4-Dichlorotoluene (SS) (%) | SURR- ND | | |
| Polycyclic Aromatic Hydrocarbons | | SURR- ND 65.4 | 70.5 | |
| Aromatic Hydrocarbons | Acenaphthene (mg/kg) | 65.4 | 12.5 | |
| | . , , , , , , , , , , , , , , , , , , , | <0.050 | <0.050 | |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | |
| | Anthracene (mg/kg) | <0.050 | <0.050 | |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | |
| | Chrysene (mg/kg) | <0.050 | <0.050 | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | |
| | Fluorene (mg/kg) | <0.050 | <0.050 | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | |
| | Pyrene (mg/kg) | <0.050 | <0.050 | |
| | Surrogate: Acenaphthene d10 (%) | 103.3 | 94.0 | |
| | Surrogate: Chrysene d12 (%) | 69.9 | 124.2 | |
| | Surrogate: Naphthalene d8 (%) | 103.0 | 91.8 | |
| | Surrogate: Phenanthrene d10 (%) | 90.7 | 91.0 | |

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

Reference Information

L1965280 CONTD....

PAGE 4 of 5

27-JUL-17 18:02 (MT)

Version: FINAL

QC Samples with Qualifiers & Comments:

| QC Type Des | cription Parameter | Qualifier | Applies to Sample Number(s) |
|---------------|--|---------------------------|--|
| Duplicate | Uranium (U) | DUP-H | L1965280-1, -2 |
| Qualifiers fo | r Individual Parameters Listed: | | |
| Qualifier | Description | | |
| DUP-H | Duplicate results outside ALS DQO, due to sample | heterogeneity. | |
| SURR-ND | Surrogate recovery marginally exceeded ALS DQO unaffected. | . Reported non-detect res | sults for associated samples were deemed to be |

Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** |
|-----------------|--------|------------------------------------|--------------------|
| EPH-TUMB-FID-VA | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

Reference Information

L1965280 CONTD....

PAGE 5 of 5

27-JUL-17 18:02 (MT)

Version: FINAL

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).

XYLENES-CALC-VA

Soil

Sum of Xylene Isomer Concentrations

EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

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

Laboratory Definition Code

Laboratory Location

VA

ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-609410

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

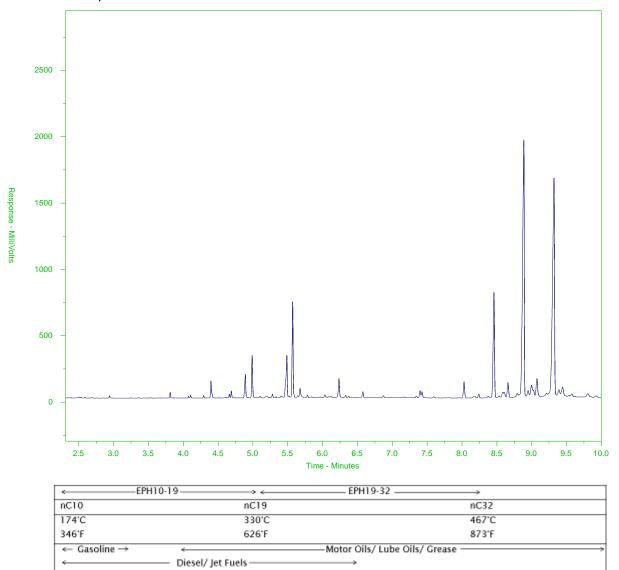
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1965280-1 Client Sample ID: EIRA-18



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

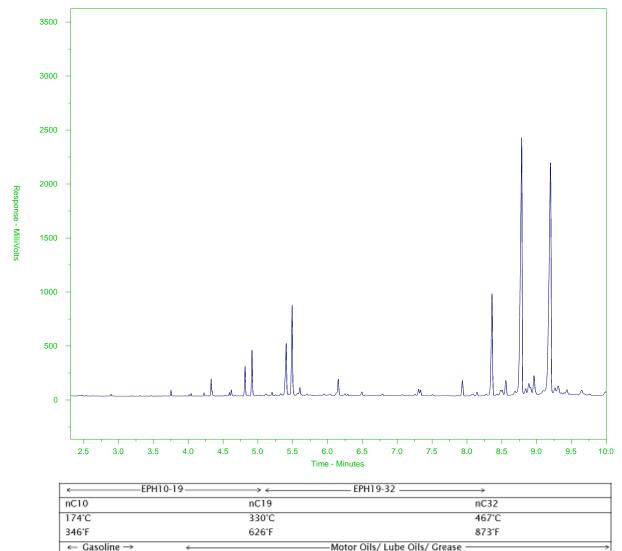
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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



ALS Sample ID: WG2578998-4#L1965280-1

Client Sample ID: EIRA-18



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

Diesel/ Jet Fuels

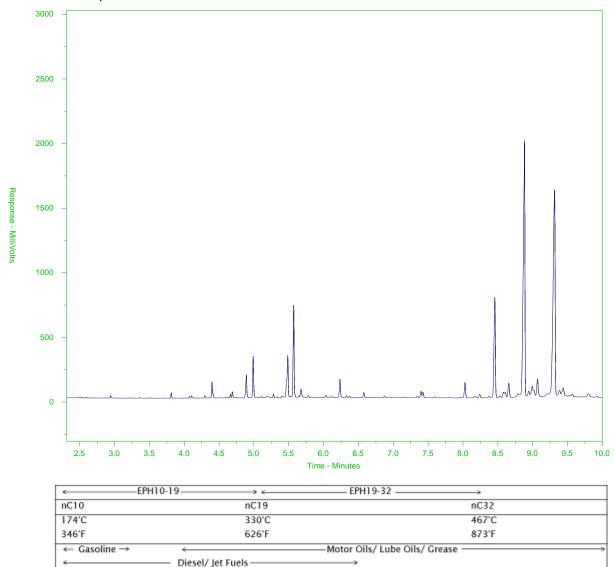
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1965280-2 Client Sample ID: DUP-2



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form

L1965280-COFC

coc Number: 15 - 609410

age of

www.alsglobal.com Canada Toll Free: 1 800 668 9878

| | · | | | | the same and the same of the s | | | | | i | | | | | | |
|-------------------|--|-------------------------|--------------------------------|--------------------------|--|-----------------------------|-----------|--|---------------|--------------|-----------|------------|---------------|--------------|----------------|----------------------|
| Report To | Contact and company name below will appear on the final report | | Report Format | | | Select S | ervice Le | vel Below - P | lease comm | all E&P T | ATs with | your AM - | surcharge | s will apply | | |
| Company: | AECOM | Select Report Fo | | | EDD (DIGITAL) | | Re | gular [R] | | Standard | TAT if re | eceived b | y 3 pm - l | usiness d | ays - no surch | arges apply |
| Contact: | Michael Gill | Quality Control (| QC) Report with Repo | ort XYES | NO NO | 7 Jays) | 4 | day [P4] | | | łCY | 1 E | Busines | s day [E | [1] | |
| Phone: | 604 444 6400 | Compare Res | ults to Criteria on Report - I | provide details below it | f box checked | PRIORITY (Business Days) | 3 | day [P3] | | | RGEN | Same | Day, We | ekend | or Statuto | у Д Д |
| | Company address below will appear on the final report | Select Distribution | | MAIL | | (Busi | 2 | day [P2] | | | EW | | | iday [E0 | | |
| Street: | 3292 Production Way | Mailtodrap | ol, ailla a | 200m. Co | M | | Date | and Time R | equired for | all E&P T | ATs: | | AS | ₩P | | |
| City/Province: | Burnaha | TOBILE S | outherne | Dagram | Com | For tests | that can | not be perfo | rmed accord | ing to the s | ervice le | vel select | ed, you wil | be contac | ted. | |
| Postal Code: | | Email 3 | | | | | | | | | Analys | sis Rec | uest | | | |
| Invoice To | Same as Report To YES NO | | Invoice Dis | tribution | | | 1 | ndicate Filte | red (F), Pres | served (P) | or Filter | ed and P | reserved (| F/P) belov | v | |
| | Copy of Invoice with Report YES NO | Select Invoice D | | EMAIL MAIL | FAX | P | | | | | | | | | | |
| Company: | Chevron Canada Ltd. | Email 1 of | Me as | above | | | | | | | | | | | | |
| Contact: | Chris Bous | Email 2 | | | |] | | | | | | ŀ | | | | s s |
| | Project Information | (| Dil and Gas Required | l Fields (client us | se) | 1 | _ | | | | | | | | | iner |
| ALS Account # / | Quote #: | AFE/Cost Center: | | PO# | | 1-4- | 7 | i | | | | | | | | onta |
| Job#: | 60542455 | Major/Minor Code: | | Routing Code: | | HQ1 | EPH | | | | | | | | | ပို |
| PO / AFE: | · | Requisitioner: | | • | | 15 | 本 | . ~ | | | | | | | | er o |
| LSD: | Foreshore | Location: | | | | | < | 2 | | ŀ | | | | | | Number of Containers |
| | | | \ | F | 5 / | ١×١ | | · \(\mathbf{Z}\) | ļ | | | | | | | Ž |
| ALS Lab Wo | rk Order # (lab use only) | 45 Peters | Wate | Sampler: EA | H/JB | \square | PH | 4 | | Ì | | | | | | |
| ALS Sample # | Sample Identification and/or Coordinates | | Date | Time | 1 | | Ū | 2 | | | | | | | | |
| (lab use only) | (This description will appear on the report) | | (dd-mmm-yy) | (hh:mm) | Sample Type | M | J | 2 | • | | | | | | | |
| | EIRA-18 | | 26-Jul-17 | 12:30 | Sediment | | | | | | | | | | | 4 |
| | Dup-2 | | Sul IV | PM | Decomplete | | | | | - | | _ | | + | | + 7. |
| | DUF-Z | | * | \$ 101 | | | ~ | \frown | | - | | | - | | | - |
| | | | | | | <u> </u> | | | | | | | | _ | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | , | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 1 | | |
| | | | | | - | | | -+- | | ļ | | | · · · · · · · | + | | |
| | | | ļ | | | \vdash | | | - | | | | | + | | 1 |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | Special Instruction | s / Specify Criteria to | add on report by click | ing on the drop-do | own list below | ' | | | SAMPLE | COND | TION A | S REC | EIVED | (lab use | e only) | |
| | g Water (DW) Samples' (client use) | | ctronic COC only) | | | Frozei | ı | | | | SIF O | bservat | ions | Yes | _ No | · |
| | n from a Regulated DW System? | | | | | Ice Pa | cks | | e Cubes | | Custo | dy seal | intact | Yes | ☐ No | , – |
| YES | | $\wedge \wedge \wedge$ |) | | | Coolin | g Initia | ted | | | | | | | | |
| Are samples for h | uman drinking water use? | しいて | | | | | INII | TIAL COOL | R TEMPER | ATURES | °C | | F | NAL COC | LER TEMPE | RATURES °C |
| YES | | • | • | | | l | | | | | | | 2 | 5- | | |
| | SHIPMENT RELEASE (client use) | | INITIAL SHIPMEN | | ab use only) | | | | | FINAL | SHIPM | | | ON (lab | use only) | ···! |
| Released by: | in Beder Duly 26 th, 2017 1833 | | | Date: | | Time: | | Received | i by: | | | | Date: | 7 (| lin | Time: 18240 |
| <u>)~57</u> | Beller Suly 26 th 2017 1835 | <u> </u> | 12.1.1. | F - LABORATORY | 0000 | V 6::- | NT OF | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | | <u></u> | | | <u> </u> | 6/ | /12 | 18210 |
| REFER TO BACK I | PAGE FOR ALSTOCATIONS AND SAMPLING INFORMATION | | WHIT | E - LABORATORY | LUBY YELLON | v - CHE | MI CO | -v * | | | | | | | | |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 26-JUL-17

Report Date: 10-AUG-17 14:01 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1965281
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 15-609419
Legal Site Desc: Foreshore

Dean Watt, B.Sc. Account Manager

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

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group An ALS Limited Company



L1965281 CONTD.... PAGE 2 of 5

ALS ENVIRONMENTAL ANALYTICAL REPORT

10-AUG-17 14:01 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1965281-1 Sediment 26-JUL-17 13:30 ESA-21 | L1965281-2 Sediment 26-JUL-17 13:35 ESA-22 | L1965281-3 Sediment 26-JUL-17 13:40 ESA-23 | |
|-------------------------------|---|--|--|--|--|
| Grouping | Analyte | | | | |
| SOIL | | | | | |
| Physical Tests | Moisture (%) | 16.6 | 19.2 | 20.1 | |
| | pH (1:2 soil:water) (pH) | 7.57 | 7.69 | 7.52 | |
| Metals | Antimony (Sb) (mg/kg) | 0.19 | 0.19 | 0.21 | |
| | Arsenic (As) (mg/kg) | 1.32 | 1.25 | 1.49 | |
| | Barium (Ba) (mg/kg) | 45.6 | 55.4 | 49.2 | |
| | Beryllium (Be) (mg/kg) | 0.31 | 0.38 | 0.33 | |
| | Cadmium (Cd) (mg/kg) | 0.064 | 0.053 | <0.050 | |
| | Chromium (Cr) (mg/kg) | 13.7 | 17.5 | 12.8 | |
| | Cobalt (Co) (mg/kg) | 7.85 | 10.5 | 8.49 | |
| | Copper (Cu) (mg/kg) | 22.4 | 29.4 | 26.9 | |
| | Lead (Pb) (mg/kg) | 5.81 | 5.30 | 5.13 | |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Molybdenum (Mo) (mg/kg) | 0.20 | 0.15 | 0.13 | |
| | Nickel (Ni) (mg/kg) | 8.25 | 7.16 | 6.16 | |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | <0.20 | |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 | |
| | Thallium (TI) (mg/kg) | 0.054 | 0.057 | 0.056 | |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | |
| | Uranium (U) (mg/kg) | 0.517 | 0.600 | 0.411 | |
| | Vanadium (V) (mg/kg) | 65.2 | 73.3 | 65.0 | |
| | Zinc (Zn) (mg/kg) | 52.0 | 59.9 | 52.3 | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | Field MeOH | Field MeOH | |
| | Benzene (mg/kg) | <0.0050 | 0.0147 | 0.0104 | |
| | Ethylbenzene (mg/kg) | <0.015 | <0.015 | <0.015 | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Toluene (mg/kg) | <0.050 | 0.058 | <0.050 | |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | meta- & para-Xylene (mg/kg) | 0.061 | <0.050 | <0.050 | |
| | Xylenes (mg/kg) | <0.075 | <0.075 | <0.075 | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 97.2 | 97.6 | 91.5 | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 93.4 | 98.0 | 88.1 | |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | <200 | |
| | EPH19-32 (mg/kg) | <200 | <200 | <200 | |
| | LEPH (mg/kg) | <200 | <200 | <200 | |
| | HEPH (mg/kg) | <200 | <200 | <200 | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | <100 | |

L1965281 CONTD.... PAGE 3 of 5

PAGE 3 of 5 10-AUG-17 14:01 (MT)

Version: FINAL

| ALS | ENVIRO | ONMENIA | L ANALY | IICAL | REPORT |
|-----|--------|---------|---------|-------|--------|
| | | | | | |

| | Sample ID Description Sampled Date Sampled Time Client ID | L1965281-1 Sediment 26-JUL-17 13:30 ESA-21 | L1965281-2 Sediment 26-JUL-17 13:35 ESA-22 | L1965281-3 Sediment 26-JUL-17 13:40 ESA-23 | |
|--|---|--|--|--|--|
| Grouping | Analyte | | | | |
| SOIL | | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 85.4 | 93.6 | 91.4 | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 118.1 | 108.4 | 121.6 | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| _ | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | 0.125 | |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Surrogate: Acenaphthene d10 (%) | 97.2 | 98.9 | 95.6 | |
| | Surrogate: Chrysene d12 (%) | 112.5 | 103.6 | 99.4 | |
| | Surrogate: Naphthalene d8 (%) | 101.2 | 100.2 | 99.1 | |
| | Surrogate: Phenanthrene d10 (%) | 94.6 | 93.1 | 97.8 | |
| | | | | | |
| | | | | | |

Reference Information

L1965281 CONTD....

PAGE 4 of 5

10-AUG-17 14:01 (MT)

Version: FINAL

Test Method References:

ALS Test Code Matrix Test Description Method Reference**

EPH-TUMB-FID-VA Soil EPH in Solids by Tumbler and GCFID BC MOE EPH GCFID

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

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).

XYLENES-CALC-VA Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

Reference Information

L1965281 CONTD....

PAGE 5 of 5

10-AUG-17 14:01 (MT)

Version: FINAL

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

 Laboratory Definition Code
 Laboratory Location

 VA
 ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-609419

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

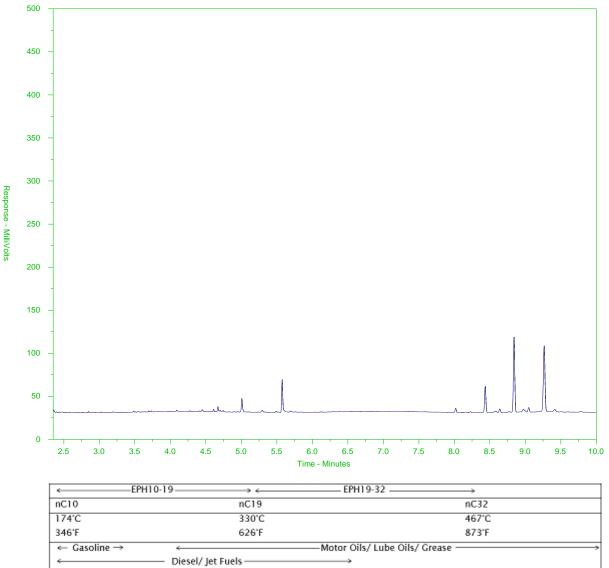
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1965281-1 Client Sample ID: ESA-21



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

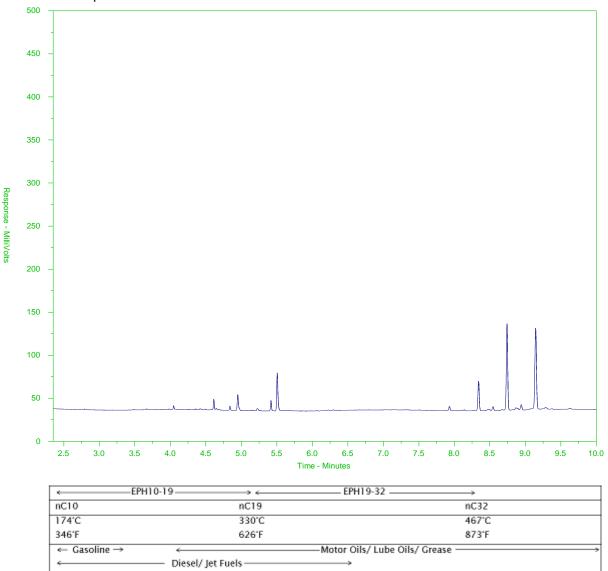
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1965281-2 Client Sample ID: ESA-22



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

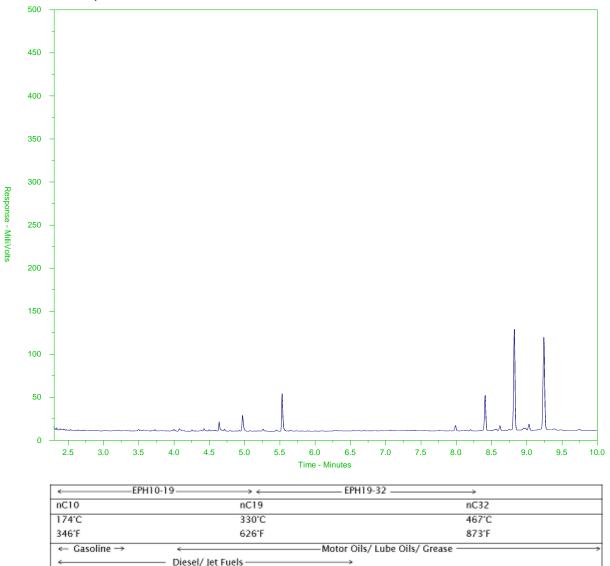
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1965281-3 Client Sample ID: ESA-23



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form

L1965281-COFC

COC Number: 15 - 609419

age of

www.alsglobal.com Canada Toll Free: 1 800 668 9878

| Report To | Contact and company name below will appear on the final report | R | eport Format / | Distribution | | Select ber | ¥100 LC. | | | ≟&P TA | Ts with you | r AM - surc | harges will | apply | | - |
|--------------------|---|--|----------------------|-------------------------|----------------|-------------------|----------|--------------------|----------------|--------------|--------------|-------------|--------------|----------|--------------|---------------|
| Company: | AECOM | Select Report Format: | | | EDD (DIGITAL) | | Reg | gular [R | X | Standard 7 | TAT if recei | ived by 3 p | ım - busin | ess days | - no surchar | jes apply |
| Contact: | Michael Gill | Quality Control (QC) Re | port with Repo | rt YES [| NO | 7 Days) | 4 c | lay [P4] | | | ç | 1 Busi | ness da | ay [E1] | | |
| Phone: | 604 444 6400 | Compare Results to Cri | iteria on Report - p | rovide details below if | box checked | RIORIT Iness (| 3 c | lay [P3] | | | Sa | me Day | | | Statutory | |
| | Company address below will appear on the final report | Select Distribution: | EMAIL | MAIL _ | FAX | Isng) | 2 0 | lay [P2] | | | E | | holiday | / [E0] | | |
| Street: | 3292 Production Way | michael, g | illa aec | com. co | m | | Date a | ind Time F | lequired for | ali E&P TA | īīs: | | | | | |
| City/Province: | Burnaby | lestie sou | thema | a secom | . Com | For tests t | hat can | not be perf | ormed accord | ng to the se | ervice level | selected, y | ou will be o | ontacted | | |
| Postal Code: | | Email 3 | | | | | | | | | Analysis | Reques | st | | | , |
| Invoice To | Same as Report To YES NO | | Invoice Dis | tribution | | | lr. | ndicate Fill | ered (F), Pres | erved (P) | or Filtered | and Prese | rved (F/P) | below | | |
| | Copy of Invoice with Report YES NO | Select Invoice Distribution | on: | EMAIL MAIL | FAX | P | | | | | | | | | | |
| Company: | Cheston Canada Ltd. | Eragiourae a | ls ab | ove | | | İ | | | | | | | | | |
| Contact: | Chois Boys | Email 2 | - | | | | 1 | | | | | | | | | Sis |
| | Projectinformation | | | Fields (client us | e) | | # | | | | | 1 | | | | of Containers |
| ALS Account # / | | AFE/Cost Center: | | PO# | | 1 | ۵ | | | | İ | | | | | Cont |
| | 0542455 | Major/Minor Code: | | Routing Code: | | 곱 | W | | | | | 1 | | | | Jo. |
| PO / AFE: | | Requisitioner: | | | | > | 1 | S | | | | - | | | | Jper |
| LSD: | neshow | Location: | - | | | `.\ | | | | | | | | | | Nun |
| ALS Lab Wor | rk Order # (lab use only) | ALS Contact: | radd | Sampler | JB | 益 | Hd | 12 | | | | | | | | |
| ALS Sample # | Sample Identification and/or Coordinates | | Date | Time | Sample Type | 180 | m | 3 | Ĭ | | | | | | | |
| (lab use only) | (This description will appear on the report) | (d | d-mmm-yy) | (hh:mm) | Sample Type | 133 | _ | _ | | | | | | | | _ |
| | FSA- 格2 | 26-3 | Jul-17 | 13,30 | Sediment | λ | X | X | | | | | | | | 4 |
| | FSA-19 72 | | 1 | 13:35 | 1 | i | 1 | 1 | | | | | | | | 1 |
| | ESA - 20077 | | V | 13:40 | | \ | | 1/ | | | | | | | | |
| | CON 124 15 | | ¥ | 15190 | | Y. | | <u> </u> | | | | | | | | |
| | | | | 13.30 | | | | | | | | | | | | |
| | | | | -0.70 | | | 1/_ | - | | | | | | | | |
| | | | | | | | | • | | | | | | | | |
| | · · · · · · · · · · · · · · · · · · · | | | | | | | | | | | | | _ | | |
| | | | | | | | | | | | | | | - | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | Constitution | / Sif: Oritori- to dd | | | link halann | | | | SAMPLE | CONDIT | TION AS | RECEIV | /FD /lah | i use n | nlv) | L |
| Drinking | g Water (DW) Samples¹ (client use) | ns / Specify Criteria to add on electronic) | | ing on the drop-do | WII list below | Frozen | | | | | SIF Obse | | | _ | No. | |
| | from a Regulated DW System? | | | | | ice Pac | | | ce Cubes | _ | Custody | | | Yes | T No | - |
| YES | NO D C | 000 | | | | Cooling | | | \exists | _ | • | | | | | - 1 |
| Are samples for hi | uman drinking water use? | \mathcal{L} | | | | | INIIT | TIAL COO | ER TEMPER | ATURES ° | C | | FINAL | COOLE | R TEMPERA | TURES °C |
| YES | No | • | | | | | | | | | | 16 | 35 | - | | |
| | SHIPMENT RELEASE (client use) | | | T RECEPTION (la | b use only) | | | ' | | FINAL S | HIPMEN | IT RECE | PTION | (lab us | se only) | - |
| Released by: | Becular Date: Saly 26 2017 18: PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | Received by: | | Date: | | Time: | | Receive | by: | | | Date | 1/20 | 2 / | 1:0 | Time: 18:40 |
| DEED TO BACK E | DECEMBER OF ALL OCATIONS AND SAMPLING INFORMATION | <u> </u> | WHIT | E - LABORATORY (| OPY VELLOV | / CLIEN | IT COL | - / | مسين | | | | 1 U | 9/ | 17 | 10.10 |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 27-JUL-17

Report Date: 28-JUL-17 17:46 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1966069
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 608559
Legal Site Desc: Foreshore

Dean Watt, B.Sc. Account Manager

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

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



PAGE 2 of 7 28-JUL-17 17:46 (MT)

Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | 27-JUL-17 | L1966069-2 Sediment 27-JUL-17 13:10 EIRA-20 | L1966069-3 Sediment 27-JUL-17 13:15 EIRA-21 | L1966069-4 Sediment 27-JUL-17 13:20 EIRA-22 | L1966069-5 Sediment 27-JUL-17 13:30 EIRA-23 |
|-------------------------------|---|------------|---|---|---|---|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Physical Tests | Moisture (%) | 13.2 | 14.5 | 7.31 | 19.7 | 19.2 |
| | pH (1:2 soil:water) (pH) | 8.85 | 8.93 | 8.89 | 9.12 | 8.94 |
| Metals | Antimony (Sb) (mg/kg) | 0.19 | 0.19 | 0.20 | 0.17 | 0.18 |
| | Arsenic (As) (mg/kg) | 3.81 | 3.69 | 3.27 | 2.92 | 2.36 |
| | Barium (Ba) (mg/kg) | 71.5 | 105 | 64.8 | 37.1 | 39.0 |
| | Beryllium (Be) (mg/kg) | 0.26 | 0.26 | 0.25 | 0.28 | 0.22 |
| | Cadmium (Cd) (mg/kg) | 0.105 | 0.080 | 0.102 | 0.096 | 0.074 |
| | Chromium (Cr) (mg/kg) | 28.4 | 21.5 | 20.0 | 23.4 | 11.2 |
| | Cobalt (Co) (mg/kg) | 4.91 | 5.31 | 5.11 | 5.08 | 4.04 |
| | Copper (Cu) (mg/kg) | 15.9 | 18.7 | 15.6 | 16.8 | 11.7 |
| | Lead (Pb) (mg/kg) | 6.21 | 7.10 | 6.29 | 6.13 | 5.57 |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Molybdenum (Mo) (mg/kg) | 0.36 | 0.33 | 0.36 | 0.38 | 0.28 |
| | Nickel (Ni) (mg/kg) | 19.0 | 20.5 | 17.1 | 19.4 | 9.46 |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| | Thallium (TI) (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| | Uranium (U) (mg/kg) | 0.862 | 1.00 | 1.05 | 0.874 | 0.762 |
| | Vanadium (V) (mg/kg) | 37.0 | 41.2 | 40.0 | 40.0 | 35.5 |
| | Zinc (Zn) (mg/kg) | 35.3 | 37.7 | 34.4 | 35.4 | 29.7 |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | Field MeOH | Field MeOH | Field MeOH | Field MeOH |
| | Benzene (mg/kg) | 0.0099 | 0.0140 | 0.0134 | 0.0390 | 0.0060 |
| | Ethylbenzene (mg/kg) | <0.015 | <0.015 | <0.015 | 0.034 | <0.015 |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Xylenes (mg/kg) | <0.075 | <0.075 | <0.075 | <0.075 | <0.075 |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 85.5 | 94.0 | 85.1 | 90.5 | 81.6 |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 90.4 | 98.1 | 87.6 | 90.5 | 85.8 |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | <200 | 210 | 230 |
| | EPH19-32 (mg/kg) | 670 | 720 | 660 | 770 | 740 |
| | LEPH (mg/kg) | <200 | <200 | <200 | 210 | 230 |
| | HEPH (mg/kg) | 670 | 720 | 660 | 770 | 740 |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | <100 | <100 | <100 |

ALS ENVIRONMENTAL ANALYTICAL REPORT

28-JUL-17 17:46 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1966069-6 Sediment 27-JUL-17 13:35 EIRA-24 | L1966069-7 Sediment 27-JUL-17 12:00 DUP-3 | | |
|-------------------------------|---|---|---|--|--|
| Grouping | Analyte | | | | |
| SOIL | | | | | |
| Physical Tests | Moisture (%) | 25.0 | 21.4 | | |
| | pH (1:2 soil:water) (pH) | 9.14 | 9.06 | | |
| Metals | Antimony (Sb) (mg/kg) | 0.18 | 0.15 | | |
| | Arsenic (As) (mg/kg) | 2.06 | 2.75 | | |
| | Barium (Ba) (mg/kg) | 60.6 | 32.4 | | |
| | Beryllium (Be) (mg/kg) | 0.30 | 0.23 | | |
| | Cadmium (Cd) (mg/kg) | 0.081 | 0.088 | | |
| | Chromium (Cr) (mg/kg) | 11.9 | 17.9 | | |
| | Cobalt (Co) (mg/kg) | 3.54 | 4.56 | | |
| | Copper (Cu) (mg/kg) | 9.55 | 15.6 | | |
| | Lead (Pb) (mg/kg) | 7.11 | 6.17 | | |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | | |
| | Molybdenum (Mo) (mg/kg) | 0.27 | 0.25 | | |
| | Nickel (Ni) (mg/kg) | 8.54 | 16.8 | | |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | | |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | | |
| | Thallium (TI) (mg/kg) | <0.050 | <0.050 | | |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | | |
| | Uranium (U) (mg/kg) | 1.23 | 0.844 | | |
| | Vanadium (V) (mg/kg) | 32.2 | 35.7 | | |
| | Zinc (Zn) (mg/kg) | 29.6 | 32.6 | | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | Field MeOH | | |
| | Benzene (mg/kg) | 0.0135 | 0.0278 | | |
| | Ethylbenzene (mg/kg) | 0.207 | 0.046 | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | | |
| | Styrene (mg/kg) | <0.050 | <0.050 | | |
| | Toluene (mg/kg) | <0.050 | <0.050 | | |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | | |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | | |
| | Xylenes (mg/kg) | <0.075 | <0.075 | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 89.6 | 91.0 | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 98.6 | 94.8 | | |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | | |
| | EPH19-32 (mg/kg) | 420 | 720 | | |
| | LEPH (mg/kg) | <200 | <200 | | |
| | HEPH (mg/kg) | 420 | 720 | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | | |

PAGE 4 of 7 28-JUL-17 17:46 (MT)

Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1966069-1 Sediment 27-JUL-17 13:00 EIRA-19 | L1966069-2 Sediment 27-JUL-17 13:10 EIRA-20 | L1966069-3 Sediment 27-JUL-17 13:15 EIRA-21 | L1966069-4 Sediment 27-JUL-17 13:20 EIRA-22 | L1966069-5 Sediment 27-JUL-17 13:30 EIRA-23 |
|--|---|---|---|---|---|---|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | <100 | <100 |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 86.7 | 80.6 | 80.8 | 79.3 | 76.5 |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 88.0 | 102.1 | 88.1 | 87.8 | 90.2 |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Surrogate: Acenaphthene d10 (%) | 111.4 | 91.1 | 94.2 | 109.3 | 94.8 |
| | Surrogate: Chrysene d12 (%) | 89.3 | 64.4 | 92.6 | 126.5 | 128.7 |
| | Surrogate: Naphthalene d8 (%) | 98.2 | 78.3 | 91.3 | 88.8 | 91.1 |
| | Surrogate: Phenanthrene d10 (%) | 99.8 | 85.8 | 93.6 | 88.2 | 92.5 |
| | | | | | | |

L1966069 CONTD.... PAGE 5 of 7

Version: FINAL

PAGE 5 of 7 28-JUL-17 17:46 (MT)

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1966069-6 Sediment 27-JUL-17 13:35 EIRA-24 | L1966069-7 Sediment 27-JUL-17 12:00 DUP-3 | | |
|--|---|---|---|--|--|
| Grouping | Analyte | | | | |
| SOIL | | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | <100 | | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 81.1 | 77.3 | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 87.1 | 94.9 | | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | | |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | | |
| | Anthracene (mg/kg) | <0.050 | <0.050 | | |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | | |
| | Chrysene (mg/kg) | <0.050 | <0.050 | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | | |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | | |
| | Fluorene (mg/kg) | <0.050 | <0.050 | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | | |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | | |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | | |
| | Pyrene (mg/kg) | <0.050 | <0.050 | | |
| | Surrogate: Acenaphthene d10 (%) | 88.8 | 115.1 | | |
| | Surrogate: Chrysene d12 (%) | 83.9 | 66.9 | | |
| | Surrogate: Naphthalene d8 (%) | 87.3 | 102.2 | | |
| | Surrogate: Phenanthrene d10 (%) | 87.7 | 78.7 | | |
| | | 87.7 | 78.7 | | |
| | | | | | |

Reference Information

L1966069 CONTD.... PAGE 6 of 7 28-JUL-17 17:46 (MT) Version: FINΔI

Test Method References:

ALS Test Code Matrix Method Reference** **Test Description EPH-TUMB-FID-VA** Soil EPH in Solids by Tumbler and GCFID BC MOE EPH GCFID

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA

HG-200.2-CVAF-VA

Soil

Metals in Soil by CRC ICPMS

Mercury in Soil by CVAFS

EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including AI, Ba, Be, Cr, Sr, Ti, TI, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA

Soil

PAH - Rotary Extraction (Hexane/Acetone)

EPA 3570/8270

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

PH-1:2-VA

pH in Soil (1:2 Soil:Water Extraction)

BC WLAP METHOD: PH. ELECTROMETRIC. SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA

Soil

VH in soil by Headspace GCFID

BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA VH Surrogates for Soils BC Env. Lab Manual (VH in Solids) Soil

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7 and/or VOC Surrogates for Soils VOC7/VOC-SURR-MS-VA Soil EPA 5035A/5021A/8260C

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

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).

XYLENES-CALC-VA

Soil

Sum of Xvlene Isomer Concentrations

EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

Reference Information

L1966069 CONTD....

PAGE 7 of 7

28-JUL-17 17:46 (MT)

Version: FINAL

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

 Laboratory Definition Code
 Laboratory Location

 VA
 ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

608559

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

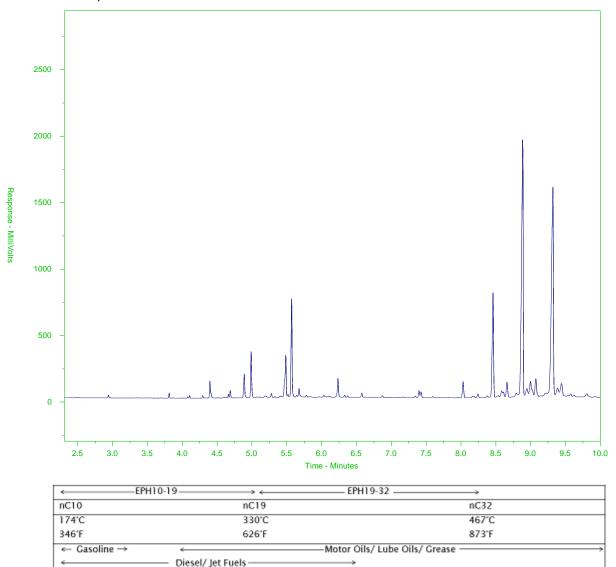
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1966069-1 Client Sample ID: EIRA-19



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

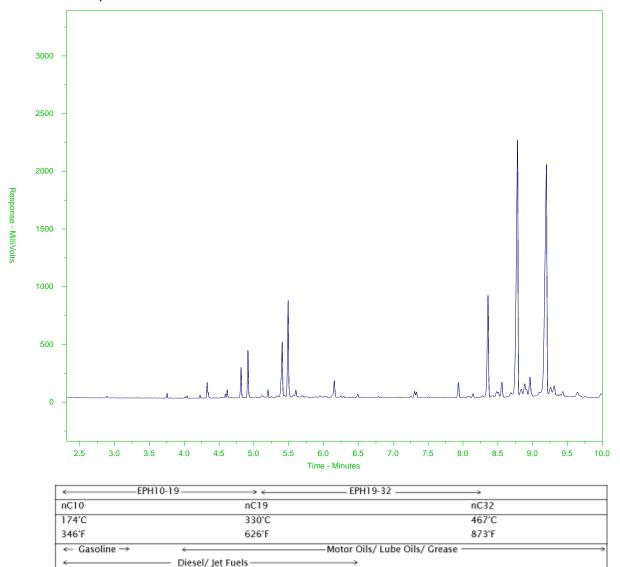
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1966069-2 Client Sample ID: EIRA-20



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

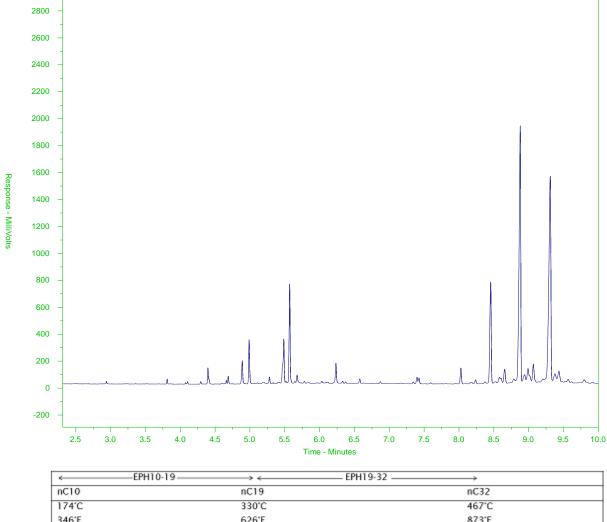
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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



ALS Sample ID: WG2579951-4#L1966069-2

Client Sample ID: EIRA-20



346'F 626°F 873°F ← Gasoline → Motor Oils/ Lube Oils/ Grease Diesel/ Jet Fuels

The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

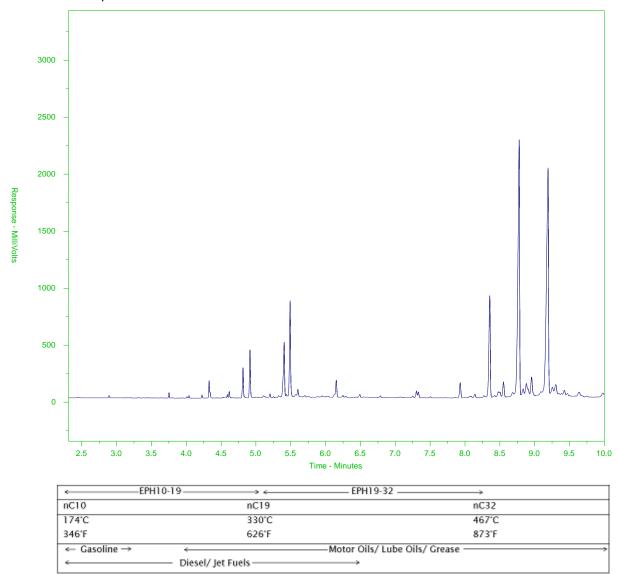
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1966069-3 Client Sample ID: EIRA-21



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

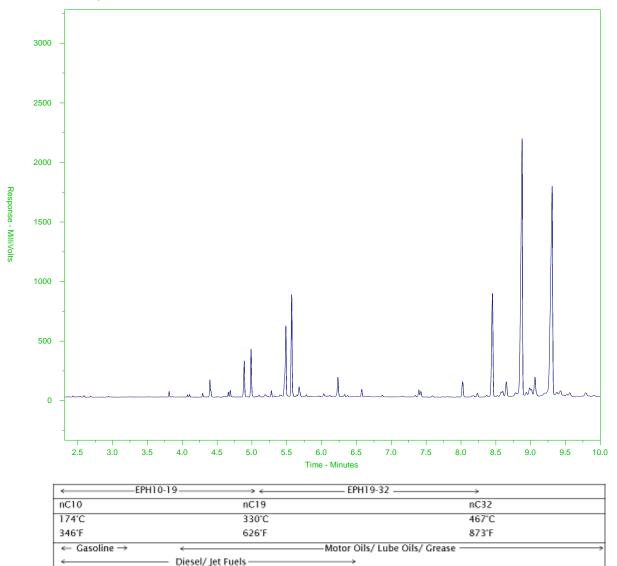
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1966069-4 Client Sample ID: EIRA-22



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

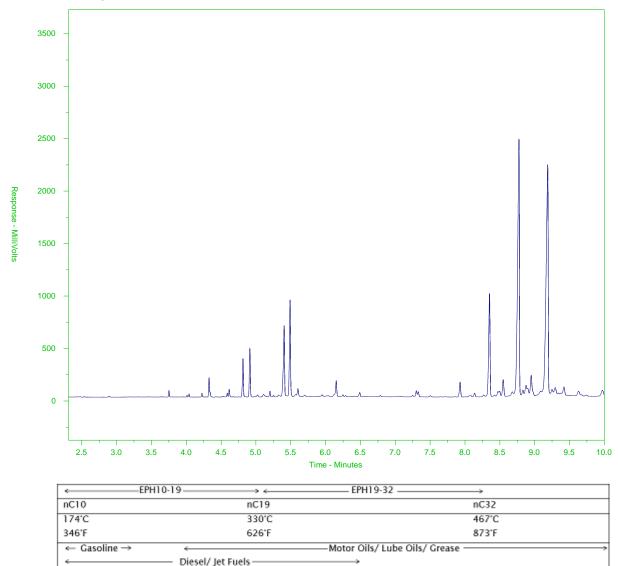
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1966069-5 Client Sample ID: EIRA-23



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

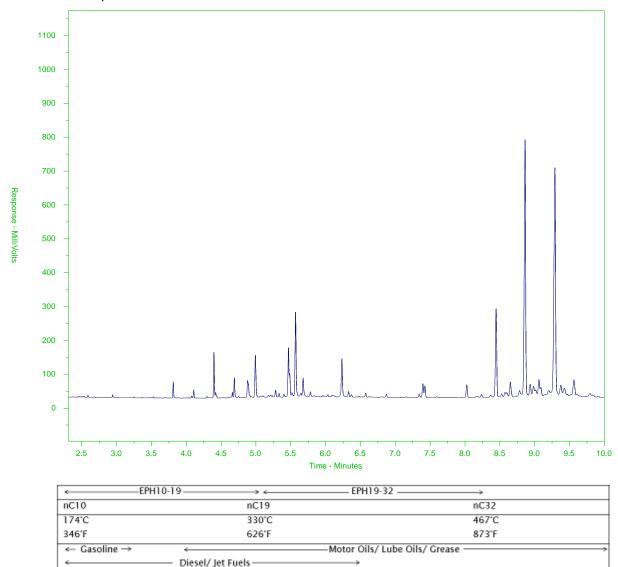
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1966069-6 Client Sample ID: EIRA-24



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

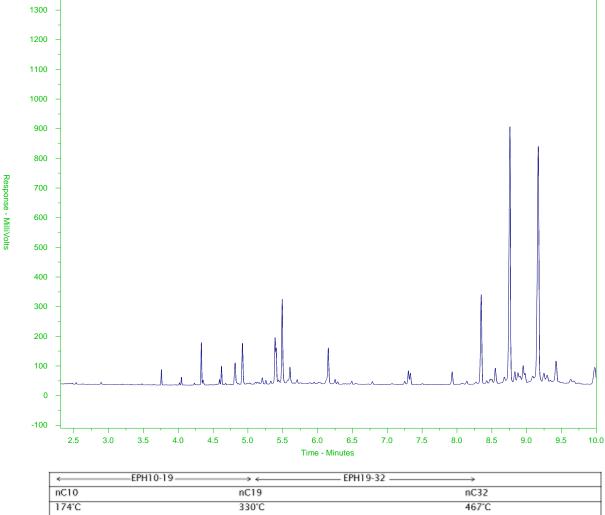
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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



ALS Sample ID: WG2579993-4#L1966069-6

Client Sample ID: EIRA-24



| | -EPH10-19 | — EPH19-32 — → | | | |
|-----------------------|--|----------------|--|--|--|
| nC10 | nC19 | nC32 | | | |
| 174°C | 330°C | 467°C | | | |
| 346'F | 626°F | 873°F | | | |
| ← Gasoline → | Gasoline → ← Motor Oils/ Lube Oils/ Grease | | | | |
| ← Diesel/ Jet Fuels → | | | | | |

The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

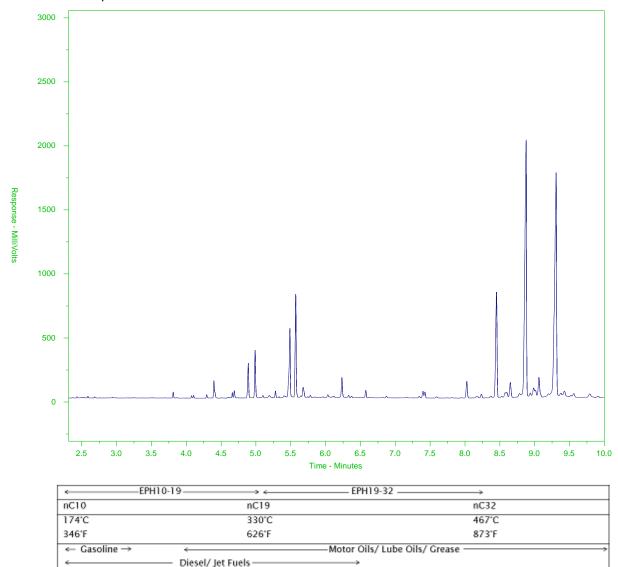
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1966069-7 Client Sample ID: DUP-3



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form



L1966069-COFC

coc Number: 15 - 608559

age of

www.alsglobal.com Canada Toll Free: 1 800 668 9878

| Report To | Contact and company name below will appear on the final report | Γ | Report Format | / Distribution | <u> </u> | 10 | | | | | | | | | | | |
|--|--|--|------------------------------|-----------------------|--|---|----------|---------------|------------------|--------------|----------|-----------|----------|--------------|-----------------------|------------|----------------------|
| Company: | AECOM | Select Report Fo | | | EDD (DIGITAL) | Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply Regular [R] Standard TAT if received by 3 pm - business days - no surcharges apply | | | | | | | | | | | |
| Contact: | Michael Gill | 4 | | | | 2 | | | | Standard | TAT if r | | _ | | | :harges ap | ply |
| Phone: | 604 444 6400 | | ults to Criteria on Report - | provide details below | if how shooked | PRIORITY (Business Days) | | day [P4] | 片 | | ENCY | | | ss day [E | - | L | |
| | Company address below will appear on the final report | Select Distribution | on: EMAIL | MAIL [| FAX | 3 day [P3] Same Day, Weekend or Statutory holiday [E0] | | | | | | | ~ | | | | |
| Street: | 3292 Production Way | | ligilla ae | C 6044 O4 | | | | | | | | | | | | | |
| City/Province: | Burnaby | TOPACE C | southern | DOM, CA | 2001 | Date and Time Required for all E&P TATs: For tests that can not be performed according to the service level selected, you will be contacted. | | | | | | | | | | | |
| Postal Code: | | Email 3 | wayre vi | emeraj ivi, | LOVA | 1 | | - Hot be pen | Jinea accord | | | sis Rec | | .i be contac | .ea. | | |
| Invoice To | Same as Report To YES NO | | Invoice Dis | tribution | | † | | Indicate Filt | ered (F), Pres | | | | · | (E/P) helov | | \neg | |
| | Copy of Invoice with Report YES NO | Select Invoice Di | istribution: | ÉMAIL MAIL | FAX | P | | | - - | T | T | | | 7,00.0 | | - | l |
| Company: | Cherron Canada Ltd. | Email of Faxe | | | | 1 | | | | + | + | | + | + | | \dashv | l |
| Contact: | Chris Bous | Email 2 | | | | 1 | | | | | | | | | | | |
| | Project Information | C | Dil and Gas Required | l Fields (client u | se) | 1 | | - | | | | | | [] | | - | ners |
| ALS Account # / | | AFE/Cost Center: | | PO# | | 1 ,] | Ö. | ' I | | | 1 1 | | | | | - 1 | ntaii |
| Job#: 60 | 542455 | Major/Minor Code: | | Routing Code: | | A H | 本の社 | . | | | | . | | | | ŀ | වු |
| PO / AFE: | | Requisitioner: | | | |] & | \Box | - | | | | | | | l | ł | er o |
| LSD: For | reshow | Location: | | | | | | S. | | | | | | | | | Number of Containers |
| ALS Lab Wor | rk Order # (lab use only) | Al. Contact: 1 | 1 11. | Sampler: | 6 - | 1 🖈 | X | R | | | | | ŀ | | | 1 | ž |
| | | AL Contact: | watt | Sampler: | 2/JB | $ \mathcal{M} $ | 111 | 1 | | | | | | - | | | |
| ALS Sample # (lab use only) | Sample Identification and/or Coordinates | | Date | Time | Sample Type | BIE | 1 | Mex | Ì | Ì | | | | | | | |
| | (This description will appear on the report) | | (dd-mmm-yy) | (hh:mm) | - Tampio 13pc | U | ر | 4 | _ | | | | | | | | |
| | EIKA-19 | | 27-JW-17 | 13100 | Sediment | | X | > | | | | | | T | | 7 | ī |
| | EI HA - 20 | | | 13:10 | | 1 | ī | 1 | | 1 | | | | | | 7 | 1 |
| | EIRA -21 | | | 13:15 | | | | | - | | | \neg | | 1 1 | | | |
| | EIRA -22 | | | 13:20 | | | 1 | 1 | - | | | | + | +-+ | | + | 1 |
| | EIRA -73 | | | 13:30 | | | + | | | | | | + | ++ | | | |
| | FIRA -24 | | | | | +++ | + | | | | - | | + | + | $-\!\!\!\!+\!\!\!\!-$ | | ļ |
| | DWP-3 | | N/ | 13:35 | | | -1/-1 | - / - | | <u> </u> | | | | | | | |
| | DVW-3 | | W | PM_ | - V | V | V | V _ | | | | | | | | ` | V |
| | | | | _ | | | | | | | | | | | | - 1 | |
| | | | | | | | ŀ | | | ! | | | | | | | |
| | | | | | | | | | | | | | | T T | | | |
| | | | | | | | | | <u> </u> | | | | _ | 1 | \neg | | |
| | | | | | | | | | | | | | | + | _ | + | |
| Drinking | Water (DW) Samples ¹ (client use) Special Instructions / S | specify Criteria to a | add on report by clicki | ng on the drop-do | wn list below | | | | SAMPLE (| CONDI | TION A | S REC | EIVED | lab use | oply) | | |
| | (2 tt) campios (short use) | (elec | tronic COC only) | | | Frozen | | |] | | | servati | | Yes | No. | 0 | |
| | from a Regulated DW System? | | | | | Ice Pac | ks | ☐ lo | e Cubes | | | ly seal i | | Yes | | 0 | |
| | | , Q | | | | Cooling | | | | | | | | | | | _ |
| re samples for human drinking water use? | | | | | | | | RTEMPERA | TURES | °C | | FI | NAL COOL | ER TEMPER | RATURES | °C | |
| | | | | | 23 | 13 | | | | | | | | | | ŀ | |
| Released by: | | INITIAL SHIPMENT RECEPTION (lab use only) Received by: Date: Time: Received by: Date | | | | DN (lab ι | se only) | | | | | | | | | | |
| Justin 1 | July 27 217 19:10 | ALX | [| Jate 17/07 | 12017 | Time: (44(| 7 l | Received | by: | | | D | ate: | | | Time: | |
| EFER TO BACK PA | AGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | FILL | WHITE | - LABORATORY | COPY YELLOW | | | · - | | | | | | | | | |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 27-JUL-17

Report Date: 04-AUG-17 17:51 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1966071
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 608373
Legal Site Desc: Foreshore

Dean Watt, B.Sc. Account Manager

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

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group An ALS Limited Company



L1966071 CONTD....

PAGE 2 of 7 04-AUG-17 17:51 (MT)

Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1966071-1 Sediment 27-JUL-17 15:00 ESA-18 | L1966071-2 Sediment 27-JUL-17 15:10 ESA-19 | L1966071-3 Sediment 27-JUL-17 15:15 ESA-20 | L1966071-4 Sediment 27-JUL-17 15:20 ESA-24 | L1966071-5 Sediment 27-JUL-17 15:45 ESA-25 |
|-------------------------------|---|--|--|--|--|--|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Physical Tests | Moisture (%) | 14.0 | 18.7 | 18.3 | 16.7 | 11.7 |
| | pH (1:2 soil:water) (pH) | 8.02 | 7.95 | 8.03 | 7.19 | 7.93 |
| Metals | Antimony (Sb) (mg/kg) | 0.12 | 0.11 | 0.14 | 0.19 | 0.20 |
| | Arsenic (As) (mg/kg) | 3.03 | 1.37 | 1.91 | 1.29 | 2.26 |
| | Barium (Ba) (mg/kg) | 56.1 | 104 | 73.3 | 110 | 63.8 |
| | Beryllium (Be) (mg/kg) | 0.36 | 0.35 | 0.36 | 0.43 | 0.44 |
| | Cadmium (Cd) (mg/kg) | 0.068 | 0.053 | 0.053 | 0.069 | 0.115 |
| | Chromium (Cr) (mg/kg) | 11.4 | 12.3 | 14.9 | 21.8 | 26.9 |
| | Cobalt (Co) (mg/kg) | 10.1 | 9.45 | 10.2 | 10.8 | 10.5 |
| | Copper (Cu) (mg/kg) | 18.0 | 26.8 | 29.4 | 34.2 | 34.9 |
| | Lead (Pb) (mg/kg) | 4.36 | 4.27 | 10.0 | 6.55 | 5.81 |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Molybdenum (Mo) (mg/kg) | 0.11 | 0.16 | 0.15 | 0.11 | 0.19 |
| | Nickel (Ni) (mg/kg) | 7.75 | 8.99 | 8.23 | 10.5 | 12.0 |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| | Thallium (TI) (mg/kg) | 0.110 | <0.050 | 0.066 | 0.082 | 0.103 |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| | Uranium (U) (mg/kg) | 0.500 | 0.450 | 0.381 | 0.509 | 0.517 |
| | Vanadium (V) (mg/kg) | 61.7 | 61.2 | 58.3 | 84.1 | 84.6 |
| | Zinc (Zn) (mg/kg) | 50.3 | 53.7 | 59.5 | 68.1 | 72.0 |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH |
| | Benzene (mg/kg) | 0.0221 | <0.018 | 0.0083 | <0.0050 | 0.0066 |
| | Ethylbenzene (mg/kg) | 0.040 | 0.087 | <0.015 | <0.015 | <0.015 |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | ortho-Xylene (mg/kg) | <0.050 | 0.118 | <0.050 | <0.050 | <0.050 |
| | meta- & para-Xylene (mg/kg) | <0.050 | 0.416 | <0.050 | <0.050 | <0.050 |
| | Xylenes (mg/kg) | <0.075 | 0.534 | <0.075 | <0.075 | <0.075 |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 84.3 | 92.2 | 81.7 | 74.1 | 85.5 |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 89.9 | 87.4 | 91.9 | 85.9 | 93.9 |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | <200 | <200 | <200 |
| | EPH19-32 (mg/kg) | <200 | <200 | <200 | <200 | <200 |
| | LEPH (mg/kg) | <200 | <200 | <200 | <200 | <200 |
| | HEPH (mg/kg) | <200 | <200 | <200 | <200 | <200 |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | <100 | <100 | <100 |

 $^{^{\}star}$ Please refer to the Reference Information section for an explanation of any qualifiers detected.

PAGE 3 of 7 04-AUG-17 17:51 (MT)

Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1966071-6 Sediment 27-JUL-17 15:45 DUP-4 | L1966071-7 Sediment 27-JUL-17 15:50 ESA-26 | L1966071-8 Sediment 27-JUL-17 15:20 ESA-27 | L1966071-9 Sediment 27-JUL-17 15:30 ESA-28 | |
|-------------------------------|---|---|--|--|--|--|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Physical Tests | Moisture (%) | 15.3 | 15.4 | 14.0 | 10.5 | |
| | pH (1:2 soil:water) (pH) | 8.08 | 8.08 | 8.24 | 8.38 | |
| Metals | Antimony (Sb) (mg/kg) | 0.10 | 0.10 | <0.10 | 0.13 | |
| | Arsenic (As) (mg/kg) | 0.74 | 0.78 | 0.77 | 1.56 | |
| | Barium (Ba) (mg/kg) | 58.7 | 58.2 | 87.4 | 62.9 | |
| | Beryllium (Be) (mg/kg) | 0.32 | 0.37 | 0.27 | 0.32 | |
| | Cadmium (Cd) (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Chromium (Cr) (mg/kg) | 12.4 | 12.7 | 9.76 | 11.8 | |
| | Cobalt (Co) (mg/kg) | 7.16 | 7.13 | 7.93 | 9.57 | |
| | Copper (Cu) (mg/kg) | 23.2 | 24.3 | 24.5 | 29.0 | |
| | Lead (Pb) (mg/kg) | 3.61 | 3.69 | 4.06 | 4.64 | |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Molybdenum (Mo) (mg/kg) | <0.10 | <0.10 | <0.10 | 0.27 | |
| | Nickel (Ni) (mg/kg) | 7.58 | 7.83 | 6.30 | 6.09 | |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | 0.24 | <0.20 | |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 | <0.10 | |
| | Thallium (TI) (mg/kg) | 0.096 | 0.091 | <0.050 | 0.069 | |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | <2.0 | |
| | Uranium (U) (mg/kg) | 0.439 | 0.419 | 0.450 | 0.294 | |
| | Vanadium (V) (mg/kg) | 55.6 | 55.3 | 54.8 | 58.0 | |
| | Zinc (Zn) (mg/kg) | 58.1 | 59.7 | 53.8 | 50.9 | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | Field MeOH | Field MeOH | Field MeOH | |
| | Benzene (mg/kg) | <0.0050 | <0.0050 | <0.0050 | <0.0050 | |
| | Ethylbenzene (mg/kg) | <0.015 | <0.015 | <0.015 | <0.015 | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | <0.20 | |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Xylenes (mg/kg) | <0.075 | <0.075 | <0.075 | <0.075 | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 76.0 | 82.7 | 79.3 | 75.2 | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 85.5 | 92.1 | 85.9 | 90.9 | |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | <200 | <200 | |
| | EPH19-32 (mg/kg) | <200 | <200 | <200 | <200 | |
| | LEPH (mg/kg) | <200 | <200 | <200 | <200 | |
| | HEPH (mg/kg) | <200 | <200 | <200 | <200 | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | <100 | <100 | |

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

L1966071 CONTD....

PAGE 4 of 7 04-AUG-17 17:51 (MT)

Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1966071-1 Sediment 27-JUL-17 15:00 ESA-18 | L1966071-2 Sediment 27-JUL-17 15:10 ESA-19 | L1966071-3 Sediment 27-JUL-17 15:15 ESA-20 | L1966071-4 Sediment 27-JUL-17 15:20 ESA-24 | L1966071-5 Sediment 27-JUL-17 15:45 ESA-25 |
|--|---|--|--|--|--|--|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | <100 | <100 |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 90.0 | 90.9 | 88.0 | 90.1 | 87.4 |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 112.2 | 118.3 | SURR- ND 130.3 | 108.7 | 129.2 |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | 0.166 | <0.050 | <0.050 | <0.050 |
| | Naphthalene (mg/kg) | <0.050 | 0.105 | <0.050 | <0.050 | <0.050 |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Surrogate: Acenaphthene d10 (%) | 99.6 | 98.4 | 93.1 | 91.7 | 96.7 |
| | Surrogate: Chrysene d12 (%) | 101.0 | 96.6 | 91.4 | 93.0 | 96.5 |
| | Surrogate: Naphthalene d8 (%) | 97.0 | 88.3 | 89.8 | 88.9 | 93.4 |
| | Surrogate: Phenanthrene d10 (%) | 98.1 | 95.4 | 92.6 | 92.0 | 96.0 |
| | | | | | | |

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

L1966071 CONTD....

PAGE 5 of 7 04-AUG-17 17:51 (MT)

Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1966071-6 Sediment 27-JUL-17 15:45 DUP-4 | L1966071-7 Sediment 27-JUL-17 15:50 ESA-26 | L1966071-8 Sediment 27-JUL-17 15:20 ESA-27 | L1966071-9 Sediment 27-JUL-17 15:30 ESA-28 | |
|--|---|---|--|--|--|--|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | <100 | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 92.1 | 88.9 | 89.8 | 94.6 | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 112.2 | 110.1 | 118.5 | 112.0 | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | |
| | Surrogate: Acenaphthene d10 (%) | 98.0 | 96.0 | 96.3 | 93.0 | |
| | Surrogate: Chrysene d12 (%) | 94.9 | 92.8 | 92.3 | 92.9 | |
| | Surrogate: Naphthalene d8 (%) | 95.6 | 94.4 | 94.2 | 90.2 | |
| | Surrogate: Phenanthrene d10 (%) | 97.4 | 96.1 | 95.3 | 92.7 | |
| | | | | | | |

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

L1966071 CONTD.... PAGE 6 of 7

04-AUG-17 17:51 (MT)
Version: FINAL

Reference Information

QC Samples with Qualifiers & Comments:

| QC Type Des | scription | Parameter | Qualifier | Applies to Sample Number(s) |
|---------------|-----------------------|--------------------------------|-----------|--|
| Duplicate | | Lead (Pb) | DUP-H | L1966071-1, -2, -3, -4, -5, -6, -7, -8, -9 |
| Laboratory C | ontrol Sample | Volatile Hydrocarbons (VH6-10) | LCS-ND | L1966071-4, -5, -6, -7, -8, -9 |
| Qualifiers fo | r Individual Paramete | rs Listed: | | |
| Qualifier | Description | | | |
| DI OI | | | | |

DLCI Detection Limit Raised: Chromatographic Interference due to co-elution.

DUP-H Duplicate results outside ALS DQO, due to sample heterogeneity.

LCS-ND Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.

SURR-ND Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be

unaffected.

Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** |
|-----------------|--------|------------------------------------|--------------------|
| EPH-TUMB-FID-VA | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

LEPH/HEPH-CALC-VA Soil LEPHs and HEPHs

BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA

Soil Metals in Soil by CRC ICPMS

EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA

Soil Moisture content

CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA

Soil

PAH - Rotary Extraction (Hexane/Acetone)

EPA 3570/8270

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

PH-1:2-VA

Soil

pH in Soil (1:2 Soil:Water Extraction)

BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA

Soil

VH in soil by Headspace GCFID

BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA

Soil

VH Surrogates for Soils

BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA

Soil

VOCs in soil by Headspace GCMS

EPA 5035A/5021A/8260C

Reference Information

L1966071 CONTD.... PAGE 7 of 7 04-AUG-17 17:51 (MT) Version: FINΔI

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

VOC7 and/or VOC Surrogates for Soils VOC7/VOC-SURR-MS-VA Soil EPA 5035A/5021A/8260C

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

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).

XYLENES-CALC-VA Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

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

ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Laboratory Definition Code Laboratory Location VA

Chain of Custody Numbers:

608373

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

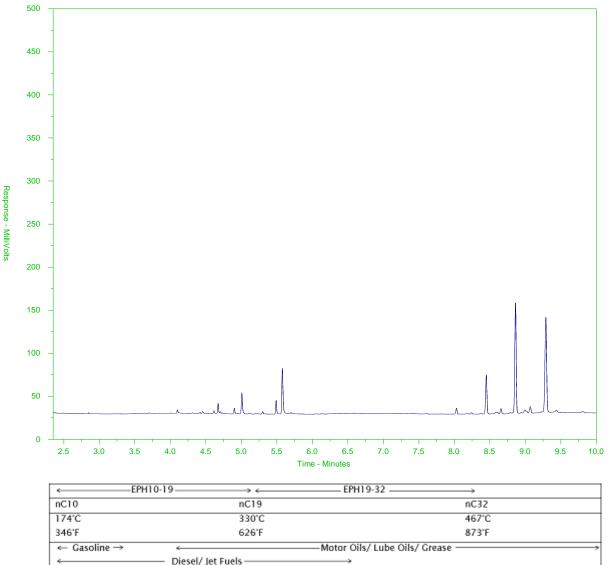
Test results reported relate only to the samples as received by the laboratory

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

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



ALS Sample ID: L1966071-1 Client Sample ID: ESA-18



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

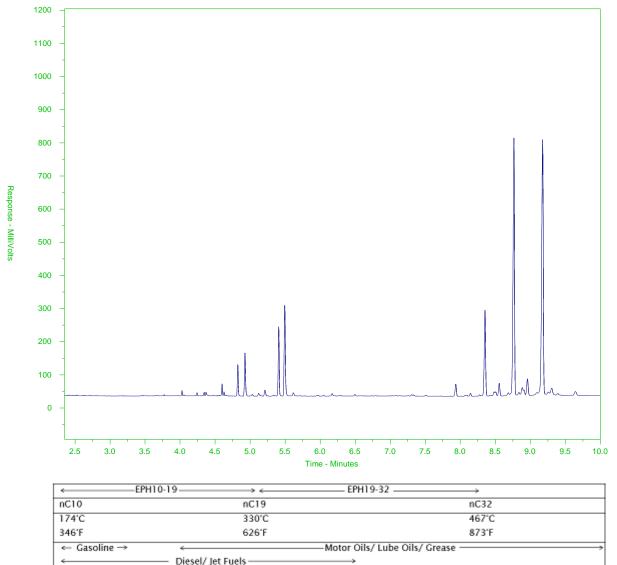
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1966071-2 Client Sample ID: ESA-19



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

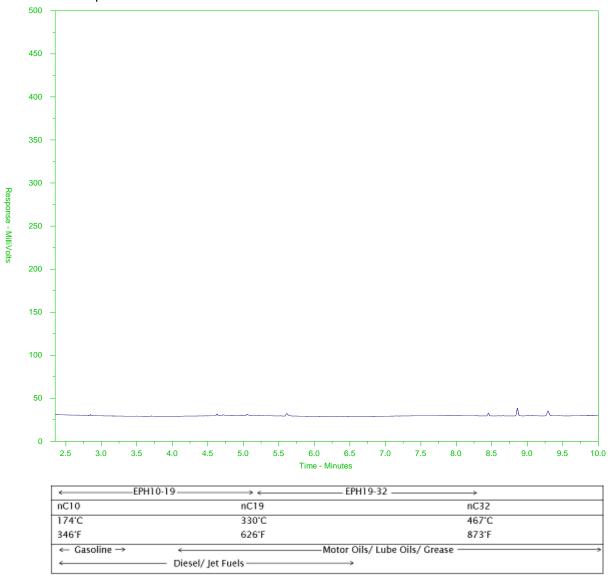
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1966071-3 Client Sample ID: ESA-20



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

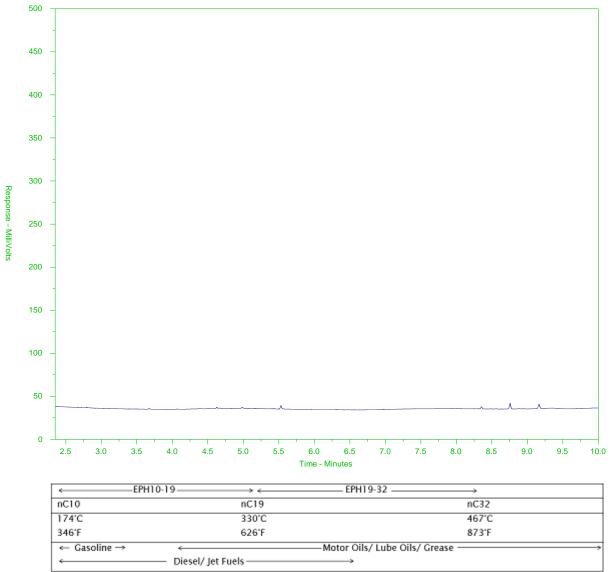
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1966071-4 Client Sample ID: ESA-24



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

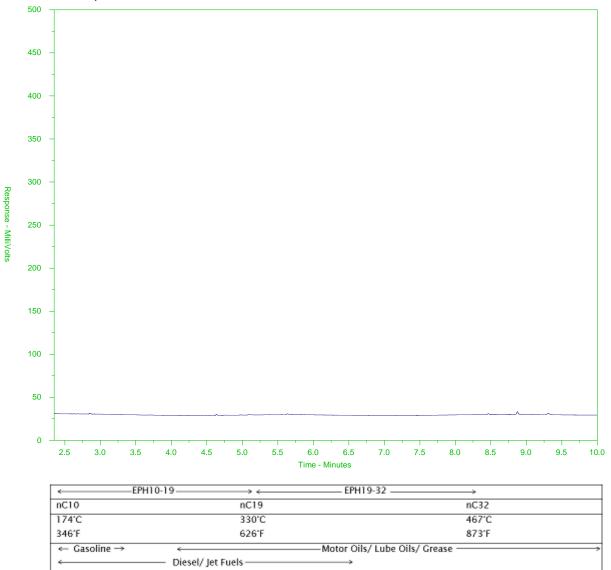
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1966071-5 Client Sample ID: ESA-25



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

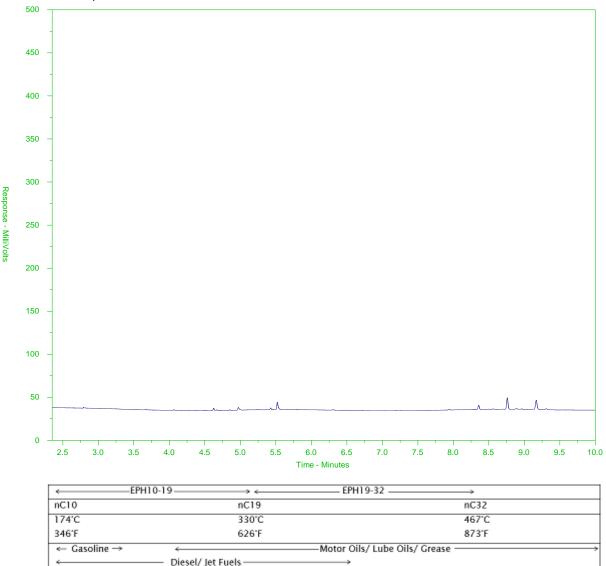
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1966071-6 Client Sample ID: DUP-4



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

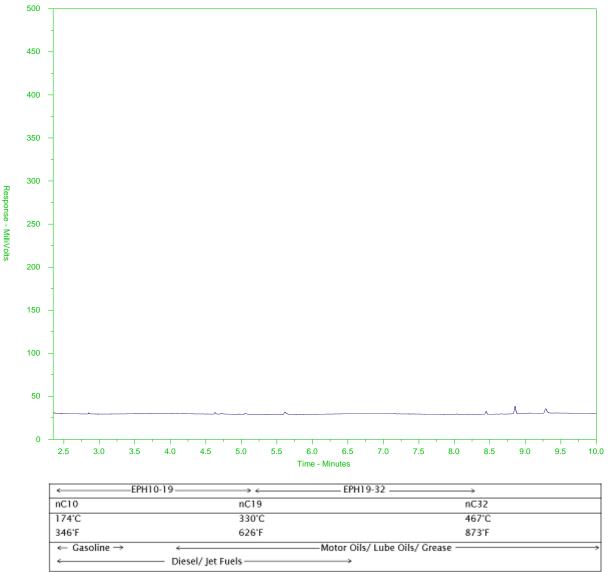
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1966071-7 Client Sample ID: ESA-26



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

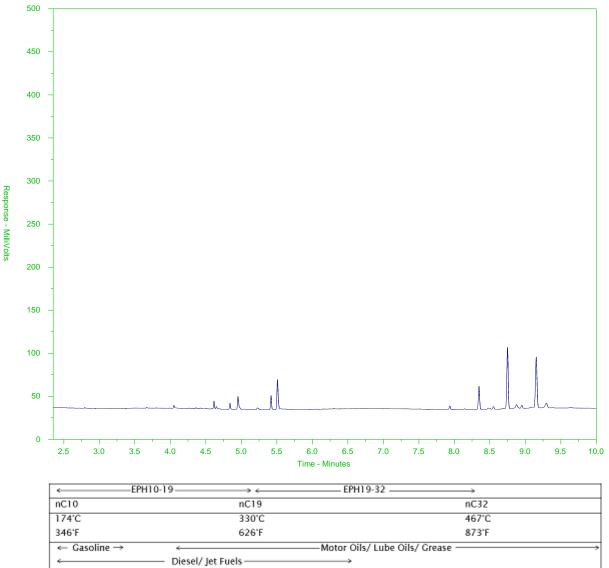
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1966071-8 Client Sample ID: ESA-27



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

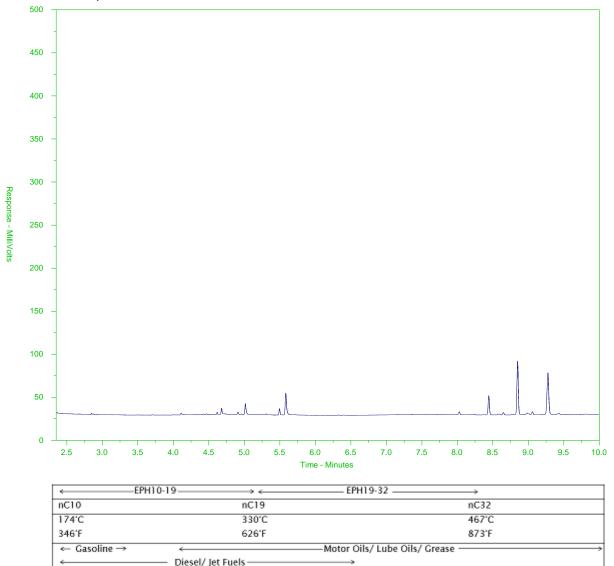
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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



ALS Sample ID: WG2580710-4#L1966071-8

Client Sample ID: ESA-27



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

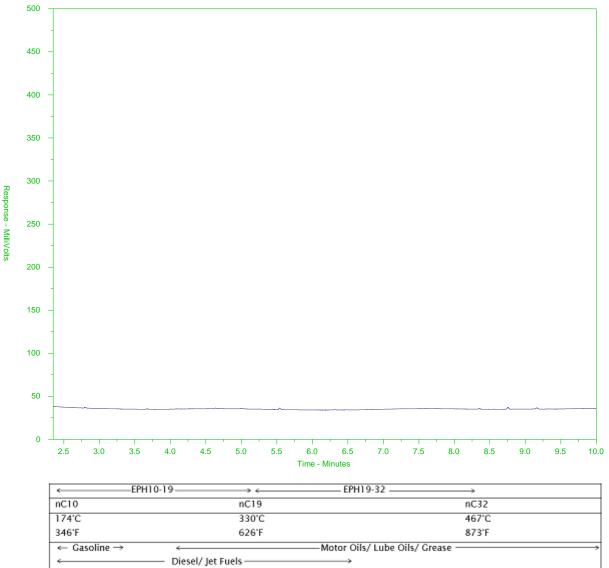
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1966071-9 Client Sample ID: ESA-28



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878



L1966071-COFC

COC Number: 15 - 608373

Page of

| Report To | Contact and company name below will appear on the final re | eport | Report Format | <u>.</u> :/ | | | | | , al | II E&P TATs | with you | AM - surcha | ges will appl | у | |
|--------------------------------|--|------------------------------------|-------------------------------------|------------------------------|-------------|-----------------------------|------------------|----------------|----------------|-------------|------------|--------------|---------------|--|--|
| Company: | AECOM | Select Report Fo | rmat: PDF | EXCEL EDD | (DIGITAL) | | Reg | jular [R] | ★ St | andard TA | T if recei | ved by 3 pm | - business o | lays - no surchar | ges apply |
| Contact: | Michael Gill | | QC) Report with Rep | ort YES | | PRIORITY (Business Days) | 4 0 | lay [P4] | | | ģ | 1 Busin | ess day [| £1] | |
| Phone: | 604 444 6400 | | | provide details below if box | | RIOR | 3 0 | iay [P3] | | | Sa | | | or Statutory | |
| | Company address below will appear on the final report | Select Distributio | | <u> </u> | | (Bus | | lay [P2] | | | | | oliday [E | 0] | |
| Street: | 3292 Production W | an MailCheael | aill@acc | om. Com | | | | | quired for all | | | | | · · · · · · | |
| City/Province: | Burnaby | y pestie.s | outhern (| Doecom. c | '0M | For tests | that can | not be perfor | ned according | | | | will be conta | cted. | |
| Postal Code: | | Email 3 | | | | | | | | | | Request | | · | |
| | Same as Report To YES NO | | Invoice Di | | • | _ | il | ndicate Filter | ed (F), Presei | rved (P) or | Filtered a | and Preserve | d (F/P) belo | w T | 1 |
| | Copy of Invoice with Report ES NO | Select Invoice Di | | | FAX | P | | | _ | | | | | | 4 |
| Company: | Chevron Canada Ltd | | as above | v | | 1 | | 1 | | | | | | | ļ |
| Contact: | Chris Boys | Email 2 | | | | | | | | | | | | | ers |
| | Project Information | | il and Gas Require | d Fields (client use) | | | ¥ | | | | | | | | Number of Containers |
| ALS Account # / | | AFE/Cost Center: | | PO# | | 1 | 8 | İ | | | | | | | Cou |
| Job #: 60 | 15424 <i>55</i> | Major/Minor Code: | | Routing Code: | | ام ا | 出 | | | | | | 1 | | r of |
| PO / AFE: | | Requisitioner: | · · · · · · · · · · · · · · · · · · | | | -> | ~ | | | | | | - | | l ppe |
| LSD: FOR | eshove | Location: | | 1 | | K, I | 全 | · v) | | | | | | | Į Ī |
| ALS Lab Wor | k Order # (lab use only) | ALS Contact: | 1. M. | Sampler: | F O | M | | B | | | | | | | |
| | | | Watt | TEAL V | 7R | | B | す | | | | | | ! | |
| ALS Sample # (lab use only) | Sample Identification and/or Cod | | Date | Time | Sample Type | 100 | 1 | * | | | | | | | |
| (las ase only) | (This description will appear on the | | (dd-mmm-yy) | (hh:mm) | | | | <u> </u> | | | | + + | | | 11 |
| | ESPA-18 | | 27-Jul-17 | | ediment | X | \boldsymbol{X} | Χ | | | | | | | 4 |
| | ESA-19 | | 1 | 15:10 | | | 1 | 1 | | | | | | | |
| | ESA-20 | | | 18:15 | | Ш | | | | | | | | | <u> </u> |
| | FSA - 24 | | | 5.40 | | | $ I_I $ | | | | | | | | |
| | ESA - 25 | | V | 15:45 | V | M | \mathbf{V} | V | | | | | | | |
| | NIAP-4 | | V | PM. | 1 | 1 | 1/4 | V | | | | | | | V |
| | TCA - 21- | | - 4 | 10.00 | 4 | 1 | 4 | Y | | | + | ++ | | | |
| | B3A- 70 | | | 15 30 | 1 | +++ | 1 | +-+- | - | | | | - | + | |
| | ESA-27 | · · · · | , | 5,47620 | 1/- | 1 | J/1 | | - | | | | - | | .\/ |
| | LSA-28 | | ¥ | 15:30 | | Y | V | W | | | | | _ | | - V |
| | | | | 30 | | | | | | | | | | | |
| | | | | | | li | | : | | | | | | | |
| | | | | | | | | | | | | | | | |
| | Special | Instructions / Specify Criteria to | add on report by clic | king on the drop-down | list below | | | , | AMPLE C | ONDITI | ON AS | RECEIVE | D (lab us | e only) | |
| L | g Water (DW) Samples¹ (client use) | (ele | ctronic COC only) | | _ | Frozer | 1 | |] | _ s | IF Obs | ervations | Yes | ☐ No | □ |
| | from a Regulated DW System? | | | | | Ice Pa | | _ | e Cubes | □ c | ustody | seal intac | t Yes | ☐ No | |
| | 2 | ic csh | | | | Coolin | g Initia | | | | | | 2077 | | |
| | | 0001 | | | | | | FIAL COOLE | R TEMPERA | TURES °C | · | | FINAL CO | OLER TEMPERA | ATURES °C |
| YES | NO . | | | | | | الأغير | سلس | | | | | | | |
| Released by: . | SHIPMENT RELEASE (client use) | Time: Received by: | INITIAL SHIPMEI | NT RECEPTION (lab | | Time | | Received | | INAL SH | IPMEN | T RECER | HON (lal | b use only) | Time: |
| Treleased by | Beeller Sn 1 27 2017 | Time: Received by: | | Date: 27/07/2 | 201/ | Time: | 10 l | . 10001460 | ~ y . | | | Date. | | | |
| REFER TO BACK P | EFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY OCTOBER 2015 FRO | | | | | | | | | | | | | | |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 01-AUG-17

Report Date: 03-AUG-17 14:37 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1967694
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 15-609411
Legal Site Desc: FORESHORE

Dean Watt, B.Sc. Account Manager

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

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group An ALS Limited Company



L1967694 CONTD.... PAGE 2 of 5

03-AUG-17 14:37 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1967694-1 SEDIMENT 01-AUG-17 08:15 EIRA-25 | L1967694-2 SEDIMENT 01-AUG-17 08:15 DUP-5 | | |
|-------------------------------|---|---|---|--|--|
| Grouping | Analyte | - | | | |
| SOIL | | | | | |
| Physical Tests | Moisture (%) | 13.6 | 14.2 | | |
| | pH (1:2 soil:water) (pH) | 8.38 | 8.44 | | |
| Metals | Antimony (Sb) (mg/kg) | 0.18 | 0.17 | | |
| | Arsenic (As) (mg/kg) | 2.57 | 2.86 | | |
| | Barium (Ba) (mg/kg) | 33.4 | 43.7 | | |
| | Beryllium (Be) (mg/kg) | 0.24 | 0.27 | | |
| | Cadmium (Cd) (mg/kg) | 0.077 | 0.079 | | |
| | Chromium (Cr) (mg/kg) | 10.4 | 16.4 | | |
| | Cobalt (Co) (mg/kg) | 4.38 | 4.75 | | |
| | Copper (Cu) (mg/kg) | 13.7 | 14.4 | | |
| | Lead (Pb) (mg/kg) | 8.20 | 8.61 | | |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | | |
| | Molybdenum (Mo) (mg/kg) | <0.50 | <0.50 | | |
| | Nickel (Ni) (mg/kg) | 10.9 | 15.3 | | |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | | |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | | |
| | Thallium (TI) (mg/kg) | <0.050 | <0.050 | | |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | | |
| | Uranium (U) (mg/kg) | 0.893 | 0.917 | | |
| | Vanadium (V) (mg/kg) | 32.1 | 34.3 | | |
| | Zinc (Zn) (mg/kg) | 38.7 | 40.5 | | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | Field MeOH | | |
| | Benzene (mg/kg) | 0.528 | 0.711 | | |
| | Ethylbenzene (mg/kg) | 11.5 | 22.2 | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | | |
| | Styrene (mg/kg) | <0.050 | <0.050 | | |
| | Toluene (mg/kg) | 0.588 | 0.911 | | |
| | ortho-Xylene (mg/kg) | 8.74 | 10.9 | | |
| | meta- & para-Xylene (mg/kg) | 52.9 | 74.9 | | |
| | Xylenes (mg/kg) | 61.6 | 85.7 | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 84.3 | 84.0 | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 75.1 | 70.2 | | |
| Hydrocarbons | EPH10-19 (mg/kg) | 2260 | 1720 | | |
| | EPH19-32 (mg/kg) | 1890 | 1660 | | |
| | LEPH (mg/kg) | 2250 | 1710 | | |
| | HEPH (mg/kg) | 1890 | 1660 | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | 1230 | 870 | | |

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

L1967694 CONTD.... PAGE 3 of 5

03-AUG-17 14:37 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1967694-1 SEDIMENT 01-AUG-17 08:15 EIRA-25 | L1967694-2 SEDIMENT 01-AUG-17 08:15 DUP-5 | | |
|--|---|---|---|--|--|
| Grouping | Analyte | | | | |
| SOIL | | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | 1150 | 760 | | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 126.3 | 123.7 | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | Not Reportable | 116.9 | | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.50 | <0.40 | | |
| . iyar ooar zono | Acenaphthylene (mg/kg) | DLCI <0.20 | DLCI <0.10 | | |
| | Anthracene (mg/kg) | <0.20 DLCI <0.20 | <0.10 DLCI <0.20 | | |
| | Benz(a)anthracene (mg/kg) | <0.20 DLCI <0.060 | <0.20 DLCI <0.070 | | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | | |
| | Chrysene (mg/kg) | <0.090 | OLCI <0.10 | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | | |
| | Fluoranthene (mg/kg) | OLCI | <0.20 | | |
| | Fluorene (mg/kg) | 0.857 | 0.693 | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | | |
| | 2-Methylnaphthalene (mg/kg) | 16.8 | 14.0 | | |
| | Naphthalene (mg/kg) | 9.27 | 7.89 | | |
| | Phenanthrene (mg/kg) | 1.43 | 1.41 | | |
| | Pyrene (mg/kg) | 0.547 | 0.651 | | |
| | Surrogate: Acenaphthene d10 (%) | 117.4 | 125.5 | | |
| | Surrogate: Chrysene d12 (%) | 92.7 | 105.3 | | |
| | Surrogate: Naphthalene d8 (%) | 96.6 | 98.1 | | |
| | Surrogate: Phenanthrene d10 (%) | 108.0 | 102.0 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 1 | | | | | |
| ı | | | | | |
| | | | | | |

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

L1967694 CONTD.... PAGE 4 of 5

03-AUG-17 14:37 (MT) Version: FINAL

Reference Information

QC Samples with Qualifiers & Comments:

| QC Type Desc | cription | Parameter | Qualifier | Applies to Sample Number(s) | | | | | |
|----------------|---|---------------------------------------|------------|-----------------------------|--|--|--|--|--|
| Laboratory Co | ntrol Sample | Volatile Hydrocarbons (VH6-10) | LCS-ND | L1967694-1, -2 | | | | | |
| Qualifiers for | Individual Parameters Li | sted: | | | | | | | |
| Qualifier | Description | | | | | | | | |
| DLCI | Detection Limit Raised: | Chromatographic Interference due to d | o-elution. | | | | | | |
| LCS-ND | Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected. | | | | | | | | |
| SMI | Surrogate recovery could not be measured due to sample matrix interference. | | | | | | | | |

Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** |
|-----------------|--------|------------------------------------|--------------------|
| EPH-TUMB-FID-VA | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

Hg-WW-200.2-CVAF-VA Soil Hg in Soil by CVAFS EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, sieved (wet sample) through a 2 mm (10 mesh) sieve, and a representative subsample of the material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

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

LEPH/HEPH-CALC-VA Soil LEPHs and HEPHs

BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-WW-200.2-CCMS-VA Soil

Metals in Soil by CRC ICPMS

EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-SIEVE-VA Soil Moisture for CSR Metals Calculations ASTM D2974-00 Method A

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

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-WW-1:2-DI-MAN-VA Soil pH in Soil (1:2 Soil:Water Ext.) (WET) BC WLAP MET

BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the wet sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water, where the samples moisture is accounted for. The pH of the solution is then measured using a standard pH probe.

H-HSFID-VA Soil VH in soil by Headspace GCFID

BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas

Reference Information

L1967694 CONTD....

PAGE 5 of 5

03-AUG-17 14:37 (MT)

Version: FINAL

chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

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).

XYLENES-CALC-VA Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

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

Laboratory Definition Code Laboratory Location

VA ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-609411

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

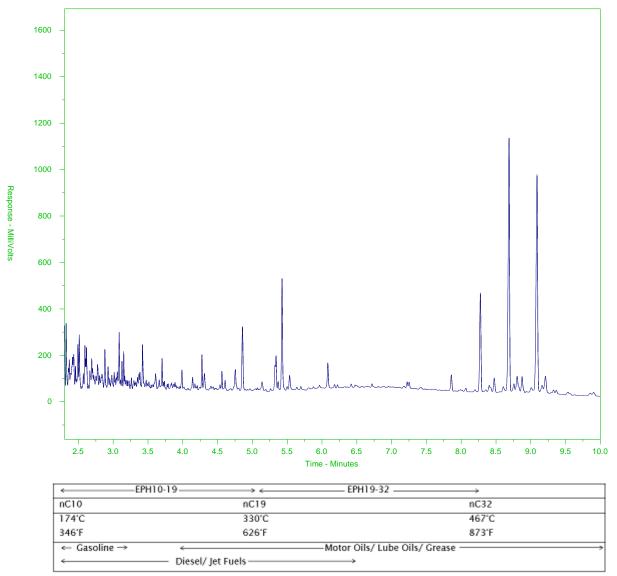
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1967694-1 Client Sample ID: EIRA-25



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

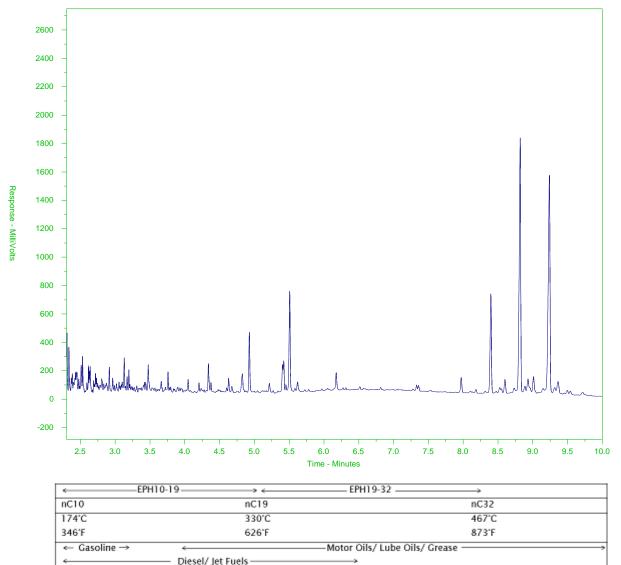
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1967694-2 Client Sample ID: DUP-5



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878



L1967694-COFC

COC Number: 15 - 609411

| | www.aisgiobai.com | | | | | | | | | | | | | | | | |
|-------------------|---|--------------------------------------|--|----------------------|-----------------|--|---|--|---------------|------------|---------------|-----------|--|--|---|--|--|
| Report To | Contact and company name below will appear on the final r | eport | Report Format / Distribution | | | | Select Service Level Balow - Please confirm all ESP TATs with your AM - surcharges will apply | | | | | | | | | | |
| Company: | AECOM | Select Report Fo | | EXCEL 🔲 | EDD (DIGITAL) | Regular [R] Standard TAT If received by 3 pm - business days - no surcharges | | | | | | | | | rges apply | | |
| Contact: | Michael Gill | | rality Control (QC) Report with Report XYES \(\square\) NO | | | | | y (P4) | | ğ | 1 | Busine | | | | | |
| Phone: | 604 444 6400 | Compare Resi | Compare Results to Criteria on Report - provide details below if box checked | | | | 4 day [P4] 5 1 Business day [E1] 5 2 day [P3] 5 Same Day, Weekend or Statutory holiday [E0] | | | | | | | / No/ | | | |
| | Company address below will appear on the final report | Select Distributio | Select Distribution: EMAIL MAIL FAX | | | | 2 da | y [P2] | | | | he | oliday (E | 0] | _ | | |
| Street: | 3292 Production Way | AARIC ON FORD | enalchood, gillagecom. com | | | | Date and Time Required for all E&P TATs: | | | | | | | | | | |
| City/Province: | Burnaby | | Tostie southern a accom. com | | | | For losts that can not be performed according to the service level selected, you will be contacted. | | | | | | | | | | |
| Postal Code: | | Email 3 | ii 3 | | | | | | | Ana | lysis Re | equest | | | | | |
| Invoice To | Same as Report To YES NO | | Invoice Dis | stribution | | Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below | | | | | | | | | | | |
| | Copy of Invoice with Report | Select Invoice Di | stribution: | EMAIL MAIL | FAX | 4 | | | | | | | | |] | | |
| Company: | Chevron Canada Ital. | 500 NOWINE | AS abe | Ve | | | <u> </u> | | | | | | | | 1 | | |
| Contact: | CHIS BOUS | Email 2 | | | |] | | | 1 1 | | | | | | ا بو | | |
| | Project Information | | il and Gas Require | fields (client u | se) |] [| I | | 1 1 | | 1 | | 1 | | i ii | | |
| ALS Account # / | Quote #: | AFE/Cost Center: | | PO# | | المهد [| Q - | | | | | | | | oute | | |
| Job #: 60 | 547455 | Major/Minor Code: | | Routing Code: | | H | Μ | | 1 \ | | | | 1 | | of Containers | | |
| PO/AFE: | | Requisitioner: | | | | | HEP | | 1 1 | | | | | | j je | | |
| LSD: FOR | echore, | Location: | Location: | | | | | (h | | | | | l | | Vumber | | |
| | (A) (A) (A) (A) (A) (A) (A) (A) (A) (A) | | | | | l∡ĭ | ` = #[- | ₹" | | | | | - 1 | | 2 | | |
| ALS Lab Wor | rk Order # (lab use only) | ALS Contact: | Mat-t | PEAP | ZEZES AN | $ \omega $ | Q - | -F3 | | | | | i | | 1 | | |
| ALS Sample # | Sample Identification and/or Co- | ordinates | Date | Time | Committe Time | 1 | П | و | 1 1 | 1 | 1 1 | | 1 | | 1 1 | | |
| (lab use only) | (This description will appear on th | ne report) | (dd-mmm-yy) | (hh:mm) | Sample Type | 80 | | 2 | | | | | | | 1 | | |
| | ETBA - 25 | | 1-Aug-17 | 8:15 | Sodiment | | \mathbf{X}^{2} | ∀ | | | | | l l | | Tu | | |
| | NUE C | | 1.7.7 | A | 1 | | J/ . | 17 | | | | | | | 1 | | |
| | DWI- D | <u> </u> | - | | | V | - W 1 | - | 1 - | | 1 1 | | | | ♥ | | |
| | | <u> </u> | | | | ┼─┼ | | - | ┼──┤ | | + | \vdash | | | | | |
| | | | | | | | <u> </u> | _ | | -+ | | | _ | | | | |
| | | <u></u> | | | | <u> </u> | | | \perp | | 1-1 | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | · | | | | | | $T^{a}I$ | | | | | | |
| | | | · | - | | | | | | | 1 1 | | _ | - | 1 1 | | |
| | <u> </u> | | | | | | ∤ | - | | | + | | | <u> </u> | | | |
| | | | <u></u> | | <u>-</u> | 1 | | | + + | | + | | | | | | |
| <u> </u> | | | | ļ <u>.</u> | | | <u> </u> | | + | | | | | | | | |
| | | | | | | | | | 1 | | | | | | | | |
| | | | | | | l l | | | | | | | [] | | <u>i </u> | | |
| B | Special Special | I Instructions / Specify Criteria to | | king on the drop-d | lown list below | | | | MPLE C | ONDITION | AS RE | CEIVE |) (lab us | e only) | | | |
| | | ctronic COC only) | | | Frozen | | _ 🗓 | | SIF | Observ | ations | Yes | □ No | | | | |
| | n from a Regulated DW System? | | | | | Ice Pac | | _ | Cubes | ☐ Cus | tody sea | al intact | Yes | ☐ No | | | |
| 1 | 5 🗷 NO | 000 | | | | Cooling | Initiate | | | | <u>.</u> | | | | | | |
| Are samples for h | uman drinking water uso? | SC CSR | | | | | INIITIA | AL COOLER | TEMPERAT | rures °C . | | | ***** | LER TEMPER | ATURES °C | | |
| YES | | | | | | <u> </u> | | | | | | | 23 | | | | |
| | SHIPMENT RELEASE (client use) | | INITIAL SHIPME | | lab use only) | I=: | | lanah - d L | | INAL SHIP | MENT | | TON (lab | use only) | 1-1-1 | | |
| Released by: | Date: | Time: Received by: | | Date: | | Time: | * | eceived b | iy: | J(| r | Date: | I_{1} | 17 | 10:54 | | |
| REFER TO BACK I | PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | <u>-</u> | WHI | L TE - LABORATORY | COPY YELLOV | L. V - CLIEN | VIT COPY | , | | <u> </u> | <u></u> | <u> </u> | / | 1 1 | OCTORER 2015 FRONT | | |



AECOM CANADA LTD. Date Received: 02-AUG-17

ATTN: Michael Gill Report Date: 02-AUG-17 22:22 (MT)

Version: FINAL

3292 Production Way Suite 330

Burnaby BC V5A 4R4

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1968560

Project P.O. #: NOT SUBMITTED

Job Reference: 60542455 C of C Numbers: 15-609420 Legal Site Desc: Foreshore

Dean Watt, B.Sc. Account Manager

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

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group An ALS Limited Company



L1968560 CONTD....

Version: FINAL

PAGE 2 of 5 02-AUG-17 22:22 (MT)

| | Sample ID Description Sampled Date Sampled Time Client ID | L1968560-1 Sediment 02-AUG-17 09:30 EIRA-26 | | |
|-------------------------------|---|---|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Physical Tests | Moisture (%) | 15.8 | | |
| | pH (1:2 soil:water) (pH) | 8.21 | | |
| Metals | Antimony (Sb) (mg/kg) | 0.13 | | |
| | Arsenic (As) (mg/kg) | 2.23 | | |
| | Barium (Ba) (mg/kg) | 45.5 | | |
| | Beryllium (Be) (mg/kg) | 0.21 | | |
| | Cadmium (Cd) (mg/kg) | 0.074 | | |
| | Chromium (Cr) (mg/kg) | 14.9 | | |
| | Cobalt (Co) (mg/kg) | 4.26 | | |
| | Copper (Cu) (mg/kg) | 14.3 | | |
| | Lead (Pb) (mg/kg) | 6.31 | | |
| | Mercury (Hg) (mg/kg) | <0.050 | | |
| | Molybdenum (Mo) (mg/kg) | <0.50 | | |
| | Nickel (Ni) (mg/kg) | 11.3 | | |
| | Selenium (Se) (mg/kg) | <0.20 | | |
| | Silver (Ag) (mg/kg) | <0.10 | | |
| | Thallium (TI) (mg/kg) | <0.050 | | |
| | Tin (Sn) (mg/kg) | <2.0 | | |
| | Uranium (U) (mg/kg) | 0.671 | | |
| | Vanadium (V) (mg/kg) | 33.6 | | |
| | Zinc (Zn) (mg/kg) | 32.8 | | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | | |
| | Benzene (mg/kg) | <0.0070 | | |
| | Ethylbenzene (mg/kg) | 0.382 | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | | |
| | Styrene (mg/kg) | <0.050 | | |
| | Toluene (mg/kg) | <0.050 | | |
| | ortho-Xylene (mg/kg) | 0.650 | | |
| | meta- & para-Xylene (mg/kg) | 1.92 | | |
| | Xylenes (mg/kg) | 2.57 | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 79.9 | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 77.7 | | |
| Hydrocarbons | EPH10-19 (mg/kg) | 340 | | |
| | EPH19-32 (mg/kg) | 690 | | |
| | LEPH (mg/kg) | 340 | | |
| | HEPH (mg/kg) | 690 | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | | |

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

L1968560 CONTD.... PAGE 3 of 5

ALS ENVIRONMENTAL ANALYTICAL REPORT

02-AUG-17 22:22 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | Sediment 02-AUG-17 09:30 EIRA-26 | | |
|--|---|---|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 93.3 | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 106.5 | | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.070 | | |
| | Acenaphthylene (mg/kg) | <0.050 | | |
| | Anthracene (mg/kg) | <0.050 | | |
| | Benz(a)anthracene (mg/kg) | <0.050 | | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | | |
| | Chrysene (mg/kg) | <0.050 | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | | |
| | Fluoranthene (mg/kg) | <0.20 DLCI | | |
| | Fluorene (mg/kg) | 0.114 | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | | |
| | 2-Methylnaphthalene (mg/kg) | 1.47 | | |
| | Naphthalene (mg/kg) | 0.661 | | |
| | Phenanthrene (mg/kg) | 0.223 | | |
| | Pyrene (mg/kg) | 0.153 | | |
| | Surrogate: Acenaphthene d10 (%) | 107.1 | | |
| | Surrogate: Chrysene d12 (%) | 126.1 | | |
| | Surrogate: Naphthalene d8 (%) | 97.7 | | |
| | Surrogate: Phenanthrene d10 (%) | 104.1 | | |
| | | | | |

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

L1968560 CONTD....

PAGE 4 of 5

02-AUG-17 22:22 (MT)

Version: FINAL

Reference Information

QC Samples with Qualifiers & Comments:

| QC Type De | scription Parameter | Qualifier | Applies to Sample Number(s) | | | | |
|--|---|-----------------------|-----------------------------|--|--|--|--|
| Duplicate | Copper (Cu) | DUP-H | L1968560-1 | | | | |
| Qualifiers for Individual Parameters Listed: | | | | | | | |
| Qualifier | Description | | | | | | |
| DLCI | Detection Limit Raised: Chromatographic Interference due to co-elution. | | | | | | |
| DLQ | Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria. | | | | | | |
| DUP-H | Duplicate results outside ALS DQO, due to | sample heterogeneity. | | | | | |

Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** | |
|-----------------|--------|------------------------------------|--------------------|--|
| EPH-TUMB-FID-VA | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID | |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

Hg-WW-200.2-CVAF-VA Soil Hg in Soil by CVAFS EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, sieved (wet sample) through a 2 mm (10 mesh) sieve, and a representative subsample of the material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

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

LEPH/HEPH-CALC-VA Soil LEPHs and HEPHs

BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-WW-200.2-CCMS-VA Soil

Metals in Soil by CRC ICPMS

EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-SIEVE-VA

Soil

Moisture for CSR Metals Calculations

ASTM D2974-00 Method A

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

MOISTURE-VA

Soil

Moisture content

CWS for PHC in Soil - Tier 1

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

PAH-TMB-D/A-MS-VA

Soil

PAH - Rotary Extraction (DCM/Acetone)

EPA 3570/8270

Polycyclic Aromatic Hydrocarbons in Sediment/Soil

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

PH-WW-1:2-DI-MAN-VA

Soil

pH in Soil (1:2 Soil:Water Ext.) (WET)

BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the wet sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water, where the samples moisture is accounted for. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA

Soil

VH in soil by Headspace GCFID

BC Env. Lab Manual (VH in Solids)

Reference Information

L1968560 CONTD....

PAGE 5 of 5

02-AUG-17 22:22 (MT)

Version: FINAL

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

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).

XYLENES-CALC-VA Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

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

Laboratory Definition Code Laboratory Location

VA ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-609420

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

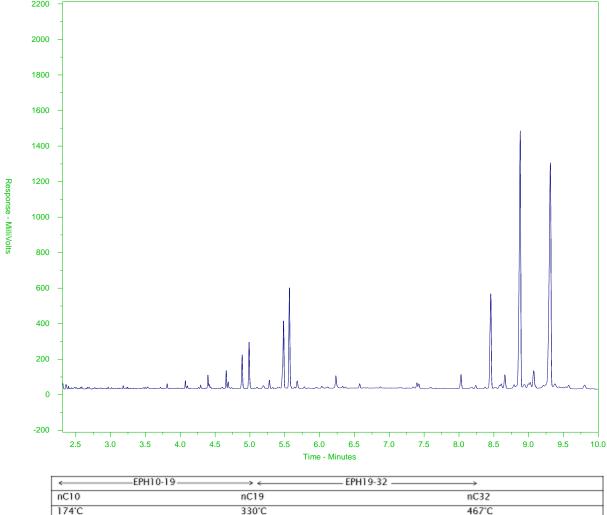
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1968560-1 Client Sample ID: EIRA-26



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

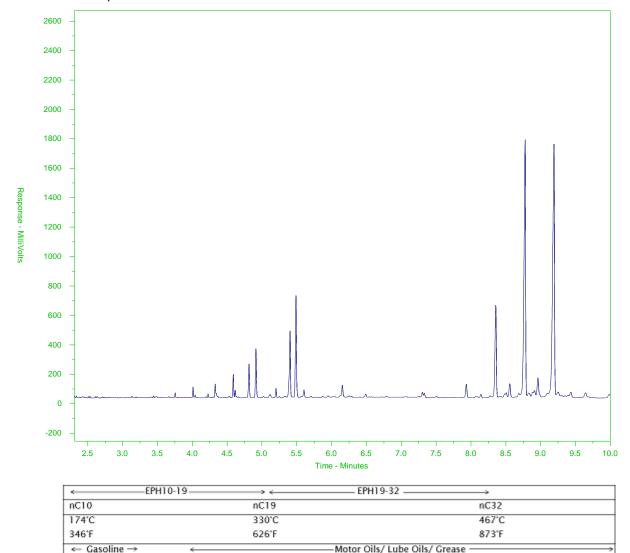
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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



ALS Sample ID: WG2583851-4#L1968560-1

Client Sample ID: EIRA-26



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

Diesel/ Jet Fuels

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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

Environmental



L1968560-COFC

COC Number: 15 - 609420

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

| Γ | | | | | | | | | | | | | | | • | | | |
|--|---|--|--|---|------------------------|-------------------------|--|---|-------------|--|----------|-------------|---|--------------|--|--|--|--|
| Report To | Contact and company name below wi | appear on the final report | Report Format / Distribution | | | | | Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply | | | | | | | | | | |
| Company: Contact: | AECOM | | Select Report Format: PDF EXCEL EDD (DIGITAL) | | | | | | | | | | | | | | | |
| Phone: | Michael Gill | | Quality Control | Quality Control (QC) Report with Report | | | | | day [P4] | Business days - no surcharge | | | | | | rges apply | | |
| i none. | 604.444. 6480 | | Compare Results to Criteria on Report - provide details below if box checked | | | | ORITY PSS D2 | 3 | day [P3] | H | SENC | | | | | | | |
| Street: | Company address below will appear on the f | nal report | Select Distribution: EMAIL MAII FAY | | | | PRIORITY (Business Days) | 2 | day [P2] | Same Day, Weekend or holiday [E0] | | | | nd or S | Statutory | | | |
| City/Province: | 3292 Production | Way | Michael | I. aill@ooco | in . Com | | | Date and Time Required for all E&P TATs: | | | | | | | | | | |
| Postal Code: | Burnaby | | teshe. | southern 6 | Doccom. | COM | For tes | For tests that can not be performed according to the service level selected, you will be contacted. | | | | | | | | | | |
| Invoice To | Same as Report To | 13 | michael gill Dacon. com frestre. Sointhern Baccom. com Email 3 | | | | | Analysis Request | | | | | | | | | | |
| | Copy of Invoice with Report | s NO | | | istribution | | Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below | | | | | | | | | Γ | | |
| Сотрапу: | A1 A A | S NO | Select Invoice I | Distribution: | EMAIL MAIL | FAX | P | | | T | <u> </u> | | \top | | | 1 | | |
| Contact: | Chevron Canada | _ LADI | Email 161 Fax | ne as a | (gyodi | | 1 | | | | _ | \vdash | +++ | + | +- | - | | |
| | Project Unformation | | Entall 2 | | | | 1 | | | | | | | | | | | |
| ALS Account # | | | | Oil and Gas Require | ed Fields (client u | use) | 7. | 7 | | | | 1 1 | | | | ers | | |
| | 542455 | | AFE/Cost Center: | | PO# | |] ≱ | | | | | ı I | | | | Itair | | |
| PO/AFE: | 3 12-130 | | Major/Minor Code: | | Routing Code: | | ₩d/ | 至 | | | | 1 | | | | Š | | |
| SD: Fan | echone | | Requisitioner: | | | | | \boldsymbol{x} | | | - 1 | . | 1 1 | 1 | ' | ar of | | |
| | | | Location: | | | |] . "] | | 1) | | | | | | | Number of Containers | | |
| ALS Lab Wo | rk Order # (lab use only) | | Deant . | 14277 | Sample | 1/1/1 | \mathbb{Z} | I | ď | | | | | | | ž | | |
| ALS Sample # | Sample Identifica | tion and/or Coordinates | 1 Dean | Wath | PAI | <u>//</u> w | מע [| 0 | - | 1 | | | | | | | | |
| (lab use only) | | vill appear on the report) | | Date | Time * | Sample Type | | pi | Med | |] | - 1 | | | | | | |
| | EIRA-Z6 | m appear on the report) | | (dd-mmm-yy) | (hh:mm) | | | | \leq | | | | . | | | | | |
| | L-11/1 20 | | | 2-Aug-17 | 9:30 | Sedimen | \mathbf{Y} | $\boldsymbol{\chi}$ | ン | | | | | | + | 11. | | |
| | | | | 7 | | | | | | | | | + | + | 1-1 | 7- | | |
| | | | | | | | | | | | 1-1 | -+- | + | + | + | | | |
| | | | | | | | \top | | | ++ | | | + | + | +-1 | | | |
| | | | | | | | \vdash | | | | | | | + | | | | |
| | | | | | | | + | -+ | | | | | | | | | | |
| | | | | | | | + | -+ | | | | | | | | | | |
| | | | | | | ļ | 1_1 | | | | | | | | | | | |
| | | | | | | | | | | | | | | 7 | | | | |
| | | | | | | | | | | | | | | + | | | | |
| | | | | | | | | | | | + | | + + - | - | \vdash | | | |
| | | | | | | | | | | | + + | + | +-+- | + | ++ | | | |
| | | | | | | | | -+ | | + | + + | + | + | + | | | | |
| Drinking | Water (DW) Samples ¹ (client use) | Special Instructions / | Specify Criteria to | add on report by click | ing on the drop-do | own list helow | | | | MPLE CON | DITION | C DECE: | VED (: | | $oldsymbol{ol}}}}}}}}}}}}}}}}}}$ | | | |
| | from a Regulated DW System? | <u> </u> | (elec | tronic COC only) | _ | WILL HOLD BEIOW | Frozen | | T T | WIFEE CON | | servation | | | | | | |
| YES NO | | | | | | | Ice Pac | | | Cubes | | | | = | No | | | |
| | man drinking water use? | 1 20 | PCD | | | | Cooling | | | | Oustou | y Scal IIII | act Yes | š 📙 | No | X | | |
| | NO NO | | WIT | | | | | INIITI | AL COOLER | TEMPERATURE | s °C | | FINAL CC | OI ÉR TE | MPERATU | IRES 9C | | |
| | SHIPMENT RELEASE (client use | <u> </u> | · · · · · · · · · · · · · · · · · · · | | | | | | | | | 1 | 7) | T | CAND | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | | |
| eleased by: | Date: |) Time: | Possived by | INITIAL SHIPMEN | | b use only) | | Т | | FINA | . SHIPME | NT REC | EPTION (lat | h use or | 300 | | | |
| | | | Received by: | | Date: | | Time: | F | Received b | <i>i</i> . | | Date | | J use of | | ime: | | |
| FER TO BACK PA | AGE FOR ALS LOCATIONS AND SAMPLING II | NFORMATION | | \ <u>\\</u> | E - LABORATORY (| CODY | | | | ِ َ | <u> </u> | <i>\</i> | US 7 | /1 | 71 | ime: 10:24 | | |
| iure to complete all po f any water samples a | ortions of this form may delay analysis. Please fill in the | s form LEGIBLY. By the use of this for | orm the user acknowled | ges and agrees with the Ti | erms and Conditions as | S specified on the back | r - CLIEN page of th | I COPY e white - | report conv | | | 7- | 7 | 7 | | OCTOBER 2015 FRON | | |



AECOM CANADA LTD. Date Received: 03-AUG-17

ATTN: Michael Gill Report Date: 04-AUG-17 14:05 (MT)

Version: FINAL

3292 Production Way Suite 330

Burnaby BC V5A 4R4

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1969670
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 15-609412
Legal Site Desc: FORESHORE

Dean Watt, B.Sc. Account Manager

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

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group An ALS Limited Company



L1969670 CONTD.... PAGE 2 of 5

ALS ENVIRONMENTAL ANALYTICAL REPORT

04-AUG-17 14:05 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1969670-1 SEDIMENT 03-AUG-17 08:15 EIRA-27 | | |
|-------------------------------|---|---|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Physical Tests | Moisture (%) | 15.8 | | |
| | pH (1:2 soil:water) (pH) | 7.45 | | |
| Metals | Antimony (Sb) (mg/kg) | 0.15 | | |
| | Arsenic (As) (mg/kg) | 2.93 | | |
| | Barium (Ba) (mg/kg) | 38.6 | | |
| | Beryllium (Be) (mg/kg) | 0.25 | | |
| | Cadmium (Cd) (mg/kg) | 0.069 | | |
| | Chromium (Cr) (mg/kg) | 21.3 | | |
| | Cobalt (Co) (mg/kg) | 5.24 | | |
| | Copper (Cu) (mg/kg) | 16.5 | | |
| | Lead (Pb) (mg/kg) | 7.04 | | |
| | Mercury (Hg) (mg/kg) | <0.050 | | |
| | Molybdenum (Mo) (mg/kg) | 0.58 | | |
| | Nickel (Ni) (mg/kg) | 18.7 | | |
| | Selenium (Se) (mg/kg) | <0.20 | | |
| | Silver (Ag) (mg/kg) | <0.10 | | |
| | Thallium (TI) (mg/kg) | <0.050 | | |
| | Tin (Sn) (mg/kg) | 12.8 | | |
| | Uranium (U) (mg/kg) | 1.05 | | |
| | Vanadium (V) (mg/kg) | 38.4 | | |
| | Zinc (Zn) (mg/kg) | 33.7 | | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | | |
| | Benzene (mg/kg) | <0.0050 | | |
| | Ethylbenzene (mg/kg) | <0.015 | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | | |
| | Styrene (mg/kg) | <0.050 | | |
| | Toluene (mg/kg) | <0.050 | | |
| | ortho-Xylene (mg/kg) | <0.050 | | |
| | meta- & para-Xylene (mg/kg) | <0.050 | | |
| | Xylenes (mg/kg) | <0.075 | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 79.1 | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 85.8 | | |
| Hydrocarbons | EPH10-19 (mg/kg) | 200 | | |
| | EPH19-32 (mg/kg) | 640 | | |
| | LEPH (mg/kg) | 200 | | |
| | HEPH (mg/kg) | 640 | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | | |

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

L1969670 CONTD.... PAGE 3 of 5

04-AUG-17 14:05 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1969670-1 SEDIMENT 03-AUG-17 08:15 EIRA-27 | | |
|--|---|---|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 92.4 | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 77.6 | | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | | |
| • | Acenaphthylene (mg/kg) | <0.050 | | |
| | Anthracene (mg/kg) | <0.050 | | |
| | Benz(a)anthracene (mg/kg) | <0.050 | | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | | |
| | Chrysene (mg/kg) | <0.050 | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | | |
| | Fluoranthene (mg/kg) | <0.40 | | |
| | Fluorene (mg/kg) | <0.050 | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | | |
| | Naphthalene (mg/kg) | <0.050 | | |
| | Phenanthrene (mg/kg) | <0.050 | | |
| | Pyrene (mg/kg) | <0.050 | | |
| | Surrogate: Acenaphthene d10 (%) | 129.3 | | |
| | Surrogate: Chrysene d12 (%) | 96.6 | | |
| | Surrogate: Naphthalene d8 (%) | 99.7 | | |
| | Surrogate: Phenanthrene d10 (%) | 95.4 | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

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

L1969670 CONTD....

PAGE 4 of 5

04-AUG-17 14:05 (MT) Version: FINAL

Reference Information

QC Samples with Qualifiers & Comments:

| QC Type Des | scription Parameter | Qualifier | Applies to Sample Number(s) | |
|---------------|--|-------------------------|-----------------------------|--|
| Duplicate | Tin (Sn) | DUP-H | L1969670-1 | |
| Qualifiers fo | or Individual Parameters Listed: | | | |
| Qualifier | Description | | | |
| DLCI | Detection Limit Raised: Chromatographic Interfer | ence due to co-elution. | | |
| DUP-H | Duplicate results outside ALS DQO, due to samp | le heterogeneity. | | |

Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** | |
|-----------------|--------|------------------------------------|--------------------|--|
| FPH-TUMR-FID-VA | Soil | EPH in Solids by Tumbler and GCEID | BC MOF FPH GCFID | |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-WW-200.2-CVAF-VA Soil Hg in Soil by CVAFS EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, sieved (wet sample) through a 2 mm (10 mesh) sieve, and a representative subsample of the material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

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

LEPH/HEPH-CALC-VA Soil LEPHs and HEPHs

BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-WW-200.2-CCMS-VA Soil

Metals in Soil by CRC ICPMS

EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-SIEVE-VA Soil Moisture for CSR Metals Calculations ASTM D2974-00 Method A

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

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-D/A-MS-VA Soil PAH - Rotary Extraction (DCM/Acetone) EPA 3570/8270

Polycyclic Aromatic Hydrocarbons in Sediment/Soil

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

PH-WW-1:2-DI-MAN-VA Soil pH in Soil (1:2 Soil:Water Ext.) (WET)

BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the wet sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water, where the samples moisture is accounted for. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British

Reference Information

L1969670 CONTD....

PAGE 5 of 5

04-AUG-17 14:05 (MT)

Version: FINAL

Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

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).

XYLENES-CALC-VA Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

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

Laboratory Definition Code Laboratory Location

VA ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-609412

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/kg iwt - miligrams per kilogram based on lipid-adjusted weight of sar

mg/L - milligrams per litre.

< - Less than.

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

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

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

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

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

Chain of Custody (COC) / Analytical Request Form



L1969670-COFC

coc Number: 15 - 609412

Environmental

Canada Toll Free: 1 800 668 9878

| • | www.alsglobal.com | Callada 101 | ii Fiee. 1 800 00 | | | | | | | | | | | | | _ | | |
|----------------|----------------------------------|--|----------------------|-----------------------------|-----------------------|-------------------|-----------------------------|---------------|---------------|-------------|----------------|-------------|-------------|--------------------|------------------|-----------|-------------|----------------------|
| Report To | Contact and company name | below will appear on the final report | | Report Format | | | Select Ser | vice Leve | Below - | Please con | firm all E&P 1 | | | | | | | |
| Company: | AECOM | | Select Report For | | | EDD (DIGITAL) | 1 | | ular [R | | Standard | TAT if rece | | pm - busin | | | arges app | <u>y</u> |
| Contact: | Michael Gill | | Quality Control (C | QC) Report with Repo | | | PRIORITY (Business Days) | | ay [P4] | - | 4 | ENCY | | siness da | | | | '_ |
| Phone: | COLL HILL GUCH | \ | _ | lts to Criteria on Report - | provide details below | if box checked | PRIOR | | ay [P3] | | 븍 | S | ame Da | y, Weeke holida | ena or v 1E01 | Statuto | y 🔀 | · ' |
| | Company address below will appea | r on the final report | Select Distributio | | MAIL | | ng) | | ay [P2] | | | | | <u> </u> | Ö | | | |
| Street: | 3292 Produc | tion Wau | FUEL CONTERE | aill eae | com. C | 2011 | | | | | for all E&P | | l selected | YOU will be | contacted | | | |
| City/Province: | Burnabu | 7 | 105 110 11° | Solutivery | DALLO: | M. Com | For tests 1 | hat can n | ot be per | formed acc | oraing to the | Analysi | | | - | | | |
| Postal Code: | - Constant | | Email 3 | | | | | | diesto Fil | Itorod (E) | Preserved (F | | | |) below | | Т- | |
| nvoice To | Same as Report To | YES NO | | Invoice Dis | | | P T | | ulcale Fi | itereu (r), | Treserved (I | 7 1 | 1 | T T | - T | | - | |
| | Copy of Invoice with Report | YES NO | Select Invoice Di | stribution: | EMAIL MAIL | FAX | - | | | | - | ┾ | - | + | | | ┪ | |
| Company: | Chevron Ca | hada Ltd. | Emant or Fax | 135 NOC | We | | | | | | | | | 1 1 | Ì | | ļ | |
| Contact: | Chris Bous | | Email 2 | 0 0 0 0 0 | . =: | | 1 | 工 | | | | | | | | | | iner |
| | Project Vaforma | ition | | il and Gas Require | | use) | 1 . | 9 | | | | | | 1 1 | ļ | | | onta |
| ALS Account # | | | AFE/Cost Center: | | PO# | | MdV | AEPA A | | | - | 1 1 | | | | | | Number of Containers |
| Job #: | 0542455 | | Major/Minor Code: | | Routing Code: | | 5 | 1 | | | ŀ | | | 1 1 | 1 | | | o Jec |
| PO/AFE: | | | Requisitioner: | | | | | | S | | | | | | | | | d H |
| LSD: | preshore | | Location: | | т | | C I | 古 | - | | - | | | | | | ì | Z |
| ALS Lab W | ork Order# (lab use only) | | AS Contact: | Walt | Sampler: | 2/ | 位 | CI) | 5 | | | | | | | | | |
| ALS Sample # | Sample i | dentification and/or Coordinates | | Date | Time | Sample Type | 80 | J | 2 | | | | | | | | Ì | |
| (lab use only) | (This de | scription will appear on the report) | | (dd-mmm-yy) | (hh:mm) | 5 (1 3 | 1.00 | $\overline{}$ | | | | + | | +-+ | | + | - 17 | L |
| | EIRA-27 | | | 3-Aug-17 | 8:15 | Sediment | X | X | X | | | +-+ | | +- | | $-\vdash$ | -├ - | T |
| | 113 | | | 3 . | | | 1 | | | | | + | | | | _ | + | |
| | | | | | | | | | | | _ | \perp | | 4 | | _ | | |
| | | | | | | | | | | | | | | | | _ | | |
| | | | | | | | | | | • | | | | | | | | |
| | | | | | | | 1 | | | | | | | | | | ļ | |
| | | | | | | | - | | - | | | + 1 | | | | | | |
| | | | | <u> </u> | | | | | | | | + + | | | | | | |
| | | | | | | | | | | | | | | + | | | _ | |
| | | • | | | | | | | | | | | _ | | - | | + | |
| | | | | | | | | | | | _ | | | | | - | | |
| | | | | | | | | | | | | | | | \perp | | | |
| | | | | | | | | | | | | | | <u> </u> | | | | |
| | | Superior line to the state of t | / Specify Criteria f | o add on report by cli | cking on the dro | o-down list below | | | | | PLE CON | | | | | | | |
| Drink | ing Water (DW) Samples¹ (client | use) | (el | ectronic COC only) | ong on | | Froze | n | | | _ | _ | bservati | | Yes | _ | No | |
| l . | ken from a Regulated DW System? | | | | | | Ice Pa | | | Ice Cu | ubes 🗀 | Custo | dy seal | ntact | Yes | | No | |
| | / | l Qn | 200 | | | | Cooli | ng Initia | | | | | | | W. 600 | LER TEMP | EDATIO | ES °C |
| | r human drinking water use? | BC (| son ! | | | | | | ITIAL CO | | MPERATUR | ES℃ | | FIN | VAL COO | LEKIEN | CIVAL OR | |
| I | YES NO | | - , | | | | | the state of | | 9,9 | | | (m) 1 = = = | -0557.2 | NI (1-1 | | | |
| | SHIPMENT RELEASI | E (client use) | | | ENT RECEPTIO | N (lab use only) | Tr: | | Bass | ived by: | | L SHIPN | | ECEPTIC ate: | מפו) אנ | use only | Tir | me: |
| Released by: | | Time: | Received by | 10 1) | Date: | , 3 | Time 2 | 50 | Rece | iveu by: | | | ٦ | _, | | | " | |
| Released by: | est work Av | 43,17 Dit | 20. C | ûde V. | HITE - I ABORATE | | کا - CLI | ENT CO | DPÝ | | | | | | | | | OCTOBER 2015 FR |

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 03-AUG-17

Report Date: 11-AUG-17 17:12 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1969674

Project P.O. #: 0015243589

Job Reference: 60542455

C of C Numbers: 15-609413

Legal Site Desc: FORESHORE

Dean Watt, B.Sc. Account Manager

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

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



L1969674 CONTD....

PAGE 2 of 7 11-AUG-17 17:12 (MT)

Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

L1969674-2 L1969674-3 L1969674-4 L1969674-5 Sample ID L1969674-1 Description SEDIMENT SEDIMENT SEDIMENT SEDIMENT SEDIMENT Sampled Date 03-AUG-17 03-AUG-17 03-AUG-17 03-AUG-17 03-AUG-17 08:25 10:00 Sampled Time 08:35 08:45 10:10 ESA-29 ESA-30 ESA-31 ESA-32 ESA-33 Client ID Grouping **Analyte** SOIL **Physical Tests** Moisture (%) 19.6 18.5 16.1 19.5 17.3 pH (1:2 soil:water) (pH) 7.29 7.86 8.39 7.54 8.27 Metals Antimony (Sb) (mg/kg) 0.16 0.12 0.18 0.14 0.14 Arsenic (As) (mg/kg) 1.07 0.80 1.91 2.01 0.67 Barium (Ba) (mg/kg) 86.2 146 345 46.0 73.7 Beryllium (Be) (mg/kg) 0.52 0.39 0.24 0.42 0.40 Cadmium (Cd) (mg/kg) 0.053 0.083 0.071 < 0.050 0.061 Chromium (Cr) (mg/kg) 17.9 15.8 13.4 13.8 16.4 Cobalt (Co) (mg/kg) 10.5 7.27 6.77 9.73 8.76 Copper (Cu) (mg/kg) 48.8 26.5 19.6 30.2 31.5 Lead (Pb) (mg/kg) 4.97 5.51 4.49 7.56 4.11 Mercury (Hg) (mg/kg) < 0.050 < 0.050 < 0.050 < 0.050 < 0.050 Molybdenum (Mo) (mg/kg) 0.33 0.12 0.19 0.11 < 0.10 Nickel (Ni) (mg/kg) 10.3 8.21 8.67 7.40 8.47 Selenium (Se) (mg/kg) < 0.20 <0.20 < 0.20 < 0.20 < 0.20 Silver (Ag) (mg/kg) < 0.10 < 0.10 < 0.10 < 0.10 < 0.10 Thallium (TI) (mg/kg) 0.065 < 0.050 < 0.050 0.084 0.084 Tin (Sn) (mg/kg) < 2.0 <2.0 < 2.0 < 2.0 <2.0 Uranium (U) (mg/kg) 0.523 0.480 0.401 0.348 0.444 Vanadium (V) (mg/kg) 101 67.3 52.0 65.5 76.2 Zinc (Zn) (mg/kg) 74.6 59.1 50.7 56.7 63.9 **Volatile Organic** VOC Sample Container Field MeOH Field MeOH Field MeOH Field MeOH Field MeOH Compounds Benzene (mg/kg) <0.0090 0.0053 < 0.0050 < 0.0050 < 0.0050 Ethylbenzene (mg/kg) < 0.015 0.111 < 0.015 < 0.015 < 0.015 Methyl t-butyl ether (MTBE) (mg/kg) < 0.20 <0.20 < 0.20 < 0.20 < 0.20 Styrene (mg/kg) < 0.050 < 0.050 < 0.050 < 0.050 < 0.050 Toluene (mg/kg) < 0.050 < 0.050 < 0.050 < 0.050 < 0.050 ortho-Xylene (mg/kg) 0.198 < 0.050 < 0.050 < 0.050 < 0.050 meta- & para-Xylene (mg/kg) < 0.050 < 0.050 0.496 < 0.050 < 0.050 Xylenes (mg/kg) < 0.075 0.694 < 0.075 < 0.075 < 0.075 Surrogate: 4-Bromofluorobenzene (SS) (%) 97.1 104.9 97.6 97.2 98.4 Surrogate: 1,4-Difluorobenzene (SS) (%) 90.5 100.0 93.0 92.0 94.9 **Hydrocarbons** EPH10-19 (mg/kg) <200 <200 <200 <200 <200 EPH19-32 (mg/kg) <200 <200 <200 <200 <200 LEPH (mg/kg) <200 <200 <200 <200 <200 HEPH (mg/kg) <200 <200 <200 <200 <200 Volatile Hydrocarbons (VH6-10) (mg/kg) <100 <100 <100 <100

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

L1969674 CONTD.... PAGE 3 of 7

Version: FINAL

11-AUG-17 17:12 (MT)

| | Sample ID Description Sampled Date Sampled Time Client ID | L1969674-6 SEDIMENT 03-AUG-17 10:20 ESA-34 | | |
|-------------------------------|---|--|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Physical Tests | Moisture (%) | 18.9 | | |
| | pH (1:2 soil:water) (pH) | 7.94 | | |
| Metals | Antimony (Sb) (mg/kg) | 0.15 | | |
| | Arsenic (As) (mg/kg) | 0.87 | | |
| | Barium (Ba) (mg/kg) | 80.1 | | |
| | Beryllium (Be) (mg/kg) | 0.48 | | |
| | Cadmium (Cd) (mg/kg) | 0.197 | | |
| | Chromium (Cr) (mg/kg) | 16.1 | | |
| | Cobalt (Co) (mg/kg) | 11.4 | | |
| | Copper (Cu) (mg/kg) | 31.0 | | |
| | Lead (Pb) (mg/kg) | 8.02 | | |
| | Mercury (Hg) (mg/kg) | <0.050 | | |
| | Molybdenum (Mo) (mg/kg) | 0.12 | | |
| | Nickel (Ni) (mg/kg) | 8.60 | | |
| | Selenium (Se) (mg/kg) | <0.20 | | |
| | Silver (Ag) (mg/kg) | 0.11 | | |
| | Thallium (TI) (mg/kg) | 0.079 | | |
| | Tin (Sn) (mg/kg) | <2.0 | | |
| | Uranium (U) (mg/kg) | 0.508 | | |
| | Vanadium (V) (mg/kg) | 88.1 | | |
| | Zinc (Zn) (mg/kg) | 57.7 | | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | | |
| | Benzene (mg/kg) | <0.0050 | | |
| | Ethylbenzene (mg/kg) | <0.015 | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | | |
| | Styrene (mg/kg) | <0.050 | | |
| | Toluene (mg/kg) | <0.050 | | |
| | ortho-Xylene (mg/kg) | <0.050 | | |
| | meta- & para-Xylene (mg/kg) | <0.050 | | |
| | Xylenes (mg/kg) | <0.075 | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 98.2 | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 94.7 | | |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | | |
| | EPH19-32 (mg/kg) | <200 | | |
| | LEPH (mg/kg) | <200 | | |
| | HEPH (mg/kg) | <200 | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | | |

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

L1969674 CONTD....

PAGE 4 of 7 11-AUG-17 17:12 (MT)

Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1969674-1 SEDIMENT 03-AUG-17 08:25 ESA-29 | L1969674-2 SEDIMENT 03-AUG-17 08:35 ESA-30 | L1969674-3 SEDIMENT 03-AUG-17 08:45 ESA-31 | L1969674-4 SEDIMENT 03-AUG-17 10:00 ESA-32 | L1969674-5 SEDIMENT 03-AUG-17 10:10 ESA-33 |
|--|---|--|--|--|--|--|
| Grouping | Analyte | | | | | |
| SOIL | | | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | <100 | <100 |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 83.2 | 85.4 | 82.1 | 84.2 | 81.6 |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 108.0 | Not Reportable | 104.0 | 111.1 | 104.5 |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | DLCI <0.060 | <0.050 | <0.050 |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | 2-Methylnaphthalene (mg/kg) | 0.132 | 0.407 | <0.050 | <0.050 | <0.050 |
| | Naphthalene (mg/kg) | <0.050 | 0.198 | <0.050 | <0.050 | <0.050 |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |
| | Surrogate: Acenaphthene d10 (%) | 94.4 | 100.5 | 93.7 | 99.4 | 89.4 |
| | Surrogate: Chrysene d12 (%) | 83.1 | 88.3 | 88.0 | 93.1 | 82.8 |
| | Surrogate: Naphthalene d8 (%) | 93.9 | 98.9 | 94.5 | 96.2 | 88.8 |
| | Surrogate: Phenanthrene d10 (%) | 95.1 | 93.6 | 93.8 | 93.8 | 87.9 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

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

L1969674 CONTD.... PAGE 5 of 7

11-AUG-17 17:12 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1969674-6 SEDIMENT 03-AUG-17 10:20 ESA-34 | | |
|--|---|--|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 81.9 | | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 107.2 | | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | | |
| • | Acenaphthylene (mg/kg) | <0.050 | | |
| | Anthracene (mg/kg) | <0.050 | | |
| | Benz(a)anthracene (mg/kg) | <0.050 | | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | | |
| | Chrysene (mg/kg) | <0.050 | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | | |
| | Fluoranthene (mg/kg) | <0.050 | | |
| | Fluorene (mg/kg) | <0.050 | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | | |
| | Naphthalene (mg/kg) | <0.050 | | |
| | Phenanthrene (mg/kg) | <0.050 | | |
| | Pyrene (mg/kg) | <0.050 | | |
| | Surrogate: Acenaphthene d10 (%) | 83.7 | | |
| | Surrogate: Chrysene d12 (%) | 87.3 | | |
| | Surrogate: Naphthalene d8 (%) | 83.5 | | |
| | Surrogate: Phenanthrene d10 (%) | 81.7 | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

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

Reference Information

L1969674 CONTD....

PAGE 6 of 7

11-AUG-17 17:12 (MT)

Version: FINAL

Qualifiers for Individual Parameters Listed:

| Qualifier | Description |
|-----------|---|
| DLCI | Detection Limit Raised: Chromatographic Interference due to co-elution. |
| DLQ | Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria. |
| SMI | Surrogate recovery could not be measured due to sample matrix interference. |

Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** |
|-----------------|--------|------------------------------------|--------------------|
| EPH-TUMB-FID-VA | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

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

Reference Information

L1969674 CONTD....

PAGE 7 of 7

11-AUG-17 17:12 (MT)

Version: FINAL

elements of BCMELP method "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

XYLENES-CALC-VA

Soil

Sum of Xylene Isomer Concentrations

EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

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

Laboratory Definition Code Laboratory Location

ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-609413

VA

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

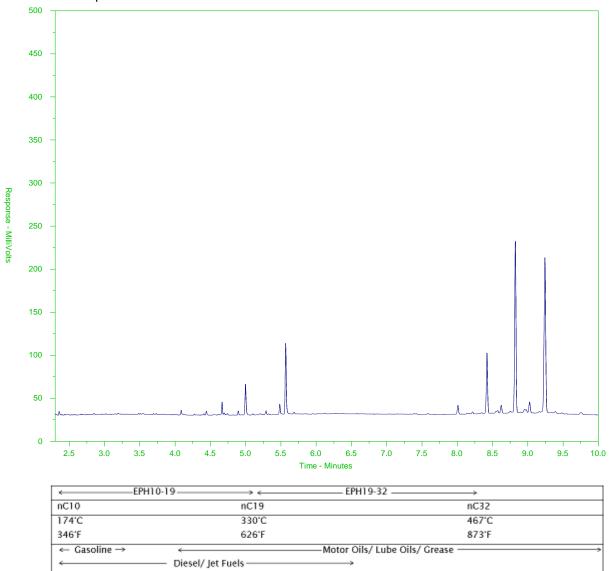
Test results reported relate only to the samples as received by the laboratory.

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

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



ALS Sample ID: L1969674-1 Client Sample ID: ESA-29



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

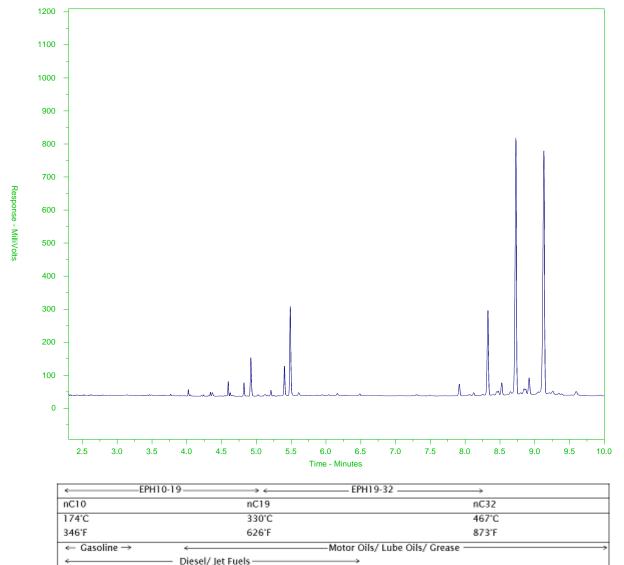
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1969674-2 Client Sample ID: ESA-30



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

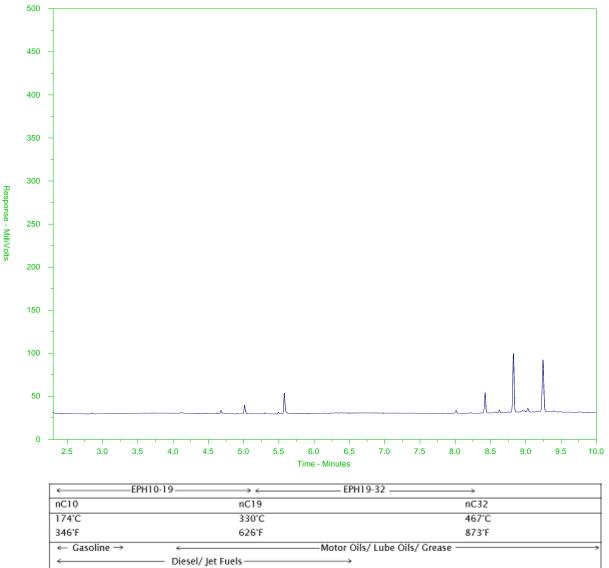
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1969674-3 Client Sample ID: ESA-31



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

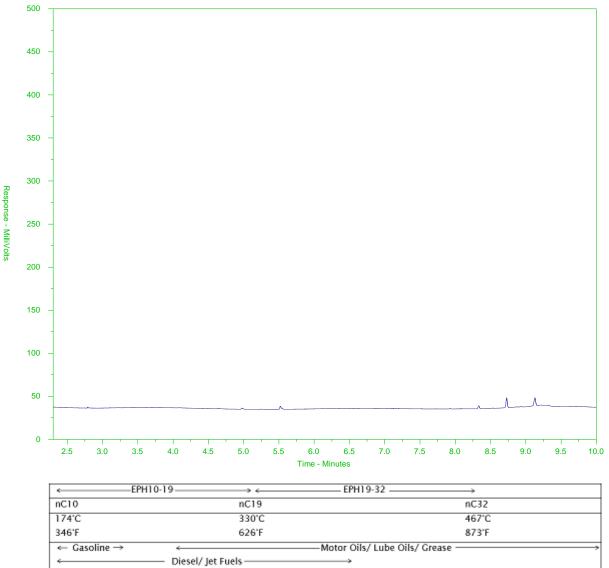
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1969674-4 Client Sample ID: ESA-32



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

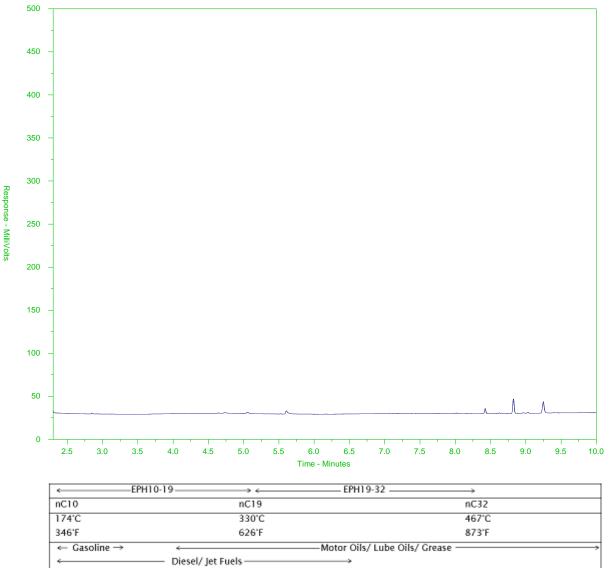
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1969674-5 Client Sample ID: ESA-33



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

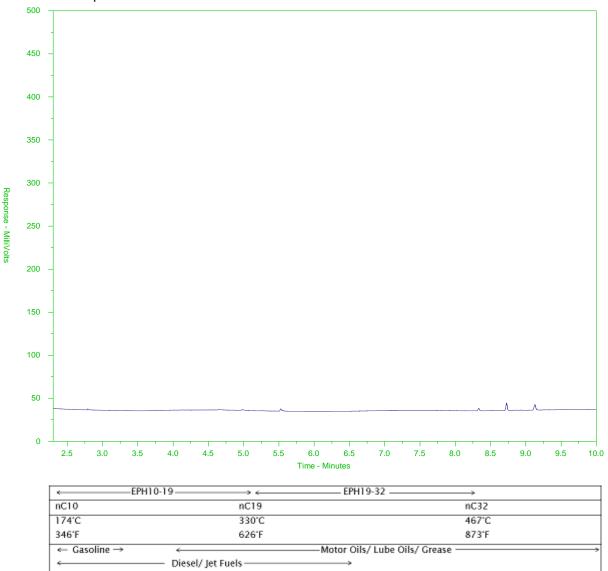
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1969674-6 Client Sample ID: ESA-34



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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

Environmental www.alsolobal.com

Chain of Custody (COC) / Analytical Request Form



COC Number: 15 - 609413

Canada Toll Free: 1 800 668 9878

| _ | www.aisgiobai.com | magnetic and the second of the | The state of the s |
|-------------------|--|--|--|
| Report To | Contact and company name below will appear on the final report | Report Format / Distribution | Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply |
| Company: | AFCOM | Select Report Format: PDF EXCEL EDD (DIGITAL) | Regular [R] Standard TAT if received by 3 pm - business days - no surcharges apply |
| Contact: | Michael Gill | Quality Control (QC) Report with Report | Same Day, Weekend or Statutory Carlot Carl |
| Phone: | 604 444 6400 | Compare Results to Criteria on Report - provide details below if box checked | The second of Statutory Same Day, Weekend or Statutory holiday [E0] |
| | Company address below will appear on the final report | Select Distribution: FAX MAIL FAX | |
| Street: | 3292 Production Way | morrisolail Qocombon | Date and Time Required for all E&P TATs: |
| | Burnaby | Horace sollier Dacon com | For tests that can not be performed according to the service level selected, you will be contacted. |
| Postal Code: | Survey | Email 3 | Analysis Request |
| Invoice To | Same as Report To | Invoice Distribution | Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below |
| | Copy of Invoice with Report YES NO | Select Invoice Distribution: EMAIL MAIL FAX | P |
| Company: | Chevron Canada Id. | Email 1 Stime as above | |
| Contact: | Chins Bous | Email 2 | |
| | Project Information | Oil and Gas Required Fields (client use) | |
| ALS Account # / (| | AFE/Cost Center: PO# | |
| | 42455 | Major/Minor Code: Routing Code: | 12472 |
| PO/AFE: | | Requisitioner: | Number of Containers |
| | preshove | Location: | |
| - | | A A A A Samulan V-AS / | |
| ALS Lab Wor | rk Order # (lab use only) | ALS Contact: Wast Sampler: EAP |] 内岩名 |
| ALS Sample # | Sample Identification and/or Coordinates | Date Time Sample Type | 1124 4 5 |
| (lab use only) | (This description will appear on the report) | (dd-mmm-yy) (hh:mm) | |
| | FCA-79 | 3-Aug-17 8:25 Sediment | $X \times X$ |
| | ESA-30 | 8:35 | |
| | | 8:45 | |
| | ESA- 31 | 10:00 | |
| | ESA-32 | | |
| | ESA-23 | 10:10 | |
| | FSA-24 | V 10:20 V | VVV |
| | | <u> </u> | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | SAMPLE CONDITION AS RECEIVED (lab use only) |
| Databio | Special Instructions | / Specify Criteria to add on report by clicking on the drop-down list below | You No. |
| | g Water (DW) Samples¹ (client use) | (electronic COC only) | |
| | n from a Regulated DW System? | | Ice Packs |
| | BC BC | CCQ | INITIAL COOLER TEMPERATURES °C FINAL COOLER TEMPERATURES °C |
| Are samples for h | numan drinking water use? | / USY\ | 4 9.5 |
| YES | 5 × NO | DUTTER OF HEAT DECEDITION (1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1- | FINAL SHIPMENT RECEPTION (lab use only) |
| | SHIPMENT RELEASE (client use) Date: Time: | INITIAL SHIPMENT RECEPTION (lab use only) Received by: Date: | Time: Received by: Date: Time: |
| Released by: | twens Date: Time: 1255 | Received by Carle W Aug 3 | [25]) |
| REFER TO BACK I | PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | WHITE - LABORATORY COPY YELLO | W - CLIENT COPY OCTOBER 2015 FROM |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 04-AUG-17

Report Date: 14-AUG-17 17:25 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1970498
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 15-609414
Legal Site Desc: Foreshore

Dean Watt, B.Sc. Account Manager

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

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group An ALS Limited Company



L1970498 CONTD.... PAGE 2 of 5

ALS ENVIRONMENTAL ANALYTICAL REPORT

14-AUG-17 17:25 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1970498-1 Sediment 04-AUG-17 13:00 ESA-35 | | |
|-------------------------------|---|--|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Physical Tests | Moisture (%) | 15.1 | | |
| | pH (1:2 soil:water) (pH) | 7.56 | | |
| Metals | Antimony (Sb) (mg/kg) | 0.14 | | |
| | Arsenic (As) (mg/kg) | 1.26 | | |
| | Barium (Ba) (mg/kg) | 44.2 | | |
| | Beryllium (Be) (mg/kg) | 0.36 | | |
| | Cadmium (Cd) (mg/kg) | <0.050 | | |
| | Chromium (Cr) (mg/kg) | 12.9 | | |
| | Cobalt (Co) (mg/kg) | 7.91 | | |
| | Copper (Cu) (mg/kg) | 25.0 | | |
| | Lead (Pb) (mg/kg) | 4.36 | | |
| | Mercury (Hg) (mg/kg) | <0.050 | | |
| | Molybdenum (Mo) (mg/kg) | 0.15 | | |
| | Nickel (Ni) (mg/kg) | 6.44 | | |
| | Selenium (Se) (mg/kg) | <0.20 | | |
| | Silver (Ag) (mg/kg) | <0.10 | | |
| | Thallium (TI) (mg/kg) | 0.060 | | |
| | Tin (Sn) (mg/kg) | <2.0 | | |
| | Uranium (U) (mg/kg) | 0.465 | | |
| | Vanadium (V) (mg/kg) | 62.4 | | |
| | Zinc (Zn) (mg/kg) | 48.2 | | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | | |
| | Benzene (mg/kg) | <0.0050 | | |
| | Ethylbenzene (mg/kg) | <0.015 | | |
| | Methyl-tert-Butyl Ether (mg/kg) | <0.20 | | |
| | Styrene (mg/kg) | <0.050 | | |
| | Toluene (mg/kg) | <0.050 | | |
| | o-Xylene (mg/kg) | <0.050 | | |
| | m+p-Xylene (mg/kg) | <0.050 | | |
| | Xylenes (Total) (mg/kg) | <0.071 | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <10 | | |
| | Surrogate: 4-Bromofluorobenzene (%) | 81.6 | | |
| | Surrogate: 3,4-Dichlorotoluene (%) | 95.1 | | |
| | Surrogate: 1,4-Difluorobenzene (%) | 87.7 | | |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | | |
| | EPH19-32 (mg/kg) | <200 | | |
| | LEPH (mg/kg) | <200 | | |

L1970498 CONTD.... PAGE 3 of 5

ALS ENVIRONMENTAL ANALYTICAL REPORT

14-AUG-17 17:25 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1970498-1 Sediment 04-AUG-17 13:00 ESA-35 | | |
|--|---|--|--|---|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Hydrocarbons | HEPH (mg/kg) | <200 | | |
| | VPH (C6-C10) (mg/kg) | <10 | | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 86.9 | | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | | |
| | Acenaphthylene (mg/kg) | <0.050 | | |
| | Anthracene (mg/kg) | <0.050 | | |
| | Benz(a)anthracene (mg/kg) | <0.050 | | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | | |
| | Benzo(k)fluoranthene (mg/kg) | < 0.050 | | |
| | Chrysene (mg/kg) | <0.050 | | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | | |
| | Fluoranthene (mg/kg) | <0.050 | | |
| | Fluorene (mg/kg) | <0.050 | | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | | |
| | Naphthalene (mg/kg) | <0.050 | | |
| | Phenanthrene (mg/kg) | <0.050 | | |
| | Pyrene (mg/kg) | <0.050 | | |
| | Surrogate: Acenaphthene d10 (%) | 100.1 | | |
| | Surrogate: Chrysene d12 (%) | 97.7 | | |
| | Surrogate: Naphthalene d8 (%) | 94.5 | | |
| | Surrogate: Phenanthrene d10 (%) | 95.3 | | |
| | Total PAHs (mg/kg) | <0.21 | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | l |

Reference Information

L1970498 CONTD....

PAGE 4 of 5

14-AUG-17 17:25 (MT)

Version: FINAL

Test Method References:

ALS Test Code Matrix Test Description Method Reference**

BTXSM-MEOH-HS-MS-CL Soil BTEX, Styrene and MTBE EPA 8260C/5021A

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

EPH-TUMB-FID-VA Soil EPH in Solids by Tumbler and GCFID BC MOE EPH GCFID

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-SUM-CALC-VA Soil Sum of PAH's CALCULATION

Total PAH represents the sum of all PAH analytes reported for a given sample. Note that regulatory agencies and criteria differ in their definitions of Total PAH in terms of the individual PAH analytes to be included.

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-MEOH-HS-FID-CL Soil VHs BC Env. Lab Manual (VH in Solids)

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999)

VPH-CALC-CL Soil VPH Calculation BC MOE LABORATORY MANUAL (2005)

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).

XYLENES-SUM-CALC-CL Soil Sum of Xylene Isomer Concentrations CALCULATED RESULT

Total xylenes represents the sum of o-xylene and m&p-xylene.

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

Reference Information

L1970498 CONTD.... PAGE 5 of 5 14-AUG-17 17:25 (MT) Version: **FINAL**

| Laboratory Definition Code | Laboratory Location |
|-----------------------------------|---|
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |
| CL | ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA |
| | |

Chain of Custody Numbers:

15-609414

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. mg/kg - milligrams per kilogram based on dry weight of sample.

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

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

mg/L - milligrams per litre.

< - Less than.

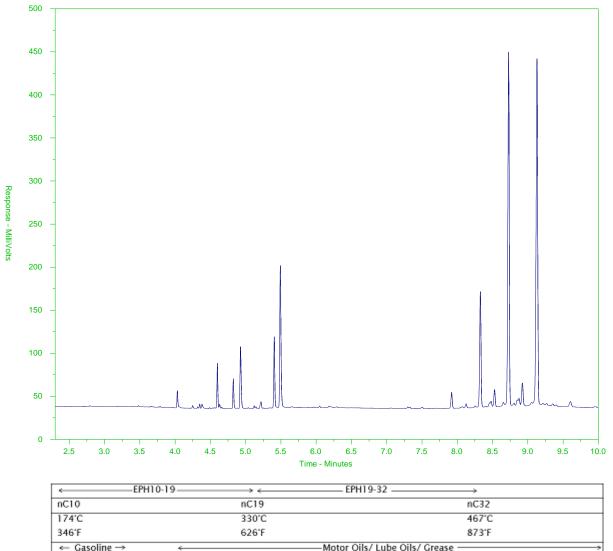
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

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

Test results reported relate only to the samples as received by the laboratory. UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION. Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



ALS Sample ID: L1970498-1 Client Sample ID: ESA-35



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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

Diesel/ Jet Fuels



Chain of Custody (COC) / Analytical Request Form



Canada Toll Free: 1 800 668 9878

| Report To | Contact and company name below will appear | | | Report Format | | | Select S | SLAICA FA | ro | | | ₄P TATs with | ı your Al | M - surch | arges will | apply | | |
|--|--|-------------------------------|---------------------|---------------------------------------|-------------------------|----------------|---|---------------|--------------|---------------|----------|----------------|--------------|---------------|------------|---------------|--------------|----------------------|
| Company: | AECOM | | Select Report Fo | | EXCEL | EDD (DIGITAL) | | Re | gular [R | X | Stan | dard TAT if | received | d by 3 pr | n - busine | ss day | s - no surci | narges apply |
| Contact: | Michael Gill | | Quality Control (| QC) Report with Repo | ort YES | NO NO | 7 Jays) | 4 | day [P4] | | | łcy | 1 | Busin | ness da | y [E1 |] | |
| Phone: | 604 444 6400 | | Compare Res | sults to Criteria on Report - EMAIL | provide details below i | f box checked | PRIORITY (Business Days) | 3 | day [P3] | | | MERGENC | Sam | | | | r Statuto | ry 🖂 |
| | Company address below will appear on the final rep | oort | Select Distribution | on: EMAIL | MAIL | FAX | P (Bus | 2 | day [P2] | [| | M | | | holiday | [E0] | | <u> </u> |
| Street: | 3292 Production | Way | Mail Collings | el.aillaac | COM. C | Mo | | Date a | and Time F | equired f | or all E | kP TATs: | | | | | | |
| City/Province: | Burnaby | 7 | resie. | el.ailleac | DOCEN | " com | For tests that can not be performed according to the service level selected, you will be contacted. | | | | | | | | | | | |
| Postal Code: | | | Email 3 | | | | <u> </u> | | | | | Analy | /sis R | eques | t | | | |
| Invoice To | Same as Report To YES | NO | | Invoice Dis | | | | ! | ndicate Filt | ered (F), F | reserve | d (P) or Filte | ered and | Presen | /ed (F/P) | below | | |
| | Copy of Invoice with Report YES | NO | Select Invoice D | | EMAIL MAIL | FAX | P | | | | | | | | | | | |
| Company: | Chevior Canada Li Chais Boys Project Information | bol. | | u as abo | ve | | ' | | , | | | | | | | | | |
| Contact: | Charles Boys | | Email 2 | · · · · · · · · · · · · · · · · · · · | | | . | # | | | | | | | | | | ည |
| | | | | Oil and Gas Required | | se) | | 9 | | | | | | | | | | aine |
| ALS Account # / | Quote #: | | AFE/Cost Center: | | PO# | | 9 | 用 | | | | | | | | | | Sout |
| Job #: 60S | 44455 | | Major/Minor Code: | | Routing Code: | | 1 | T. | . | | | | | | | | |) Jo. |
| PO/AFE: | | | Requisitioner: | | | | | | - 50 | | | | | | | | | Number of Containers |
| LSD: FON | eshore | · · · · · · · · · · · · · · · | Location: | | Ī | | | `# | | | | | | | | | | P P |
| ALS Lab Wor | k Order # (lab use only) | | ALS Contact: | 1,004 | SamplerEA | 3.7 | 1 | <u>`</u> @ | 4 | | | | | | | | | |
| | | | AS Contact: | | | | | u | 9 | | | | | li | | | | |
| ALS Sample # (lab use only) | Sample Identification | | | Date | Time | Sample Type | 80 | | \geq | | | | | | | | | |
| (lab use offy) | (This description will a | appear on the report) | | (dd-mmm-yy) | (hh:mm) | 62 . 31 . 1 | | $\overline{}$ | - | + | - | | | | | _ | | |
| | ESA - 35 | | | 4-Aug-17 | 13:00 | Sediment | X | X | X L | | | | <u> </u> | | | | | 14 |
| | | | | 7 | | | | | | | _ | | <u> </u> | | | _ | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 1 | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | - | | <u> </u> | 11 | | | | | - | | | | | | |
| | | | | | | | | | | | - | | | | | \dashv | | |
| | | | | | | | | | | _ | - | | - | | | - | | |
| | | | | _ | | | ļ | | | | | | | | | _ | | |
| | · | | | | | | ļ | | | | | | | | | _ | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | _ | | i i | - | | | | | | | | | | | | | |
| Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below | | | | | | own list below | | | | SAMPL | E CO | NOITION | | | | use | only) | |
| Drinking Water (DW) Samples' (client use) | | (ele | ectronic COC only) | | | Froze | n | | | | | | vations | | | N | | |
| • | from a Regulated DW System? | | | | | | Ice Pa | | | ce Cube | es [| Cust | ody se | eal inta | ct ' | es/ | □ N | o 🔲 |
| | 5 | De rec |) | | | | Coolir | g Initia | | | | 200.00 | | | | 00- | | |
| • | man drinking water use? | BC CSP | | | | | <u> </u> | INII | TIAL COOL | ER TEMP | PERATU | KES °C | | | | COOL | ER TEMPE | RATURES °C |
| YES | TS NO | | | | | | | | | | | ai ain | 4=1 | | 75 | <u>U</u> | | |
| Released by: | SHIPMENT RELEASE (client use) Date: | Time: | Received by: | INITIAL SHIPMEN | IT RECEPTION (IDate: | ab use only) | Time: | | Receive | d bv. | FIN | AL SHIP | VIENT | RECE Date: | | (lab u | ise only) | Time: - |
| s.odood by. | Date. | Time. | , loodived by. | | | | | | . 1000140 | - ~ j. | | wo | h | 246 | F | hu | ŋ | Time: |
| | AGE FOR ALS LOCATIONS AND SAMPLING INF | | form the constraint | | | COPY YELLOV | | | | | | <u> </u> | 7 | | | $\frac{1}{1}$ | | OCTOBER 2015 FRONT |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 08-AUG-17

Report Date: 09-AUG-17 09:23 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1971203
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 15-608374
Legal Site Desc: FORESHORE

Dean Watt, B.Sc. Account Manager

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

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



L1971203 CONTD.... PAGE 2 of 5

Version:

09-AUG-17 09:23 (MT)

FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

L1971203-1 Sample ID Description SEDIMENT Sampled Date 08-AUG-17 11:30 Sampled Time BF-SG2 **Client ID** Grouping Analyte SOIL Moisture (%) **Physical Tests** 6.76 pH (1:2 soil:water) (pH) 8.74 Antimony (Sb) (mg/kg) Metals <0.10 Arsenic (As) (mg/kg) 1.57 Barium (Ba) (mg/kg) 29.1 Beryllium (Be) (mg/kg) 0.25 Cadmium (Cd) (mg/kg) < 0.050 Chromium (Cr) (mg/kg) 5.31 Cobalt (Co) (mg/kg) 3.45 Copper (Cu) (mg/kg) 3.74 Lead (Pb) (mg/kg) 1.22 Mercury (Hg) (mg/kg) < 0.050 Molybdenum (Mo) (mg/kg) 2.45 Nickel (Ni) (mg/kg) 2.73 Selenium (Se) (mg/kg) < 0.20 Silver (Ag) (mg/kg) < 0.10 Thallium (TI) (mg/kg) < 0.050 Tin (Sn) (mg/kg) <2.0 Uranium (U) (mg/kg) 0.263 Vanadium (V) (mg/kg) 18.7 Zinc (Zn) (mg/kg) 32.4 **Volatile Organic VOC Sample Container** Field MeOH Compounds Benzene (mg/kg) < 0.0050 Ethylbenzene (mg/kg) < 0.015 Methyl t-butyl ether (MTBE) (mg/kg) <0.20 Styrene (mg/kg) < 0.050 Toluene (mg/kg) < 0.050 ortho-Xylene (mg/kg) < 0.050 meta- & para-Xylene (mg/kg) < 0.050 Xylenes (mg/kg) < 0.075 Surrogate: 4-Bromofluorobenzene (SS) (%) 90.2 Surrogate: 1,4-Difluorobenzene (SS) (%) 92.0 **Hydrocarbons** EPH10-19 (mg/kg) <200 EPH19-32 (mg/kg) <200 LEPH (mg/kg) <200 HEPH (mg/kg) <200 Volatile Hydrocarbons (VH6-10) (mg/kg) <100

L1971203 CONTD.... PAGE 3 of 5

09-AUG-17 09:23 (MT) Version: FINAL

| SOIL | Sampl Descrij Sampled Sampled Clie | ption SEDIMENT Date 08-AUG-17 | | |
|--|--|--------------------------------|--|--|
| Hydrocarbons | Grouping Analyte | | | |
| Surrogate: 2-Bromobenzotrifluoride (%) 89.5 Surrogate: 3,4-Dichlorotoluene (SS) (%) 113.1 Polycyclic Aromatic Acenaphthene (mg/kg) <0.050 Anthracene (mg/kg) <0.050 Anthracene (mg/kg) <0.050 Benz(a)anthracene (mg/kg) <0.050 Benz(a)pyrene (mg/kg) <0.050 Benzo(a)pyrene (mg/kg) <0.050 Benzo(b)fluoranthene (mg/kg) <0.050 Benzo(k)fluoranthene (mg/kg) <0.050 Benzo(k)fluoranthene (mg/kg) <0.050 Chrysene (mg/kg) <0.050 Dibenz(a,h)anthracene (mg/kg) <0.050 Fluoranthene (mg/kg) <0.050 Fluorene (mg/kg) <0.050 Fluorene (mg/kg) <0.050 Indeno(1,2,3-c,d)pyrene (mg/kg) <0.050 2-Methylnaphthalene (mg/kg) <0.050 Naphthalene (mg/kg) <0.050 Phenanthrene (mg/kg) <0.050 Pyrene (mg/kg) <0.050 Surrogate: Acenaphthene d10 (%) 105.0 Surrogate: Chrysene d12 (%) 80.4 Surrogate: Naphthalene d8 (%) 94.1 | | | | |
| Surrogate: 2-Bromobenzotrifluoride (%) 89.5 | Hydrocarbons VPH (C6-C10) (mg/kg) | | | |
| Surrogate: 3,4-Dichlorotoluene (SS) (%) | | | | |
| Polycyclic Aromatic Hydrocarbons Acenaphthylene (mg/kg) Acenaphthylene (mg/kg) Anthracene (mg/kg) Benz(a)anthracene (mg/kg) Benzo(a)pyrene (mg/kg) Benzo(b)fluoranthene (mg/kg) Benzo(b)fluoranthene (mg/kg) Benzo(b,hi)perylene (mg/kg) Benzo(k)fluoranthene (mg/kg) Chrysene (mg/kg) Chrysene (mg/kg) Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) 40.050 40.05 | Surrogate: 3,4-Dichlorotoluene (SS) (%) | | | |
| Anthracene (mg/kg) Benz(a)anthracene (mg/kg) Benzo(a)pyrene (mg/kg) Benzo(b)fluoranthene (mg/kg) Benzo(g,h,i)perylene (mg/kg) Benzo(k)fluoranthene (mg/kg) Chrysene (mg/kg) Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) | Aromatic | | | |
| Benz(a)anthracene (mg/kg) Benzo(a)pyrene (mg/kg) Benzo(b)fluoranthene (mg/kg) Benzo(g,h,i)perylene (mg/kg) Benzo(k)fluoranthene (mg/kg) Chrysene (mg/kg) Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Prene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) | Acenaphthylene (mg/kg) | <0.050 | | |
| Benzo(a)pyrene (mg/kg) Benzo(b)fluoranthene (mg/kg) Benzo(g,h,i)perylene (mg/kg) Benzo(k)fluoranthene (mg/kg) Chrysene (mg/kg) Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Acenaphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) | Anthracene (mg/kg) | <0.050 | | |
| Benzo(b)fluoranthene (mg/kg) Benzo(g,h,i)perylene (mg/kg) Benzo(k)fluoranthene (mg/kg) Chrysene (mg/kg) Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluoranthene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) | Benz(a)anthracene (mg/kg) | <0.050 | | |
| Benzo(g,h,i)perylene (mg/kg) Benzo(k)fluoranthene (mg/kg) Chrysene (mg/kg) O.050 Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Acenaphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) | Benzo(a)pyrene (mg/kg) | <0.050 | | |
| Benzo(k)fluoranthene (mg/kg) Chrysene (mg/kg) O.050 Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) O.050 O. | Benzo(b)fluoranthene (mg/kg) | <0.050 | | |
| Chrysene (mg/kg) Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Co.050 Co.050 Surrogate: Naphthalene d8 (%) Co.050 | Benzo(g,h,i)perylene (mg/kg) | <0.050 | | |
| Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Surrogate: Time the Mark (M) | Benzo(k)fluoranthene (mg/kg) | <0.050 | | |
| Fluoranthene (mg/kg) Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) | | <0.050 | | |
| Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Surrogate: Acenaphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) | Dibenz(a,h)anthracene (mg/kg) | <0.050 | | |
| Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) 94.1 | | <0.050 | | |
| 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Pyrene (mg/kg) 40.050 40.050 40.050 80.4 80.4 94.1 | | <0.050 | | |
| Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) 94.1 | | <0.050 | | |
| Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) 94.1 | | <0.050 | | |
| Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) 94.1 | | <0.050 | | |
| Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) 94.1 | , • • | <0.050 | | |
| Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) 94.1 | | <0.050 | | |
| Surrogate: Naphthalene d8 (%) 94.1 | | 105.0 | | |
| 0 | | 80.4 | | |
| Surrogate: Phenanthrene d10 (%) 100.2 | | | | |
| | Surrogate: Phenanthrene d10 (%) | 100.2 | | |
| | | | | |

Reference Information

L1971203 CONTD....
PAGE 4 of 5
09-AUG-17 09:23 (MT)

rence information Version: FINAL

Test Method References:

ALS Test Code Matrix Test Description Method Reference**

EPH-TUMB-FID-VA Soil EPH in Solids by Tumbler and GCFID BC MOE EPH GCFID

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

Hg-WW-200.2-CVAF-VA Soil Hg in Soil by CVAFS EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, sieved (wet sample) through a 2 mm (10 mesh) sieve, and a representative subsample of the material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

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

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-WW-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-SIEVE-VA Soil Moisture for CSR Metals Calculations ASTM D2974-00 Method A

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

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-D/A-MS-VA Soil PAH - Rotary Extraction (DCM/Acetone) EPA 3570/8270

Polycyclic Aromatic Hydrocarbons in Sediment/Soil

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

PH-WW-1:2-DI-MAN-VA Soil pH in Soil (1:2 Soil:Water Ext.) (WET) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the wet sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water, where the samples moisture is accounted for. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

Reference Information

L1971203 CONTD....

PAGE 5 of 5

09-AUG-17 09:23 (MT)

Version: FINAL

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).

XYLENES-CALC-VA

Soil

Sum of Xylene Isomer Concentrations

EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

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

Laboratory Definition Code

Laboratory Location

VA

ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-608374

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

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

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

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



Chain of Custody (COC) / Analytical Request Form



COC Number: 15 - 608374

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1971203-COFC

| Report To | Contact and company name below will appear on the final report | | | | | | | | _ | | | | | | | |
|--------------------------------|--|---------------------|--|--------------------|---------------------------------------|---------------------------|-------------------------|--------------|---------------|-------------|---------------|-------------|-----------|--------------|-----------------|--|
| Company: | AECOW | Select Report F | Report Forns | | | | | | | | | | | ges will app | | |
| Contact: | Michael Gill | | | | EDD (DIGITAL) | | | egular [l | | Standa | rd TAT if | received b | / 3 pm - | business (| days - no surci | arges apply |
| Phone: | 604 444 6400 | Compare Re | Quality Control (QC) Report with Report YES NO Compare Results to Criteria on Report - provide details below if box checked | | | PRIORITY usiness Days} | | day [P4 | | ╛ | NCY | 1 E | usine | ss day [| E1] | |
| | Company address below will appear on the final report | Select Distributi | | | | RIOR | | day [P3 | | | ERGE | Same | Day, W | /eekend | or Statuto | ry 🔽 |
| Street: | 3292 Production Way | Gelect Distributi | Select Distribution: EMAIL MAIL FAX PARTICIDADE SOUTHERN BACOM. COM Email 3. Southern BACOM. Com Email 3. Southern BACOM. | | | | | day [P2 | | | <u> </u> | | ho 4 | liday [E | 0] | |
| City/Province: | Burnaby | Trop 1 ot a | rei Bille | ofcom. | com | | | | Required for | | | | <u>AS</u> | AP | | |
| Postal Code: | ow may | Email 3 | southern | <u>W</u> aecan | 4. com | For test | s that ca | n not be per | formed acco | rding to th | | | | ill be conta | cted. | |
| Invoice To | Same as Report To | Elliali 3 | | | | ┿ | | | | | | /sis Req | | | | |
| | Copy of Invoice with Report YES NO | Select Invoice D | Invoice Di | | | | | Indicate Fi | Itered (F), P | reserved (| P) or Filte | ered and Pi | eserved | (F/P) belo | w | |
| Company: | Chevron Canada Ltd. | 1 | visitibution. | | FAX | P | | | | | | | | | | |
| Contact: | Clark Days | Email 2 | e as ab | ove | · · · · · · · · · · · · · · · · · · · | 4 | | | | | | | | | | 7 |
| | Project Information | | Oil and Cas Dassies | | _ | - | سد. ا | | | | 1 | | | | 1 1 | |
| ALS Account # / | | AFE/Cost Center: | Oil and Gas Require | PO# | se) | ┨ | PH | | | | | | | 1 | | ai. |
| | 00542455 | Major/Minor Code: | | | | 1 1 | \ \(\frac{1}{1} \) | † | | | | | | | | onts |
| PO / AFE: | 003 12 7 53 | Requisitioner: | | Routing Code: | | <u> </u> | £ | | | | | | | -[| |) o |
| LSD: | reshore | Location: | | | | √ | ~ | | | | | | 1 | | | Number of Containers |
| | | Location. | | | | √. L | 7 | \sqrt{3} | ł | | | | | | | <u>E</u> |
| | rk Order # (lab use only) | ALS Contact: | Walt | Sampler | P/ | 位 | Q. | TS T | | | | | | | | 2 |
| ALS Sample # (lab use only) | Sample Identification and/or Coordinates | | Date | Time | Samula T | 117 | W | 9 | | | | | | | | 1 |
| (100 011) | (This description will appear on the report) | | (dd-mmm-yy) | (hh:mm) | Sample Type | 100 | | Σ | | | | | | | | 1 |
| | BF-SG2 | | B-Aug-17 | 11:30 | Sediment | | $\overline{\mathbf{Y}}$ | V | | | | | | | | 177 |
| | | | 1.08 | 17.55 | | | < 7 | | | | \vdash | | | | | |
| | | | | | | - | | | _ | | - | | | | | - |
| | | | | | | | | | | - | | | | | | _ |
| | | | | | | | | | | | $oxed{oxed}$ | | | | | |
| | | | <u></u> | | | | | | | | <u> </u> | | | | | |
| | | | | | | | ł | | | | | | | | | |
| | | | | | | | | | | | | | 1- | - | | |
| | | | | | | \vdash | | | | - | | | +- | | | |
| [| | | | | | ╁┈┼ | | | _ | + | | | + | - | | |
| | | | | | | ├ | | | _ | | | | + | | | |
| | | | | | | <u> </u> | | | _ | | | | | | | |
| | | | | | | | | | _ | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Drinking | Water (DW) Samples ¹ (client use) Special Instructions / | Specify Criteria to | add on report by click | ing on the drop-do | wn list below | | | | SAMPLE | COND | TION A | S RECE | IVED | (lab use | only) | - |
| re samples taken | from a Regulated DW System? | (elec | etronic COC only) | · | | Frozen | | | | | | oservatio | | Yes | No | |
| YES | NO | 000 | | | | ice Pac | | | ce Cubes | | Custo | dy seal ir | itact | Yes | ☐ No | |
| | man drinking water use? | | | | | Cooling | | | | | | | | | | |
| YES | , | • | | | | <u> </u> | | 162 - | ER TEMPER | RATURES | °C | | FI | NAL COO | ER TEMPER | ATURES °C |
| | SHIPMENT RELEASE (client use) | T | 10 11 11 11 11 11 11 11 11 11 11 11 11 1 | | | <u> </u> | <u>∞</u> | <u>'</u> り | | | | | | | | |
| Released by: | Date: Time: | Received by: | INITIAL SHIPMEN | RECEPTION (la | | Time - : | | D : | | FINAL : | SHIPM | | | ON (lab | use only) | |
| | | | (5) | Aug 6/ | | | _ | Receive | a by: | | | Da | te: | | | Time: |
| EFER TO BACK PA | AGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | <u> </u> | WHIT | E - LABORATORY C | COPY VELLOW | / CUEX | T COL | | | | | | | | | |

te all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy. 1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.



AECOM CANADA LTD. Date Received: 16-AUG-17

ATTN: Michael Gill Report Date: 17-AUG-17 10:04 (MT)

Version: FINAL

3292 Production Way Suite 330

Burnaby BC V5A 4R4

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1975749
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 15-609415
Legal Site Desc: FORESHORE

Dean Watt, B.Sc. Account Manager

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

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group An ALS Limited Company



L1975749 CONTD.... PAGE 2 of 5

17-AUG-17 10:04 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1975749-1 SEDIMENT 16-AUG-17 09:00 WIRA-3 | | |
|-----------------------------|---|--|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Physical Tests | Moisture (%) | 20.5 | | |
| | pH (1:2 soil:water) (pH) | 8.17 | | |
| Metals | Antimony (Sb) (mg/kg) | 0.21 | | |
| | Arsenic (As) (mg/kg) | 2.95 | | |
| | Barium (Ba) (mg/kg) | 24.0 | | |
| | Beryllium (Be) (mg/kg) | <0.20 | | |
| | Cadmium (Cd) (mg/kg) | 0.088 | | |
| | Chromium (Cr) (mg/kg) | 10.5 | | |
| | Cobalt (Co) (mg/kg) | 6.07 | | |
| | Copper (Cu) (mg/kg) | 22.1 | | |
| | Lead (Pb) (mg/kg) | 19.4 | | |
| | Mercury (Hg) (mg/kg) | <0.050 | | |
| | Molybdenum (Mo) (mg/kg) | <0.50 | | |
| | Nickel (Ni) (mg/kg) | 8.46 | | |
| | Selenium (Se) (mg/kg) | <0.20 | | |
| | Silver (Ag) (mg/kg) | <0.10 | | |
| | Thallium (TI) (mg/kg) | <0.050 | | |
| | Tin (Sn) (mg/kg) | 6.1 | | |
| | Uranium (U) (mg/kg) | 0.422 | | |
| | Vanadium (V) (mg/kg) | 46.4 | | |
| | Zinc (Zn) (mg/kg) | 55.5 | | |
| olatile Organic ompounds | VOC Sample Container | Field MeOH | | |
| | Benzene (mg/kg) | <0.0050 | | |
| | Ethylbenzene (mg/kg) | <0.015 | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | | |
| | Styrene (mg/kg) | <0.050 | | |
| | Toluene (mg/kg) | <0.050 | | |
| | ortho-Xylene (mg/kg) | <0.050 | | |
| | meta- & para-Xylene (mg/kg) | <0.050 | | |
| | Xylenes (mg/kg) | <0.075 | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 100.5 | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 92.8 | | |
| lydrocarbons | EPH10-19 (mg/kg) | 220 | | |
| | EPH19-32 (mg/kg) | <200 | | |
| | LEPH (mg/kg) | 220 | | |
| | HEPH (mg/kg) | <200 | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | | |

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

L1975749 CONTD.... PAGE 3 of 5

17-AUG-17 10:04 (MT) Version: FINAL

| | | Sample ID Description Sampled Date Sampled Time Client ID | L1975749-1 SEDIMENT 16-AUG-17 09:00 WIRA-3 | | |
|--|--------------|---|--|--|---|
| SOIL Hydrocarbons VPH (C6-C10) (mg/kg) Surrogate: 2-Bromobenzotrifluoride (%) 103.1 Saut Not reportable < 0.050 | Grouping | Analyte | - | | |
| Surrogate: 2-Bromobenzotrifluoride (%) Surrogate: 3,4-Dichlorotoluene (SS) (%) Polycyclic Aromatic Hydrocarbons Acenaphthene (mg/kg) Acenaphthylene (mg/kg) Acenaphthylene (mg/kg) Acenaphthylene (mg/kg) Acenaphthylene (mg/kg) Acenaphthylene (mg/kg) Acenaphthylene (mg/kg) Acenaphthylene (mg/kg) Acenaphthylene (mg/kg) Acenaphthylene (mg/kg) Acenaphthylene (mg/kg) Benz(a)anthracene (mg/kg) Benzo(a)pyrene (mg/kg) Benzo(b)fluoranthene (mg/kg) Benzo(b)fluoranthene (mg/kg) Benzo(b)fluoranthene (mg/kg) Chrysene (mg/kg) Chrysene (mg/kg) Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluoranthene (mg/kg) Fluoranthene (mg/kg) Fluorene (mg/kg) Acenaphthylene (mg/kg) Chrysene (mg/kg) Fluoranthene (mg/kg) Acenaphthylene (mg/kg) Acenaphtylene (mg/kg) Acenaphtylene (mg/kg) Acenaphtylene (mg/kg) Acenaphtylene (mg/kg) Acenaphtylene (mg/kg) Acenaphtylene (mg/kg) Acenaphtylene (mg/kg) Acenaphtylene (mg/kg) Acenaphtylene (mg/kg) Acenaphtylene (mg/kg) Acenaphtylene (mg/kg) Acenaphtylene (mg/kg) Acenaphtylene (mg/kg) Acenaphtylene (mg/kg) Acenaphtylene (mg/kg) Acenaphtylene (mg/kg) Acenaphtylene (mg/kg) Acenaphtylene (mg/kg) Acenaphtylen | SOIL | | | | |
| Surrogate: 2-Bromobenzotrifluoride (%) Surrogate: 3,4-Dichlorotoluene (SS) (%) Acenaphthylene (mg/kg) | Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | | |
| Surrogate: 3,4-Dichlorotoluene (SS) (%) Polycyclic Aromatic Hydrocarbons Acenaphthylene (mg/kg) Acenaphthylene (mg/kg) Acenaphthylene (mg/kg) Acenaphthylene (mg/kg) Acenaphthylene (mg/kg) Acenaphthylene (mg/kg) Benz(a)anthracene (mg/kg) Benzo(a)pyrene (mg/kg) Benzo(b)fluoranthene (mg/kg) Benzo(b)fluoranthene (mg/kg) Benzo(k)fluoranthene (mg/kg) Chrysene (mg/kg) Chrysene (mg/kg) Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluoranthene (mg/kg) Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Not reportable <0.050 Acenaphthene (mg/kg) <0.050 Cho50 Fluoranthene (mg/kg) Fluoranthene (mg/kg) Acenaphthyliaphthalene (mg/kg) Acenaphthene (mg/kg) Acenaphthene (mg/kg) Acenaphthene (mg/kg) Acenaphthene (mg/kg) Acenaphthene (mg/kg) Acenaphthene (mg/kg) Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Not reportable <0.050 Acenaphthene (mg/kg) Acenaphthene (SS) (%) Not reportable Acenaphthene (mg/kg) Acenator (mg/kg) Acenaphthene (mg/kg) Acenable (mg/kg) Acenable (m | | Surrogate: 2-Bromobenzotrifluoride (%) | | | |
| Polycyclic Aromatic Hydrocarbons Acenaphthylene (mg/kg) Acenaphthylene (mg/kg) Anthracene (mg/kg) Benz(a)anthracene (mg/kg) Benzo(a)pyrene (mg/kg) Benzo(b)fluoranthene (mg/kg) Benzo(b)fluoranthene (mg/kg) Benzo(k)fluoranthene (mg/kg) Chrysene (mg/kg) Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluoranthene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Acenaphthylene (mg/kg) Aco.050 | | Surrogate: 3,4-Dichlorotoluene (SS) (%) | SMI | | |
| Anthracene (mg/kg) | Aromatic | Acenaphthene (mg/kg) | | | |
| Benz(a)anthracene (mg/kg) Benzo(a)pyrene (mg/kg) Benzo(b)fluoranthene (mg/kg) Benzo(g,h,i)perylene (mg/kg) Benzo(k)fluoranthene (mg/kg) Chrysene (mg/kg) Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) Vo.050 Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Sourogate: Naphthalene d10 (%) Surrogate: Naphthalene d8 (%) Vo.050 Vo. | | Acenaphthylene (mg/kg) | <0.050 | | |
| Benzo(a)pyrene (mg/kg) Benzo(b)fluoranthene (mg/kg) Benzo(g,h,i)perylene (mg/kg) Chrysene (mg/kg) Chrysene (mg/kg) Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Phenanthrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Acenaphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) | | Anthracene (mg/kg) | <0.050 | | |
| Benzo(a)pyrene (mg/kg) Benzo(b)fluoranthene (mg/kg) Benzo(g,h,i)perylene (mg/kg) Benzo(k)fluoranthene (mg/kg) Chrysene (mg/kg) O.050 Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Acenaphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) | | Benz(a)anthracene (mg/kg) | | | |
| Benzo(b)fluoranthene (mg/kg) Benzo(g,h,i)perylene (mg/kg) Benzo(k)fluoranthene (mg/kg) Chrysene (mg/kg) Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Acenaphthalene (mg/kg) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Acenaphthalene d8 (%) Sunosto | | Benzo(a)pyrene (mg/kg) | | | |
| Benzo(k)fluoranthene (mg/kg) Chrysene (mg/kg) Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Co.050 C | | Benzo(b)fluoranthene (mg/kg) | | | |
| Chrysene (mg/kg) Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Co.050 Sourrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Co.050 | | Benzo(g,h,i)perylene (mg/kg) | <0.050 | | |
| Dibenz(a,h)anthracene (mg/kg) Fluoranthene (mg/kg) Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) O.050 <0.050 108.9 Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) O.050 | | Benzo(k)fluoranthene (mg/kg) | <0.050 | | |
| Fluoranthene (mg/kg) Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) | | Chrysene (mg/kg) | <0.050 | | |
| Fluorene (mg/kg) Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) | | Dibenz(a,h)anthracene (mg/kg) | <0.050 | | |
| Indeno(1,2,3-c,d)pyrene (mg/kg) 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) Surrogate: Naphthalene d8 (%) 108.2 | | Fluoranthene (mg/kg) | <0.050 | | |
| 2-Methylnaphthalene (mg/kg) Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) 108.2 | | Fluorene (mg/kg) | <0.050 | | |
| Naphthalene (mg/kg) Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) 108.2 | | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | | |
| Phenanthrene (mg/kg) Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) 108.2 | | 2-Methylnaphthalene (mg/kg) | <0.050 | | |
| Pyrene (mg/kg) Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) 108.2 | | Naphthalene (mg/kg) | <0.050 | | |
| Surrogate: Acenaphthene d10 (%) Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) 108.9 103.9 108.2 | | Phenanthrene (mg/kg) | <0.050 | | |
| Surrogate: Chrysene d12 (%) Surrogate: Naphthalene d8 (%) 108.2 | | Pyrene (mg/kg) | <0.050 | | |
| Surrogate: Naphthalene d8 (%) 108.2 | | Surrogate: Acenaphthene d10 (%) | 108.9 | | |
| | | Surrogate: Chrysene d12 (%) | 103.9 | | |
| Surrogate: Phenanthrene d10 (%) 107.8 | | Surrogate: Naphthalene d8 (%) | 108.2 | | |
| | | Surrogate: Phenanthrene d10 (%) | 107.8 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | l |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

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

L1975749 CONTD....

PAGE 4 of 5

17-AUG-17 10:04 (MT)

Version: FINAL

QC Samples with Qualifiers & Comments:

| QC Type Des | scription | Parameter | Qualifier | Applies to Sample Number(s) |
|---------------|----------------------|-------------------------------------|---------------------------|--|
| Duplicate | | Tin (Sn) | DUP-H | L1975749-1 |
| Method Blank | k | Arsenic (As) | MB-LOR | L1975749-1 |
| Qualifiers fo | or Individual Parame | ters Listed: | | |
| Qualifier | Description | | | |
| DUP-H | Duplicate results | outside ALS DQO, due to sample h | eterogeneity. | |
| MB-LOR | Method Blank ex | ceeds ALS DQO. Limits of Reporting | g have been adjusted for | samples with positive hits below 5x blank level. |
| SMI | Surrogate recove | ery could not be measured due to sa | mple matrix interference. | |

Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** |
|-----------------|--------|------------------------------------|--------------------|
| EPH-TUMB-FID-VA | Soil | EPH in Solids by Tumbler and GCFID | BC MOE EPH GCFID |

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

Hg-WW-200.2-CVAF-VA Soil Hg in Soil by CVAFS EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, sieved (wet sample) through a 2 mm (10 mesh) sieve, and a representative subsample of the material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

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

LEPH/HEPH-CALC-VA Soil LEPHs and HEPHs

BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-WW-200.2-CCMS-VA Soil

Metals in Soil by CRC ICPMS

EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-SIEVE-VA Soil Moisture for CSR Metals Calculations ASTM D2974-00 Method A

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

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-D/A-MS-VA Soil PAH - Rotary Extraction (DCM/Acetone) EPA 3570/8270

Polycyclic Aromatic Hydrocarbons in Sediment/Soil

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

PH-WW-1:2-DI-MAN-VA Soil pH in Soil (1:2 Soil:Water Ext.) (WET) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the wet sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water, where the samples moisture is accounted for. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA

Soil

VH in soil by Headspace GCFID

BC Env. Lab Manual (VH in Solids)

L1975749 CONTD....

PAGE 5 of 5

17-AUG-17 10:04 (MT)

Version: FINAL

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

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).

XYLENES-CALC-VA Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

Calculation of Total Xylenes

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

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

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

Laboratory Definition Code Laboratory Location

VA ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

15-609415

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

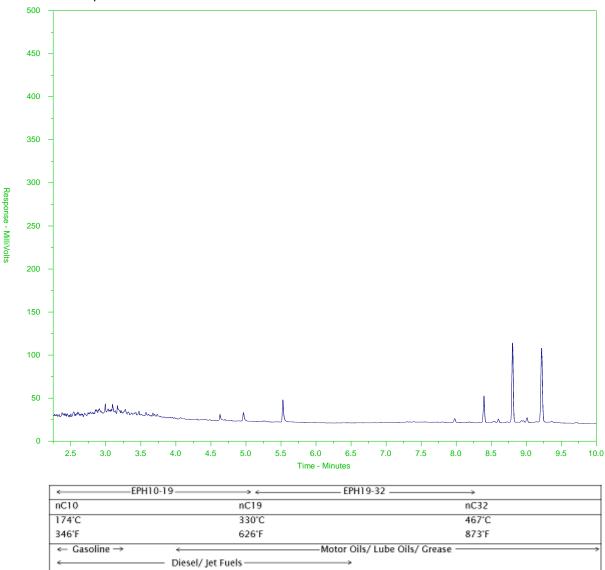
Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATÉD, ALL SAMPLES WERE RÉCEIVED IN ACCEPTABLE CONDITION.

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



ALS Sample ID: L1975749-1 Client Sample ID: WIRA-3



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form



L1975749-COFC

COC Number: 15 - 609415

ge of

www.alsglobal.com Canada Toll Free: 1 800 668 9878

| Report To Contact and company name below will appear on the final report | Report Format / Distribution | Salact Sarving Lovel Balance Dr |
|--|--|---|
| Company: AECOM | Select Report Format: PDF EXCEL EDD (DIGITAL) | Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply Regular [R] Standard TAT if received by 3 pm - business days - no surcharges apply |
| Contact: Michael Gill | Quality Control (QC) Report with Report YES NO | , production ges apply |
| Phone: 604 444 6400 | Compare Results to Criteria on Report - provide details below if box checked | |
| Company address below will appear on the final report | Select Distribution: EMAIL MAIL FAX | 3 day [P3] Same Day, Weekend or Statutory holiday [E0] |
| Street: 3292 Production Way | michael gillegecon. com | Date and Time Required for all E&P TATs: |
| Sky/ Tovillo. BUNABU | teste southern a ocom. com | For tests that can not be performed according to the service level selected, you will be contacted. |
| Postal Code: | Email 3 | Analysis Request |
| Invoice To Same as Report To YES NO | Invoice Distribution | Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below |
| Copy of Invoice with Report YES NO | Select Invoice Distribution: EMAIL MAIL FAX | ρ |
| Company: Chevron Canada Ltd. | EmaBertine as above | |
| Contact: Chris Boils Project Information | Email 2 | |
| ALS Account # / Quote #: | Oil and Gas Required Fields (client use) | |
| Job#: 605 42455 | AFE/Cost Center: PO# | |
| PO/AFE: | Major/Minor Code: Routing Code: | 표인 |
| SD: FOREShore | requisitioner. | |
| | Location: | KWPH ALS ALS Number of Containers |
| ALS Lab Work Order # (lab use only) | ADCONTACT: Wath Sample AP) | |
| ALS Sample # Sample Identification and/or Coordinates | | |
| (lab use only) (This description will appear on the report) | Date Time / Sample Type | |
| WIBA-3 | 16-Aug-17 9:00 Codimant | |
| | 16-Aug-17 9:00 Sediment | XXX 4 |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| · | | |
| | | |
| | | |
| | | |
| | | |
| Special Instructions / | Specify Criteria to add on report by clicking on the drop-down list below | |
| , | (electronic COC only) | SAMPLE CONDITION AS RECEIVED (lab use only) rozen SIF Observations Yes No |
| re samples taken from a Regulated DW System? | | |
| □ YES 2000 | | ce Packs |
| | C CSR | INITIAL COOLER TEMPERATURES °C FINAL COOLER TEMPERATURES °C |
| YES NO | , | 21 |
| SHIPMENT RELEASE (client use) Released by: Date: Time: | INITIAL SHIPMENT RECEPTION (lab use only) | FINAL SHIPMENT RECEPTION (lab use only) |
| Time. | Received by: Date Log 16 | me: Date: Time: |
| FER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | | CLIENT COPY COMPRESSION |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 01-SEP-17

Report Date: 28-NOV-17 17:58 (MT)

Version: FINAL REV. 2

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1985282
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 15-609422
Legal Site Desc: Foreshore

Comments:

28-NOV-2017 Client ID update

Dean Watt, B.Sc. Account Manager

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

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group An ALS Limited Company



L1985282 CONTD....

PAGE 2 of 5 28-NOV-17 17:58 (MT)

Version: FINAL REV. 2

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1985282-1 Soil 25-AUG-17 14:15 PW17-16 @0.7-0.9 | L1985282-2 Soil 31-AUG-17 08:30 PW17-26 @0.5-0.7 | L1985282-3 Soil 31-AUG-17 10:45 PW17-21 @0.5-0.7 | |
|-------------------------------|---|--|--|--|--|
| Grouping | Analyte | - | | | |
| SOIL | | | | | |
| Physical Tests | Moisture (%) | 12.6 | 14.5 | 13.4 | |
| | pH (1:2 soil:water) (pH) | 7.42 | 7.16 | 7.19 | |
| Metals | Antimony (Sb) (mg/kg) | 0.14 | 0.17 | 0.14 | |
| | Arsenic (As) (mg/kg) | 1.68 | 1.11 | 1.70 | |
| | Barium (Ba) (mg/kg) | 50.5 | 122 | 48.3 | |
| | Beryllium (Be) (mg/kg) | 0.27 | 0.49 | 0.26 | |
| | Cadmium (Cd) (mg/kg) | <0.050 | 0.053 | 0.065 | |
| | Chromium (Cr) (mg/kg) | 14.9 | 17.1 | 16.4 | |
| | Cobalt (Co) (mg/kg) | 7.52 | 12.7 | 8.25 | |
| | Copper (Cu) (mg/kg) | 23.5 | 35.8 | 25.6 | |
| | Lead (Pb) (mg/kg) | 5.01 | 4.94 | 9.32 | |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Molybdenum (Mo) (mg/kg) | 0.22 | 0.15 | 0.20 | |
| | Nickel (Ni) (mg/kg) | 10.3 | 10.3 | 12.2 | |
| | Selenium (Se) (mg/kg) | <0.20 | <0.20 | <0.20 | |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | <0.10 | |
| | Thallium (TI) (mg/kg) | <0.050 | 0.069 | <0.050 | |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | <2.0 | |
| | Uranium (U) (mg/kg) | 0.494 | 0.433 | 0.533 | |
| | Vanadium (V) (mg/kg) | 57.1 | 89.1 | 60.7 | |
| | Zinc (Zn) (mg/kg) | 45.6 | 72.1 | 46.5 | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | Field MeOH | Field MeOH | |
| | Benzene (mg/kg) | <0.0050 | 0.0052 | 0.0074 | |
| | Ethylbenzene (mg/kg) | <0.015 | <0.015 | <0.015 | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | <0.20 | |
| | Styrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Toluene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | meta- & para-Xylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Xylenes (mg/kg) | <0.075 | <0.075 | <0.075 | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 91.6 | 87.6 | 90.1 | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 90.8 | 85.8 | 89.1 | |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | <200 | |
| | EPH19-32 (mg/kg) | <200 | <200 | <200 | |
| | LEPH (mg/kg) | <200 | <200 | <200 | |
| | HEPH (mg/kg) | <200 | <200 | <200 | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | <100 | |

L1985282 CONTD....

PAGE 3 of 5 28-NOV-17 17:58 (MT) Version: FINAL REV. 2

ALS ENVIRONMENTAL ANALYTICAL REPORT

| | Sample ID Description Sampled Date Sampled Time Client ID | L1985282-1 Soil 25-AUG-17 14:15 PW17-16 @0.7-0.9 | L1985282-2 Soil 31-AUG-17 08:30 PW17-26 @0.5-0.7 | L1985282-3 Soil 31-AUG-17 10:45 PW17-21 @0.5-0.7 | |
|--|---|--|--|--|--|
| Grouping | Analyte | | | | |
| SOIL | | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | <100 | <100 | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 93.2 | 92.1 | 92.2 | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 91.8 | 83.8 | 87.4 | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| • | Acenaphthylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Chrysene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Fluorene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Pyrene (mg/kg) | <0.050 | <0.050 | <0.050 | |
| | Surrogate: Acenaphthene d10 (%) | 97.9 | 91.9 | 93.1 | |
| | Surrogate: Chrysene d12 (%) | 100.9 | 95.8 | 98.1 | |
| | Surrogate: Naphthalene d8 (%) | 95.1 | 88.7 | 89.9 | |
| | Surrogate: Phenanthrene d10 (%) | 97.0 | 93.4 | 94.7 | |
| | | | | | |
| | | | | | |
| | | | | | |

L1985282 CONTD.... PAGE 4 of 5 28-NOV-17 17:58 (MT) Version: FINAL REV. 2

Test Method References:

ALS Test Code Matrix Method Reference** **Test Description EPH-TUMB-FID-VA** Soil EPH in Solids by Tumbler and GCFID BC MOE EPH GCFID

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-200.2-CVAF-VA Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including AI, Ba, Be, Cr, Sr, Ti, TI, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH. ELECTROMETRIC. SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH in soil by Headspace GCFID VH-HSFID-VA Soil BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA VH Surrogates for Soils BC Env. Lab Manual (VH in Solids) Soil

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7 and/or VOC Surrogates for Soils VOC7/VOC-SURR-MS-VA Soil EPA 5035A/5021A/8260C

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

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).

Soil Sum of Xvlene Isomer Concentrations EPA 8260B & 524.2 XYLENES-CALC-VA

Calculation of Total Xylenes

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

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

L1985282 CONTD.... PAGE 5 of 5 28-NOV-17 17:58 (MT)

Version: FINAL REV. 2

| The last two letters of the above | e test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below: |
|-----------------------------------|---|
| Laboratory Definition Code | Laboratory Location |
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |
| | |

Chain of Custody Numbers:

15-609422

GLOSSARY OF REPORT TERMS

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

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

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

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

mg/L - milligrams per litre.

< - Less than.

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

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

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

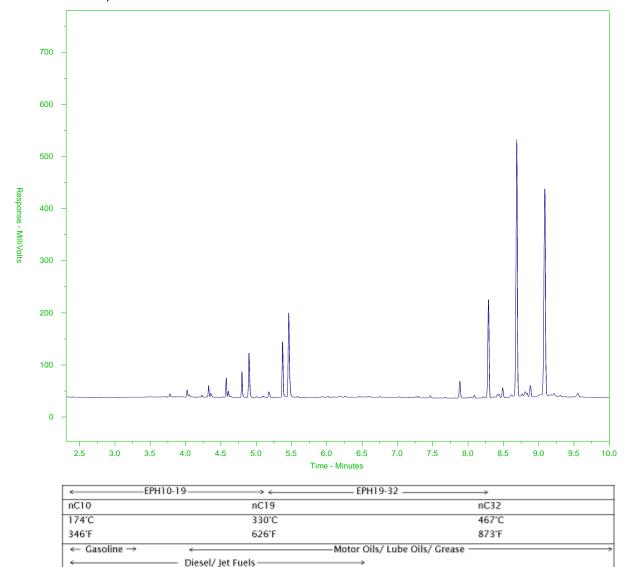
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

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



ALS Sample ID: L1985282-1

Client Sample ID: MW17-16 @0.7-0.9



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

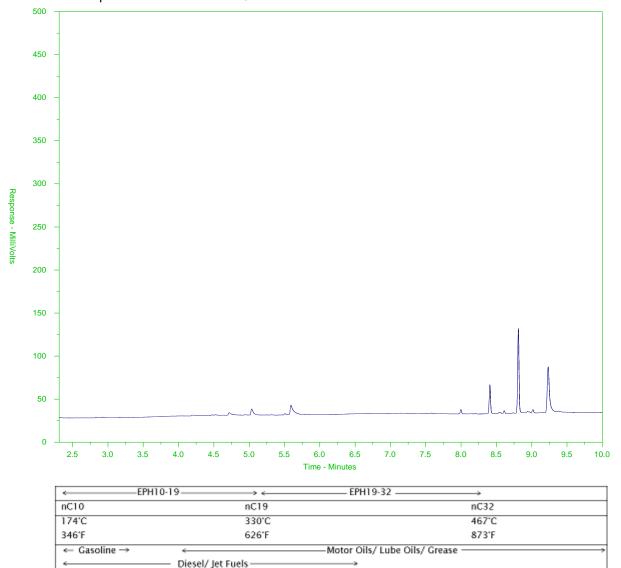
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1985282-2 Client Sample ID: MW17-26 @0.5-0.7



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

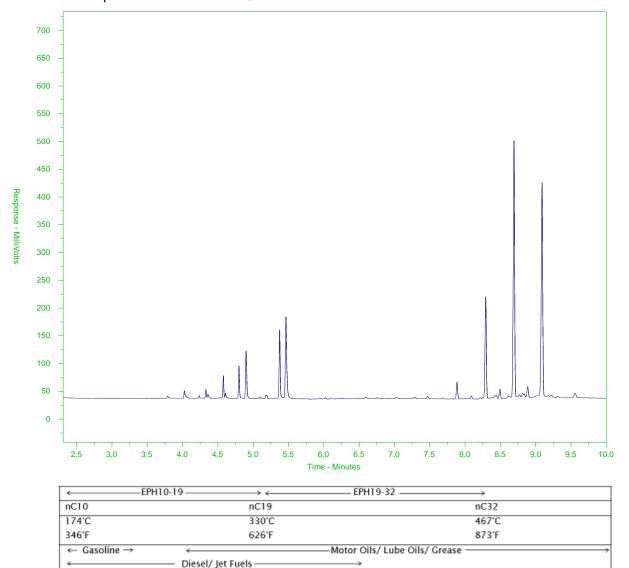
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



ALS Sample ID: L1985282-3 Client Sample ID: MW17-21 @0.5-0.7



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

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

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



Chain of Custody (COC) / Analytical Request Form



L1985282-COFC

coc Number: 15 - 609422

Canada Toll Free: 1 800 668 9878 www.alsglobal.com

| Report To | Contact and company name below will appear | ar on the final report | | Report Format | / Distribution | | Select Se | ervice Le | vel Below - | Please confir | m all 5867 | ATs with y | our AM - sur | harges wil | apply | | |
|-------------------|--|--------------------------|---------------------|---------------------------------------|---------------------------------------|---------------------------------------|-----------------------------|-------------------------|------------------------|----------------|-------------|-----------------|----------------|------------------|-----------------|--------------|---|
| Company: | Hecom | | Select Report For | mat: PDF | EXCEL | EDD (DIGITAL) | | Re | gular [R | 1 4 | Standard | TAT if red | ceived by 3 | pm - busin | ess days | - no surchar | jes apply |
| Contact: | Michael Gill | | Quality Control (C | C) Report with Repo | ort YES | NO | ۲ ays) | 4 | day [P4] | | | ζ | 1 Bus | iness d | ay [E1] | | |
| Phone: | 604 444 6547 | | Compare Resu | Its to Criteria on Report | provide details below if | box checked | PRIORITY (Business Days) | 3 | day [P3] | | 1 | RGEN 6 | Same Da | , Week | end or | Statutory | |
| | Company address below will appear on the final rep | port | Select Distribution | n: EMAIL | MAIL | FAX | Busir (| 2 | day [P2] | |] | EWE | • | holida | | • | |
| Street: | 4th floor - 3292 Production | n Was | Email 1 or Fax V | icky wirdat | mad a @de | 2 COM. COM | | Date a | nd Time | Required for | all E&P T | ATs: | | | | | |
| City/Province: | Burnoby, BC V5A 4R4 | | Email 2 (esli | ricky without e. southern | @ aecom | Con | For tests | that can | not be per | formed accord | ling to the | service lev | el selected, y | ou will be | ontacted | i. | |
| Postal Code: | | 7 | Email 3 mich | 161, 9:11 @00 | com. com | • | | | | | | Analys | is Reque | st | | | |
| Invoice To | Same as Report To YES | | | Invoice Dis | | | | 1 | ndicate Fil | tered (F), Pre | eserved (P |) or Filtere | d and Prese | rved (F/P) | beiow | | |
| | Copy of Invoice with Report YES | NO | Select Invoice Dis | stribution: | EMAIL MAIL | FAX | | | | | | | | | | | 1 |
| Company: | Chevron | | Email 1 or Fax | cbys @c | herron, c | om, | | | | | | | | | | | 1 ! |
| Contact: | Chris Boys | | Email 2 | | | | | \mathcal{T} | | | i | | | | | | φ |
| | Project Information | | 0 | il and Gas Require | d Fields (client us | e) | 12 | 2 | | - | | | | | | | ij. |
| ALS Account # / | Quote #: | , | AFE/Cost Center: | | PO# | | T | 111 | | | | | | | | | onta |
| Job #: 6 | 0542455 | | Major/Minor Code: | | Routing Code: | | / > | 77 | 1 | | | | | | | | يِّ |
| PO / AFE: | | | Requisitioner: | | | | | <u> </u> | | | | | | | | | er o |
| LSD: For | reshore | | Location: | | · · · · · · · · · · · · · · · · · · · | | | <u>`_\</u> | امن | | | | | | | | Number of Containers |
| | | | | | i/ | C 112 | | PH | | | | | | | | | ž |
| ALS Lab Wo | rk Order # (lab use only) | | ALS Contact: | lean Weth | Sampler: Ke | , Gauthier | 12 | 2 | 10 | | | | | | | | 1 ! |
| ALS Sample # | Sample Identification | and/or Coordinates | | Date | Time | | | Ш | me | | | | | | | | 1 ! |
| (lab use only) | (This description will a | | | (dd-mmm-yy) | (hh:mm) | Sample Type | $ \mathcal{M} $ | V | 8 | | | | - | | | | 1 ! |
| | MW17-16@0.7-0. | 9 | | | 14:15 | Sail | | ∇ | V | | | | | | $\neg \uparrow$ | | 4 |
| | HW17-26@ 0.5-0 MW17-21@ 0.5-0 | 1-1 | | 25-Aug-1 31-Aug-1 31-Aug-17 | 14:15 + 8:30 10:25 | Soil Soil | Ì | $\langle \rangle$ | $\langle \rangle \mid$ | _ | | | | - | | | Z.J |
| | MULT 216 0.5 5 | 1 7 | | 31 1109 1 | 10:05 | 50:1 | | $\langle \cdot \rangle$ | ≺⊁ | _ | - | | _ | ┝─┼ | | | |
| | 1-4160.3-0 | 7 · T | | 21-429-17 | 10:25 | 20,1 | X | <u> </u> | <u> </u> | | | - | | | | | |
| | | -1. | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1 |
| | | | | | | | | | | | | | | | | | |
| | | | • | | | | | | | | | | | | | | · · · · · · · · · · · · · · · · · · · |
| | | | | | | | | | | | | | - 1 | | + | | |
| | | | | | | | | | | | | | - | | | | |
| | | | | | | | | | | | | L | | | | | |
| | | | | | | 1 | | . | | 1 | | | | | | | 1 ! |
| | | | | | | | | | | | | | | | | | |
| | - | | * | | | | | | | 1 | | | <u> </u> | | | | |
| | | Special Instructions / S | Specify Criteria to | add on report by click | ing on the dron-da | wn liet helaw | ļ <u>-</u> | | | SAMPLE | COND | TION A | S RECEI | /ED (lat | use | niv) | |
| Drinkin | g Water (DW) Samples¹ (client use) | oposiai monaciono i | | tronic COC only) | ang on the drop at | | Frozer | 1 | | | | | servation | | | No | |
| | from a Regulated DW System? | | | .== | | · · · · · · · · · · · · · · · · · · · | lce Pa | | | Ice Cubes | | Custod | ly seal int | act | Yes | No. | |
| YES | NO NO | | | | | | | g Initia | | | _ | | - | | | _ | _ |
| Are samples for h | uman drinking water use? | | | | | | | | | LER TEMPE | RATURES | °C | | FINAL | COOLE | R TEMPERA | rures °C |
| YES | | Ì | | | | | 9 | 1.9 | | | | | | | | | |
| | SHIPMENT RELEASE (client use) | | | INITIAL SHIPMEN | IT RECEPTION (I | ab use only) | | ' ' | | | FINAL | SHIPME | ENT REC | EPTION | (ląb u: | se only) | |
| Released by: | hir Sept 1/2 | 2017 Time: | Received by: | · · · · · · · · · · · · · · · · · · · | Date: Sept | i | Time: | _ | Receive | ed by: | | | Date | | | | Time: |
| | | | Lade | <u> </u> | | <u> </u> | | | | | | | | | | | |
| REFER TO BACK I | PAGE FOR ALS LOCATIONS AND SAMPLING INF | ORMATION • - | - | WHI | E - LABORATORY | COPY YELLOW | V - CLIE | NT CO | >γ | | | | | | | | OCTOBER 2015 FRONT |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 06-OCT-17

Report Date: 28-NOV-17 17:56 (MT)

Version: FINAL REV. 2

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L2003518 Project P.O. #: 0015243589

Job Reference: 60542455 SOIL ANALYSIS

C of C Numbers: 15-609423 Legal Site Desc: Foreshore

Comments:

28-NOV-2017 Client ID update

Dean Watt, B.Sc. Account Manager

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

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group An ALS Limited Company



L2003518 CONTD.... PAGE 2 of 5

ALS ENVIRONMENTAL ANALYTICAL REPORT

28-NOV-17 17:56 (MT) Version: FINAL REV. 2

| | Sample ID Description Sampled Date Sampled Time Client ID | L2003518-1 Soil 02-OCT-17 09:00 PW17-4@0.1-0.3 | L2003518-2 Soil 02-OCT-17 09:10 PW17-4@0.7-0.9 | | |
|-------------------------------|---|--|--|--|--|
| Grouping | Analyte | | | | |
| SOIL | | | | | |
| Physical Tests | Moisture (%) | 16.2 | 18.5 | | |
| | pH (1:2 soil:water) (pH) | 7.51 | 7.44 | | |
| Metals | Antimony (Sb) (mg/kg) | 0.26 | 0.29 | | |
| | Arsenic (As) (mg/kg) | 3.77 | 4.92 | | |
| | Barium (Ba) (mg/kg) | 25.5 | 24.1 | | |
| | Beryllium (Be) (mg/kg) | 0.25 | 0.22 | | |
| | Cadmium (Cd) (mg/kg) | 0.129 | 0.166 | | |
| | Chromium (Cr) (mg/kg) | 18.5 | 16.9 | | |
| | Cobalt (Co) (mg/kg) | 7.66 | 10.7 | | |
| | Copper (Cu) (mg/kg) | 19.7 | 21.0 | | |
| | Lead (Pb) (mg/kg) | 5.43 | 5.21 | | |
| | Mercury (Hg) (mg/kg) | <0.050 | <0.050 | | |
| | Molybdenum (Mo) (mg/kg) | 1.01 | 0.89 | | |
| | Nickel (Ni) (mg/kg) | 11.6 | 8.74 | | |
| | Selenium (Se) (mg/kg) | 0.29 | 0.28 | | |
| | Silver (Ag) (mg/kg) | <0.10 | <0.10 | | |
| | Thallium (TI) (mg/kg) | <0.050 | 0.070 | | |
| | Tin (Sn) (mg/kg) | <2.0 | <2.0 | | |
| | Uranium (U) (mg/kg) | 3.24 | 3.56 | | |
| | Vanadium (V) (mg/kg) | 61.9 | 72.2 | | |
| | Zinc (Zn) (mg/kg) | 43.2 | 48.0 | | |
| Volatile Organic Compounds | VOC Sample Container | Field MeOH | Field MeOH | | |
| | Benzene (mg/kg) | 0.0123 | 0.0341 | | |
| | Ethylbenzene (mg/kg) | <0.015 | 0.020 | | |
| | Methyl t-butyl ether (MTBE) (mg/kg) | <0.20 | <0.20 | | |
| | Styrene (mg/kg) | <0.050 | <0.050 | | |
| | Toluene (mg/kg) | 0.056 | 0.145 | | |
| | ortho-Xylene (mg/kg) | <0.050 | <0.050 | | |
| | meta- & para-Xylene (mg/kg) | <0.050 | 0.063 | | |
| | Xylenes (mg/kg) | <0.075 | <0.075 | | |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 89.9 | 89.8 | | |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 91.4 | 91.5 | | |
| Hydrocarbons | EPH10-19 (mg/kg) | <200 | <200 | | |
| | EPH19-32 (mg/kg) | <200 | <200 | | |
| | LEPH (mg/kg) | <200 | <200 | | |
| | HEPH (mg/kg) | <200 | <200 | | |
| | Volatile Hydrocarbons (VH6-10) (mg/kg) | <100 | <100 | | |

L2003518 CONTD.... PAGE 3 of 5

ALS ENVIRONMENTAL ANALYTICAL REPORT

28-NOV-17 17:56 (MT) Version: FINAL REV. 2

| | Sample ID Description Sampled Date Sampled Time Client ID | L2003518-1 Soil 02-OCT-17 09:00 PW17-4@0.1-0.3 | L2003518-2 Soil 02-OCT-17 09:10 PW17-4@0.7-0.9 | |
|--|---|--|--|--|
| Grouping | Analyte | | | |
| SOIL | | | | |
| Hydrocarbons | VPH (C6-C10) (mg/kg) | <100 | <100 | |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 91.6 | 88.6 | |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 106.1 | 127.5 | |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/kg) | <0.050 | <0.050 | |
| | Acenaphthylene (mg/kg) | <0.050 | <0.050 | |
| | Anthracene (mg/kg) | <0.050 | <0.050 | |
| | Benz(a)anthracene (mg/kg) | <0.050 | <0.050 | |
| | Benzo(a)pyrene (mg/kg) | <0.050 | <0.050 | |
| | Benzo(b)fluoranthene (mg/kg) | <0.050 | <0.050 | |
| | Benzo(g,h,i)perylene (mg/kg) | <0.050 | <0.050 | |
| | Benzo(k)fluoranthene (mg/kg) | <0.050 | <0.050 | |
| | Chrysene (mg/kg) | <0.050 | <0.050 | |
| | Dibenz(a,h)anthracene (mg/kg) | <0.050 | <0.050 | |
| | Fluoranthene (mg/kg) | <0.050 | <0.050 | |
| | Fluorene (mg/kg) | <0.050 | <0.050 | |
| | Indeno(1,2,3-c,d)pyrene (mg/kg) | <0.050 | <0.050 | |
| | 2-Methylnaphthalene (mg/kg) | <0.050 | <0.050 | |
| | Naphthalene (mg/kg) | <0.050 | <0.050 | |
| | Phenanthrene (mg/kg) | <0.050 | <0.050 | |
| | Pyrene (mg/kg) | <0.050 | <0.050 | |
| | Surrogate: Acenaphthene d10 (%) | 89.6 | 92.0 | |
| | Surrogate: Chrysene d12 (%) | 90.2 | 90.1 | |
| | Surrogate: Naphthalene d8 (%) | 84.6 | 87.8 | |
| | Surrogate: Phenanthrene d10 (%) | 88.2 | 91.0 | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

L2003518 CONTD.... PAGE 4 of 5 28-NOV-17 17:56 (MT)

Version: FINAL REV. 2

Test Method References:

ALS Test Code Matrix Test Description Method Reference**

EPH-TUMB-FID-VA Soil EPH in Solids by Tumbler and GCFID BC MOE EPH GCFID

Analysis is in accordance with BC MOE Lab Manual method "Extractable Petroleum Hydrocarbons in Solids by GC/FID", v2.1, July 1999. Soil samples are extracted with a 1:1 mixture of hexane and acetone using a rotary extraction technique modified from EPA 3570 prior to 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).

HG-200.2-CVAF-VA Soil Mercury in Soil by CVAFS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.

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

Light and Heavy Extractable Petroleum Hydrocarbons in Solids. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated

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

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

MOISTURE-VA Soil Moisture content CWS for PHC in Soil - Tier 1

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

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

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

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID BC Env. Lab Manual (VH in Solids)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BC Env. Lab Manual (VH in Solids)

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA 5035A/5021A/8260C

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

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA 5035A/5021A/8260C

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

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).

XYLENES-CALC-VA Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

Calculation of Total Xylenes

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

^{**} ALS test methods may incorporate modifications from specified reference methods to improve performance.

L2003518 CONTD.... PAGE 5 of 5 28-NOV-17 17:56 (MT)

Version: FINAL REV. 2

| The last two letters of the above | e test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below: |
|-----------------------------------|---|
| Laboratory Definition Code | Laboratory Location |
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |
| | |

Chain of Custody Numbers:

15-609423

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

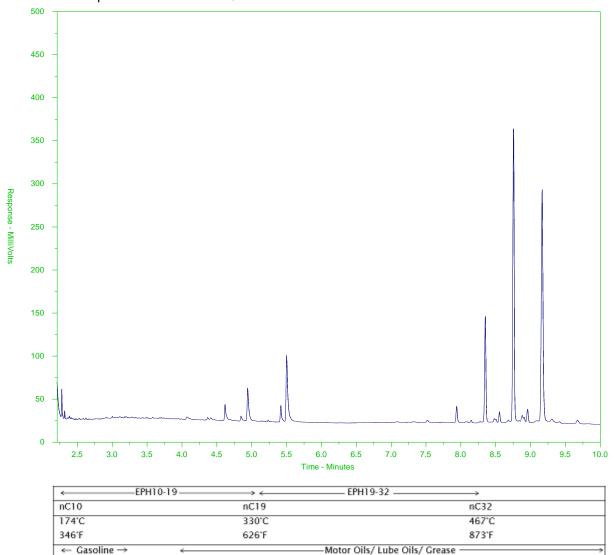
Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



ALS Sample ID: L2003518-1 Client Sample ID: MW17-4@0.1-0.3



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

Diesel/ Jet Fuels

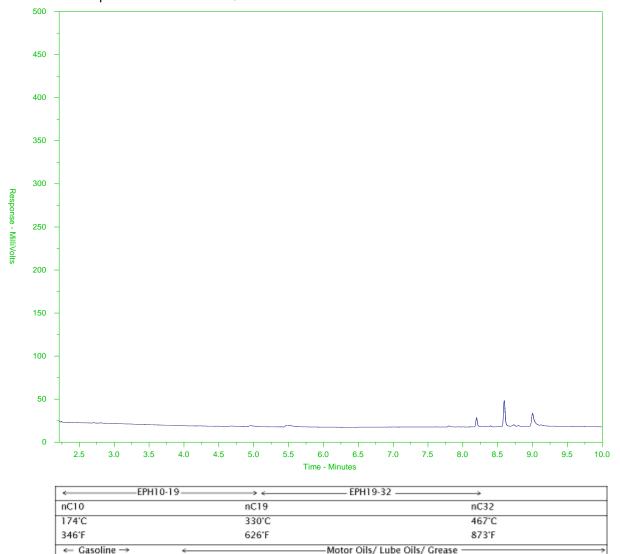
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.



ALS Sample ID: L2003518-2 Client Sample ID: MW17-4@0.7-0.9



The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

Diesel/ Jet Fuels

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.



Chain of Custody (COC) / Analytical Request Form

L2003518-COFC COC Number: 15 - 609423

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

| | ************************************** | | | | | | | | | | | | | | |
|--------------------------------|--|-----------------------|--|---------------------------|---------------------------------------|--|--------------|----------------|---------------|----------------|----------------|------------------|---|-----------------|---------------------|
| Report To | Contact and company name below will appear on the final report | | Report Format | | | GRIACI GI | 814KG F4 | ve: Delon - : | | =6P T/ | Ts with your | · AM - surch | erges will app | ly | _ |
| Company: | Aecom | Select Report F | ormat: PDF [| EXCEL | EDD (DIGITAL) | | Re | gular [R] | 1 | Standard | TAT if receiv | ved by 3 pr | n - business | days - no surch | arges apply |
| Contact: | Michael Gill | Quality Control (| (QC) Report with Repo | ort YES [| NO | - fr. | 4 | day [P4] | |] | <u>5</u> | 1 Buşir | ness day (| Ē1] | |
| Phone: | 604 444 6547 | Compare Re | sults to Criteria on Report | | | MORT WAS E | 3 | day [P3] | |) | g Sa | me Day, | Weekend | or Statutor | y 🗀 |
| | Company address below will appear on the final report | Select Distributi | on; EMAIL | MAJI, | FAX | S Cara | 2 | day [P2] | |] | | | holiday [E | | · 🗀 |
| Street: | 4th Floor - 3292 Production Way | Email 1 or Fax | lestie. so | uthern Co | decomicon | | Date | nnd Time R | tequired for | ali E&P_TA | Ts. Ta | 5 8 | | F.J. See 1. | 1 |
| City/Province: | Burmbia BC. | | chael, will (| | | For tests | that can | not be park | ormed accord | ling to the s | ervice level s | selected, yo | u will be conta | .cted. | |
| Postal Code: | 1/5A 4R4 | Email 3 | anny.lee(| 3 decom. | COM | | | | | | Analysis | Reques | t | | |
| Invoice To | Same as Report To YES NO | | Invoice Dis | | | | ı | odicate Filt | ored (F), Pre | served (P) | or Filtered a | and Preserv | ved (F/P) belo | AW. | |
| | Copy of Invoice with Report YES NO | Select Invoice D | Distribution: | EMAIL MAIL | FAX | | | | | | | | | | |
| Company: | Chevron | Email 1 or Fax | chusech | erran, cor | าา . | | | | | | | 1 | | | 7 |
| Contact: | Chris Bous | Émail 2 | | | | | T | |] | | | | | | <i>ι</i> ο |
| | Project Information | 29 | Oil and Gas Required | d Fields (client us | e) | 1 | 0 | | ĺ | | | | | | ueu |
| ALS Account # / | Quote #: | AFE/Cost Center: | | PO# | | 12 | U | | | | | | | | anta |
| Job #: | 60542455 | Major/Minor Code: | | Routing Code: | | 1 | I, | | | | | | | | <u>ပ</u> ို့ ျ |
| PO / AFE: | | Requisitioner: | | | | | \searrow | | | l i | | | | | ē o |
| LSD: | Foreshore. | Location: | | | | ا ا | استيه | ` | | | | | | | Number of Container |
| | | | D | - 1/ | C 100 | 16 | 0 | - | | | | | | | Ž |
| ALS Lab Wo | rk Order () (lab use only) | ALS Contact: | Dean Wett | Sampler: Ker | , Gauthia | 117 | 10 | +2 | ľ | | | | | | |
| ALS Sample # (lab use only) | Sample Identification and/or Coordinates | ··· †··· | Date | Time | | $1\lambda_{\sim}$ | .0 | 2 | Ì | | | | | | |
| (lab use only) | (This description will appear on the report) | | (dd-mmm-yy) | (hh:mm) | Sample Type | | 7 | 2 | | | | | | | |
| | MW17-4@01-03 | - | 02-0ct-17 | 9.00 | 50.1 | ∇ | \mathbf{X} | ∇ | | | | | | | |
| | MW 17-4@ 0,7-0,9 | | 02-001-17 | 9:10 | Soil | X | ∇ | V | | 1 | | | | | |
| | | | - ~ / . | 1 | | | | $\overline{}$ | | 1 | | 1 1 | | | |
| | | | <u> </u> | | | | | - | | + + | | | _ | + | |
| | | | | | | | | - | | | | + | | +-+- | _ |
| <u> </u> | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | l | | | | | 1 | | | 1 | | | | |
| | ,s ^{r,} | | | | | | | | | | | | | | |
| | | | <u> </u> | | | | | | | | | ++ | _ | | - |
| | | · . | - | | · · · · · · · · · · · · · · · · · · · | | | | | - | | + | -+ | | |
| | | · · | | | | | | | - | + | | | | ┼ | - |
| | | ···· | | | | | | | | 4 | | 4 | $-\!$ | +- | |
| | | | | L | <u></u> | | | | | | | | | | |
| Drinkin | ng Water (DW) Samples¹ (client use) | / Specify Criteria to | add on report by clici | king on the drop-do | wn list below | | | | | | | يديدن ونحمي | مستعدي وأحجرتها | | Maria di dina en e |
| | on from a Regulated DW System? | (e) | ectronic COC only) | | | Frozer | | | | _ | SIF Obse | | | □ No | _ |
| | s No | | | | | Ice Pa | | | ce Cubes | Ц | Custody s | seal intac | ct Yes | ☐ No | . 🗆 |
| _ | _ | | | | | COOIIII | g Initia | | SO TOWNS | ATUDEO | vo | | - 50 IV 00 | O' CO TEMPE | 14741000 40 |
| | numan drinking water use? | | | | | ماستست | inii | HAL GOOL | ER TEMPE | WINKES | <u>V</u> | + | | OLER TEMPER | RATURES TC |
| | S No | | TOTAL STREET | Dr. Barrello | | <u> </u> | | | | <u> </u> | o district | | 7 | <u></u> | <u> </u> |
| Pologood by: | 8HIPMENT RELEASE (client use) Date: Time: | Received by: | INITIAL SHIPMEN | NT RECEPTION (Iz Date: | ib use only) | Time: | 55° a.C | Receive | | :FINAL S | HIPMEN | T RECEI Dale: | PTION (lat | use only) | Time: |
| Released by: | Det 6/2017 W. | | (1.100 | OC+. | 6 | 160 | 56 l | . 1000140 | a by. | | | Date. | | | Tillie. |
| REFER TO BACK | PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | <u>~, \/, \</u> | ayan whi | TE - LABORATORY | COPY YELLOV | V - CLIE | NT CO | PY | | | | | | | OCTORER 2015 FRONT |



AECOM CANADA LTD.

ATTN: Michael Gill 3292 Production Way

Suite 330

Burnaby BC V5A 4R4

Date Received: 26-JUL-17

Report Date: 03-AUG-17 20:37 (MT)

Version: FINAL

Client Phone: 604-444-6608

Certificate of Analysis

Lab Work Order #: L1965282
Project P.O. #: 0015243589
Job Reference: 60542455
C of C Numbers: 15-609418
Legal Site Desc: Foreshore

Dean Watt, B.Sc. Account Manager

 $[This\ report\ shall\ not\ be\ reproduced\ except\ in\ full\ without\ the\ written\ authority\ of\ the\ Laboratory.]$

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS CANADA LTD Part of the ALS Group An ALS Limited Company



L1965282 CONTD.... PAGE 2 of 5

ALS ENVIRONMENTAL ANALYTICAL REPORT

03-AUG-17 20:37 (MT) Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1965282-1 Water 26-JUL-17 11:50 EIRA-WATER- 1 REG GW |
|--|---|--|
| Grouping | Analyte | |
| WATER | · | |
| Volatile Organic Compounds | Benzene (mg/L) | <0.00050 |
| • | Ethylbenzene (mg/L) | 0.00127 |
| | Styrene (mg/L) | <0.00050 |
| | Toluene (mg/L) | <0.00050 |
| | ortho-Xylene (mg/L) | 0.00333 |
| | meta- & para-Xylene (mg/L) | 0.00447 |
| | Xylenes (mg/L) | 0.00780 |
| | Surrogate: 4-Bromofluorobenzene (SS) (%) | 93.0 |
| | Surrogate: 1,4-Difluorobenzene (SS) (%) | 101.0 |
| Hydrocarbons | EPH10-19 (mg/L) | <0.25 |
| | EPH19-32 (mg/L) | <0.25 |
| | LEPH (mg/L) | <0.25 |
| | HEPH (mg/L) | <0.25 |
| | Volatile Hydrocarbons (VH6-10) (mg/L) | <0.10 |
| | VPH (C6-C10) (mg/L) | <0.10 |
| | Surrogate: 2-Bromobenzotrifluoride (%) | 90.4 |
| | Surrogate: 3,4-Dichlorotoluene (SS) (%) | 102.6 |
| Polycyclic Aromatic Hydrocarbons | Acenaphthene (mg/L) | <0.000050 |
| | Acenaphthylene (mg/L) | <0.000050 |
| | Acridine (mg/L) | <0.000050 |
| | Anthracene (mg/L) | <0.000050 |
| | Benz(a)anthracene (mg/L) | <0.000050 |
| | Benzo(a)pyrene (mg/L) | <0.0000050 |
| | Benzo(b)fluoranthene (mg/L) | <0.000050 |
| | Benzo(g,h,i)perylene (mg/L) | <0.000050 |
| | Benzo(k)fluoranthene (mg/L) | <0.000050 |
| | Chrysene (mg/L) | <0.000050 |
| | Dibenz(a,h)anthracene (mg/L) | <0.0000050 |
| | Fluoranthene (mg/L) | <0.000050 |
| | Fluorene (mg/L) | <0.000050 |
| | Indeno(1,2,3-c,d)pyrene (mg/L) | <0.000050 |
| | Naphthalene (mg/L) | <0.00080 |
| | Phenanthrene (mg/L) | <0.000050 |
| | Pyrene (mg/L) | <0.000050 |
| | Quinoline (mg/L) | <0.000050 |
| | Surrogate: Acridine d9 (%) | 106.0 |

^{*} Please refer to the Reference Information section for an explanation of any qualifiers detected.

L1965282 CONTD....

PAGE 3 of 5 03-AUG-17 20:37 (MT)

ALS ENVIRONMENTAL ANALYTICAL REPORT

Version: FINAL

| | Sample ID Description Sampled Date Sampled Time Client ID | L1965282-1 Water 26-JUL-17 11:50 EIRA-WATER- 1 REG GW | | |
|--|---|--|--|--|
| Grouping | Analyte | | | |
| WATER | | | | |
| Polycyclic Aromatic Hydrocarbons | Surrogate: Chrysene d12 (%) | 78.7 | | |
| | Surrogate: Naphthalene d8 (%) | 102.5 | | |
| | Surrogate: Phenanthrene d10 (%) | 107.4 | | |
| | | | | |
| | | | | |

^{*} Please refer to the Reference Information section for an explanation of any qualifiers detected.

03-AUG-17 20:37 (MT) Version: FINAL

QC Samples with Qualifiers & Comments:

| QC Type Description | Parameter | Qualifier | Applies to Sample Number(s) |
|---------------------------|-------------------------|-----------|-----------------------------|
| Laboratory Control Sample | Acridine | LCS-ND | L1965282-1 |
| Laboratory Control Sample | Anthracene | LCS-ND | L1965282-1 |
| Laboratory Control Sample | Benzo(g,h,i)perylene | LCS-ND | L1965282-1 |
| Laboratory Control Sample | Dibenz(a,h)anthracene | LCS-ND | L1965282-1 |
| Laboratory Control Sample | Indeno(1,2,3-c,d)pyrene | LCS-ND | L1965282-1 |
| Laboratory Control Sample | Phenanthrene | LCS-ND | L1965282-1 |

Qualifiers for Individual Parameters Listed:

| Qualifier | Description |
|-----------|---|
| DLQ | Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria. |
| LCS-ND | Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected. |

Test Method References:

| ALS Test Code | Matrix | Test Description | Method Reference** | | | | | |
|---|--------|------------------|--------------------|--|--|--|--|--|
| EPH-ME-FID-VA | Water | EPH in Water | BC Lab Manual | | | | | |
| EPH is extracted from water using a hexage micro-extraction technique, with analysis by GC-FID, as per the RC Lab Manual. EPH results include | | | | | | | | |

EPH is extracted from water using a hexane micro-extraction technique, with analysis by GC-FID, as per the BC Lab Manual. EPH results include PAHs and are therefore not equivalent to LEPH or HEPH.

LEPH/HEPH-CALC-VA Water LEPHs and HEPHs BC MOE LABORATORY MANUAL (2005)

Light and Heavy Extractable Petroleum Hydrocarbons in water. These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water". According to this method, LEPH and HEPH are calculated by subtracting selected Polycyclic Aromatic Hydrocarbon results from Extractable Petroleum Hydrocarbon results. To calculate LEPH, the individual results for Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene are subtracted from EPH(C10-19). To calculate HEPH, the individual results for Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene are subtracted from EPH(C19-32). Analysis of Extractable Petroleum Hydrocarbons adheres to all prescribed elements of the BCMELP method "Extractable Petroleum Hydrocarbons in Water by GC/FID" (Version 2.1, July 20, 1999).

PAH-ME-MS-VA Water PAHs in Water EPA 3511/8270D (mod)

PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

VH-HSFID-VA Water VH in Water by Headspace GCFID BC Env. Lab Manual (VH in Water)

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Compounds eluting between n-hexane and n-decane are measured and summed together using flame-ionization detection.

VH-SURR-FID-VA Water VH Surrogates for Waters BC Env. Lab Manual (VH in Solids)

VOC7-HSMS-VA Water BTEX/MTBE/Styrene by Headspace GCMS EPA 5021A/8260C

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

VOC7/VOC-SURR-MS-VA Water VOC7 and/or VOC Surrogates for Waters EPA 5035A/5021A/8260C

VPH-CALC-VA Water VPH is VH minus select aromatics BC MOE LABORATORY MANUAL (2005)

These results are determined according to the British Columbia Ministry of Environment Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water". The concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, Xylenes and, in solids, Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10).

XYLENES-CALC-VA Water Sum of Xylene Isomer Concentrations CALCULATION

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

| Laboratory Definition Code | Laboratory Location |
|----------------------------|---|
| VA | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |

Chain of Custody Numbers:

L1965282 CONTD....

PAGE 5 of 5

03-AUG-17 20:37 (MT)

Version: FINAL

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

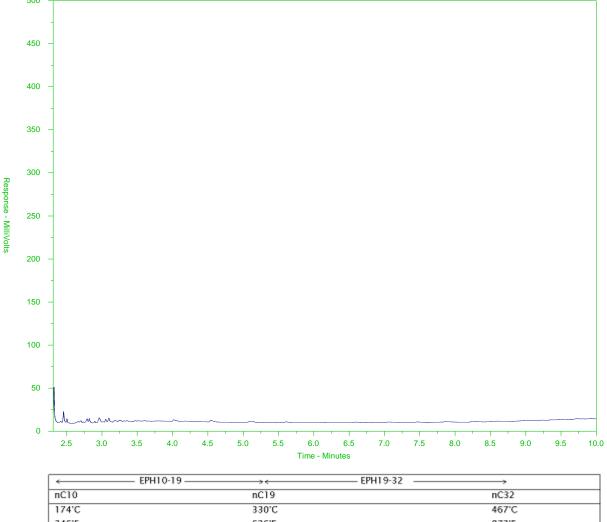
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



ALS Sample ID: L1965282-1

Client Sample ID: |REG|GWEIRA-WATER-1



| — | - EPH10-19 | - EPH19-32 → |
|--------------|-------------------------|------------------------|
| nC10 | nC19 | nC32 |
| 174'C | 330°C | 467°C |
| 346'F | 626'F | 873'F |
| ← Gasoline → | ← Motor C | ils/ Lube Oils/ Grease |
| * | — Diesel/ Jet Fuels — → | |

The BC EPH Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and three n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

A "-L-" in the sample ID denotes a low level sample. A "-S-" denotes a silica gel cleaned sample.



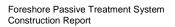
Chain of Custody (COC) / Analytical **Request Form**



COC Number: 15 - 609418

Canada Toll Free: 1 800 668 9878

| Report To | Contact and company nar | ne below will appear on the final report | I | Report Format | Distribution | | Select Se | ervice Levi | el Below - Free | , | E&P TATs with | vour AM - sur | charges will ap | nly | | |
|----------------------|---------------------------------------|--|--------------------|---------------------------------------|---|---------------|------------|---------------------|------------------|-----------------|-----------------|-----------------|------------------------|-------------|--------------------|--------------------|
| Company: | AFCOM | in Edward in the main teport | Select Report Fo | | | EDD (DIGITAL) | | | ular [R] | - | | | pm - business | | rcharges | annly |
| Contact: | Michael Gill | | | QC) Report with Repo | rt YES [| | · · | | ay [P4] | | > - | | iness day | | charges | арріу |
| Phone: | 604 444 64 | 3 2) | Compare Resi | ults to Criteria on Report - p | provide details below if | box checked | SS Day | | ay [P3] | H | GENC | | = | | ا ۔۔۔۔ | <u> </u> |
| | Company address below will app | | Select Distributio | n: EMAIL | MAIL [| l FAX | PRIC | | ay [P2] | H | MER | Same Da | y, Weeken holiday [| | ory [| |
| Street: | | | | | | | = | | | uired for all E | P.D.TATe: | | | | | |
| City/Province: | Start Produ | uction Way | Engil bil a | 1,gfll@oec | OM . COV | <u>'0.44</u> | For toets | | | | | nuni salastad : | you will be con | atastasi | | |
| Postal Code: | Burnaby | <u>v</u> | Email 3 | outherna | ORCOMI | 2017 V | r or tests | that Can I | ot be perioni | ed according i | | sis Reque | · | tacteu. | | |
| Invoice To | Same as Report To | YES NO | Liliali 5 | Invoice Dis | tribution | | | lo. | dianta Filtara | d (E) Bronon | | | erved (F/P) be | · Inv | $\neg \neg$ | |
| THY OICE 10 | · · · · · · · · · · · · · · · · · · · | | Select Invoice Di | | | <u> </u> | P | PΪ | dicate i litere | u (i), Fleseiv | ed (F) OI Fille | reu and Fresi | 7 | | | |
| | Copy of Invoice with Report | YES NO | | | EMAIL MAIL | FAX | F | | _ | | | | + | | | |
| Company: Contact: | Chewron Cay | rada Ltd. | Email 2 | as abov | | | 1 | | | | | | | | | |
| Contact. | Project Norm | anting | } | il and Can Beautine | Fields felient us | | 1 | | | | | | | | | ers |
| ALS Account # / | | lation | | oil and Gas Required | PO# | e) | ! | 1 | | | | | | | | tain |
| | | | AFE/Cost Center: | · · · · · · · · · · · · · · · · · · · | | | ابد ا | 9 | | | | | | | | Co |
| JOD #: 6 | 0542455 | | Major/Minor Code: | | Routing Code: | | to | (X) | | | | | | | <u>.</u> | Į. |
| PO / AFE: | -1 | | Requisitioner: | | | | 5 | _== | | | | | | - | ~ | Number of Containe |
| LSD: For | eshore | | Location: | | | | | \prec | . | | | | | - | ᅬ | Nur |
| ALS Lab Wo | rk Order # (lab use only) | | Als Contact: | Vatt | Sample | /JB | | à | | | | | | | Exackis | |
| ALS Sample # | Sample | Identification and/or Coordinates | • | Date | Time | Sample Type | 8 | $ \dot{m} $ | | | | | | | 5 | |
| (lab use only) | (This d | escription will appear on the report) | | (dd-mmm-yy) | (hh:mm) | oampie Type | (JN | ~-1 | | | | | | | | |
| | EIRA-Wate | r-) | 7 | 6-JW-17 | 11:50 | Water | \times | $\boldsymbol{\chi}$ | | | | | | > | | 4 |
| | | | _ | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | - | | + | - | | + | +++ | \dashv | |
| | | | | | | | | | | | | | + | + | | |
| | | | | | | | | | | | | | | \perp | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| _ | | | | | | | | | | | | | | | | |
| | | | • | | | | | | | | | | +-+ | + | | |
| | | | | | | | | | | + | - | | | + | | |
| | | | | | | | | | | | | | ↓ ↓ | + | | |
| | <u> </u> | | | | | | | | | | | | | | | |
| Drinkin | g Water (DW) Samples¹ (clien | Special Instructions / | | | ing on the drop-do | wn list below | | | | AMPLE CO | | | VED (lab u | | | |
| | n from a Regulated DW System? | . 430, | (elec | ctronic COC only) | | | Frozer | | _ □ | | | Observation | | = | No | |
| | NO NO | | | | | | Ice Pa | | | Cubes | Custe | ody seal int | tact Ye | s 🔲 I | No | |
| | | BC C8 | \mathcal{R} | | | | Coolin | g Initiate | | | | | | | | |
| | uman drinking water use? | | - ' ' | | | | | INIIT | IAL COOLER | TEMPERATI | JKES °C | | 1 | OOLER TEMP | ERATUR | (ES C |
| YES | NO CHIPMENT DELEAC | | | AUTIAL OLUGATE | T DEOEDTIO: | | | | | | 141 011/5 | AELIT DÉ C | 15 | | $\overline{\bot}$ | |
| Released by: | SHIPMENT RELEAS | | Received by: | INITIAL SHIPMEN | T RECEPTION (la Date: | b use only) | Time: | - , | Received I | | NAL SHIP | | EPTION (la | ib use only | | me: |
| Zabo | Beiler Date | July 26, 2017 18:35 | | | _ = = = = = = = = = = = = = = = = = = = | | | [| 1 | | | Dat | 7/21 | 3/17 | ِ [ˈj̈ | 8.40 |
| REFER TO BACK | PAGE FOR ALS LOCATIONS AND | SAMPLING INFORMATION | | VATLIT | F - LABORATORY | CORV VELLOW | / CLIE | NT COD | ~~~/` | | | ' | | | ئ ىلىت. | 200000 2000 50000 |



Project number: 60542455

Appendix I - Tervita Manifests and Bill of Lading



RICHMOND BIOREMEDIATION FACILITY <u>DAILY LOADS LOG SHEET</u>

| S20010508 | Chevron | WR#: | 888 |
|-----------|-------------------------------|------|-----|
| DATE: | 20-Jul-2017 | MP#: | |
| CONT: | CL+ BTEX/VPH, EPH, Supersacks | | |

| LOAD# | TIME | TRUCK | CLASS | CELL# | WEIGHT | BAGS |
|-------|-------|--------|-------|-------|--------|------|
| 1 | 7:10 | HB8386 | CL+ | 12 | 9.940 | 8 |
| 2 | 10:02 | HN6555 | CL+ | 12 | 17.628 | 8 |
| 3 | 10:06 | HB8386 | CL+ | 12 | 8.590 | 8 |
| 4 | 13:17 | HN6555 | CL+ | 12 | 10.718 | 8 |
| | h | | | | 46.876 | 32 |

Jul 24,17 09:03:07

Page 1

RL Ecowaste Industries Ltd.
Listing of Tickets
For Jul 21,17
All Tickets
Both Posted & Unposted
Customer ID=2945 Tervita Corporation(Environmental)

| Ticket # Date Tm In License Vehicle Desc | Yds (| 5∨W(kg) ⁻ | Tare kg | Net Wgt |
|---|----------------------------|----------------------------------|----------------------------------|---|
| Customer: 2945 Tervita Corporation(Environmental) | | | | |
| Material: S20010508 5201 Penzance Dr Bby (2945) 1546949 Jul 21 07:10 HB8386 Tervita - 20 yd3 1547068 Jul 21 10:02 HN6555 Southdale/Pup 1547070 Jul 21 10:06 HB8386 Tervita - 20 yd3 1547210 Jul 21 13:17 HN6555 Southdale/Pup SubSubTotal: | 20 28 20 28 96 | 23600 35280 22250 28370 | 13660 17652 13660 17652 | 9940 17628 8590 10718 46876 |





RICHMOND BIOREMEDIATION FACILITY SOIL MANIFEST

| Classification: | | | | PCOC |
|--|---------------------|--|---|--|
| CL+ | X FOR STOR | AGE OR SUSPECT QUALI | TY BTEX/VPH | X |
| L | | | EPH | X |
| | | | Supersacks | X |
| | | | | |
| Project Number | S20010508 | Expiry date: | September 30, | 2017 |
| Section I | | GENERATOR | | |
| | | CLITERATOR | | The state of the s |
| Generator Name: <u>Chevro</u> | n | Site Location: Fore | eshore N of 5201 Penzai | nce Dr |
| Generator Address: 5201 P | enzance Drive | Site Address: Fore | eshore N of 5201 Penzar | nce Dr |
| Burnab | y, BC | Bur | naby, BC | |
| Generator Phone No: 604-25 | 7-4012 (Chris Boys) | Site Phone No: 778 | -232-8533 (Edward Pre | ece AECOM) |
| Description of Waste: Conta | minated Soil | | | |
| Ed - 10 | Tilliacca 50ii | 11 11 | - : 0 | |
| Generator's Representative Na | ime | Signature Signature | Shipment Date | 2017 |
| • | | _ | ompragate bacc | |
| Section II TRANSPORTER | Tandem | TRANSPORTER | | |
| LOAD SIZE: | Truck&Pony | Tailgate Se and Dum | Ecowaste Industrie 100 - 3031 Viking | s Ltd. Wav |
| | Truck & Transfer | 12/1 | Richmond, BC V61 | / 1W1 |
| and the second | • | | Phone (604) 276-9! Richmond Landfill | 511 GST R#: 87228 2 RL |
| Name: LOVIA | 1. 1/1/1 | The same of the sa | Ticket: RL 1546949 | |
| | in way | | Acct#: 2945 | |
| Driver Name/Title: | 64441121 | | Tervita Corporati | on(Environmen |
| A . | uck No: WHTCO | 22 | Vehicle: HB838620 Date Jul 21,17 07 | lervita - 20 yd 7:10 - SM |
| Vehicle License No./Prov.: | | | | |
| Acknowledgment of Receipt of | | | Material: \$2001050 5201 Penzance Dr | 18 Bby (2945) |
| Tillle H | | | Area: H - Tervita | - General |
| 7,000 | ment Date | | Gross 23,600 | ka |
| | Anenc Date | | Tare 13,660 | kg File |
| Section III | DE | STINATION | NET 9,940 X | kg |
| Tervita Richmond Bioremed | diation Facility | Phone No: (60 | Signature | phillip Market and the first control of the state of the Market of the Market of the Assessment Asses (1994) |
| 15111 Williams Road, Rich | • | | Jignatul e | |
| | | | 040 | 1 |
| Cell | Cause: | WR # | 800 | |
| I hereby certify that the above foregoing is true and accurate | | een accepted and to the best | of my knowledge the | |
| iorogonig io trae and accurate | | | | <i>(</i>) |
| Anthony mas | er a Ca | Santa Contraction of the Contrac | JULY 21 | |
| Name of Authorized Agent | ···· | Signature | Receipt Date | |
| - | | - | | air. |
| | | | | -16 |





RICHMOND BIOREMEDIATION FACILITY SOIL MANIFEST

| Classificat | t <u>ion:</u> | | | | | PCOC |
|---|-------------------------|--|---------------------------|-------------------------------|--|---|
| | CL+ | X FOR STOR | AGE OR SUSPECT QU | ALITY | BTEX/VPH | X |
| | | | | | ĘPH | X |
| | | | | | Supersacks | X |
| Description of the | | C20040700 | 1 | | | |
| Project Nu | ımber: | S20010508 | Expiry date: | | September 30 | , 2017 |
| Section I | | | GENERATOR | | | |
| Generator Name: | Chevron | | Site Location: | Foresho | ore N of 5201 Penz | zance Dr |
| Generator Address: | 5201 Penz | ance Drive | Site Address: | Foresho | ore N of 5201 Penz | zance Dr |
| | Burnaby, | ЗС | | Burnaby | | |
| Generator Phone No: | 604-257-4 | 1012 (Chris Boys) | Site Phone No: | 778-232 | 2-8533 (Edward P | reece AECOM) |
| Description of Waste: | Contami | nated Soil | | | | |
| Edward Re | O.CE) | | 31 112 | | Juliu 20 | 2017 |
| Generator's Represen | tative Name | | Signature | | Shipment Date | 10014 |
| Section II | | | TRANSPORTER | | | |
| Name: | ER D SIZE: R | Tandem Truck&Pony Truck & Transfer | Tailgate S and Dur | 100 Ric Pho Ric | owaste Industri D - 3031 Viking Chmond, BC V6 One (604) 276-9 Chmond Landfill Cket: RL 154706 | Way V 1W1 511 GST R#: 87228 216 RL |
| Driver Name/Title: Phone No.: Vehicle License No./Pr Acknowledgment of Re | | 6555 | | Te Veh Dat Mat 53 | et#: 2945 ervita Corporat nicle: HN6555P: te Jul 21,17 1 terial: S200105 201 Penzance Dr ea: H - Tervita | Southdale/Pup 0:03 SM 08 Bby (2945) |
| Driver Signature | Shipme | ent Date | | (| Gross 35,280 | |
| Section III | 9 | DE | STINATION | | Tare 17,652 VET 17,628 | kg File kg |
| | | | -OTTNATION | Х | • | |
| Tervita Richmond Bi 15111 Williams Roa | | - | Phone No: (6) | Sig | gnature | 7-7-12-6-7-III. III. AARININ III. AARIN AARIN AARIN AARIN AARIN AARIN AARIN AARIN AARIN AARIN AARIN AARIN AARIN |
| | Cell | | WR # [| 388 | 8 | |
| I hereby certify that the foregoing is true and a | ne above na accurate | med material has be | een accepted and to the b | est of m | y knowledge the | |
| Name of Authorized | Agent | | Signature | | Receipt Date | 117 |





RICHMOND BIOREMEDIATION FACILITY SOIL MANIFEST

| Classificat | ion: | | | | | | PCOC |
|---|------------------------|-----------------------------|-------------|--------------------|---|--|---|
| | CL+ | X FOR STOR | RAGE OR S | SUSPECT QU | ALITY | BTEX/VPH | X |
| | | | | | | EPH | х |
| | | | | | | Supersacks | Х |
| Project Nu | ımber: | S20010508 | Ex | piry date: | 5 | September 30, | 2017 |
| Section I | | | GENERAT | ΓOR | | | |
| Generator Name: | Chevron | | | Site Location: | Foresho | ore N of 5201 Penza | ance Dr |
| Generator Address: | 5201 Pen: | zance Drive | <u> </u> | Site Address: | Foresho | re N of 5201 Penza | ance Dr |
| | Burnaby, | ВС | | | Burnaby | | |
| Generator Phone No: | 604-257- | 4012 (Chris Boys) | | Site Phone No: | 778-232 | 2-8533 (Edward Pr | eece AECOM) |
| Description of Waste: | Contami | nated Soil | | | | | - |
| Edua d Generator's Represent | Beece | <u> </u> | <u>S</u> | | agreed through and the second | Tuly 20 Shipment Date | 2017 |
| Section II | | | TRANSPO |)PTFP | | | |
| TRANSPORT | D SIZE: | aterials. 2(261) ent Date | | Tailgate and Du | 100 Rick Phon Rick Tick Acc ⁻ Veh Date Mate 520 Are: | waste Industries - 3031 Viking waste (604) 276-951 nmond Landfill ket: RL 1547070 t#: 2945 rvita Corporation icle: HB838620 Te Jul 21,17 10: erial: S20010508 01 Penzance Dr Ea: H - Tervita - ross 22,250 ket 13,660 ket 8,590 ket | ay 1W1 1 GST R#: 87228 2 RL m(Environmen ervita - 20 yd 06 SM by (2945) General |
| Tervita Richmond B | ioremedia | tion Facility | | Phone No: (| Sigi | nature | ggagnety kaan nagangga an mindaa gala salkaassahaa askartaksa alka sakassassassa mindaa |
| 15111 Williams Roa | d, Richmo | ond, B.C. | | | 5 | | |
| | Cell | 121 | | WR # | 8 | 88 |] |
| I hereby certify that the foregoing is true and a | he above n accurate | amed material has t | been accept | ed and to the I | best of n | ny knowledge the | |
| PAT D UJ Name of Authorized | PR C Agent | | Signature | Jupu - | - J | Receipt Date | 17 |





RICHMOND BIOREMEDIATION FACILITY SOIL MANIFEST

| Classificat | tion: | | | | | PCOC |
|--|--------------|--|-------------------------|--|---|--|
| | CL+ | X FOR STORA | AGE OR SUSPECT QU | ALITY | BTEX/VPH | X |
| | | | | | EPH | x |
| | | | | | Supersacks | X |
| Project No | umber: | S20010508 | Expiry date: | S | eptember 30, | 2017 |
| Section I | | | GENERATOR | | | |
| Generator Name: | Chevron | | Site Location: | Foreshor | e N of 5201 Penza | ance Dr |
| Generator Address: | 5201 Pen | zance Drive | Site Address: | Foreshor | e N of 5201 Penz | ance Dr |
| | Burnaby, | ВС | | Burnaby | , BC | |
| Generator Phone No: | 604-257- | 4012 (Chris Boys) | Site Phone No | : 778-232 | -8533 (Edward Pr | eece AECOM) |
| Description of Waste: | | | | | | |
| C1 10 | este s | | Signature | | Tulu 20 Shipment Date | 2017 |
| Section II | | | TRANSPORTER | | 9- | |
| Name: Address: Driver Name/Title: Phone No.: | AD SIZE: | Tandem Truck&Pony Truck & Transfer Value k No: ZR 13 | Tailgate and Du | 100 Rich Phor Rich Tick Acct Ter Vehi Date | vaste Industrie - 3031 Viking in annond, BC V6V vice (604) 276-95: vita Corporation (1547210 tel: HN6555P School 21,17 13 | Way 1W1 11 GST R#: 87228 21 RL on(Environmen outhdale/Pup :18 SM |
| Acknowledgment of F | Receipt of M | | | 520 Area G r | Ol Penzance Dr I a: H - Tervita Toss 28,370 I are 17,652 I | Bby (2945) - General kg kg File |
| Section III | | DE | STINATION | NE X | T 10,718 I | kg |
| Tervita Richmond I 15111 Williams Ro | | ation Facility | Phone No: (| ويردوهو يستعملون | ature | ` \ |
| | Cell | | WR # | | 38 | |
| I hereby certify that foregoing is true and | | named material has be | een accepted and to the | best of m | ny knowledge the | |
| Name of Authorize | d Agent | | Signature Signature | _ [| Receipt Date | 17 |

Z&RTrucking & Construction Contracting Co Ltd. *Transporation of Dangerous Goods *Sand & Gravel *Washed Aggregates *Top Soil 23302- 70 A Avenue - Langley - BC - V2Y 2H9 *OFFICE: 604-318-7929 *FAX:604-888-7927 *Email:zrtrucking@shaw.ca

| Job# 2001 0508 Date: July 21/17 | | | | | | |
|---|--|--|---|---------------------------|--|--|
| IN ACCOUNT WITH: Territa | | | | | | |
| JOB LOCATION: 65 Rodger Pl | | | | | | |
| Variouver Ports | | | | | | |
| G.S.T. NO. R105795041 TRUCK NO. 2R. 13 | | | | | | |
| 4. AXLE TRANSFER TRIDEM & TRIDEM PONY TRUCK & TRIDEM PONY TRUCK & PONY TANDEM | | | | | | |
| TICKET NO. | PIT NO. | MATERIAL | NET WEIGHT | RECEIVED BY | | |
| 1547068 | RBF | CL+ | 17628 | | | |
| 1547210 | RBF | CL+ | 10,7186 | | | |
| | | · | | | | |
| | | | | | | |
| | Lopo | as By Fork | if at | SAc | | |
| | Wi | th BAS | | | | |
| | Light | & BAGE Tull | | | | |
| | 0 | | | | | |
| | | -3/ | | | | |
| | man at the same of | Thys | | | | |
| | 1701. | | | | | |
| | | | | | | |
| | | | | | | |
| START TIME: FINISH: | | | | | | |
| INVOICE | NET | 30 DAYS 2% INTEREST PER MON CUSTOMER IS RESPONSIE | TH CHARGED ON OVE BLE FOR OVER WEIGH | ERDUE ACCOUNTS T FINES | | |
| 017096 SIGNED VO | | | | | | |
| | | WHITE - CUSTOMER YE | LLOW - Z&R | PINK - DRIVER | | |

SHAN PRINTING & SINGS LTD. • PH: 778-885-5164, 604-593-5070



RICHMOND BIOREMEDIATION FACILITY <u>DAILY LOADS LOG SHEET</u>

| S20010508 | Chevron | WR#: | 888 |
|-----------|-------------------------------|----------|-----|
| DATE: | 20-Jul-2017 | | |
| CONT: | CL+ BTEX/VPH, EPH, Supersacks | <u> </u> | |

| LOAD# | TIME | TRUCK | CLASS | CELL# | WEIGHT | BAGS |
|-------|-------|--------|-------|-------|--------|------|
| 1 | 10:23 | HB8386 | CL+ | 12 | 11.590 | 8 |
| 2 | 12:35 | JM8155 | CL+ | 12 | 11.520 | 8 |
| 3 | 12:39 | HB8386 | CL+ | 12 | 11.660 | 8 |
| 4 | 14:54 | JM8155 | CL+ | 12 | 9.566 | 8 |
| 5 | 15:08 | HB8386 | CL+ | 12 | 11.520 | 8 |
| | | | | | 55.856 | 40 |

RL Ecowaste Industries Ltd. Listing of Tickets For Jul 20,17 All Tickets Both Posted & Unposted Customer ID=2945 Tervita Corporation(Environmental)

| Ticket # Date | Tm In License | Vehicle Desc | Yds (| GVW(kg) | Tare kg | Net Wgt |
|--|--|--|----------------------------------|---|---|---|
| Customer: 2945 | Tervita Corpora | tion(Environmental) | | | | |
| Material: S200 1546679 Jul 20 1546780 Jul 20 1546786 Jul 20 1546903 Jul 20 1546910 Jul 20 SubSubTotal: | 10:23 HB8386 12:35 JM8155 12:39 HB8386 14:54 JM8155 | ance Dr Bby (2945) Tervita - 20 yd3 Southdale Trucking Tervita - 20 yd3 Southdale Trucking Tervita - 20 yd3 | 20 16 20 16 20 92 | 25250 23890 25320 21900 25180 | 13660 12370 13660 12334 13660 | 11590 11520 11660 9566 11520 55856 |





| Classificat | ion: | | | | | PCOC |
|---|--|------------------------------|--|---|--|---|
| | CL+ | X FOR STOR | AGE OR SUSPECT QU | ALITY | BTEX/VPH | X |
| | ····· | | | | EPH | X |
| | | | | | Supersacks | X |
| Project Nu | ımber: | S20010508 | Expiry date: | S | eptember 30, | 2017 |
| Section I | | | GENERATOR | | | |
| Generator Name: | Chevron | | Site Location: | Foreshor | e N of 5201 Penza | nce Dr |
| Generator Address: | | ance Drive | | | e N of 5201 Penza | |
| | Burnaby, I | | | Burnaby | , BC | |
| Generator Phone No: | | | Site Phone No: | 778-232 | -8533 (Edward Pre | eece AECOM) |
| Description of Waste: | Contami | nated Soil | | | | · |
| Falling d 6 | Dranca | | 41 10 | ſ. | July 20 | 2017 |
| Generator's Represen | tative Name | 2 | Signature | | Shipment Date | - Assumed |
| Section II | | | TRANSPORTER | | | |
| Name: Address: Driver Name/Title: Phone No. PAcknowledgment of F | ND SIZE: Volcar Roc Brent Fil9 Truck | Hellyer (No: <u>whice</u> | and Dui | Pho Ric Pho Ric Tio Acc Te Veh Dat Mat | child Landfiji cket: RL 1546679 ct#: 2945 ctrvita Corporati cicle: HB838620 de Jul 20,17 10 cerial: \$2001050 01 Penzance Dr | es Ltd. Way / 1W1 511 GST R#: 87228 2165 RL) on(Environmen Tervita - 20 yd :23 SM 8 Bby (2945) |
| Driver Signature Section III | Shipm | ent Date | ESTINATION | Are G | a: H - Tervita ross 25,250 are 13,660 | - General |
| Tervita Richmond E | ad, Richmo | tion Facility | Phone No: ((| X | 11,590 | kg |
| I hereby certify that foregoing is true and ATDU Name of Authorized | accurate | amed material has t | wR # peen accepted and to the Signature | best of m | ny knowledge the | <u>- 17</u> |

Betting Weigh Slip NEXT Round.



PCOC



| Classificat | tion: | | | | | | PCOC |
|---|------------------|--------------------------------|--------------|---|--|--|-----------------------------------|
| | CL+ | X FOR STOR | AGE OR SUSPE | T QU | ALITY | BTEX/VPH | x |
| | l | <u> </u> | | | | EPH | × |
| | | | | | | Supersacks | X |
| | | | | | | | |
| Project No | umber: | S20010508 | Expiry da | ite: | | September 30, | 2017 |
| Section I | | | GENERATOR | | *** | | |
| Generator Name: | Chevron | | Site Loc | ation: | Foresho | ore N of 5201 Penza | ance Dr |
| Generator Address: | | zance Drive | | • | | ore N of 5201 Penza | |
| Concretor rider obsi | Burnaby, | | | _ | Burnab | | |
| Generator Phone No: | | | Site Pho | | | 2-8533 (Edward Pr | eece AECOM) |
| | , | | Jice I III | 1101, | 770 23 | 2 0303 (241141417) | 3333 7.1233.17 |
| Description of Waste: | Contami | nated Soil | | 11 |) | | |
| Generator's Represer | Tative Name | | Signature | <u>UL</u> | - | Shipment Date | 2017 |
| | itative Nami | - | | | | Shiping it bate | |
| Section II TRANSPORT | | Tandem | TRANSPORTER | | | - · | |
| Name: | Receipt of M | k No: (O) Aderials. Dent Date | ESTINATION | 100 Ridh Midh Acct Tan Veh Data Mat 52 Are. G | - 3031 mond, ne (604 mond L cet: Ri c#: 294 voita (icle: L e Jul 2 erial: 01 Pen a: H - | Corporation(Environ8155 Southdale 20,17 12:49 | ronmen Truckin SM (2945) |
| I hereby certify that foregoing is true and Name of Authorize | Cell the above n | ond, B.C. | - | 'R # | best of | 88 |] |





| Classificati | on: | | | | _ | | P | COC |
|--|-------------|-------------------------------------|---------------|--------------------|--|--|--|--|
| · · | CL+ | X FOR STOR | AGE OR SU | ISPECT QU | ALITY | BTEX/VPH | | x |
| _ | | | | | Ī | EPH | | х |
| | | | | | Ì | Supersack | s | Х |
| Project Nur | mber: | S20010508 | Expi | ry date: | 9 | September : | 30, 20 | 17 |
| Section I | | | GENERATO | R | | | | |
| Generator Name: | Chevron | | Sit | te Location: | Foresho | re N of 5201 Pe | enzance | Dr |
| Generator Address: | 5201 Penzan | ce Drive | Sit | te Address: | Foresho | re N of 5201 Pe | enzance | Dr |
| | Burnaby, BC | | | | Burnaby | , BC | | |
| Generator Phone No: | | | Sit | te Phone No: | | 2-8533 (Edward | d Preece | AECOM) |
| Description of Waste: | Contaminat | ced Soil | | | | | | |
| Edward Pr Generator's Representa | 201601 | | Signature | Mh | | Tulu 2 Shipment Date | 0 [2 | 2017 |
| Section II | | | TRANSPOR | TER | | | | |
| Name: Address: Driver Name/Title: Phone No. Acknowled@ment of Red Driver Signature Section III | SIZE: Tr | 366 Prials. 20 2011 t Date | ESTINATION | Tailgate S and Dur | PH EC 10 R-1 R-1 R-1 R-1 R-1 R-1 R-1 R-1 R-1 R-1 | ichmond Landficket: RL 154 cct#: 2945 Fervita Corpo shicle: HB838 ate Jul 20,17 aterial: S200 5201 Penzance rea: H - Terv Gross 25, Tare 13, | ing Way V6V 1V 6-9511 ill 6786 ratione 620 Tes 12:39 10508 Dr 6b ita ~ (| y W1 GST R#: 87228 RL (Environmen rvita - 20 yd 9 SM y (2945) General |
| Section III | | | LOTINATIO | | X | NET 11, | 660 kg | |
| Tervita Richmond Bio 15111 Williams Road | | - | Ph | one No: (6 | | ignature | | Fig. (Lower to the state of the |
| | Cell | 1/2- |] | WR # | | 788 | | |
| I hereby certify that the foregoing is true and according to the foregoing is true and according to the foregoing is true and according to the foregoing is true and according to the foregoing in the foregoing is true and according to the foregoing is true and according to the foregoing is true and according to the foregoing is true and according to the foregoing is true and according to the foregoing is true and according to the foregoing is true and according to the foregoing is true and according to the foregoing is true and according to the foregoing is true and according to the foregoing is true and according to the foregoing is true and according to the foregoing is true and according to the foregoing is true and according to the foregoing | | ed material has b | seen accepted | d and to the l | pest of n | ny knowledge t | he O | 17 |





| Classificat | tion: | | | | PCOC |
|-----------------------|-------------------------|----------------------|-----------------------------|---|----------------------------|
| | CL+ | X FOR STOR | AGE OR SUSPECT QUAL | ITY BTEX/VPH | х |
| | | L | | EPH | X |
| | | | | Supersacks | х |
| Project N | umber: | S20010508 | Expiry date: | September 30 | 0, 2017 |
| Section I | | | GENERATOR | | |
| Generator Name: | Chevron | | Site Location: Fo | reshore N of 5201 Per | izance Dr |
| Generator Address: | | zance Drive | | preshore N of 5201 Per | |
| dellerator Address. | | | | ırnaby, BC | |
| Caramban Dhaga Nas | Burnaby, | | | 78-232-8533 (Edward | Preece AFCOM) |
| Generator Phone No: | 604-257-4 | 4012 (CIIIS BOYS) | Site Filone No. 77 | 0 232 0333 (Edward | Treede ALCOTT |
| Description of Waste: | <u>Contami</u> | nated Soil | 1 | | |
| Edward Y | PP.CES | | Signature | July 20 | 12017 |
| Generator's Represer | itative Nam | e | | | |
| Section II | | | TRANSPORTER | | I. 1997/99 |
| TRANSPORT | T ER AD SIZE: | Tandem Truck&Pony | Tai (| vaste Industries Lt | :d. |
| LO | AD SIZL. | Truck & Transfer | 100 | - 3031 Viking Way | 70/75 |
| | & | Truck & transfer | Rich | mond, BC V6V 1W1 | |
| Name: <u>SOU</u> | AL | :\e | Pho | ne (604) 276-9511 0 nmond Landfill | SST R#: 8/228 RL |
| | 1100 | () | RICI | mond Land) ket: RL 1546903 | KL SAR |
| Address <u>:</u> | | 1.00 | \$ 1 Apr. 1 | | |
| | 1 / | | | t#: 2945 | |
| Driver Name/Title: | - 20 K | -\ \ | Te | rvita Corporation(E icle: JM8155 South | invironmen Jala Truckin |
| Phone No.: 3540 | | k No: | ven | e Jul 20,17 14:55 | SM |
| Vehicle License No./F | | 18150 | Date. | 5 Jul 20,2. 2 | |
| Acknowledgment of I | Receipt of M | laterials. | | erial: S20010508 | |
| | | | 52 | 01 Penzance Dr Bby | (2945) 2945) |
| 1 - | الالإل | 120111 | _ Are | a: H - Tervita - G | 31161 21 |
| Driver Signature | Shipm | nent Date | G | ross 21,900 kg | |
| Section III | | D | ESILIVALIUN | are 12,334 kg | File |
| | | | N | ET 9,566 kg | |
| Tervita Richmond | Bioremedia | ation Facility | Phone I | | 16000 |
| 15111 Williams Ro | ad, Richm | ond, B.C. | Sig | nature | |
| | | | - | 200 | |
| | Cell | 1/1 | WR # | 000 | |
| I hereby certify that | the above r | named material has l | peen accepted and to the be | st of my knowledge th | e |
| foregoing is true and | | | 0. 0 | | |
| 0 - 1 | | | 1)~// | (1) | 1 - |
| LUT III | 1005 | | 16th hinde | V 11 Sen 5/1 |) /// |
| Name of Authorize | of Agent | | Signature | Receipt Date | |
| Manne of Authorize | a Agent | | Signature # | / Nederpt Date | |
| | | | | \ \ \ | |
| | | | | | |





| Classification | n: | | | | | PCOC |
|--|---|----------------------------|--|---|---|--|
| C | CL+ | X FOR STOR | AGE OR SUSPECT QUA | LITY | BTEX/VPH | x |
| <u> </u> | | | | | EPH | х |
| | | | | S | upersacks | X |
| Project Nun | nber: | S20010508 | Expiry date: | Sept | ember 30, | , 2017 |
| Section I | | | GENERATOR | | | |
| Generator Name: C | Chevron | | Site Location: _F | oreshore N | of 5201 Penz | ance Dr |
| Generator Address: 5 | 201 Penz | ance Drive | Site Address: F | | , | |
| | Burnaby, E | | | Burnaby, BC | , | |
| Generator Phone No: 6 | 504-257-4 | 012 (Chris Boys) | Site Phone No: 7 | 78-232-853 | 33 (Edward Pr | reece AECOM) |
| Description of Waste: | Contamin | ated Soil | | | | |
| Edward Pre | P.CO.) | 2 | Ed Phin | <u> </u> | 14 20 | 12017 |
| Generator's Represental | tive Name | | Signature | Snipi | ment Date | |
| TRANSPORTER LOAD Name: Address: Oriver Name/Title: Oriver No./Provoncknowledgment of Recommendation Driver Signature | SIZE: JUCAN BC GENT Truck v.:1488 ceipt of Ma | terials. 20 2e(1 ent Date | TRANSPORTER Tailgate and Du ESTINATION | 100 - 30 Richmond Phone (8 Richmond Ticket: Acct#: 2 Tervita Vehicle: Date Jul Material 5201 Pe | I Landfill RL 1546910 2945 Corporatio HB838620 1 20,17 15: | Nay 1W1 L1 GST R#: 87228 RL PR(Environmen Fervita - 20 yd 109 SM Bby (2945) General Kg Kg File |
| Γervita Richmond Bio L5111 Williams Road | | - | Phone No: (| Signatur | | V PETERSONAL Minnesons and revenue Library, such as and a |
| | Cell | 1/2 |] WR # [| 78 | 7 | |
| I hereby certify that the foregoing is true and action of Authorized A | ocurate | nmed material has b | peen accepted and to the be | 20 | nowledge the | 1/7 |



RICHMOND BIOREMEDIATION FACILITY <u>DAILY LOADS LOG SHEET</u>

| S20010508 | Chevron | WR#: | 889 |
|-----------|-----------------|------|-----|
| DATE: | 25-Jul-2017 | MP#: | |
| CONT: | RL+, Supersacks | | |

| LOAD# | TIME | TRUCK | CLASS | CELL# | WEIGHT | BAGS |
|-------|-------|--------|-------|-------|--------|------|
| 1 | 9:16 | HN6555 | RL+ | 12 | 15.968 | 8 |
| 2 | 9:22 | DB7778 | RL+ | 12 | 15.102 | 8 |
| 3 | 12:54 | DB7778 | RL+ | 12 | 15.952 | 8 |
| 4 | 12:56 | HN6555 | RL+ | 12 | 16.968 | 8 |
| E | | | | | 63.990 | 32 |

Jul 26,17 11:18:22

RL Ecowaste Industries Ltd. Listing of Tickets For Jul 25,17 All Tickets Both Posted & Unposted Customer ID=2945 Tervita Corporation(Environmental)

Page 1

| Ticket # Date | Tm In License | Vehicle Desc | Yds (| GVW(kg) | Tare kg | Net Wgt |
|--|--|---|-----------------------------|----------------------------------|----------------------------------|---|
| Customer: 2945 | Tervita Corpora | ation(Environmental) | | | | |
| 1547847 Jul 25 1547852 Jul 25 1547990 Jul 25 | 010508 5201 Pena 5 09:16 HN6555 5 09:22 DB7778 5 12:53 DB7778 5 12:56 HN6555 | zance Dr Bby (2945) Southdale/Pup Z & R Enviro/Pup #5 Z & R Enviro/Pup #5 Southdale/Pup | 28 28 28 28 112 | 33620 31940 32790 34620 | 17652 16838 16838 17652 | 15968 15102 15952 16968 63990 |



| Classificati | on: | | PCOC |
|-------------------------|--------------------------------|--|--|
| | RL+ X FOR STOR | AGE OR SUSPECT QUALIT | Supersacks X |
| | <u> </u> | | ۷., |
| Project Nu | mber: \$20010508 | Expiry date: S | September 30, 2017 |
| Project Nu | 320010300 | Expiry date. | |
| Section I | G | ENERATOR | |
| Generator Name: | Chevron | Site Location: Foresho | re N of 5201 Penzance Dr |
| Generator Address: | 5201 Penzance Drive | Site Address: Foresho | re N of 5201 Penzance Dr |
| | Burnaby, BC | Burnaby | v, ВС |
| Generator Phone No: | 604-257-4012 (Chris Boys) | Site Phone No: <u>778-232</u> | 2-8533 (Edward Preece AECOM) |
| Description of Waste: | Contaminated Soil | | |
| Edinal Pa | 0100 | 1 // | July 25 2017 |
| Generator's Represent | ative Name Si | gnature | Shipment Date |
| Section II | . T | RANSPORTER | |
| TRANSPORTI | | Tailgate Sc | |
| LOAD | SIZE: Truck&Pony | | owaste Industries Ltd. O – 3031 Viking Way |
| | Truck & Transfer | Ri | chmond, BC V6V 1W1 |
| Name: Sol | Brivesianut U | Ph Ri | one (604) 276-9511 GST R#: 87 chmond Landfill RL |
| Name: Address: | 1- 131 | | cket: RL 1547847 |
| ,100,000 | | | ct#: 2945 |
| Driver Name/Title: | <u>Klaff</u> | | ervita Corporation(Environmen |
| Phone No.: | Truck No: 7213 | | hicle: HN6555P Southdale/Pup tte Jul 25,17 09:16 AK |
| Vehicle License No./Pr | | | |
| Acknowledgment of Re | eceipt of Materials. | | tterial: S20010508 [201 Penzance Dr Bby (2945) |
| | 7/125112 | | ea: H - Tervita - General |
| Driver Signature | Shipment Date | | Gross 33,620 kg |
| | | -CTTALATTON | Tare 17,652 kg File |
| Section III | D | ESTINATION X | NET 15,968 kg |
| Tervita Richmond Bi | ioremediation Facility | Phone No: (60 | ignature |
| 15111 Williams Roa | d, Richmond, B.C. | . 31 | igniciali a |
| | Coll T | wr. # 188 | 9 |
| | Cell | VVK # [] | |
| | he above named material has be | en accepted and to the best of r | my knowledge the |
| foregoing is true and a | accurate | | |
| A 11 | <i>t</i> | | July 25 17 |
| Hothany 1 | varu(a | and the same of th | Passist Pats |
| Name of Authorized | Agent | | Receipt Date |



| Classification | on: | | | | | PCUC |
|--|--|-----------------------------|--------------------------|--------------------|---------------------------------|--|
| | RL+ | X FOR STO | RAGE OR SUSPECT | QUALIT | Supersacks | X |
| | | | | | | |
| | | S20010508 | Expiry date: | Se | ptember 30, | 2017 |
| Project Nu | mber: | 520010508 | Expiry date. | | promoci so, | |
| Section I | | | GENERATOR | | | |
| Generator Name: | Chevron | | Site Location: | Foreshore | N of 5201 Penza | ance Dr |
| Generator Address: | 5201 Per | zance Drive | Site Address: | Foreshore | N of 5201 Penza | ance Dr |
| | Burnaby, | ВС | | Burnaby, E | BC | |
| Generator Phone No: | 604-257 | 4012 (Chris Boys) | Site Phone No | : <u>778-232-8</u> | 533 (Edward Pr | eece AECOM) |
| Description of Waste: | Contam | inated Soil | | | | |
| Edward Pr | ocs | | 5/_// | | TM. 25 | 2017 |
| Generator's Represent | | ! | Signature | S | nipment Date | |
| Section II | | | TRANSPORTER | 94 S | | |
| TRANSPORT | | Tandem | Tailgate | | | |
| LOAD | SIZE: | Truck&Pony Truck & Transfer | and Du | = Ecowa | ste Industries | s "Liii. |
| | | Truck & Transfer | - 100e | Richma | 3031 Viking World, BC V6V | 1W1 |
| Name: 292 61 | un/iRo_ | HAUL | | Phone | (604) 276-951 and Landfill | L1 GST R#: 87228 |
| Address: Langle | 4 | | | Ticke | t: RL 1547852 | RL |
| Driver Name/Title: | MAND | AIZIZT | | Acct# | | |
| Phone No.: | - | ck No: # 1 | | Terv Vehic | ita Corporatio le: DB7778P 7 | on(Environmen & R Enviro/Pup |
| Vehicle License No./Pr | | | | Date : | บนไ 25,17 09: | 22 AK |
| Acknowledgment of Ro | eceipt of M | aterials. | | Ma te ri | ial: S20010508 | |
| M4 | July | 28 2017 | 7 | 5201 | Penzance Dr B H - Tervita - | by (2945) |
| Driver Signature | | ment Date | _ _ | AICA, | | |
| | | | DESTINATION | Gros Tare | | |
| Section III | and the second s | | DESTINATION | NET | 15,102 k | |
| Tervita Richmond B | ioremedia | ition Facility | Phone No: | × Ø | 6 | |
| 15111 Williams Roa | ad, Richmo | ond, B.C. | | Signat | ure | CHEST I CONTROLLED TO THE PROPERTY OF THE PROP |
| | Cell | | | 884 | | |
| | | <u> </u> | _ | | | _ |
| I hereby certify that t foregoing is true and | the above r | named material has | been accepted and to the | ne best of m | y knowledge the | : |
| roregoing is true and | accui ace | | | _ | July 25 | 17 |
| Q. Harry | AA-216 | 10 | | . Г | JULY 2 | |
| Name of Authorized | 1 Agent | LV. | | | Receipt Date | |



| Classification: | | | _ | | PCOC |
|---|--------------------|---------------------|-----------------|-----------------------------------|--|
| RL+ | X FOR STO | RAGE OR SUSPE | CT QUALIT | Supersacks | X |
| Lucasy | - | | • | | |
| | photo and a second | 1 | | | |
| Project Number: | S20010508 | Expiry dat | e: S | September 30, | 2017 |
| Section I | | GENERATOR | | | |
| Generator Name: Chevron | | Site Locat | ion: Foreshor | e N of 5201 Penza | nce Dr |
| | zance Drive | Site Addre | ess: Foreshor | e N of 5201 Penza | nce Dr |
| Burnaby, | , | · | Burnaby | | |
| | 4012 (Chris Boys) | Site Phone | | -8533 (Edward Pre | ece AECOM) |
| | nated Soil | | | | |
| | nated Soil | . , 10 | | £1105 | 17017 |
| Generator's Representative Name | - 2 | Signature | | Shipment Date | 12017 |
| Section II | | TRANSPORTER | | <u> </u> | |
| TRANSPORTER | Tandem | T. | Ecowaste II | ndustries Ltd. | |
| LOAD SIZE: | Truck&Pony | | 100 - 3031 | ์ Vา์kา์ทฐ์ Way | |
| | Truck & Transfer | | Richmond, E | 3C V6V 1W1) 276-9511 GST R | 4, 97009 016E |
| | | | Richmond La | | #, 0/220 2103 |
| Name: ZfA LNVIRO | MAUL | | Ticket: RL | 1547990 | |
| Address: Langley | | | Acct#: 294! | 5 | |
| 0 0 | 1000 | ····· | Tervita Co | orporation(Envir | onmen |
| | PARET | | | 37778P Z & R Env | |
| Phone No.:778-24(4443Truc | | | vale jui 2: | 5,17 12:54 A | Ν. |
| Vehicle License No./Prov.: 18- | | | Material: S | | |
| Acknowledgment of Receipt of Ma | teriais. | | | ance Dr Bby (Tervita - Genera | 2945) 1 |
| W/2 195 | July 2017 | 7 | Al Car II | rervita senera | ' |
| | nent Date | | Gross | 32,790 kg | |
| | | | Tare NET | 16,838 kg File 15,952 kg | |
| Section III | | DESTINATION | ×18Ve | , 3 | |
| Tervita Richmond Bioremediat | ion Facility | Phon€ | Signature | | nankinina mili cimilalini efeliki (diliki (diliki) |
| 15111 Williams Road, Richmor | | | | _ | |
| | | - | | 1 <u>G</u> | |
| Cell | | _ wr | # | 0_(| |
| I hereby certify that the above na foregoing is true and accurate | med material has | been accepted and t | o the best of r | ny knowledge the | _ |
| Anthony M | arylor | | | Jaly 25 | 17 |
| Name of Authorized Agent | | | | Receipt Date | |

Z & R Trucking & Construction Contracting Co Ltd. *Transporation of Dangerous Goods *Sand & Gravel *Washed Aggregates *Top Soil

23302- 70 A Avenue - Langley - BC - V2Y 2H9 *OFFICE: 604-318-7929 *FAX:604-888-7927 *Email:zrtrucking@shaw.ca

| Job# | | | | C |)ate: <u>25 3</u> | Tuly-2017 |
|---------|--|-------------|----------------------|-----------|------------------------------|------------------|
| JOB LOG | OUNT V | vith: n: | RVITA Rogers A |) NE | VAN | |
| | | 05795041 | TR | | . <u>21</u> R mpony truck | |
| A. AALE | TANSFE | | | | L | |
| TICKET | NO. | PIT NO. | MATERIAL | | NET WEIGHT | RECEIVED BY |
| 1547 | 859 | | | | 15,102 | Territa |
| 15117 | 000 | | | | 15,953 | 4 |
| 1547 | OFF | | | | 131100 | 7 |
| - | | | | | | |
| | · | | | | | |
| | | | | | | |
| | | | Job tim | e - | 7 thes | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | . | | | EINICH | | |
| | T TIME | | T 30 DAYS 2% INTERES | ST PER MO | | OVERDUE ACCOUNTS |
| | ······································ | 4980 | SIGNED | | | |
| | ~ ~ | - , | WHITE - CUSTO | MER ' | ELLOW - Z&R | PINK - DRIVER |

SHAN PRINTING & SINGS LTD. • PH: 778-885-5164, 604-593-5070



| Classificati | on: | | | | | PCOC |
|---|-----------------------|------------------------------------|------------------------|------------------------------------|--|--|
| | RL+ | X FOR STOR | AGE OR SUSPECT (| QUALIT | Supersacks | Х |
| | | | | | and the second s | |
| Project Nu | mber: | S20010508 | Expiry date: | S | eptember 30, | 2017 |
| Section I | | G | ENERATOR | | | |
| Generator Name: | Chevron | | Site Location: | Foreshore | e N of 5201 Penzai | nce Dr |
| Generator Address: | 5201 Pen | zance Drive | Site Address: | Foreshore | e N of 5201 Penzai | nce Dr |
| | Burnaby, | ВС | | Burnaby, | ВС | |
| Generator Phone No: | 604-257- | 4012 (Chris Boys) | Site Phone No: | 778-232- | 8533 (Edward Pre | ece AECOM) |
| Description of Waste: | Contam | inated Soil | | | | |
| Edward Ph Generator's Represent | oc (L ative Name | _ <u> </u> | ignature | I | Tial. 1 25 | 10017 |
| Section II | | T | RANSPORTER | | | |
| TRANSPORTI LOAD Name: | ER D SIZE: R LA | Tandem Truck&Pony Truck & Transfer | Tailgate and D | 100 - Richmo Phone Richmo | ste Industries L 3031 Viking Way ond, BC V6V 1V (604) 276-9511 ond Landfill c: RL 1547993 | ,)1 |
| Driver Name/Title: Phone No.: Vehicle License No./Pr Acknowledgment of Re | eceipt of Ma | ck No: 2215 6555 aterials. | <u></u> | Vehic Date Mater 5201 | ita Corporation(le: HN6555P Sout Dul 25,17 12:56 ial: S20010508 Penzance Dr Bby H ~ Tervita ~ C | hdale/Pup 6 AK 7 (2945) General |
| Section III | | D | ESTINATION | NET X | 16,968 kg | 1110 |
| Tervita Richmond B 15111 Williams Roa | | | Phone No: | signa | | TARKAN MARIA MARIA MARIA MARIA MARIA MARIA MARIA MARIA MARIA MARIA MARIA MARIA MARIA MARIA MARIA MARIA MARIA M |
| I hereby certify that t foregoing is true and | he above n | amed material has be | en accepted and to the | e best of n | ny knowledge the | - |
| Name of Authorized | Marko I Agent | ia _ | | _ | Receipt Date | 1/ |

Z & R Trucking & Construction Contracting Co Ltd. *Transporation of Dangerous Goods *Sand & Gravel *Washed Aggregates *Top Soil

23302- 70 A Avenue - Langley - BC - V2Y 2H9

| *OFFICE: 60 | <i>)4-318-792</i> 9 | *FAX:604-888-7927 | *Email:zrtruck | ing@shaw.ca |
|----------------|---------------------|--|--|--------------------------|
| Job#20 | 0105 | 08) | Date: Ty | 75/17 |
| IN ACCOUNT | WITH: | /Cont | a O | |
| JOB LOCATIO | n:_Ro | doer Rd. | | |
| lo | pr of | VANCOUR | | |
| G.S.T. NO. R1 | 05795041 | TRUCK N | o. <u>ZR</u> | 13 |
| 4. AXLE TRANSF | ER TRIDEM & 1 | RIDEM PONY TRUCK & TRIE | DEM PONY TRUCK | & PONY TANDEM |
| TICKET NO. | PIT NO. | MATERIAL | NET WEIGHT | RECEIVED BY |
| 1547847 | RBF | Ret | 15,9684 | |
| 1547493 | RBF | RU | 169689 | |
| | | | / | |
| | | | | |
| | | | | |
| | | -7/ | | |
| | | Thes | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| START TIME: | | FINISH: | | |
| INVOICE | NET 3 | 00 DAYS 2% INTEREST PER MON CUSTOMER IS RESPONSIB | TH CHARGED ON OVE LE FOR OVER WEIGH | RDUE ACCOUNTS T FINES |
| 018 | 801 | SIGNED | | · |

WHITE - CUSTOMER

PINK - DRIVER



RICHMOND BIOREMEDIATION FACILITY <u>DAILY LOADS LOG SHEET</u>

| S20010508 | Chevron | WR#: | 889 |
|-----------|-----------------|------|-----|
| DATE: | 28-Jul-2017 | MP#: | |
| CONT: | RL+, Supersacks | | |

| LOAD# | TIME | TRUCK | CLASS | CELL# | WEIGHT | BAGS |
|---------|-------|--------|-------|-------|--------|------|
| 1 | 9:09 | JJ5451 | RL+ | 12 | 15.560 | 8 |
| 2 | 9:40 | KM9539 | RL+ | 12 | 16.860 | 8 |
| 3 | 12:55 | JJ5451 | RL+ | 12 | 15.416 | 8 |
| 4 | 13:03 | KM9539 | RL+ | 12 | 13.930 | 8 |
| <u></u> | | | | | 61.766 | 32 |

Jul 31,17 09:20:47

RL Ecowaste Industries Ltd.
Listing of Tickets
For Jul 28,17
All Tickets
Both Posted & Unposted
Customer ID=2945 Tervita Corporation(Environmental)

| Ticket # Date Tm In License | Vehicle Desc | Yds | GVW(kg) | Tare kg | Net Wgt |
|---|--|-----------------------------------|----------------------------------|----------------------------------|---|
| Customer: 2945 Tervita Corpora Material: D Demolition Refuse 1548854 Jul 28 08:00 HB8386 | tion(Environmental) Tervita - 40 yd3 | 40 | 21310 | 14420 | 6890 |
| Material: S20010508 5201 Penz 1548895 Jul 28 09:09 JJ5451 1548912 Jul 28 09:40 KM9539 1549042 Jul 28 12:55 JJ5451 1549050 Jul 28 13:03 KM9539 SubSubTotal: | ance Dr Bby (2945) H Hans/Pup Z & R/Pup H Hans/Pup Z & R/Pup | 28 28 28 28 28 112 | 32650 33290 32580 30360 | 17090 16430 17164 16430 | 15560 16860 15416 13930 61766 |

Page 1



| Classification | on: | | | | | PCUC |
|---|---------------------------------|------------------------------------|-------------------------|---|--|-----------------------|
| | RL+ | X FOR STOR | RAGE OR SUSPECT | QUALIT | Supersacks | X |
| | | | | | | |
| Project Nui | mher | S20010508 | Expiry date: | S | eptember 30, | 2017 |
| | iibei. | | | Ļ | | |
| Section I | | | SENERATOR | | | |
| Generator Name: | Chevron | | Site Location: | Foreshor | e N of 5201 Penzar | ice Dr |
| Generator Address: | 5201 Pen | zance Drive | Site Address: | Foreshor | e N of 5201 Penzar | ice Dr |
| | Burnaby, | ВС | | Burnaby | , BC | |
| Generator Phone No: | | 4012 (Chris Boys) | Site Phone No | : <u>778-232</u> | -8533 (Edward Pree | ece AECOM) |
| Description of Waste: | Contam | inated Soil | | | | |
| Generator's Representa | ere | | Signature (C) | | Shipment Date | 2017 |
| Section II | | | FRANSPORTER | | <u>.</u> | |
| Name: H. Hous | SIZE: | Tandem Truck&Pony Truck & Transfer | Tailgat and | Ecowas 100 - Richmo Phone Richmo | te Industries Lt 3031 Yiking Way nd, BC V6V 1W1 (604) 276-9511 G nd Landfill : RL 1548895 | |
| Driver Name/Title: Phone No.: Vehicle License No./Pro Acknowledgment of Re Driver Signature | Truc ov.: J.) ceipt of Ma | | | Acct#: Tervi Vehicl Date J Materi 5201 | | s/Pup SM (2945) |
| Section III | | | DESTINATION | Gros Tare | · · · · · · · · · · · · · · · · · · · | |
| Tervita Richmond Bi 15111 Williams Road | | tion Facility | Phone No: WR # | NET X Signat | 15,560 kg | |
| I hereby certify that the foregoing is true and a | | amed material has b | een accepted and to the | e best of r | my knowledge the |) _1 |
| Name of Authorized | Mayo Agent | la_ | | _ | Tuly 28 Receipt Date | 17 |

Z & R Trucking & Construction Contracting Co Ltd. *Transporation of Dangerous Goods *Sand & Gravel *Washed Aggregates *Top Soil 23302- 70 A Avenue - Langley - BC - V2Y 2H9 *OFFICE: 604-318-7929 *FAX:604-888-7927 *Email:zrtrucking@shaw.ca

Job#

| | | | ž. | Date: | xt/dolt |
|----------------|------------------|---|--------|--------------|---------------|
| IN ACCOUNT | | ennita Rogers Ave, Va | ncon | VC- | |
| | | 0 | | | |
| G.S.T. NO. R1 | 105795041 | TRUC | K NC | 11/H Ha | ns Trucking |
| 4. AXLE TRANSF | ER TRIDEM & 1 | RIDEM PONY TRUCK & | TRIDE | M PONY TRUCK | & PONY TANDEM |
| | | | | | |
| TICKET NO. | PIT NO. | MATERIAL | | NET WEIGHT | RECEIVED BY |
| 1548895 | RBF Tervita | RL+ | | 15,560 kg | |
| 1549042 | " | W | Ü | 15.416 Kc | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | Total Locals-Co | D. | | |
| | | P Mann Tolls- | 1 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | ٠. |
| | | | · | | |
| START TIME: | <u> Zama – 1</u> | FII | vish:_ | (7)4RS | |
| INVOICE | | 30 DAYS 2% INTEREST PER CUSTOMER IS RESP | | | |
| 00 | lor: | SIGNED_ | 10 | VO | |
| UUA | 1254 | WHITE - CUSTOMER | YE | LLOW - Z&R | PINK - DRIVER |

SHAN PRINTING & SINGS LTD. • PH: 778-885-5164, 604-593-5070



| Classification | on: | | | | | PCOC |
|--|--------------|---|--------------------------|--|--|--|
| | RL+ | X FOR STOR | AGE OR SUSPECT Q | UALIT | Supersacks | X |
| | | *************************************** | | | | |
| Project Nui | mber: | 20010508 | Expiry date: | S | eptember 30, | 2017 |
| Section I | | G | ENERATOR | | | |
| enerator Name: | Chevron | | Site Location: _F | oreshore | e N of 5201 Penzai | nce Dr |
| enerator Address: | 5201 Penzan | ce Drive | Site Address: <u>F</u> | oreshor | e N of 5201 Penzai | nce Dr |
| | Burnaby, BC | | E | Burnaby, | ВС | |
| enerator Phone No: | 604-257-401 | .2 (Chris Boys) | Site Phone No: _ | 778-232- | 8533 (Edward Pre | ece AECOM) |
| escription of Waste: | Contaminat | ed Soil | | | | |
| Edward Programmer Representation of the Communicati | etive Name | II. | ignature | | Shipment Date | 2017 |
| Section II | Ture Italiie | | RANSPORTER | | | |
| Iame: 2+ | SIZE: Ti | andem ruck&Pony ruck & Transfer | Tailgate and E | 100 - Richmo Phone Richmo Ticket | te Industries L 3031 Viking Way nd, BC V6V 1W (604) 276-9511 nd Landfill ; RL 1548912 | 1. |
| river Name/Title: hone No.: 7/05⁻373 ehicle License No./Pro | ov.: KM | 539 | | Vehicl | 2945 ta Corporation(e: KM9539P Z & ul 28,17 10:01 | R/Pup |
| acknowledgment of Re | 28 | 7 17 | | 5201 | al: s2001.0508 Penzance Dr Bby H - Tervita - G | |
| Driver Signature Section III | Shipmen | | ESTINATION | Gros Tars NET | | |
| ervita Richmond Bi | | | Phone No: | X | a programming the form the support of the support o | edian dialatanga kilong karawakan aran 4 km di Shiri kabultan 1 km di Hilian dia |
| 5111 Williams Road | d, Richmond, | B.C. | | Signat | ture | |
| | Cell | | WR # [| 8 | 54 | |
| hereby certify that th oregoing is true and a | | d material has be | en accepted and to the t | pest of m | y knowledge the | |
| Anthony Name of Authorized | Maya | <u> </u> | | Į | Tuly 28 Receipt Date | |



| Classificati | on: | | | | | PCOC |
|---|---------------------------------|------------------------------------|-----------------------|---|--|--|
| 0.000 | RL+ | X FOR STORA | AGE OR SUSPECT (| QUALIT | Supersacks | X |
| Project Nu | mber: | S20010508 | Expiry date: | Se | ptember 30, | 2017 |
| Section I | | GE | NERATOR | | | No. of Concession, Name of |
| Generator Name: Generator Address: | Chevron 5201 Pen Burnaby, | zance Drive BC | Site Address: | Foreshore Burnaby, E | | nce Dr |
| Generator Phone No: | 604-257- | 4012 (Chris Boys) | Site Phone No | : <u>778-232-8</u> | 533 (Edward Pre | ece AECOM) |
| Description of Waste: Generator's Represent | erces | inated Soil | gnature | | July 25 | 2017 |
| Section II | | ŢF | RANSPORTER | _ | ± → 100 | |
| . 9 . 9 | D SIZE: | Tandem Truck&Pony Truck & Transfer | Tailgate S | Ecowa 100 - Richr Phone Richr | aste Industries - 3031 Viking V nond, BC V6V e (604) 276-951 nond Landfill et: RL 1549042 | lay |
| Driver Name/Title: Phone No.: Vehicle License No./P | | ck No: 1/ | | Ter Vehi | #: 2945 vita Corporatio cle: JJ5451P H Jul 28,17 12 | Hans/Pup |
| Acknowledgment of R | Scale | aterials. 28 doi 7 ment Date | | 520 Area | rial: \$2001050 1 Penzance Dr : H - Tervita | Bby (2945) - General |
| Section III | Omp | | ESTINATION | Ta | oss 32,580 re 17,164 | kg File |
| Tervita Richmond E | | tion Facility | Phone No: (| | T 15,416 ature | Ny |
| I hereby certify that foregoing is true and | | amed material has be | en accepted and to th | e best of my | y knowledge the | 1- |
| AHAOA Name of Authorize | / Ma d Agent | ruca_ | | _ [| Receipt Date | |



Name of Authorized Agent

| Classification | on: | | | | PCOC |
|---|---------------|---|-----------------------|--|-------------------|
| AD E AN ED, EN E E AN ANGE OF 5 | RL+ | X FOR STORA | GE OR SUSPECT | QUALIT Supersacks | X |
| | | | | | |
| | Г | | | September 30 | 2017 |
| Project Nu | mber: | 520010508 | Expiry date: | September 30 | 3, 2017 |
| Section I | | GE | NERATOR | | |
| enerator Name: | Chevron | | Site Location: | Foreshore N of 5201 Pen: | zance Dr |
| enerator Address: | 5201 Penza | nce Drive | Site Address: | Foreshore N of 5201 Pen | zance Dr |
| | Burnaby, BO | 2 | | Burnaby, BC | |
| enerator Phone No: | 604-257-40 | 12 (Chris Boys) | Site Phone No | : <u>778-232-8533 (Edward F</u> | reece AECOM) |
| Description of Waste: | Contamina | ated Soil | | | |
| Edward Pr | 00101 | 3/- | | Tula 25 | 2017 |
| Generator's Represent | ative Name | Sig | nature * | | |
| Section II | | TR | ANSPORTER | and the state of t | |
| TRANSPORT | | Fandem | Tailgate and Du | Ecowaste Industrie | |
| LOAL | | Truck&Pony Language | | 100 - 3031 Viking Richmond, BC V6V | |
| e-managements. | | Huck & Hallstei [| | Phone (604) 276-95 | 511 GST R#: 87228 |
| Name: | HK_ | | | Richmond Landfill Ticket: RL 1549050 | RL. |
| Address: 50 | IRRE | / | | Acct#: 2945 | |
| (| 0.5 | 1671 | | Tervita Corporati | on(Environmen |
| Driver Name/Title: Phone No.: 710-597. | スク Truck | No: 110 | | Vehicle: KM9539P z Date Jul 28,17 13 | & R/Pup |
| Vehicle License No./Pr | 45°4 | | | | |
| Acknowledgment of R | | | | Material: S2001050 5201 Penzance Dr | |
| M | | | | Area: H - Tervita | |
| | 28 Shinma | ent Date | | Gross 30,360 | ka |
| Driver Signature | Shipine | inc Date | | Tare 16,430 | kg File |
| Section III | | DE | STINATION | NET 13,930 X | kg |
| Tervita Richmond B | Bioremediatio | on Facility | Phone No: | Signature | |
| 15111 Williams Roa | | | | · · · · · · · · · · · · · · · · · · · | |
| | Coll | 1 | WR # | 185 | |
| | Cell | | Ψ Ψ (π | | |
| I hereby certify that t | the above nan | ned material has be | en accepted and to th | ne best of my knowledge t | he |
| foregoing is true and | accurate | | al D | Λ | |
| C. Kr. | hache_ | | Adella | \$ 17x 107 | |
| Name of Authorized | d Agent | | | Receipt Date | |

Z & R Trucking & Construction Contracting Co Ltd. *Transporation of Dangerous Goods *Sand & Gravel *Washed Aggregates *Top Soil

23302- 70 A Avenue - Langley - BC - V2Y 2H9

*OFFICE: 604-318-7929 *FAX:604-888-7927 *Email:zrtrucking@shaw.ca

| Job# | | | Date: <u>28 - 1</u> | 7-17 | | | | |
|---|---------------|---|---------------------|---------------|--|--|--|--|
| IN ACCOUNT | _ | TERVIT | A IE VA | | | | | |
| JOB LOCATIO | N:_6_5 | Rosen A | 12 V/A | <u>N</u> | | | | |
| G.S.T. NO. R105795041 TRUCK NO. <u>KM9539</u> | | | | | | | | |
| 4. AXLE TRANSF | ER TRIDEM & 1 | RIDEM PONY TRUCK & TRI | DEM PONY TRUCK | & PONY TANDEM | | | | |
| TICKET NO. | PIT NO. | MATERIAL | NET WEIGHT | RECEIVED BY | | | | |
| 1548912 | | dut hec | 16,860 | | | | | |
| 154905 | | 14 11 | 13,930 | | | | | |
| | £ | Hod Jax | , , | | | | | |
| | | sist ount | | | | | | |
| | Z | o Territory | Polon | ļ | | | | |
| | | andyll | THK | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| START TIME: | | FINISH | | | | | | |
| INVOICE | NET | 30 DAYS 2% INTEREST PER MC CUSTOMER IS RESPONS | | | | | | |
| Constitution from the constitution of the cons | 5739 | SIGNED SHE | Lato | | | | | |

WHITE - CUSTOMER

YELLOW - Z&R

PINK - DRIVER

SHAN PRINTING & SINGS LTD. • PH: 778-885-5164, 604-593-5070



RICHMOND BIOREMEDIATION FACILITY <u>DAILY LOADS LOG SHEET</u>

| S20010508 | Chevron | WR#: | 889 |
|-----------|-----------------|------|-----|
| DATE: | 31-Jul-2017 | MP#: | |
| CONT: | RL+, Supersacks | | |

| LOAD# | TIME | TRUCK | CLASS | CELL# | WEIGHT | BAGS |
|-------|----------|-------|-------|-------|--------|------|
| 1 | 9:06 | LM330 | RL+ | 12 | 21.100 | 8 |
| 2 | 11:43 | LM330 | RL+ | 12 | 27.530 | . 8 |
| | <u> </u> | | | | 48.630 | 16 |

Aug 01,17 07:53:32

RL Ecowaste Industries Ltd.
Listing of Tickets
For Jul 31,17
All Tickets
Both Posted & Unposted
Customer ID=2945 Tervita Corporation(Environmental)

Page

1

| Ticket # Date | Tm In License | Vehicle Desc | Yds | GVW(kg) | Tare kg | Net Wgt |
|--|-----------------------------------|---|----------------|---------|---------|-------------------------|
| Customer: 2945 Material: S200 1549322 Jul 31 1549436 Jul 31 SubSubTotal: | 10508 5201 Penz . 09:06 LM3300 | tion(Environmental) ance Dr Bby (294 Z & R/Tri Pup Z & R/Tri Pup | 30 30 60 | 46400 | | 21100 27530 48630 |



| Classificati | on: | | | | | | PCOC |
|--|----------------------|--|------------------|-----------------------|--|--|---|
| | RL+ | X FOR ST | ORAGE OR SU | JSPECT Q | QUALIT | Supersacks | X |
| | | | | | | | |
| Project Nu | mber: | S20010508 | B Expiry | date: | Sept | tember 30, | 2017 |
| Section I | | | GENERATOR | | | | |
| Generator Name: | Chevron | | Site | Location: _ | Foreshore N | of 5201 Penzar | nce Dr |
| Generator Address: | 5201 Pen: | zance Drive | Site | Address: | Foreshore N | of 5201 Penzar | nce Dr |
| | Burnaby, | | | • | Burnaby, BC | | |
| Generator Phone No: | γ | 4012 (Chris Boys | s) Site | | | 33 (Edward Pre | ece AECOM) |
| Description of Waste: | Contami | nated Soil | | | | 40 | |
| Senerator's Representa | 0,00: | _ | Signature | R | _ J | oment Date | 2017 |
| Section II | | | TRANSPORTE | R | | | |
| TRANSPORTE LOAD | ER SIZE: NVIRO | Tandem Truck&Pony Truck & Transfe | | Tailgate S and Dui | 100 - 3 Richmor Phone (Richmon | te Industries 3031 Viking w nd, BC V6V (604) 276-951 nd Landfill RL 1549322 | <i>l</i> av |
| Address: 23302 LANCOM Driver Name/Title: Phone No.: | B.C. R | UG V 2 Y Z H 9 A 1' k No: 203 | | | Vehicle | 2945 ta Corporatio e: LM3300P3 Z il 31,17 09: | & R/Tri Pup |
| /ehicle License No./Pro Acknowledgment of Re | | | ——— ¬ | | 5201 P | Al: S20010508 Penzance Dr B I - Tervita - | by (2945) |
| Driver Signature | | nent Date | | | Gross Tare NET | 39,970 kg 18,870 kg 21,100 kg | g File |
| Section III | | | DESTINATION | N | X | 11,130 N | 9 |
| Tervita Richmond Bi 15111 Williams Roa | | | Phor | ne No: (6 | Signatu | re M | and an area of the second second second second second second second second second second second second second |
| | Cell | 12 | | WR# | 889 | | |
| I hereby certify that th foregoing is true and a | | med material ha | as been accepted | and to the | best of my k | nowledge the | 1-1 |
| Anthon Y Name of Authorized | May Agent | uca | | | Jc Re | eceipt Date | |



| Classificati | on: | | | | | | PCOC |
|---|---|---------------------------------------|------------|-------------------|--|--|---|
| | RL+ | X FOR STO | RAGE (| R SUSPECT | QUALIT | Supersacks | X |
| | | | | | ' | | |
| | | · · · · · · · · · · · · · · · · · · · | 1 | | | | 5047 |
| Project Nu | mber: | S20010508 | E) | cpiry date: | | September 30, | 2017 |
| Section I | | | GENER/ | TOR | | | |
| Generator Name: | Chevron | | | Site Location: | Foresho | re N of 5201 Penza | ince Dr |
| | | zance Drive | · · | | | re N of 5201 Penza | |
| Generator Address: | | | | Died / Idai - Di- | Burnaby | | |
| Course to Please No. | Burnaby, | 4012 (Chris Boys) | | Site Phone No | | 2-8533 (Edward Pr | eece AECOM) |
| Generator Phone No: | | | | Site i none no | | | . 0 |
| Description of Waste: | Contam | inated Soil | <i>l</i> , | 00 | | | |
| Edward to | eech | _ 4 | Signatu | | | Shipment Date | 31 701.7 |
| Generator's Represent | ative Name | | 3 | | | Simpling its Date | |
| Section II | | | TRANS | PORTER | Cocurad | (Pinned or Ch-:- | |
| Name: Address: 2336 LANGLEY Driver Name/Title: Phone No.: Vehicle License No./Pr Acknowledgment of R Driver Signature | SIZE: ENVI 2 ~ 70 C. Tru rov.: LM eccipt of M | | TD | and DI | Ecov 100 Rick Phor Rick Tick Acc Teven Dat Mat 52 Are | vaste Industries - 3031 Viking W nmond, BC V6V ne (604) 276-951 nmond Landfill ket: RL 1549436 t#: 2945 rvita Corporatic icle: LM3300P3 2 e Jul 31,17 11: erial: S20010508 01 Penzance Dr B a: H - Tervita - ross 46,400 k are 18,870 k | ay 1W1 1 GST R#: 87228 21 RL cn(Environmen 2 & R/Tri Pup 44 GS 3 by (2945) - General <g file<="" gg="" td=""></g> |
| Section III | | | DESTA | TA 12011 | · N X | ET 27,530 l | ∢g |
| Tervita Richmond B 15111 Williams Roa | | | | Phone No: (| | nature | |
| I hereby certify that to foregoing is true and | the above r | named material has | s been ac | cepted and to th | ne best of | my knowledge the | 17 |
| Name of Authorized | d Agent | | | | | Receipt Date | |



RICHMOND BIOREMEDIATION FACILITY DAILY LOADS LOG SHEET

| S20010508 | Chevron | WR#: | 889 |
|-----------|-----------------|------|-----|
| DATE: | 1-Aug-2017 | MP#: | |
| CONT: | RL+, Supersacks | | |

| LOAD# | TIME | TRUCK | CLASS | CELL# | WEIGHT |
|-------|-------|-------|-------|-------|--------|
| 1 | 8:50 | LM330 | RL+ | 12 | 15.770 |
| 2 | 11:52 | LM330 | RL+ | 12 | 15.510 |
| L | | d | | | 31.280 |

Aug 02,17 07:53:45

RL Ecowaste Industries Ltd.
Listing of Tickets
For Aug 01,17
All Tickets
Both Posted & Unposted
Customer ID=2945 Tervita Corporation(Environmental)

Page 1

| Ticket # Date | Tm In License | Vehicle Desc | Yds | GVW(kg) | Tare kg | Net Wgt |
|----------------|---------------------------------|---|--------------------------------|----------------|----------------|-------------------------|
| Material: S200 | 10508 5201 Penz 08:50 LM3300 | tion(Environmenta ance Dr Bby (2 Z & R/Tri Pup Z & R/Tri Pup | a1) 2945) 30 30 60 | 34640 34380 | 18870 18870 | 15770 15510 31280 |





Name of Authorized Agent

| Classificati | on: | | | | PCUC |
|--|-------------------------|--|-------------------------|---|--|
| | RL+ | X FOR STOR | AGE OR SUSPECT (| QUALIT Supersacks | X |
| | | | | | |
| Project Nu | mber: | S20010508 | Expiry date: | September 30 | , 2017 |
| Section I | | G | ENERATOR | | |
| Generator Name: | Chevron | | Site Location: | Foreshore N of 5201 Penz | ance Dr |
| Generator Address: | 5201 Per | zance Drive | Site Address: | Foreshore N of 5201 Penz | ance Dr |
| | Burnaby, | | | Burnaby, BC | |
| Generator Phone No: | | 4012 (Chris Boys) | Site Phone No: | : <u>778-232-8533 (Edward P</u> | reece AECOM) |
| Description of Waste: | Contam | inated Soil | | | 50 |
| ANALONA PR | 2000 | hated som | 1. 112 | 01-03- | 2017 |
| Generator's Represent | ative Name | _ Si | ignature | | |
| Section II | | T | RANSPORTER | | |
| Name: ZER Address: 23302 LANGL Driver Name/Title: Phone No.: Vehicle License No./Pr | ENVIA -70 A EY B. Trui | Tandem Truck&Pony Truck & Transfer O HALL UT AVE V27 2H 2 Ck No: 203 | Tailgat and [| Ecowaste Industries 100 - 3031 Viking Wa Richmond, BC V6V 1 Phone (604) 276-951: Richmond Landfill Ticket: RL 1549692 Acct#: 2945 Tervita Corporation Vehicle: LM3300P3 Z Date Aug 01,17 08: | ay LW1 L GST R#: 87228 RL n(Environmen & R/Tri Pup |
| Driver Signature | OI | 08 2017 ment Date | ESTINATION | Material: \$20010508 5201 Penzance Dr Bl Area: H - Tervita - Gross 34,640 k Tare 18,870 k NET 15,770 k | General g g File |
| OCCUPIT 222 | | | | X | 9 |
| Tervita Richmond B 15111 Williams Roa | | | Phone No: | Signature | And the second s |
| | Cell | | WR # | 889 | |
| I hereby certify that to Foregoing is true and a | | amed material has be | een accepted and to the | e best of my knowledge the | e 17 |
| Name of Authorized | Maria | (0) | | Receipt Date | |



| | | | | | PCOC |
|-------------------------|------------------|------------------------|--|--|------------------------|
| Classificati | | Ty FOR STORA | AGE OR SUSPECT | OUALIT Supersacks | X |
| | RL+ | X FOR STORA | AGE ON GOGLECT | ~ | |
| | | | | | |
| | | | | | 2047 |
| Project Nu | mber: | S20010508 | Expiry date: | September 30 | , 2017 |
| | | | | | |
| Section I | | GE | NERATOR | | |
| | Chauran | | Site Location: | Foreshore N of 5201 Penz | ance Dr |
| Generator Name: | Chevron | | | Foreshore N of 5201 Penz | |
| Generator Address: | 5201 Pen | zance Drive | Site Address. | | |
| | Burnaby, | ВС | | Burnaby, BC | |
| Generator Phone No: | 604-257- | 4012 (Chris Boys) | Site Phone No | o: <u>778-232-8533 (Edward P</u> | reece AECOM) |
| Generator Frione No. | | | | Ar 01 08- | . 40 |
| Description of Waste: | Contam | inated Soil | | | |
| Edward Pr | 00101 | 91- | Mh | _ 20003 1000 | 2017 |
| Generator's Represent | ative Name | Si | gnaturè | | |
| | | | RANSPORTER | S-00-44 | |
| Section II | | Tandem | Tailgate | S(| ± |
| TRANSPORT | EK D SIZE: | Truck&Pony | and Du | ECOMASTE INCA⊃® | je∵teu. o Way |
| / | D JIZE. | Truck & Transfer | - A | a michmond BC V | 6V 1W1 |
| | | Track of Tracks I | 77 | Phone (604) 276- | 9511 GST R#: 87228 210 |
| Name: ZERE | NVIRO | HAUL GOD | | Richmond Landfil Ticket: RL 15498 | 20 |
| Address: 23302 | | AUE | | | |
| LANCI | | C. V2Y2H9 | | Acct#: 2945 | etion(Environmen |
| Driver Name/Title: | G. | RAI | | Vehicle: LM3300F | 93 Z & R/TF1 Pup |
| Phone No.: | Tru | ck No: 203 | | Date Aug 01,17 | 11:53 SM |
| Vehicle License No./P | rov <u>.: LM</u> | 3300 | | Material: 52001 | 0508 |
| Acknowledgment of F | Receipt of M | aterials. | | 5201 Penzance i | or Bby (2945) |
| <i>s</i>) | | | | Area: H - Tervi | ta - General |
| 4 | | 082017 | | Gross 34,3 | 80 kg |
| Driver Signature | Snip | ment Date | | | 70 kg File ∧ |
| Section III | | D | ESTINATION | NET 15,5 | 10 kg |
| | | | | The second secon | |
| Tervita Richmond I | Bioremedia | ation Facility | Phone No: | (60 Signature | |
| 15111 Williams Ro | ad, Richme | ond, B.C. | | -00 | |
| | | | WR# | 889 | |
| | Cell | Kazana, | VVIX # | | |
| The makes contifue that | the above r | named material has b | een accepted and to t | he best of my knowledge t | he |
| foregoing is true and | accurate | idifica material nas s | | | |
| | | | - 25 | Aug 1 | 17 |
| And -al | AAMINEL | (a | Land Marie Control of the Control of | | |
| Name of Authorize | ed Agent | - W | | Receipt Date | |
| Number of Manual Land | - | | | | |

Z & R Trucking & Construction Contracting Co Ltd. *Transporation of Dangerous Goods *Sand & Gravel *Washed Aggregates *Top Soil

| *OFFICE: 6 | 23302- 70 04-318-792 | A Avenue - Langley 9 *FAX:604-888-7927 | BC - V2V 2L | 19 ing@shaw.ca |
|----------------|-------------------------|--|----------------------|-------------------|
| Job# 5 2 | 001050 | 8 | Date: _ <i>Aug</i> i | |
| IN ACCOUNT | WITH: | ERVITA CORPOR | ATION | |
| JOB LOCATIO | ON: <u>65 R</u> | ocers Ave | VANCOUVET | R. (PORTS) |
| G.S.T. NO. R1 | 105795041 | TRUCK NO | o. 203 | * |
| 4. AXLE TRANSF | ER TRIDEM & | TRIDEM PONY TRUCK & TRIDE | | & PONY TANDEM |
| TICKET NO. | PIT NO. | MATERIAL | NET WEIGHT | RECEIVED BY |
| Haul | in 13. | tas to RBF | RL | |
| 2 | 9 | | | |
| RL 1549 | 692 | RL | 15,70 KS | 3 |
| KL154 | 9820 | V | 15.510k | (Š. |
| | | | | 4- |
| | * | 6-HRS | · | |

| START TIME: | | FINISH: | |
|-------------|-------------------------|-------------------|---------------------|
| INVOICE | NET 30 DAYS 2% INTEREST | PER MONTH CHARGED | ON OVERDUE ACCOUNTS |

012861

CUSTOMER IS RESPONSIBLE FOR OVER WEIGHT FINES

WHITE - CUSTOMER

SIGNED_

ec.

YELLOW - Z&R

PINK - DRIVER

SHAN PRINTING & SINGS LTD. • PH: 778-885-5164, 604-593-5070



RICHMOND BIOREMEDIATION FACILITY <u>DAILY LOADS LOG SHEET</u>

| S20010508 | Chevron | WR#: | 889 |
|-----------|-----------------|------|-----|
| DATE: | 4-Aug-2017 | MP#: | |
| CONT: | RL+, Supersacks | | |

| LOAD# | TIME | TRUCK | CLASS | CELL# | WEIGHT |
|-------|-------|--------|-------|-------|--------|
| 1 | 9:23 | LM3300 | RL+ | | 24.580 |
| 2 | 13:14 | LM3300 | RL+ | | 22.820 |
| | | | | | 47.400 |

Aug 08,17 07:53:49 RL Ecowaste Industries Ltd.
Listing of Tickets
For Aug 04,17
All Tickets
Both Posted & Unposted

Page 1

Both Posted & Unposted
Customer ID=2945 Tervita Corporation(Environmental)

Ticket # Date Tm In License Vehicle Desc Yds GVW(kg) Tare kg Net Wgt

Customer: 2945 Tervita Corporation(Environmental)

Material: S20010508 5201 Penzance Dr Bby (2945) 1550825 Aug 04 09:23 LM3300 Z & R/Tri Pup 1550985 Aug 04 13:14 LM3300 Z & R/Tri Pup

30 43450 18870 24580 30 41690 18870 22820 60 47400



| Classificati | on: | | | , | | PCOC |
|-------------------------|--------------|----------------------|---------------------------|------------------------------|------------------------|------------------------|
| | RL+ | X FOR STOR | AGE OR SUSPECT QU | ALIT Supersa | acks | X |
| | | | | | | |
| Project Nu | mber: | S20010508 | Expiry date: | Septembe | r 30, 2 | 017 |
| Section I | | G | ENERATOR | | | |
| Generator Name: | Chevron | | Site Location: Fo | reshore N of 5201 | Penzanc | e Dr |
| Generator Address: | 5201 Pen | zance Drive | Site Address: Fo | reshore N of 5201 | Penzanc | e Dr |
| Contractor i laur con | | | | ırnaby, BC | | |
| | Burnaby, | | | | and Droot | A ECOM) |
| Generator Phone No: | 604-257- | 4012 (Chris Boys) | Site Phone No: 77 | 8-232-8533 (Edw | ard Preed | e AECOM) |
| Description of Waste: | Contam | inated Soil | | MY DU C | <u> </u> | 40 |
| The sal One | 10 00 / | 4 | 1 112- | 13322 · | open | 2017 |
| Generator's Represent | ative Name | S | ignature | Shipment D | ate | |
| | | | DANCOORTED | | | |
| Section II | | | RANSPORTER Tailgate Se | | | • |
| TRANSPORTE | SIZE: | Tandem Truck&Pony | A TAIDEM and Dum | Ecowaste Ind | lustries | Ltd. |
| LOAD | JIZE. | Truck & Transfer | A | 100 - 3031 V | | |
| <i>E</i> , | | Track & Transfer _ | | Richmond, BC Phone (604) | | iwi 1. GST R#: 8722 |
| Name: Z&A | | | | Richmond Lan | ndfill | RL |
| Address: 23302 - | 70 A A | 45 | | Ticket: RL 1 | .550825 | |
| LANGLEY | | 24249 | | Acct#: 2945 | | |
| Driver Name/Title: | a R | | | | | n(Environmen |
| Phone No.: | Truc | ck No: <u>203</u> | | Vehicle: LM3 Date Aug 04, | | |
| Vehicle License No./Pr | ov.: LM | 3300 | | bate Ang on, | 27 001 | |
| Acknowledgment of Re | eceipt of Ma | iterials. | | Material: S2 5201 Penzar | | bv (2945) |
| \mathcal{Q} | | | | Area: H - Te | | |
| <u> </u> | 2017 | 08 04 | | | | |
| Driver Signature | Shipr | nent Date | | | 13,450 ki 18,870 ki | |
| Section III | | D | ESTINATION | | 24,580 kg | |
| | | | | Х | (| 7 |
| Tervita Richmond Bi | ioremedia | tion Facility | Phone No: (60 | Signature | | |
| 15111 Williams Roa | d, Richmo | nd, B.C. | | | | |
| | | | | -429 | | 1 |
| | Cell | 4 | WR # L_ | 001 | | |
| | | amed material has be | en accepted and to the be | est of my knowledg | ge the | |
| foregoing is true and a | accurate | | | ^ | 4 8 | 1-7 |
| Anthony 1 | Maka | (A) | | Aug | 4 | |
| Name of Authorized | Agent | <u></u> | | Receipt D | ate | |



| Classificatio | NM: | | | | | PCOC |
|--|--|--|--|--------------|----------------------------------|--|
| ~ ia >> i i ca fif | RL+ | X FOR STORA | GE OR SUSPECT Q | QUALIT | Supersacks | X |
| | 110 | | | - | | |
| | | | 3 | | | |
| Project Nur | nber: | S20010508 | Expiry date: | Sep | tember 30, | 2017 |
| Section I | | GE | NERATOR | | | |
| Section 1 | | | | - I N | Lef COOL Bonza | nce Dr |
| Generator Name: | Chevron | | - Andreadis | | of 5201 Penza | |
| Generator Address: | 5201 Pen | zance Drive | Site Address: | Foreshore ! | N of 5201 Penza | nce Dr |
| | Burnaby, | вс | | Burnaby, B | C | and the same of th |
| Generator Phone No: | 604-257- | 4012 (Chris Boys) | Site Phone No: | 778-232-8 | 533 (Edward Pre | eece AECOM) |
| | | | | the m | u - 08 _ | 40_ |
| Description of Waste: | Contain | nated Soil | 1/1 | | man stan | 2017 |
| Edward YY Generator's Representa | P.CO/ | - 2/Sic | nature | - TQ Sh | ipment Date | |
| Generator's Representa | ative Name | | | | | |
| Section II | | | ANSPORTER Tailgate (| | 1 | |
| TRANSPORTE | R SIZE: | Tandem Truck&Pony To: | and Du | Ecowa | ste Industries | |
| LUAL | JIZL. | Truck & Transfer | | 100 - | 3031 Viking V ond, BC V6V | vay |
| | | | 7 46 | Phone | (604) 276-951 | |
| Name: Z & | REA | IVIRO HAUL | Lib | Richmo | ond Landfill : RL 1550985 | RL |
| Address: <u>333</u> 0 | 2-70 | A GUE | -9 | TICKET | L. KL 1550985 | |
| LANG | GLEY, | D.C. 15513 | 14 | Acct#: | | and Community |
| Driver Name/Title: | | <u>. KA'</u> | The state of the s | Vehicî | ita Corporatic le: LM3300P3 Z | Dn(EnV1ronmen 2 & R∕Tri Puo |
| Phone No.: | а. | tk No: $\frac{203}{43300}$ | programme VVVV | Date A | ug 04,17 13: | 15 GS |
| Vehicle License No./Pr | The second secon | Charles of the Party of the Par | and the second s | Materi | al: \$20010508 | |
| Acknowledgment of Re | eceipt of Ma | iteriais. | | 5201 | Penzance Dr B | by (2945) |
| The state of the s | 2017 | 108 04 | | Area: | H - Tervita - | General |
| Driver Signature | Shipr | nent Date | | Gros | , | ~ |
| Castles TTT | | ni | STINATION | Tare NET | 18,870 k 22,820 k | |
| Section III | | | | x | A | ·9 |
| Tervita Richmond B | ioremedia | tion Facility | Phone No: | Signat | ure H | |
| 15111 Williams Roa | ıd, Richmo | nd, B.C. | | | | - |
| | | $\overline{++}$ | MD # | 1 8 8 C | } | |
| | Cell | le le le le le le le le le le le le le l | WR # | | 7 | · · · · · · · · · · · · · · · · · · · |
| I hereby certify that t foregoing is true and | he above n accurate | amed material has be | en accepted and to th | e best of my | / knowledge the | 17 |
| Name of Authorized | <u>Μαγαζ</u> j Agent | | * Andrew * | | Receipt Date | |



RICHMOND BIOREMEDIATION FACILITY <u>DAILY LOADS LOG SHEET</u>

| S20010508 | Chevron | WR#: | 889 |
|-----------|-----------------|------|-----|
| DATE: | 9-Aug-2017 | MP#: | |
| CONT: | RL+, Supersacks | | |

| LOAD# | TIME | TRUCK | CLASS | CELL# | WEIGHT |
|-------|-------|--------|-------|--------|--------|
| 1 | 9:12 | LM3300 | RL+ | 12 | 26.650 |
| 2 | 12:55 | LM3300 | RL+ | RL+ 12 | |
| | | | | | 53.460 |

Aug 10,17 08:34:09 RL Ecowaste Industries Ltd.
Listing of Tickets
For Aug 09,17
All Tickets
Both Posted & Unposted

Page 1

Both Posted & Unposted Customer ID=2945 Tervita Corporation(Environmental)

Ticket # Date Tm In License Vehicle Desc Yds GVW(kg) Tare kg Net Wgt

Customer: 2945 Tervita Corporation(Environmental)

Material: S20010508 5201 Penzance Dr Bby (2945)
1551628 Aug 09 09:12 LM3300 Z & R/Tri Pup 30
1551781 Aug 09 12:55 LM3300 Z & R/Tri Pup 30
SubSubTotal: 60

30 45520 18870 26650 30 45680 18870 26810 60 53460



RICHMOND BIOREMEDIATION FACILITY SOIL MANIFEST

| Classificati | ion: | | | PCOC |
|--|--|--|--|--|
| | RL+ X FOR STORA | GE OR SUSPECT Q | UALIT Supersacks | X |
| | the second secon | | Annual Statement and High year and the statement of the s | angelogy, and the transpirities of societies and |
| | | | | |
| Project Nu | mber: \$20010508 | Expiry date: | September 30 | 2017 |
| | | L | | |
| Section I | GEI | NERATOR | | |
| Generator Name: | Chevron | Site Location: | Foreshore N of 5201 Penza | nce Dr |
| Generator Address: | 5201 Penzance Drive | Site Address: | Foreshore N of 5201 Penza | nce Dr |
| | Burnaby, BC | | Burnaby, BC | |
| Generator Phone No: | 604-257-4012 (Chris Boys) | Site Phone No: | 778-232-8533 (Edward Pre | ece AECOM) |
| Description of Waste: | Contaminated Soil | | A11.04 Q | 40 |
| Educad Pro | 18.001 | 11 | James para | 10017 |
| Generator's Represent | | nature | Shipment Date | 1 2017 |
| Section II | 775 | ANSPORTER | | |
| TRANSPORTE | | Tailgate S | | ad) |
| | O SIZE: Truck&Pony > \ | and Dun | | |
| | Truck & Transfer | | Ecowaste Industrie 100 - 3031 Viking | Nav |
| | Track & Transfer | - 4 | Richmond, BC Vav | 101 |
| Name: ZOR E | NVIRO HALL CTD | | Phone (604) 276-95: Richmond Landfill | l1 GST R#: 87228 216! |
| Company of the Compan | TO A AUE | addition and | Ticket: RL 1551628 | RL |
| LANGLE | | , | 110 110 100 100 100 100 100 100 100 100 | |
| Driver Name/Title: | G.RAI | | Acct#: 2945 | |
| Phone No.: | Truck No: 203 | | Tervita Corporation Vehicle: LM3300P3 2 | n(Environmen |
| Vehicle License No./Pro | COLUMN TO THE PROPERTY OF THE | AND THE PROPERTY OF THE PROPER | Date Aug 09,17 09: | a K/Iri Pup 13 SM |
| Acknowledgment of Re | | and a second | | |
| Δ | | | Material: S20010508 5201 Penzance Dr B | |
| the | 2017 08 09 | | Area: H - Tervita - | by (2945) General |
| Driver Signature | Shipment Date | | | |
| | | | Gross 45,520 kg |] |
| Section III | DES | TINATION | NET 26,650 kg | ; File |
| Tervita Richmond Bi | oremediation Facility | Phone No: (| X | $\Rightarrow c$ |
| 15111 Williams Road | - | 11101101101 | Signature | The state of the s |
| | | | 000 | |
| | Cell | WR # [| 881 | |
| I hereby certify that th | ne above named material has been | accepted and to the h | est of my knowledge the | |
| foregoing is true and a | occurate | | | |
| ((| | | Ara 9 | 1-7 |
| Anthony N | Marca | | 100 | |
| Name of Authorized | Agent | | Receipt Date | |



RICHMOND BIOREMEDIATION FACILITY SOIL MANIFEST

| Classification | on: | | | | PCOC |
|--|-------------------------------------|---|-----------------|--|--|
| e de la composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della comp | RL+ | X FOR STORA | AGE OR SUSPECT | QUALIT Supersacks | Х |
| Project Nur | nber: | S20010508 | Expiry date: | September 3 | 0, 2017 |
| Section I | | Gl | ENERATOR | | į. |
| Generator Name: Generator Address: | Chevron 5201 Pen Burnaby, | zance Drive BC | Site Address: | Foreshore N of 5201 Per Foreshore N of 5201 Per Burnaby, BC | izance Dr |
| Generator Phone No: | 604-257- | 4012 (Chris Boys) | Site Phone No | : 778-232-8533 (Edward | Preece AECOM) |
| Description of Waste: Edward Presenting Generator's Representi | P.101 | inated Soil | Ignature | 09-08 Shiphent Date | £ 2017 |
| Section II | | | RANSPORTER | | - |
| | FNVIII True ov.: 1M cecipt of Ma | RAL ck No: 203 3300 aterials. ment Date | Tailgate and Dy | 100 * 3031 *Viking Richmond, BC V6 Phone (604) 276-9 Richmond Landfill Ticket: RL 155178 Acct#: 2945 Tervita Corporat Vehicle: LM3300P3 Date Aug 09,17 1 Material: \$200105 5201 Penzance Dr Area: H - Tervita Gross 45,680 | Way V 1W1 511 GST R#: 87228 RL ion(Environmen Z & R/Tri Pup 2:55 SM 08 Bby (2945) - General kg kg File |
| | | | Phone No: | Problem (1998) and complete the | |
| Tervita Richmond B 15111 Williams Roa I hereby certify that t foregoing is true and | Cell | ond, B.C. | WR # | signature Signature | he |
| Anthony Name of Authorized | Maru | <u>(h</u> | 2 | Receipt Date | 1 17 |



RICHMOND BIOREMEDIATION FACILITY <u>DAILY LOADS LOG SHEET</u>

| S20010508 | Chevron | WR#: | 889 |
|-----------|-----------------|------|-----|
| DATE: | 22-Aug-2017 | MP#: | |
| CONT: | RL+, Supersacks | | |

| LOAD# | TIME | TRUCK | CLASS | CELL# | WEIGHT |
|-------|-------|--------|-------|-------|--------|
| 1 | 8:17 | LM3300 | RL+ | 12 | 26.110 |
| 2 | 11:13 | LM3300 | RL+ | 12 | 24.530 |
| 3 | 13:21 | LM3300 | RL+ | 12 | 10.020 |
| | | | | | 60.660 |

RL Ecowaste Industries Ltd. Listing of Tickets For Aug 22,17 All Tickets Both Posted & Unposted Customer ID=2945 Tervita Corporation(Environmental)

| Ticket # Date Tm In License Vehicle Desc | Yds (| GVW(kg) | Tare kg | Net Wgt |
|---|----------------------|-------------------------|-------------------------|----------------------------------|
| Customer: 2945 Tervita Corporation(Environmental) Material: S20010508 5201 Penzance Dr Bby (2945) 1555143 Aug 22 08:37 LM3300 Z & R/Tri Pup 1555247 Aug 22 11:13 LM3300 Z & R/Tri Pup 1555348 Aug 22 13:21 LM3300 Z & R/Tri Pup SubSubTotal: | 30 30 30 90 | 44980 43400 28890 | 18870 18870 18870 | 26110 24530 10020 60660 |



RICHMOND BIOREMEDIATION FACILITY SOIL MANIFEST

| Classificati | on: | | | | | FCCC | |
|---------------------------|----------------|-------------------|--|--|--|--|-----------------------------|
| | RL+ | x FOR STO | RAGE OR SUSPECT | QUALIT | Supersacks | Х | |
| | | | | | - | | |
| Project Nu | mber: | 520010508 | Expiry date: | | September 30 | 0, 2017 | |
| Section I | | | GENERATOR | | | | |
| Generator Name: | Chevron | | Site Location | : <u>Foresho</u> | re N of 5201 Pen | zance Dr | |
| Generator Address: | 5201 Penzai | nce Drive | Site Address | : <u>Foresho</u> | re N of 5201 Pen | zance Dr | |
| | Burnaby, BO | > | | Burnaby | /, BC | | |
| Generator Phone No: | | 12 (Chris Boys) | Site Phone N | lo: <u>778-23</u> 2 | 2-8533 (Edward F | Preece AECOM) | |
| Description of Waste: | Contamina | ted Soil | | · | AU9 22 | 40 | |
| - 10 | | À | 11 11 | | Baris 1 1 12 | 1 2013 | |
| Generator's Represent | ative Name | Ä | Signature | and the second s | Shipment Date | | |
| Section II | | | TRANSPORTER | | 1 | | |
| TRANSPORTI | | andem | Tailgate | ese ₁ | cowaste Indust: 00 - 3031 Vikir | | |
| LOAD | | ruck&Pony | and D | um R | ichmond, BC 🛝 | /6V 1W1 | |
| | 7 | ruck & Transfer | | IN R | hone (604) 276- ichmond Landfi ⁻ | 17 RL | 0/2 |
| Name: 24 | Q. | | | T | icket: RL 15551 | 143 | |
| Address: | | <u> </u> | special rest | A | cct#: 2945 | | |
| | \sim | ð . | • | | Tervita Corpora ehicle: LM3300F | | |
| Driver Name/Title: | nul | - 4010 | <u>, </u> | | ate Aug 22,17 | | Pup |
| Phone No.: | Truck I | Vo: <u># 20</u> | <u> 3</u> | | • | | |
| Vehicle License/Ño./Pr | | | | | aterial: S20010 5201 Penzance E | | 1457 |
| Acknowledgment of Re | eceipt of Mate | ials. | | | rea: H - Tervit | | |
| 1/1/2 | | non I mij | 1 | | Gross 44,98 | RO ka | |
| Driver Signature | Shipmer | # Date | J | | | 30 kg 70 kg File | |
| Differ Signature | Simplifier | it Date | , | | NET 26,11 | | |
| Section III | | | DESTINATION | X | | na and opposite department and the control of the c | Markilla Mary Joseph George |
| Tervita Richmond B | ioremediatio | n Facility | Phone No: | | ignature | | |
| 15111 Williams Roa | | , B.C. | | , , == . | | | |
| | | 11/11/ | <u> 1</u> 7 | | 906 88 | 9_ | |
| | Cell | 188 | → WR # | | 140) | | |
| I hereby certify that the | he above nam | ed material has l | been accepted and to t | he best of | my knowledae th | e | |
| foregoing is true and | | ca material nas i | | 2 2 2 2 2 2 3 1 | , | | |
| // Pan | | | | | 1 1- | 7017 | |
| / //AN | RIKS . | | | | 1/th5 1 -d- | | \neg |
| Name of Authorized | l Agent | | -'// | | Rećeipt Date | | |



RICHMOND BIOREMEDIATION FACILITY SOIL MANIFEST

| Classificati | on: | | | PCOC |
|---|--|--|---------------------------------------|--|
| · | RL+ X FOR ST | TORAGE OR SUSPECT | QUALIT Supersacks | X |
| | | | | |
| Project Nu | mber: \$20010508 | Expiry date: | September 30, | 2017 |
| Section I | | GENERATOR | | |
| | | | | |
| Generator Name: | Chevron | есть опестивности по по по по по по по по по по по по по | Foreshore N of 5201 Penza | |
| Generator Address: | 5201 Penzance Drive | Site Address: | Foreshore N of 5201 Penza | nce Dr |
| | Burnaby, BC | Pi-P-P-P-P-P-P-P-P-P-P-P-P-P-P-P-P-P-P- | Burnaby, BC | |
| Generator Phone No: | 604-257-4012 (Chris Boys | Site Phone No | : 778-232-8533 (Edward Pre | ece AECOM) |
| Description of Waste: | Contaminated Soil | | ALG 22 | 40 |
| Edward Pr | PELLI | 11 M | Barrio Alla | 2017 |
| Generator's Representa | | Signature | Shipment Date | and a second second second second second second second second second second second second second second second |
| Section II | | TRANSPORTER | | |
| TRANSPORTE | | | Secured (Pinned or Chain | ed) |
| LOAD | SIZE: Truck&Pony | and Du | Ecowaste Industr. | |
| | Truck & Transfe | er | 100 - 3031 Vikin Richmond, BC V | g Way Sv 151 |
| Name: | 240. | | Phone (604) 276- | 9511 GST R#: 87228 |
| Address: | | | Richmond Landfil Ticket: RL 15552 | |
| | | | | • |
| Driver Name/Title: | the had | <u>c/</u> | Acct#: 2945 Tervita Corpora | ion(Environmen |
| Phone No.: | Truck No: | <u> 1030</u> | Vehicle: LM3300P: | 3 Z & R/Tri Pup |
| Vehicle License No./Pro | | 200-Taxabi Carabin Annicologica (Carabin Carabin) | Date Aug 22,17 | L1:14 SM |
| Acknowledgment of Re | ceipt of Materials. | | Material: \$20010 | |
| | 08 27 M | | 5201 Penzance Di Area: H - Tervitz | Bby (2945) |
| Driver Signature | Shipment Date | herend. | | |
| Section III | | DESTINATION | Gross 43,400 Tare 18.870 |) kg) kg File |
| | ndigat in Maderia kunna androjik Produkti Paragelah produkti produkti produkti. Mjeto in 1800. | | NET 24,530 | |
| | premediation Facility | Phone No: (6 | 504 ^X | NIGHT STATE OF THE |
| 15111 Williams Road | I, Richmond, B.C. | | Signature | |
| | Cell / | | 589 | 7 |
| | Cell | | | |
| I hereby certify that the foregoing is true and a | e above named material has | s been accepted and to the | e best of my knowledge the | |
| | ccurate | 1. | | |
| (PARICI | P | Jala - | - A 72 | - 67 |
| Name of Authorized | Agent | | Receipt Date | // |



RICHMOND BIOREMEDIATION FACILITY SOIL MANIFEST

| Classificati | ion: | | P | COC |
|--|---|----------------------------|---|--|
| | RL+ X FOR STOR | AGE OR SUSPECT QUA | ALIT Supersacks | x |
| | ke nsonessassassassassassassassassassassassassa | _ | | and the control of th |
| | | | | |
| Project Nu | mber: \$20010508 | Expiry date: | September 30, 20 | 17 |
| IVO GERMANI DE UNIVERSE DE CONTRACTO DE CONTRACTO DE CONTRACTO DE CONTRACTO DE CONTRACTO DE CONTRACTO DE CONTRACTO DE CONTRACTO DE CONTRACTO DE CONTRACTO DE CONTRACTO DE CONTRACTO DE CONTRACTO DE CONTRACTO DE CONTRACTO | | | | |
| Section I | G | ENERATOR | | |
| Generator Name: | Chevron | Site Location: For | eshore N of 5201 Penzance | Dr |
| Generator Address: | 5201 Penzance Drive | Site Address: For | eshore N of 5201 Penzance | Dr |
| | Burnaby, BC | | rnaby, BC | |
| Generator Phone No: | 604-257-4012 (Chris Boys) | | 3-232-8533 (Edward Preece | AECOM) |
| Description of Maria | | Site Tions 1401 | DB 22 6 | , 7 |
| Description of Waste: | Contaminated Soil | , , , | 00 10 9 | £ |
| Generator's Representa | eriya Nama | | Beaton 25 | 2017 |
| Generator's Representa | auve name Si | gnature | Shipment Date | |
| Section II | | RANSPORTER | | |
| TRANSPORTE | | Tailgate S | Ecowaste Industries L | td. |
| LOAD | O SIZE: Truck&Pony Truck & Transfer | and Duri | 100 - 3031 Viking Way | |
| | Truck & Transfer | | Richmond, BC V6V 1W Phone (604) 276-9511 (| |
| Name: | 346 ' | - f | Richmond Landfill | RL 87220 2103 |
| Address: | | | Ticket: RL 1555348 | |
| to the state of th | | £ | Acct#: 2945 | |
| Driver Name/Title: | - No 10 11 | ; | Tervita Corporation() Vehicle: LM3300P3 Z & | |
| Phone No.: | Truck No: | destal destal | Date Aug 22,17 13:21 | |
| Vehicle License No./Pro Acknowledgment of Re | | yearone, and | Material: S20010508 | |
| Acknowledgment of Re | cerpt of Materials. | | 5201 Penzance Dr Bby | |
| Miller. | 08 22 17 | | Area: H - Tervita - G | eneral |
| Bri√er Signature | Shipment Date | | Gross 28,890 k g | |
| Section III | DE | STINATION | Tare 18,870 kg NET 10,020 kg | řile |
| | | | X | |
| | oremediation Facility | Phone No: (60 | Signature | |
| 15111 Williams Road | 1, Richmond, B.C. | | | |
| | Cell 2 | WR# | 889 | |
| | Fortunes and our metallic discourse party and an arrange of | Эф-антринуал | | • |
| I hereby certify that the foregoing is true and a | e above named material has bee ccurate | n accepted and to the besi | t of my knowledge the | |
| 06 | | M | 1 20 | 17 |
| C. CAVERE | 5 | | 1/25 12- | |
| Name of Authorized | Agent // | /// | Recéipt Date | A CONTRACTOR OF THE PROPERTY O |



RICHMOND BIOREMEDIATION FACILITY DAILY LOADS LOG SHEET

| Z20010508 | Chevron | | | WR#: | | | | |
|-----------|---------------|-------------------|-------|-------|---------------------|--|--|--|
| DATE: | 28-Jul-2017 | | | | | | | |
| CONT: | Demolition De | Demolition Debris | | | | | | |
| | | | | | | | | |
| | • | | | | | | | |
| LOAD# | TIME | TRUCK | CLASS | CELL# | WEIGHT | | | |
| LOAD# | TIME 8:00 | TRUCK HB8386 | CLASS | CELL# | WEIGHT 6.890 | | | |

oul 31,17 09:20:47

RL Ecowaste Industries Ltd. Listing of Tickets For Jul 28,17 All Tickets Both Posted & Unposted Customer ID=2945 Tervita Corporation(Environmental)

Page 1

| Ticket # Date | Tm In License | Vehicle Desc | | Yds | GVW(kg) | Tare kg | Net Wgt |
|--|------------------------------|---|--------|-----------------------------|----------------------------------|----------------------------------|---|
| Customer: 2945 Material: D D 1548854 Jul 28 | emolition Refuse | | | 40 | 21310 | 14420 | 6890 |
| Material: S200 1548895 Jul 28 1548912 Jul 28 1549042 Jul 28 1549050 Jul 28 SubSubTotal: | 09:40 КМ9539 12:55 JJ5451 | ance Dr Bby H Hans/Pup Z & R/Pup H Hans/Pup Z & R/Pup | (2945) | 28 28 28 28 112 | 32650 33290 32580 30360 | 17090 16430 17164 16430 | 15560 16860 15416 13930 61766 |



RICHMOND BIOREMEDIATION FAC: **REFUSE MANIFEST**

Ecowaste Industries Ltd. 100 - 3031 Viking Way Richmond, BC V6V 1W1 Phone (604) 276-9511 GST R#: 87228 2165

Richmond Landfill RL Ticket: RL 1548854

| Classification: | (check one) |
|---------------------|-------------|
| CONSTRUCTION REFUSE | |
| DEMOLITION DEBRIS | X |
| CONCRETE | |
| ACDHAIT | |

Acct#: 2945

REFUSE FO

Tervita Corporation(Environmen Vehicle: HB838640 Tervita - 40 yd Date Jul 28,17 08:00 SM

| | | | | | | oute 50,1 | . 08.00 SM |
|---|--------------------|------------|--|--|----------------|---------------------------|--|
| CONCRI | | | | | | Material: D - | Demolition Refuse |
| ASPHAL | T | | | | | Area: D - Dem | |
| TREATE | D LUMBER | | | | | Gross 21 | ,310 kg |
| OTHER(| describe) | | | | | Tare 14 | ,420 kg File |
| | | | | | | NET 6 | ,890 kg |
| | | | | | | 20010508 | |
| Project | Number: | | 20010 | 508 | | X | |
| Section I | | | | NAME OF TAXABLE PARTY. | RATOR | Signature | a very alless that the first or a second control of the control of |
| aagat aranna salaksa nii oo aanaa aranna qoo gaagabbaanii ay ka bibbi Aanii aasa Dabbii | | | | | . * | 2.1 9 112.421.2 | |
| Generator Name | Chevron Car | nada Ltd | | | Site Location: | Chevron Fore | eshore |
| Generator Addre | ss: 5201 Penzar | ice Dr | | | Site Address: | Foreshore N | of 5201 Penzance Dr |
| | Burnaby, BC | | | | | Burnaby, BC | |
| | | | | and the same of th | City Div. 1 | | |
| Generator Phone | No: 604-257-40 | 12 | · | | Site Phone No: | 604-444-654 | ./ |
| | | | | | | | |
| Generator's Repr | esentative Nam | e | | Signa | ture | Shi | pment Date |
| | | | | | IODODTED | | |
| Section II | | | | IKAI | NSPORTER | | |
| TRANSP | DRTER | | | | LOAD SIZE | | |
| Name: TEXV | 1 ~ | | | | | Truck&Pony Truck & Tra | |
| | | Li IAG | | | | | risier |
| Address 351 | | <u> </u> | | | | End Dump Roll Off | |
| KITHMO | | = VI.1(0 | <u> </u> | | | Koli Oli | |
| Driver Name/Titl | 3 Steven | - Heliye | 1 10 00 | | | | |
| Phone No <u>sC4-2</u> Vehicle License N | | Truck No: | | <u></u> | | | |
| | | | <i>DC</i> | | | | |
| Acknowledgme | it of Receipt of | materiais. | | | | | |
| | / - \ i | | 7 11 | | | | |
| D C | l Juy | | 2ed] | | | | |
| Driver Signatu | e Snipme | nt Date | | | | | |
| Section III | · | | D | ESTINATI | ON | | |
| | | | Comment of the Comment of Section Sect | | | | |
| | mal Painnamanii. | | ty | | Phone No: (| (604) 214-7000 | |
| Tervita Richmo | | | | | | | |
| 15111 Williams I | Road, Richmond | | 1 | | | | |
| | Road, Richmond | | To ! | Kno_ | | | |
| 15111 Williams I | Road, Richmond | | To l | <u>Rao</u> | | | |
| 15111 Williams I Receiver Comme | Road, Richmond | | To 1 | <u>Kno</u> | | Table | 28 17 |



RICHMOND BIOREMEDIATION FACILITY <u>DAILY LOADS LOG SHEET</u>

9.380

| Z20010508 | Chevron | | | WR#: | |
|-----------|----------------|--------|---------|-------|--------|
| DATE: | 14-Aug-2017 | | | MP#: | |
| CONT: | Demolition Ref | use | | | |
| | | | | | |
| LOAD# | TIME | TRUCK | CLASS | CELL# | WEIGHT |
| 1 | 15:25 | LJ2595 | Z - NCL | | 9.380 |

Page 1

Aug 15,17 08:12:50 RL Ecowaste Industries Ltd.
Listing of Tickets
For Aug 14,17
All Tickets
Both Posted & Unposted

Both Posted & Unposted
Customer ID=2945 Tervita Corporation(Environmental)

Ticket # Date Tm In License Vehicle Desc Yds GVW(kg) Tare kg Net Wgt

Customer: 2945 Tervita Corporation(Environmental)

Material: D Demolition Refuse
1553108 Aug 14 15:25 LJ2595 Alchemist (all bins) 40 22760 13380 9380



RICHMOND BIOREMEDIATION FACILITY REFUSE MANIFEST

REFUSE FOR DIRECT DISPOSAL

| Classification: | (check one) |
|---------------------|-------------|
| CONSTRUCTION REFUSE | |
| DEMOLITION DEBRIS | Х |
| CONCRETE | |
| ASPHALT | |
| TREATED LUMBER | |
| OTHER(describe) | |

| Project Nu | mber: | 20010508 | | | |
|---|-----------------|------------|---------------------------------|---|---|
| Section I | | G | ENERATOR | | |
| Generator Name: | Chevron Canada | Ltd | Site Loca | ition: | Chevron Foreshore |
| Generator Address: | 5201 Penzance I |)r | Site Add | ress: | Foreshore N of 5201 Penzance Dr |
| | Burnaby, BC | | | | Burnaby, BC |
| Generator Phone No | | | Site Pho | ne No: | 604-444-6547 |
| Generator's Represe | entative Name | 2n Si | gnature | | Shipment Date |
| Section II | · · | T | RANSPORTER | | |
| Name: Address Address Phone No.: Acknowledgment of Driver Signature | Prov.: | 19 17 | 100 Rii Phi Rii Tii | owaste 0 - 303 chmond, chmond chmond cket: F | Tandem Truck&Pony Truck & Transfer End Dump Roll Off Industries Ltd. 31 Viking way EC- V6V 1W1 04) 276-9511 GST R#: 87228 216 Landfill RL RL 1553108 345 Corporation(Environmen |
| Section III Tervita Richmond 15111 Williams Roa Receiver Comments | d, Richmond, B. | n Facility | Ve Da Ma Ar | hicle: te Aug | LJ2595 Alchemist (all b 14,17 15:52 SM : D - Demolition Refuse - Demo 22,760 kg 13,380 kg 9,380 kg |



BILL OF LADING

| SPECIALTS CARR | 24 - 24 - 24 - 24 - 24 - 24 - 24 - 24 - | HOUR CON | IACII | Anmre | K 604-882- | -1518 | | - NOT NEGOTIABL |
|---|--|--|--|--|-------------------------------|---------------------------|---------------|--|
| CUSTOMER BOL # | JOB# | 5940 | cust | OMER | | # Radro | | |
| POINT OF ORIGIN | | | DATE | 105 | 14 5 | 0/ /- | | ip required es .@^no |
| SHIPPER AND SOLETION | COMMY | THALKA | CONS | IGNEE 🕎 | AL VIII | Ç | | |
| STREET ADDRESS / 5 | Motraco | | STRE | ET ADDRESS | 1544 | しょう しょう | | くれった。多か |
| CITY | 19756 | M. E.C | CITY | | RITCH | j := { %; | 19 J | Fo C |
| Received at the point of origin on the da and destined as indicated below, which subject to the rates and classification in | ale specified, from the consignor mention the carrier agrees to carry and to deliver effect on the date of shipment. | ed herein, the property herein of the consignee at the said destr | described in appar mation, if on its or | ent good order exc vn authorized mule | eot as noted (contents and co | ndilions of cont | ents of packa | ge unknown) marked, consigned he route to seid destination, |
| It is mutually agreed, as to each carrier subject to all the conditions not prohibite | of all or any of the goods over all or any ed by law, whether printed or written, inc | portion of the route to destination biding conditions on back here: | on, and as to eact of, which are here | party of any time agreed by the con | ur de saere S | | | |
| сомморлу | LITRES | COMP # | | , , , , , , , , , , , , , , , , , , , | Ecowaste In | | | |
| | | 1. | עדואו | ils . | - 100 - 3031 Richmond, B | | | |
| Pro 1 Just | Q63-40 | 2. | | | Phone (604) Richmond La | | L GST R RL | t≠: 87228 2165 |
| | | 3, | | | . Ticket: RL | 1553108 | | |
| 10011 | 147065 | 4. | | | Acct=: 2945 Tervita Co | | a f Eastáir | таная |
| | | 5. | | | Vehicle: LJ | 2595 Alc | hemist | |
| | | 6. | DAT | E | Date Aug 14 | | | |
| | | 7. | | | Material: D Area: D - D | | TTION K | eruse. |
| | | 8. | | | | 22,760 k | | |
| GROSS LITRES | | DRIVER | CHAR | SEABLE TIME | Tare ; NET | 13,380 k 9,380 k | | |
| NET LITHES | | | PURCH ORDE | IASE I NO. | 20010508 | 1 | ~ | |
| UN: PROPE | R SHIPPING NAME: | | CLASS | , | Signature | X(| | |
| | of this consignment are fully and accuracy to the consignment are fully and accuracy to the constitution of the constitution o | | COMMENTS | T. A. | | #1 | START | cm |
| marks proper supports name, are particular marks properly affixed or displayed according to the Transportation of U | on them, and are in all respects in pr | oper condition for transport | Î, | . 54 K | 341463 | | FINISH | cm |
| SHIPPER: | | | Y., | | 321 1 32 1 2 2 | #2 | START | cm |
| LOADING TIME | al Mark | J. Brown of | - L. J. | FATEL C | - (2,30 | | FINISH | ······································ |
| UNLOADING TIME | A Breeze P | A 1 | 4 | · Justile | - 6.30 | #3 | START | CM |
| PAVEMENT TIME | RVOAK | ×1011 | * / 4 | 17/: 6 | - 6 /4 M | Ş" | FINISH | ст |
| GRAVEL TIME | | of Coping | | | | #4 | START | cm |
| STANDBY TIME | 7 | - | | | | | FINISH | cm |
| TOTAL HOURS | | | | - | | RESI | DUE LAST (| CONTAINED: |
| PRINT NAME IN FULL: | | . CONSIGN | IEE SIGNATUR | - | | | | |
| | Name of the second seco | # PLACARDS | אט | | CLASS | | FREIGH | T CHARGES |
| DECLARED VALUATION S | *************************************** | | 0 20 | UNLOADED BY | | Erniahi ahas | ☐ Collect | ☐ Prepaid ollect unless marked prepald. |
| Maximum tability of \$2.00 per pound unt | ess declared valuation states otherwise. Iamage or delay to any goods uni | <u> </u> | se notice there | | 233 - 4 6 | 115 GH GHA | S i | SHIPMENT |
| prioin, destination and date of | shipment of the goods and the es | timated amount claimed i | in respect of s | uch loss, dama | ge or delay is given in | A | | \$ |
| delivery, within nine (9) months | r or the delivering carrier within s s from the date of shipment. | | | | | Amount Collection Charge | | |
| b) The final statement of the cli c) All accounts due & payable v | aim must be filled within nine (9) within 10 days. | months from the date of | snipment toge | ther with a cop | y or the paid freight bill. | | - | \$ |
| REGULATED DANGEROUS GOO | DDS FOR ALL EMERG | ENCY ASSISTANCE | | | | ☐ Collect☐ Prepaid | TOTAL | |

Chevron Foreshore Project - 20010508Water Disposal Summary

| Date | WO No. | Volume (L) | Total Volume |
|--------|--------|------------|--------------|
| 25-Jul | 99839 | 7660 | 7660 |
| 25-Jul | 99840 | 7140 | 14800 |
| 25-Jul | 99841 | 6810 | 21610 |
| 26-Jul | 99837 | 7410 | 29020 |
| 26-Jul | 99838 | 7810 | 36830 |
| 28-Jul | 99831 | 12910 | 49740 |
| 28-Jul | 99832 | 11850 | 61590 |
| 28-Jul | 99835 | 2047 | 63637 |
| 29-Jul | 99833 | 11870 | 75507 |
| 29-Jul | 99836 | 7290 | 82797 |

Ticket#

89754

Date

7/29/2017

Work Order #

99839

CHEVRON REFINERY BURNABY

Location Company

CHEVRON CANADA LIMITED

Province

BC

| Profile | Container Type | Qty | NOS | Waste Notes | Final Destination | Manifest | Status | Waste # |
|------------------------|----------------|----------|---------------------------------|-------------|---|-------------|--------|---------|
| WATER NR TRACE BTEX | VACTRUCK | 7,660 kg | Ground Water with trace BTEX | | Metro Vancouver Sanitary Sewer Richmon | 101294 d | | 405903 |

. ord GFL Truck.

12:31:58 25/07/2017

12745119 7578777**7**1**7**

Ticket # 8

89753

Date

7/29/2017

Work Order #

99840

CHEVRON REFINERY BURNABY

Location Company

CHEVRON CANADA LIMITED

Province

ВС

| Profile | Container Type | Qty | NOS | Waste Notes | Final Destination | Manifest | Status | Waste# |
|------------------------|----------------|----------|---------------------------------|-------------|--|----------|--------|--------|
| WATER NR TRACE BTEX | VACTRUCK | 7,140 kg | Ground Water with trace BTEX | | Metro Vancouver Sanitary Sewer Richmond | 100995 | | 405904 |

15

200 AC

Ticket # 89752 Date 7/29/2017

Work Order # 99841

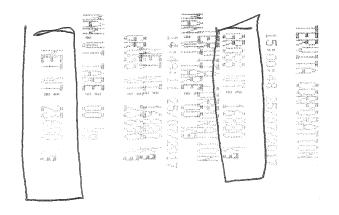
CHEVRON REFINERY BURNABY

Company CHEVRON CANADA LIMITED

Province BC

Location

| Profile | Container Type | Qty | NOS | Waste Notes | Final Destination | Manifest | Status | Waste# |
|------------------------|----------------|---------|----------------------|--------------|---|-------------|--------|--------|
| WATER NR TRACE BTEX | VACTRUCK | 6,810kg | Ground Water BTEX | r with trace | Metro Vancouver Sanitary Sewer Richmor | 101295 d | | 405905 |



Ticket #

89757

Date

7/29/2017

Work Order #

99837

CHEVRON REFINERY BURNABY

Location Company

CHEVRON CANADA LIMITED

Province

ВС

| Profile | Container Type | Qty | NOS | Waste Notes | Final Destination | Manifest | Status | Waste# |
|------------------------|----------------|---------|---------------------------------|-------------|---|-------------|--------|--------|
| WATER NR TRACE BTEX | VACTRUCK | 7,410kg | Ground Water with trace BTEX | | Metro Vancouver Sanitary Sewer Richmon | 101296 d | | 405901 |

14:43:06 26/07/2017

14:54:39 26/07/2017

The second secon

Ticket#

89756

Date

7/29/2017

Work Order #

99838

CHEVRON REFINERY BURNABY

Location Company

CHEVRON CANADA LIMITED

Province

BC

| Profile | Container Type | Qty | NOS | Waste Notes | Final Destination | Manifest | Status | Waste # |
|------------------------|----------------|---------|--------------------------------|-------------|---|----------|--------|---------|
| WATER NR TRACE BTEX | VACTRUCK | 7,810kg | Ground Water with trac BTEX | e | Metro Vancouver Sanitary Sewer Richmon | 100275 | | 405902 |

7/31/201 1:4

Page 1 of 1

Ticket #

89762

Date

7/29/2017

Work Order #

99831 Location

CHEVRON REFINERY BURNABY

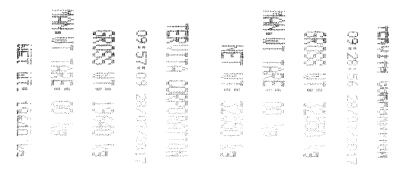
Company

CHEVRON CANADA LIMITED

Province

BC

| Profile | Container Type | Qty | NOS | Waste Notes | Final Destination | Manifest | Status | Waste # |
|------------------------|----------------|----------|---------------------------------|-------------|--|-------------|--------|---------|
| WATER NR TRACE BTEX | VACTRUCK | 12,910kg | Ground Water with trace BTEX | | Metro Vancouver Sanitary Sewer Richmond | 102608 i | | 405896 |



Ticket# 8

89761

Date

7/29/2017

Work Order #

99832

Location

CHEVRON REFINERY BURNABY

Company

CHEVRON CANADA LIMITED

Province

ВС

| Profile | Container Type | Qty | NOS | Waste Notes | Final Destination | Manifest | Status | Waste # |
|------------------------|----------------|-----------|---------------------------------|-------------|---|-------------|--------|---------|
| WATER NR TRACE BTEX | VACTRUCK | 11,850 Kg | Ground Water with trace BTEX | | Metro Vancouver Sanitary Sewer Richmon | 102609 d | | 405897 |

12:39:43 28/07/2017

14. 14. 00 kg

weight = 11 450 kg

12:59:59 28/00/0017

Ticket # 89759 Date 7/29/2017

Work Order # 99835

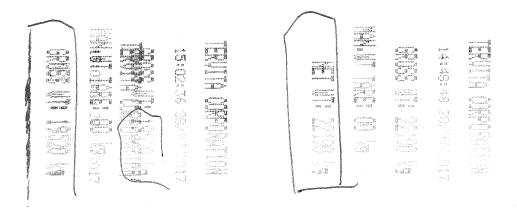
CHEVRON REFINERY BURNABY

Company CHEVRON CANADA LIMITED

Province BC

Location

Status Waste# Manifest **Container Type** NOS **Waste Notes** Final Destination Profile Qty Ground Water with trace Metro Vancouver 102611 405899 VACTRUCK WATER NR TRACE 2,047 kg Sanitary Sewer Richmond BTEX **BTEX**



Ticket# 99833

89760

Date

7/29/2017

Work Order #

Location

CHEVRON REFINERY BURNABY

Company

CHEVRON CANADA LIMITED

Province

ВС

| Profile | Container Type | Qty | NOS | Waste Notes | Final Destination | Manifest | Status | Waste# |
|------------------------|----------------|----------|---------------------------------|-------------|--|-------------|--------|--------|
| WATER NR TRACE BTEX | VACTRUCK | 11,870Kg | Ground Water with trace BTEX | | Metro Vancouver Sanitary Sewer Richmond | 102612 I | • | 405898 |

09:19:08 29/00/017

The second secon

09:07:46 29/07/2017

weight = 11870kg

Ticket #

89758

Date

7/29/2017

Work Order # Location

99836

CHEVRON REFINERY BURNABY

Company

CHEVRON CANADA LIMITED

Province

ВС

| Profile | Container Type | Qty | NOS | Waste Notes | Final Destination | y-v | Status | Waste # |
|------------------------|----------------|----------|---------------------------------|-------------|--|--------|--------|---------|
| WATER NR TRACE BTEX | VACTRUCK | 7,290 kg | Ground Water with trace BTEX | | Metro Vancouver Sanitary Sewer Richmond | 102613 | | 405900 |

11:00:25 29/07/2017

10:51:23 29/67/0017

Weight = 7290 kg

Chevron Foreshore Project - 20010508Water Disposal Summary

| Date | WO No. | Volume (L) | Total Volume |
|--------|--------|------------|--------------|
| 2-Aug | 100316 | 9999 | 92796 |
| 2-Aug | 100317 | 4500 | 97296 |
| 3-Aug | 100313 | 9900 | 107196 |
| 3-Aug | 100315 | 5560 | 112756 |
| 3-Aug | 100432 | 12100 | 124856 |
| 4-Aug | 100433 | 8140 | 132996 |
| 4-Aug | 100434 | 10480 | 143476 |
| 9-Aug | 100560 | 11620 | 155096 |
| 9-Aug | 100561 | 5290 | 160386 |
| 22-Aug | 101159 | 6030 | 166416 |



At:

Date:

GFL Environmental Inc.

7890 Vantage Way, Delta BC V4G 1A7 Bus: 604 946 0506 or 604 451 4578 BILL OF LADING LT# 1029

| | CREEL F | | Fax: 604 946 0 GST # 8418 | | BL# | | 10 | 12618 | 3 |
|--|-----------------------|---------------------------------------|------------------------------|------------------|-------------|-----------------------|-------------------|----------------|--|
| Date 17/08/ | 02 | PO# | GOT # 0410 | Profile # | UL W | | Job# | 2632 | ************************************** |
| Generator Name (From) TEVITO Street 85 Roge City / Province / Postal Code VON COUVEY Billing Address, if Different | Corp. 05 5+ B.C | | | | Street (35) | Volc | Coip 9n l | Vay | |
| Time Dispatched | | Arrival Time | | Departure Tim | e | | Time Un | iloaded | TABLES . |
| Special Instructions / Notes *** Chevier | ı Job | I | | ļ | | | | | |
| PIECES / VOLUME | UNIT | DESCRIPT | ION OF ARTICLES | S AND SPECIAL MA | RKS CL | DANGE F ASS | ROUS GO P.I.N. | PKG/GRP | WEIGHT (KGs) |
| 9,999 | R | Sall | - Wate | (| NA | 1 | <u> </u> | NA | 9,999 |
| actual. 1015 | 30 KG- | | | | | | | | |
| Work Performed | -109 | d 9+ | Tervite | a Corp | | | | | |
| Emergency Response Telepho | ne No. 1578 | | | Type of Placard | Quan | tity Eme | ergency Re | esponse Plan N |). |
| Per: John | 2-1 | 3 | | Driver: John Z | Truck | 62 | | 17/ | 0ate: |
| Shipper / Generator: | Carp |) , | | Carrier: | | GF | L Envi | ronmenta | l Inc. |
| Received by: | ()0 | ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ | | 2 | | | | | |



At:

Date:

GFL Environmental Inc.

7890 Vantage Way, Delta BC V4G 1A7 Bus: 604 946 0506 or 604 451 4578

Fax: 604 946 0575

BILL OF LADING LT# 1029

| | enviror | omental GST#841 | 88 4893 | Ē | BL# | 1 (|)2619 |) |
|---|--|------------------------|---|-----------|------------------------|---------------------------------|-----------|-----------------|
| Date 17/08 | Profile # | | | | 2632 | | | |
| Generator Name (From) | Corp | , | | Consigne | ee (To) Tel | vita | Cop. | |
| Street 85 Rose | <u> </u> | | | 0.1001 | 35 U vince / Postal | Valce | in Way | / |
| Billing Address, if Different | BC | | *************************************** | Email Add | <i>Sichm</i> | end 5 | C | |
| Time Dispatched | | Arrival Time | Departure Tim | e | wara. | Time U | nloaded | |
| Special Instructions / Notes **Chevion | Jab, | | | | | | | |
| PIECES / VOLUME | UNIT | DESCRIPTION OF ARTICLI | ES AND SPECIAL MA | RKS | DAN CLASS | P.I.N. | PKG/GRP | WEIGHT (KGs) |
| 2632 | 4271 | Salt Wat | er | | NA | MA | NA | 4271 |
| | | | | | | | | 4500KG |
| | | | | | | | | |
| Work Performed | | | | | | Control Control Control Control | | |
| Work Fellormed | off- | load at TE | With Corp |). | | | | |
| | | | , | | | | | |
| | | | | | | | | |
| Emergency Response Telepho | Type of Placard Quantity Emergency Response Plan No. | | | | | | | |
| Dimensions | | | | | Total Cubic Fo | eet | | |
| Per: | 2 | | Driver: | | Truck: | 63 | D | ate: 7/08/02 |
| Shipper / Generator: | th Co | <i>(p</i> . | Carrier: | | | GFL Env | ironmenta | Inc. |
| Received by: | (|) | | | | | | |



GFL Environmental Inc.

7890 Vantage Way, Delta BC V4G 1A7 Bus: 604 946 0506 or 604 451 4578

Fax: 604 946 0575

environmental

GST # 84188 4893

BILL OF LADING LT# 1029

102652

| Aug 3 2 | 017 | PO# | Profile # | 1000/600000 | Job# | 2637 | | |
|---|---------|--|---------------------------------|--|--------------------------------------|---------|--|--|
| Generator Name (From) | 200 PAT | N _{Ci} | | Consignee (To) | | | | |
| | | | | Street | VULC A | U WAY | | |
| Street 68 Roc City / Province / Postal Code VAN COMEN | BC | | | 1350 City/Province/Postal 2 CHyn 0 | Code | 20 | | |
| Billing Address, if Different | | | į | Email Address | | | | |
| Time Dispatched 30 | | Arrival Time | Departure Time | 1109 | Time Unl | oaded | | |
| Special Instructions / Notes | | | | | | | | |
| PIECES / VOLUME | UNIT | DESCRIPTION OF ARTICLE | ES AND SPECIAL MAR | KS CLASS | GEROUS GO P.I.N. | PKG/GRP | WEIGHT (KGs) | |
| 12010 | | EXCAUNTON/GRO | w) water | - MA | Mn | NO | 9900 K | |
| | | | | , | , | | | |
| | | | | | | | LA CONTRACTOR CONTRACT | |
| Work Performed | | | | | | | | |
| | | | | | | | | |
| | | | | | T- | | | |
| Emergency Response Telephon | ne No. | | Type of Placard | Ø | Quantity Emergency Response Plan No. | | | |
| Dimensions | | | · | Total Cubic Fe | eet | | | |
| Per: | | | Driver: | Truck: | 1 | AUG 3 | ate: 2017 | |
| Shipper / Generator: | | | Carrier: GFL Environmental Inc. | | | | | |
| Received by: | | | | | | | | |
| At: | Fervil | a Corp. | | | | | | |
| Date: | = 3/1 | The same of the sa | | | | | | |



At:

Date:

GFL Environmental Inc.

7890 Vantage Way, Delta BC V4G 1A7 Bus: 604 946 0506 or 604 451 4578

Fax: 604 946 0575

| | | | | 00.0 | | | 1 0 | 2651 | |
|-------------------------------|-----------|--------------|-----------------|-----------------|----------------|--------------------|---------------------|-----------------|----------------|
| | environ | mental | GST # 841 | 88 4893 | | BL# | <u> </u> | 2001 | **** |
| Aug 3-d | 017 | PO # | | Profile | e# OCOVATIO | W/WAS | Job# | 260 | 37 |
| Generator Name (From) | | 7 | | | Consign | nee (To) | | | |
| TEQUIT | AC | ORP | | | Sonsign | ERU, | FA | | |
| TEQVIV. Street 68 Re | 0 GR1 | 28 | | | Street 1 2 | 354 | Vaca | on W | Y / |
| City / Province / Postal Code | MA | 286 | | | City (P | rovince / Postal (| Codo |) | |
| Billing Address, if Different | , , , | | | | Email A | | | | |
| | | | | | | | | | - |
| Time Dispatched | 1 10 M | Arrival Time | 129 | Depar | ture Time | 120 | Time Un | loaded | 2 Down |
| Special Instructions / Notes | | | (/ | | | | | | 0 |
| PIECES / VOLUME | UNIT | DESCRIPT | TION OF ARTICLI | ES AND SPECI | IAL MARKS | DAN CLASS | GEROUS GO P.I.N. | PKG/GRP | WEIGHT (KGs) |
| 1 Voso | d | FRCA VI | + ion/E | 1 Moun | ONATHR | No | NR | Na | \$560 |
| | | | | | | | , | v | |
| | | | | | | | | | |
| | | | | | | | | | |
| Work Performed | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| Emergency Response Telephor | ne No. | | | Type of Placard | j | Quantity | Emergency Re | esponse Plan No | |
| Dimensions | | | | 1 | | Total Cubic Fe | et | | |
| Per: | | | , | Driver: 4 | | Truoles | | D | oto. |
| | | | | A.se | (RAD) | Trucky | | Š, | ate: 18/1/Z |
| Shipper / Generator: | | | | Carrier: | | | GFL Envi | ronmental | Inc. |
| Received by: | | | | | | | | | |



At:

Date:

GFL Environmental Inc.

7890 Vantage Way, Delta BC V4G 1A7 Bus: 604 946 0506 or 604 451 4578

Fax: 604 946 0575

| | FOR HEE Tillin cet# 0 | 4188 4893 | BL# | . 1 U | 112/0 | |
|--|---|-------------------------|----------------------------------|-------------|--|------------|
| ate 1116 8 / 17 | nmental GSI#8 | Profile # | <i>⊌</i> | Job # | 7.654 | 4 |
| enerator Name (From) | | C | onsignee (To) | ·770. | COA | 2P) |
| reet 7990 Vavrs. ty/Province/Postal Code | age wat | 1. | treet ity / Province / Postal | Code 4 | | Eng. |
| OelTA ling Address, if Different | | | mail Address | | | |
| ne Dispatched | Arrival Time | Departure Time | | Time U | nloaded | ···· |
| oecial Instructions / Notes | i | | | | | |
| PIECES / VOLUME UNIT | | ICLES AND SPECIAL MARKS | CLASS | P.I.N. | OODS PKG/GRP | WEIGHT (KG |
| 129012100 | Fam 68 | CONTRA | 1/0 | i/s | NA | 12901; |
| | FROM 68 | BUSELS. | | | | , 7 |
| | | | | | | 12100 |
| ork Performed | | | | | | |
| | | | | | | |
| nergency Response Telephone No. | -70 | Type of Placard | Quantity | Emergency R | tesponse Plan N | 5. |
| mensions | | | Total Cubic Fo | eet | and the second s | |
| or: | , | Driver: | Truck: | 1 | Sil | Pate: |
| nipper / Generator: | | Carrier: | | GFL Env | ironmenta | Inc. |
| eceived by: | | | | | | |



Date:

GFL Environmental Inc.

7890 Vantage Way, Delta BC V4G 1A7 Bus: 604 946 0506 or 604 451 4578

| | F G R E C N | FOR LIFE | Fax: 604 946 0575 | | | | 4.0 | 0647 | |
|--|---------------|--------------|-------------------|----------------|---|--------------|--------------|-----------------|---|
| | enviro | nmental | GST # 84188 489 | 93 | BL | # | I U | 12643 |) |
| Date | | PO# | | Profile # | | | Job# | | <u>, , , , , , , , , , , , , , , , , , , </u> |
| Aug 4 2017 | ŀ | | | | | | | 2644 | - Contraction |
| Generator Name (From) | | | | | Consignee | | | | |
| Terui | 4 a Cox | 0 | | | | 7 | (evilla | | |
| Street City / Province / Postal Code | | 9 | | | Street | | | Dey | |
| 88 7 | <u>Cosess</u> | | | | 135 | 511 V: | alcen i | Dey_ | |
| City / Province / Postal Code | 5 | _ | | | Oity / 1 lovii | 10071031411 | oodc | | |
| <u>Vらんこのい</u> Billing Address, if Different | ver 13 | sC. | | | Email Addre | | nd BC | | |
| Diming / Idahood, II Dimoronic | | | | | Linui / Idai | ,00 | | | |
| Time Dispatched | | Arrival Time | | Departure Time | | | Time Un | loaded | |
| 1:45 | | 2:4 | 15 | 3: | 30 | | | 5:00 | |
| Special Instructions / Notes | | | • | | | | | | |
| | | | | | | - AN | | | |
| PIECES / VOLUME | UNIT | DESCRIPTIO | N OF ARTICLES AND | SPECIAL MAR | KS | CLASS | GEROUS GO | PKG/GRP | WEIGHT (KGs) |
| | | | | | *************************************** | OLNO | 1 .1.14. | T KG/GHI | Allini |
| 8173 | (_i4=59 | Weter. | | | | | | | 8/40 Kg |
| | | | | | | | | | *************************************** |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | • | | | |
| Work Performed | | | | | | | | | Angel style from the Angel Style (1995) |
| Vac Water | From 1 | tolding Tar | ik on Dier | | | | | | |
| | | 5 | | | | | | | |
| | | | | | | | W-974 | | |
| | | | | | | | | | |
| Emergency Response Teleph | ione No. | | Type of I | Placard | Q | uantity | Emergency Re | esponse Plan No |). |
| | | | | | | , | | , | |
| Dimensions | | | 1 | | То | tal Cubic Fe | et | | |
| | | | | | | | | | |
| Per: | <u> </u> | · . 11 | Driver: | | Tr | uck: | | D | ate: |
| Per: Socy | MY | e, II | - Te | 570 | | 23 | | Aire | 4 2017 |
| Shipper / Generator: |) . | <u> </u> | Carrier: | × | | | | | |
| × // | | | | | | | GFL Envi | ronmenta | linc. |
| Received by: | | | | | | | | | |
| | | 1/2/_ | and the second | | | | | | |



GFL Environmental Inc.

7890 Vantage Way, Delta BC V4G 1A7 Bus: 604 946 0506 or 604 451 4578

Fax: 604 946 0575

| | environ | ORLEEN Imental GST#841 | 88 4893 | BL# | 1 (|)2622 | * |
|--|--|--|--|--------------------------|-------------|------------------|--------------|
| Date 17 | 104 | PO # | Profile # | | Job# | 2649 | |
| Generator Name (From) | Corp | | C | Consignee (To) | 7 Col | <i>(</i>), | |
| Street 35 Rogers City / Province / Postal Code | 54 | | ANT I ANN THE RESERVE OF THE PERSON OF THE P | treet 1351/ | Vulo | on Way | , |
| Billing Address, if Different | BC | | | City / Province / Postal | nd BC | | |
| Time Dispatched | | Arrival Time | Departure Time | man Address | Time U | nloaded | |
| Special Instructions / Notes | | <u> </u> | | | | | |
| PIECES / VOLUME | UNIT | DESCRIPTION OF ARTICL | ES AND SPECIAL MARKS | S CLASS | IGEROUS G | OODS PKG/GRP | WEIGHT (KGs) |
| 9871 | 1 | Salt Water | No. | NA | NR | NA | 9871 |
| | | | | | | | 104801 |
| | | | | | | | Actual" |
| Work Performed | PP- | load at Tern | ita Corp | | | | |
| | | | · · · · · · · · · · · · · · · · · · · | | | | |
| Emergency Response Telepho | ne No. | \rangle \rangl | Type of Placard | Quantity | Emergency R | tesponse Plan No |). |
| Dimensions | and the same of th | | | Total Cubic Fe | eet | | |
| Per: | 7 | | Driver: | Truck: | | 17/0 | ate: |
| Shipper / Generator: | Jo Co | orp. | Carrier: | | GFL Env | ironmenta | I Inc. |
| Received by: |) () e | | | | | | |
| At: QHWF | | | | | | | |



7890 Vantage Way, Delta BC V4G 1A7 Bus: 604 946 0506 or 604 451 4578

Fax: 604 946 0575

GFL Environmental Inc.

LT# 1029

| e i | n | v | i | r | o | n | m | e | n | t | а |
|-----|---|---|---|---|---|---|---|---|---|---|---|
|-----|---|---|---|---|---|---|---|---|---|---|---|

GST # 84188 4893

100873 BL# ____

| Date | 7 | PO# | | Profile # | | | Job# | ^{Job#} 2660 | | | |
|-------------------------------|------|---|-------------|---|--|-------------------|-------------|----------------------|---|--|--|
| Generator Name (From) Street | J700 | ie ws; | 1 | | Consign | ee (To) 9001 | TR C | COR. | pust | | |
| City / Province / Postal Code | 7 | | | | City / Pro | ovince / Postal (| Code //// | 6×1) | | | |
| Billing Address, if Different | | | | | Email Ad | dress | | | | | |
| Time Dispatched | , | Arrival Time | | Departure Time | e | | Time Ur | nloaded | | | |
| Special Instructions / Notes | | | | | | | | | | | |
| PIECES / VOLUME | UNIT | DESCRIPTION OF A | RTICLES AND | SPECIAL MAF | RKS | DAN CLASS | GEROUS GO | PKG/GRP | WEIGHT (KGs) | | |
| 12728/17ex | 3 | SAZT | CNOT | R | | NA | NA | N/s | 127281 | | |
| ` , | | FBOM 6 | 58 K | | 5 | / | | | 11620KB | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Work Performed | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | TANK TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO | | |
| Emergency Response Telephone | lo. | 578 | Type of | Placard | and the second s | Quantity | Emergency R | esponse Plan N | Quantitation of the second of | | |
| Dimensions | | uud kikkeen elikkii kiri oli oli oli oli oli oli oli oli oli ol | | and and the second second second second second second second second second second second second second second | | Total Cubic Fe | et | 000 Exceller*** | | | |
| Per: | | | Driver: | WI | | Truck: | *** **- | ACE | Date: 9/17 | | |
| Shipper / Generator: | | | Carrier | | | | GFL Envi | ironmenta | il Inc. | | |
| Received by: | , 4 | itankovic | | | | | | | | | |
| At: RHWE | | | | | | | | | | | |
| Date: | 017 | | | | | | | | | | |



GFL Environmental Inc.

7890 Vantage Way, Delta BC V4G 1A7 Bus: 604 946 0506 or 604 451 4578

Fax: 604 946 0575

BILL OF LADING LT# 1029

environmental

GST # 84188 4893

100874

| Date 9 | PO# | Profile # | | Job# | 2660 | |
|----------------------------------|--|--|--|-------------|-----------------|--------------|
| 1706/// | | | | la | | |
| Generator Name (From) | | | Consignee (To) | 1 11 | | |
| (3) pm (in) | | | TERVITA | | | |
| Street 7890 Vant | BE WAT | | Street 35 | Ve | raco | MAT |
| City / Province / Postal Code | | | City / Province / Postal C | | | |
| Billing Address, if Different | | | Email Address | | | |
| | | | | | | |
| Time Dispatched | Arrival Time | Departure Time | | Time U | nloaded | |
| Special Instructions / Notes | | | | | | |
| PIECES / VOLUME UNIT | DESCRIPTION OF ARTICLE | S AND SPECIAL MAR | KS | GEROUS G | | WEIGHT (KGs) |
| 3 | | | CLASS | P.I.N. | PKG/GRP | 40 |
| 5194 / Teles | SA SALT | WATER | NIC | MA | 1/0 | 5/91/ |
| | from & Rodge | WATEK US | | · | | 5290kg |
| | | | | | | J |
| | | | | | | |
| Work Performed | | | | | | |
| | | | | | | |
| | | | *** | | | |
| | | | | | | |
| Emergency Response Telephone No. | 78 | Type of Placard | Quantity | Emergency F | Response Plan N | 0. |
| Dimensions | 3 / 4 | A STATE OF THE PROPERTY OF THE | Total Cubic Fe | et | | |
| | gill aum eild der familie im Nederland (gelein der verteilt der vertei | | · 20120000000000000000000000000000000000 | | | |
| Per: | | Driver: | Truck | | Auz I | Date |
| Shipper / Generator: | | Carrier: | 07 | | VUG) | |
| Gripper / deficiation. | | Camer. | | GFL Env | ironmenta | I Inc. |
| Received by: | <i>C</i> 1 1 2 | | | | | |
| At: Vladimir | Stankovic | | | | | |
| Date: | | | | | | |
| Au 9 2017 | - | | | | | |



GFL Environmental Inc.

7890 Vantage Way, Delta BC V4G 1A7 Bus: 604 946 0506 or 604 451 4578

Fax: 604 946 0575

BILL OF LADING

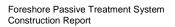
LT# 1029

| е | n | V | ì | r | 0 | n | m | е | n | t | a |
|---|---|---|---|---|---|---|---|---|---|---|---|

GST # 84188 4893

BL# 102776

| Date / 106 22/17 | PO # | Profile # | | | Job# | 7702 | |
|----------------------------------|------------------------|--|--|-----------------|--|-----------------|--|
| Generator Name (From) Street | CORP | - | Consignee (Tonsignee (| 5) J. J. | | | |
| Ke 5 65 K | DALL 57 | | 78 | 20 1/2 | ヘス | ndel l | NOT |
| City / Province / Postal Code | iel . | | City / Province | e / Postal Code | TA | | |
| Billing Address, if Different | | | Email Address | ı | | | |
| Time Dispatched | Arrival Time | Departure Time | and the second s | | Time Unio | oaded | |
| Special Instructions / Notes | | | | | | | |
| PIECES / VOLUME UNIT | DESCRIPTION OF ARTICLE | S AND SPECIAL MAF | RKS | DANGER CLASS | OUS GO P.I.N. | ODS PKG/GRP | WEIGHT (KGs) |
| 5994/1783 | Tunper o | Clark | 0 A | hn | lo · | r) | 6030kg |
| | 3/00/ TAN | 125° | | | | | |
| `. | SALT W. | MER | | | | | |
| | | | | | | | |
| Work Performed | | | | | | | |
| | : | | | | | | |
| | | | | | | | |
| Emergency Response Telephone No. | 73 | Type of Placard | Qua | ntity Eme | ergency Res | sponse Plan No. | and the same of th |
| Dimensions | | The features of the second sec | Tota | Cubic Feet | and the same of th | | |
| Per | | Driver: | Truc | k: 70 | , | NU6 | te: 37/7 |
| Shipper/Generator: | | Carrier: | | GF | L Envir | onmental | Inc. |
| Received by: | (lankin | | | | | 9 | |
| At: Texus to | Jones | | | | | | |
| Date: 9/22// | · | | | | | | |



Appendix J - Quality Assurance / Quality Control

1. QUALITY ASSURANCE AND QUALITY CONTROL PROTOCOLS

1.1. DATA QA/QC

In order to assure the integrity and defensibility of the data collected, rigorous QA/QC protocols were observed. These protocols ensured that all samples were properly collected, identified, stored, shipped, and documented. Standard operating procedures (SOPs) for sample collection and storage, equipment decontamination, and sample chain of custody protocols were followed. Sediment samples were collected using sampling techniques discussed above. The use of these methods ensured the quality, soundness, and defensibility of the data obtained. The laboratory analytical data, once generated, was also proofed for inconsistencies and anomalies. Field duplicates were collected for QA/QC purposes.

Laboratory QC reports for sediment were reviewed prior to accepting analytical data. All QC limits were met for internal laboratory QC samples with the exception of the qualifiers for individual parameters listed below:

- Approximate result may be biased low;
- Detection limit raised chromatographic interference due to co-elution;
- Detection limit raised analyte detected at comparable level in method blank;
- Detection limit adjusted for required dilution;
- Detection limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria;
- Low surrogate recovery observed due to adsorptive material in sample (e.g. charcoal). Associated results represent solvent extractable concentrations;
- Surrogate recovery could not be measured due to sample matrix interference;
- Surrogate diluted out, percent recovery not available;
- Surrogate recovery marginally exceeded ALS data quality objective (DQO). Reported non-detect results for associated samples were deemed to be unaffected;
- Lab control sample (LCS) recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified; and
- Duplicate results outside ALS DQO, due to sample heterogeneity.

In addition to the above, twelve laboratory reports were flagged with discrepancies pertaining to quality control samples which are summarized below:

- Laboratory report L1959111 listed six samples analyzed for selenium in which LCS recovery was above ALS DQO;
- Laboratory report L1957480 listed one sample analyzed for copper and molybdenum in which duplicate results were outside ALS DQO, due to sample heterogeneity;
- Laboratory report L1961329 listed one sample analyzed for copper in which the method blank exceeded ALS DQO. The same sample for chromium had duplicate results outside ALS DQO, due to sample heterogeneity;
- Laboratory report L1962063 listed six samples analyzed for silver in which DQO was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan;
- Laboratory report L1964330 listed three samples analyzed for lead in which duplicate results were outside ALS DQO, due to sample heterogeneity;
- Laboratory report L1965280 listed two samples analyzed for uranium in which duplicate results were outside ALS DQO, due to sample heterogeneity;
- Laboratory report L1966071 listed nine samples analyzed for lead in which duplicate results were outside ALS DQO, due to sample heterogeneity. This same report also listed six samples analyzed for VH(6-10) in which the LCS recovery was slightly outside ALS DQO.

- Laboratory report L1967694 listed two samples analyzed for VH(6-10) in which the LCS recovery was slightly outside ALS DQO.
- Laboratory report L1968560 listed one sample analyzed for copper in which duplicate results were outside ALS DQO, due to sample heterogeneity;
- Laboratory report L1969670 listed one sample analyzed for tin in which duplicate results were outside ALS DQO, due to sample heterogeneity;
- Laboratory report L1975749 listed one sample analyzed for tin in which duplicate results were outside ALS DQO, due to sample heterogeneity. The same sample analyzed for arsenic had method blank exceed the ALS DQO; and,
- Laboratory report L1965282 listed one sample analyzed for PAH constituents (acridine, anthracene, benzo(g,h,i)perylene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, and phenanthrene) in which LCS recovery was slightly outside ALS DQO.

For the laboratory reports noted above in which "the method blank exceeded the ALS DQO", generally all affected sample results were at least five times the blank levels; therefore, the results are all considered reliable. Otherwise, limits of reporting were adjusted for samples with positive hits below five times the blank level.

For the reports above in which the "LCS recovery was slightly outside the ALS DQO"; reported non-detect results for associated samples were unaffected (other results if reported, were qualified).

For the report above in which the DQO was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan. This is considered acceptable as per Ontario Ministry of Environment (OMOE) and Canadian Council of Ministers of the Environment (CCME); therefore the results are considered reliable.

For all other affected reports noted above in which the "duplicate results were outside the ALS DQO, due to sample heterogeneity". This was likely due to the "nugget effect", where a concentration was present in the parent sample, but not the duplicate, resulting in sample heterogeneity in the field being difficult to achieve.

The results of the laboratory analyses are considered to be of good quality and acceptable for the purposes of this investigation.

1.1.1. Field Duplicate Samples

Field duplicate samples are two identical samples that are submitted to the laboratory with no indication that they are the same. The analysis of field duplicate samples provides an indication of the total precision of the sampling and analysis process. Field duplicate samples were collected and analyzed at a rate of approximately 10% of samples for a given analytical suite.

1.2. QUALITY ASSURANCE/QUALITY CONTROL

1.2.1. Precision

Precision measures the reproducibility of repetitive measurements and is usually expressed in terms of imprecision. It is strictly defined as the degree of mutual agreement among multiple independent measurements as the result of repeated application of the same process under similar conditions.

Analytical precision is a measurement of the variability associated with the duplicate (i.e., two) or replicate (i.e., more than two) analyses of the same sample in the laboratory, and is determined by the analysis of matrix spike duplicate or laboratory duplicate samples.

Total precision is a measurement of the variability associated with the entire sampling and analysis process. It is determined by the analysis of duplicate or replicate field samples and incorporates any variability introduced by the analytical procedure, sample collection and handling procedures, and matrix factors. Precision data must be interpreted by taking into consideration these possible sources of variability.

Duplicate field samples were collected, and duplicate spiked or unspiked samples were analyzed to assess analytical precision. The results were assessed using the relative percent difference (RPD) between duplicate measurements. The equation used to calculate RPD for duplicate samples is:

$$RPD = \frac{(A-B)}{((A+B)/2)} \times 100$$

where:

A = analytical result

B = duplicate result.

Note that for RPDs the result can be a positive or a negative value. RPDs are often presented as absolute RPDs, in which case the absolute value of the RPD is reported, always resulting in a positive number. Reporting the absolute RPD results in a reduction in information, since, for instance, if a duplicate sample consistently returned higher results than the original sample, all RPD values would be negative and it may be an indication of a precision problem. In this case, if absolute RPD was reported, no indication would be forthcoming.

Total precision was determined by collecting field duplicate samples. These samples were collected and analyzed at a rate of approximately 10% of total samples for each analytical suite.

Analytical precision will be determined in the laboratory by running matrix spike/matrix spike duplicate (MS/MSD) pairs, or by running laboratory duplicate analyses. These samples will be analyzed at a rate of approximately 5% for each analytical suite.

1.3. ACCURACY

Accuracy is a statistical measurement of correctness and includes components of random error (e.g., variability due to imprecision) and systematic error (e.g., bias). Therefore, accuracy reflects the total error associated with a measurement. A measurement is accurate when the value reported does not differ beyond acceptable limits from the true value or known concentration of the spike or standard. Acceptance criteria are indicated in the individual standardized analytical methods.

Analytical accuracy is typically measured by determining the percent recovery of known target analytes that are spiked into a field sample (i.e., a surrogate or matrix spike), or reagent water (i.e., laboratory control sample [LCS] or blank spike) before extraction at known concentrations. Percent recovery is calculated as:

$$\% REC = \frac{A}{B} \times 100$$

where:

A = obtained value

B = true value.

Analytical accuracy was determined in the laboratory by the running of MS samples or laboratory control samples. These samples were analyzed at a minimum rate of 5% for each analytical suite.

1.4. COMPLETENESS

Completeness for this investigation was defined as the percentage of valid analytical results. Results made uncertain due to missed hold times, improper calibration, blank contamination, or poor calibration verification results would be deemed invalid. Results that may be flagged due to matrix effects are not considered invalid. Completeness for projects should exceed 90%. Completeness is calculated by:

$$completeness = \frac{A}{B} \times 100$$

where:

A = number of valid analytical results

B = total number of analytical results

1.5. QA/QC MIXING ASSESSMENT

Prior to backfilling the treatment cells with the premixed materials, a QA/QC sieve analysis (ASTM E-11 Standard – Sieve No.8) was implemented to verify that Tervita was appropriately mixing the materials consistent with the RAP and IFC drawings. The backfill materials in the up slope treatment cells were designed to consist of a mixture of 75% Lafarge washed sand and 25% Aquagate with Organoclay (AG+OC). The backfill materials in the down slope treatment cells were designed to consist of a mixture of 75% Lafarge washed sand and 25% Aquagate and Powdered Activated Carbon (AG+PAC).

As the sand and AG+OC and AG+PAC mixtures were being placed into the excavations (contained in one cubic meter supersacs), representative samples were collected from the top, middle, and bottom of the supersacs.

Prior to sieve analysis, materials were transferred to a bucket to determine the total weight. Once the sieve analysis was completed (fines and coarse materials separated), the percentage of fine materials were calculated. Table J-1 below identifies the acceptable criteria used during the sieve analysis for the two types of premixed sand.

Table J-1 - Acceptable Criteria for Premixed Sand

| Type of Premixed Sand | Acceptable Criteria for Sand Weight - (Fines %) |
|-------------------------|---|
| 75% Sand and 25% AG/OC | 64 - 71 % |
| 75% Sand and 25% AG/PAC | 59 - 68.7 % |

Overall, the average weight of fine materials (sand) was within the acceptable criteria for both types of premixed sand. The average fines weight (%) for the sand mixed with AG/OC was 68%, whereas the average fines weight (%) for the sand mixed with AG/PAC was 63.9%. If the batches were outside the acceptable criteria, Tervita was then requested to mix in more or less sand to ensure the batches were within the acceptable criteria prior to using onsite. Results of the sieve analysis are summarized in Table J-2 and Table J-3 below.

Table J-2 - Sieve Analysis for Sand and AG/OC

| 75% Sanc | 75% Sand and 25% AG/OC | | | | | | | | | | |
|-----------|------------------------|-----------------------|--|--|------------------------------|--|--|--|--|--|--|
| Date | Batch Description | Total Weight (lbs) | Sand - Fine Materials Weight (lbs) | AG/OC - Coarse Materials Weight (lbs) | Sand – Fine Materials (%) | | | | | | |
| 18-Jul-17 | Bottom bag | 14.6 | 9.8 | 4.8 | 67.1% | | | | | | |
| 18-Jul-17 | Bottom bag - Batch #8 | 17.9 | 12.6 | 5.3 | 70.4% | | | | | | |
| 19-Jul-17 | Middle bag | 17.6 | 12.6 | 5.0 | 71.6% | | | | | | |
| 20-Jul-17 | Top bag - Batch #76 | 18.6 | 13.2 | 5.4 | 71.0% | | | | | | |
| 21-Jul-17 | Middle bag - Batch #8 | 12.8 | 8.4 | 4.4 | 65.6% | | | | | | |
| 21-Jul-17 | Top bag - Batch #93 | 14 | 9.0 | 5.0 | 64.3% | | | | | | |
| 22-Jul-17 | Bottom bag - Batch #4 | 16.6 | 11.2 | 5.4 | 67.5% | | | | | | |
| 24-Jul-17 | Middle bag - Batch #5 | 23.4 | 16.2 | 7.2 | 69.2% | | | | | | |

| 75% Sand | and 25% AG/OC | | | | |
|-----------|-------------------------------------|-----------------------|--|--|------------------------------|
| Date | Batch Description | Total Weight (lbs) | Sand - Fine Materials Weight (Ibs) | AG/OC - Coarse Materials Weight (lbs) | Sand – Fine Materials (%) |
| 25-Jul-17 | Middle bag - Batch #65 | 11.2 | 8.8 | 2.4 | 78.6% |
| 25-Jul-17 | Middle bag | 14.8 | 9.6 | 5.2 | 64.9% |
| 26-Jul-17 | Top bag - Batch #39 | 25.4 | 18.2 | 7.2 | 71.7% |
| 26-Jul-17 | Top bag - Batch #82 | 21.4 | 14.0 | 7.4 | 65.4% |
| 28-Jul-17 | Bottom bag - Batch #55 | 15.2 | 12.2 | 3.0 | 80.3% |
| 28-Jul-17 | Bottom bag - Batch #54 | 25.8 | 17.4 | 8.4 | 67.4% |
| 29-Jul-17 | Top bag - Batch #56 | 22.4 | 16.0 | 6.4 | 71.4% |
| 2-Aug-17 | Middle bag - Batch #25 | 22.6 | 16.2 | 6.4 | 71.7% |
| 4-Aug-17 | Bottom bag - Batch #32 | 30.2 | 22.0 | 8.2 | 72.8% |
| 8-Aug-17 | Top bag - Batch #19 | 14.8 | 10.0 | 4.8 | 67.6% |
| 14-Aug-17 | Batch #5 | 17.6 | 10.6 | 7.0 | 60.2% |
| 14-Aug-17 | Batch #6 | 14.6 | 8.6 | 6.0 | 58.9% |
| 14-Aug-17 | Batch #7 | 15.2 | 9.6 | 5.6 | 63.2% |
| 14-Aug-17 | Batch #8 | 15.6 | 10.0 | 5.6 | 64.1% |
| 14-Aug-17 | Batch #9 | 15.6 | 10.4 | 5.2 | 66.7% |
| 14-Aug-17 | Batch #10 | 18.2 | 11.8 | 6.4 | 64.8% |
| 17-Aug-17 | Mid bag - Batch #6 | 1 | 1 | 1 | 1 |
| 21-Aug-17 | Middle bag - Batch #10 | 22.0 | 13.8 | 8.2 | 62% |
| | not completed, materials materials. | too wet to use sie | eve and lack of | Average Fines (%) | 68.0% |

Table J-3 – Sieve Analysis for Sand and AG/PAC

| 75% Sand and 25% AG/PAC | | | | | | |
|-------------------------|------------------------|-----------------------|--|---|------------------------------|--|
| Date | Batch Description | Total Weight (lbs) | Sand - Fine Materials Weight (lbs) | AG/PAC - Coarse Materials Weight (lbs) | Sand - Fine Materials (%) | |
| 18-Jul-17 | Bottom bag | 12.8 | 8.4 | 4.4 | 65.6% | |
| 19-Jul-17 | Middle bag | 19.8 | 13.4 | 6.4 | 67.7% | |
| 20-Jul-17 | Top bag - Batch #6 | 20.6 | 13.2 | 7.4 | 64.1% | |
| 21-Jul-17 | Middle bag - Batch #5 | 14.8 | 9.4 | 5.4 | 63.5% | |
| 21-Jul-17 | Top bag - Batch #7 | 12.2 | 7.8 | 4.4 | 63.9% | |
| 22-Jul-17 | Bottom bag - Batch #47 | 12.2 | 7.6 | 4.6 | 62.3% | |
| 24-Jul-17 | Middle bag - Batch #17 | 15.0 | 10.0 | 5.0 | 66.7% | |
| 25-Jul-17 | Middle bag - Batch #93 | 12.0 | 7.4 | 4.6 | 61.7% | |
| 26-Jul-17 | Top bag - Batch #35 | 18.0 | 12.0 | 6.0 | 66.7% | |
| 28-Jul-17 | Bottom bag - Batch #65 | 19.8 | 13.2 | 6.6 | 66.7% | |
| 28-Jul-17 | Bottom bag - Batch #11 | 17.2 | 10.8 | 6.4 | 62.8% | |
| 29-Jul-17 | Top Bag - Batch #666 | 27.0 | 18.0 | 9.0 | 66.7% | |

| 75% Sand and 25% AG/PAC | | | | | |
|---------------------------|------------------------------|-----------------------|--|---|------------------------------|
| Date | Batch Description | Total Weight (lbs) | Sand - Fine Materials Weight (lbs) | AG/PAC - Coarse Materials Weight (lbs) | Sand - Fine Materials (%) |
| 2-Aug-17 | Middle bag - Batch #39 | 26.6 | 18.0 | 8.6 | 67.7% |
| 4-Aug-17 | Bottom bag - Batch #36 | 20.6 | 14.4 | 6.2 | 69.9% |
| 8-Aug-17 | Top bag - Batch #14 | 23.6 | 15.2 | 8.4 | 64.4% |
| 14-Aug-17 | Batch #1 | 15.0 | 8.6 | 6.4 | 57.3% |
| 14-Aug-17 | Batch #2 | 17.4 | 9.8 | 7.6 | 56.3% |
| 14-Aug-17 | Batch #3 | 14.2 | 8.6 | 5.6 | 60.6% |
| 14-Aug-17 | Batch #4 | 22.4 | 13.6 | 8.8 | 60.7% |
| 17-Aug-17 | Middle bag - Batch #8 | 1 | 1 | 1 | 1 |
| 21-Aug-17 | Middle bag - Batch #4 | 23.2 | 14.4 | 8.8 | 62.1% |
| 1 - QA/QC r materials. | not completed, materials too | wet to use sieve ar | nd lack of time to dry | Average Fines (%) | 63.9% |

Appendix K - FPTS Post Construction Monitoring and Maintenance Plan



AECOM Fourth Floor 3292 Production Way Burnaby, BC V5A 4R4 www.aecom.com 604 444 6400 tel 604 294 8597 fax

December 21, 2017 Project No.: 60542455

Parkland Refining (B.C.) Ltd. 355 North Willingdon Avenue Burnaby, BC V5C 1X4

Attention: Mr. Christopher Boys, P.Geo.

Senior Environmental Specialist

RE: FORESHORE PASSIVE TREATMENT SYSTEM

MONITORING AND MAINTENANCE PLAN

DOWN SLOPE FROM THE EASTERN IMPOUNDING BASIN, AREA 2,

PARKLAND BURNABY REFINERY, BURNABY, B.C.

Dear Mr. Boys:

AECOM has prepared this Foreshore Passive Treatment System (FPTS) Monitoring and Maintenance Plan (MMP) to maintain and assess the performance of the recently installed FPTS along the Foreshore (hereafter referred to as "the Site") area of Burrard Inlet, down slope from the Eastern Impounding Basin (EIB), Area 2 of the Parkland (formerly Chevron) Burnaby Refinery (Figure 1).

The MMP is based on the Ministry of Environment and Climate Change Strategy's (ENV) supported Remedial Action Plan (RAP) prepared in 2016 (AECOM 2016b). This MMP is considered as equivalent to a Performance Verification Plan as defined in ENV's Administration Guidance 14 even though Parkland is currently not seeking a legal instrument or site profile release for the Site.

Contents

| SUMMARY OF THE FORESHORE PASSIVE TREATMENT SYSTEM | 3 |
|---|----|
| OBJECTIVES OF THE MONITORING AND MAINTENANCE PLAN | 3 |
| SCOPE OF WORK | 3 |
| MONITORING COMPONENTS OF THE MMP | 4 |
| PROGRAM REVIEW | 7 |
| REMEDY INTEGRITY INSPECTION AND MAINTENANCE | 8 |
| REPORT | 8 |
| FIGURE | 12 |
| APPENDIX A – BACKGROUND | 14 |
| APPENDIX B - REGULATORY CONTEXT | 16 |
| APPENDIX C - FORESHORE MONITORING WELLS CONSTRUCTION DETAILS | 18 |
| APPENDIX D - SAMPLE COLLECTION METHODOLOGIES | 20 |
| APPENDIX E - PORT OF VANCOUVER PERMIT NO.16-180 | 23 |
| APPENDIX E - OLIALITY ASSLIBANCE AND OLIALITY CONTROL PROTOCOLS | 25 |

SUMMARY OF THE FORESHORE PASSIVE TREATMENT SYSTEM

The FPTS was designed and constructed to be a final remedial action to address free-phase and dissolved phase hydrocarbons and sheens at the Site. The FPTS was installed between July and October 2017 and consisted of the removal of the existing Eastern and Western Interim Remedial Action (IRA) Barriers and the installation of a multicomponent FPTS comprised of permeable subsurface treatment cells for the mitigation of free-phase (aka non-aqueous phase liquids [NAPL]) and dissolved phase hydrocarbons impacted porewater. The FPTS also contains an oleophilic biobarrier (OBB) surface layer for the prevention of sheens. To assess the performance of the FPTS, four distinct types of monitoring wells, Upslope Wells, Performance Wells, Sentry Wells and Compliance Wells were installed and will be monitored under this MMP.

Further information on the FPTS may be found in Appendix A and in the FPTS Construction Report (AECOM 2017).

OBJECTIVES OF THE MONITORING AND MAINTENANCE PLAN

The objectives of the MMP are as follows:

- Collect samples from, and present the data for, the Compliance Wells;
- Assess the presence/absence of NAPL and the concentrations of dissolved phase contaminants of concern (COCs) in the water at the Site;
- Assess the performance of the remedial treatment cells and OBB surface layer installed in 2017; and
- Maintain the integrity of the FPTS by checking and, where needed, replacing the protective rip-rap, cobbles and monitoring wells, and by managing vegetation as required.

SCOPE OF WORK

The scope of work for the MMP is as follows:

- Ensure all required authorizations are obtained and followed;
- Inspect and gauge the 33 monitoring wells on the Foreshore and coordinate repairs or replacements for damaged wells;
- Monitor and sample the 33 monitoring wells as per the schedule provided below;
- Screen water samples for color, clarity, temperature, pH, dissolved oxygen (DO), salinity, electrical conductivity, oxidation reduction potential (ORP), turbidity, and total dissolved solids (TDS);
- Collect water samples from monitoring wells, and surface water samples within the
 vicinity of the FPTS. Samples will be analyzed for the following COCs: benzene, toluene,
 ethylbenzene, xylenes (BTEX), volatile petroleum hydrocarbons in water (VPHw), light
 extractable petroleum hydrocarbons in water (LEPHw), benzo(a)pyrene, naphthalene,
 dissolved copper and dissolved zinc. In addition, surface water samples will also be
 analyzed for total copper and zinc;
- Complete trend analysis of the COC concentrations and compare analytical results to their respective Risk-Based Management Target (RBMT, see Appendix B);

- Monitor for the presence of sheens on the surface water in Burrard Inlet at the Site during surface water sampling;
- Maintain the integrity of the treatment cells and the OBB surface layer, which will include inspection and maintenance of the rip-rap, cobbles, vegetation and monitoring wells; and
- Provide analysis and science-based recommendations that address the well monitoring and sampling frequency after three years of monitoring.

MONITORING COMPONENTS OF THE MMP

Monitoring Wells

Thirty-three (33) monitoring wells (PW17-1 through PW17-33) were installed at the Site during construction of the FPTS (refer to Figure 1 and Tables 1 and C-1). Previous monitoring wells in the Eastern and Western IRA Barriers were destroyed during the FPTS construction activities. As indicated in the introduction, the new monitoring wells are divided into the following four types:

- 1. <u>Upslope Wells:</u> monitoring wells installed upslope of the treatment cells. These wells will be used to monitor porewater concentrations entering the Site.
- 2. <u>Performance Wells:</u> monitoring wells installed within the treatment cells. These wells will be used to evaluate the ability of the treatment cells to reduce petroleum hydrocarbon concentrations through adsorption and degradation.
- Sentry Wells: monitoring wells located down slope of the treatment cells, but still
 within the FPTS. These wells will be used to evaluate the performance of the
 treatment cells, but also provide an early warning if elevated concentrations of
 dissolved COCs have migrated past the treatment cells.
- 4. <u>Compliance Wells:</u> monitoring wells installed twelve meters north of the toe of the slope and beyond the limit of the FPTS.

TABLE 1
FORESHORE MONITORING WELLS

| Well Type | Well Name | | | |
|-----------------------|---|--|--|--|
| Upslope Wells (8) | PW17-1, PW17-4, PW17-9, PW17-13, PW17-16, PW17-21, | | | |
| | PW17-26, and PW17-31 | | | |
| Performance Wells (8) | PW17-5, PW17-6, PW17-17, PW17-18, PW17-22, PW17-23, | | | |
| | PW17-27 and PW17-28 | | | |
| Sentry Wells (8) | PW17-2, PW17-7, PW17-10, PW17-14, PW17-19, PW17-24, | | | |
| | PW17-29, and PW17-32 | | | |
| Compliance Wells (9) | PW17-3, PW17-8, PW17-11, PW17-12, PW17-15, PW17-20, | | | |
| | PW17-25, PW17-30, and PW17-33 | | | |

Generally, all wells were screened between 0.45 and 1.2 m bgs with a 0.3 m length screened interval and in some instances a 0.36 m length screen (stainless steel prepacked screens) as presented in the FPTS Construction report (AECOM 2017).

The area between the Eastern and Western IRAs is referred to as the In-Between Area (IBA), as shown in Figure 1. As previously communicated to the ENV (AECOM, 2017b), benzene concentrations in IBA well P4.2-3D increased in early 2016 but became stable since then. In order to continue to monitor this area of the IBA, a porewater monitoring well, PW17-12 was installed to 1.4 metres below ground surface (bgs), and screened between

0.85 and 1.15 m bgs, down slope of the former location of P4.2-3D during FPTS construction.

Surface Water

Surface water samples will be collected from six surface water locations (Figure 1, Table 1). Two samples will be collected from each location; a near bottom surface water and near top surface water sample for a total of twelve surface water samples. It should be noted that there is the potential for surface water samples to be impacted by non-refinery anthropogenic sources within Burrard Inlet.

A boom encompassing the entire FPTS installation area will be in place for one year after construction.

Analytical Program

Water samples collected from the monitoring wells will be submitted to a Canadian Association for Laboratory Accreditation (CALA) certified laboratory on a standard turn-around-time basis, for the following laboratory analyses:

- BTEX and VPHw
- LEPHw
- Benzo(a)pyrene and naphthalene
- Dissolved copper and dissolved zinc

Surface water samples will be submitted for the same analysis as samples collected from the monitoring wells, but will also be analysed for total copper and zinc.

Sampling Schedule

The sampling schedule for the first three years is summarized in Table 2. Following the construction of the FPTS, monitoring described in this MMP was started in November 2017.

During the first six months following installation of the FPTS, additional monitoring and sampling events may be completed. During the first year (Year 1) after installation of the FPTS, monitoring well sampling will be completed on a quarterly basis (March, June, September and December)¹. In the second and third years (Year 2 and 3), monitoring well sampling will be completed on a semi-annual basis (June and December), after which the program will be reviewed.

Surface water sampling and sheen monitoring will be completed quarterly during the first year, after which the surface water monitoring program will be reviewed.

¹ Monitoring well sampling will be during falling and low tide events whenever possible.

TABLE 2 MONITORING WELL DESIGNATION AND SAMPLING SCHEDULE

| | | Frequency | Frequency | Frequency | | | |
|-----------------|------------------------------------|------------------------|---------------------|---------------------|--|--|--|
| Well / Location | Designation | Year 1 ^{1,2} | Year 2 | Year 3 | | | |
| TYON / LOCATION | | Seep Area | 1001 2 | 10010 | | | |
| PW17-1 | Upslope Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-2 | Sentry Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-3 | Compliance Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-4 | Upslope Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-5 | Performance Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-6 | Performance Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-7 | Sentry Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-8 | Compliance Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-9 | Upslope Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-10 | Sentry Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-11 | Compliance Well | Quarterly | Semi-annual | Semi-annual | | | |
| | | veen Area | | | | | |
| PW17-12 | Compliance Well | Quarterly | Semi-annual | Semi-annual | | | |
| | | Seep Area | | | | | |
| PW17-13 | Upslope Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-14 | Sentry Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-15 | Compliance Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-16 | Upslope Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-17 | Performance Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-18 | Performance Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-19 | Sentry Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-20 | Compliance Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-21 | Upslope Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-22 | Performance Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-23 | Performance Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-24 | Sentry Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-25 | Compliance Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-26 | Upslope Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-27 | Performance Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-28 | Performance Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-29 | Sentry Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-30 | Compliance Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-31 | Upslope Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-32 | Sentry Well | Quarterly | Semi-annual | Semi-annual | | | |
| PW17-33 | Compliance Well | Quarterly | Semi-annual | Semi-annual | | | |
| | Surface Water Samples ³ | | | | | | |
| Well / Location | Designation | Frequency Year 1 | Frequency Year 2 | Frequency Year 3 | | | |
| P3-3 | บธอเนิแซแกแ | Quarterly | No Sampling | No Sampling | | | |
| P3-12 | - | Quarterly | No Sampling | No Sampling | | | |
| P6-3 | - | | No Sampling | No Sampling | | | |
| P6-12 | - - | Quarterly Quarterly | No Sampling | No Sampling | | | |
| P8-3 | <u>-</u> | Quarterly | No Sampling | No Sampling | | | |
| P8-12 | - | Quarterly | No Sampling | No Sampling | | | |
| Notes: | - | Quarterry | 140 Sampling | 140 Sampling | | | |

Water sampling collection methodologies are presented in Appendix D.

Notes:

1. During the first six months following installation of the FPTS, additional monitoring and sampling events

may be completed.

² Quarterly sampling events should occur in March, June, September and December.

³ Two surface water samples will be collected from each location (near top surface and near bottom surface).

To assure integrity and reliability of the data collected, rigorous quality assurance/quality control (QA/QC) protocols will be observed during sample collection. QA/QC protocols are presented in Appendix F.

PROGRAM REVIEW

Due to disturbance during construction of the FPTS, elevated concentrations in the water samples are anticipated in the first year after installation. This is a lesson learned from previous IRA Barrier construction activities (URS, 2012). Therefore, there will not be any action if elevated concentrations above screening levels in Compliance Wells occur during Year 1.

The Risk-Based Management Targets (RBMTs), which are set out in Appendix B, will be used as screening levels for Compliance Wells after Year 1. Action will be taken if any of the following conditions occur:

- If there is an exceedance above a RBMT in porewater collected from a Compliance Well, the well will be re-sampled twice immediately (e.g., twice within the month following the exceedance).
- If there are two consecutive exceedances (semi-annual in Years 2 and 3) in a Compliance Well above an RBMT, data from adjacent Compliance, Sentry, Performance and Upslope Wells will be assessed to determine if this exceedance is indicative of a wider issue and what further action is required, if any. This will occur in consultation with ENV.

The FPTS includes contingency piping into which bioremediation enhancements (e.g., nutrients, sulphate and nitrate) may be applied as appropriate to further aid the breakdown of petroleum hydrocarbons. If bioremediation enhancements are applied, they will be recorded in the Annual FPTS Monitoring Report.

After three years, the data collected will be reviewed to assess what Site monitoring and sampling frequency will be proposed for subsequent years. The frequency of future Site monitoring and sampling will be assessed based on the absence, decrease, stabilization, or increase of concentrations of contaminants of concern (COCs) in porewater, primarily in the down slope Compliance Wells.

Based on this trend analysis, the following are three potential example scenarios that could arise:

- COCs concentrations are not detected above their respective reported detection limit (RDL) in any of the Compliance Wells – monitoring and sampling could be discontinued in all wells.
- COCs concentrations are detected above half of their respective RBMTs in select Compliance Wells monitoring and sampling of only these particular wells could continue on a semi-annual basis. The program would then be re-evaluated at the end of each year.
- COCs concentrations are detected above half of their respective RBMT on an intermittent basis in over half of the Compliance Wells – monitoring of all wells at the

FPTS could continue on a semi-annual basis. The program would then be reevaluated at the end of each year.

REMEDY INTEGRITY INSPECTION AND MAINTENANCE

To maintain integrity of the remedy, regular inspections of the FPTS will be completed during the quarterly and semi-annual monitoring. The inspections and actions will include:

- Visual inspection of the system to check that two layers of rip-rap are above the treatment cells (i.e., maintaining a thickness of approximately 1.4 m) and two layers of cobbles are above the OBB surface layer (i.e., maintaining a thickness of 0.4 m).
 - If necessary, replacing and adding rip-rap and/or cobbles as required to maintain the required thickness.
- Visual inspection of the FPTS to make sure vegetation is not growing above the treatment cells or the OBB surface layer. The roots of the vegetation may puncture the liner, reducing the system effectiveness.
 - If necessary, removing any vegetation that may affect the treatment cells or the OBB surface layer.
- Inspection of the monitoring well network for damage.
 - If necessary, replacing/repairing any wells that are destroyed or damaged.

REPORT

Annual FPTS Monitoring Reports will be prepared and will contain the following key elements:

- Summary
- Statement of Objectives
- Description of Sampling
- Presentation of Data
- Presentation of any remedy monitoring and maintenance
- Interpretation and Evaluations
- Recommendations

The Annual FPTS Monitoring Reports will be prepared under the direction of a Contaminated Sites Approved Professional (CSAP).

Yours very truly,

AECOM

per:

Leslie Southern, M.Sc., P.Ag. Environmental Scientist

Robert Horwath, CA PG Senior Geologist Senior Project Manager

Rob Dickin, M.Sc., P.Geo., CSAP, FGC Technical Leader - Hydrogeology

Attachments:

Figure 1 – Site Map and Foreshore Sampling Locations

Table 1 – Foreshore Monitoring Wells

Table 2 - Monitoring Well Designation and Sampling Schedule

Table B-1 – Foreshore Risk Based Management Targets

Appendix A – Background

Appendix B – Regulatory Context

Appendix C – Foreshore Monitoring Wells Construction Details

Appendix D – Sample Collection Methodologies

Appendix E – Port of Vancouver Permit No.16-180

Appendix F – Quality Assurance Quality Control Protocols

REFERENCES

AECOM (2017a). Foreshore Final Remedy Remediation Report, Parkland Refinery, Burnaby, British Columbia, AECOM, December 22, 2017.

AECOM (2017b). Dissolved Benzene Concentrations in Porewater in Foreshore Monitoring Well P4.2-3D, Chevron Burnaby Refinery, Burnaby, B.C. AECOM, June 13, 2017.

AECOM (2016a). Foreshore 2014 Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia AECOM, July 13, 2016.

AECOM (2016b). Foreshore Remedial Action Plan Below Area 2 Eastern Impounding Basin – Chevron Burnaby Refinery, Burnaby, BC. October 27, 2016.

AECOM (2016c). Foreshore 2015 Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia AECOM, December 21, 2016.

AquaBlok (2010a). *AquaGate+ORGANOCLAY. AquaBlok Ltd.* January 1, 2010. Accessed February 22, 2016:

http://www.aquablok.com/clientuploads/library/Aquagate/AG+OC%20Spec%20Sheet_07-30-10.pdf

AquaBlok (2010b). *AquaGate+PAC. AquaBlok Ltd.* January 1, 2010. Accessed February 22, 2016:

http://www.aquablok.com/clientuploads/library/Aquagate/AG+PAC%20Spec%20Sheet_01-01-10.pdf

BC Ministry of Environment (ENV) 2014. Letter from Lizzy Mos of the ENV to Christopher Boys of Chevron regarding approval of SLRs Foreshore derived RBMTs, August 28, 2014.

SLR (SLR Consulting Canada) (2014). Risk-Based Management Targets, Seep Area Foreshore Down Slope of the East Impounding Basin, Chevron Burnaby Refinery, Burnaby BC. Vancouver, BC: SLR Consulting Canada, February 28, 2014.

SLR (SLR Consulting Canada) (2016). Human Health and Ecological Risk Assessment of Seep Area Foreshore Down Slope of the East Impounding Basin, Chevron Burnaby Refinery, Burnaby BC. Vancouver, BC: SLR Consulting Canada, May, 2016.

URS (2011). Foreshore Detailed Site Investigation Below Area 2 East Impounding Basin, Chevron Burnaby Refinery, Burnaby BC. URS Canada Inc., September 30, 2011.

URS (2012). Foreshore 2012 First Semi-Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia URS Canada Inc., December 19, 2012.

URS (2013). Foreshore 2012 Second Semi-Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia URS Canada Inc., March 26, 2013.

URS (2014). Foreshore 2013 First Semi-Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia URS Canada Inc., October 30, 2014.

URS (2015). Foreshore 2013 Second Semi-Annual Report Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, British Columbia URS Canada Inc., August 27, 2015.

LIMITATIONS

The findings and conclusions documented in this report have been prepared for specific application to this project and have been developed in a manner consistent with that level of

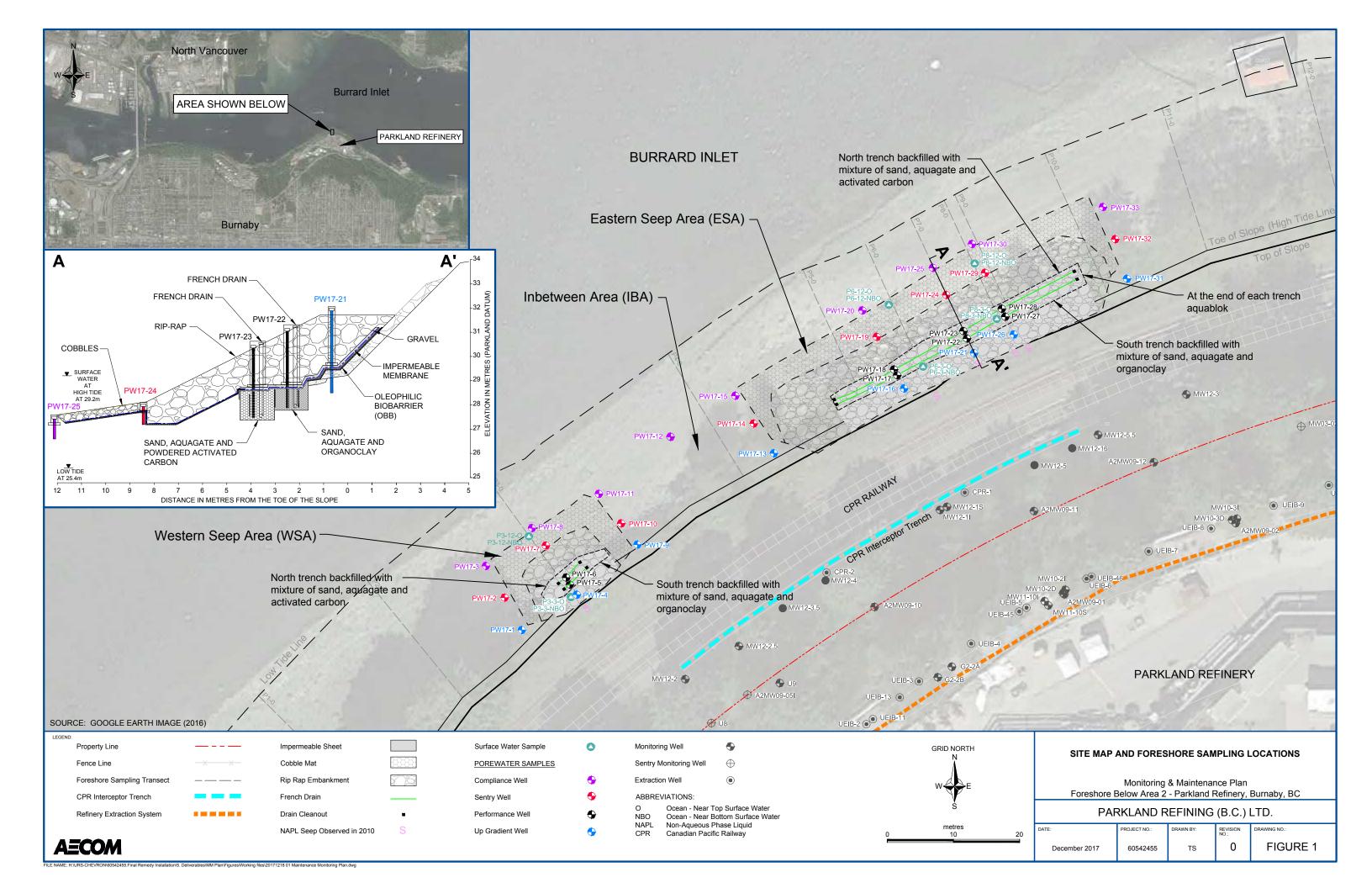
Parkland Refining B.C. Ltd. December 21, 2017 Page 11

care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area, and in accordance with AECOM's standard terms and conditions. No other warranty, expressed or implied, is made. This report is for the exclusive use of Parkland Refining (B.C.) Ltd, ENV and VFPA, who may rely upon this report.

AECOM's objective is to perform our work with care, exercising the customary thoroughness and competence of earth science, environmental, and engineering consulting professionals, in accordance with the standard for professional services at the time and location those services are rendered. It is important to recognize that even the most comprehensive scope of services may fail to detect environmental liability on a particular site. Therefore, AECOM cannot act as insurers and cannot "certify" or "underwrite" that a site is free of environmental contamination, and no expressed or implied representation or warranty is included or intended in our reports, except that our work was performed, within the limits prescribed by our client, with the customary thoroughness and competence of our profession.

Parkland Refining B.C. Ltd. December 21, 2017 Page 12

FIGURE



Parkland Refining B.C. Ltd. December 21, 2017 Page 13

APPENDIX A BACKGROUND

APPENDIX A – BACKGROUND

Chevron Canada Limited (CCL) first observed NAPL seeps on the north, downward slope of the Parkland (formerly Chevron) Burnaby Refinery towards Burrard Inlet during an inspection on April 21, 2010. The seeps were immediately reported by CCL to the Provincial Emergency Program and addressed using soaker pads and booms. The source of the NAPL is unknown but believed to be associated with historical Refinery operations and the north process sewer (decommissioned in June 2011).

A Preliminary Site Investigation (PSI) was conducted in June 2010, followed by a Detailed Site Investigation (DSI) in April 2011 (URS, 2011a). The Eastern and Western IRA Barriers, comprised of a sand-organoclay mixture and a CETCO Reactive Core Mat (RCM) were constructed in February and March 2011. The Eastern IRA Barrier was refurbished in March and April 2012 by extending the sand-organoclay downgradient into the anchor trench. Porewater, porewater ecologically active zone (EAZ) samples (containing water from wells that are located from ground surface to 1 metre below ground surface), surface water from Burrard Inlet, and ambient air samples, have been collected from the Site on a regular basis in accordance with the Foreshore Monitoring Plan (URS, 2012a).

AECOM completed air, porewater and/or surface water monitoring and sampling in the ESA and WSA from 2011 to 2016. Details of the monitoring and sampling from 2011 to 2016 are included in seven reports completed by AECOM (URS 2011, URS 2012, URS 2013, URS 2014, URS 2015, AECOM 2016a, and AECOM 2016b).

From July to October 2017, the Eastern and Western IRA Barriers were excavated and removed from the Site and taken to an off-site licensed disposal facility. Two Foreshore Passive Treatment Systems (FPTS) were constructed and installed at the Site; one in the Eastern Seep Area and the second in the Western Seep Area. The FPTSs each consist of two subsurface treatment cells; the first up slope treatment cell contains a mixture of sand and AquaGate+Organoclay (AG+OC); the second, down slope treatment cell will contain a mixture of sand and AquaGate+Powdered Activated Carbon (AG+PAC) (AquaBlok, 2010a; AquaBlok 2010b). The subsurface cells are protected by rip-rap which is calculated to withstand the wave forces generated by a 100-year storm event and by local ships. The sheen control layer, which extends down slope of the treatment cells, consists of an OBB layer, which is anchored with 0.2 metre diameter cobbles. Refer to the Remedial Action Plan for further details (AECOM, 2016b). Monitoring wells were installed within and around the remedy and have been discussed within the text of this plan.

APPENDIX B REGULATORY CONTEXT

APPENDIX B - REGULATORY CONTEXT

The British Columbia Ministry of Environment and Climate Change Strategy (ENV) approved the Stage 10 Amendment (Omnibus) to the Contaminated Sites Regulation (CSR) on October 27, 2016. The Stage 11 (Housekeeping) amendments to the CSR were approved on October 31, 2017. Pursuant to the CSR, standards for aquatic life water use apply to groundwater located within 500 metres of a surface water body containing aquatic life. Standards for aquatic life water use also apply where there is the potential for contaminated groundwater to flow through preferential corridors that discharge directly to a surface water body containing aquatic life.

In 2014, SLR Consulting (Canada) Ltd (SLR) derived Risk Based Management Targets (RBMTs) for the Site and in 2016 completed a Human Health and Ecological Risk Assessment (HHERA) for the contaminants associated with the seeps (SLR 2014 and 2016). The HHERA was submitted to ENV, Port of Vancouver (POV – formerly Port Metro Vancouver) and Fraser Health. The RBMTs are intended to be used as a risk management tool to assess the performance of the FPTS. The RBMTs were developed to be protective of aquatic plants and invertebrates at the community level and fish at the population level. The HHERA did not find any significant risk to human health; therefore, RBMTs were not needed for human receptors.

These RBMTs were established and accepted by the ENV in 2014 (ENV, 2014).

RBMTs for Site porewater were developed for benzene, ethylbenzene, toluene, xylenes, benzo(a)pyrene, naphthalene, VPHw, LEPHw, dissolved copper, and dissolved zinc. The results of SLR's HHERA indicated that all other previously identified COCs were no longer considered to be a concern to humans or marine aquatic life. Concentrations of COCs reported in surface water and porewater samples will be screened against the RBMTs.

The RBMTs for the Site are presented in Table B-1 below.

TABLE B-1 FORESHORE RISK BASED MANAGEMENT TARGETS

| Parameter | RBMT micrograms per litre (µg/L) | | |
|------------------|--|--|--|
| LEPHw | 300 | | |
| VPHw | 1,500 | | |
| Benzene | 2,100 | | |
| Toluene | 770 | | |
| Ethylbenzene | 320 | | |
| Xylenes | 330 | | |
| Naphthalene | 44 | | |
| Benzo(a)pyrene | 0.28 | | |
| Dissolved copper | 6.2 | | |
| Dissolved zinc | 90 | | |

APPENDIX C

Foreshore Monitoring Wells Construction Details

APPENDIX C - FORESHORE MONITORING WELLS CONSTRUCTION DETAILS

TABLE C-1 FORESHORE MONITORING WELLS CONSTRUCTION DETAILS

| Monitoring Well | Well Type | Total Depth (m bgs) | Top of Well Screen (m bgs) | Bottom of Well Screen (m bgs) | Screen type |
|-----------------|-------------|------------------------|-------------------------------|-------------------------------------|------------------|
| PW17-1 | Upslope | 1.20 | 0.85 | 1.15 | PVC |
| PW17-2 | Sentry | 1.20 | 0.85 | 1.15 | PVC |
| PW17-3 | Compliance | 1.20 | 0.85 | 1.15 | PVC |
| PW17-4 | Upslope | 0.80 | 0.45 | 0.75 | PVC |
| PW17-5 | Performance | 1.10 | 0.64 | 1.00 | SS |
| PW17-6 | Performance | 1.30 | 0.84 | 1.20 | SS |
| PW17-7 | Sentry | 1.05 | 0.7 | 1.00 | PVC |
| PW17-8 | Compliance | 1.30 | 0.84 | 1.20 | SS |
| PW17-9 | Upslope | 1.20 | 0.85 | 1.15 | PVC |
| PW17-10 | Sentry | 1.25 | 0.85 | 1.15 | PVC |
| PW17-11 | Compliance | 1.20 | 0.74 | 1.10 | SS |
| PW17-12 | Compliance | 1.20 | 0.85 | 1.15 | PVC |
| PW17-13 | Upslope | 1.20 | 0.85 | 1.15 | PVC |
| PW17-14 | Sentry | 1.20 | 0.85 | 1.15 | PVC |
| PW17-15 | Compliance | 1.30 | 0.84 | 1.20 | SS |
| PW17-16 | Upslope | 0.80 | 0.45 | 0.75 | PVC |
| PW17-17 | Performance | 1.10 | 0.64 | 1.00 | SS |
| PW17-18 | Performance | 1.30 | 0.84 | 1.20 | SS |
| PW17-19 | Sentry | 1.20 | 0.87 | 1.15 | PVC |
| PW17-20 | Compliance | 1.10 | 0.64 | 1.00 | SS |
| PW17-21 | Upslope | 0.80 | 0.45 | 0.75 | PVC |
| PW17-22 | Performance | 1.10 | 0.64 | 1.00 | SS |
| PW17-23 | Performance | 1.30 | 0.84 | 1.20 | SS |
| PW17-24 | Sentry | 1.20 | 0.85 | 1.15 | PVC |
| PW17-25 | Compliance | 1.25 | 0.85 | 1.15 | PVC ¹ |
| PW17-26 | Upslope | 0.80 | 0.45 | 0.75 | PVC |
| PW17-27 | Performance | 1.10 | 0.64 | 1.00 | SS |
| PW17-28 | Performance | 1.30 | 0.84 | 1.20 | SS |
| PW17-29 | Sentry | 1.20 | 0.85 | 1.15 | PVC |
| PW17-30 | Compliance | 1.30 | 0.84 | 1.20 | SS |
| PW17-31 | Upslope | 1.20 | 0.85 | 1.15 | PVC |
| PW17-32 | Sentry | 1.20 | 0.85 | 1.15 | PVC |
| PW17-33 | Compliance | 1.20 | 0.85 | 1.15 | PVC |

Notes:

m bgs - metres below ground surface SS - Stainless steel wrapped screen prepacked with 20/40 sand

PVC - Schedule 40 - 10 slot screen

1 - Screen consisted of a 3" - 10 slot screen surrounding a 2" - 10 slot screen prepacked with 20/40 filter sand (manufactured by Bluemax Drilling)

APPENDIX D SAMPLE COLLECTION METHODOLOGIES

APPENDIX D - SAMPLE COLLECTION METHODOLOGIES

MONITORING, WELL PURGING AND WATER SAMPLING METHODOLOGY

There are 33 monitoring wells at the Site (Figure 1 and Table 1).

Porewater monitoring will include recording the time of day, depth to water (DTW), depth to product (DTP) and total depth of the well (TD). The DTW and DTP will be measured using an interface probe which will be decontaminated between monitoring wells to prevent cross contamination.

Porewater samples will be collected from each monitoring well using dedicated high-density polyethylene and silicone tubing attached to a peristaltic pump, to ensure minimal entrainment of silt in the sample as well as minimal losses of volatile constituents. Prior to sample collection, water will be purged from the well for approximately 5 to 10 seconds until clear. During purging, field parameters including pH, temperature, electrical conductivity, salinity, TDS, ORP, DO, and turbidity will be monitored and documented. During purging and sample collection, care will be taken to remove water from near the top of the water column to minimize any disturbance and subsequent entrainment of solids near the base of the well. Samples will be placed into a cooler containing blue or wet ice, and were kept under chain-of-custody procedures until delivery to ALS Laboratories (ALS).

SURFACE WATER SAMPLING METHODOLOGY

A total of 48 surface water samples from 12 locations will be collected the first year after installation of the Final Remedy. Surface water samples will be collected on a quarterly basis. Similar to the historical monitoring programs at the Site, surface water samples were only collected at three transect locations (P3 at the Western Seep Area and P6 and P8 both at the Eastern Seep Area) on the Foreshore, resulting in 12 samples per quarterly event.

Surface water samples will be collected by placing the sample bottles near the surface of the water. Near bottom samples will be collected by placing and opening sample bottles at the sediment-water interface approximately five centimetres above the sediment surface during a falling tide to collect water being emitted from the subsurface sediments of the Foreshore. Samples will only be collected when any turbulence in the water had dissipated and minimal sediment was present in the water column. Care will be taken to preclude the introduction of particulates into the sample container.

The surface water samples will be field screened for colour, clarity, pH, temperature, electrical conductivity, salinity, TDS, ORP, DO and turbidity. Samples will be placed into a cooler containing blue or wet ice, and were kept under chain-of-custody procedures until delivery to ALS.

Sample IDs for surface water samples will follow a similar convention as past investigations at the Site; the sample ID will contain an "O" for surface ocean and "NBO" for near bottom surface samples.

Parkland Refining B.C. Ltd. December 21, 2017 Page 21

DECONTAMINATION

All non-disposable water monitoring and sampling equipment (i.e., interface probes and YSI multimeters) will be decontaminated between sample locations as follows:

- Washing external and internal surfaces of the sampling equipment with amended water2;
 scrubbing as necessary to remove dirt, grime, grease, and oil;
- Rinsing with de-ionized water; and
- Double rinsing with de-ionized water.

 $^{^{2}}$ Amended water is a 0.5% solution of an environmentally friendly cleaner labelled Liquinox and de-ionized water.

APPENDIX E PORT OF VANCOUVER PERMIT NO.16-180

APPENDIX E - PORT OF VANCOUVER PERMIT NO.16-180

The Port of Vancouver issued Permit No.16-180 for construction of the Final Remedy. The permit is valid from May 24, 2017 to May 31, 2022. All contractors will have a copy of Permit No.16-180 when on Site. Conditions within Permit No.16-180 will be adhered to during monitoring and sampling events and maintenance activities (i.e., replacement of protective riprap, cobbles and/or monitoring wells, and managing vegetation).



VANCOUVER FRASER PORT AUTHORITY PROJECT AND ENVIRONMENTAL REVIEW REPORT AND PERMIT

| PER No.: | 16-180 |
|-----------------------|--|
| Tenant: | Chevron Canada Limited |
| Project: | Chevron Refinery Foreshore Final Remedy |
| Project Location: | 5201 Penzance Drive, Burnaby |
| VFPA SID No.: | BBY089 |
| Land Use Designation: | Port Water |
| Applicant(s): | AECOM, on behalf of Chevron Canada Limited |
| Applicant Address: | 3292 Production Way, Burnaby, BC, V5A 4R4 |
| Category of Review: | В |
| Date of Approval: | May 24, 2017 |
| Date of Expiry: | May 31, 2022 |

1 INTRODUCTION

The Vancouver Fraser Port Authority (VFPA), a federal port authority, manages lands under the purview of the *Canada Marine Act*, which imparts responsibilities for environmental protection. VFPA accordingly conducts project and environmental reviews of works and activities undertaken on these lands to ensure that the works and activities will not likely cause significant adverse environmental effects. This project and environmental review report and project permit (the Permit) documents VFPA's project and environmental review of PER No. 16-180: Chevron Refinery Foreshore Final Remediation (the Project) proposed by AECOM working on behalf of Chevron Canada Limited (the Applicant).

This project and environmental review was carried out to address VFPA's responsibilities under the *Canada Marine Act*, and to meet the requirements of the *Canadian Environmental Assessment Act*, 2012 (CEAA 2012), as applicable. The proposed Project is not a CEAA 2012 "designated project" and an environmental assessment as described in CEAA 2012 is not required. However, VFPA authorization is required for the proposed Project to proceed and in such circumstances, where applicable, Section 67 of CEAA 2012 requires federal authorities to assure themselves that projects will not likely cause significant adverse environmental effects. This review provides that assurance. In addition, VFPA considers other interests, impacts and mitigations through the project and environmental review.

The project and environmental review considered the application along with supporting studies, assessments and consultations carried out or commissioned by the Applicant, as well as other information provided by the Applicant. In addition, this project and environmental review considered other information available to VFPA and other consultations carried out by VFPA. A full list of information sources germane to the review is provided in the following pages of this report.

This Permit is the authorizing document allowing the Applicant to proceed with the Project subject to the listed project and environmental conditions.

PER No. 16-180 Page 1 of 15

2 PROJECT DESCRIPTION

The Project is the final step in Chevron's Foreshore Remedial Action Plan (RAP) to remediate soil and groundwater near Chevron's Burnaby Refinery at 5201 Penzance Drive, Burnaby, BC. The Project is to mitigate environmental risk by managing the non-aqueous phase liquid (NAPL) and associated contaminants of concern in porewater and surface water in the vicinity of the NAPL seeps. The site of the NAPL seepage and of the Project is located in the northern portion of the refinery in and near the foreshore of Burrard Inlet. The proposed work will be conducted within 250m of archaeological site DhRr-0230.

After the initial observation of the seeps in April 2010, contaminants of concern were recorded in sediment, air, and ground and surface water, including petroleum hydrocarbons and select metals. The seeps were identified as two areas: Western Seep Area (WSA) and Eastern Seep Area (ESA), which are approximately 30m apart. Interim interceptor trenches were first installed in 2011, at both the WSA and ESA, as an interim measure to manage the seeps while more permanent solutions were studied. VFPA issued Permit 10-161 for the interim remediation project.

The works for the remediation activities are planned early July 2017 to late September 2017 at low tide during the day at normal operation hours. The footprint of the work site (including the ESA, WSA, rip-rap, and monitoring wells) is approximately 140m x 30m, or 4200m². The excavation footprint will range from 950m² to 1500m², depending on the extent of contaminated soils in the WSA. The site is not accessible by road; therefore, all equipment will be loaded on a barge and mobilized via Burrard Inlet to the site.

The Project consists of removing the interim remediation barriers installed in 2011 in the foreshore, and installing new permanent remediation measures. The ESA will have subsurface treatment cells installed; the WSA is not expected to require subsurface treatment cells and will be backfilled with appropriate matching subgrade material, provided no contaminated soils are found. If contaminated soils are discovered in the WSA, the size of the WSA excavation will be expanded and subsurface treatment cells will be installed in the same manner as the ESA. Rip-rap will be installed on the foreshore to protect the remediation structures and also to prevent scouring of the slope near the CP Rail right-of-way. Approximately 23 monitoring wells are proposed to be installed. A qualified remediation contractor will conduct these works.

The Applicant completed a *Fisheries Act* self-assessment and submitted a Request for Project Review to Fisheries and Oceans Canada (DFO). DFO responded that a *Fisheries Act* authorization is not required for the project given that serious harm to fish can be avoided by following standard measures. The Applicant will only work in the foreshore during low tide to keep works dry. No equipment or open excavations will be left in intertidal areas overnight or during high tides.

The Applicant has prepared a Construction Environmental Management Plan (CEMP) that includes measures to mitigate potential environmental impacts including: sediment transport and turbidity, contaminated soil and groundwater, riparian vegetation, and spills and leaks. An Environmental Monitor will ensure compliance with the CEMP, this Permit, and applicable environmental regulations. The Environmental Monitor will prepare weekly reports. A qualified archaeological monitor will be on site during ground disturbance to native soils. Aboriginal groups will be given the opportunity to participate in archaeological and environmental monitoring during the Project.

Confirmatory excavation sampling will follow the BC Ministry of Environment's *Technical Guidance 1* Site Characterization and Confirmation Testing (2009) with samples collected every metre vertically and every 5 metres horizontally from the base and side walls of excavations. Soils and groundwater that are confirmed to be contaminated will be removed and transported to an

PER No. 16-180 Page 2 of 15

approved disposal site. Confirmed contaminated soil will be removed to the extent allowed without affecting geotechnical stability of the CP Rail slope and right-of-way.

The Applicant plans to monitor contamination for a minimum of three (3) years post-construction. The Applicant will conduct ongoing vegetation maintenance and management near the Project site over the life of the remediation structures (~30 years). Rip-rap replacement may be required in the future, subject to a separate subsequent approval by VFPA.

The BC Ministry of Environment (BC MOE) has reviewed the Project and supports the planned works, as outlined in their letter to Chevron dated September 9, 2016.

In this project permit, the Project means the physical activities authorized by VFPA to be carried out pursuant to **PER No. 16-180**, as described below.

2.1 Proposed Works

- 1. Access to foreshore by loading equipment on a barge and mobilizing via Burrard Inlet to the site, and returning equipment to the barge prior to high-tide.
- 2. Removal of an estimated 150m² of riparian vegetation, including trees, shrubs, and ferns. Vegetation maintenance will be performed over the lifetime of the remedy to prevent damage to the remedy structures.
- 3. Removal of the boom near the ESA.
- 4. Excavation and removal of the existing interim remediation barriers (approximately 44m) from the WSA and ESA. The excavations will be staged in 5 to 10 metre segments along the length of the foreshore. Each segment will be excavated, backfilled and covered by the end of each work day before the tide covers the site; there will be minimal in-water works.
- 5. Contaminated soil and groundwater will be removed and transported on a barge in polypropylene super sack bags. All disposals will be at approved disposal sites.
- 6. Installation of the new permanent remediation barrier at the ESA within trench segments (5 to 10 metres) in the foreshore. This includes imported fill (e.g., gravel, sand, clay), geogrid filter fabric, and poly sheeting. The ESA subsurface treatment cells will be covered by an oleophilic biobarrier geocomposite to capture potential NAPL sheens. A layer of cobbles 20 centimetres (cm) thick will anchor the oleophilic biobarrier composite.
- 7. Installation of natural, non-leaching rip-rap of a median 0.7 metres in diameter and total rip rap thickness of 1.4 metres to protect the ESA remediation structures and for scour protection of the CP Rail right-of-way slope from wave forces generated by 100-year storm events and ship wakes.
- 8. The WSA trench segments will be backfilled with appropriate matching subgrade materials unless additional contamination is discovered, upon which the WSA excavation area will be extended and will receive similar remedy structures as the ESA.
- 9. Installation of 23 monitoring wells with concrete risers to protect them from shifting rip-rap. Porewater wells will be placed up slope, within and down slope of the ESA and WSA to monitor performance and establish compliance with applicable standards.

3 VANCOUVER FRASER PORT AUTHORITY INTERNAL REVIEWS

The following VFPA departments have reviewed the application and support approval of the Project subject to the listed project and environmental conditions.

 $oxed{oxed}$ Planning $oxed{oxed}$ Environmental Programs $oxed{oxed}$ Engineering

 $oxed{oxed}$ Marine Operations $oxed{oxed}$ Project Communications $oxed{oxed}$ Aboriginal Affairs

PER No. 16-180 Page 3 of 15



4 ABORIGINAL CONSULTATION

VFPA Aboriginal Affairs reviewed the proposed works and determined that the project may have the potential to adversely impact Aboriginal rights.

Scope of Consultation

- Tsleil-Waututh Nation
- Squamish Nation
- Musqueam Indian Band
- Sto: lo Nation
- Hul'qumi'num Treaty Group
 - Halalt First Nation
 - Lake Cowichan First Nation
 - Lyackson First Nation
 - o Penelakut Tribe
 - Cowichan Tribes
 - Stz'uminus First Nation

All Aboriginal groups listed above were consulted on the proposed project.

Overview of Consultation Activities

On December 14, 2016, a referral package was sent to each of the Aboriginal groups listed above. The referral package included:

- Referral Letter
- Permit Application
- Project Overview Map
- Project Remedial Action Plan

Comments were requested from Aboriginal groups within 40 business days, by February 10, 2017. VFPA elected to extend the review period from the usual 30 business days to account for office closures over the December holiday in some Aboriginal communities.

On January 12, 2017, VFPA sent an update email, reminding Aboriginal groups about the project review and requesting comments by the February 10, 2017 deadline.

VFPA received comments from Aboriginal groups via letters and email. VFPA responded to all comments from Aboriginal groups.

Summary of Issues

Below is a table summarizing comments received by VFPA and how they were considered as part of the project and environmental review.

PER No. 16-180 Page 4 of 15

| Issue | VFPA Considerations | Action Required | |
|---|---|---|--|
| Current use of lands and resources for traditional purposes | | | |
| Contamination of Burrard Inlet | The project involves installing barriers to impede remaining contamination from entering the inlet, and installing long-term monitoring wells to monitor contamination and to assess whether or not further action needs to be taken. This project will reduce contamination and | VFPA included the following permit condition (no. 43): The Applicant shall make monitoring reports available to Aboriginal | |
| | provide an overall environmental benefit to Burrard Inlet. In acknowledgement of the concerns of Aboriginal groups about the contamination, the Applicant committed to making communications relating to monitoring available. | groups. | |
| Presence of Aboriginal group environmental monitors on-site | VFPA acknowledges that the environmental health of Burrard Inlet is of high importance to Aboriginal groups. VFPA is interested in working with Aboriginal groups to allow environmental | VFPA included the following permit condition (no. 25): | |
| during installation | monitors to be on-site during project works. | The Applicant shall make opportunities available for Aboriginal groups to participate in environmental monitoring during project works. | |
| Monitoring and Sampling of Project Area | The Applicant will undertake a monitoring and sampling program for three years, after which the program will be reviewed. Monitoring will likely occur for five years or more, but likely at a | VFPA included the following permit condition (no. 43): | |
| | reduced frequency, subject to the analytical results from the first three years. The Applicant committed to copying Aboriginal groups on communications related to this issue. | The Applicant shall make monitoring reports available to Aboriginal groups. | |
| Preservation of sandy beach | The Applicant has completed the remedial design to limit the amount of sandy beach that will be altered while still installing a robust system that is protective of the environment. | None | |

PER No. 16-180 Page 5 of 15

| Issue | VFPA Considerations | Action Required |
|---|--|---|
| Principle of net environmental gain, rather than no net environmental loss | VFPA continues to seek opportunities to work with Aboriginal groups and others to improve environmental management practices and to provide net environmental benefits through various initiatives. VFPA is also keen to continue identifying shared interests and to focus on collaborative projects with Aboriginal groups that will result in net environmental gains within Burrard Inlet. | None |
| | The Applicant provided a response recognizing that Aboriginal groups are leaders in environmental stewardship in Burrard Inlet. Chevron is working with Aboriginal groups and others on environmental initiatives that benefit Burrard Inlet. | |
| Monitoring of future cumulative effects of ground and surface | The Applicant will undertake a monitoring and sampling program for three years, after which the program will be reviewed. Monitoring will likely occur for five years or more, but likely at a | VFPA included the following permit condition (no. 43): |
| water contamination | reduced frequency, subject to the analytical results from the first three years. The Applicant committed to copying Aboriginal groups on communications related to this issue. | The Applicant shall make monitoring reports available to Aboriginal groups. |
| | The Applicant developed risk-based management targets (RBMTs) which were finalised in 2014 and approved by the BC MOE. The RBMTs are site-specific concentration limits for the parameters of concern in the site porewater, and are designed to be protective of aquatic life that may experience potentially long-term exposures. As long as the concentrations of the parameters are below the RBMTs (which the remedy is designed to ensure), the ecological function and viability of aquatic life in the foreshore will be maintained. The RBMTs form an integral part of the performance monitoring program described in the RAP. | |
| Impacts to fish and fish habitat as a result of ground and surface water contamination | Impacts to fish and fish habitat are not expected as a result of the project. An analysis of the potential effect on the physical fish habitat was completed and submitted to Fisheries and Oceans Canada as part of the Request for Review process. That analysis showed that the physical changes to the Foreshore area would not result in significant harm to fish. | None |

PER No. 16-180 Page 6 of 15

| Issue | VFPA Considerations | Action Required |
|---|---|---|
| Loss of riparian vegetation resulting from lowering of groundwater levels | The drawdown from the Perimeter Extraction System is limited to 10 to 30 meters from the well. The wells are located far enough from Burrard Inlet to affect the water table near the inlet. Therefore, the project is not expected to have an effect on riparian vegetation as a result of lowering groundwater levels. | None |
| Loss of wildlife habitat resulting from lowering groundwater levels | The drawdown from the Perimeter Extraction System is limited to 10 to 30 meters from the well. The wells are located far enough from Burrard Inlet to affect the water table near the inlet. Therefore, the project is not expected to have an effect on wildlife habitat as a result of lowering groundwater levels. | None |
| Cultural Heritage | | |
| Project area holds high cultural value for TWN Impacts to archaeological resources | VFPA acknowledges the importance of the area to Aboriginal groups. The Applicant recognizes the cultural sensitivity of the site and has been working with an Aboriginal-owned business to ensure all activities are carried out in regards to this sensitivity. VFPA understands that the Applicant is working with Aboriginal groups to address potential impacts to archaeology. This includes the use of Aboriginal cultural monitors during project works. | VFPA included the following permit condition (no. 24): The Applicant shall make opportunities available for Aboriginal groups to |
| | | provide archaeological monitors during project works. |
| Additional Issue | | |
| Outstanding project design considerations | VFPA will endeavor to share details around materials used with Aboriginal groups when they become available from the Applicant. This may occur through a post-construction report, which will be shared with Aboriginal groups. | None |

Based on the record of consultation, VFPA is of the view that the duty to consult has been met.

5 NOTIFICATIONS

5.1 Community Notification

The proposed Project was assessed by VFPA to have minimal or no potential impacts to community interests in the surrounding area either during construction or once the project is completed. Therefore no community consultation or construction notification was required.

PER No. 16-180 Page 7 of 15



6 INFORMATION SOURCES

VFPA has relied upon the following sources of information in its review of the Project.

- Application form and materials submitted by the Applicant on behalf of the tenant on November 23-December 16, 2016.
- Foreshore Remedial Action Plan Below Area 2 Eastern Impounding Basin Chevron Burnaby Refinery, Burnaby, BC" October 27, 2016, AECOM
- Letter titled "Final Remediation Action Plan Below Area 2 Eastern Impounding Basin Chevron Refinery", September 9, 2016, Lavinia Zanini of the BC Ministry of Environment
- Email dated 2016-10-04, from Michael Engelsjord of DFO to Chris Boys of Chevron, "Serious harm to fish can be avoided or mitigated."
- Draft Construction Environmental Management Plan (CEMP) for the Foreshore Final Remedy submitted by Aecom February 3, 2017.
- Email correspondence from Michael Gill May 15, 2017 re: Cost Proposal for tree planting at EIB in Area 2.
- All plans and drawings labelled PER No. 16-180-A to D.

7 PROJECT AND ENVIRONMENTAL CONDITIONS

VFPA has undertaken and completed a review of the Project in accordance with the *Canada Marine Act* and Section 5 of the Port Authorities Operations Regulations and, as applicable, Section 67 of the *Canadian Environmental Assessment Act*, 2012.

If at any time the Applicant fails to comply with any of the project and environmental conditions set out in the project permit (the Permit) below, or if VFPA determines that the Applicant has provided any incomplete, incorrect or misleading information in relation to the Project, VFPA may, in its sole and absolute discretion, cancel its authorization for the Project or change the project and environmental conditions to which such authorization is subject.

Pursuant to Section 29 of the Port Authorities Operations Regulations, VFPA may also cancel its authorization for the Project, or change the project and environmental conditions to which such authorization is subject, if new information is made available to VFPA at any time in relation to the potential adverse environmental and other effects of the Project.

The following are the minimum conditions that must be followed by the Applicant to mitigate potential or foreseeable adverse environmental and other effects.

| No. | GENERAL CONDITIONS |
|-----|--|
| 1. | This Permit is conditional on a valid tenure agreement with respect to the subject premises being in place. No construction or any other physical activities may commence in the absence of a valid tenure agreement. |
| 2. | This Permit is granted subject to the fulfillment of all other requirements of VFPA, relating to the Project. Furthermore, prior to commencing construction or any other physical activities the Applicant shall ensure that it has complied with all other necessary legal requirements and that all necessary regulatory approvals have been obtained. |
| 3. | This Permit in no way endorses or warrants the design, engineering, or construction of the Project and no person may rely upon this Permit for any purpose other than the fact that VFPA has permitted the construction of the Project, in accordance with the terms and conditions of this Permit. |

PER No. 16-180 Page 8 of 15

- 4. In consideration of the granting of this Permit by VFPA the Applicant agrees to indemnify and save harmless VFPA against any and all actions, claims, loss, damages or other expenses in any way arising or following from or caused by the granting of this Permit or the construction or operation of the Project as contemplated by this Permit.
- 5. The Applicant is responsible for locating all existing site services and utilities including any located underground and to employ best practices and meet applicable code requirements with respect to protection of existing site services and clearance between existing and proposed site services. The Applicant is responsible for repair or replacement of any damage to existing site services and utilities, to the satisfaction of VFPA, that result from construction and operation of the Project.
- 6. The Applicant shall undertake and deliver the Project to total completion in a professional, timely and diligent manner in accordance with the Application submitted by the Applicant and the applicable standards and specifications set out in the sections above entitled Project Description and Information Sources. The Applicant shall not carry out any other physical activities unless expressly authorized by VFPA.
- 7. The Applicant shall establish a spill prevention, containment and clean-up plan for hydrocarbon products (including fuel, oil and hydraulic fluid) and any other deleterious substances using standards, practices, methods and procedures to a good commercial standard, conforming to applicable law and using that degree of skill and care, diligence, prudence and foresight which would be reasonably and ordinarily expected from a qualified, skilled and experienced person engaged in a similar type of undertaking under the same or similar circumstances. The Applicant shall ensure that appropriate spill containment and clean-up supplies are available on site at all times and that all personnel working on the project are familiar with the spill prevention, containment and clean-up plan.
- 8. The Applicant shall have due regard to the potential application of the *Migratory Birds Convention Act* (Canada) and/or the *Wildlife Act* (British Columbia). To reduce the risk of Project-related harm to birds and/or their active nests and eggs, the Applicant may wish to avoid certain physical activities during the general bird breeding season, which falls between **April 1 and July 31**, or outside of this time span if occupied nests are present. The Applicant shall exercise all due diligence to avoid causing harm to birds and/or their active nests and eggs.

The Applicant shall also have due regard to nests of those species of birds protected by Applicable Law at all times of the year, regardless of the time of year or whether or not the nests are occupied. The Applicant should, where circumstances warrant, retain the services of qualified environmental professionals to assist in developing and undertaking appropriate bird nest surveys immediately before, during and after the general bird breeding season.

- The Applicant shall cooperate fully with VFPA in respect of any review by VFPA of the Applicant's compliance with these conditions including, without limitation, providing any information or documentation required by VFPA.
- 10. The Applicant shall make a copy of this Permit available to all employees, agents, contractors, licensees and invitees prior to commencing any physical activities. The Applicant shall be solely responsible for ensuring that all such employees, agents, contractors, licensees and invitees comply with these conditions.

PER No. 16-180 Page 9 of 15

| 11. | The Applicant shall make available upon request by any regulatory authority (such as a Fishery Officer) a copy of this Permit. | | |
|-----|--|---|--|
| 12. | Unless otherwise noted, the Applicant shall submit all documents required for VFPA approva to email: per@portvancouver.com ; fax: 1-866-284-4271 and referencing PER No.16-180. | | |
| | CONDITIONS – PRIOR TO COMMENCING CONSTRUCTION OR ANY PHYSICAL ACTIVITIES | SUBMISSION TIMING (business days) | |
| 13. | The Applicant shall notify the Fisheries and Oceans Canada (DFO), Conservation and Protection Field Supervisor for Fraser Valley West in Langley, British Columbia (tel: 604-607-4150; fax: 604-607-4199). The Applicant shall copy VFPA Environmental Programs and the Harbour Master on this notification EnvironmentalPrograms@portvancouver.com and Harbour Master@portvancouver.com ; or fax 1-866-284-4271. | 2 days before commencing construction or any physical activities | |
| 14. | The Applicant shall submit signed and sealed drawings for proposed works approved for construction by a professional engineer licensed to practice in the Province of British Columbia. | 5 days before commencing construction or any physical activities | |
| 15. | The Applicant shall distribute a construction notice to the City of Burnaby describing the works and activities, hours of construction, and contact information. The Applicant shall copy VFPA when the construction notice is distributed. | 10 days before commencing construction or any physical activities | |
| 16. | Prior to the commencement of any vessel-related activities, the Applicant shall contact the appropriate Canadian Coast Guard ("CCG") Marine Communications and Traffic Services ("MCTS") centre regarding the issuance of a Notice to Shipping ("NOTSHIP") to advise the marine community of potential hazards associated with the Project. | As per Coast Guard requirements | |
| | The Applicant must advise CCG that works are planned to occur near a CCG-owned radar tower. | | |
| 17. | The Applicant shall submit a Vegetation Compensation Plan to the satisfaction of VFPA. The Vegetation Compensation Plan must include a description of the | 10 days before commencing construction or any | |
| | The Vegetation Compensation Plan must include a description of the type and area of vegetation to be removed and describe how impacts will be compensated. | physical activities | |
| 18. | The Applicant shall submit a finalized Construction Environmental Management Plan (CEMP) to the satisfaction of VFPA. | 10 days before commencing construction or any physical activities | |
| | CONDITIONS – DURING CONSTRUCTION OR ANY PHYSICAL ACTIVITIES | | |
| 19. | The Applicant shall notify VFPA upon commencement of construction activities of the Project. | or any physical | |

PER No. 16-180 Page 10 of 15

20. The Project shall be monitored by an appropriately qualified Environmental Monitor. The Environmental Monitor shall be empowered in writing to direct works to ensure compliance with this Permit and the Construction Environmental Management Plan. Monitoring events shall occur when the Environmental Monitor deems it appropriate but in no case less than weekly, and shall be full time during works with potential to cause adverse effects on fish or fish habitat. The Environmental Monitor shall provide monitoring reports to VFPA on a weekly basis or 21. more frequently if circumstances warrant. The VFPA reserves the right to rule on the adequacy of the monitoring and the content of the reports. All general construction and physical activities related to the Project shall be conducted from Monday to Saturday between the hours of 7:00am and 8:00pm. No construction and physical activities shall occur during Sundays or holidays. These hours shall not be modified without prior approval from VFPA. 23. The Applicant shall ensure that an appropriately qualified archaeological monitor be on site at all times during ground disturbing activities that may intrude into native soils. 24. The Applicant shall make opportunities available for Aboriginal groups to provide archaeological monitors during project works. 25. The Applicant shall make opportunities available for Aboriginal groups to participate in environmental monitoring during project works. In the event that evidence of what is suspected to be an archaeological resource is 26. encountered, the Applicant shall: a) Immediately stop any activities that might disturb the archaeological resource or the site in which it is contained ("Site"). b) Not move or otherwise disturb the artifacts or other remains present at the c) Stake or flag off the Site to prevent additional disturbances. d) Immediately notify VFPA. 27. The Applicant shall not, directly or indirectly: (a) deposit or permit the deposit of a deleterious substance of any type in water frequented by fish in a manner contrary to Section 36(3) of the Fisheries Act; or (b) adversely affect fish or fish habitat in a manner contrary to Section 35(1) of the Fisheries Act. 28. The Applicant shall ensure that debris and waste material resulting from the Project are contained, collected, and disposed of at suitable upland locations using standards, practices, methods and procedures to a good commercial standard, conforming to applicable law and using that degree of skill and care, diligence, prudence and foresight which would be reasonably and ordinarily expected from a qualified, skilled and experienced person engaged in a similar type of undertaking under the same or similar circumstances. 29. The Applicant shall ensure that all equipment is in good mechanical condition and maintained free of fluid leaks, invasive species, and noxious weeds.

PER No. 16-180 Page 11 of 15

30. The Applicant shall not permit barges or other vessels used during the Project to ground on the foreshore or seabed or otherwise disturb the foreshore or seabed (including disturbance as a result of vessel propeller wash), excepting only such disturbance as is reasonably required to complete the Project. 31. Works in shoreline shall be limited to the project area as defined in the Construction Environmental Plan and PER No. 16-180-A to D. The Applicant shall be responsible for the repair of any damage, contamination, or erosion resulting from disturbance to the intertidal foreshore during the Project. Existing native riparian vegetation shall be retained where possible, and disturbance or 32. clearing of vegetation shall be staged and strictly limited to that required for Project implementation. 33. Works in the intertidal area shall be undertaken in the dry (i.e., above the water surface). 34. The Applicant shall use a clean excavator bucket. The bucket and any portion of the excavator arm that will be in contact with or near Burrard Inlet shall be clean prior to the start of works. 35. The direct or indirect release or deposit of sediment or sediment laden water into the aquatic environment shall be minimized during the works. In this regard, reference should be made to the water quality criteria described in the British Columbia Water Quality Guidelines (Criteria): May 2015 Edition produced by the BC Ministry of Environment. 36. Should contaminated materials be encountered, the Applicant shall ensure that all contaminated materials, including contaminated drill cuttings and equipment wash water, are removed, contained, and disposed of at appropriate off-site facilities using standards, practices, methods and procedures to a good commercial standard, conforming to Applicable Law and using that degree of skill and care, diligence, prudence and foresight which would be reasonably and ordinarily expected from a qualified, skilled and experienced person engaged in a similar type of undertaking under the same or similar circumstances. Suspect materials should be treated as contaminated or stockpiled until their environmental quality has been determined. Materials brought onto the property to be used for backfilling, site preparation, or other 37. uses shall be from sources demonstrated to be clean and free of environmental contamination.

PER No. 16-180 Page 12 of 15

38. During any vessel-related activities, the Applicant shall: a) Position vessels and equipment associated with the Project in such a manner so as not to obstruct line of sight to navigational aids or markers. b) As per the International Regulations for Preventing Collisions at Sea, exhibit the appropriate lights and day shapes at all times. c) Monitor the VHF channel used for MCTS communications in the respective area at all times and participate as necessary. d) Be familiar with vessel movements in areas affected by the Project. The Applicant shall plan and execute the Project in a manner that will not impede navigation or interfere with vessel operations. e) During night hours, unless working 24 hrs per day, the rig and associated equipment shall be moored outside the navigation channel and lit in accordance with all applicable regulations. SUBMISSION TIMING CONDITIONS – UPON COMPLETION (Business Days) 39. The Applicant shall notify VFPA upon completion of the Project. Within 10 days of completion 40. The Applicant shall provide record drawings, in both AutoCAD and Within 40 days of Adobe (PDF) format to VFPA. completion 41. The Applicant shall confirm the Project was constructed within the Within 40 days of tenured area by providing to VFPA: completion a) Digital photographs of the tenured area, both before and after construction of the Project, from the land and water

side of the tenured area.

c) A letter from an engineer confirming the Project was

The Applicant shall submit a comprehensive post-construction

remains at the site, and any new contamination characteristics that can be attributed to the site; A summary of all environmental monitoring and

Copies of all manifest for contaminated soils and groundwater removed from the Project location; and Plans and schedules for post-construction monitoring as detailed in "Section 8: Performance Verification Plan" of the Applicant's Foreshore Remedial Action Plan dated October

A description of any known or suspected contamination that

constructed within the tenured area.

report, to VFPA's satisfaction, which shall include:

environmental incidents for the Project;

b) A survey plan.

27, 2016.

42.

PER No. 16-180 Page 13 of 15

Within 40 days of

completion

43. The Applicant shall provide VFPA all future environmental monitoring data and reports that are related to the Project until such time that environmental monitoring at the Project site is completed. Monitoring data and reports shall include, at minimum, monitoring as detailed in "Section 8: Performance Verification Plan" of the Applicant's Foreshore Remedial Action Plan dated October 27, 2016.

Within 30 days of each monitoring period

The Applicant shall also make monitoring reports available to Aboriginal groups and the BC MOE.

VFPA reserves the right to rescind or revise these conditions at any time that new information warranting this action is made available to VFPA.

LENGTH OF PERMIT VALIDITY

The Project must be completed no later than May 31, 2022 (the Expiry Date).

AMENDMENTS

- Details of any material proposed changes to the Project, including days and hours when construction and any physical activities will be conducted, must be submitted to VFPA for consideration of an amendment to this Permit.
- For an extension to the Expiry Date, the Applicant must apply in writing to VFPA no later than 30 days prior to that date.

Failure to apply for an extension as required may, at the sole discretion of VFPA, result in termination of this Permit.

8 ENVIRONMENTAL REVIEW DECISION

In completing the environmental review, VFPA has reviewed and taken into account relevant information available on the proposed project, has considered the information and proposed mitigations provided by the Applicant and other information as listed elsewhere in this document, and concludes that with the implementation of proposed mitigation measures and conditions described in the project and environmental conditions section above, the Project is not likely to cause significant adverse environmental effects.

ANDREA MACLEOD
MANAGER, ENVIRONMENTAL PROGRAMS

May 24, 2017

DATE OF DECISION

9 CONCLUSION

In completing the project and environmental review, VFPA concludes that with the implementation of proposed mitigation measures and conditions described in the project and environmental conditions section above, the Project has appropriately addressed all identified concerns.

PER No. 16-180 Page 14 of 15

PROJECT AND ENVIRONMENTAL REVIEW DECISION

Project Permit PER No. 16-180 is approved by:

ANDREA MACLEOD
MANAGER, ENVIRONMENTAL PROGRAMS

May 24, 2017

DATE OF APPROVAL

CONTACT INFORMATION

Vancouver Fraser Port Authority (VFPA) 100 The Pointe, 999 Canada Place Vancouver BC V6C 3T4 Canada Project & Environmental Review

Tel.: 604-665-9047 Fax: 1-866-284-4271

Email: PER@portvancouver.com
Website: www.portvancouver.com

PER No. 16-180 Page 15 of 15

Chevron Refinery Foreshore Final Remedy

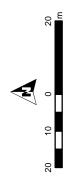
PER #16-180



Proposed Project Area



--- VFPA Boundary



City of North Vancouver

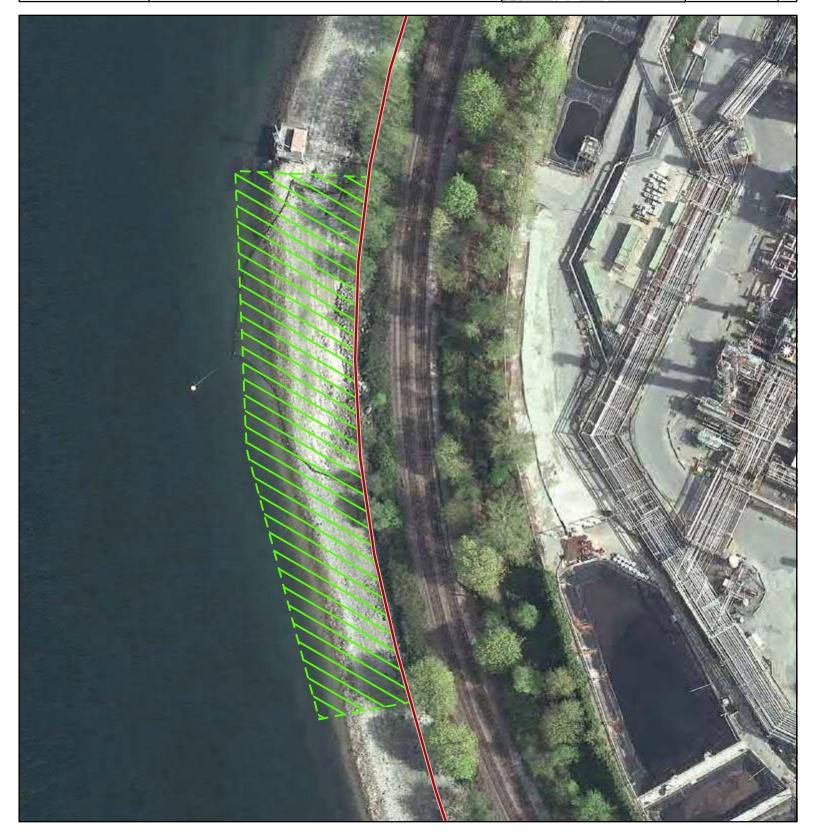
Map Location

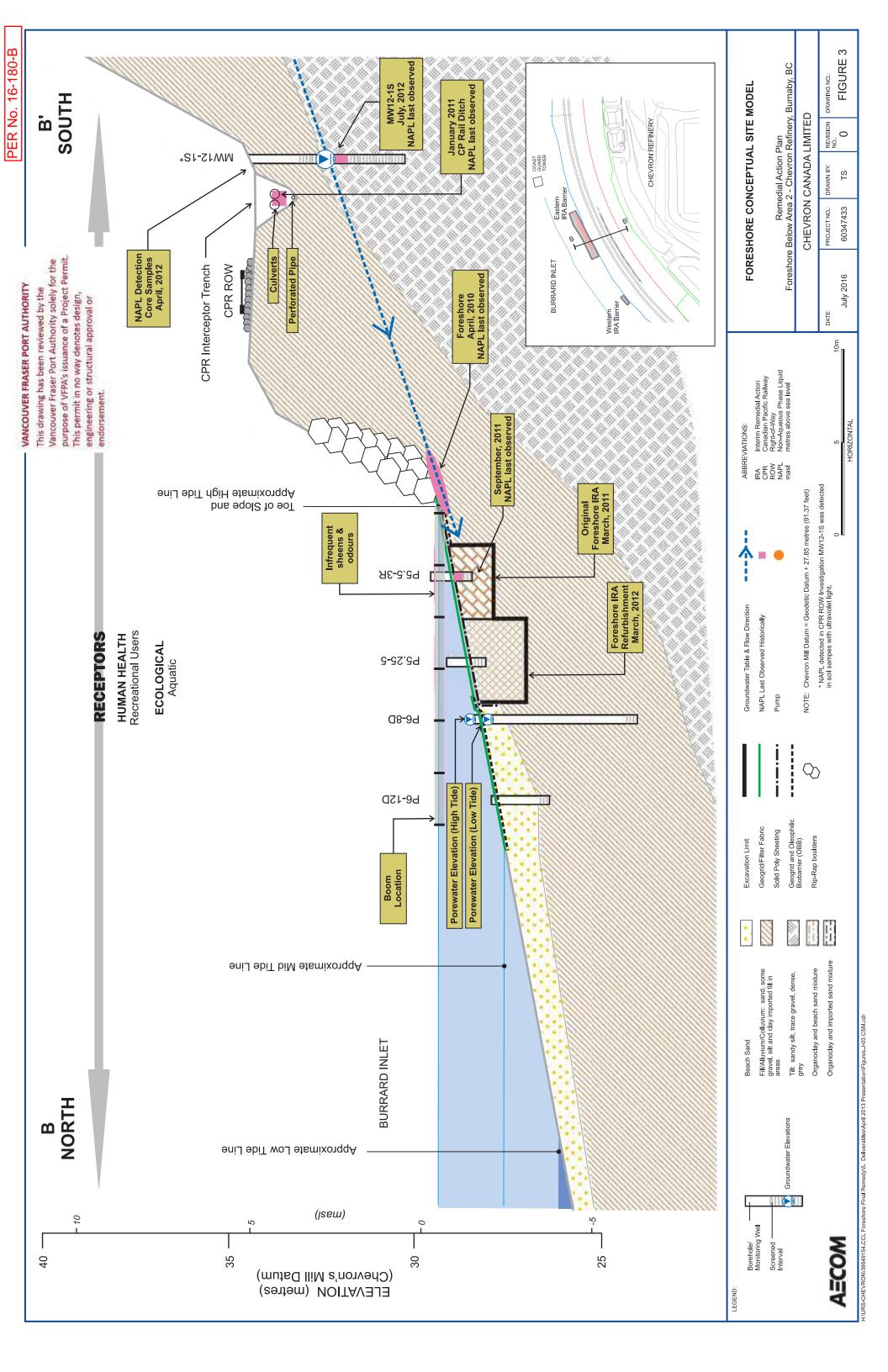
Burnaby

Vancouver

PORT of Vancouver

VFPA Spatial Data Group May 2017 PLAN # G2016-133





FORESHORE REMEDIAL
ACTION PLAN
BELOW AREA 2 EASTERN
IMPOUNDING BASIN
CHEVRON BURNABY REFINERY

EXISTING COAST GUARD TOWER

Chevron Canada Limited Burnaby Refinery

CLIENT

This drawing has been reviewed by the Vancouver Fraser Port Authority solely for the purpose of VFPA's issuance of a Project Permit. This permit in no way denotes design, engineering or structural approval or

endorsement.

UTM: E= 500940.23m
N= 5460273.11m
CHEVRON MILL DATUM
REFERENCE SYSTEM:
X= 138.08m
Y = 268.41m

THE

LIMIT OF CONSTRUCTION

EASTERN SEEP AREA

- CONSTRUCTION AREA 3111m²

TOTAL

VANCOUVER FRASER PORT AUTHORITY

355 North Willingdon Avenue Burnaby BC V5C 1X4

CONSULTANT

3292 Production Way Burnaby, BC 1.604.444.6400 tel 1. www.aecom.com

1.604294.8597 fax

This drawing has been prepared for the use of PECOM's client and may not be used, reproduced or relied upon by third parties, except as agreed by AECOM accepts no responsibility, and denies any liability whatsoever, to any parties to responsibility, and denies any liability whatsoever, to any parties from its denies and its client, and denies and its client, and denies any liability whatsoever, to any parties, except as agreed by AECOM's express written consent. Do not scale this document. All measurements must be obtained from stated dimensioned from stated dimensions.

AREA

ESA CONSTRUCTION A 922m²

ROCIPHIO

TAR

CONTINGENCY AREA 524m²

WSA CONSTRUCTION AREA 9.4m²

PROJECT NUMBER 60347433 TITLE

Locations and calculated areas are approximate

NOTE:

BOTTOM OF SLOPE TOP OF SLOPE

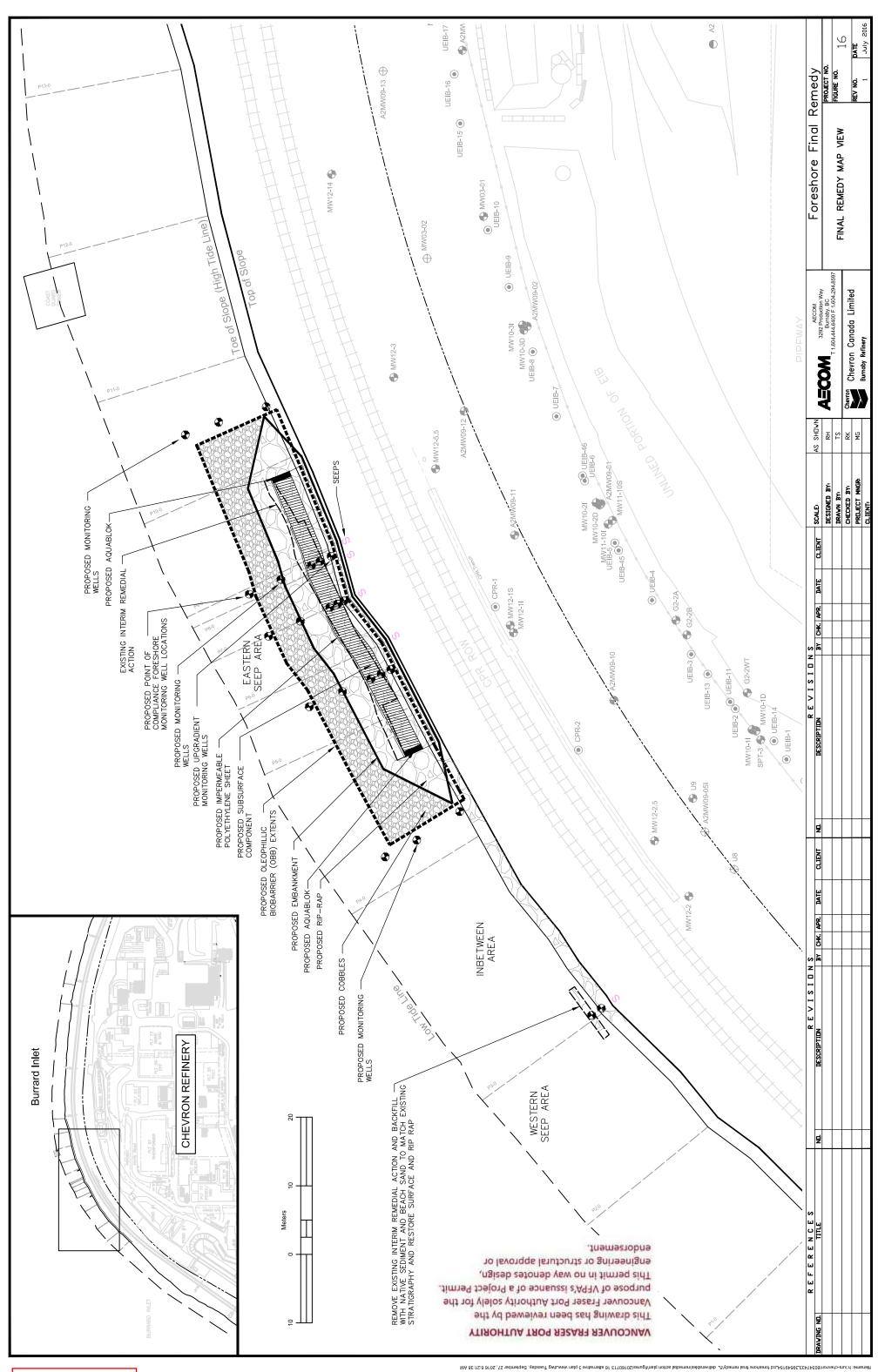
N N

LEGEI

FOR PORT OF VANCOUVER PERMIT REFERENCE

PLAN

Last saved by: TIM.SMYTH(2016-12-14) Last Plotted: 2016-12-14) Last Plotted: 2016-12-14 Remedy: WORKING FILES/2016 CONTRACT DESIGN/900-CAD, GIS/910-CAD/05-MODELS/C/PORT OF VANCOUVER PERMIT APPLICATION/60347433-CONSTRUCTION AREAS.DWG mm148 x mm462 1A OSI Designer:







September 28, 2017

Mr. Michael Gill Senior Environmental Engineer AECOM 3293 Production Way Burnaby, BC V5A 4R4

Dear Mr. Gill:

Re: VFPA Project Permit No. 16-180
Chevron Refinery Foreshore Final Remedy
Request for Extended Hours of Work

The Vancouver Fraser Port Authority (VFPA) has received AECOM's September 19, 2017 request to undertake Project Permit No. 16-180 shoreline remediation activities within VFPA jurisdiction during extended hours of work at night Monday to Saturday 12am to 7am in Burnaby, BC. This constitutes an exemption to Condition 22 of the Permit.

Extended hours of work are understood to be limited to the following dates: from September 28 to November 15, 2017. The shoreline remediation activities proposed during these hours include:

- Minor rip rap placement;
- Excavation and backfill to 0.4 m depth from 8 m to 12 m from the original toe of the slope;
- Placement of a geotextile;
- Placement of 200 mm cobbles on top of geotextile to grade; and
- Installation of monitoring wells using an excavator mounted auger.

Due to AECOM's need to work within the low tide window to mitigate the in-water dispersal of suspended contaminated sediments in conjunction with their Project Permit, VFPA will allow extended hours of work during the above noted windows provided the following conditions are met:

 AECOM shall ensure the scope of works undertaken during extended hours is limited to the activities outlined in their September 20 and 21, 2017 emails detailing the request. Mr. Gill PER No. 16-180 September 28, 2017 Page 2 of 2

- 2. AECOM must implement all proposed mitigation measures and activities outlined in their September 20 and 21, 2017 emails including a construction notification email to the City of Burnaby and the Tsleil Waututh First Nation prior to extended work hours. VFPA must approve the content of the email prior to distribution. It is understood that the proposed works were communicated to the Chevron Burnaby Community Advisory Panel during their September 20, 2017 meeting and that no concerns were raised.
- 3. All Project Permit No. 16-180 conditions shall be strictly adhered to during extended work windows.

VFPA reserves the right to cancel or revoke authorization for remediation work within the port authority's jurisdiction during extended periods should noise levels or disturbances to surrounding residents exceed reasonable levels.

Should you have any questions please contact Spencer Chaisson, Environmental Coordinator at 604-665-9389 or spencer.chaisson@portvancouver.com.

Yours truly,

VANCOUVER FRASER PORT AUTHORITY

Greg Yeomans

Director Planning & Development

cc Tegan Smith, Manager, Planning, VFPA
Andrea Macleod, Manager, Environmental Programs
Spencer Chaisson, Environmental Programs, VFPA
Barbara Yandel, Real Estate, VFPA
Jessica Davies, Aboriginal Affairs, VFPA
Cherryl Lam, Project Communications, VFPA

Gauthier, Ken

From: Chaisson, Spencer < Spencer. Chaisson@portvancouver.com >

Sent: Tuesday, November 07, 2017 3:43 PM

To: Southern, Leslie

Cc: Gauthier, Ken; Kannappan, Ram; Horwath, Robert; Gill, Michael (Vancouver);

christopher.boys@parkland.ca

Subject: RE: VFPA Permit 16-180 - future sampling events

Hi Leslie,

VFPA has decided that additional approval for ongoing monitoring, during night or day, is not required so long as there are no new intrusive works. This does not limit any of the conditions or requirements of VFPA Permit 16-180.

Several restrictions will apply:

- 1. Crossing other lease boundaries for access will continue to require prior approval specifically if you plan night time access across the Penzance rail tracks, which is not a public crossing. You have stated that access will be by boat but we must be alerted if that changes.
- 2. Share the well sampling/monitoring schedule with the Chevron/Parkland Community Advisory Panel so that they are aware of planned night time works.
- 3. For all night time works that require access by boat myself and Marine Operations (Harbour Master@portvancouver.com) must be notified 2 days in advance via email.

These requirements will be reiterated after VFPA receives the plans and schedules for post-construction monitoring as detailed in condition 42 of VFPA Permit 16-180.

Thank you,

Spencer Chaisson

Environmental Coordinator Environmental Programs P 604.665.9389

E spencer.chaisson@portvancouver.com



Vancouver Fraser Port Authority 100 The Pointe, 999 Canada Place Vancouver, B.C. Canada V6C 3T4 portvancouver.com

From: Chaisson, Spencer

Sent: Friday, November 03, 2017 12:10 PM

To: 'Southern, Leslie' < leslie.southern@aecom.com>

Cc: Gauthier, Ken <ken.gauthier@aecom.com>; Kannappan, Ram <ram.kannappan@aecom.com>; Horwath, Robert <robert.horwath@aecom.com>; Gill, Michael (Vancouver) <michael.gill@aecom.com>; christopher.boys@parkland.ca Subject: RE: VFPA Permit 16-180 - November sampling event

Hello Leslie.

Thank you for providing this information. By way of this email, provided the ongoing activities consist of monitoring and sampling the wells at the site (i.e., no new intrusive works), the period of validity for VFPA Permit 16-180 extended work hours as stated in the attached 2017-09-28 letter is hereby extended to November 16, 2017.

As project construction nears completion and you move on to monitoring, please be sure to fulfill conditions 39 to 43 of VFPA Permit 16-180.

Thank you,

Spencer Chaisson

Environmental Coordinator Environmental Programs P 604.665.9389 E spencer.chaisson@portvancouver.com



Vancouver Fraser Port Authority 100 The Pointe, 999 Canada Place Vancouver, B.C. Canada V6C 3T4 portvancouver.com

From: Southern, Leslie [mailto:leslie.southern@aecom.com]

Sent: Friday, November 03, 2017 11:43 AM

To: Chaisson, Spencer < Spencer. Chaisson@portvancouver.com>

Cc: Gauthier, Ken <ken.gauthier@aecom.com>; Kannappan, Ram <ram.kannappan@aecom.com>; Horwath, Robert <robert.horwath@aecom.com>; Gill, Michael (Vancouver) <michael.gill@aecom.com>; christopher.boys@parkland.ca

Subject: VFPA Permit 16-180 - November sampling event

Spencer,

As discussed, we plan on collecting porewater samples from the wells on the Foreshore in November 14-16, approximately 6:30pm to 11:00pm). The sampling must be completed at night, when the tide allows access. A subcontractor will provide access to the site via boat. They will bring a generator and light stands to illuminate the work area - which is comprised of the two barriers. A barge and heavy equipment will not be at the site.

The exemption to condition 22 of the permit provided on September 28, to allow for extended work hours expires on November 15, 2017. Can this be extended to November 16?

Thank you,

Leslie

Leslie Southern M.Sc., P.Ag. **Environmental Scientist** leslie.southern@aecom.com

AECOM 3292 Production Way, Suite 330 Burnaby, BC V5A 4R4 T 604-444-6608 F 604-294-8597 www.aecom.com

This communication is intended for the sole use of the person(s) to whom it is addressed and may contain information that is privileged, confidential or subject to copyright. Any unauthorized use, disclosure or copying of this communication is strictly prohibited. If you have received this communication in error, please contact the sender immediately. Any communication received in error should be deleted and all copies destroyed.



Please consider the environment before printing this page.

APPENDIX F QUALITY ASSURANCE AND QUALITY CONTROL PROGRAM

APPENDIX F - QUALITY ASSURANCE AND QUALITY CONTROL PROTOCOLS

1. DATA QA/QC

In order to assure the integrity and defensibility of the data collected, rigorous QA/QC protocols will be observed. These protocols ensure that all samples are properly collected, identified, stored, shipped, and documented. Standard operating procedures (SOPs) for sample collection and storage, equipment decontamination, and sample chain of custody protocols will be followed. Porewater and surface water samples will be collected using sampling techniques presented in Section 6. The use of these methods will ensure the quality, soundness, and defensibility of the data obtained. The laboratory analytical data, once generated, will be proofed for inconsistencies and anomalies. Field duplicates, trip blanks, and rinsate blanks will be collected for QA/QC purposes.

1.1. Field Duplicate Samples

Field duplicate samples are two identical samples that are submitted to the laboratory with no indication that they are the same. The analysis of field duplicate samples provides an indication of the total precision of the sampling and analysis process. Field duplicate samples will be collected and analyzed at a rate of approximately 10% of samples for a given analytical suite.

1.2. Trip Blanks

Trip blanks are samples of clean deionized, distilled (Reagent Grade Type II) water that are prepared in the laboratory, taken to the field, retained on site throughout sample collection, returned to the laboratory, and analyzed with the environmental samples. The QA/QC review identifies trip blanks with detections of target analytes and evaluates the effect of the detections on associated sample results for possible cross-contamination during transport. One trip blank will be included for analysis in every cooler submitted to the laboratory.

1.3. Rinsate Blanks

Rinsate blanks are samples of deionized and distilled analyte free (Reagent Grade Type II) water that are prepared in the field by pouring water over or through decontaminated field sampling equipment, prior to the collection of the environmental samples. The QA/QC review identifies rinsate blank detections of target analytes and evaluates the effect of the detections on associated sample results for possible cross-contamination during sample collection. Rinsate blank samples will be collected and analyzed at a rate of approximately 5% of samples for petroleum hydrocarbon parameters (BTEX, VPHw, and LEPHw).

QUALITY ASSURANCE/QUALITY CONTROL

2. Precision

Precision measures the reproducibility of repetitive measurements and is usually expressed in terms of imprecision. It is strictly defined as the degree of mutual agreement among multiple independent measurements as the result of repeated application of the same process under similar conditions.

Analytical precision is a measurement of the variability associated with the duplicate (*i.e.*, two) or replicate (*i.e.*, more than two) analyses of the same sample in the laboratory, and is determined by the analysis of matrix spike duplicate or laboratory duplicate samples.

Total precision is a measurement of the variability associated with the entire sampling and analysis process. It is determined by the analysis of duplicate or replicate field samples and incorporates any variability introduced by the analytical procedure, sample collection and handling procedures, and matrix factors. Precision data must be interpreted by taking into consideration these possible sources of variability.

Duplicate field samples will be collected, and duplicate spiked or unspiked samples will be analyzed to assess analytical precision. The results will be assessed using the relative percent difference (RPD) between duplicate measurements. The equation used to calculate RPD for duplicate samples is:

$$RPD = \frac{(A-B)}{((A+B)/2)} \times 100$$

where:

A = analytical result
B = duplicate result.

Note that for RPDs the result can be a positive or a negative value. RPDs are often presented as *absolute* RPDs, in which case the absolute value of the RPD is reported, always resulting in a positive number. Reporting the absolute RPD results in a reduction in information, since, for instance, if a duplicate sample consistently returns higher results than the original sample, all RPD values would be negative and it may be an indication of a precision problem. In this case, if absolute RPD was reported, no indication would be forthcoming.

Total precision will be determined by collecting field duplicate samples. These samples will be collected and analyzed at a rate of approximately 10% of total samples for each analytical suite.

Analytical precision will be determined in the laboratory by running matrix spike/matrix spike duplicate (MS/MSD) pairs, or by running laboratory duplicate analyses. These samples will be

analyzed at a rate of approximately 5% for each analytical suite.

3. Accuracy

Accuracy is a statistical measurement of correctness and includes components of random error (e.g., variability due to imprecision) and systematic error (e.g., bias). Therefore, accuracy reflects the total error associated with a measurement. A measurement is accurate when the value reported does not differ beyond acceptable limits from the true value or known concentration of the spike or standard. Acceptance criteria are indicated in the individual standardized analytical methods.

Analytical accuracy is typically measured by determining the percent recovery of known target analytes that are spiked into a field sample (*i.e.*, a surrogate or matrix spike), or reagent water (*i.e.*, laboratory control sample [LCS] or blank spike) before extraction at known concentrations. Percent recovery is calculated as:

$$\% REC = \frac{A}{B} \times 100$$

where:

A = obtained value B = true value.

Analytical accuracy will be determined in the laboratory by the running of MS samples or laboratory control samples. These samples will be analyzed at a minimum rate of 5% for each analytical suite.

4. Completeness

Completeness for the investigation will be defined as the percentage of valid analytical results. Results made uncertain due to missed hold times, improper calibration, blank contamination, or poor calibration verification results would be deemed invalid. Results that may be flagged due to matrix effects are not considered invalid. Completeness for projects should exceed 90%. Completeness is calculated by:

$$completeness = \frac{A}{B} \times 100$$

where:

A = number of valid analytical results
B = total number of analytical results.

Project number: 60542455

Appendix L – Project Data

| Table L-1 Project Data | | | |
|--|--|--|-----------------------------|
| | Project Team Members | | |
| The project team consisted | of Parkland, AECOM, Tervita, Inlailawatash, Tsleil-Waututh First Nation, N | 1ercury Launch & Tug Ltd., and PS Surveys | |
| Date | | Project Milestones | |
| July 10, 2017 July 13-15 and August 16-17, 2017 | | Construction Begins rn IRA Barrier Excavated | |
| July 14-August 8, 2017 | | rn IRA Barrier Excavated | |
| July 12 - October 21, 2017 | | stern FPTS Installed ² | |
| July 12-October 21, 2017 | | stern FPTS Installed ² | |
| October 30, 2017 October 9, 10, 11, 12, 13, 14, 20 and 21, 2017 | Cor | nstruction Completed Night shifts | |
| Total hours worked | | 5642 | |
| Number of First Aids and Recordable Injuries | | 0 | |
| | Equipment Used on Site During Construction ¹ Tug boat | | |
| | Barge and Ramp | | |
| | Barge crane | | |
| | Rescue Boat (12 Ft Aluminum Boat) Water Taxi | | |
| | Marooka Dump Truck | | |
| | Bobcat T650 - 3000 lb Skid Steer (with Bobcat 30C Auger attachment) | | |
| | Small Equipment and Hand Tools 20 Tonne Excavator | | |
| | Forklift | | |
| | Loader | | |
| | PID | | |
| | GPS survey unit Generator | | |
| | Light towers | | |
| | Submersible Sump Pump | | |
| | Heron Oil/Water Interface meter RKI Eagle | | |
| | YSI 556 Water Quality Meter | | |
| | Hach 2100Q Turbidity Meter | | |
| Sample | Sediment, Sand-organoclay and Backfill Samples Quantity | | |
| Sample Limit Samples from Eastern IRA Barrier | Quantity 36 | | |
| Sand-organoclay samples from within the Eastern IRA Barrier | 31 | | |
| Limit Samples from Western IRA Barrier | 17 | | |
| Sand-organoclay samples from within the Western IRA Barrier Samples of backfill material | 3 14 | | |
| Samples collected from up gradient of Eastern IRA Barrier | 5 | | |
| | Number of samples with exceedances above CSR Stage 11 Stan | dards | |
| Total Limit Samples Eastern IRA Barrier | 7 | | |
| Western IRA Barrier | 5 2 | | |
| | Parameters which exceeded CSR Stage 11 Standards in Excavation Lin | nit Samples | |
| Location | Parameter | Maximum Concentration (μg/g) | Minimum Concentration (μg/g |
| Eastern IRA Barrier | 2-Methylnapthalene Naphthalene | 0.717 0.377 | < 0.050 < 0.050 |
| | EPH (C10-C19) | 2,250 | < 200 |
| Western IRA Barrier | EPH (C10-C19) Silica Gel | 2,770 | 1,610 |
| | LEPH Dimensions (metres) | 2,250 | < 200 |
| Area | Length ³ | Width ³ | Depth ³ |
| Western Trench Excavation | 10 m | 3 m | 1.2 m |
| Eastern Trench Excavation Western FPTS | 44 m 20 m | Generally 2.8 m, and 4 m at its widest point 13 m | 1.2 m 1.2 m |
| Eastern FPTS | 60 m | 17.5 m | 1.2 m |
| | Materials Installed at the Site | | |
| Material | Quantity | | |
| Aquagate Aquagate and Powder Activated Carbon | 36.1 tonnes 36 tonnes | | |
| Aquablock | 4 tonnes | | |
| Lafarge washed sand | 627.7 tonnes | | |
| Cobbles Rip Rap | 320.2 tonnes 2,817.3 tonnes | | |
| кір кар Filter Fabric (Nilex Non-Woven 4510) | 2,817.3 tonnes 1254 m ² | | |
| HDPE Geomembrane (GSE HD) | 1672 m ² | | |
| Geogrid (Nilex Bx1100 Biaxial) | 1200 m ² | | |
| OBB (GSE Tendrain 7.6mm Geocomposite) | 720 m ² | | |
| OBB (Skap Transnet HDPE Geocomposite with TN 330 Geonet) Black Polyethylene (4 mm) | 242 m ² 3 rolls | | |
| Black Polyethylene (4 mm) Well Materials | 3 rolls Quantity unconfirmed | | |
| Concrete | Quantity unconfirmed | | |
| | Materials Removed from Site | | |
| Type Soil | Classification Classified as above CSR Commercial Land Use Standard | Volume 103 tonnes | |
| Soil | Classified as above CSR Residential Land Use Standard | 367 tonnes | |
| Demolition Refuse | Not classified | 16 tonnes | |
| Groundwater | Groundwater with trace BTEX Environmental Monitoring During Construction | 170,000 litres | |
| | 2.101 Vinnental Monitoring Puring Constitution | | |
| mber of surface water samples collected associated with Environmental Monitoring | 320 | | |
| umber of exceedances above WQG in surface water samples collected | 320 | | |
| during Environmental Monitoring | 128 | | |
| Number of Environmental Incidents | 0 | | |
| Total control of the first transfer of the | Monitoring Wells Installed at the Site | | |
| Total number of monitoring wells installed at the Site Compliance wells | 33 9 | | |
| Sentry wells | 8 | | |
| Performance wells | 8 | | |
| Up Gradient wells | 8 | | |
| High Tido | Tide | | |
| High Tide Low Tide | 29.2 m (Refinery Datum) ⁴ 25.4 m (Refinery Datum) ⁴ | | |
| Area of Western FPTS exposed at high tide | 215 m ² | | |
| Area of Eastern EDTS avaced at high tide | 702 m ² | | |

¹ The list of equipment is not exhaustive

Area of Eastern FPTS exposed at high tide

CSR = Contaminated Sites Regulation EPH = extractable petroleum hydrocarbons

FPTS = Foreshore Passive Treatment System IRA = Interim Remedial Action

HDPE = high density polyethylene LEPH = light extractable petroleum hydrocarbons

m = metres mm = millimetre OBB = oleophilic bio barrier

RDL = Reportable Detection Limit $\mu g/g$ = micrograms per gram WQG = Water Quality Guidelines

² Timeline references the first day rip rap was removed off ground surface to completion of down slope cobble matting

³ Unless otherwise specified, trench dimensions were approximated based on the maximum transect across or within the barrier

⁴ Refinery datum is 27.9 metres above sea level BTEX = benzene, toluene, ethylbenzene, xylenes